Online LROI annual report 2018

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Introduction

This online annual report 2018 of the Dutch Arthroplasty Register (LROI) contains information on orthopaedic prosthesis procedures in the Netherlands in 2017. This concerns primary hip, knee, ankle, shoulder, elbow, wrist and finger arthroplasties and revision procedures, performed by orthopaedic surgeons, trauma surgeons and plastic surgeons.

You will find data on:

- Prosthesis characteristics
- Surgical techniques
- Survival of prostheses
- Patient characteristics of patients who underwent an arthroplasty procedure
- Patients' experiences in the form of PROMs (Patient Reported Outcome Measures)
- Information on the data quality, like completeness and validity of the register

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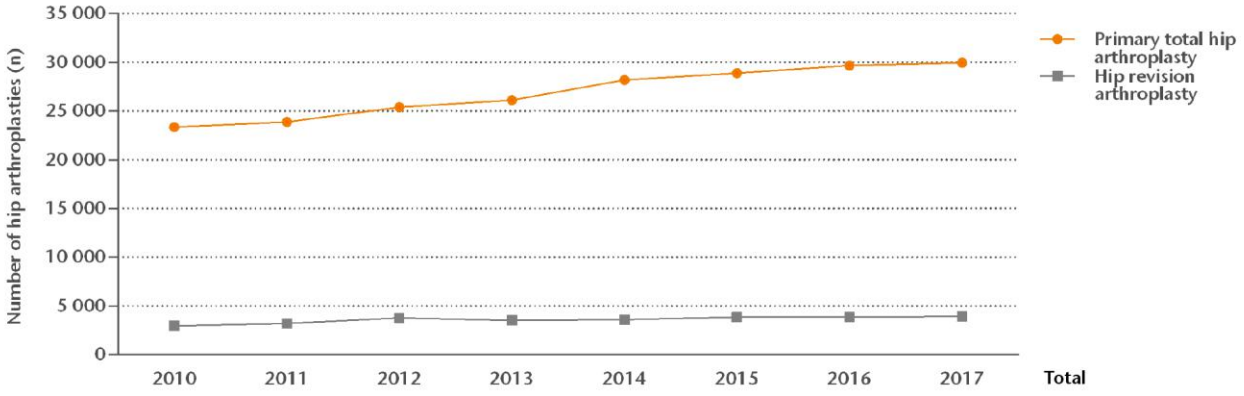
Hip arthroplasty

Numbers

Procedures 2010-2017

FIGURE NUMBER OF PRIMARY TOTAL HIP ARTHROPLASTIES AND HIP REVISION ARTHROPLASTIES REGISTERED IN THE LROI IN THE NETHERLANDS IN 2010-2017.

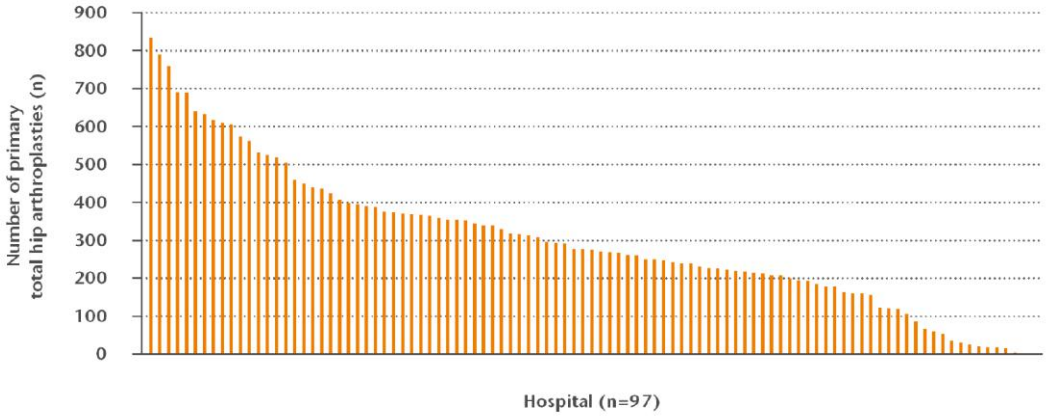


Year	2010	2011	2012	2013	2014	2015	2016	2017	Total
Type of procedure									
Primary total hip arthroplasty (n)	23,338	23,875	25,384	26,124	28,181	28,879	29,662	29,937	215,380
Hip revision arthroplasty (n)	2,952	3,197	3,767	3,517	3,583	3,833	3,879	3,911	28,639
Total (n)	26,290	27,072	29,151	29,641	31,764	32,712	33,541	33,848	244,019

Out of 29,937 primary total hip arthroplasties that were performed in 2017, 3.0% (n=906) was performed bilaterally.

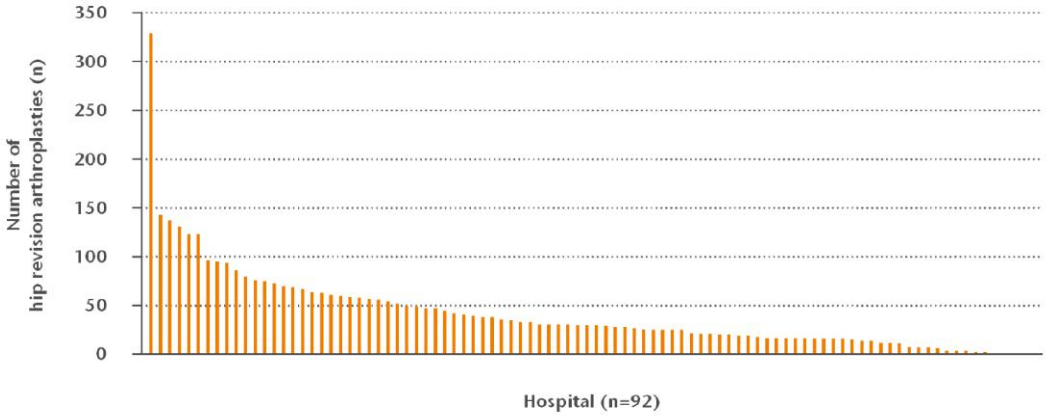
THA per hospital

FIGURE NUMBER OF PRIMARY TOTAL HIP ARTHROPLASTIES PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=29,937).



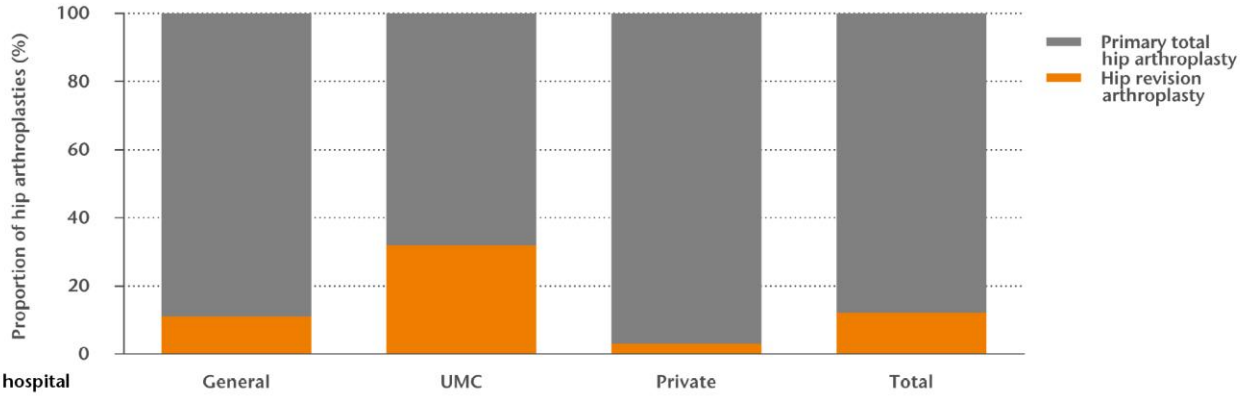
Revisions per hospital

FIGURE NUMBER OF HIP REVISION ARTHROPLASTIES PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=3,911).



Type of procedure by type of hospital

FIGURE PRIMARY TOTAL HIP ARTHROPLASTIES AND HIP REVISION ARTHROPLASTIES (PROPORTION [%] PER CATEGORY) BY TYPE OF HOSPITAL IN THE NETHERLANDS IN 2017.



Type of hospital	General	UMC	Private	Total
Type of procedure				
Primary total hip arthroplasty (%)	89.0	63.3	97.8	88.5
Hip revision arthroplasty (%)	11.0	36.7	2.2	11.5
Total (n)	30,582	1,383	1,883	33,848

General: general hospital; UMC: university medical centre; Private: private hospital.

Total hip arthroplasty

Demographics

Patient characteristics by diagnosis

TABLE PATIENT CHARACTERISTICS OF ALL PATIENTS WITH A REGISTERED PRIMARY TOTAL HIP ARTHROPLASTY BY DIAGNOSIS IN THE NETHERLANDS IN 2017.

N	Osteoarthritis 25,095 (86.4%)	Fracture 1,435 (4.9%)	Osteonecrosis 750 (2.6%)	Late post-traumatic 734 (2.5%)	Dysplasia 498 (1.7%)	Reumatoid arthritis 179 (0.6%)	Post-Perthes' disease 82 (0.3%)	Tumour 71 (0.2%)	Total 29,031
Completeness (%)									99
Mean age (years) (SD)	69.8 (9.9)	70.2 (9.2)	63.2 (16.0)	67.7 (12.9)	54.5 (13.9)	65.7 (14.0)	50.5 (14.7)	62.9 (12.6)	69.2 (10.7)
Age (years) (%)									
<50	3	1	19	9	38	12	49	12	4
50-59	11	10	17	15	24	13	25	24	12
60-69	31	35	26	28	23	29	15	37	31
70-79	39	40	23	30	12	34	10	17	38
≥80	16	14	15	18	3	12	1	10	15
Gender (%)									
Men	34	33	44	40	33	21	57	46	35
Women	66	67	56	60	67	79	43	54	65
ASA score (%)									
I	16	14	13	14	36	3	35	4	16
II	66	57	54	57	58	66	54	45	64
III-IV	18	29	33	29	6	31	11	51	19
Type of hospital (%)									
General	91	96	89	90	82	91	73	76	91
UMC	2	4	19	8	9	6	17	24	3
Private	7	0	2	2	9	3	10	0	6
Charnley-score (%)									
A One hip joint affected	43	74	63	80	48	31	74	83	45
B1 Both hip joints affected	32	9	18	10	34	30	19	7	31
B2 Contralateral hip joint with a total hip prosthesis	22	11	13	7	15	19	6	7	21
C Multiple joints affected or chronic disease that affects quality of life	3	6	6	3	3	20	1	3	3
Body Mass Index (kg/m²) (%)									
Underweight (≤18,5)	1	4	2	4	1	2	1	1	1
Normal weight (>18,5-25)	32	52	41	44	36	35	33	34	34
Overweight (>25-30)	42	33	36	37	40	38	45	43	41
Obesity (>30-40)	24	10	21	14	22	23	20	20	23
Morbid obesity (>40)	1	1	0	1	1	2	1	2	1
Smoking (%)									
No	90	86	75	82	86	91	75	82	89
Yes	10	14	25	18	14	9	25	18	11

Please note: In 2017, 173 (0.6%) patients received a primary total hip arthroplasty after a diagnosis that is not listed in the table. The diagnosis of 14 (0.1%) patients was not registered.
Please note: In 2017, 77 general hospitals, 9 UMCs and 11 private hospitals performed primary total hip arthroplasties.
General: general hospital; UMC: university medical centre; Private: private hospital; SD: standard deviation.

Patient characteristics of patients who underwent a primary THA in 2017 strongly depend on the primary diagnosis.

Previous surgery

TABLE PREVIOUS SURGERIES TO THE SAME JOINT IN PATIENTS WHO UNDERWENT A PRIMARY TOTAL HIP ARTHROPLASTY IN THE NETHERLANDS IN 2017 (N=28,959).

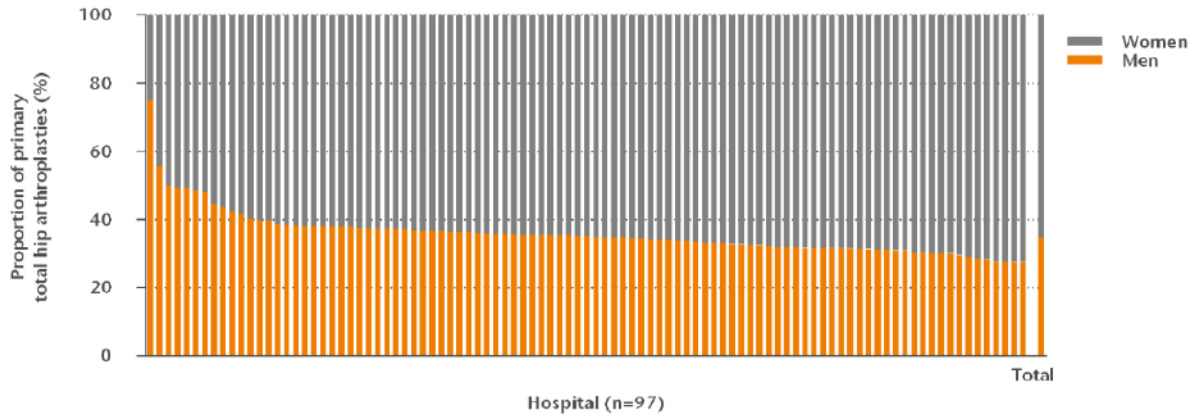
	Proportion[1] (%)
Previous surgery to the relevant hip (total)	4.9
Osteosynthesis	3.6
Osteotomy	0.9
Girdlestone situation	0.1
Arthrodesis	0.1
Other	1.1

[1] A patient may have undergone multiple previous surgeries to the same joint. As such, the total proportion is more than the total proportion of patients with one or more previous surgeries to the same joint.

Practice variation

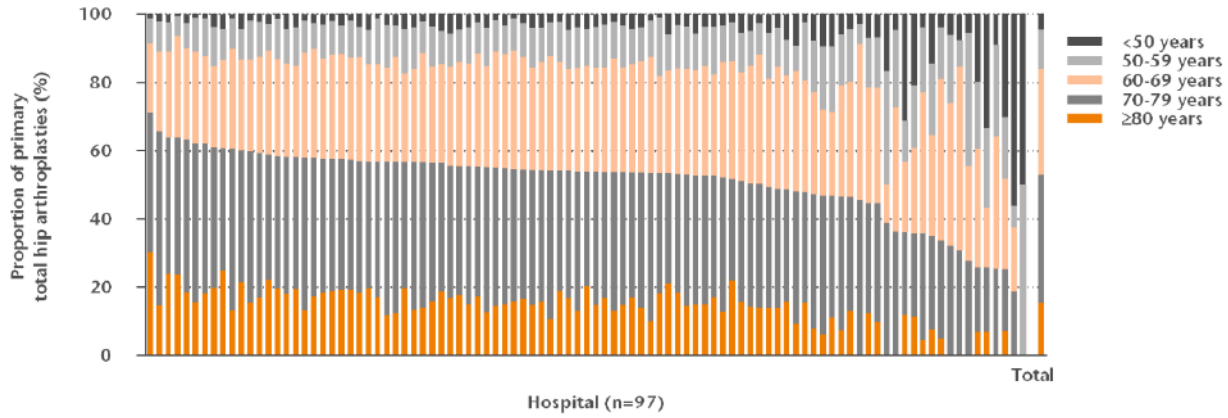
Gender

FIGURE DISTRIBUTION OF GENDER OF PATIENTS WHO UNDERWENT A PRIMARY TOTAL HIP ARTHROPLASTY PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=29,030).



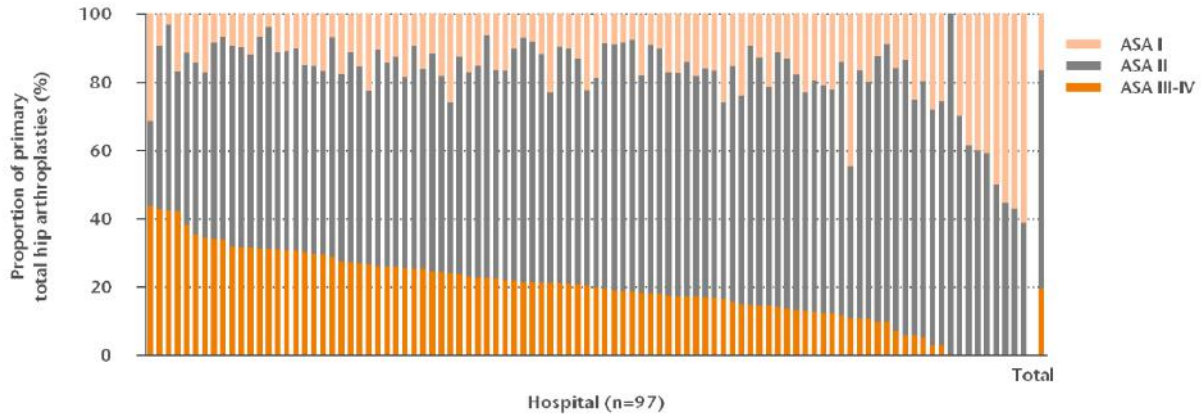
Age

FIGURE DISTRIBUTION OF AGE OF PATIENTS WHO UNDERWENT A PRIMARY TOTAL HIP ARTHROPLASTY PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=29,024).



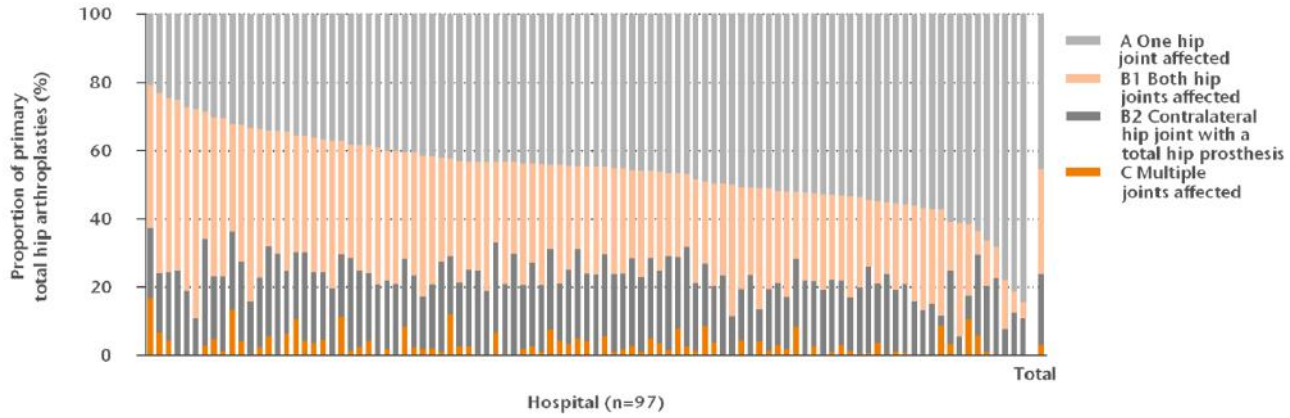
ASA score

FIGURE DISTRIBUTION OF ASA SCORE OF PATIENTS WHO UNDERWENT A PRIMARY TOTAL HIP ARTHROPLASTY PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=29,026).



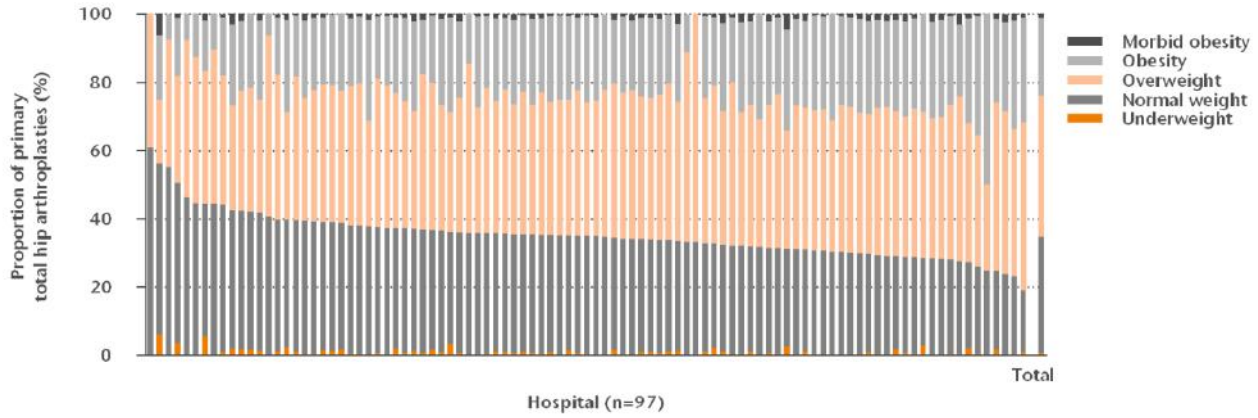
Charnley score

FIGURE DISTRIBUTION OF CHARNLEY SCORE OF PATIENTS WHO UNDERWENT A PRIMARY TOTAL HIP ARTHROPLASTY PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=27,807).



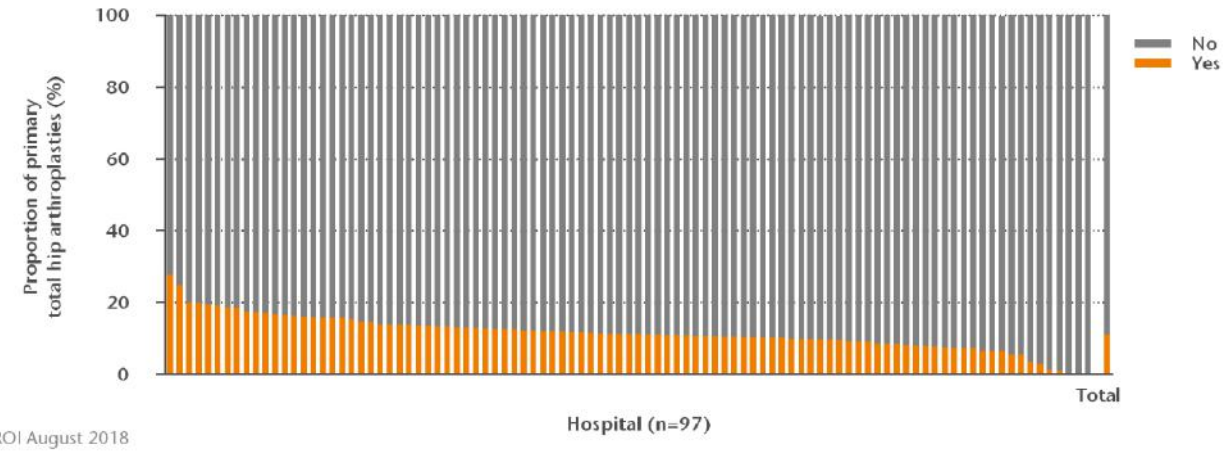
Body Mass Index

FIGURE DISTRIBUTION OF BODY MASS INDEX (KG/M²) OF PATIENTS WHO UNDERWENT A PRIMARY TOTAL HIP ARTHROPLASTY PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=28,863).



Smoking

FIGURE DISTRIBUTION OF SMOKING BY PATIENTS WHO UNDERWENT A PRIMARY TOTAL HIP ARTHROPLASTY PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=28,524).

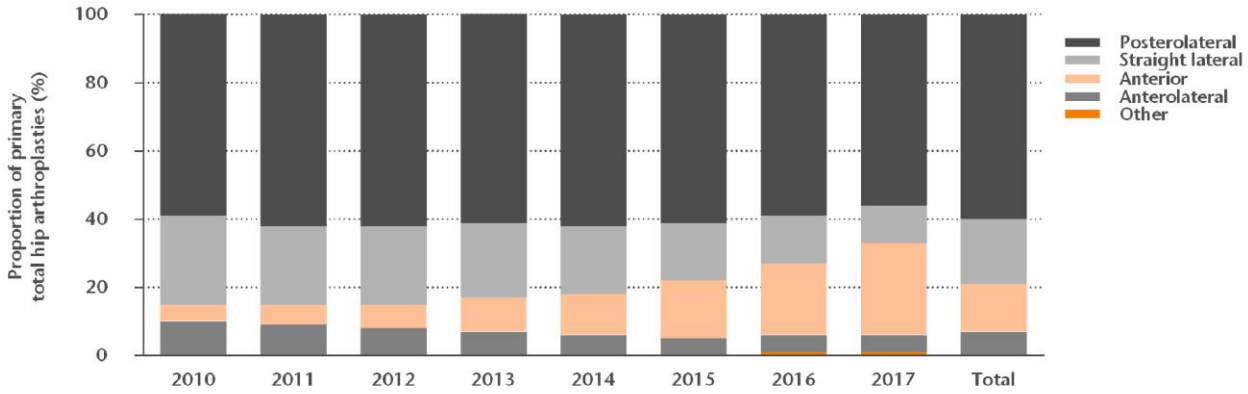


Surgery

Surgical techniques

Surgical approach 2010-2017

FIGURE TREND (PROPORTION [%] PER YEAR) IN SURGICAL APPROACH FOR PERFORMING A PRIMARY TOTAL HIP ARTHROPLASTY IN THE NETHERLANDS IN 2010-2017.



Year	2010	2011	2012	2013	2014	2015	2016	2017	Total
Surgical approach									
Posterolateral (%)	59.6	62.3	62.1	61.6	62.0	60.7	59.2	56.0	60.3
Straight lateral (%)	25.7	23.3	23.1	21.8	20.2	17.0	13.6	10.7	19.0
Anterior (%)	4.7	5.6	6.8	9.9	12.3	16.8	20.9	27.3	13.7
Anterolateral (%)	9.6	8.6	7.9	6.6	5.4	5.1	5.5	5.0	6.6
Other (%)	0.4	0.2	0.1	0.1	0.1	0.4	0.8	1.0	0.4
Total (n)	23,144	23,677	25,177	25,955	28,017	28,797	29,646	29,914	214,327

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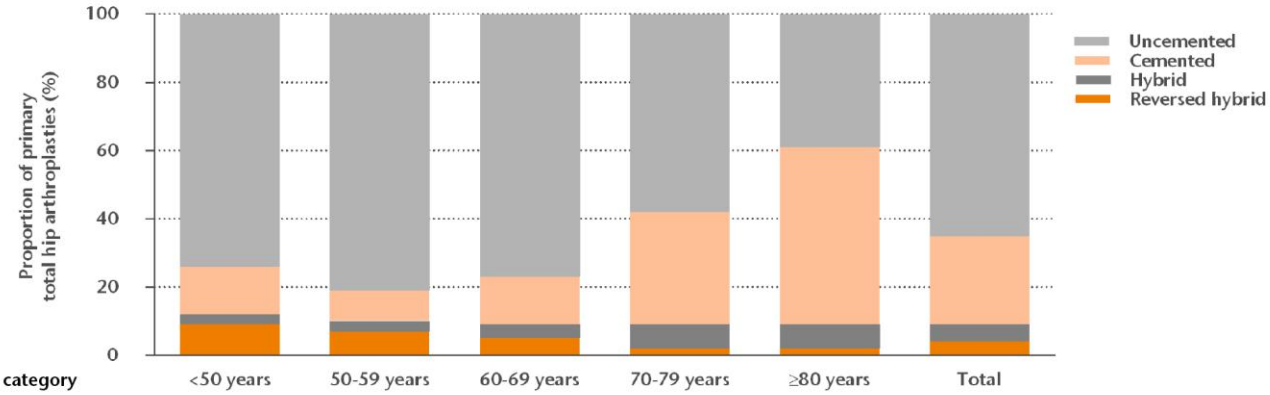
Fixation by age category

FIGURE TYPE OF FIXATION (PROPORTION [%] PER CATEGORY) IN PRIMARY TOTAL HIP ARTHROPLASTIES BY AGE CATEGORY IN THE NETHERLANDS IN 2017.

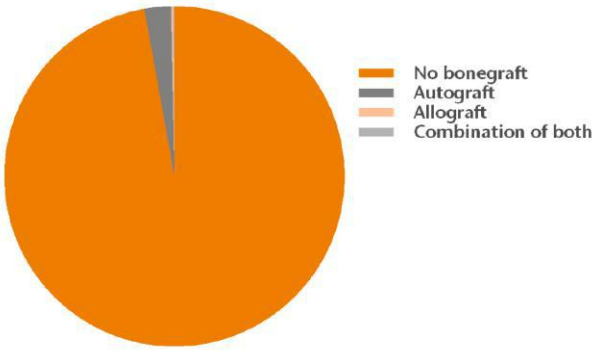


Age category	<50 years	50-59 years	60-69 years	70-79 years	≥80 years	Total
Fixation						
Uncemented (%)	73.5	80.9	77.4	58.4	38.7	64.6
Cemented (%)	13.8	8.7	13.8	32.8	51.8	26.1
Hybrid (%)	3.2	3.1	4.3	6.4	7.1	5.3
Reversed hybrid (%)	9.5	7.3	4.5	2.4	2.4	4.0
Total (n)	1,317	3,495	9,156	11,107	4,512	29,587

Prosthesis characteristics

Type of bonegraft

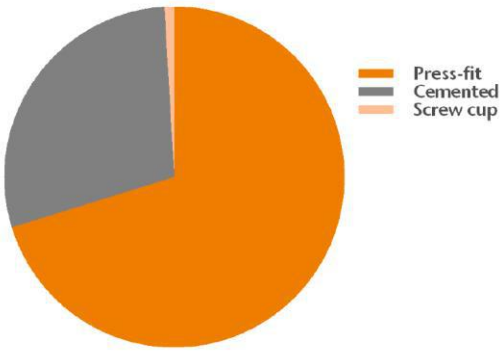
FIGURE TYPE OF BONEGRAFT IN PRIMARY TOTAL HIP ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=29,818).



Type of bonegraft	Number (n)	Proportion (%)
No bonegraft	28,974	97.2
Autograft	756	2.5
Allograft	47	0.2
Combination of both	41	0.1

Type of acetabular component

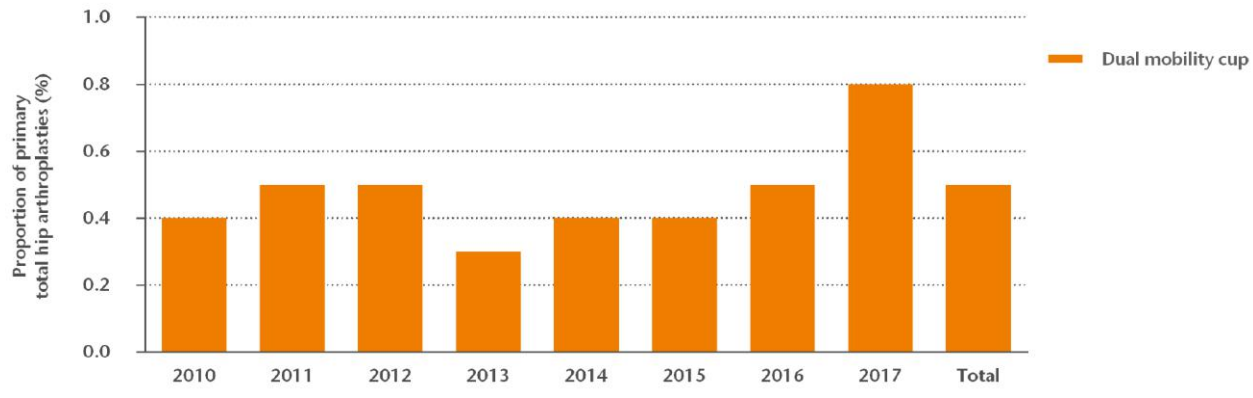
FIGURE TYPE OF ACETABULAR COMPONENT IN PRIMARY TOTAL HIP ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=29,276).



Type of acetabular component	Number (n)	Proportion (%)
Press-fit	20,556	70.2
Cemented	8,446	28.9
Screw cup	274	0.9

Dual mobility cups 2010-2017

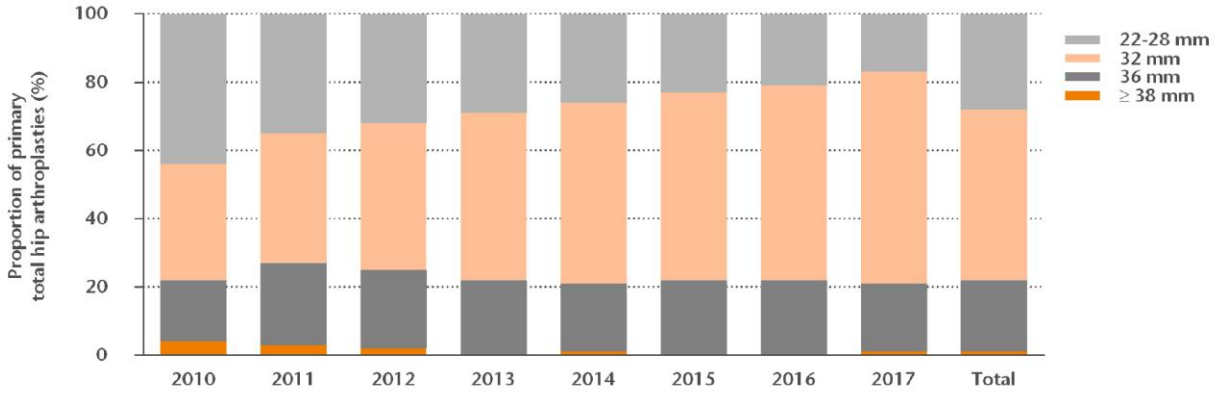
FIGURE TREND (PROPORTION [%] PER YEAR) IN DUAL MOBILITY CUPS IN PRIMARY TOTAL HIP ARTHROPLASTIES IN THE NETHERLANDS IN 2010-2017.



Year	2010	2011	2012	2013	2014	2015	2016	2017	Total
Type of cup									
Conventional cup (%)	99.6	99.5	99.5	99.7	99.6	99.6	99.5	99.2	99.5
Dual mobility cup (%)	0.4	0.5	0.5	0.3	0.4	0.4	0.5	0.8	0.5
Total (n)	23,018	23,619	25,137	25,909	27,960	28,687	29,287	29,414	213,031

Femoral head diameter 2010-2017

FIGURE TREND (PROPORTION [%] PER YEAR) IN FEMORAL HEAD COMPONENT DIAMETER IN PRIMARY TOTAL HIP ARTHROPLASTIES IN THE NETHERLANDS IN 2010-2017.

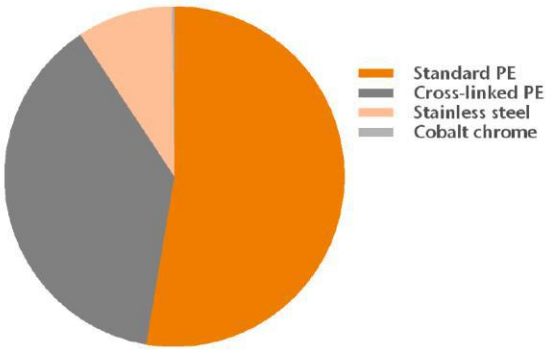


Year	2010	2011	2012	2013	2014	2015	2016	2017	Total
Femoral head size									
22-28 mm (%)	43.6	35.4	32.3	29.4	26.0	22.6	21.0	16.8	27.6
32 mm (%)	33.8	37.9	43.0	48.5	53.0	55.4	56.5	62.1	49.7
36 mm (%)	18.3	24.0	23.2	21.6	20.4	21.5	22.0	20.4	21.4
≥ 38 mm (%)	4.3	2.7	1.5	0.5	0.6	0.5	0.5	0.7	1.3
Total (n)	21,467	22,297	23,933	24,465	26,598	27,548	27,960	28,954	203,222

Materials

Cemented acetabular component

FIGURE CEMENTED ACETABULUM MATERIAL IN PRIMARY TOTAL HIP ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=8,446).

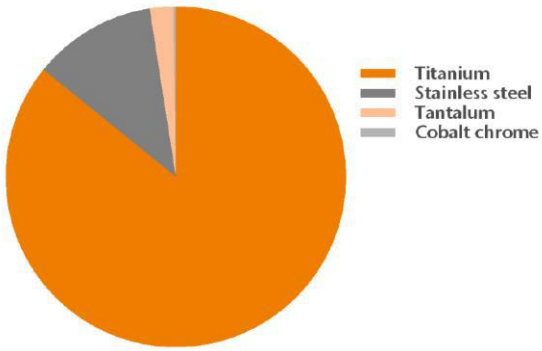


Cemented acetabulum material	Number (n)	Proportion (%)
Standard PE	4,448	52.7
Cross-linked PE	3,210	38.0
Stainless steel	768	9.1
Cobalt chrome	20	0.2

PE: polyethylene.

Uncemented acetabular component

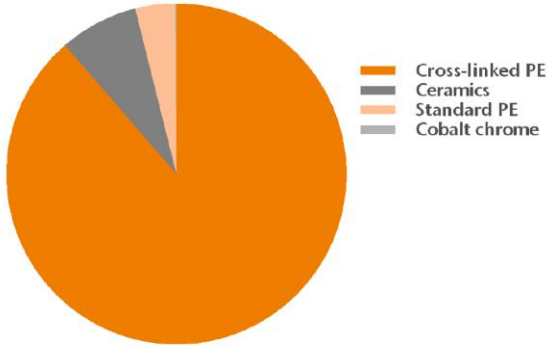
FIGURE UNCEMENTED ACETABULUM MATERIAL IN PRIMARY TOTAL HIP ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=20,830).



Uncemented acetabulum material	Number (n)	Proportion (%)
Titanium	17,876	85.8
Stainless steel	2,440	11.7
Tantalum	462	2.2
Cobalt chrome	52	0.3

Inlay

FIGURE INLAY MATERIAL IN PRIMARY TOTAL HIP ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=20,063).

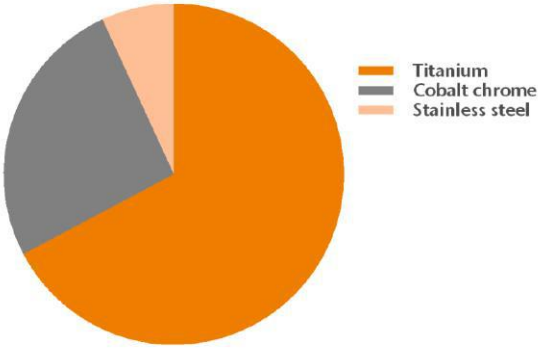


Inlay material	Number (n)	Proportion (%)
Cross-linked PE	17,781	88.6
Ceramics	1,498	7.5
Standard PE	760	3.8
Cobalt chrome	24	0.1

PE: polyethylene.

Femur component

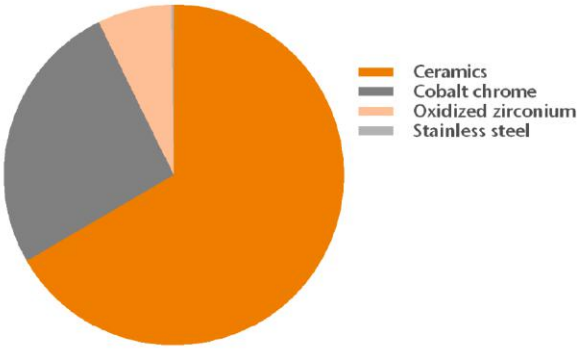
FIGURE FEMUR COMPONENT MATERIAL IN PRIMARY TOTAL HIP ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=29,322).



Femur material	Number (n)	Proportion (%)
Titanium	19,719	67.2
Cobalt chrome	7,584	25.9
Stainless steel	2,019	6.9

Femoral head component

FIGURE FEMORAL HEAD MATERIAL IN PRIMARY TOTAL HIP ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=28,954).

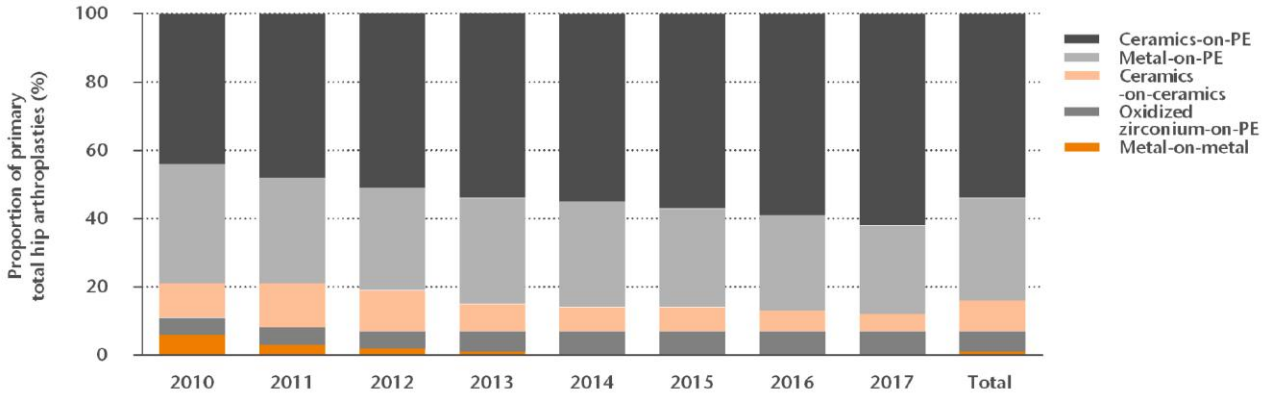


Femoral head material	Number (n)	Proportion (%)
Ceramics	19,284	66.6
Cobalt chrome	7,561	26.1
Oxidized zirconium	2,038	7.1
Stainless steel	68	0.2

Please note: A cross-linked PE head component was implanted in 2 (0.01%) primary total hip arthroplasties. A titanium head component was implanted in 1 (<0.01%) primary total hip arthroplasty.
PE: polyethylene.

Articulation 2010-2017

FIGURE TREND (PROPORTION [%] PER YEAR) IN ARTICULATION IN PRIMARY TOTAL HIP ARTHROPLASTIES IN THE NETHERLANDS IN 2010-2017.

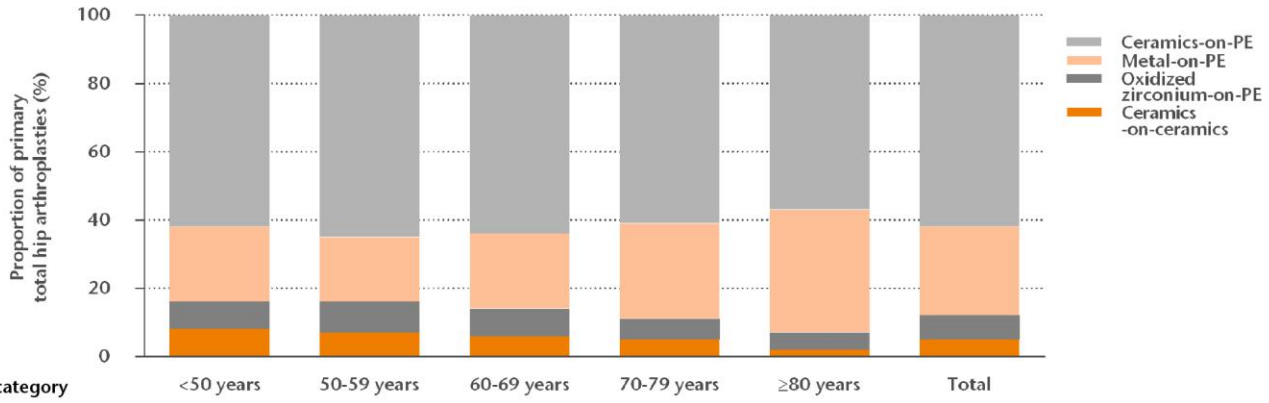


Year	2010	2011	2012	2013	2014	2015	2016	2017	Total
Articulation									
Ceramics-on-PE (%)	43.4	48.2	51.7	54.5	55.5	57.1	59.0	61.7	54.5
Metal-on-PE (%)	35.4	31.0	29.7	30.6	30.9	29.5	27.6	25.9	29.8
Ceramics-on-ceramics (%)	10.3	13.1	11.9	8.1	7.0	6.8	6.4	5.3	8.4
Oxidized Zirconium-on-PE (%)	4.8	4.8	4.9	6.1	6.5	6.4	7.0	7.0	6.0
Metal-on-Metal (%)	6.1	2.7	1.8	0.7	0.1	0.2	0.0	0.1	1.3
Other (%)	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	20,691	21,714	23,287	23,909	25,681	26,660	27,369	28,178	197,489

Please note: The proportion of other articulation was too small to show in the figure.
PE: polyethylene.

Articulation by age category

FIGURE ARTICULATION (PROPORTION [%] PER YEAR) IN PRIMARY TOTAL HIP ARTHROPLASTIES BY AGE CATEGORY IN THE NETHERLANDS IN 2017.



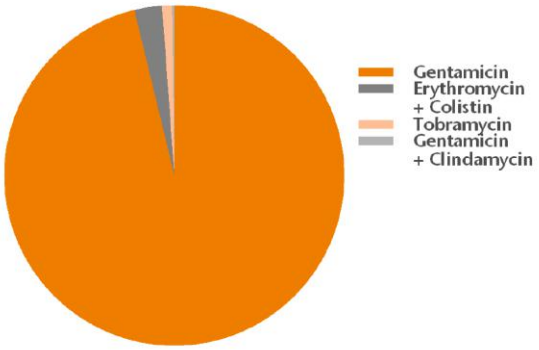
Age category	<50 years	50-59 years	60-69 years	70-79 years	≥80 years	Total
Articulation						
Ceramics-on-PE (%)	61.6	64.6	63.6	61.0	57.3	61.7
Metal-on-PE (%)	22.4	19.3	21.9	27.9	35.6	25.9
Oxidized Zirconium-on-PE (%)	8.1	9.1	8.1	6.3	4.9	7.0
Ceramics-on-ceramics (%)	7.5	6.8	6.4	4.8	2.1	5.3
Metal-on-Metal (%)	0.4	0.2	0.0	0.0	0.1	0.1
Total (n)	1,253	3,343	8,777	10,604	4,195	28,174

Please note: In 2 (<0.01%) primary total hip arthroplasties, another type of articulation was registered. The proportion metal-on-metal primary total hip arthroplasties was too small to show in this figure.
PE: polyethylene.

Bone cement

Antibiotics

FIGURE ANTIBIOTICS IN BONE CEMENT IN PRIMARY TOTAL HIP ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=9,933).

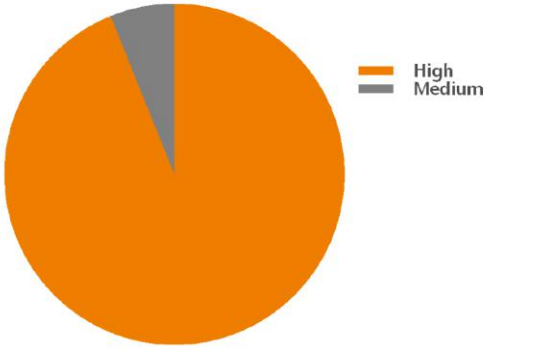


Bone cement antibiotics	Number (n)	Proportion (%)
Gentamicin	9,554	96.2
Erythromycin + Colistin	260	2.6
Tobramycin	94	1.0
Gentamicin + Clindamycin	21	0.2

Please note: Bone cement with gentamicin and vancomycin was used in 2 (0.02%) primary total hip arthroplasties. Bone cement without antibiotics was used in 2 (0.02%) primary total hip arthroplasties.

Viscosity

FIGURE VISCOSITY IN BONE CEMENT IN PRIMARY TOTAL HIP ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=9,933).

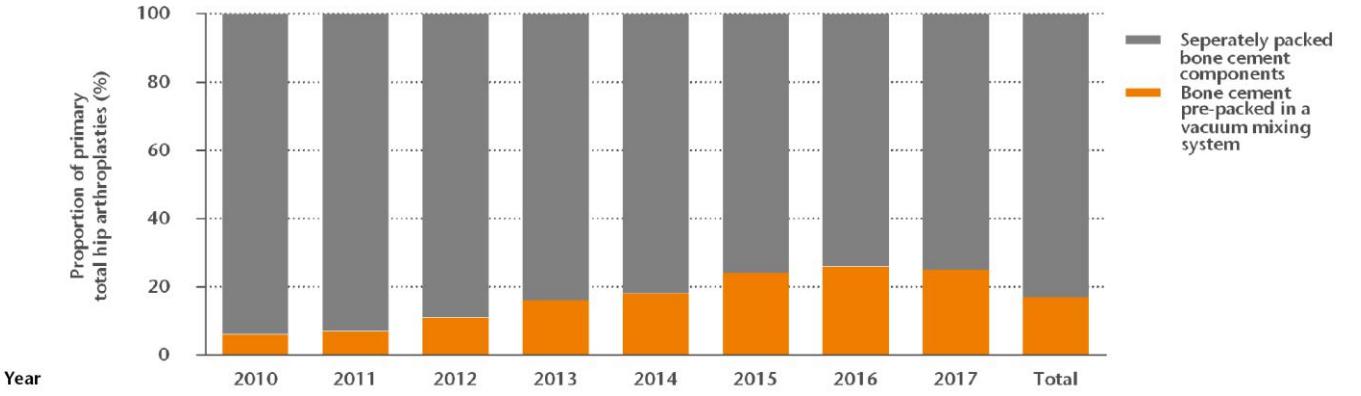


Bone cement viscosity	Number (n)	Proportion (%)
High	9,324	93.9
Medium	608	6.1

Please note: Bone cement viscosity was low in 1 (0.01%) primary total hip arthroplasties.

Vacuum mixing system 2010-2017

FIGURE TREND (PROPORTION [%] PER YEAR) IN USE OF BONE CEMENT PRE-PACKED IN A VACUUM MIXING SYSTEM IN PRIMARY TOTAL HIP ARTHROPLASTIES IN THE NETHERLANDS IN 2010-2017.



Vacuum mixing system	2010	2011	2012	2013	2014	2015	2016	2017	Total
Separately packed bone cement components (%)	94.5	92.6	88.6	83.5	82.1	75.7	74.1	75.5	82.8
Bone cement pre-packed in a vacuum mixing system (%)	5.5	7.4	11.4	16.5	17.9	24.3	25.9	24.5	17.2
Total (n)	7,925	8,447	9,081	9,327	9,999	9,571	9,807	9,933	74,090

Most frequently registered components

TABLE THE TEN MOST FREQUENTLY REGISTERED ACETABULUM (BOTH CEMENTED AND UNCEMENTED) AND FEMUR (BOTH CEMENTED AND UNCEMENTED) COMPONENTS IN PRIMARY TOTAL HIP ARTHROPLASTIES IN THE NETHERLANDS IN 2017.

Acetabulum

Cemented (n=8,525)		Uncemented (n=20,489)	
Name	**Proportion (%)**	**Name**	**Proportion (%)**
Müller low profile	23.8	Allofit	28.2
IP Cup	16.2	Pinnacle	22.5
FAL Cup	9.9	Exceed ABT	9.0
Avantage Cemented	7.6	R3	6.8
Exeter Rimfit X3	7.1	Trident	5.9
Stanmore	6.0	Mallory Head	5.7
Reflection All Poly XLPE	5.5	Trident Tritanium	3.3
CCB cup Low Profile	4.1	Reflection	3.2
Exeter Contemporary Hooded	3.4	RM Pressfit Vitamys cup	3.1
Muller	2.8	RM Pressfit cup	2.7

Femur

Cemented (n=9,066)		Uncemented (n=19,926)	
Name	**Proportion (%)**	**Name**	**Proportion (%)**
Lubinus SPII	33.2	Taperloc Complete	28.0
Original ME Muller	20.8	Corail	22.1
Exeter	15.6	Accolade	9.6
Stanmore	10.3	CLS Spotorno	7.0
Spectron EF	8.6	Alloclassic Zweymuller SL	6.9
CCA stem	2.8	Twinsys stem Cementless	4.7
C-Stem AMT	2.5	Polarstem	4.5
Taperloc Complete Cemented	1.4	SL Plus	2.4
Twinsys stem Cemented	1.3	M/L Taper	2.4
Taperloc Complete	0.8	Mallory Head Stems	2.4

Most frequently registered types of bone cement

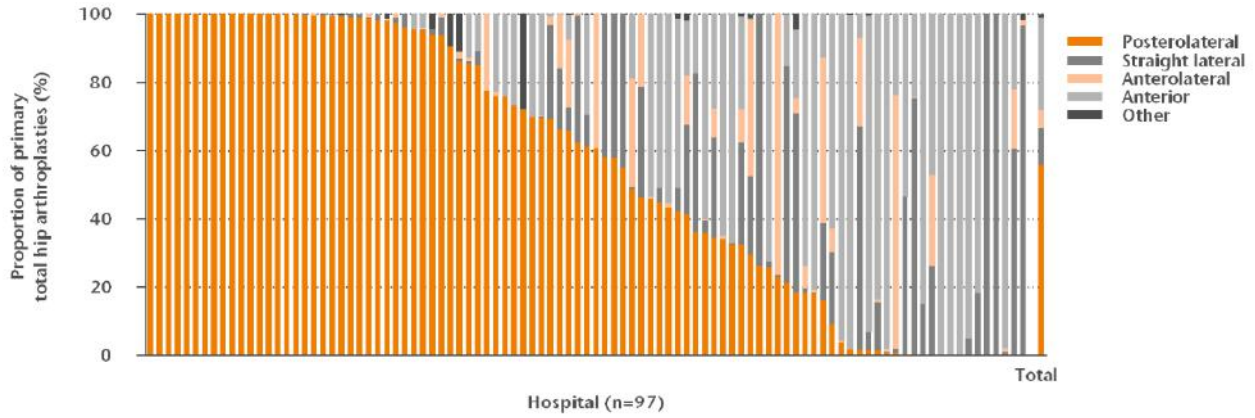
TABLE THE MOST FREQUENTLY REGISTERED TYPES OF BONE CEMENT BY TYPE OF MIXING SYSTEM USED DURING PRIMARY TOTAL HIP ARTHROPLASTIES IN THE NETHERLANDS IN 2017.

Separately packed bone cement components (n=7,496)		Bone cement pre-packed in a vacuum mixing system (n=2,430)	
Name	**Proportion (%)**	**Name**	**Proportion (%)**
Palacos R+G	76.6	Refobacin Bone Cement R	45.8
Refobacin Bone Cement R	10.3	Palacos R+G	45.5
Simplex ABC EC	3.5	Refobacin Plus Bone Cement	8.5
Palacos MV+G	3.4	Refobacin Revision	0.2
Simplex HV	2.0		

Practice variation

Surgical approach

FIGURE DISTRIBUTION OF SURGICAL APPROACH USED DURING PRIMARY TOTAL HIP ARTHROPLASTIES PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=29,914).



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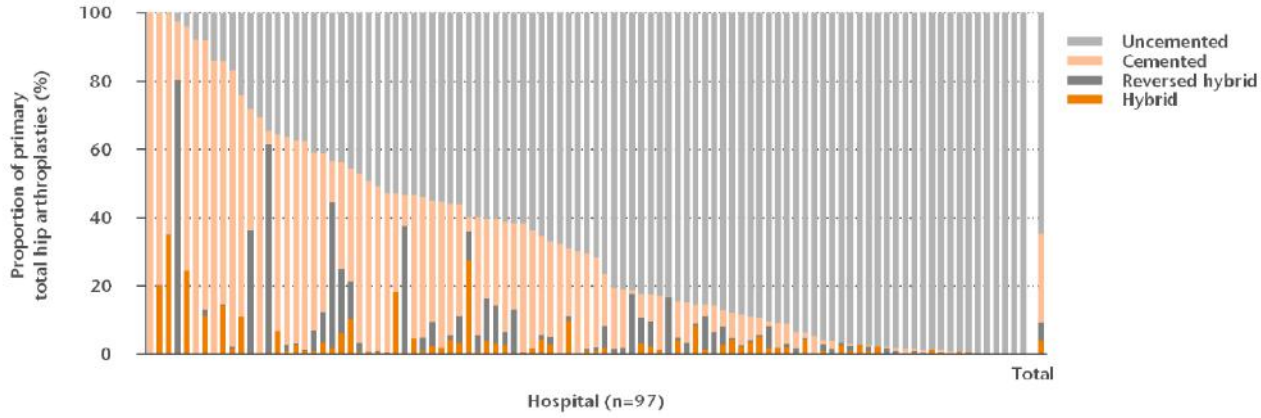
Fixation

FIGURE DISTRIBUTION OF TYPE OF FIXATION USED DURING PRIMARY TOTAL HIP ARTHROPLASTIES PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=29,594).



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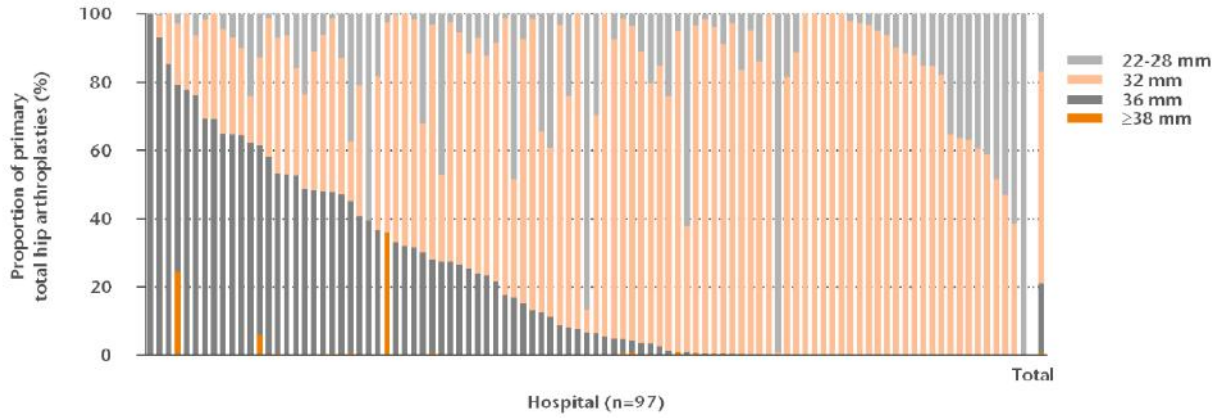
Femoral head diameter

FIGURE DISTRIBUTION OF DIAMETER FEMORAL HEAD USED DURING PRIMARY TOTAL HIP ARTHROPLASTIES PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=28,954).



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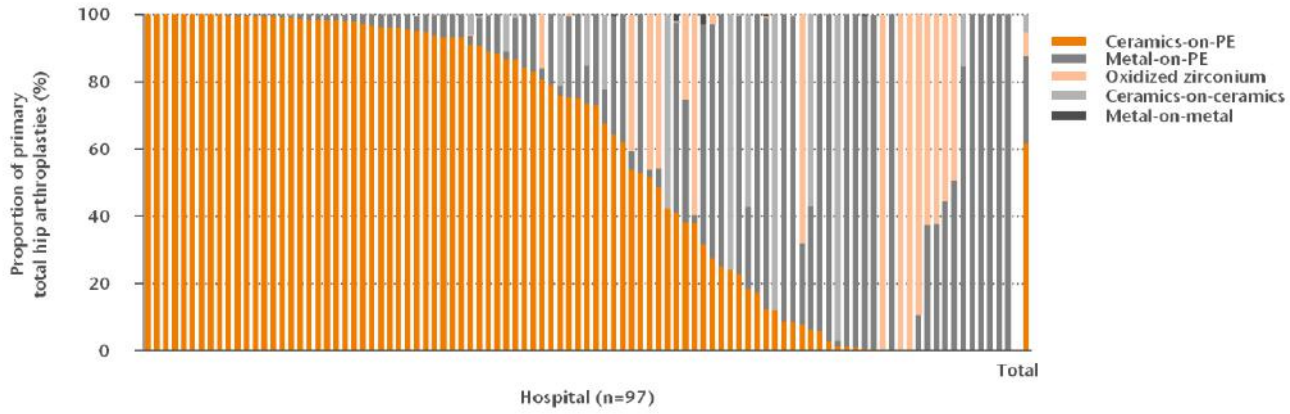
Articulation

FIGURE DISTRIBUTION OF ARTICULATION USED DURING PRIMARY TOTAL HIP ARTHROPLASTIES PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=28,178).



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Hip hemiarthroplasty

Demographics

TABLE PATIENT CHARACTERISTICS OF ALL PATIENTS WITH A REGISTERED PRIMARY HIP HEMIARTHROPLASTY BY SPECIALISM IN THE NETHERLANDS IN 2017.

N	Orthopaedic surgeon 4,079 (71.6%)	Trauma surgeon 1,616 (28.4%)	Total 5,695
Completeness (%)	96	64	84
Mean age (years) (SD)	82.0 (8.8)	82.5 (8.8)	82.1 (8.8)
Age (years) (%)			
<50	1	0	1
50-59	1	1	1
60-69	5	5	5
70-79	25	24	25
≥80	68	70	68
Gender (%)			
Men	33	34	33
Women	67	66	67
ASA score (%)			
I	2	2	2
II	33	31	32
III-IV	65	67	66
Type of hospital (%)			
General	97	95	97
UMC	3	5	3
Diagnosis (%)			
Fracture (acute)	92	99	94
Osteoarthritis	5	1	4
Late post-traumatic	1	0	1
Tumour	1	0	1
Osteonecrosis	1	0	0
Dysplasia	0	0	0
Rheumatoid arthritis	0	0	0
Post-Perthes' disease	0	0	0
Inflammatory arthritis	0	0	0
Charnley-score (%)			
A One hip joint affected	69	72	70
B1 Both hip joints affected	12	14	12
B2 Contralateral hip joint with a total hip prosthesis	12	10	12
C Multiple joints affected or chronic disease that affects quality of life	7	4	6
Body Mass Index (kg/m²) (%)			
Underweight (≤18,5)	5	6	5
Normal weight (>18,5-25)	55	54	55
Overweight (>25-30)	31	31	31
Obesity (>30-40)	9	9	9
Morbid obesity (>40)	0	0	0
Smoking (%)			
No	92	91	92
Yes	8	9	8

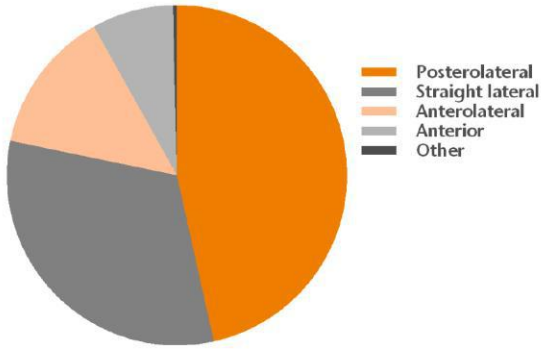
Please note: In 2017, 74 general hospitals and 8 UMCs performed primary hip hemiarthroplasties.
General: general hospital; UMC: university medical centre; SD: standard deviation.

Surgery

Surgical techniques

Surgical approach

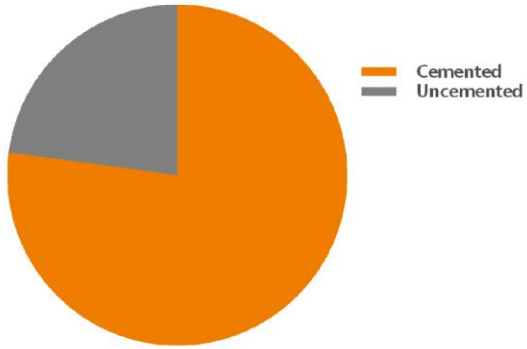
FIGURE SURGICAL APPROACH FOR PERFORMING A PRIMARY HIP HEMIARTHROPLASTY IN THE NETHERLANDS IN 2017 (N=5,891).



Surgical approach	Number (n)	Proportion (%)
Posterolateral	2,740	46.5
Straight lateral	1,870	31.7
Anterolateral	804	13.7
Anterior	455	7.7
Other	22	0.4

Fixation

FIGURE TYPE OF FIXATION IN PRIMARY HIP HEMIARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=5,708).

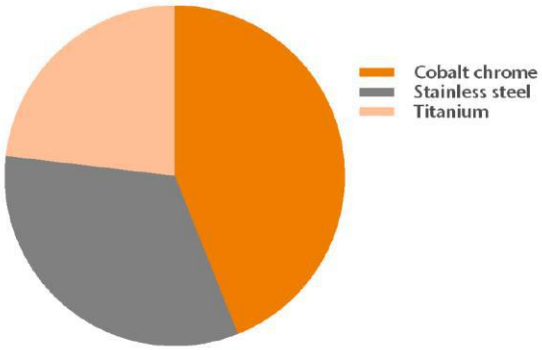


Fixation	Number (n)	Proportion (%)
Cemented	4,403	77.1
Uncemented	1,305	22.9

Materials

Femur component

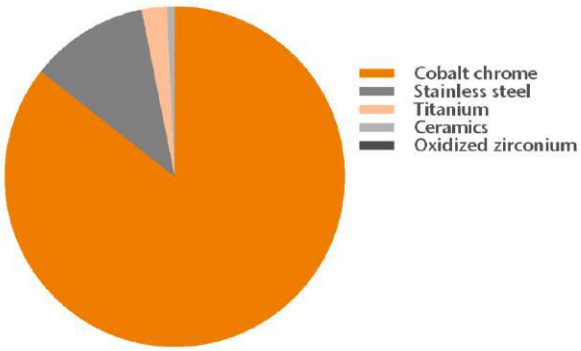
FIGURE FEMUR MATERIAL IN PRIMARY HIP HEMIARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=5,632).



Femur material	Number (n)	Proportion (%)
Cobalt chrome	2,475	44.0
Stainless steel	1,854	32.9
Titanium	1,303	23.1

Femoral head component

FIGURE FEMORAL HEAD MATERIAL IN PRIMARY HIP HEMIARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=5,617).



Femoral head material	Number (n)	Proportion (%)
Cobalt chrome	4,808	85.6
Stainless steel	633	11.3
Titanium	134	2.4
Ceramics	40	0.7
Oxidized Zirconium	2	0.0

Most frequently registered components

TABLE THE TEN MOST FREQUENTLY REGISTERED FEMORAL AND FEMORAL HEAD COMPONENTS IN PRIMARY HIP HEMIARTHROPLASTIES IN THE NETHERLANDS IN 2017.

Femur component (n=5,634)		Femoral head component (n=5,617)	
Name	**Proportion (%)**	**Name**	**Proportion (%)**
Original ME Muller	22.3	Unipolar Head	26.9
Lubinus SPII	16.1	Link CoCr head	16.5
CCA stem	9.4	UHR Unitrax	11.5
Spectron EF	7.8	Stainless Steel head	9.9
Exeter	6.1	Uni-polar	9.0
Stanmore	4.0	Hemi Heads	8.6
Accolade	4.0	Modular Cathcard Unipolar head	7.4
Alloclassic Zweymuller SL	3.9	Smith & Nephew CoCr kopje	2.7
Taperloc Complete	3.6	COCR Modular Heads	2.6
DB10	2.6	Bipolar Hip	1.4

Most frequently registered types of bone cement

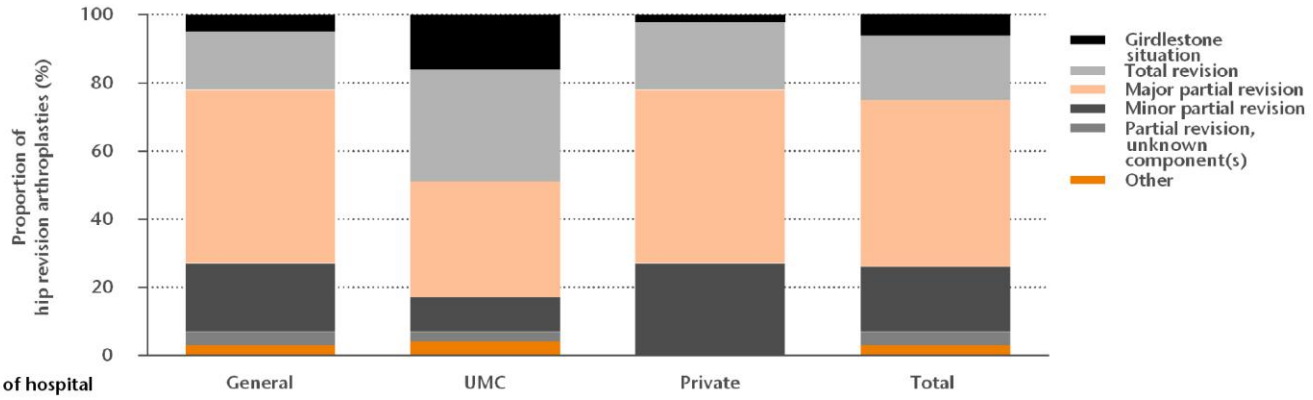
TABLE THE MOST FREQUENTLY REGISTERED TYPES OF BONE CEMENT BY TYPE OF MIXING SYSTEM USED DURING PRIMARY HIP HEMIARTHROPLASTIES IN THE NETHERLANDS IN 2017.

Separately packed bone cement components (n=2,625)		Bone cement pre-packed in a vacuum mixing system (n=1,206)	
Name	**Proportion (%)**	**Name**	**Proportion (%)**
Palacos R+G	69.2	Palacos R+G	59.1
Refobacin Bone Cement R	14.9	Refobacin Bone Cement R	26.2
Simplex HV	4.0	Refobacin Plus Bone Cement	14.7
Refobacin Plus Bone Cement	2.6		
Simplex ABC EC	2.6		

Hip revision arthroplasty

Type of revision

FIGURE TYPE OF REVISION (PROPORTION [%] PER CATEGORY) IN HIP REVISION ARTHROPLASTIES BY TYPE OF HOSPITAL IN THE NETHERLANDS IN 2017.



Type of hospital	General	UMC	Private	Total
Type of revision				
Girdlestone situation (%)	5.2	15.8	2.5	6.6
Total revision (%)	17.4	33.0	19.5	19.4
Major partial revision[1] (%)	51.0	33.8	51.2	48.8
Minor partial revision[2] (%)	19.6	10.5	26.8	18.5
Partial revision, unknown component(s) (%)	4.0	2.6	0.0	3.7
Other (%)	2.8	4.3	0.0	3.0
Total (n)	3,350	506	41	3,897

[1] Major partial revision, at least acetabulum or femur component revised.
[2] Minor partial revision, only inlay and/or femoral head exchange.

In 1,182 (62.2%) major partial hip revision arthroplasties the acetabulum component was revised and in 717 (37.8%) major partial hip revision arthroplasties the femur component was revised in 2017.

Reasons for revision

TABLE REASONS FOR REVISION OR RE-SURGERY IN PATIENTS WHO UNDERWENT A HIP REVISION ARTHROPLASTY IN THE NETHERLANDS IN 2017 (N=3,911).

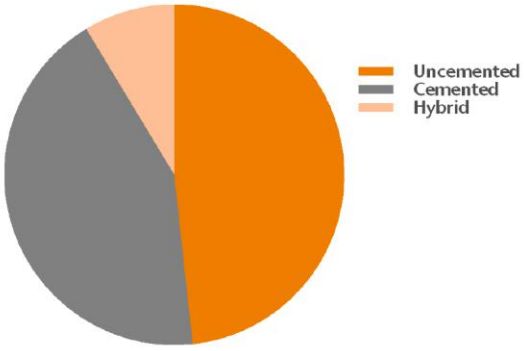
Reasons for revision	Proportion[1] (%)
Loosening of acetabulum component	21.6
Infection	21.1
Inlay wear	18.0
Loosening of femur component	18.0
Dislocation	17.8
Peri-prosthetic fracture	14.7
Girdlestone situation	5.3
Symptomatic MoM inlay	2.7
Peri-articular ossification	1.4
Other	10.0

[1] One patient may have more than one reason for revision or re-surgery. As such, the total proportion is over 100%.

Surgery

Fixation

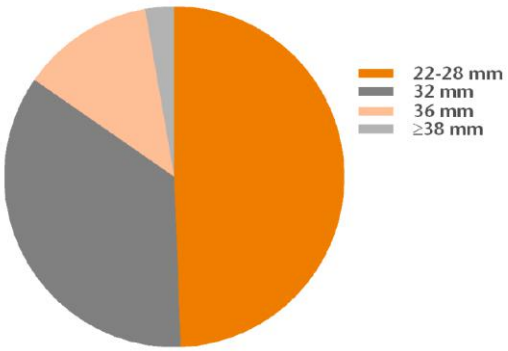
FIGURE TYPE OF FIXATION IN HIP REVISION ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=3,557).



Fixation	Number (n)	Proportion (%)
Uncemented	1,717	48.3
Cemented	1,532	43.1
Hybrid	308	8.6

Femoral head diameter

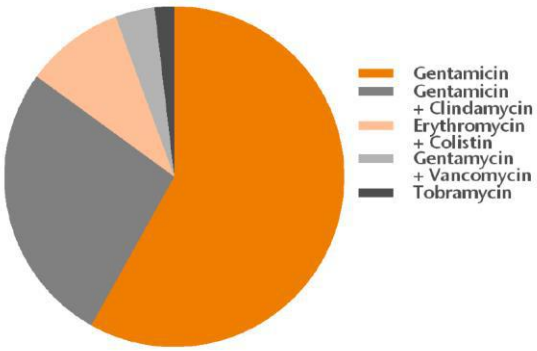
FIGURE FEMORAL HEAD DIAMETER IN HIP REVISION ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=3,332).



Femoral head diameter	Number (n)	Proportion (%)
22-28 mm	1,646	49.4
32 mm	1,174	35.2
36 mm	420	12.6
≥38 mm	92	2.8

Bone cement antibiotics

FIGURE BONE CEMENT ANTIBIOTICS IN HIP REVISION ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=1,607).



Bone cement antibiotics	Number (n)	Proportion (%)
Gentamicin	934	58.1
Gentamicin + Clindamycin	432	26.9
Erythromycin + Colistin	151	9.4
Gentamycin + Vancomycin	60	3.7
Tobramycin	30	1.9

Most frequently registered components

TABLE THE TEN MOST FREQUENTLY REGISTERED ACETABULUM (BOTH CEMENTED AND UNCEMENTED) AND FEMUR COMPONENTS (BOTH CEMENTED AND UNCEMENTED) IN HIP REVISION ARTHROPLASTIES IN THE NETHERLANDS IN 2017.

Acetabulum

Cemented (n=1,354)		Uncemented (n=553)	
Name	**Proportion (%)**	**Name**	**Proportion (%)**
Avantage Cemented	48.1	Continuum	25.0
Polarcup	12.1	Delta-One TT	10.5
Saturne Dual Mobility	6.2	Trident	7.2
Exeter Contemporary Flanged	4.9	Pinnacle	6.9
Müller low profile	3.8	Allofit	6.3
Reflection All Poly XLPE	3.8	Delta-TT	6.1
Exeter Rimfit X3	3.5	Avantage Reload	4.7
FAL Cup	2.8	R3	4.5
DS Evolution	2.7	Saturne Dual Mobility	3.6
IP Cup	2.4	Reflection	3.1

Femur

Cemented (n=599)		Uncemented (n=780)	
Name	**Proportion (%)**	**Name**	**Proportion (%)**
Exeter	28.0	Restoration Modular	15.8
Lubinus SPII	23.0	Revitan	13.3
Spectron EF	11.7	MP Reconstruction Prosthesis	12.7
Original ME Muller	10.7	Arcos	9.5
Stanmore	8.8	SLR Plus	6.9
C-Stem AMT	3.0	Alloclassic SLL	4.9
MP Reconstruction Prosthesis	2.3	Corail Revision	4.5
C-Stem AMT Long	1.2	MRS stem	4.4
Taperloc Complete Cemented	1.2	Corail	3.5
CCA stem	0.8	Taperloc Complete	2.7

Most frequently registered types of bone cement

TABLE THE MOST FREQUENTLY REGISTERED TYPES OF BONE CEMENT BY TYPE OF MIXING SYSTEM USED DURING HIP REVISION ARTHROPLASTIES IN THE NETHERLANDS IN 2017.

Separately packed bone cement components (n=1,393)		Bone cement pre-packed in a vacuum mixing system (n=213)	
Name	**Proportion (%)**	**Name**	**Proportion (%)**
Palacos R+G	40.3	Refobacin Bone Cement R	39.6
Copal G+C	21.5	Palacos R+G	26.4
Simplex ABC EC	10.8	Refobacin Revision	22.7
Refobacin Revision	8.3	Refobacin Plus Bone Cement	11.3
Refobacin Bone Cement R	5.9		

Survival

Revision within 1 year

By type of revision

TABLE CUMULATIVE 1-YEAR REVISION PERCENTAGE OF PRIMARY TOTAL HIP ARTHROPLASTIES BY TYPE OF REVISION IN THE NETHERLANDS IN 2012-2016 (N=137,725).

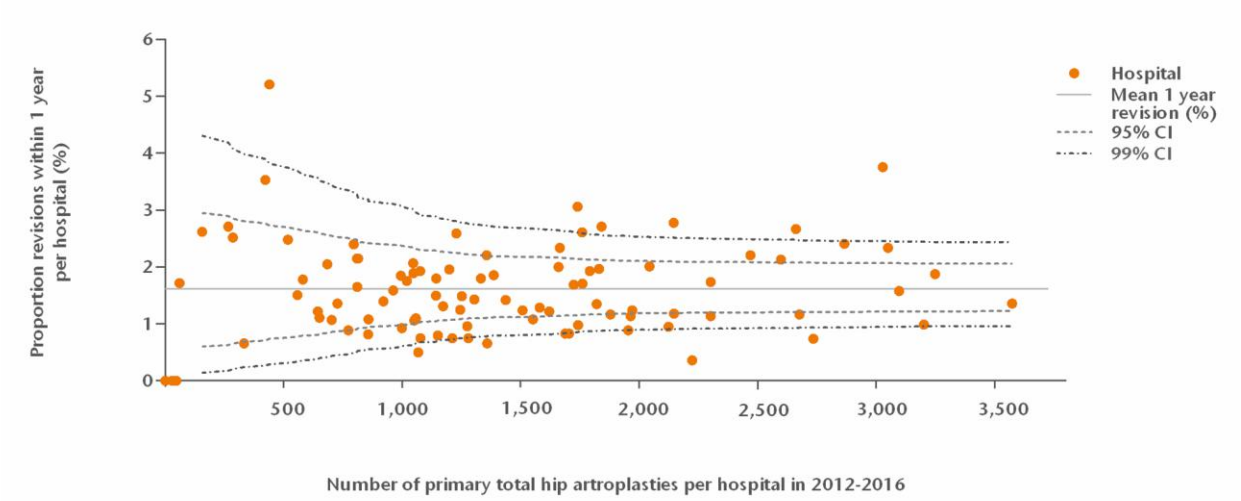
	Cumulative 1-year revision percentage	
	Competing Risk (95% CI)	Kaplan Meier (95% CI)
Any type of revision	1.6 (1.5-1.7)	1.6 (1.5-1.6)
Minor revision[1]	0.5 (0.4-0.5)	0.5 (0.5-0.5)
Major revision[2]	1.1 (1.0-1.1)	1.1 (1.0-1.1)

[1] Only inlay and/or femoral head exchange.
[2] Revision of at least the acetabulum or femur component.
THA: total hip arthroplasty; CI: confidence interval.

In 2012-2016, 1,838 (1.3%) primary total hip arthroplasties were implanted in patients who died within one year after the primary procedure.

Per hospital

FIGURE FUNNEL PLOT OF PROPORTION OF HIP REVISION ARTHROPLASTIES WITHIN ONE YEAR AFTER A PRIMARY TOTAL HIP ARTHROPLASTY PER HOSPITAL IN THE NETHERLANDS IN 2012-2016 (N=137,725).



Please note: The proportions of revisions within 1 year per hospital were adjusted for casemix factors age, gender, ASA score and diagnosis (osteoarthritis versus other).
CI: confidence interval.

The mean 1-year revision percentage is 1.6 (95% CI: 1.5-1.7) in the Netherlands in 2012-2016. Confidence intervals indicate a plausible range of the outcome if all hospitals perform equally well.

Reasons for revision by type of revision

TABLE REASONS FOR REVISION WITHIN ONE YEAR IN PATIENTS THAT UNDERWENT A HIP REVISION ARTHROPLASTY BY TYPE OF REVISION IN THE NETHERLANDS IN 2012-2016.

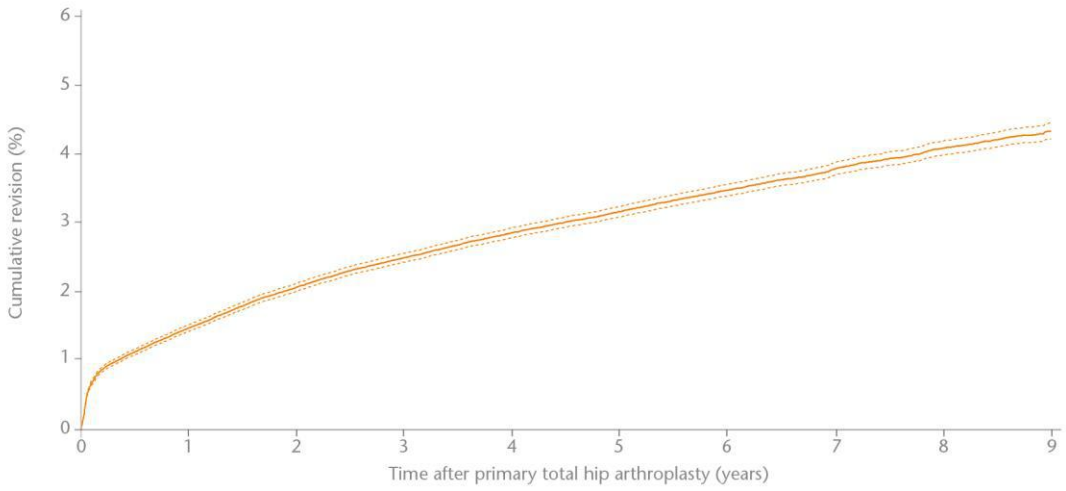
Reasons for revision	Minor revision[1] (n=664) Proportion[4] (%)	Major revision[2] (n=1,505) Proportion[4] (%)	Any type of revision[3] (n=2,235) Proportion[4] (%)
Dislocation	27.1	36.7	32.8
Infection	58.0	11.7	25.7
Peri-prosthetic fracture	2.0	26.3	18.5
Loosening of femur component	0.2	21.8	14.7
Loosening of acetabulum component	0.6	11.4	7.9
Girdlestone situation	0.3	2.7	2.0
Inlay wear	1.8	1.2	1.3
Peri-articular ossification	0.8	1.1	0.9
Symptomatic MoM inlay	0.0	0.2	0.2
Other	15.2	12.4	13.1

[1] Only inlay and/or femoral head exchange.
[2] Revision of at least the acetabulum or femur component.
[3] Any type of revision includes minor and major revisions as well as revision procedures that could not be classified as minor or major revision.
[4] One patient may have more than one reason for revision or re-surgery. As such, the total proportion is over 100%.

Revision within 9 years

Overall

FIGURE CUMULATIVE REVISION PERCENTAGE OF TOTAL HIP ARTHROPLASTIES IN THE NETHERLANDS IN 2007-2017 (N=259,929).



Please note: Dotted lines represent the upper and lower limits of the 95% confidence interval.

By type of revision

TABLE CUMULATIVE 9-YEAR REVISION PERCENTAGE OF PRIMARY TOTAL HIP ARTHROPLASTIES BY TYPE OF REVISION IN THE NETHERLANDS IN 2007-2017 (N=259,929).

	Cumulative 9-year revision percentage	
	Competing Risk (95% CI)	Kaplan Meier (95% CI)
Any type of revision	4.4 (4.3-4.5)	4.6 (4.5-4.7)
Minor revision[1]	0.8 (0.8-0.8)	0.9 (0.9-1.0)
Major revision[2]	3.5 (3.4-3.6)	3.8 (3.6-3.9)

[1] Only inlay and/or femoral head exchange.
[2] Revision of at least the acetabulum or femur component.
THA: total hip arthroplasty; CI: confidence interval.

In 2007-2017, 20,526 (7.9%) primary total hip arthroplasties were implanted in patients who died within nine years after the primary procedure.

By demographics

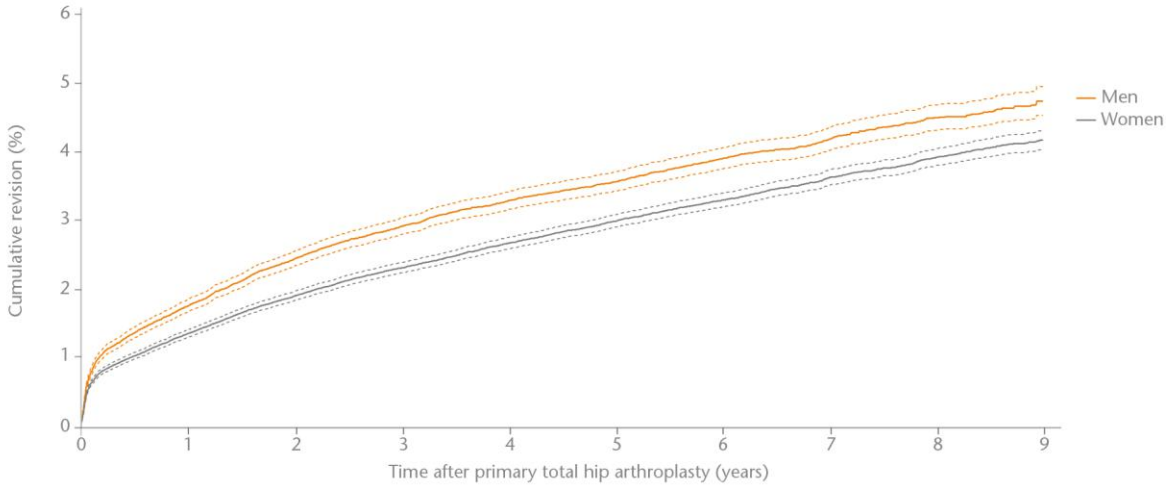
TABLE CUMULATIVE 9-YEAR REVISION PERCENTAGE OF PRIMARY TOTAL HIP ARTHROPLASTIES BY DEMOGRAPHICS IN THE NETHERLANDS IN 2007-2017.

		Cumulative 9-year revision percentage	
	Number (n)	Competing Risk (95% CI)	Kaplan Meier (95% CI)
Total	259,929	4.4 (4.3-4.5)	4.6 (4.5-4.7)
Gender			
Men	86,500	4.7 (4.5-5.0)	5.0 (4.8-5.2)
Women	172,859	4.2 (4.0-4.3)	4.4 (4.3-4.6)
Age (years)			
<50	11,639	7.1 (6.4-7.9)	7.1 (6.4-7.9)
50-59	31,863	6.0 (5.6-6.4)	6.2 (5.8-6.6)
60-69	82,702	4.8 (4.5-5.0)	4.9 (4.8-5.0)
70-79	94,236	3.8 (3.7-4.0)	4.1 (3.9-4.2)
≥80	39,093	2.7 (2.5-2.9)	3.0 (2.8-3.3)
Diagnosis			
Osteoarthritis	224,028	4.2 (4.1-4.4)	4.4 (4.3-4.6)
Other	33,356	5.3 (5.0-5.6)	5.8 (5.4-6.2)
ASA score			
I	56,250	4.7 (4.2-4.9)	4.8 (4.5-5.0)
II	157,721	4.2 (4.1-4.4)	4.5 (4.3-4.6)
III-IV	36,083	4.1 (3.8-4.4)	4.6 (4.3-4.9)

CI: confidence interval.

By gender

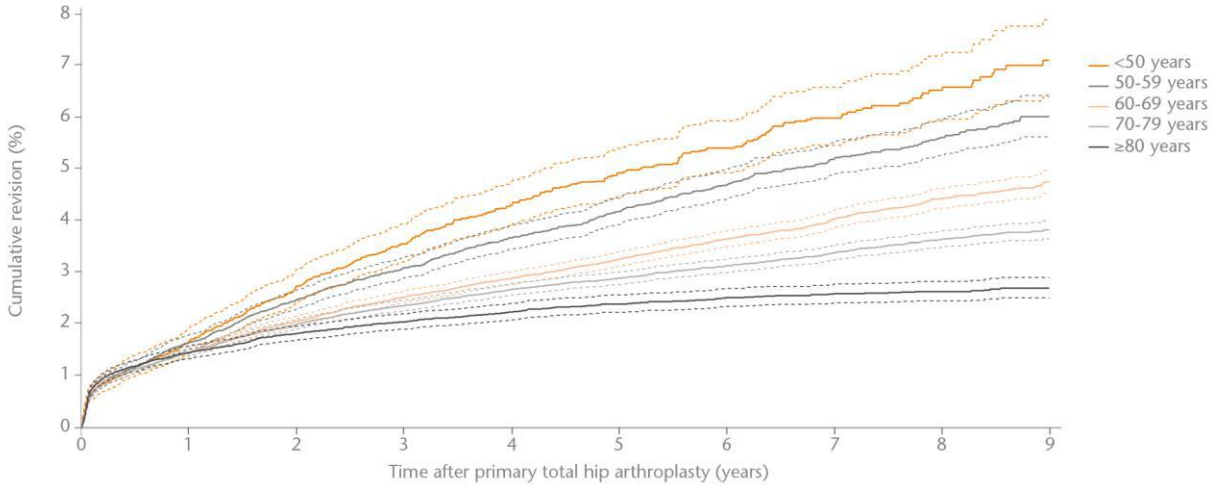
FIGURE CUMULATIVE REVISION PERCENTAGE OF TOTAL HIP ARTHROPLASTIES BY GENDER IN THE NETHERLANDS IN 2007-2017 (N=259,359).



Please note: Dotted lines represent the upper and lower limits of the 95% confidence interval.

By age category

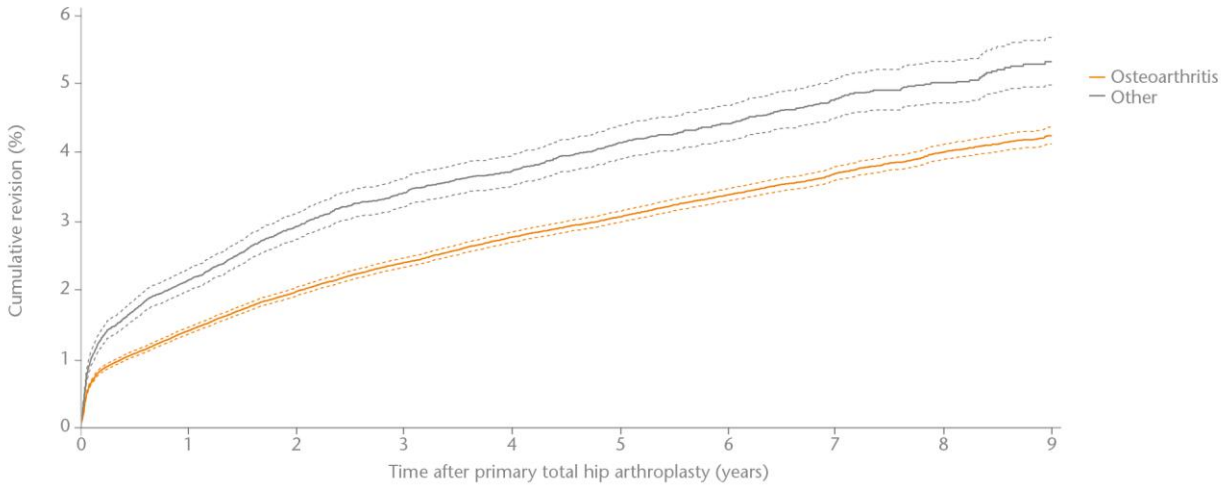
FIGURE CUMULATIVE REVISION PERCENTAGE OF TOTAL HIP ARTHROPLASTIES BY AGE CATEGORY IN THE NETHERLANDS IN 2007-2017 (N=259,533).



Please note: Dotted lines represent the upper and lower limits of the 95% confidence interval.

By diagnosis

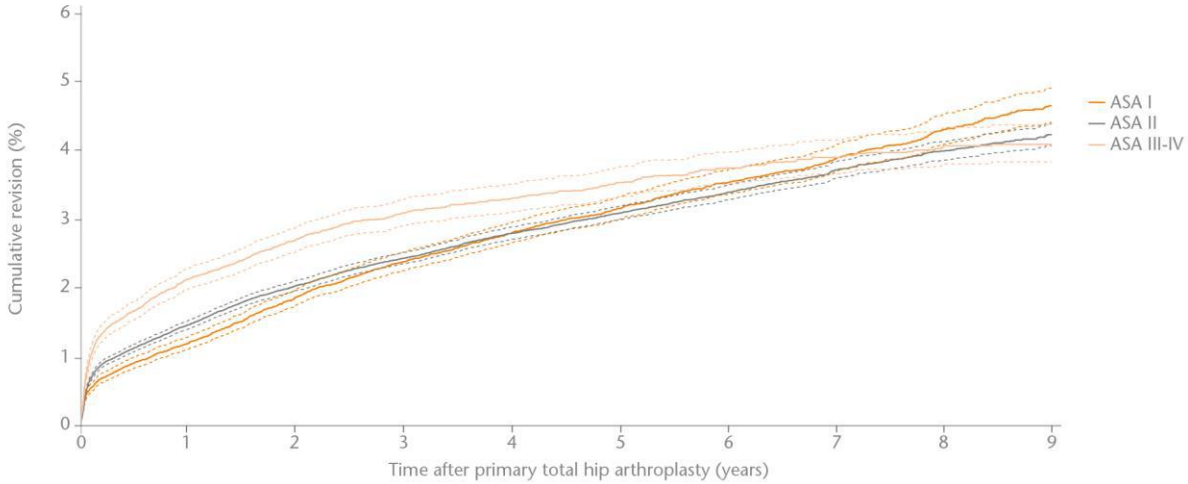
FIGURE CUMULATIVE REVISION PERCENTAGE OF TOTAL HIP ARTHROPLASTIES BY DIAGNOSIS IN THE NETHERLANDS IN 2007-2017 (N=257,384).



Please note: Dotted lines represent the upper and lower limits of the 95% confidence interval.

By ASA score

FIGURE CUMULATIVE REVISION PERCENTAGE OF TOTAL HIP ARTHROPLASTIES BY ASA SCORE IN THE NETHERLANDS IN 2007-2017 (N=250,054).



Please note: Dotted lines represent the upper and lower limits of the 95% confidence interval.

Revision within 1, 3, 5 and 7 years

Cemented primary THA

TABLE CUMULATIVE 1-, 3-, 5- AND 7-YEAR REVISION PERCENTAGES OF CEMENTED PRIMARY TOTAL HIP ARTHROPLASTIES BY PROSTHESIS COMPONENT COMBINATION OF PATIENTS WHO UNDERWENT A THA FOR OSTEOARTHRITIS IN THE NETHERLANDS IN 2007-2017 (N=59,661).

					Type of revision (n)					Cumulative revision percentage (95% CI)			
Femur component	Acetabulum component	Total primary THAs (n)	Median (IQR) age (yr)	Total hip revision arthroplasties (n)	Total hip (complete revision)	Only femur component	Only acetabulum component	Only femoral head/inlay	Missing/ unknown	1yr	3yr	5yr	7yr
All combinations (n=399)		**59,661**	**76 (71-80)**	**1,281**	**259**	**135**	**538**	**314**	**35**	**1.1 (1.0-1.2)**	**1.8 (1.7-1.9)**	**2.3 (2.2-2.4)**	**2.8 (2.6-2.9)**
Lubinus SPII	IP Cup	10,899	76 (71-80)	221	31	35	103	49	3	0.9 (0.7-1.1)	1.8 (1.5-2.1)	2.4 (2.1-2.7)	2.7 (2.3-3.1)
Original ME Muller	Müller low profile	9,826	76 (71-80)	185	27	2	64	84	8	1.2 (0.9-1.4)	1.8 (1.5-2.0)	2.1 (1.8-2.5)	2.4 (2.0-2.8)
Spectron EF	Reflection All Poly XLPE	4,193	77 (73-81)	64	20	4	27	13	0	0.7 (0.4-0.9)	1.2 (0.9-1.6)	1.5 (1.1-1.9)	2.1 (1.5-2.6)
Lubinus SPII	Fal Cup	3,584	75 (70-80)	90	23	5	32	26	4	1.7 (1.2-2.1)	2.4 (1.8-2.9)	2.8 (2.2-3.5)	3.6 (2.7-4.5)
Stanmore	Stanmore	3,251	75 (70-80)	53	16	2	30	3	2	0.7 (0.4-1.0)	1.4 (1.0-1.8)	1.8 (1.3-2.3)	2.0 (1.4-2.5)
Exeter	Exeter Rimfit X3	2,925	75 (69-80)	50	11	11	10	18	0	1.2 (0.8-1.6)	1.8 (1.2-2.3)	2.5 (1.7-3.2)	n.a.
Exeter	Exeter Contemporary Hooded	2,575	76 (72-80)	60	15	12	21	10	2	1.1 (0.7-1.5)	1.6 (1.1-2.1)	2.0 (1.4-2.6)	2.7 (2.0-3.5)
Lubinus SPII	SHP	2,490	75 (71-80)	29	7	2	19	1	0	0.4 (0.1-0.6)	0.7 (0.4-1.0)	1.0 (0.6-1.4)	1.3 (0.8-1.8)
Exeter	Exeter	2,429	73 (68-79)	108	16	10	50	28	4	2.8 (2.1-3.4)	3.7 (2.9-4.4)	4.2 (3.4-5.0)	4.8 (3.8-5.7)
Exeter	Exeter Contemporary Flanged	2,365	75 (67-80)	45	12	4	23	4	2	0.7 (0.4-1.0)	1.3 (0.8-1.8)	1.7 (1.2-2.3)	1.9 (1.3-2.6)
Stanmore	SHP	1,978	75 (71-80)	81	25	5	41	9	1	1.3 (0.8-1.6)	3.0 (2.2-3.8)	4.1 (3.1-5.0)	4.9 (3.8-6.0)
CCA stem	CCB cup Low Profile	1,323	77 (73-80)	31	4	0	8	18	1	2.0 (1.2-2.7)	2.2 (1.4-3.1)	2.5 (1.6-3.4)	2.9 (1.7-4.0)
Stanmore	All Poly Arcom Cup	1,046	74 (69-79)	18	2	3	11	0	2	0.3 (0.0-0.6)	1.4 (0.6-2.1)	2.0 (1.1-3.0)	2.3 (1.2-3.4)
Stanmore	Muller	838	76 (71-80)	11	3	2	5	1	0	0.8 (0.2-1.4)	1.5 (0.6-2.4)	n.a.	n.a.
Spectron EF	Mueller cup	824	77 (72-81)	8	2	1	3	2	0	0.4 (0.0-0.8)	0.7 (0.2-1.3)	0.6 (0.2-1.5)	0.6 (0.2-1.5)
Spectron EF	Reflection All Poly	604	77 (74-82)	25	6	0	16	3	0	0.8 (0.1-1.6)	1.8 (0.8-2.9)	2.6 (1.3-3.8)	3.3 (1.9-4.8)
MS30	Müller low profile	488	78 (74-83)	12	0	7	4	1	0	0.8 (0.0-1.7)	1.9 (0.6-3.2)	2.6 (1.0-4.2)	2.6 (1.0-4.2)
Stanmore	Exceed ABT Cemented	430	77 (72-82)	9	0	0	1	8	0	1.6 (0.4-2.8)	1.9 (0.6-3.3)	2.9 (0.6-5.1)	n.a.
Spectron EF	Müller low profile	390	78 (74-82)	7	2	0	1	4	0	1.1 (0.0-2.1)	2.7 (0.4-5.0)	n.a.	n.a.
Twinsys stem cemented	CCB cup Low Profile	382	80 (76-83)	4	0	1	2	0	1	0.5 (0.0-1.3)	0.9 (0.0-1.9)	1.3 (0.0-2.7)	n.a.
Stanmore	Apollo	372	75 (70-80)	4	2	1	0	0	1	0.3 (0.0-0.8)	0.9 (-0.1-1.8)	1.3 (0.0-2.7)	n.a.
Lubinus SPII	Avantage Cemented	292	78 (70-83)	8	3	0	1	4	0	2.2 (1.4-3.9)	2.2 (1.4-3.9)	4.3 (0.9-7.8)	n.a.
GHE-huftstiel	Huftpfanne	271	75 (71-80)	14	3	2	9	0	0	0.4 (0.0-1.1)	1.9 (0.3-3.6)	2.7 (0.7-4.7)	4.8 (2.0-7.6)
Charnley Modular	Marathon	255	71 (65-79)	5	2	1	2	0	0	0.4 (0.0-1.2)	1.2 (0.0-2.6)	1.7 (0.1-3.3)	2.5 (0.2-4.7)

Please note: n.a. if <50 cases were at risk; THA: total hip arthroplasty; CI: confidence interval; IQR: interquartile range.

399 combinations of cemented acetabulum and femur components were registered in 2007-2017. Only combinations with over 250 procedures have been listed. These combinations represented 90.6% of all registered cemented acetabulum and femur combinations.

Results must be interpreted with caution. Patient characteristics like age and diagnosis, as well as procedure characteristics like the experience of the surgeon performing the procedure, femoral head size and articulation of the prosthesis may have influenced the cumulative revision percentages.

Uncemented primary THA

TABLE CUMULATIVE 1-, 3-, 5- AND 7-YEAR REVISION PERCENTAGES OF UNCEMENTED PRIMARY TOTAL HIP ARTHROPLASTIES BY PROSTHESIS COMPONENT COMBINATION OF PATIENTS WHO UNDERWENT A THA FOR OSTEOARTHRITIS IN THE NETHERLANDS IN 2007-2017 (N=136,612).

					Type of revision (n)					Cumulative revision percentage (95% CI)			
Femur component	Acetabulum component	Total primary THAs (n)	Median (IQR) age (yr)	Total hip revision arthroplasties (n)	Total hip (complete revision)	Only femur component	Only acetabulum component	Only femoral head/inlay	Missing/ unknown	1yr	3yr	5yr	7yr
All combinations (n=544)		**136,612**	**68 (61-74)**	**4,297**	**715**	**1,513**	**1,111**	**858**	**100**	**1.6 (1.5-1.6)**	**2.7 (2.6-2.7)**	**3.4 (3.3-3.6)**	**4.3 (4.1-4.4)**
Corail	Pinnacle	22,525	69 (62-75)	523	95	167	97	156	8	1.4 (1.2-1.5)	2.3 (2.1-2.5)	2.9 (2.6-3.2)	3.6 (3.6-4.0)
Alloclassic Zweymuller SL	Allofit	12,636	70 (63-76)	329	54	120	80	70	5	1.1 (0.9-1.3)	2.0 (1.7-2.2)	2.6 (2.3-2.9)	3.2 (2.9-3.6)
Taperloc Complete	Exceed ABT	9,477	69 (62-74)	191	29	66	37	47	12	1.3 (1.1-1.5)	2.2 (1.9-2.5)	2.4 (2.1-2.8)	2.7 (2.2-3.2)
CLS Spotorno	Allofit	8,574	65 (59-69)	294	34	127	56	62	15	2.5 (2.1-2.8)	3.4 (3.0-3.8)	3.8 (3.4-4.3)	4.3 (3.8-4.9)
Taperloc Complete	Mallory Head	6,473	67 (61-72)	185	28	50	53	51	3	1.8 (1.4-2.1)	2.8 (2.4-3.2)	3.1 (2.7-3.6)	3.8 (3.2-4.5)
Mallory Head Stems	Mallory Head	5,666	65 (60-69)	152	24	20	55	47	6	1.4 (1.1-1.7)	2.2 (1.8-2.6)	2.6 (2.1-3.0)	3.2 (2.6-3.7)
Accolade	Trident	5,582	69 (62-76)	169	22	92	23	31	1	1.4 (1.0-1.7)	3.0 (2.5-3.5)	4.1 (3.4-4.7)	4.7 (3.9-5.5)
SL Plus	Bicon Plus	3,480	70 (64-76)	159	26	80	39	12	2	1.7 (1.2-2.1)	3.8 (3.1-4.4)	4.6 (3.8-5.3)	5.5 (4.6-6.4)
Accolade	Trident Tritanium	3,042	67 (62-74)	48	5	18	11	14	0	0.9 (0.6-1.3)	1.7 (1.2-2.3)	2.5 (1.6-3.4)	n.a.
Taperloc Complete	Allofit	3,039	68 (62-73)	34	4	14	4	12	0	1.3 (0.8-1.8)	1.6 (0.9-2.3)	n.a.	n.a.
Alloclassic Zweymuller SL	Alloclassic Zweymuller CSF	2,891	69 (63-75)	102	11	41	15	33	2	1.3 (0.9-1.7)	2.8 (2.2-3.4)	3.4 (2.7-4.1)	3.6 (2.9-4.3)
Synergy	Reflection	2,856	66 (60-72)	95	8	50	17	19	1	2.1 (1.5-2.6)	2.6 (2.0-3.2)	3.0 (2.4-3.7)	3.6 (2.8-4.3)
Twinsys stem Cementless	RM Pressfit Vitamys cup	2,291	66 (60-71)	33	6	13	6	7	1	1.0 (0.6-1.4)	1.5 (1.0-2.1)	2.1 (1.3-2.9)	n.a.
Twinsys stem Cementless	RM Pressfit cup	2,264	73 (67-79)	68	9	31	12	15	1	2.6 (1.9-3.2)	3.0 (2.3-3.7)	3.2 (2.4-4.0)	4.1 (2.8-5.3)
Alloclassic offset	Allofit	2,143	71 (64-77)	48	8	19	10	8	3	1.1 (0.7-1.5)	1.8 (1.2-2.4)	2.5 (1.7-3.3)	3.0 (2.1-3.9)
Symax	Trident	2,067	69 (63-75)	54	4	12	14	24	0	0.6 (0.3-0.9)	1.6 (1.0-2.1)	2.2 (1.5-2.8)	2.7 (2.0-3.4)
Synergy	R3	1,923	66 (60-71)	45	6	25	7	7	0	1.8 (1.2-2.4)	2.3 (1.6-3.0)	2.6 (1.8-3.4)	n.a.
Symax	Trident Tritanium	1,738	67 (61-73)	70	8	33	18	10	1	2.3 (1.6-2.9)	3.6 (2.7-4.5)	4.2 (3.2-5.2)	4.7 (3.5-6.0)
Mallory Head Stems	Exceed ABT	1,570	65 (59-71)	29	2	11	14	2	0	0.7 (0.3-1.1)	1.5 (0.9-2.1)	1.6 (1.0-2.2)	2.1 (1.3-2.9)
Omnifit HA	Trident	1,495	63 (57-67)	117	14	57	16	26	4	3.2 (2.3-4.0)	4.6 (3.5-5.6)	6.2 (5.0-7.5)	7.7 (6.3-9.1)
SL Plus	Hofer-Imhoff	1,328	69 (63-75)	65	17	29	9	7	3	1.4 (0.7-2.0)	2.8 (1.9-3.6)	4.0 (2.9-5.1)	4.9 (3.7-6.1)
M/L Taper	Allofit IT	1,315	70 (64-76)	43	6	21	10	6	0	2.1 (1.3-2.9)	3.1 (2.1-4.1)	3.9 (2.6-5.1)	4.8 (2.9-6.7)
Anthology	R3	1,306	65 (60-69)	32	6	13	2	11	0	2.2 (1.4-3.0)	2.4 (1.5-3.3)	3.4 (2.0-4.7)	n.a.
CLS Spotorno	RM Classic cup	1,168	63 (58-68)	53	10	15	20	7	1	1.8 (1.0-2.6)	2.6 (1.7-3.5)	3.1 (2.1-4.1)	3.8 (2.7-4.9)
CLS Spotorno	Pinnacle	1,091	67 (62-72)	25	4	6	2	13	0	1.2 (0.6-1.9)	2.0 (1.1-2.9)	2.5 (1.5-3.6)	3.0 (1.8-4.3)
SL Plus	Reflection	1,019	67 (61-73)	27	3	10	7	7	0	1.7 (0.9-2.5)	3.0 (1.8-4.1)	n.a.	n.a.
Alloclassic Zweymuller SL	Continuum	1,010	70 (63-76)	18	4	9	1	3	1	0.9 (0.3-1.5)	1.7 (0.9-2.6)	2.2 (1.1-3.3)	n.a.
SL Plus Mia	R3	976	71 (65-77)	24	2	14	0	8	0	2.0 (1.1-2.9)	2.6 (1.5-3.6)	3.0 (1.6-4.4)	n.a.
Polarstem	R3	909	67 (61-72)	16	0	8	0	8	0	2.0 (1.0-3.0)	n.a.	n.a.	n.a.
Alloclassic Zweymuller SL	Trilogy	822	70 (64-76)	29	7	8	7	7	0	1.3 (0.6-2.1)	2.2 (1.2-3.2)	2.7 (1.6-3.8)	3.0 (1.8-4.2)
SL Plus	EP-Fit Plus	781	68 (63-75)	36	9	17	9	1	0	1.4 (0.6-2.3)	3.1 (1.9-4.4)	3.7 (2.3-5.0)	5.1 (3.5-6.8)
Alloclassic Zweymuller SL	Alloclassic Varial	766	71 (64-77)	19	4	8	2	4	1	1.2 (0.4-1.9)	2.0 (1.0-3.0)	2.4 (1.3-3.5)	2.8 (1.5-4.1)
CLS Spotorno	Fitmore	754	66 (61-71)	29	2	11	5	10	1	1.7 (0.8-2.7)	2.3 (1.2-3.3)	2.7 (1.5-3.8)	3.2 (1.9-4.4)
DB10	Spidercup	748	71 (64-77)	25	2	11	5	6	1	1.8 (0.8-2.7)	2.2 (1.1-3.2)	2.8 (1.6-4.0)	3.7 (2.1-5.3)
CLS Spotorno	Morscher	699	73 (68-78)	30	5	14	11	0	0	1.4 (0.6-2.3)	2.6 (1.4-3.8)	3.1 (1.7-4.4)	4.7 (2.7-6.6)
Taperloc Complete	Ringloc Ranawat Burtsein	633	68 (61-73)	5	2	2	1	0	0	0.3 (0.0-0.8)	0.9 (0.1-1.6)	n.a.	n.a.
Polarstem	Reflection	626	70 (64-76)	12	2	2	2	6	0	1.5 (0.4-2.5)	2.5 (0.9-4.1)	8.3 (0.0-19.3)	n.a.
SBH stem	RM Pressfit Vitamys cup	587	65 (60-70)	14	6	2	5	1	0	1.2 (0.3-2.1)	2.1 (0.9-3.3)	2.6 (1.2-4.0)	n.a.
CLS Spotorno	RM Pressfit cup	587	66 (60-71)	40	4	15	13	5	3	3.1 (1.7-4.5)	5.0 (3.2-6.7)	5.9 (3.9-7.9)	6.5 (4.4-8.5)
Alloclassic Zweymuller SL	Trabecular Metal	551	68 (62-75)	18	1	5	5	6	1	0.7 (0.0-1.4)	1.8 (0.7-3.0)	2.6 (1.3-3.9)	3.4 (1.9-5.0)
CBH stem	RM Pressfit cup	527	75 (69-80)	16	3	5	7	1	0	2.1 (0.9-3.4)	3.0 (1.5-4.5)	3.3 (1.7-5.0)	n.a.

Please note: n.a. if <50 cases were at risk; THA: total hip arthroplasty; CI: confidence interval; IQR: interquartile range.

544 combinations of uncemented acetabulum and femur components were registered in 2007-2017. Only combinations with over 500 procedures have been listed. These combinations represented 87.8% of all registered uncemented acetabulum and femur combinations.

Results must be interpreted with caution. Patient characteristics like age and diagnosis, as well as procedure characteristics like the experience of the surgeon performing the procedure, femoral head size and articulation of the prosthesis may have influenced the cumulative revision percentages.

Bone cement

TABLE CUMULATIVE 1-, 3-, 5- AND 7-YEAR REVISION PERCENTAGES OF THE MOST FREQUENTLY REGISTERED TYPES OF BONE CEMENT BY TYPE OF MIXING SYSTEM IN 2017, IN PRIMARY TOTAL HIP ARTHROPLASTIES IN THE NETHERLANDS IN 2007-2017.

Bone cement	n	Cumulative 1-year revision percentage (95% CI)	Cumulative 3-year revision percentage (95% CI)	Cumulative 5-year revision percentage (95% CI)	Cumulative 7-year revision percentage (95% CI)
Separately packed bone cement components (n=72,787)					
Palacos R+G	54,271	1.4 (1.3-1.5)	2.3 (2.1-2.4)	2.8 (2.6-2.9)	3.1 (3.0-3.3)
Refobacin Bone Cement R	5,547	0.7 (0.5-1.0)	1.5 (1.2-1.9)	1.9 (1.5-2.3)	2.4 (2.0-2.9)
Simplex ABC EC	2,320	2.3 (1.8-3.1)	3.3 (2.6-4.2)	4.3 (3.4-5.3)	5.2 (4.1-6.5)
Palacos MV+G	2,983	0.6 (0.4-0.9)	1.2 (0.9-1.7)	1.8 (1.3-2.4)	2.5 (1.7-3.5)
Simplex HV	582	0.5 (0.2-1.6)	0.5 (0.2-1.6)	n.a.	n.a.
Bone cement pre-packed in a vacuum mixing system (n=13,104)					
Refobacin Bone Cement R	7,152	1.4 (1.2-1.8)	2.1 (1.7-2.5)	2.9 (2.5-3.5)	3.3 (2.7-4.0)
Palacos R+G	2,177	1.5 (1.0-2.1)	1.6 (0.9-2.5)	n.a.	n.a.
Refobacin Plus Bone Cement	3,202	1.0 (0.7-1.4)	2.0 (1.5-2.6)	2.2 (1.7-2.9)	2.5 (1.9-3.3)
Refobacin Revision	70	5.9 (2.3-15.2)	n.a.	n.a.	n.a.

Please note: Revision is defined as any change (insertion, replacement and/or removal) of one or more components of the prosthesis.
n.a. if <50 cases were at risk; CI: confidence interval.

28 types of bone cement were registered in 2007-2017. Only the most frequently registered types of bone cement in 2017 have been listed. These types of bone cement represented 92.4% of all registered types of bone cement in 2007-2017.

Results must be interpreted with caution. Patient characteristics like age and diagnosis, as well as procedure characteristics like the experience of the surgeon performing the procedure, femoral head size and articulation of the prosthesis may have influenced the cumulative revision percentages.

Major revision within 1, 3, 5 and 7 years

Cemented primary THA

TABLE CUMULATIVE 1-, 3-, 5- AND 7 YEAR MAJOR REVISION PERCENTAGES OF THE MOST FREQUENTLY USED CEMENTED PRIMARY TOTAL HIP ARTHROPLASTIES BY PROSTHESIS COMPONENT COMBINATION OF PATIENTS WHO UNDERWENT A THA FOR OSTEOARTHRITIS IN THE NETHERLANDS IN 2007-2017 (N=59,661).

Femur component	Acetabulum component	Total primary THAs (n)	Median (IQR) age (yr)	Major revision[1] arthroplasties (n)	Cumulative revision percentage (95% CI)			
					1yr	3yr	5yr	7yr
All combinations (n=399)		**59,661**	**76 (71-80)**	**933**	**0.6 (0.6-0.7)**	**1.3 (1.2-1.4)**	**1.8 (1.6-1.9)**	**2.2 (2.0-2.3)**
Lubinus SPII	IP Cup	10,899	76 (71-80)	169	0.5 (0.4-0.7)	1.4 (1.1-1.6)	1.9 (1.6-2.2)	2.2 (1.8-2.6)
Original ME Muller	Müller low profile	9,826	76 (71-80)	93	0.5 (0.3-0.6)	1.0 (0.7-1.2)	1.2 (1.0-1.5)	1.4 (1.1-1.7)
Spectron EF	Reflection All Poly XLPE	4,193	77 (73-81)	51	0.4 (0.2-0.6)	0.9 (0.6-1.2)	1.2 (0.8-1.5)	1.7 (1.2-2.2)
Lubinus SPII	Fal Cup	3,584	75 (70-80)	60	0.9 (0.6-1.3)	1.6 (1.2-2.1)	2.1 (1.5-2.7)	2.9 (2.0-3.7)
Stanmore	Stanmore	3,251	75 (70-80)	48	0.6 (0.3-0.9)	1.3 (0.9-1.7)	1.7 (1.2-2.2)	1.9 (1.3-2.4)
Exeter	Exeter Rimfit X3	2,925	75 (69-80)	32	0.7 (0.4-1.0)	1.1 (0.7-1.5)	1.8 (1.1-2.4)	n.a.
Exeter	Exeter Contemporary Hooded	2,575	76 (72-80)	48	0.8 (0.5-1.2)	1.2 (0.8-1.7)	1.6 (1.1-2.1)	2.3 (1.6-3.0)
Lubinus SPII	SHP	2,490	75 (71-80)	28	0.3 (0.1-0.5)	0.7 (0.3-1.0)	0.9 (0.6-1.3)	1.3 (0.8-1.8)
Exeter	Exeter	2,429	73 (68-79)	77	1.7 (1.2-2.2)	2.5 (1.9-3.1)	3.1 (2.4-3.8)	3.6 (2.8-4.4)
Exeter	Exeter Contemporary Flanged	2,365	75 (67-80)	39	0.6 (0.3-0.9)	1.1 (0.7-1.6)	1.6 (1.0-2.1)	1.8 (1.1-2.4)

[1] Revision of at least the acetabulum or femur component.
Please note: n.a. if <50 cases were at risk; THA: total hip arthroplasty; CI: confidence interval; IQR: interquartile range.

Only combinations with over 2000 procedures have been listed. These combinations represented 74.7% of all registered cemented acetabulum and femur combinations.

Results must be interpreted with caution. Patient characteristics like age and diagnosis, as well as procedure characteristics like the experience of the surgeon performing the procedure, femoral head size and articulation of the prosthesis may have influenced the cumulative revision percentages.

Uncemented primary THA

TABLE CUMULATIVE 1-, 3-, 5- AND 7 YEAR MAJOR REVISION PERCENTAGES OF THE MOST FREQUENTLY USED UNCEMENTED PRIMARY TOTAL HIP ARTHROPLASTIES BY PROSTHESIS COMPONENT COMBINATION OF PATIENTS WHO UNDERWENT A THA FOR OSTEOARTHRITIS IN THE NETHERLANDS IN 2007-2017 (N=136,612).

Femur component	Acetabulum component	Total primary THAs (n)	Median (IQR) age (yr)	Major revision[1] arthroplasties (n)	Cumulative revision percentage (95% CI)			
					1yr	3yr	5yr	7yr
All combinations (n=544)		**136,612**	**68 (61-74)**	**3,339**	**1.2 (1.1-1.2)**	**2.1 (2.0-2.1)**	**2.7 (2.6-2.8)**	**3.4 (3.3-3.6)**
Corail	Pinnacle	22,525	69 (62-75)	359	0.9 (0.8-1.0)	1.6 (1.4-1.8)	2.1 (1.8-2.3)	2.6 (2.3-2.9)
Alloclassic Zweymuller SL	Allofit	12,636	70 (63-76)	254	0.9 (0.7-1.0)	1.5 (1.3-1.8)	2.1 (1.8-2.3)	2.6 (2.2-2.9)
Taperloc Complete	Exceed ABT	9,477	69 (62-74)	132	1.0 (0.8-1.2)	1.6 (1.3-1.9)	1.7 (1.4-2.0)	2.0 (1.6-2.4)
CLS Spotorno	Allofit	8,574	65 (59-69)	217	1.8 (1.5-2.1)	2.5 (2.2-2.9)	2.9 (2.5-3.3)	3.4 (2.8-3.9)
Taperloc Complete	Mallory Head	6,473	67 (61-72)	131	1.2 (0.9-1.4)	1.9 (1.6-2.3)	2.2 (1.8-2.7)	2.9 (2.3-3.5)
Mallory Head Stems	Mallory Head	5,666	65 (60-69)	99	1.0 (0.7-1.3)	1.5 (1.2-1.8)	1.8 (1.4-2.2)	2.2 (1.7-2.6)
Accolade	Trident	5,582	69 (62-76)	137	1.1 (0.8-1.3)	2.4 (1.9-2.9)	3.3 (2.7-3.9)	3.7 (3.0-4.3)
SL Plus	Bicon Plus	3,480	70 (64-76)	145	1.4 (1.0-1.8)	3.4 (2.8-4.0)	4.2 (3.5-4.9)	5.0 (4.2-6.0)
Accolade	Trident Tritanium	3,042	67 (62-74)	34	0.5 (0.3-0.8)	1.2 (0.8-1.7)	2.0 (1.1-2.9)	n.a.
Taperloc Complete	Allofit	3,039	68 (62-73)	22	0.9 (0.5-1.3)	n.a.	n.a.	n.a.

[1] Revision of at least the acetabulum or femur component.
Please note: n.a. if <50 cases were at risk; THA: total hip arthroplasty; CI: confidence interval; IQR: interquartile range.

Only combinations with over 3000 procedures have been listed. These combinations represented 58.9% of all registered cemented acetabulum and femur combinations.

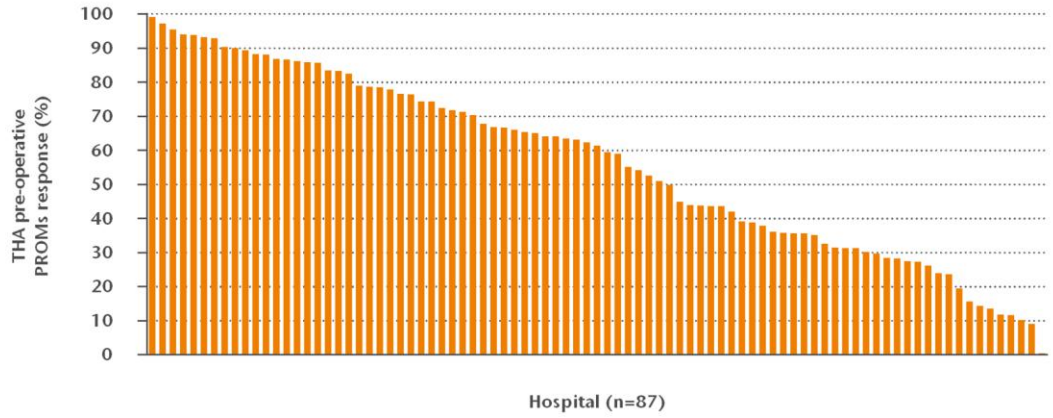
Results must be interpreted with caution. Patient characteristics like age and diagnosis, as well as procedure characteristics like the experience of the surgeon performing the procedure, femoral head size and articulation of the prosthesis may have influenced the cumulative revision percentages.

PROMs

Response

Pre-operative PROMs

FIGURE PRE-OPERATIVE PROMS RESPONSE PERCENTAGE OF PATIENTS WHO UNDERWENT A THA FOR OSTEOARTHRITIS PER PRE-OPERATIVE PROMS REGISTERING HOSPITAL IN THE NETHERLANDS IN 2017 (N=24,302).

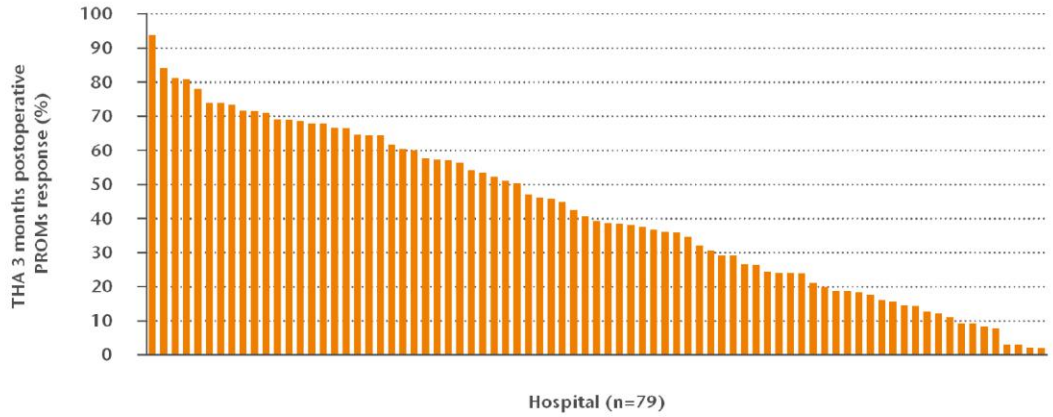


THA: total hip arthroplasty; PROM: patient reported outcome measure.

Of all 24,302 patients who underwent a THA for osteoarthritis in a pre-operative PROMs registering hospital, the mean pre-operative response score was 57.2% (n=13,907).

Three months postoperative PROMs

FIGURE THREE MONTHS POSTOPERATIVE PROMS RESPONSE PERCENTAGE OF PATIENTS WHO UNDERWENT A THA FOR OSTEOARTHRITIS (BETWEEN JANUARY 1ST AND OCTOBER 1ST) PER PRE-OPERATIVE PROMS REGISTERING HOSPITAL IN THE NETHERLANDS IN 2017 (N=17,938).

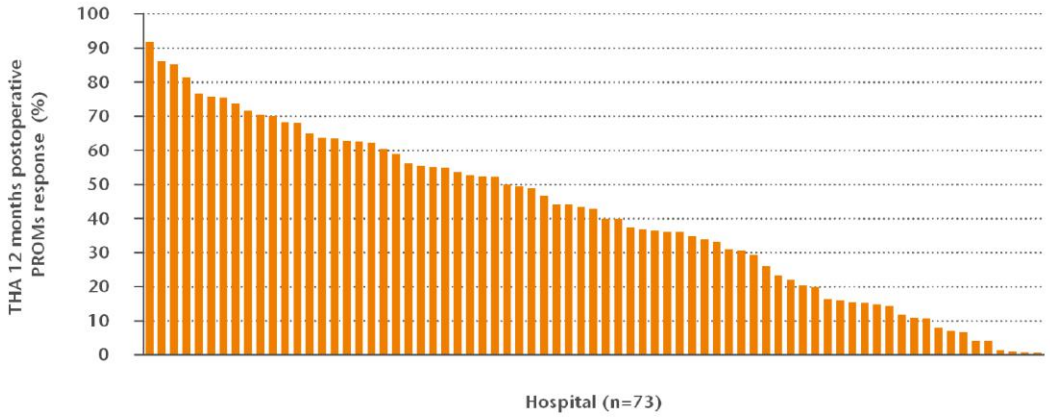


Please note: Of all hospitals in which pre-operative PROMs were registered in 2017, 7 hospitals did not register three months postoperative PROMs. One hospital registered three months postoperative PROMs after October 1st in 2017.
THA: total hip arthroplasty; PROM: patient reported outcome measure.

Of all 17,938 patients who underwent a THA for osteoarthritis in a pre-operative PROMs registering hospital between January 1st and October 1st 2017, the mean response rate of three months postoperative PROMs was 41.1% (n=7,371). The mean response rate of both pre-operative and three months postoperative PROMs was 36.9% (n=6,620).

Twelve months postoperative PROMs

FIGURE TWELVE MONTHS POSTOPERATIVE PROMS RESPONSE PERCENTAGE OF PATIENTS WHO UNDERWENT A THA FOR OSTEOARTHRITIS PER PRE-OPERATIVE PROMS REGISTERING HOSPITAL IN THE NETHERLANDS IN 2016 (N=23,044).



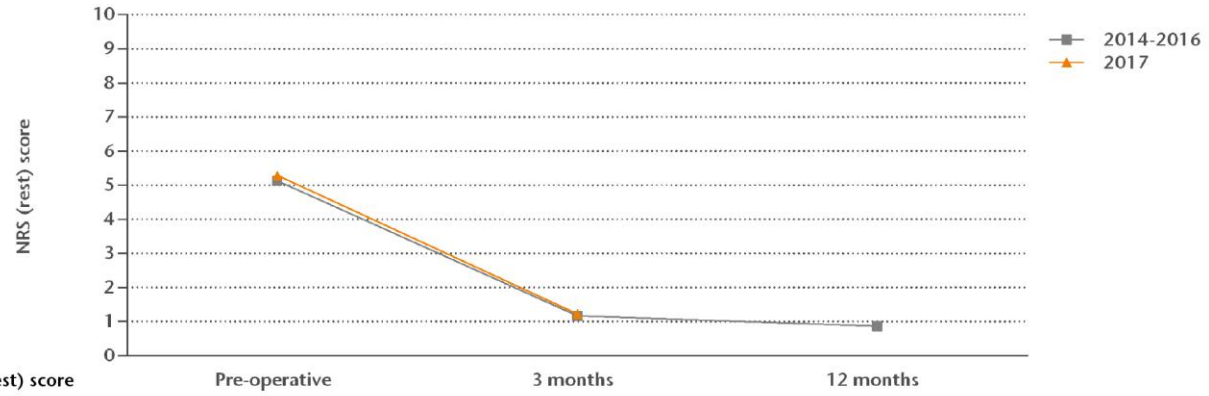
Please note: Of all hospitals in which pre-operative PROMs were registered in 2016 (n=82), 9 hospitals did not register twelve months postoperative PROMs.
The twelve months postoperative PROMs response is not yet available for 2017.
THA: total hip arthroplasty; PROM: patient reported outcome measure.

Of all 23,044 patients who underwent a THA for osteoarthritis in a pre-operative PROMs registering hospital in 2016, the mean response rate of twelve months postoperative PROMs was 39.3% (n=9,047). The mean response rate of both pre-operative and twelve months postoperative PROMs was 34.1% (n=7,867).

Mean scores (preoperative, 3 months and 12 months)

NRS (rest)

FIGURE MEAN PRE-OPERATIVE, 3 MONTHS AND 12 MONTHS NRS (REST) SCORES OF PATIENTS WHO UNDERWENT A THA FOR OSTEOARTHRITIS IN THE NETHERLANDS IN 2014-2017.



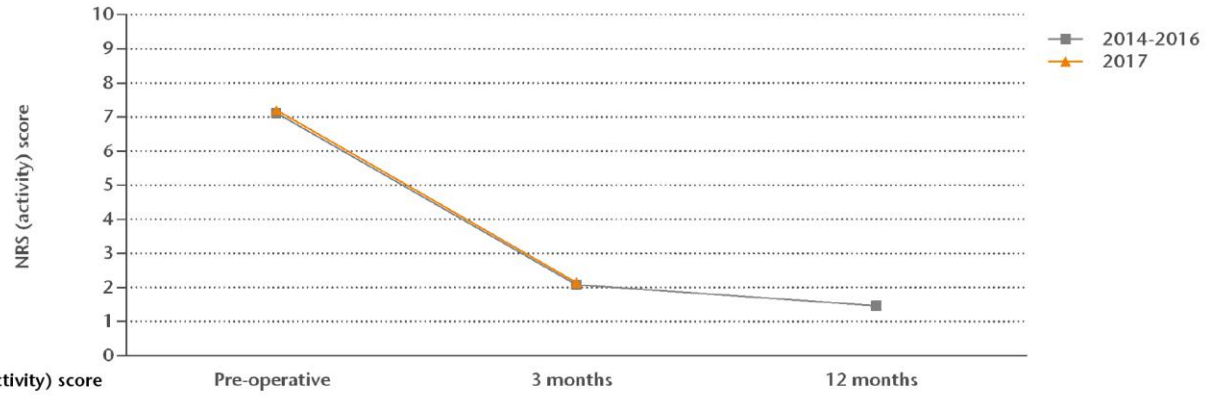
Year of THA	n	mean (95% CI)	n	mean (95% CI)	n	mean (95% CI)
2014-2016	25,492	5.1 (5.1-5.2)	18,383	1.2 (1.1-1.2)	18,345	0.9 (0.8-0.9)
2017	13,809	5.3 (5.2-5.3)	8,831	1.2 (1.2-1.3)	n.a.	n.a.
Total	39,301	5.2 (5.2-5.2)	27,214	1.2 (1.2-1.2)	18,345	0.9 (0.8-0.9)

Please note: The 12 months NRS (rest) score is not (yet) available for 2017.
THA: total hip arthroplasty.

The NRS (rest) score measures pain during rest. The score has a range of 0.0 to 10.0, with 0.0 representing no pain and 10.0 representing the most possible pain.

NRS (activity)

FIGURE MEAN PRE-OPERATIVE, 3 MONTHS AND 12 MONTHS NRS (ACTIVITY) SCORES OF PATIENTS WHO UNDERWENT A THA FOR OSTEOARTHRITIS IN THE NETHERLANDS IN 2014-2017.



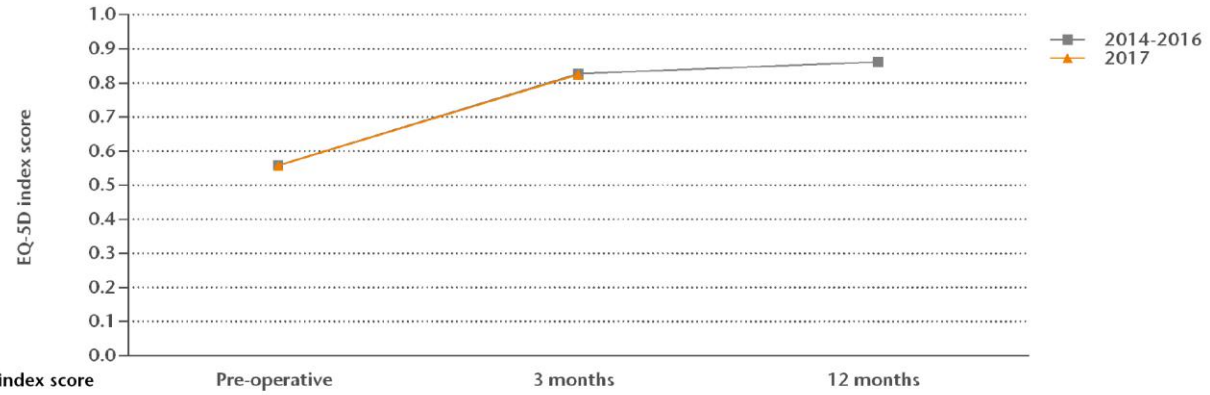
Year of THA	n	mean (95% CI)	n	mean (95% CI)	n	mean (95% CI)
2014-2016	25,547	7.1 (7.1-7.1)	18,430	2.1 (2.1-2.1)	18,397	1.5 (1.4-1.5)
2017	13,814	7.2 (7.2-7.2)	8,842	2.1 (2.1-2.2)	n.a.	n.a.
Total	39,361	7.1 (7.1-7.2)	27,272	2.1 (2.1-2.1)	18,397	1.5 (1.4-1.5)

Please note: The 12 months NRS (activity) score is not (yet) available for 2017.
THA: total hip arthroplasty.

The NRS (activity) score measures pain during activity. The score has a range of 0.0 to 10.0, with 0.0 representing no pain and 10.0 representing the most possible pain.

EQ5D index score

FIGURE MEAN PRE-OPERATIVE, 3 MONTHS AND 12 MONTHS EQ-5D INDEX SCORES OF PATIENTS WHO UNDERWENT A THA FOR OSTEOARTHRITIS IN THE NETHERLANDS IN 2014-2017.



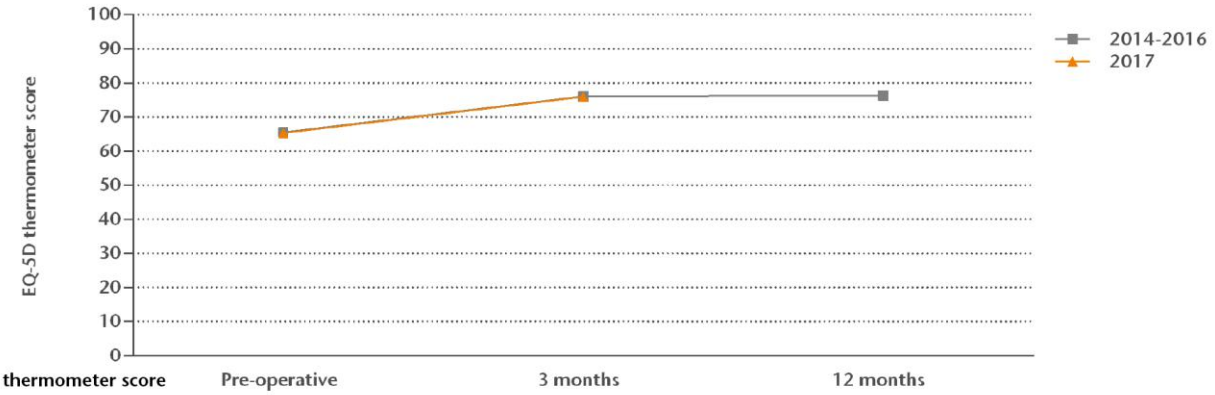
Year of THA	n	mean (95% CI)	n	mean (95% CI)	n	mean (95% CI)
2014-2016	26,076	0.56 (0.55-0.56)	18,318	0.83 (0.82-0.83)	19,022	0.86 (0.86-0.86)
2017	13,738	0.56 (0.55-0.56)	8,775	0.82 (0.82-0.83)	n.a.	n.a.
Total	39,814	0.56 (0.56-0.56)	27,093	0.83 (0.82-0.83)	19,022	0.86 (0.86-0.86)

Please note: The 12 months EQ-5D index score is not (yet) available for 2017.
THA: total hip arthroplasty.

The EQ-5D index score measures quality of life. The score has a range of -0.329 to 1.0, with 1.0 representing the best possible quality of life.

EQ5D thermometer

FIGURE MEAN PRE-OPERATIVE, 3 MONTHS AND 12 MONTHS EQ-5D THERMOMETER SCORES OF PATIENTS WHO UNDERWENT A THA FOR OSTEOARTHRITIS IN THE NETHERLANDS IN 2014-2017.



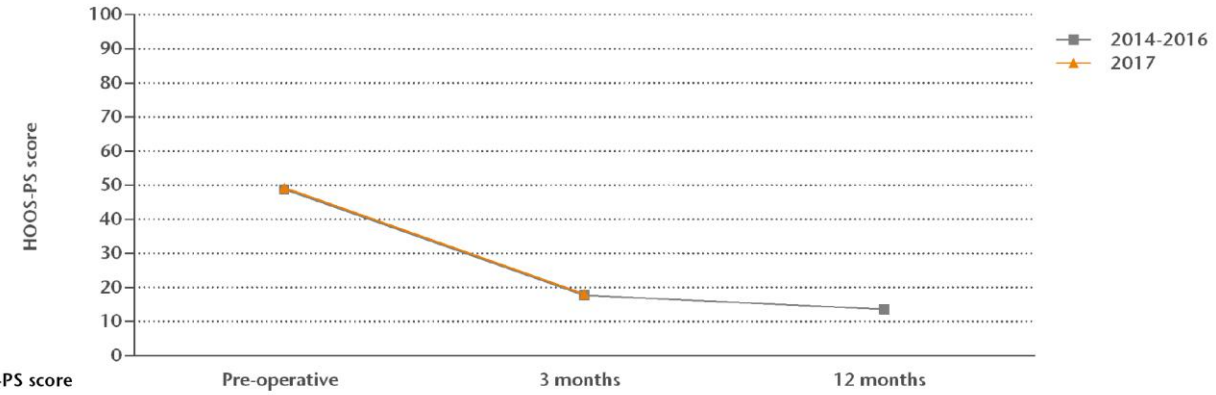
Year of THA	n	mean (95% CI)	n	mean (95% CI)	n	mean (95% CI)
2014-2016	25,814	65.5 (65.2-65.7)	18,397	76.0 (75.8-76.3)	19,250	76.3 (76.0-76.6)
2017	13,731	65.3 (65.0-65.6)	8,853	75.9 (75.5-76.3)	n.a.	n.a.
Total	39,545	65.4 (65.2-65.6)	27,250	76.0 (75.8-76.2)	19,250	76.3 (76.0-76.6)

Please note: The 12 months EQ-5D thermometer score is not (yet) available for 2017.
THA: total hip arthroplasty.

The EQ-5D thermometer score measures the health situation. The score has a range of 0.0 to 100.0, with 0.0 representing the worst possible health situation and 100.0 the best possible health situation.

HOOS-PS score

FIGURE MEAN PRE-OPERATIVE, 3 MONTHS AND 12 MONTHS HOOS-PS SCORES OF PATIENTS WHO UNDERWENT A THA FOR OSTEOARTHRITIS IN THE NETHERLAND S IN 2014-2017.



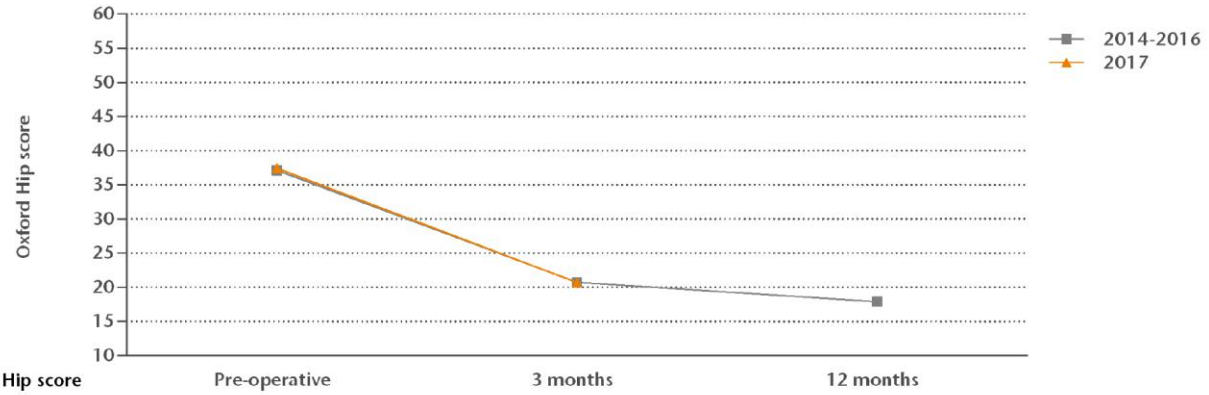
Year of THA	n	mean (95% CI)	n	mean (95% CI)	n	mean (95% CI)
2014-2016	24,214	48.8 (48.6-49.0)	16,631	17.7 (17.5-17.9)	17,533	13.6 (13.4-13.8)
2017	13,064	49.3 (49.0-49.6)	8,008	18.1 (17.8-18.5)	n.a.	n.a.
Total	37,278	49.0 (48.8-49.2)	24,639	17.8 (17.7-18.0)	17,533	13.6 (13.4-13.8)

Please note: The 12 months HOOS-PS score is not (yet) available for 2017.
THA: total hip arthroplasty.

The HOOS-PS score measures the physical functioning of patients with osteoarthritis to the hip. The score has a range of 0.0 to 100.0, with 0.0 representing no effort and 100.0 the most possible effort.

Oxford Hip score

FIGURE MEAN PRE-OPERATIVE, 3 MONTHS AND 12 MONTHS OXFORD HIP SCORES OF PATIENTS WHO UNDERWENT A THA FOR OSTEOARTHRITIS IN THE NETHERLANDS IN 2014-2017.



Year of THA	n	mean (95% CI)	n	mean (95% CI)	n	mean (95% CI)
2014-2016	22,771	37.1 (37.0-37.2)	15,887	20.7 (20.6-20.8)	16,647	17.9 (17.8-18.0)
2017	12,402	37.5 (37.3-37.6)	7,735	20.7 (20.5-20.8)	n.a.	n.a.
Total	35,173	37.2 (37.1-37.3)	23,622	20.7 (20.6-20.8)	16,647	17.9 (17.8-18.0)

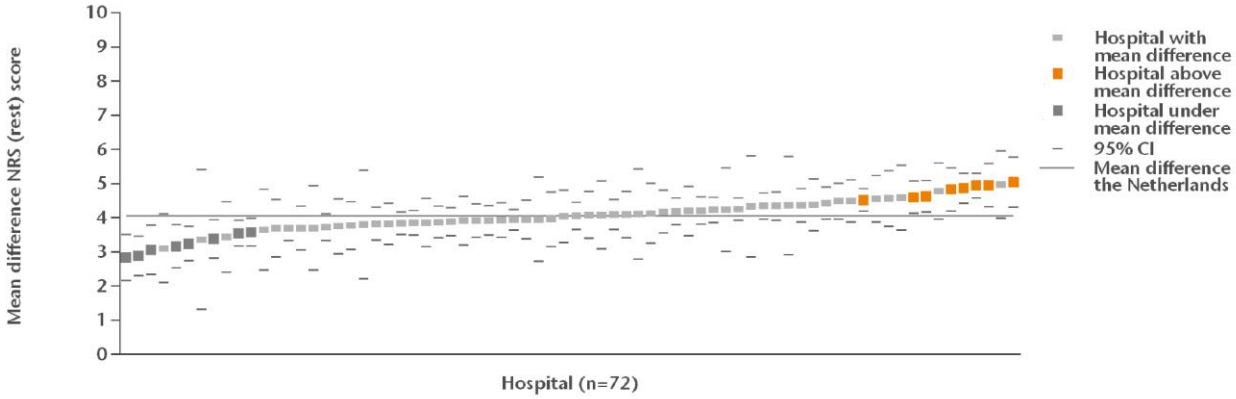
Please note: The 12 months Oxford Hip score is not (yet) available for 2017.
THA: total hip arthroplasty.

The Oxford Hip score measures the physical functioning and pain of patients with osteoarthritis to the hip. The score has a range of 12.0 to 60.0, with 12.0 representing no functional disability and 60.0 the most possible functional disability.

Mean differences (preoperative and 3 months) per hospital

NRS (rest)

FIGURE MEAN DIFFERENCE BETWEEN PRE-OPERATIVE AND 3 MONTHS POSTOPERATIVE NRS (REST) SCORES OF PATIENTS WHO UNDERWENT A THA FOR OSTEOARTHRITIS PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=7,829).

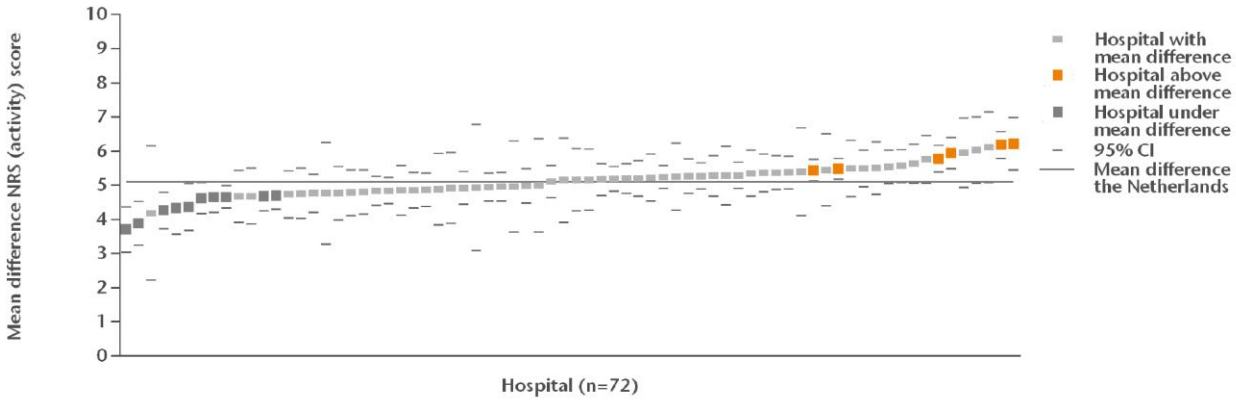


Please note: The 72 hospitals with a minimum of 10 PROMs (mean differences in NRS (rest) score) were included in this figure.
THA: total hip arthroplasty.

The mean difference between pre-operative and 3 months postoperative NRS (rest) scores of patients who underwent a THA for osteoarthritis in the Netherlands in 2017 was 4.0 (95% CI: 4.0-4.1).

NRS (activity)

FIGURE MEAN DIFFERENCE BETWEEN PRE-OPERATIVE AND 3 MONTHS POSTOPERATIVE NRS (ACTIVITY) SCORES OF PATIENTS WHO UNDERWENT A THA FOR OSTEOARTHRITIS PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=7,838).

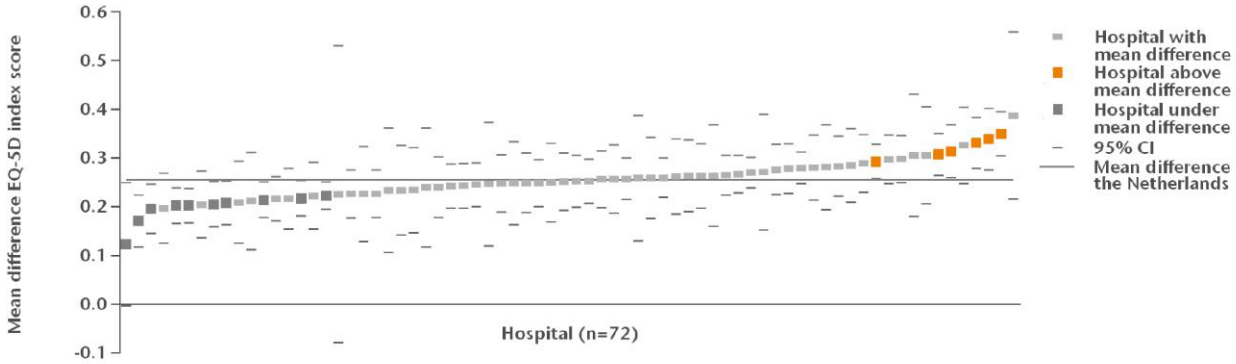


Please note: The 72 hospitals with a minimum of 10 PROMs (mean differences in NRS (activity) score) were included in this figure.
THA: total hip arthroplasty.

The mean difference between pre-operative and 3 months postoperative NRS (activity) scores of patients who underwent a THA for osteoarthritis in the Netherlands in 2017 was 5.1 (95% CI: 5.0-5.2).

EQ5D index score

FIGURE MEAN DIFFERENCE BETWEEN PRE-OPERATIVE AND 3 MONTHS POSTOPERATIVE EQ-5D INDEX SCORES OF PATIENTS WHO UNDERWENT A THA FOR OSTEOARTHRITIS PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=7,758).

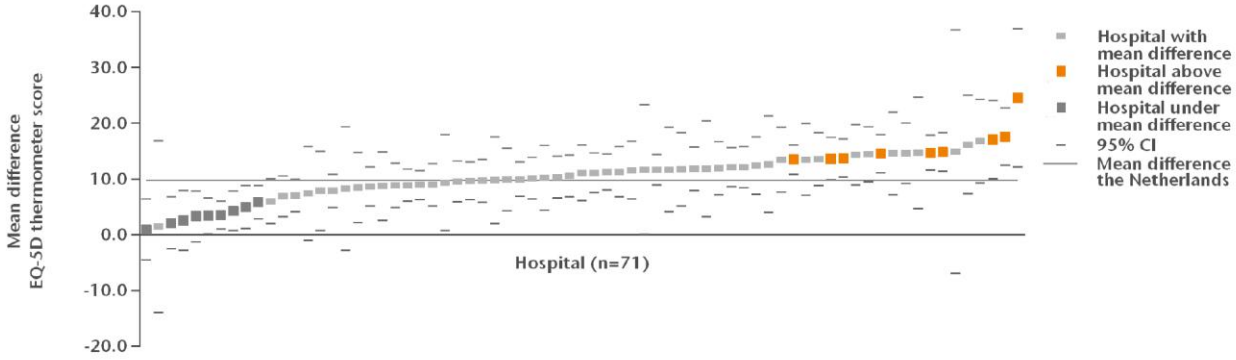


Please note: The 72 hospitals with a minimum of 10 PROMs (mean differences in EQ-5D index score) were included in this figure.
THA: total hip arthroplasty.

The mean difference between pre-operative and 3 months postoperative EQ-5D index scores of patients who underwent a THA for osteoarthritis in the Netherlands in 2017 was 0.25 (95% CI: 0.25-0.26).

EQ5D thermometer

FIGURE MEAN DIFFERENCE BETWEEN PRE-OPERATIVE AND 3 MONTHS POSTOPERATIVE EQ-5D THERMOMETER SCORES OF PATIENTS WHO UNDERWENT A THA FOR OSTEOARTHRITIS PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=7,852).

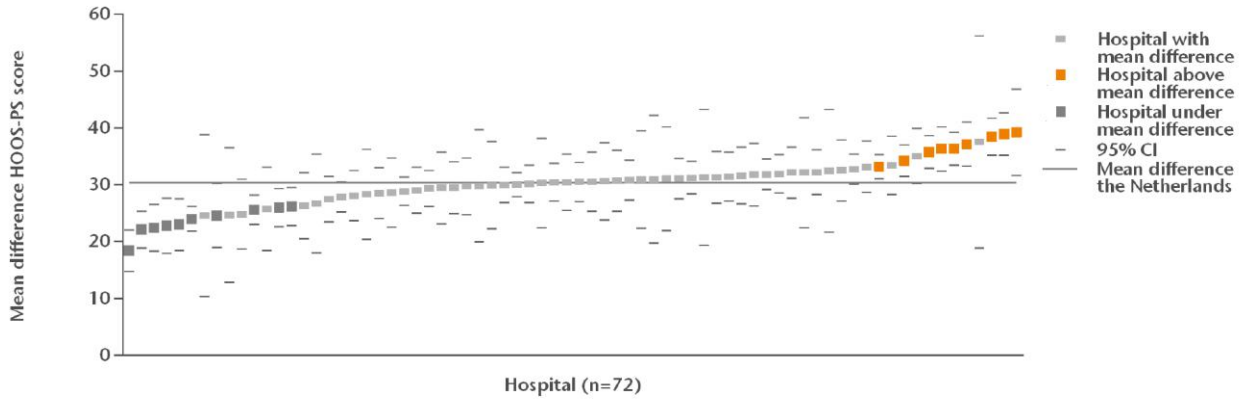


Please note: The 71 hospitals with a minimum of 10 PROMs (mean differences in EQ-5D thermometer score) were included in this figure.
THA: total hip arthroplasty.

The mean difference between pre-operative and 3 months postoperative EQ-5D thermometer scores of patients who underwent a THA for osteoarthritis in the Netherlands in 2017 was 9.8 (95% CI: 9.3-10.3).

HOOS-PS score

FIGURE MEAN DIFFERENCE BETWEEN PRE-OPERATIVE AND 3 MONTHS POSTOPERATIVE HOOS-PS SCORES OF PATIENTS WHO UNDERWENT A THA FOR OSTEOARTHRITIS PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=6,941).

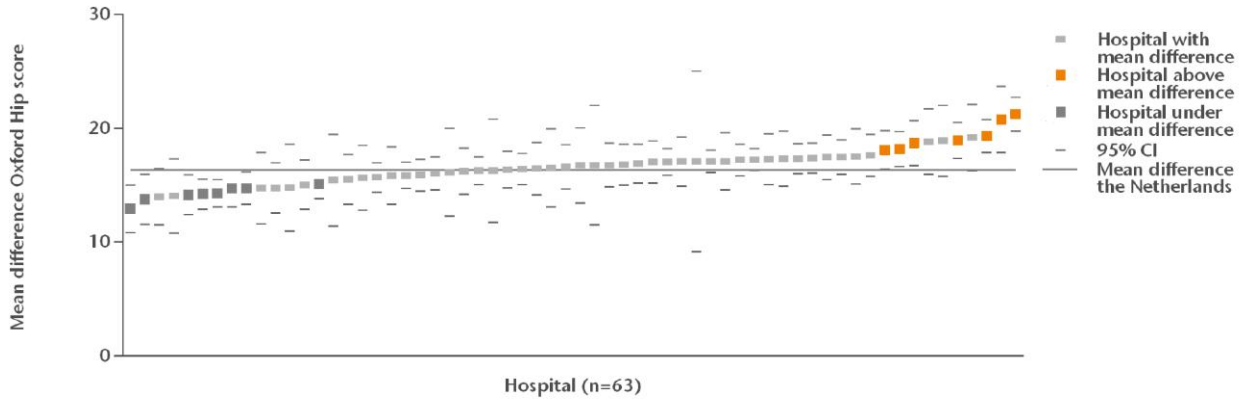


Please note: The 72 hospitals with a minimum of 10 PROMs (mean differences in HOOS-PS score) were included in this figure.
THA: total hip arthroplasty.

The mean difference between pre-operative and 3 months postoperative HOOS-PS scores of patients who underwent a THA for osteoarthritis in the Netherlands in 2017 was 30.4 (95% CI: 30.0-30.9).

Oxford Hip score

FIGURE MEAN DIFFERENCE BETWEEN PRE-OPERATIVE AND 3 MONTHS POSTOPERATIVE OXFORD HIP SCORES OF PATIENTS WHO UNDERWENT A THA FOR OSTEOARTHRITIS PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=6,862).



Please note: The 63 hospitals with a minimum of 10 PROMs (mean differences in Oxford Hip score) were included in this figure.
THA: total hip arthroplasty.

The mean difference between pre-operative and 3 months postoperative Oxford Hip scores of patients who underwent a THA for osteoarthritis in the Netherlands in 2017 was 16.4 (95% CI: 16.1-16.6).

Knee arthroplasty

Numbers

Procedures 2010-2017

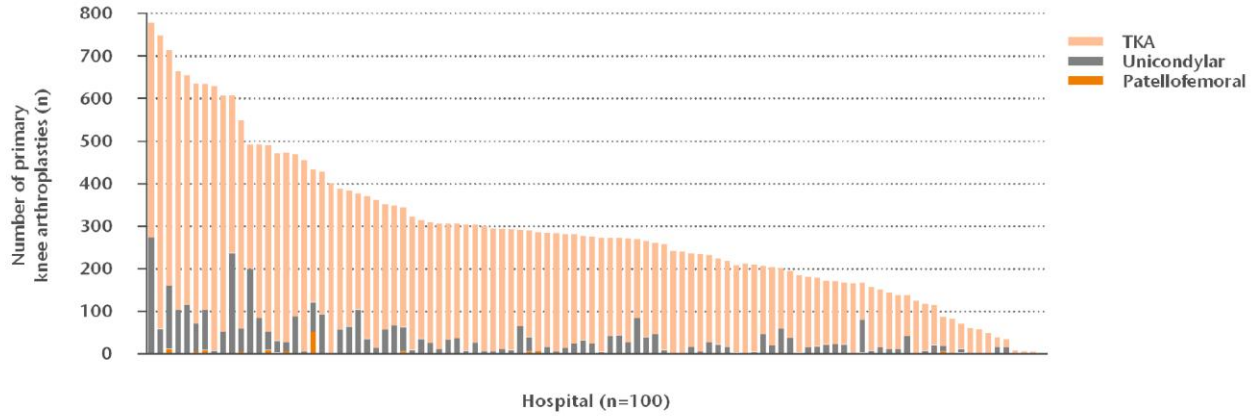
FIGURE NUMBER OF PRIMARY KNEE ARTHROPLASTIES AND KNEE REVISION ARTHROPLASTIES REGISTERED IN THE LROI IN THE NETHERLANDS IN 2010-2017.

Year	2010	2011	2012	2013	2014	2015	2016	2017	Total
Type of procedure									
Primary knee arthroplasty (n)	20,594	21,425	23,720	24,457	26,838	27,136	28,063	29,221	201,454
Knee revision arthroplasty (n)	1,624	1,794	2,115	2,309	2,559	2,684	2,923	3,037	19,045
Total (n)	22,218	23,219	25,835	26,766	29,397	29,820	30,986	32,258	220,499

Out of 29,221 primary knee arthroplasties that were performed in 2017, 3% (n=924) was performed bilaterally.

Type of primary knee prosthesis per hospital

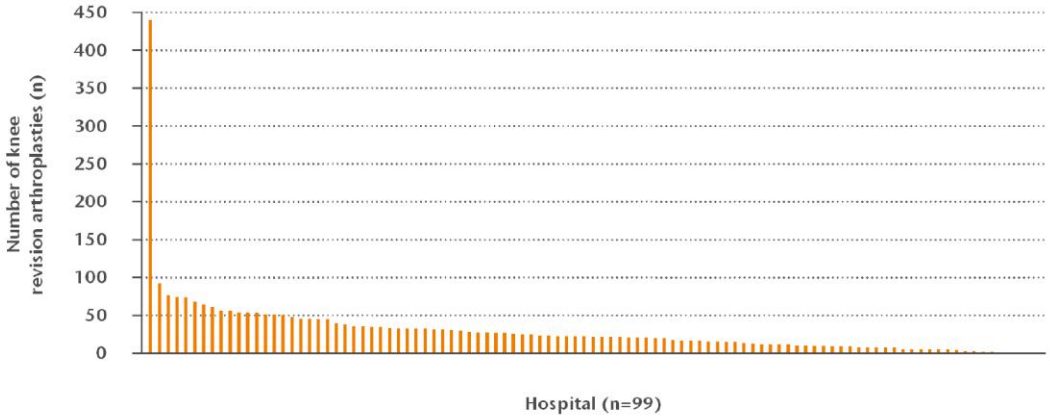
FIGURE NUMBER OF PRIMARY KNEE ARTHROPLASTIES BY TYPE OF PROSTHESIS PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=29,221).



Please note: In 2017, 12 (0.04%) primary knee arthroplasties were registered in the LROI as other type of primary knee arthroplasty. Of 33 (0.1%) primary knee arthroplasties, the type of prosthesis was not registered.
TKA: total knee arthroplasty.

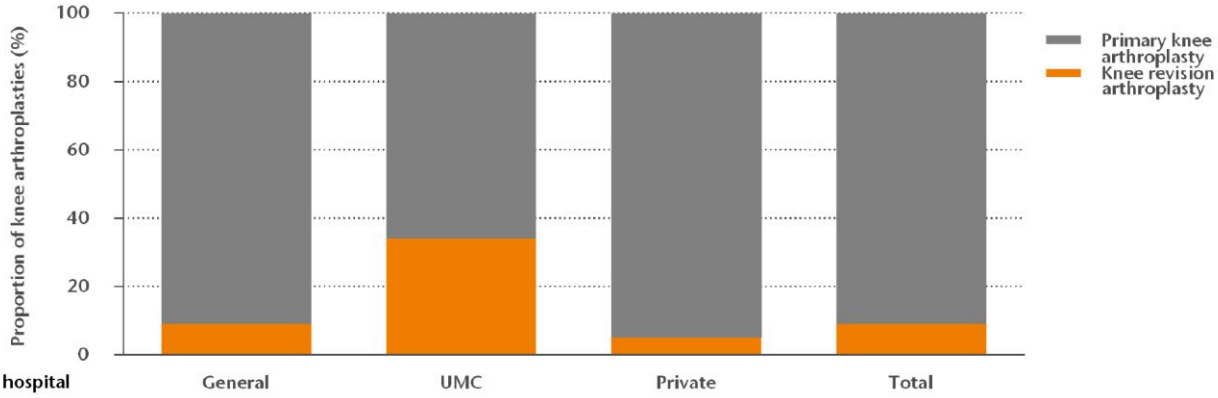
Revisions per hospital

FIGURE NUMBER OF KNEE REVISION ARTHROPLASTIES PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=3,037).



Type of procedure by type of hospital

FIGURE PRIMARY KNEE ARTHROPLASTIES AND KNEE REVISION ARTHROPLASTIES (PROPORTION [%] PER CATEGORY) BY TYPE OF HOSPITAL IN THE NETHERLANDS IN 2017.

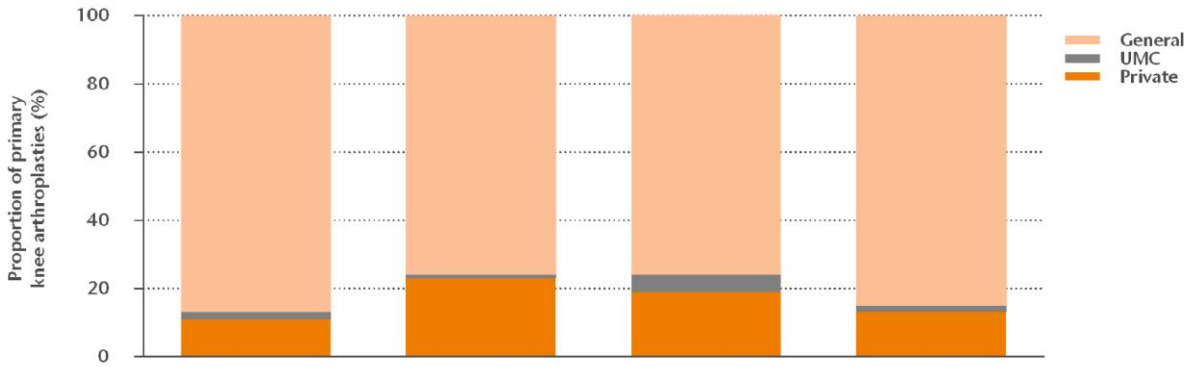


Type of hospital	General	UMC	Private	Total
Type of procedure				
Primary knee arthroplasty (%)	90.8	66.4	94.8	90.6
Knee revision arthroplasty (%)	9.2	33.6	5.2	9.4
Total (n)	27,443	944	3,871	32,258

General: general hospital; UMC: university medical centre; Private: private hospital.

Type of primary knee prosthesis by type of hospital

FIGURE TYPE OF HOSPITAL (PROPORTION [%] PER CATEGORY) BY TYPE OF PRIMARY KNEE ARTHROPLASTY IN THE NETHERLANDS IN 2017.

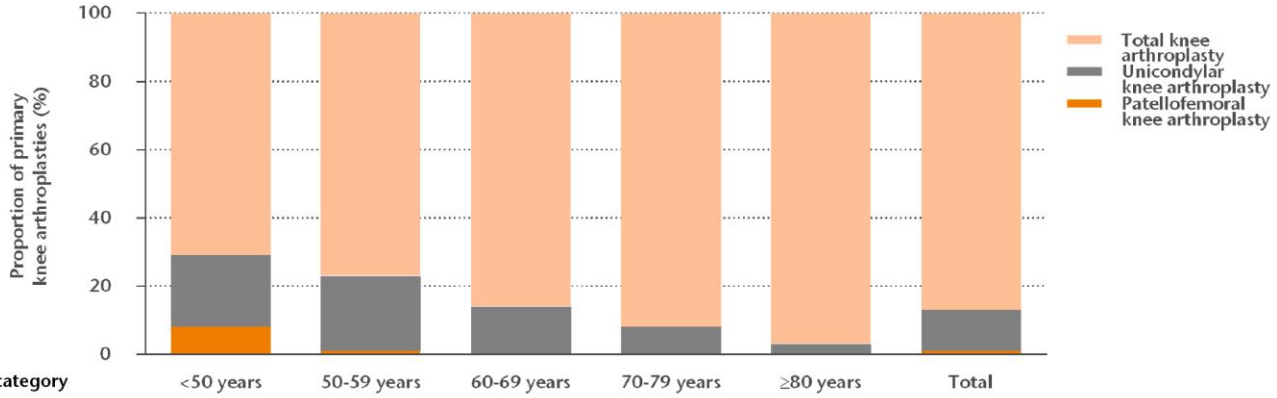


Type of primary knee arthroplasty	Total knee arthroplasty	Unicondylar knee arthroplasty	Patellofemoral knee arthroplasty	Total
Type of hospital				
General (%)	86.7	75.9	76.6	85.3
UMC (%)	2.3	0.8	4.8	2.1
Private (%)	11.0	23.3	18.6	12.6
Total (n)	25,400	3,609	167	29,221

Please note: In 2017, 12 (0.04%) primary knee arthroplasties were registered in the LROI as other type of primary knee arthroplasty. Of 33 (0.1%) primary knee arthroplasties, the type of prosthesis was not registered.
General: general hospital; UMC: university medical centre; Private: private hospital.

Type of primary knee prosthesis by age category

FIGURE TYPE OF PRIMARY KNEE ARTHROPLASTY (PROPORTION [%] PER CATEGORY) OF PATIENTS WHO UNDERWENT A PRIMARY KNEE ARTHROPLASTY FOR THE FIRST TIME BY AGE CATEGORY IN THE NETHERLANDS IN 2017.



Age category	<50 years	50-59 years	60-69 years	70-79 years	≥80 years	Total
Type of primary knee arthroplasty						
Total knee arthroplasty (%)	70.9	77.1	85.6	91.7	96.5	87.1
Unicondylar knee arthroplasty (%)	20.7	21.9	14.0	8.2	3.4	12.3
Patellofemoral knee arthroplasty (%)	8.2	1.0	0.4	0.1	0.0	0.6
Other (%)	0.3	0.0	0.0	0.0	0.1	0.0
Total (n)	793	4,538	10,035	9,895	3,001	28,262

Please note: The proportion of other primary knee arthroplasties was too small to show in this figure.

Primary knee arthroplasty

Demographics

Patient characteristics

By type of knee prosthesis

TABLE PATIENT CHARACTERISTICS OF ALL PATIENTS WITH A REGISTERED PRIMARY KNEE ARTHROPLASTY BY TYPE OF PRIMARY KNEE ARTHROPLASTY IN THE NETHERLANDS IN 2017.

	Total knee arthroplasty (n=24,623)	Unicondylar knee arthroplasty (n=3,475)	Patellofemoral knee arthroplasty (n=160)	Total[1] (n=28,297)
Completeness (%)				100
Mean age (years) (SD)	68.6 (9.3)	63.6 (8.9)	53.4 (9.6)	67.9 (9.5)
Age (years) (%)				
<50	2	5	40	3
50-59	14	29	29	16
60-69	35	40	26	35
70-79	37	23	5	35
≥80	12	3	0	11
Gender (%)				
Men	36	44	22	37
Women	64	56	78	63
ASA score (%)				
I	12	21	31	13
II	68	66	63	68
III-IV	20	13	6	19
Type of hospital[2] (%)				
General	87	76	78	85
UMC	2	1	4	2
Private	11	23	18	13
Diagnosis (%)				
Osteoarthrosis	96	99	97	97
Post-traumatic	2	0	3	1
Rheumatoid arthritis	1	0	0	1
Osteonecrosis	1	1	0	1
Other	0	0	0	0
Charnley score (%)				
A One knee joint affected	42	56	54	44
B1 Both knee joints affected	35	29	34	34
B2 Contralateral knee joint with a total knee prosthesis	19	14	11	19
C Multiple joints affected or chronic disease that affects quality of life	4	1	1	3
Body Mass Index (kg/m²) (%)				
Underweight (≤18.5)	0	0	0	0
Normal weight (>18,5-25)	17	17	22	17
Overweight (>25-30)	41	44	42	41
Obesity (>30-40)	38	37	33	38
Morbid obesity (>40)	4	2	3	4
Smoking (%)				
No	91	89	90	91
Yes	9	11	10	9

[1] Also contains 10 (0.04%) primary knee arthroplasties that were registered as other and 29 (0.1%) primary knee arthroplasties of which the type of prosthesis had not been registered.
[2] In 2017, 77 general hospitals, 8 UMCs and 15 private hospitals performed primary knee arthroplasties.
General: general hospital; UMC: university medical centre; Private: private hospital; SD: standard deviation.

By diagnosis

TABLE PATIENT CHARACTERISTICS OF ALL PATIENTS WITH A REGISTERED PRIMARY KNEE ARTHROPLASTY BY DIAGNOSIS IN THE NETHERLANDS IN 2017.

	Osteoarthritis (n=27,288)	Post-traumatic (n=402)	Rheumatoid arthritis (n=338)	Osteonecrosis (n=127)	Total (n=28,297)
Mean age (years) (SD)	68.0 (9.4)	61.7 (10.8)	66.0 (10.9)	67.7 (11.8)	67.9 (9.5)
Age (years) (%)					
<50	2	12	6	6	3
50-59	16	30	20	16	16
60-69	36	33	34	28	35
70-79	35	20	31	34	35
≥80	11	5	9	16	11
Gender (%)					
Men	37	38	25	34	37
Women	63	62	75	66	63
ASA score (%)					
I 13	21	3	13	13	
II 68	65	66	64	68	
III-IV	19	14	31	23	19
Type of hospital (%)					
General	85	80	87	89	85
UMC	2	9	8	4	2
Private	13	11	5	7	13
Charnley score (%)					
A One knee joint affected	43	79	29	78	44
B1 Both knee joints affected	35	12	36	15	34
B2 Contralateral knee joint with a total knee prosthesis	19	7	16	6	19
C Multiple joints affected or chronic disease that affects quality of life	3	2	19	1	3
Body Mass Index (kg/m²) (%)					
Underweight (≤18.5)	0	0	1	1	0
Normal weight (>18,5-25)	17	25	25	28	17
Overweight (>25-30)	41	46	37	40	41
Obesity (>30-40)	38	27	35	29	38
Morbid obesity (>40)	4	2	2	2	4
Smoking (%)					
No	91	79	89	89	91
Yes	9	21	11	11	9

Please note: In 2017, 99 (0.3%) patients had a primary knee arthroplasty after a diagnosis that is not listed in the table. Of 43 (0.2%) primary knee arthroplasties the diagnosis was not registered.
General: general hospital; UMC: university medical centre; Private: private hospital; SD: standard deviation.

Previous surgery

TABLE PREVIOUS SURGERIES TO THE SAME JOINT IN PATIENTS WHO UNDERWENT A PRIMARY KNEE ARTHROPLASTY IN THE NETHERLANDS IN 2017 (N=28,158).

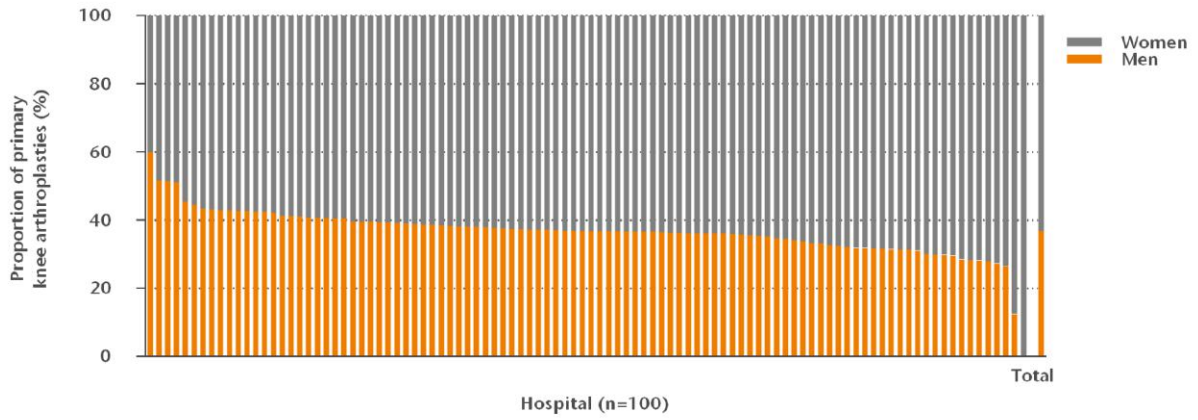
	Proportion[1] (%)
Previous surgery to the relevant knee (total)	28.2
Meniscectomy	22.4
Arthroscopy	17.3
Osteotomy	2.9
Osteosynthesis	1.5
ACL reconstruction	1.5
Synovectomy	0.8
Other	3.0

[1] A patient may have undergone multiple previous surgeries to the same joint. As such, the total proportion is more than the total proportion of patients with one or more previous surgeries to the same joint.

Practice variation

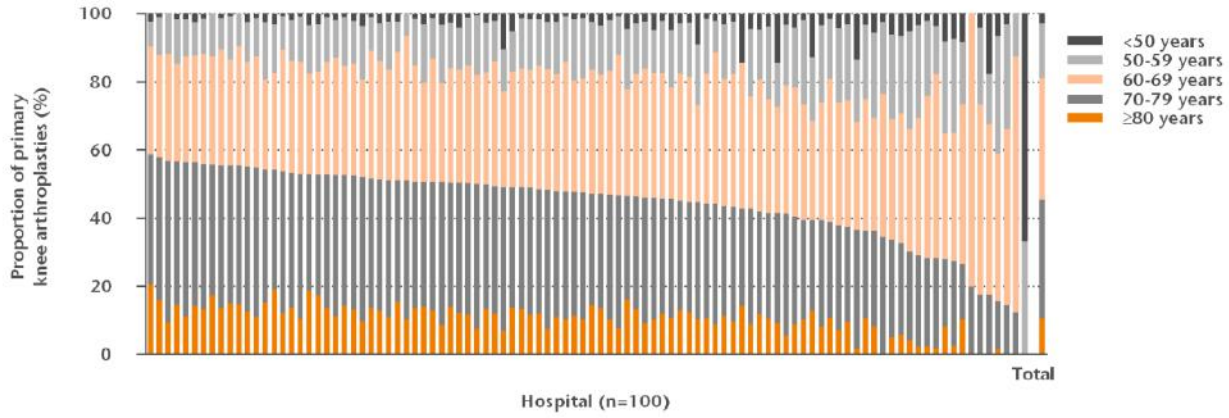
Gender

FIGURE DISTRIBUTION OF GENDER OF PATIENTS WHO UNDERWENT A PRIMARY KNEE ARTHROPLASTY PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=28,294).



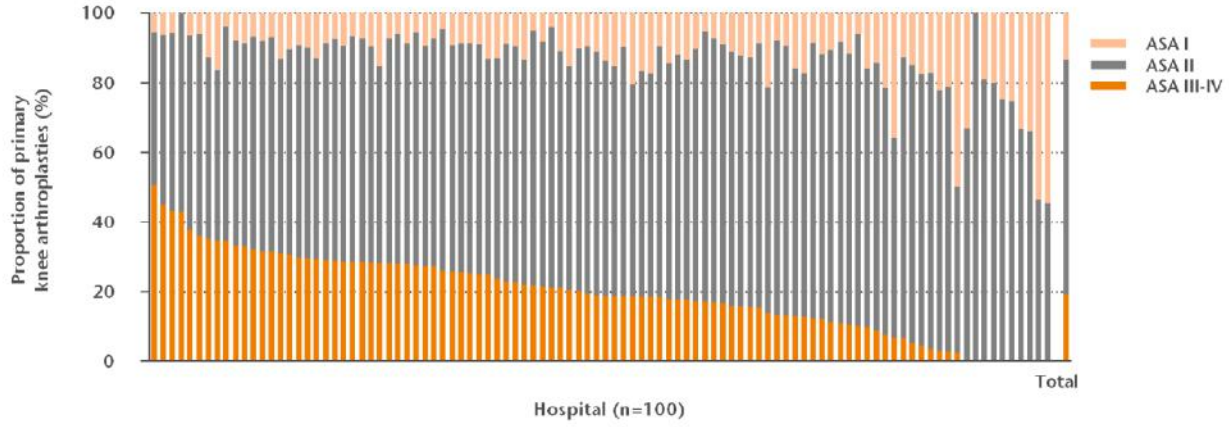
Age

FIGURE DISTRIBUTION OF AGE OF PATIENTS WHO UNDERWENT A PRIMARY KNEE ARTHROPLASTY PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=28,291).



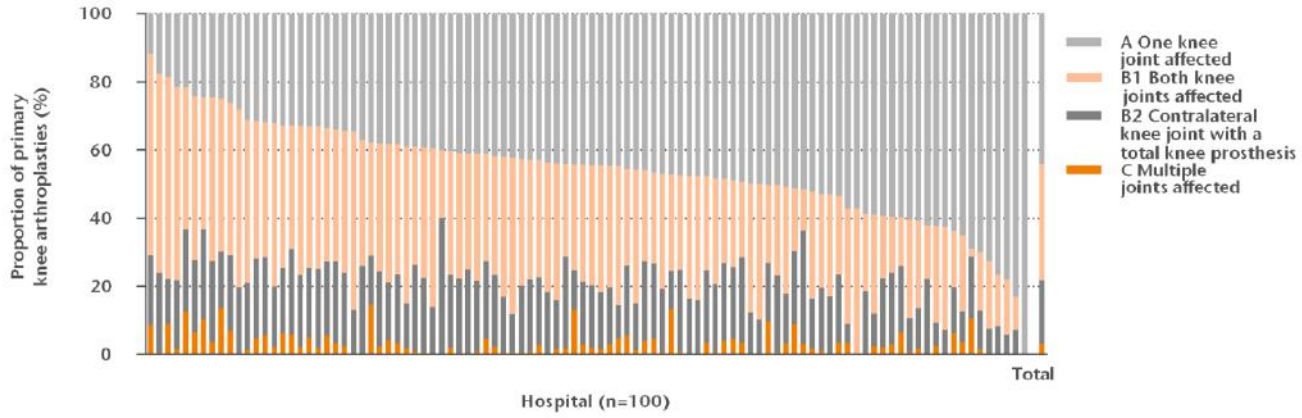
ASA score

FIGURE DISTRIBUTION OF ASA SCORE OF PATIENTS WHO UNDERWENT A PRIMARY KNEE ARTHROPLASTY PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=28,261).



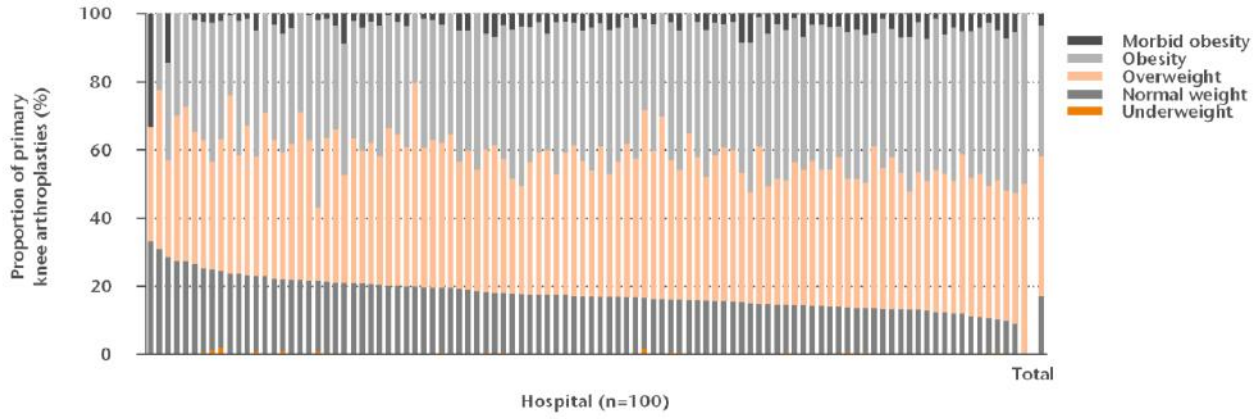
Charnley score

FIGURE DISTRIBUTION OF CHARNLEY SCORE OF PATIENTS WHO UNDERWENT A PRIMARY KNEE ARTHROPLASTY PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=28,062).



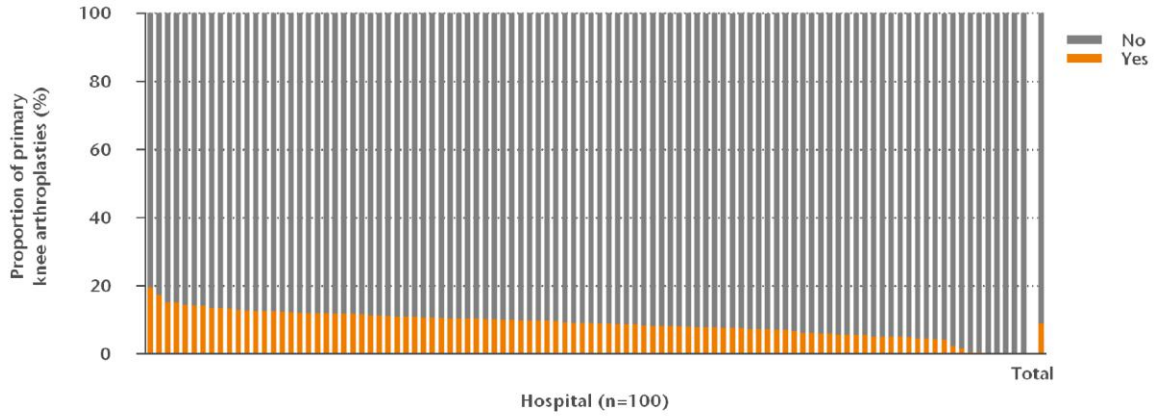
Body Mass Index

FIGURE DISTRIBUTION OF BODY MASS INDEX (KG/M²) OF PATIENTS WHO UNDERWENT A PRIMARY KNEE ARTHROPLASTY PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=28,188).



Smoking

FIGURE DISTRIBUTION OF SMOKING BY PATIENTS WHO UNDERWENT A PRIMARY KNEE ARTHROPLASTY PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=27,508).

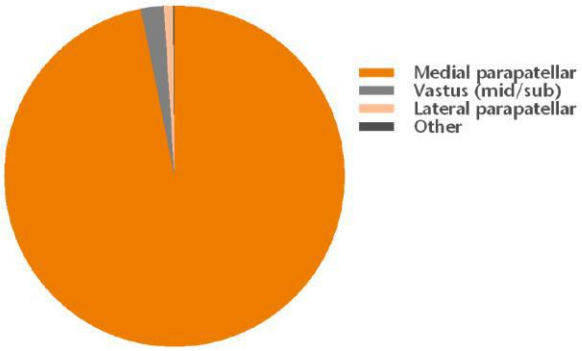


Total knee arthroplasty

Surgical techniques

Surgical approach

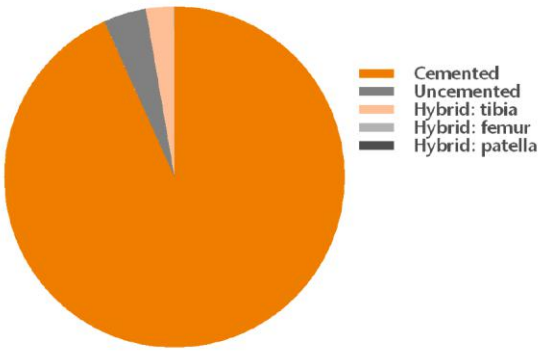
FIGURE SURGICAL APPROACH FOR PERFORMING A PRIMARY TOTAL KNEE ARTHROPLASTY IN THE NETHERLANDS IN 2017 (N=25,392).



Surgical approach	Number (n)	Proportion (%)
Medial parapatellar	24,583	96.8
Vastus (mid/sub)	553	2.2
Lateral parapatellar	224	0.9
Other	32	0.1

Fixation

FIGURE TYPE OF FIXATION IN PRIMARY TOTAL KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=25,286).

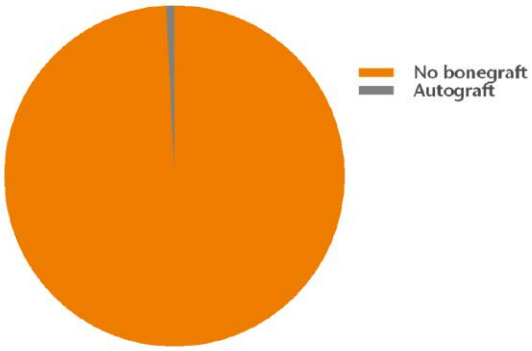


Fixation	Number (n)	Proportion (%)
Cemented	23,575	93.2
Uncemented	1,027	4.1
Hybrid: tibia	671	2.7
Hybrid: femur	10	0.0
Hybrid: patella	3	0.0

Prosthesis characteristics

Type of bonegraft

FIGURE TYPE OF BONEGRAFT IN PRIMARY TOTAL KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=25,361).

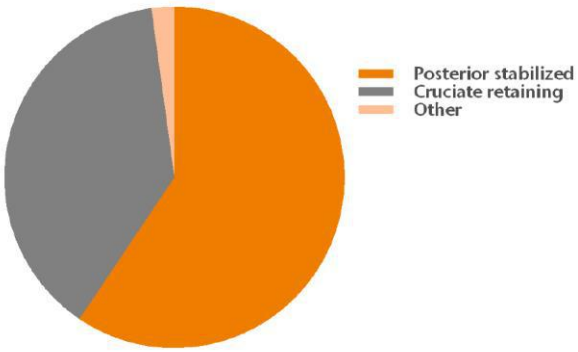


Type of bonegraft	Number (n)	Proportion (%)
No bonegraft	25,161	99.2
Autograft	193	0.8

Please note: Allograft was used in 6 (0.0%) primary total knee arthroplasties.
A combination of both was used in 1 (0.0%) primary total knee arthroplasty.

Type of femur component

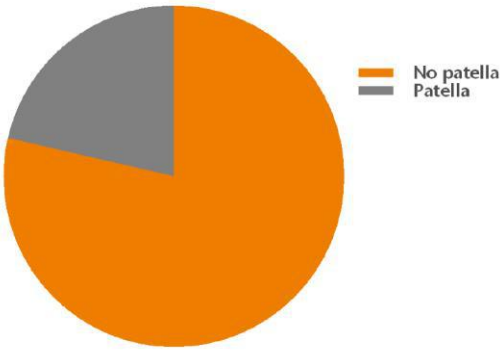
FIGURE TYPE OF FEMUR COMPONENT IN PRIMARY TOTAL KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=24,192).



Type of femur component	Number (n)	Proportion (%)
Posterior stabilized	14,375	59.5
Cruciate retaining	9,293	38.4
Other	524	2.1

Implantation of patella

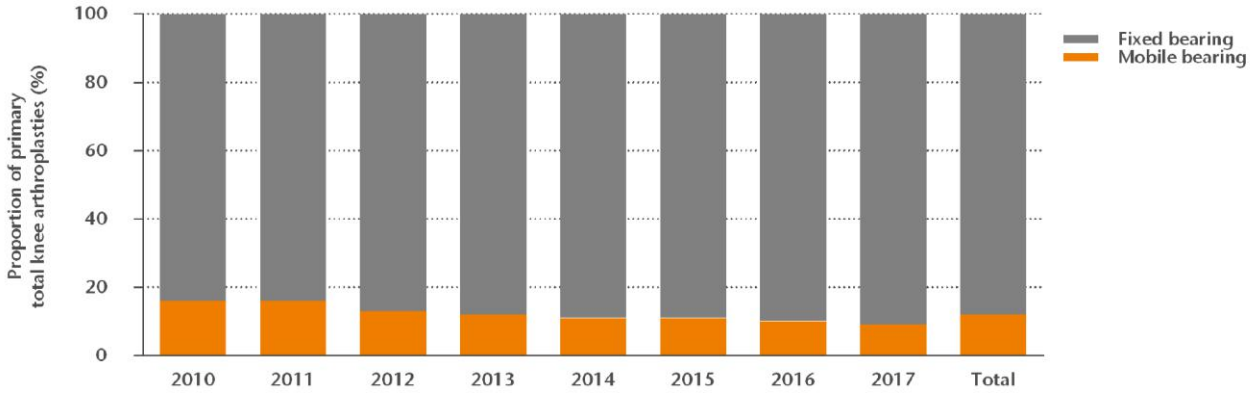
FIGURE IMPLANTATION OF PATELLA IN PRIMARY TOTAL KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=25,400).



Implantation of patella	Number (n)	Proportion (%)
No patella	19,967	78.6
Patella	5,433	21.4

Type of bearing 2010-2017

FIGURE TREND (PROPORTION [%] BY YEAR) IN USE OF MOBILE BEARING IN PRIMARY TOTAL KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2010-2017.

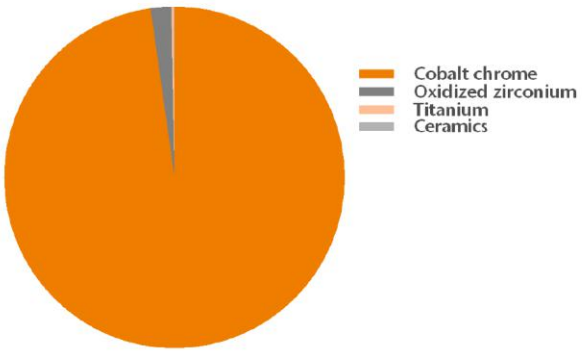


Year	2010	2011	2012	2013	2014	2015	2016	2017	Total
Type of bearing									
Fixed bearing (%)	84.5	84.2	86.7	87.6	88.6	89.4	90.2	90.5	87.9
Mobile bearing (%)	15.5	15.8	13.3	12.4	11.4	10.6	9.8	9.5	12.1
Total (n)	18,246	19,234	21,358	22,000	23,894	23,643	23,841	24,207	176,423

Materials

Femur component

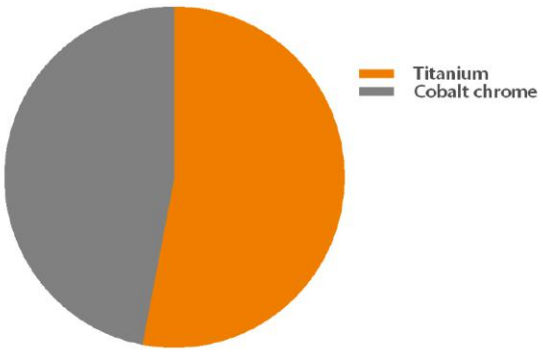
FIGURE FEMUR MATERIAL IN PRIMARY TOTAL KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=24,189).



Femur material	Number (n)	Proportion (%)
Cobalt chrome	23,643	97.7
Oxidized zirconium	477	2.0
Titanium	50	0.2
Ceramics	19	0.1

Tibia component

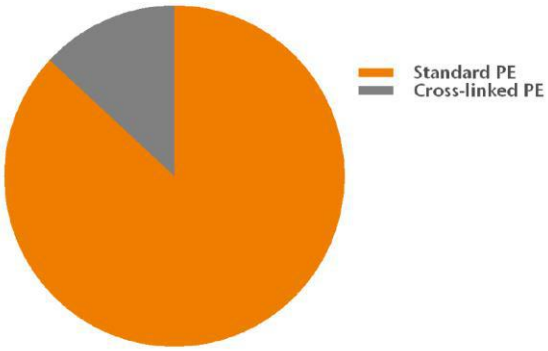
FIGURE TIBIA MATERIAL IN PRIMARY TOTAL KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=24,390).



Tibia material	Number (n)	Proportion (%)
Titanium	12,931	53.0
Cobalt chrome	11,459	47.0

Insert

FIGURE INSERT MATERIAL IN PRIMARY TOTAL KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=24,241).

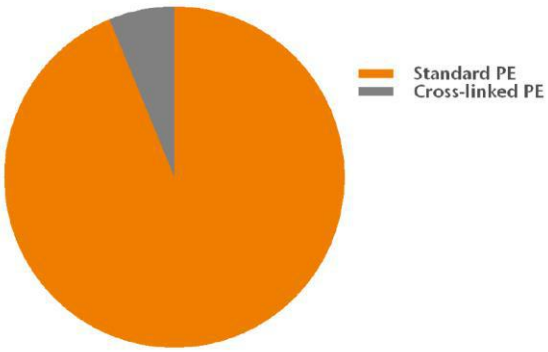


Insert material	Number (n)	Proportion (%)
Standard PE	21,064	86.9
Cross-linked PE	3,177	13.1

PE: polyethylene.

Patella component

FIGURE PATELLA MATERIAL IN PRIMARY TOTAL KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=5,218).



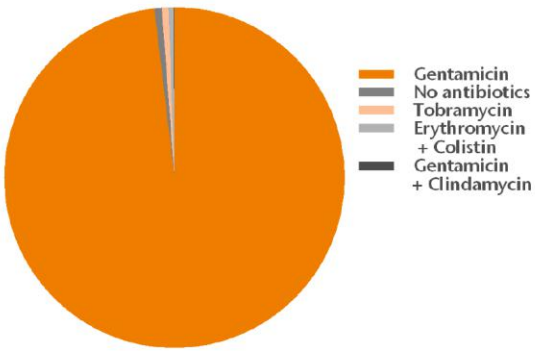
Patella material	Number (n)	Proportion (%)
Standard PE	4,893	93.8
Cross-linked PE	325	6.2

PE: polyethylene.

Bone cement

Antibiotics

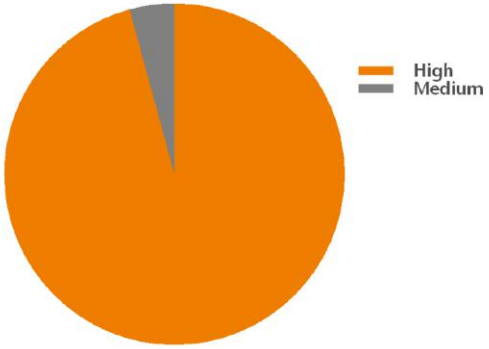
FIGURE ANTIBIOTICS IN BONE CEMENT IN PRIMARY TOTAL KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=22,016).



Bone cement antibiotics	Number (n)	Proportion (%)
Gentamicin	21,601	98.1
No antibiotics	153	0.7
Tobramycin	138	0.6
Erythromycin + Colistin	105	0.5
Gentamicin + Clindamycin	19	0.1

Viscosity

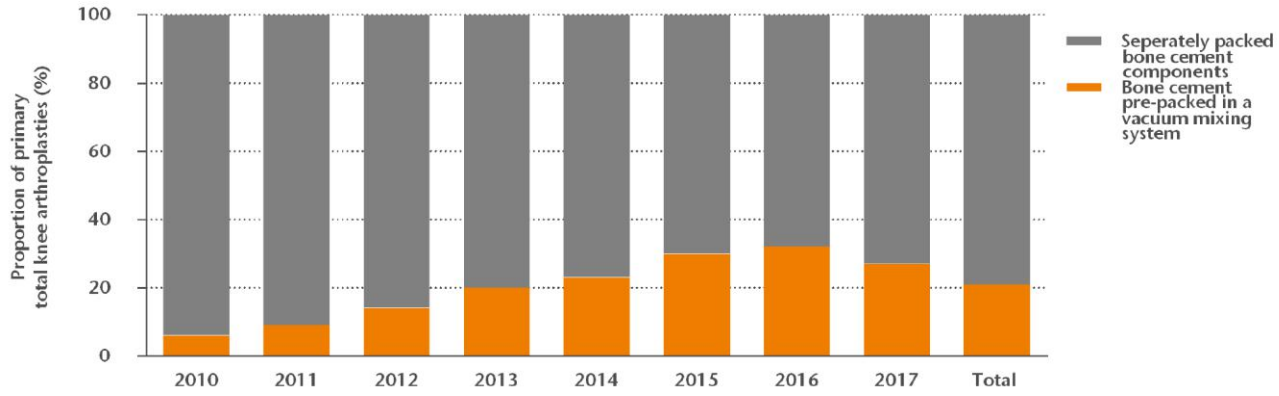
FIGURE VISCOSITY IN BONE CEMENT IN PRIMARY TOTAL KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=22,016).



Bone cement viscosity	Number (n)	Proportion (%)
High	21,081	95.8
Medium	935	4.2

Vacuum mixing system 2010-2017

FIGURE TREND (PROPORTION [%] BY YEAR) IN USE OF BONE CEMENT PRE-PACKED IN A VACUUM MIXING SYSTEM IN PRIMARY TOTAL KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2010-2017.



Year	2010	2011	2012	2013	2014	2015	2016	2017	Total
Vacuum mixing system									
Separately packed bone cement components (%)	93.8	91.4	85.6	79.6	76.8	70.1	67.6	72.6	78.6
Bone cement pre-packed in a vacuum mixing system (%)	6.2	8.6	14.4	20.4	23.2	29.9	32.4	27.4	21.4
Total (n)	15,089	16,831	19,013	19,983	21,587	21,773	22,562	22,016	158,854

Most frequently registered total knee prostheses

TABLE THE FIVE MOST FREQUENTLY REGISTERED PRIMARY TOTAL KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=24,192).

Name	Proportion (%)
Genesis II	24.2
NexGen	22.8
Vanguard Complete Knee	20.1
PFC / SIGMA	10.9
LCS	8.8

Most frequently registered types of bone cement

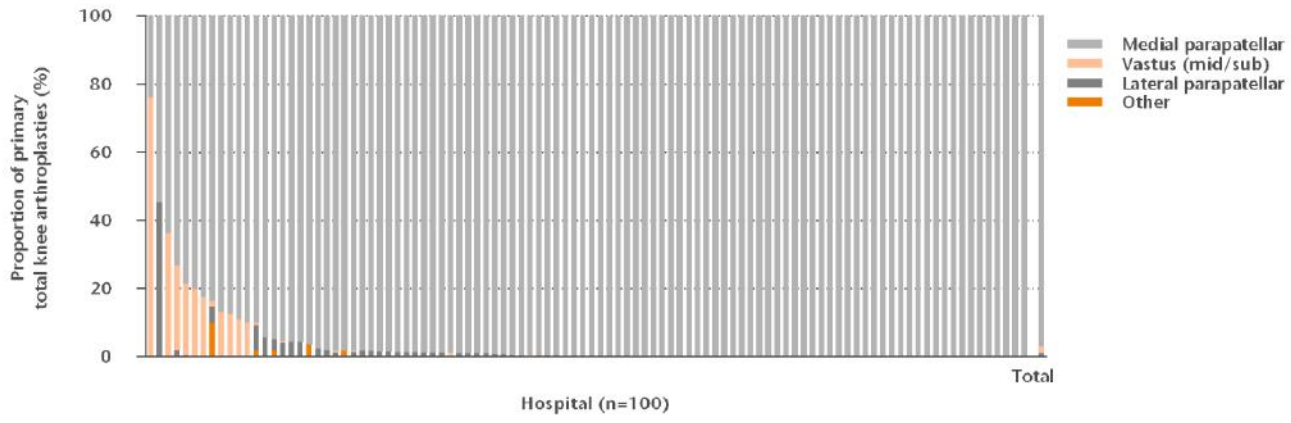
TABLE THE MOST FREQUENTLY REGISTERED TYPES OF BONE CEMENT BY TYPE OF MIXING SYSTEM USED DURING PRIMARY TOTAL KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2017.

Separately packed bone cement components (n=15,976)		Bone cement pre-packed in a vacuum mixing system (n=6,040)	
Name	Proportion (%)	Name	Proportion (%)
Palacos R+G	74.4	Refobacin Bone Cement R	44.5
Refobacin Bone Cement R	14.2	Palacos R+G	40.3
Palacos MV+G	4.3	Refobacin Plus Bone Cement	15.1
Refobacin Plus Bone Cement	2.2	Refobacin Revision	0.1
Synicem1G	1.1		

Practice variation

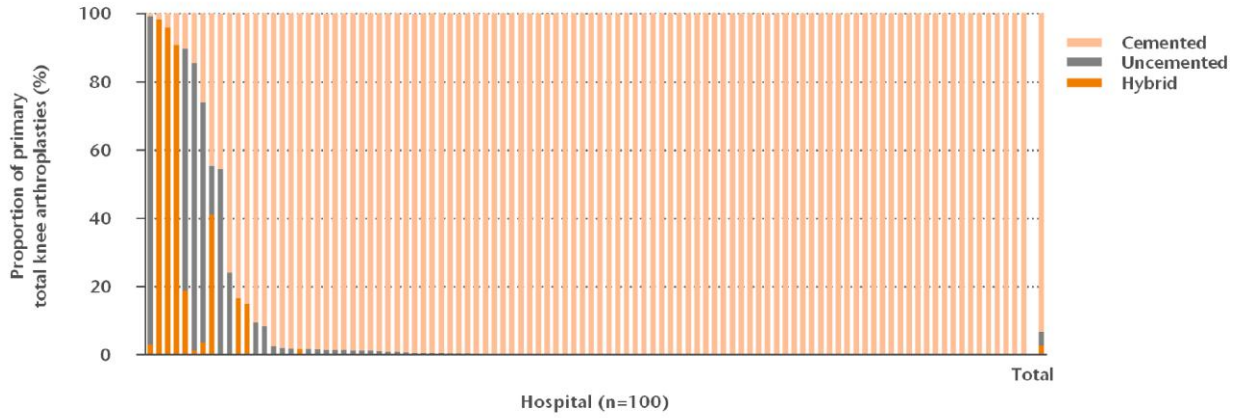
Surgical approach

FIGURE DISTRIBUTION OF SURGICAL APPROACH USED DURING PRIMARY TOTAL KNEE ARTHROPLASTIES PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=25,392).



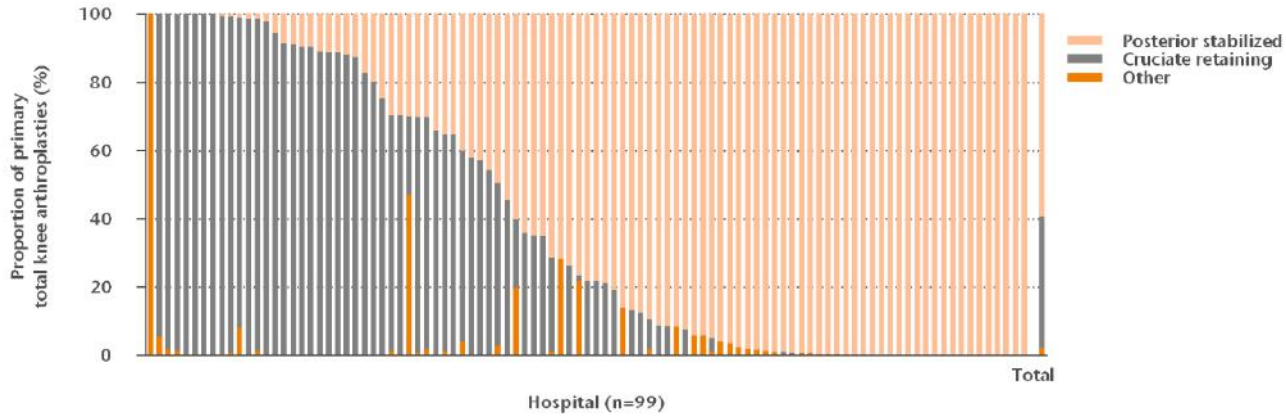
Fixation

FIGURE DISTRIBUTION OF TYPE OF FIXATION USED DURING PRIMARY TOTAL KNEE ARTHROPLASTIES PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=25,286).



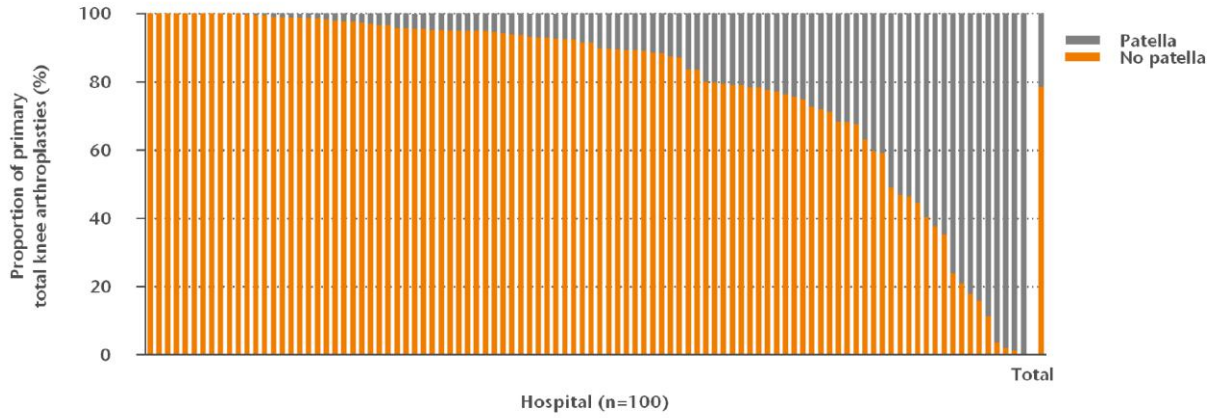
Type of femur component

FIGURE DISTRIBUTION OF TYPE OF FEMUR COMPONENT USED DURING PRIMARY TOTAL KNEE ARTHROPLASTIES PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=24,129).



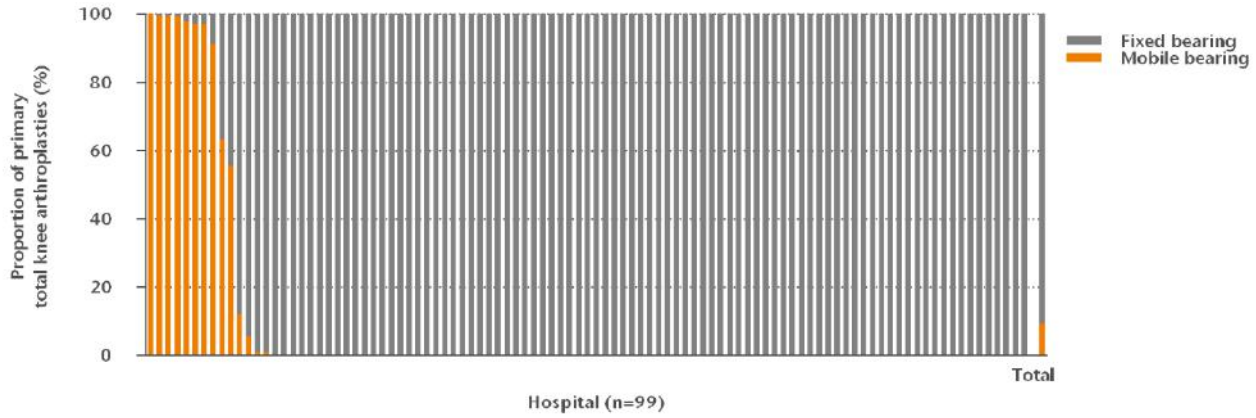
Implantation of patella

FIGURE DISTRIBUTION OF IMPLANTATION OF PATELLA DURING PRIMARY TOTAL KNEE ARTHROPLASTIES PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=25,400).



Type of bearing

FIGURE DISTRIBUTION OF TYPE OF BEARING USED DURING PRIMARY TOTAL KNEE ARTHROPLASTIES PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=24,207).

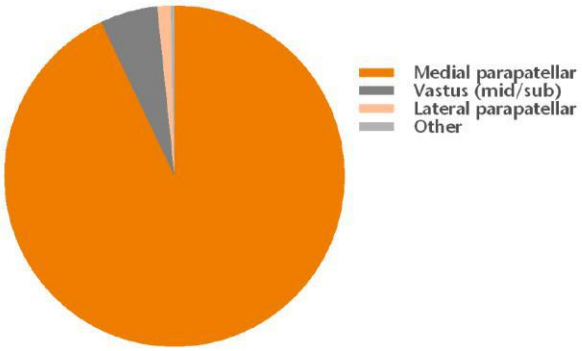


Unicondylar knee arthroplasty

Surgical techniques

Surgical approach

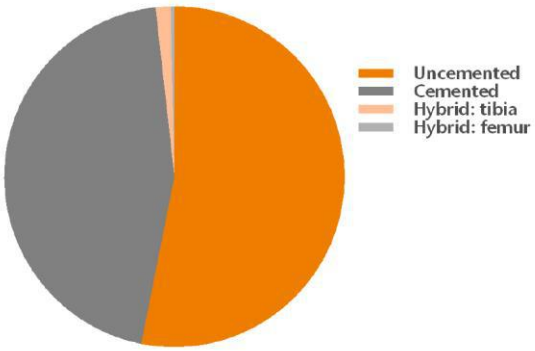
FIGURE SURGICAL APPROACH FOR PERFORMING A PRIMARY UNICONDYLAR KNEE ARTHROPLASTY IN THE NETHERLANDS IN 2017 (N=3,609).



Surgical approach	Number (n)	Proportion (%)
Medial parapatellar	3,353	92.9
Vastus (mid/sub)	197	5.5
Lateral parapatellar	45	1.2
Other	14	0.4

Fixation

FIGURE TYPE OF FIXATION IN PRIMARY UNICONDYLAR KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=3,605).

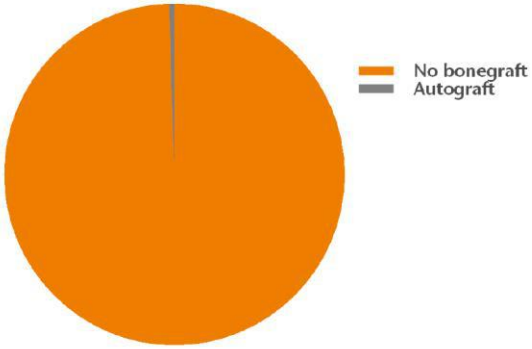


Fixation	Number (n)	Proportion (%)
Uncemented	1,915	53.1
Cemented	1,626	45.1
Hybrid: tibia	51	1.4
Hybrid: femur	13	0.4

Prosthesis characteristics

Type of bonegraft

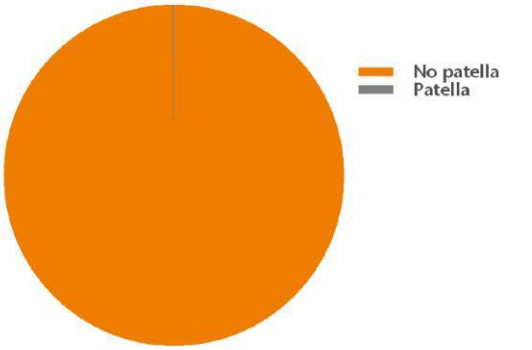
FIGURE TYPE OF BONEGRAFT IN PRIMARY UNICONDYLAR KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=3,607).



Type of bonegraft	Number (n)	Proportion (%)
No bonegraft	3,589	99.5
Autograft	18	0.5

Implantation of patella

FIGURE IMPLANTATION OF PATELLA IN PRIMARY UNICONDYLAR KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=3,609).

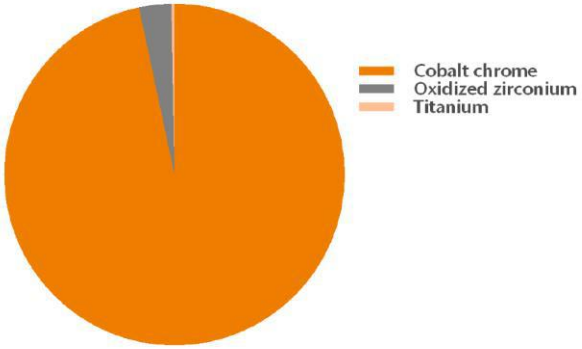


Implantation of patella	Number (n)	Proportion (%)
No patella	3,604	99.9
Patella	5	0.1

Materials

Femur component

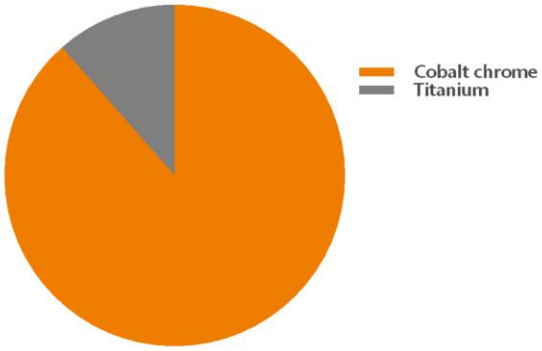
FIGURE FEMUR MATERIAL IN PRIMARY UNICONDYLAR KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=3,221).



Femur material	Number (n)	Proportion (%)
Cobalt chrome	3,113	96.6
Oxidized zirconium	99	3.1
Titanium	9	0.3

Tibia component

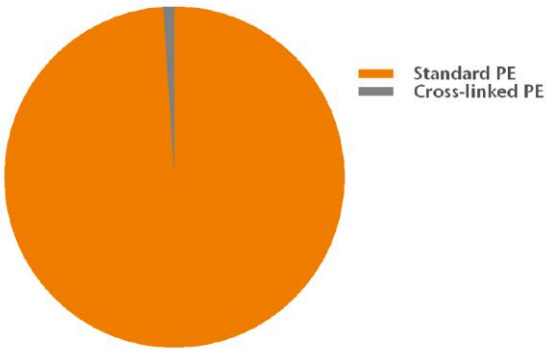
FIGURE TIBIA MATERIAL IN PRIMARY UNICONDYLAR KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=3,223).



Tibia material	Number (n)	Proportion (%)
Cobalt chrome	2,852	88.5
Titanium	371	11.5

Insert

FIGURE INSERT IN PRIMARY UNICONDYLAR KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=3,226).



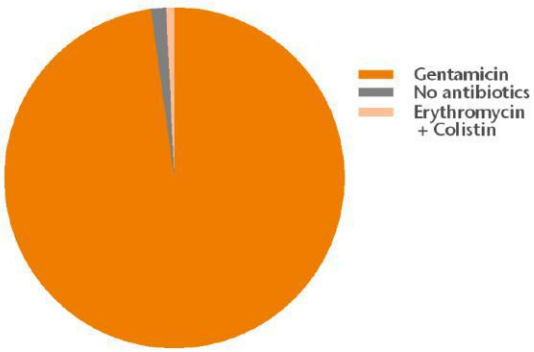
Insert material	Number (n)	Proportion (%)
Standard PE	3,192	98.9
Cross-linked PE	34	1.1

PE: polyethylene.

Bone cement

Antibiotics

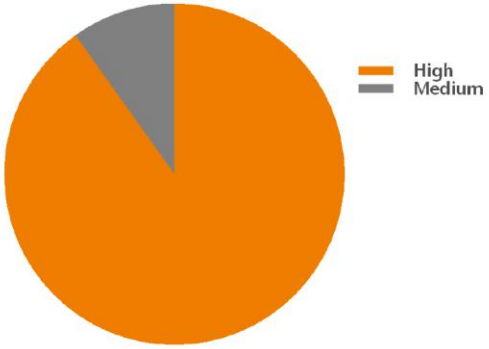
FIGURE ANTIBIOTICS IN BONE CEMENT IN PRIMARY UNICONDYLAR KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=1,528).



Bone cement antibiotics	Number (n)	Proportion (%)
Gentamicin	1,494	97.8
No antibiotics	22	1.4
Erythromycin + Colistin	12	0.8

Viscosity

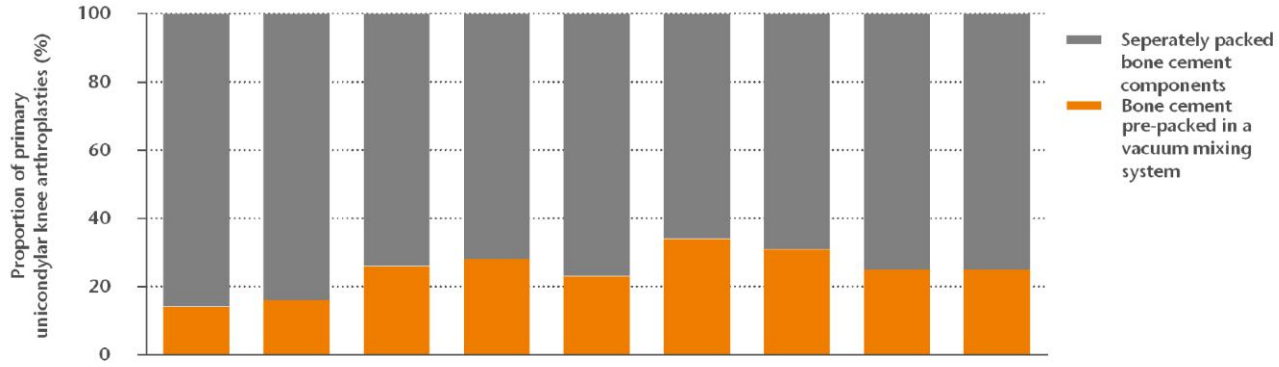
FIGURE VISCOSITY IN BONE CEMENT IN PRIMARY UNICONDYLAR KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=1,528).



Bone cement viscosity	Number (n)	Proportion (%)
High	1,367	90.1
Medium	151	9.9

Vacuum mixing system 2010-2017

FIGURE TREND (PROPORTION [%] BY YEAR) IN USE OF BONE CEMENT PRE-PACKED IN A VACUUM MIXING SYSTEM IN PRIMARY UNICONDYLAR KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2010-2017.



Year	2010	2011	2012	2013	2014	2015	2016	2017	Total
Vacuum mixing system									
Separately packed bone cement components (%)	86.2	84.2	74.0	71.6	77.2	66.4	68.5	75.3	75.4
Bone cement pre-packed in a vacuum mixing system (%)	13.8	15.8	26.0	28.4	22.8	33.6	31.5	24.7	24.6
Total (n)	1,409	1,315	1,234	1,331	1,564	1,448	1,453	1,528	11,282

Most frequently registered unicondylar knee prostheses

TABLE THE MOST FREQUENTLY REGISTERED UNICONDYLAR KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=3,221).

Name	Proportion (%)
Oxford PKR	87.0
Unicompartmental High Flex Knee	8.1
Journey Uni	2.2
Genesis Uni	0.9
BalanSys	0.5
Sigma HP Uni	0.5

Most frequently registered types of bone cement

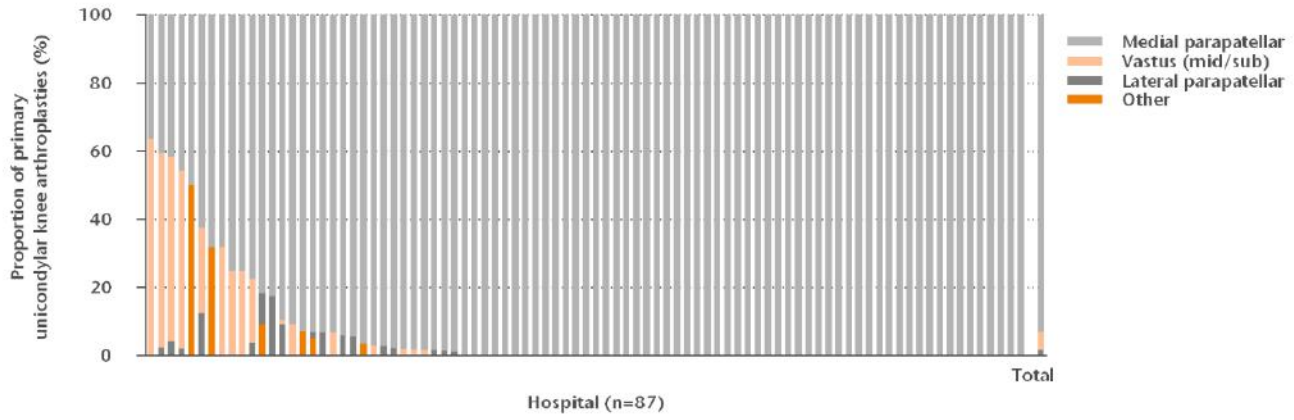
TABLE THE MOST FREQUENTLY REGISTERED TYPES OF BONE CEMENT BY TYPE OF MIXING SYSTEM USED DURING UNICONDYLAR KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2017.

Separately packed bone cement components (n=1,150)		Bone cement pre-packed in a vacuum mixing system (n=378)	
Name	Proportion (%)	Name	Proportion (%)
Palacos R+G	67.4	Refobacin Bone Cement R	81.0
Refobacin Bone Cement R	15.4	Palacos R+G	11.6
Palacos MV+G	12.1	Refobacin Plus Bone Cement	7.1
Biomet Plus Bone Cement	1.9	Cemex Genta	0.3
Refobacin Plus Bone Cement	1.3		

Practice variation

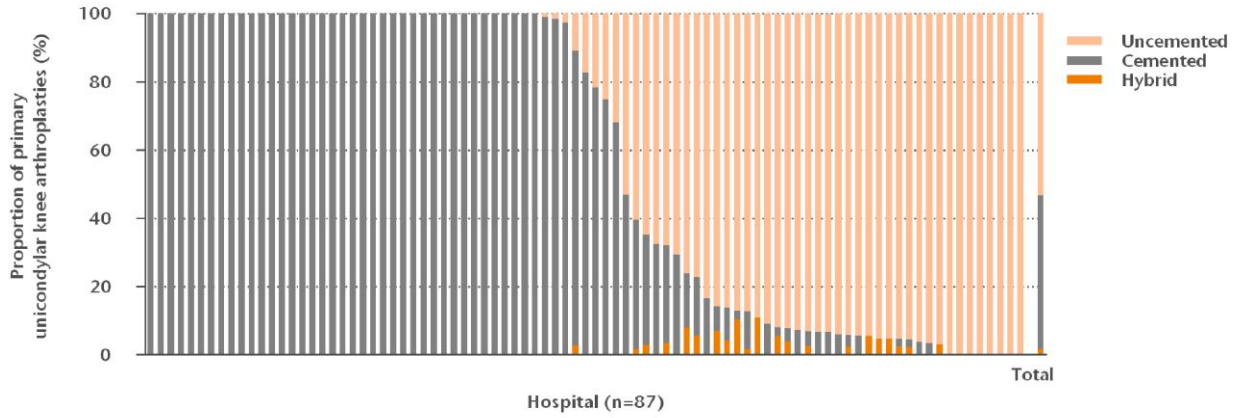
Surgical approach

FIGURE DISTRIBUTION OF SURGICAL APPROACH USED DURING PRIMARY UNICONDYLAR KNEE ARTHROPLASTIES PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=3,609).



Fixation

FIGURE DISTRIBUTION OF TYPE OF FIXATION USED DURING PRIMARY UNICONDYLAR KNEE ARTHROPLASTIES PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=3,592).

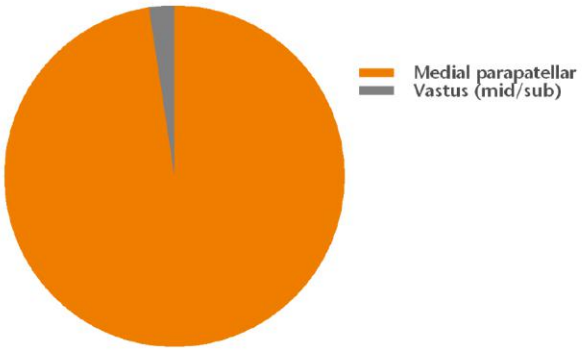


Patellofemoral knee arthroplasty

Surgical techniques

Surgical approach

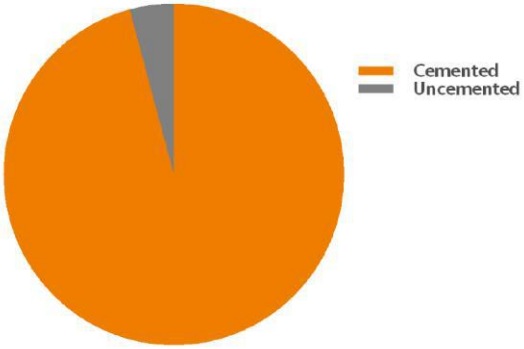
FIGURE SURGICAL APPROACH FOR PERFORMING A PRIMARY PATELLOFEMORAL KNEE ARTHROPLASTY IN THE NETHERLANDS IN 2017 (N=166).



Surgical approach	Number (n)	Proportion (%)
Medial parapatellar	162	97.6
Vastus (mid/sub)	4	2.4

Fixation

FIGURE TYPE OF FIXATION IN PRIMARY PATELLOFEMORAL KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=167).



Fixation	Number (n)	Proportion (%)
Cemented	160	95.8
Uncemented	7	4.2

Prosthesis characteristics

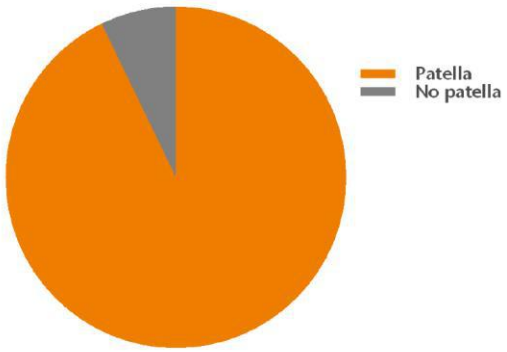
Type of bonegraft

FIGURE TYPE OF BONEGRAFT IN PRIMARY PATELLOFEMORAL KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=167).

Type of bonegraft	Number (n)	Proportion (%)
No bonegraft	167	100.0

Implantation of patella

FIGURE IMPLANTATION OF PATELLA IN PRIMARY PATELLOFEMORAL KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=167).

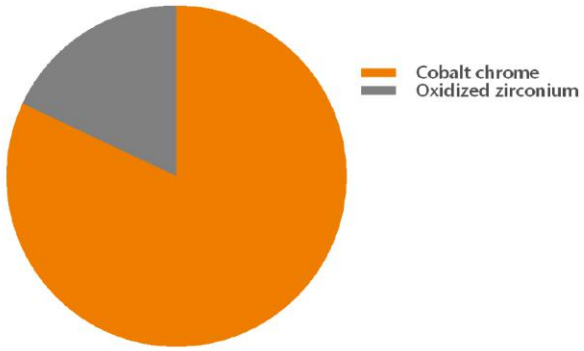


Implantation of patella	Number (n)	Proportion (%)
Patella	155	92.8
No patella	12	7.2

Materials

Femur component

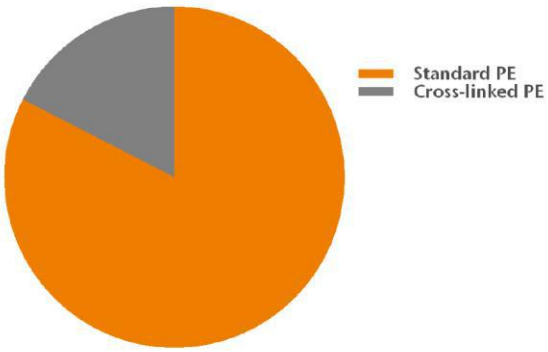
FIGURE FEMUR MATERIAL IN PRIMARY PATELLOFEMORAL KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=150).



Femur material	Number (n)	Proportion (%)
Cobalt chrome	123	82.0
Oxidized zirconium	27	18.0

Patella component

FIGURE PATELLA MATERIAL IN PRIMARY PATELLOFEMORAL KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=143).



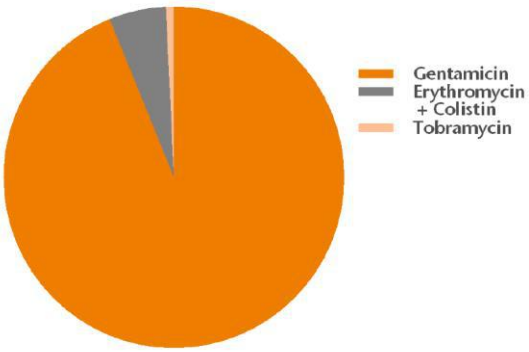
Patella material	Number (n)	Proportion (%)
Standard PE	118	82.5
Cross-linked PE	25	17.5

PE: polyethylene.

Bone cement

Antibiotics

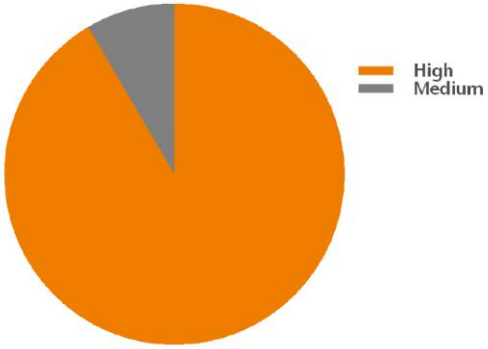
FIGURE ANTIBIOTICS IN BONE CEMENT IN PRIMARY PATELLOFEMORAL KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=130).



Bone cement antibiotics	Number (n)	Proportion (%)
Gentamicin	122	93.8
Erythromycin + Colistin	7	5.4
Tobramycin	1	0.8

Viscosity

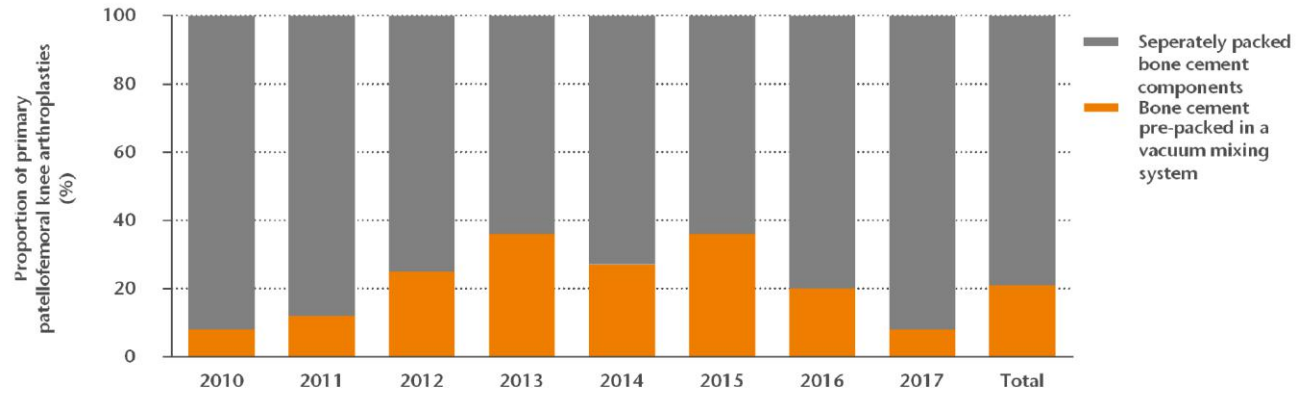
FIGURE VISCOSITY IN BONE CEMENT IN PRIMARY PATELLOFEMORAL KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=130).



Bone cement viscosity	Number (n)	Proportion (%)
High	119	91.5
Medium	11	8.5

Vacuum mixing system 2010-2017

FIGURE TREND (PROPORTION [%] BY YEAR) IN USE OF BONE CEMENT PRE-PACKED IN A VACUUM MIXING SYSTEM IN PRIMARY PATELLOFEMORAL KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2010-2017.



Year	2010	2011	2012	2013	2014	2015	2016	2017	Total
Vacuum mixing system									
Separately packed bone cement components (%)	92.2	87.7	75.4	63.9	73.2	64.3	80.0	91.5	79.4
Bone cement pre-packed in a vacuum mixing system (%)	7.8	12.3	24.6	31.1	26.8	35.7	20.0	8.5	20.6
Total (n)	116	81	122	83	82	98	115	130	827

Most frequently registered patellofemoral knee prostheses

TABLE THE FIVE MOST FREQUENTLY REGISTERED PATELLOFEMORAL KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=150).

Name	Proportion (%)
Gender Solutions® Patello-Femoral Joint	58.0
Journey PFJ	18.0
Avon	17.3
IBalance PFJ	4.0
PFC / Sigma	1.3

Most frequently registered types of bone cement

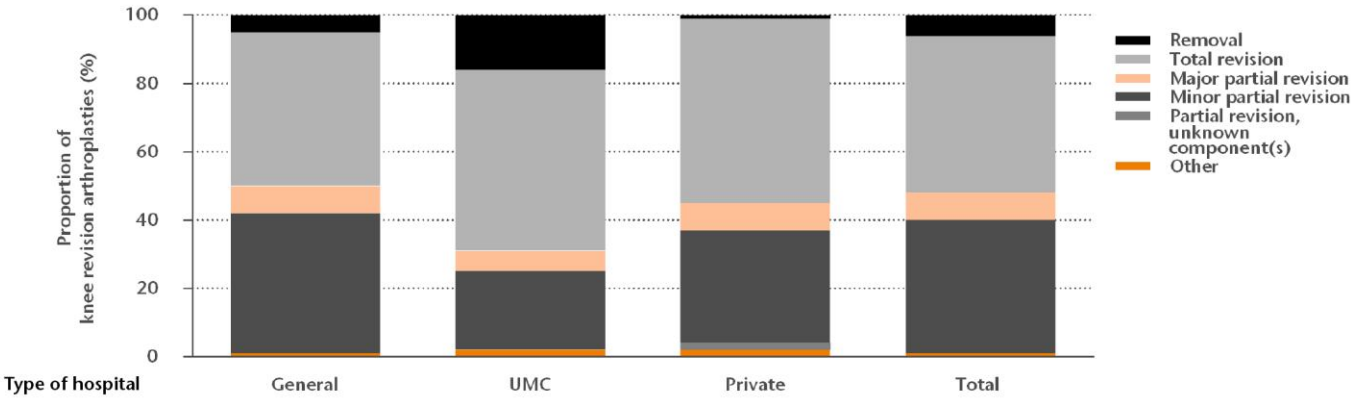
TABLE THE FIVE MOST FREQUENTLY REGISTERED TYPES OF BONE CEMENT USED DURING PATELLOFEMORAL KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=130).

Name	Proportion (%)
Palacos R+G	75.4
Refobacin Bone Cement R	11.5
Simplex ABC EC	5.4
Refobacin Plus Bone Cement	3.8
Palacos MV+G	2.3

Knee revision arthroplasty

Type of revision

FIGURE TYPE OF REVISION (PROPORTION [%] PER CATEGORY) IN KNEE REVISION ARTHROPLASTIES BY TYPE OF HOSPITAL IN THE NETHERLANDS IN 2017.



Type of hospital	General	UMC	Private	Total
Type of revision				
Removal (%)	4.8	15.8	0.5	5.6
Total revision (%)	45.0	52.7	54.5	46.5
Major partial revision[1] (%)	8.0	5.7	7.9	7.8
Minor partial revision[2] (%)	40.9	23.6	33.2	38.6
Partial revision, unknown component(s) (%)	0.2	0.0	2.5	0.3
Other (%)	1.1	2.2	1.5	1.2
Total (n)	2,512	317	202	3,031

[1] Major partial revision, at least tibia or femur component revised.
[2] Minor partial revision, only insert and/or patella exchange/addition.

In 90 (38.1%) major partial knee revision arthroplasties the femur component was revised and in 146 (61.9%) major partial knee revision arthroplasties the tibia component was revised in 2017.

Reasons for revision

TABLE REASONS FOR REVISION OR RE-SURGERY IN PATIENTS WHO UNDERWENT A KNEE REVISION ARTHROPLASTY IN THE NETHERLANDS IN 2017 (N=3,037).

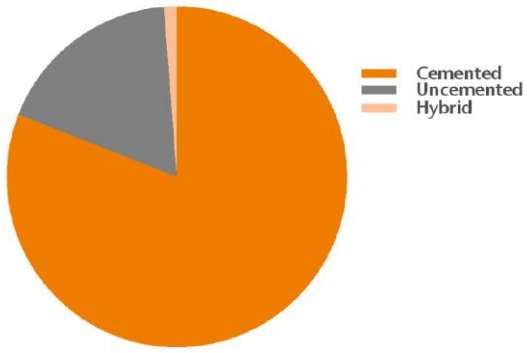
Reasons for revision	Proportion[1] (%)
Instability	27.7
Loosening of tibia component	20.8
Infection	20.3
Patellar pain	19.8
Malalignment	11.4
Loosening of femur component	9.0
Progression of osteoarthritis	8.0
Insert wear	6.8
Revision after knee removal	5.7
Arthrofibrosis	4.9
Patellar dislocation	2.4
Loosening of patella component	1.8
Periprosthetic fracture	1.8
Other	8.2

[1] One patient may have more than one reason for revision or re-surgery. As such, the total proportion is over 100%.

Surgery

Fixation

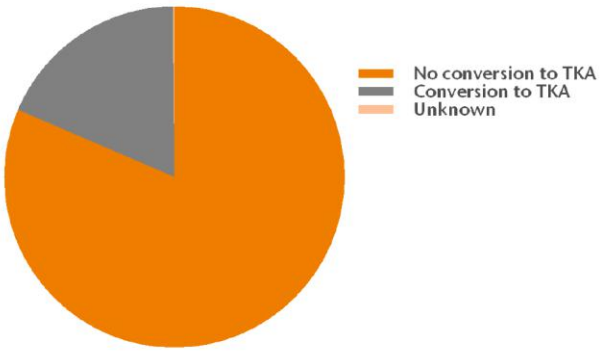
FIGURE TYPE OF FIXATION IN KNEE REVISION ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=2,758).



Fixation	Number (n)	Proportion (%)
Cemented	2,233	81.0
Uncemented	491	17.8
Hybrid	34	1.2

Conversion to TKA

FIGURE CONVERSION OF A UNICONDYLAR OR PATELLOFEMORAL KNEE ARTHROPLASTY TO A TOTAL KNEE ARTHROPLASTY IN THE NETHERLANDS IN 2017 (N=2,812).

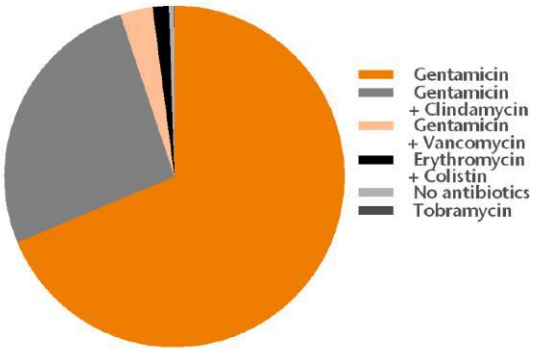


Conversion to TKA	Number (n)	Proportion (%)
No conversion to TKA	2,290	81.4
Conversion to TKA	518	18.4
Unknown	4	0.2

TKA: total knee arthroplasty.

Bone cement antibiotics

FIGURE BONE CEMENT ANTIBIOTICS IN KNEE REVISION ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=1,897).



Bone cement antibiotics	Number (n)	Proportion (%)
Gentamicin	1,303	68.7
Gentamicin + Clindamycin	496	26.2
Gentamycin + Vancomycin	59	3.1
Erythromycin + Colistin	29	1.5
No antibiotics	9	0.5
Tobramycin	1	0.0

Most frequently registered components

TABLE THE TEN MOST FREQUENTLY REGISTERED FEMUR, TIBIA, INSERT AND PATELLA COMPONENTS IN KNEE REVISION ARTHROPLASTIES IN THE NETHERLANDS IN 2017.

Femur (n=1,358)		Tibia (n=1,440)	
Name	**Proportion (%)**	**Name**	**Proportion (%)**
Legion	25.2	Legion	27.4
NexGen	20.0	NexGen	19.1
Genesis II	8.3	S-Rom	9.4
PFC / Sigma	7.4	Vanguard 360	6.5
Vanguard Complete Knee	6.0	Genesis II	5.8
Vanguard 360	5.2	Legion Hinged	5.4
Legion Hinged	5.0	Vanguard Complete Knee	5.2
LCS	4.8	PFC / Sigma	4.2
Triathlon	3.2	Triathlon	3.0
Legion Pressfit stem	2.1	Rotation Hinged Knee	2.4

Insert (n=2,257)		Patella (n=1,138)	
Name	**Proportion (%)**	**Name**	**Proportion (%)**
Genesis II	29.0	Genesis II	44.5
NexGen	18.9	NexGen	15.7
Vanguard Complete Knee	7.8	Vanguard	13.3
PFC / Sigma	7.7	PFC / Sigma	9.7
LCS	6.8	LCS	3.5
Legion Hinged	3.8	Triathlon	2.7
Oxford PKR	3.7	ACS	2.5
Vanguard SSK	3.1	AGC	1.8
ACS	3.1	Journey BCS	1.5
Triathlon	2.8	Attune	1.0

Most frequently registered types of bone cement

TABLE THE MOST FREQUENTLY REGISTERED TYPES OF BONE CEMENT BY TYPE OF MIXING SYSTEM USED DURING KNEE REVISION ARTHROPLASTIES IN THE NETHERLANDS IN 2017.

Separately packed bone cement components (n=1,494)		Bone cement pre-packed in a vacuum mixing system (n=393)[1]	
Name	**Proportion (%)**	**Name**	**Proportion (%)**
Palacos R+G	45.8	Refobacin Bone Cement R	39.9
Copal G+C	24.4	Palacos R+G	25.4
Refobacin Bone Cement R	9.4	Refobacin Plus Bone Cement	17.6
Refobacin Revision	7.2	Refobacin Revision	17.1
Palacos MV+G	3.2		

Survival

Revision within 1 year

By type of revision

TABLE CUMULATIVE 1-YEAR REVISION PERCENTAGE OF PRIMARY TOTAL KNEE ARTHROPLASTIES BY TYPE OF REVISION IN THE NETHERLANDS IN 2012-2016 (N=116,871).

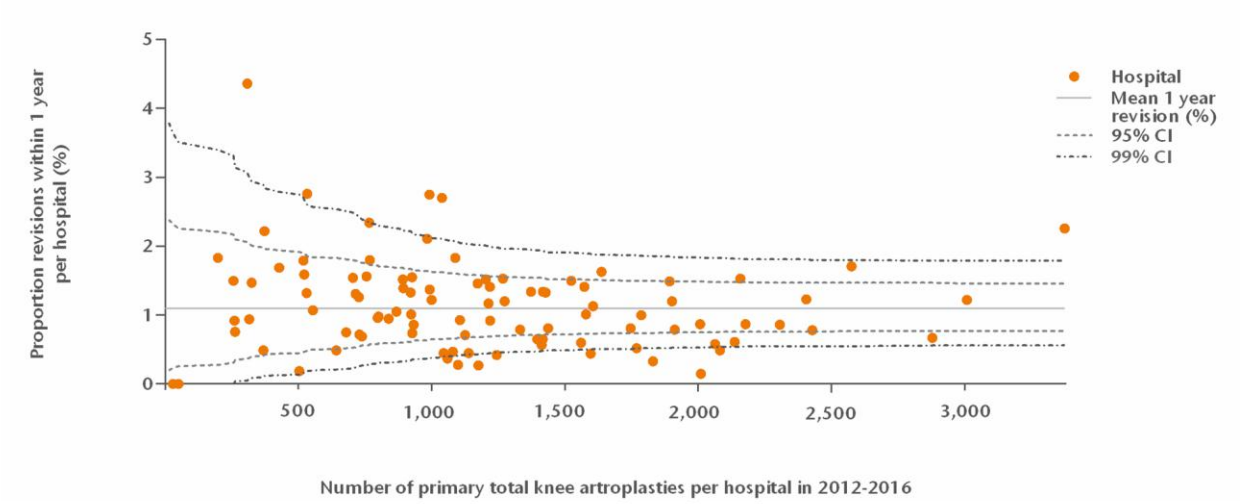
	Cumulative 1-year revision percentage	
	Competing Risk (95% CI)	Kaplan Meier (95% CI)
Any type of revision	1.1 (1.0-1.1)	1.0 (0.9-1.0)
Minor revision[1]	0.6 (0.6-0.6)	0.6 (0.5-0.6)
Major revision[2]	0.5 (0.4-0.5)	0.4 (0.4-0.5)

[1] Only insert and/or patella exchange (including patella addition).
[2] Revision of at least the femur or tibia component.
TKA: total knee arthroplasty; CI: confidence interval.

In 2012-2016, 828 (0.7%) primary total knee arthroplasties were implanted in patients who died within one year after the primary procedure.

Per hospital

FIGURE FUNNEL PLOT OF PROPORTION OF KNEE REVISION ARTHROPLASTIES WITHIN ONE YEAR AFTER A PRIMARY TOTAL KNEE ARTHROPLASTY PER HOSPITAL IN THE NETHERLANDS IN 2012-2016 (N=116,871).



Please note: The proportions of revisions within 1 year per hospital were adjusted for casemix factors age, gender, ASA score and diagnosis (osteoarthritis versus other).
CI: confidence interval.

The mean 1-year revision percentage is 1.1 (95% CI:1.0-1.1) in the Netherlands in 2012-2016. Confidence intervals indicate a plausible range of the outcome if all hospitals perform equally well.

Reasons for revision by type of revision

TABLE REASONS FOR REVISION WITHIN ONE YEAR IN PATIENTS THAT UNDERWENT A KNEE REVISION ARTHROPLASTY BY TYPE OF REVISION IN THE NETHERLANDS IN 2012-2016.

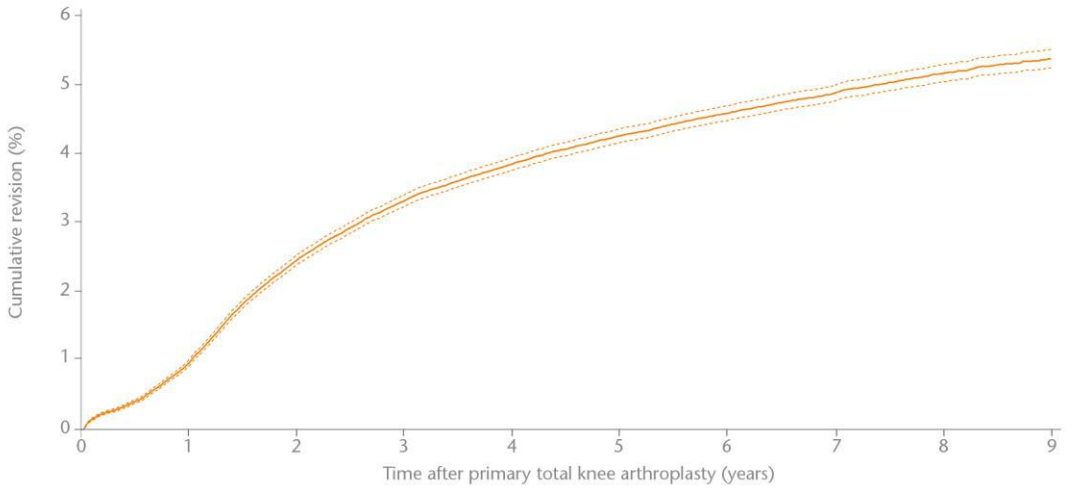
Reasons for revision	Minor revision[1] (n=705) Proportion[4] (%)	Major revision[2] (n=536) Proportion[4] (%)	Any type of revision[3] (n=1,281) Proportion[4] (%)
Infection	39.3	24.1	32.4
Instability	16.3	24.1	19.1
Patellar pain	25.7	7.5	17.7
Malalignment	0.9	27.1	11.8
Loosening of tibia component	0.3	25.0	10.7
Arthrofibrosis	7.1	7.1	6.9
Periprosthetic fracture	0.6	11.4	5.2
Patellar dislocation	4.0	2.6	3.4
Loosening of femur component	0.1	7.3	3.1
Revision after knee removal	0.3	6.2	2.7
Insert wear	2.3	0.6	1.5
Loosening of patella component	0.7	0.0	0.4
Progression of osteoarthritis	0.1	0.6	0.3
Other	14.3	10.6	12.7

[1] Only insert and/or patella exchange (including patella addition).
[2] Revision of at least the femur or tibia component.
3 Any type of revision includes minor and major revision as well as revision procedures that could not be classified as major or minor revision.
4 One patient may have more than one reason for revision or re-surgery. As such, the total proportion is over 100%.

Revision within 9 years

Overall

FIGURE CUMULATIVE REVISION PERCENTAGE OF TOTAL KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2007-2017 (N=215,486).



Please note: Dotted lines represent the upper and lower limits of the 95% confidence interval.

By type of revision

TABLE CUMULATIVE 9-YEAR REVISION PERCENTAGE OF PRIMARY TOTAL KNEE ARTHROPLASTIES BY TYPE OF REVISION IN THE NETHERLANDS IN 2007-2017 (N=215,486).

	Cumulative 9-year revision percentage	
	Competing Risk (95% CI)	Kaplan Meier (95% CI)
Any type of revision	5.4 (5.3-5.5)	5.6 (5.5-5.8)
Minor revision[1]	2.4 (2.4-2.5)	2.6 (2.5-2.7)
Major revision[2]	2.8 (2.7-2.9)	3.1 (2.9-3.2)

[1] Only insert and/or patella exchange (including patella addition).
[2] Revision of at least the femur or tibia component.
TKA: total knee arthroplasty; CI: confidence interval.

By demographics

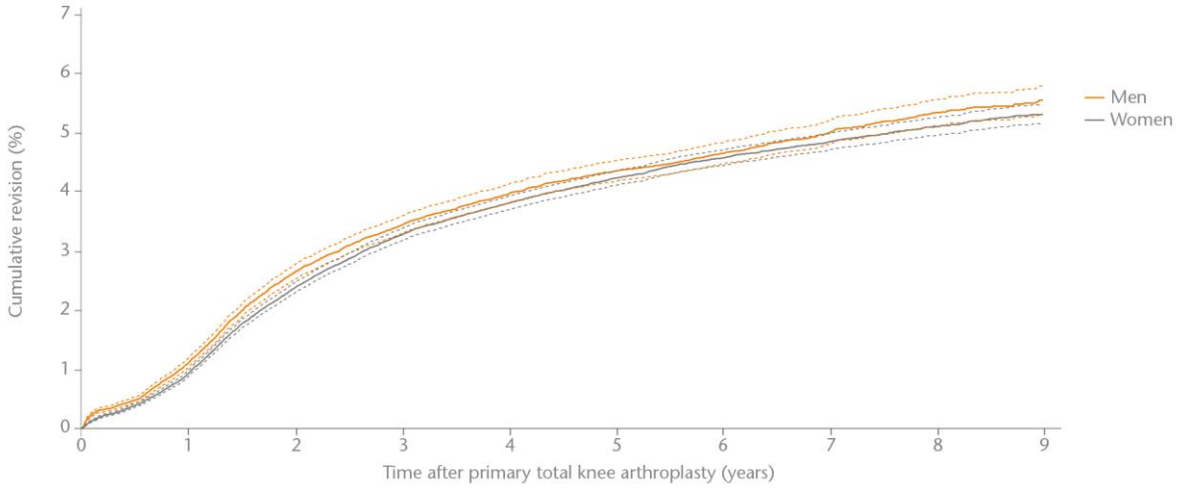
TABLE CUMULATIVE 9-YEAR REVISION PERCENTAGE OF PRIMARY TOTAL KNEE ARTHROPLASTIES BY DEMOGRAPHICS IN THE NETHERLANDS IN 2007-2017.

		Cumulative 9-year revision percentage	
	Number (n)	Competing Risk (95% CI)	Kaplan Meier (95% CI)
Total	215,486	5.4 (5.3-5.5)	5.6 (5.5-5.8)
Gender			
Men	73,793	5.6 (5.3-5.8)	5.8 (5.5-6.0)
Women	141,172	5.3 (5.2-5.5)	5.5 (5.4-5.7)
Age (years)			
<50	5,437	13.1 (11.9-14.5)	13.3 (12.0-14.6)
50-59	31,803	9.1 (8.7-9.6)	9.2 (8.7-9.7)
60-69	76,057	5.8 (5.5-6.0)	5.9 (5.7-6.1)
70-79	75,147	4.1 (3.9-4.3)	4.3 (4.1-4.5)
≥80	26,728	2.2 (2.0-2.4)	2.3 (2.1-2.5)
Diagnosis			
Osteoarthritis	204,741	5.4 (5.2-5.5)	5.6 (5.4-5.7)
Other	8,303	6.5 (5.8-7.2)	6.8 (6.0-7.6)
ASA score			
I	37,552	6.2 (5.9-6.5)	6.4 (6.0-6.7)
II	138,320	5.2 (5.0-5.4)	5.4 (5.2-5.6)
III-IV	30,290	5.1 (4.7-5.5)	5.6 (5.1-6.1)

CI: confidence interval.

By gender

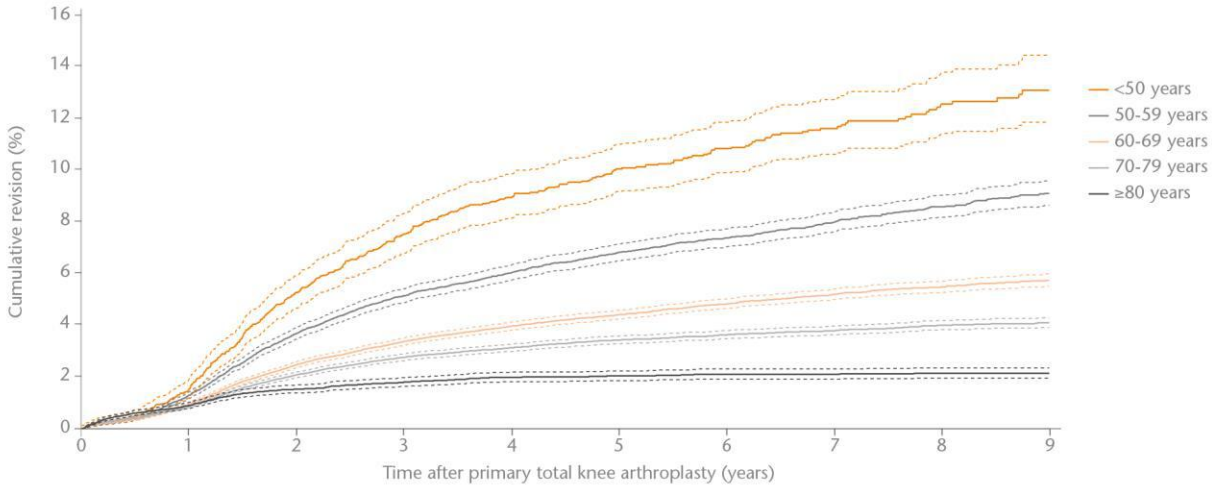
FIGURE CUMULATIVE REVISION PERCENTAGE OF TOTAL KNEE ARTHROPLASTIES BY GENDER IN THE NETHERLANDS IN 2007-2017 (N=214,956).



Please note: Dotted lines represent the upper and lower limits of the 95% confidence interval.

By age category

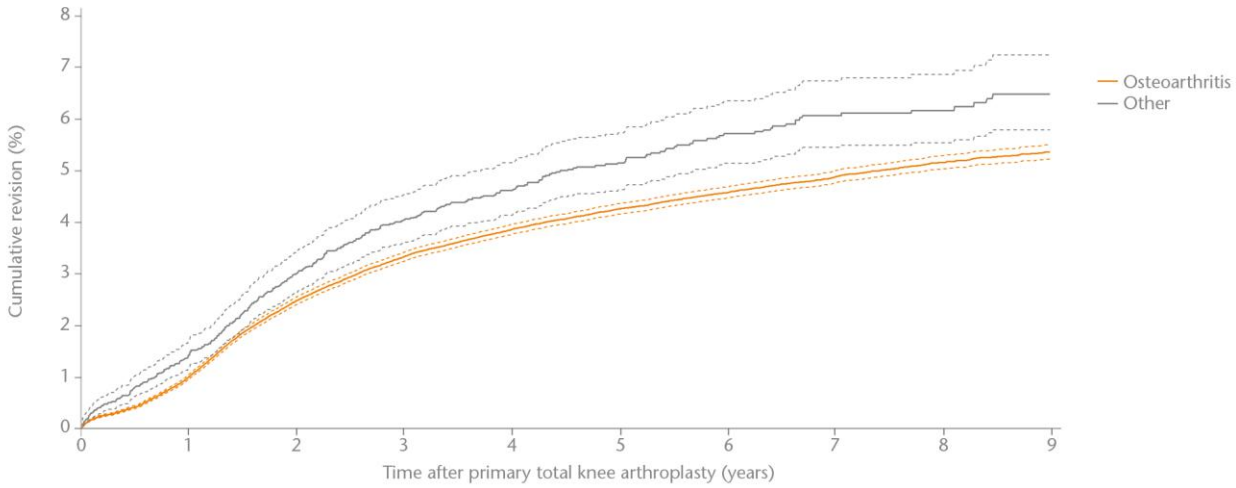
FIGURE CUMULATIVE REVISION PERCENTAGE OF TOTAL KNEE ARTHROPLASTIES BY AGE CATEGORY IN THE NETHERLANDS IN 2007-2017 (N=215,172).



Please note: Dotted lines represent the upper and lower limits of the 95% confidence interval.

By diagnosis

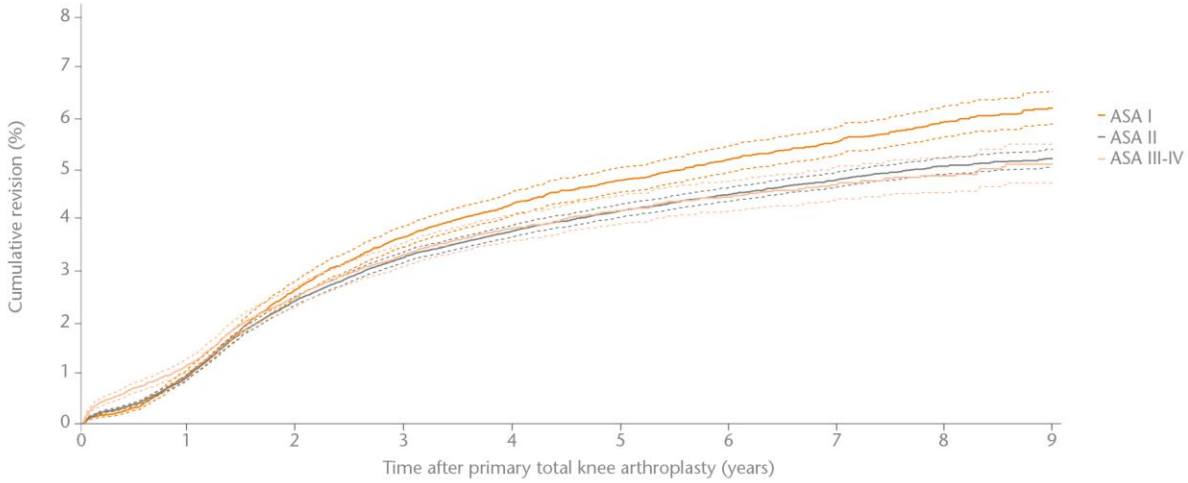
FIGURE CUMULATIVE REVISION PERCENTAGE OF TOTAL KNEE ARTHROPLASTIES BY DIAGNOSIS IN THE NETHERLANDS IN 2007-2017 (N=213,044).



Please note: Dotted lines represent the upper and lower limits of the 95% confidence interval.

By ASA score

FIGURE CUMULATIVE REVISION PERCENTAGE OF TOTAL KNEE ARTHROPLASTIES BY ASA SCORE IN THE NETHERLANDS IN 2007-2017 (N=206,162).



Please note: Dotted lines represent the upper and lower limits of the 95% confidence interval.

Revision within 1, 3, 5 and 7 years

Cemented primary TKA

TABLE CUMULATIVE 1-, 3-, 5- AND 7-YEAR REVISION PERCENTAGES OF CEMENTED PRIMARY TOTAL KNEE ARTHROPLASTIES BY PROSTHESIS COMPONENT COMBINATION OF PATIENTS WHO UNDERWENT A TKA FOR OSTEOARTHRITIS IN THE NETHERLANDS IN 2007-2017 (N=176,736).

					Type of revision (n)						Cumulative revision percentage (95% CI)			
Femur component	Tibia component	Total primary TKAs (n)	Median (IQR) age (yr)	Total knee revision arthroplasties (n)	Total knee (complete revision)	Patella addition	Only femur component	Only tibia component	Only insert/ patella	Missing/ unknown	1yr	3yr	5yr	7yr
All combinations (n=68)		**176,736**	**69 (62-76)**	**6,365**	**2,229**	**1,350**	**309**	**620**	**1,681**	**176**	**1.0 (0.9-1.0)**	**3.4 (3.3-3.5)**	**4.4 (4.3-4.5)**	**5.1 (5.0-5.2)**
Genesis II	Genesis II	39,700	69 (62-75)	1,583	417	363	154	108	499	42	1.2 (1.1-1.3)	4.1 (3.9-4.3)	5.1 (4.9-5.4)	5.6 (5.3-5.9)
NexGen	NexGen	39,404	69 (62-75)	1,319	519	154	38	174	382	52	1.0 (0.9-1.1)	2.9 (2.8-3.1)	4.1 (3.9-4.4)	5.1 (4.8-5.4)
Vanguard Complete Knee	Vanguard Complete Knee	29,199	69 (62-75)	903	299	196	31	94	255	28	1.0 (0.9-1.1)	3.2 (2.9-3.4)	4.0 (3.8-4.3)	4.6 (4.3-5.0)
PFC/Sigma	PFC/Sigma	22,835	69 (63-76)	740	226	202	16	60	218	18	0.9 (0.8-1.0)	3.1 (2.9-3.4)	3.9 (3.6-4.2)	4.4 (4.0-4.7)
LCS	LCS	12,800	70 (63-76)	447	231	43	24	86	60	3	0.8 (0.6-0.9)	3.3 (3.0-3.6)	4.4 (4.0-4.8)	5.0 (4.5-5.5)
AGC V2	AGC V2	4,417	71 (65-77)	124	67	42	1	2	9	3	0.4 (0.2-0.6)	2.0 (1.6-2.4)	2.5 (2.0-3.0)	3.1 (2.5-3.6)
Triathlon	Triathlon	3,621	70 (64-76)	101	36	21	7	6	28	3	1.1 (0.8-1.5)	3.5 (2.8-4.2)	3.9 (3.1-4.7)	4.8 (3.3-6.2)
Optetrak	Optetrak	3,030	70 (62-76)	237	105	73	3	32	19	5	1.1 (0.7-1.4)	5.5 (4.7-6.3)	7.0 (6.0-7.9)	8.7 (7.5-9.8)
Scorpio NRG	Scorpio	2,631	70 (63-76)	107	32	38	9	3	24	1	0.9 (0.5-1.2)	3.5 (2.8-4.3)	4.8 (3.8-5.7)	5.5 (4.4-6.6)
ACS	ACS	2,601	67 (60-73)	108	22	17	6	11	47	5	0.8 (0.4-1.1)	4.0 (3.2-4.8)	4.8 (3.8-5.7)	5.2 (4.1-6.2)
balanSys	balanSys	2,317	68 (62-75)	79	28	30	1	4	14	2	0.7 (0.3-1.0)	3.5 (2.6-4.4)	4.7 (3.5-5.8)	5.8 (4.3-7.3)
Scorpio	Scorpio	2,240	71 (63-76)	94	49	19	3	6	14	3	0.4 (0.1-0.6)	2.4 (1.8-3.0)	3.2 (2.4-3.9)	3.6 (2.8-4.4)
TC Plus SB	TC Plus Solution	1,901	70 (64-77)	42	19	7	2	4	9	1	0.7 (0.3-1.1)	2.0 (1.3-2.7)	2.6 (1.8-3.5)	2.8 (1.9-3.7)
PFC/Sigma	LCS	1,175	66 (58-75)	45	24	9	3	0	9	0	0.3 (0.0-0.7)	2.3 (1.4-3.2)	3.3 (2.2-4.4)	4.5 (3.1-5.8)
Journey BCS	Journey BCS	889	66 (59-72)	87	14	46	1	3	22	1	1.5 (0.7-2.3)	6.7 (5.1-8.4)	8.3 (6.4-10.1)	10.0 (7.9-12.1)
Innex	Innex	883	70 (62-78)	33	9	10	0	4	10	0	1.3 (0.5-2.0)	2.5 (1.5-3.6)	3.4 (3.1-4.7)	4.3 (2.8-5.8)
Journey II BCS	Journey BCS	834	68 (61-73)	26	3	15	0	0	6	2	0.4 (0.0-0.9)	5.8 (3.5-8.2)	6.3 (3.8-8.7)	n.a.
Profix	Profix	770	68 (61-76)	50	34	7	1	2	5	1	0.7 (0.1-1.2)	3.7 (2.3-5.0)	5.7 (4.1-7.4)	6.6 (4.8-8.4)
Attune	Attune	725	67 (61-73)	5	1	1	1	0	2	0	0.6 (0.0-1.2)	0.9 (0.1-1.6)	n.a.	n.a.
MRK	MRK	645	68 (62-75)	6	3	2	0	0	1	0	0.4 (0.0-0.9)	1.4 (0.1-2.7)	n.a.	n.a.
Genesis II	Profix/Genesis MB baseplate	622	67 (60-75)	61	25	28	0	1	6	1	2.0 (0.9-3)	7.1 (5.1-9.1)	9.0 (6.7-11.3)	10.1 (7.6-12.6)
TC Plus Solution	TC Plus Solution	606	70 (62-76)	18	14	2	0	1	0	1	0.3 (0.0-0.8)	2.7 (1.3-4.1)	3.6 (1.9-5.3)	4.0 (2.1-5.8)
Advance	Advance	479	71 (65-78)	48	8	12	1	11	15	1	2.3 (1.0-3.7)	8.6 (6.1-11.1)	9.7 (7.0-12.3)	9.9 (7.2-12.6)
Rotaglide	Rotaglide	427	71 (65-78)	29	22	1	2	0	4	0	1.2 (0.1-2.2)	4.7 (2.7-6.8)	6.1 (3.8-8.4)	7.4 (4.6-10.1)
Maxim	Vanguard Complete Knee	272	70 (63-77)	13	2	3	1	2	5	0	1.5 (0.0-2.9)	2.9 (0.9-4.9)	3.3 (1.2-5.4)	4.1 (1.7-6.4)

Please note: n.a. if <50 cases were at risk; TKA: total knee arthroplasty; CI: confidence interval; IQR: interquartile range.

68 combinations of cemented femur and tibia components were registered in 2007-2017. Only combinations with over 250 procedures have been listed. These combinations represented 99.0% of all registered cemented femur and tibia combinations.

Results must be interpreted with caution. Patient characteristics like age and diagnosis, as well as procedure characteristics like the experience of the surgeon performing the procedure or patella resurfacing of the prosthesis may have influenced the cumulative revision percentages.

Uncemented primary TKA

TABLE CUMULATIVE 1-, 3-, 5- AND 7-YEAR REVISION PERCENTAGES OF UNCEMENTED PRIMARY TOTAL KNEE ARTHROPLASTIES BY PROSTHESIS COMPONENT COMBINATION OF PATIENTS WHO UNDERWENT A TKA FOR OSTEOARTHRITIS IN THE NETHERLANDS IN 2007-2017 (N=9,696).

					Type of revision (n)						Cumulative revision percentage (95% CI)			
Femur component	Tibia component	Total primary TKAs (n)	Median (IQR) age (yr)	Total knee revision arthroplasties (n)	Total knee (complete revision)	Patella addition	Only femur component	Only tibia component	Only insert/ patella	Missing/ unknown	1yr	3yr	5yr	7yr
All combinations (n=43)		**9,696**	**69 (62-76)**	**409**	**132**	**70**	**7**	**97**	**97**	**6**	**1.1 (0.9-1.3)**	**3.7 (3.2-4.1)**	**4.6 (4.1-5.1)**	**5.2 (4.7-5.7)**
LCS	LCS	6,754	69 (62-76)	263	65	39	5	78	73	3	0.9 (0.7-1.1)	3.5 (3.0-3.9)	4.1 (3.6-4.6)	4.6 (4.0-5.2)
Triathlon	Triathlon	791	69 (63-76)	12	2	3	0	1	6	0	0.6 (0.0-1.2)	1.5 (0.5-2.4)	2.1 (0.8-3.4)	2.6 (1.0-4.2)
ACS	ACS	409	69 (61-76)	18	9	2	1	3	3	0	3.0 (1.3-4.6)	4.6 (2.5-6.6)	n.a.	n.a.
Duracon	Duracon	274	69 (61-77)	6	3	1	0	0	2	0	0.4 (0.0-1.1)	0.7 (0.0-1.7)	1.5 (0.0-2.9)	1.5 (0.0-2.9)
Rotaglide	Rotaglide	265	69 (61-76)	50	32	10	1	1	5	1	2.3 (0.5-4.1)	10.3 (6.6-14.0)	16.3 (11.8-20.8)	20.4 (15.2-25.6)
Genesis II	Genesis II	196	68 (62-75)	10	4	4	0	1	0	1	1.1 (0.0-2.6)	6.3 (2.5-10.0)	n.a.	n.a.
NexGen	NexGen	178	70 (63-77)	8	3	1	0	2	2	0	1.3 (0.0-3.0)	3.6 (0.5-6.7)	5.7 (1.5-9.9)	5.7 (1.5-9.9)
ACS LD	ACS LD	161	70 (61-76)	3	1	1	0	1	0	0	1.9 (0.0-4.6)	n.a.	n.a.	n.a.
Vanguard Complete Knee	Vanguard Complete Knee	149	67 (61-75)	7	3	0	0	4	0	0	2.8 (0.1-5.6)	4.8 (1.0-8.5)	4.8 (1.0-8.5)	4.8 (1.0-8.5)

Please note: n.a. if <50 cases were at risk; TKA: total knee arthroplasty; CI: confidence interval; IQR: interquartile range.

43 combinations of uncemented femur and tibia components were registered in 2007-2017. Only combinations with over 100 procedures have been listed. These combinations represented 94.7% of all registered uncemented femur and tibia combinations.

Results must be interpreted with caution. Patient characteristics like age and diagnosis, as well as procedure characteristics like the experience of the surgeon performing the procedure or patella resurfacing of the prosthesis may have influenced the cumulative revision percentages.

Bone cement

TABLE CUMULATIVE 1-, 3-, 5- AND 7-YEAR REVISION PERCENTAGES OF THE MOST FREQUENTLY REGISTERED TYPES OF BONE CEMENT BY TYPE OF MIXING SYSTEM IN 2017, IN PRIMARY TOTAL KNEE ARTHROPLASTIES IN THE NETHERLANDS IN 2007-2017.

Bone cement	n	Cumulative 1-year revision percentage (95% CI)	Cumulative 3-year revision percentage (95% CI)	Cumulative 5-year revision percentage (95% CI)	Cumulative 7-year revision percentage (95% CI)
Separately packed bone cement components (n=143,652)					
Palacos R+G	104,362	1.0 (0.9-1.0)	3.4 (3.3-3.5)	4.4 (4.2-4.5)	5.0 (4.8-5.1)
Refobacin Bone Cement R	10,294	0.9 (0.7-1.1)	3.1 (2.7-3.5)	4.1 (3.6-4.6)	5.1 (4.6-5.7)
Palacos MV+G	7,183	0.9 (0.7-1.1)	3.1 (2.7-3.5)	3.9 (3.4-4.4)	4.4 (3.8-5.2)
Refobacin Plus Bone Cement	3,138	1.2 (0.9-1.7)	4.7 (4.0-5.6)	5.7 (4.9-6.6)	6.2 (5.3-7.2)
Synicem1G	138	n.a.	n.a.	n.a.	n.a.
Bone cement pre-packed in a vacuum mixing system (n=34,925)					
Refobacin Bone Cement R	15,711	1.2 (1.0-1.4)	3.7 (3.3-4.0)	4.8 (4.4-5.3)	5.8 (5.0-6.6)
Palacos R+G	5,819	1.0 (0.8-1.4)	3.7 (2.8-4.9)	n.a.	n.a.
Refobacin Plus Bone Cement	11,710	0.9 (0.7-1.0)	3.3 (2.9-3.6)	4.1 (3.7-4.6)	4.7 (4.1-5.3)
Refobacin Revision	89	2.3 (0.6-8.9)	2.3 (0.6-8.9)	n.a.	n.a.

Please note: Revision is defined as any change (insertion, replacement and/or removal) of one or more components of the prosthesis.
n.a. if <50 cases were at risk; CI: confidence interval.

31 types of bone cement were registered in 2007-2017. Only the most frequently registered types of bone cement in 2017 have been listed. These types of bone cement represented 89.5% of all registered types of bone cement in 2007-2017.

Results must be interpreted with caution. Patient characteristics like age and diagnosis, as well as procedure characteristics like the experience of the surgeon performing the procedure or patella resurfacing of the prosthesis may have influenced the cumulative revision percentages.

Major revision within 1, 3, 5 and 7 years

Cemented primary TKA

TABLE CUMULATIVE 1-, 3-, 5- AND 7-YEAR MAJOR REVISION PERCENTAGES OF THE MOST FREQUENTLY USED CEMENTED PRIMARY TOTAL KNEE ARTHROPLASTIES BY PROSTHESIS COMPONENT COMBINATION OF PATIENTS WHO UNDERWENT A TKA FOR OSTEOARTHRITIS IN THE NETHERLANDS IN 2007-2017 (N=176,736).

Femur component	Tibia component	Total primary TKAs (n)	Median (IQR) age (yr)	Major revision[1] arthroplasties (n)	Cumulative percentage of major revision (95% CI)			
					1yr	3yr	5yr	7yr
All combinations (n=68)		**176,736**	**69 (62-76)**	**3,158**	**0.4 (0.4-0.5)**	**1.7 (1.6-1.7)**	**2.3 (2.2-2.4)**	**2.7 (2.6-2.8)**
Genesis II	Genesis II	39,700	69 (62-75)	679	0.5 (0.4-0.6)	1.8 (1.6-1.9)	2.3 (2.1-2.5)	2.6 (2.4-2.8)
NexGen	NexGen	39,404	69 (62-75)	731	0.4 (0.4-0.5)	1.6 (1.4-1.7)	2.4 (2.2-2.6)	3.1 (2.9-3.4)
Vanguard Complete Knee	Vanguard Complete Knee	29,199	69 (62-75)	424	0.4 (0.3-0.5)	1.5 (1.4-1.7)	2.0 (1.8-2.2)	2.3 (2.1-2.5)
PFC/Sigma	PFC/Sigma	22,835	69 (63-76)	302	0.4 (0.3-0.5)	1.3 (1.1-1.5)	1.7 (1.5-1.9)	1.9 (1.7-2.2)
LCS	LCS	12,800	70 (63-76)	341	0.5 (0.4-0.6)	2.5 (2.2-2.8)	3.4 (3.1-3.8)	4.0 (3.5-4.4)
AGC V2	AGC V2	4,417	71 (65-77)	70	0.2 (0.1-0.3)	1.1 (0.8-1.4)	1.4 (1.0-1.7)	1.8 (1.3-2.2)
Triathlon	Triathlon	3,621	70 (64-76)	49	0.6 (0.4-0.9)	1.7 (1.2-2.2)	2.0 (1.4-2.5)	2.8 (1.5-4.1)
Optetrak	Optetrak	3,030	70 (62-76)	140	0.7 (0.4-1.0)	3.2 (2.5-3.8)	4.1 (3.4-4.8)	5.2 (4.3-6.1)
Scorpio NRG	Scorpio	2,631	70 (63-76)	44	0.4 (0.2-0.7)	1.5 (1.0-2.0)	2.0 (1.4-2.6)	2.4 (1.6-3.2)
ACS	ACS	2,601	67 (60-73)	39	0.4 (0.1-0.6)	1.5 (1.0-2.0)	1.9 (1.3-2.4)	2.5 (1.3-3.7)

[1] Revision of at least the femur or tibia component.
Please note: n.a. if <50 cases were at risk; TKA: total knee arthroplasty; CI: confidence interval; IQR: interquartile range.

Only combinations with over 2500 procedures have been listed, these combinations represented 90.7% of all registered cemented femur and tibia combinations.

Results must be interpreted with caution. Patient characteristics like age and diagnosis, as well as procedure characteristics like the experience of the surgeon performing the procedure or patella resurfacing of the prosthesis may have influenced the cumulative revision percentages.

Uncemented primary TKA

TABLE CUMULATIVE 1-, 3-, 5- AND 7-YEAR MAJOR REVISION PERCENTAGES OF THE MOST FREQUENTLY USED UNCEMENTED PRIMARY TOTAL KNEE ARTHROPLASTIES BY PROSTHESIS COMPONENT COMBINATION OF PATIENTS WHO UNDERWENT A TKA FOR OSTEOARTHRITIS IN THE NETHERLANDS IN 2007-2017 (N=9,696).

Femur component	Tibia component	Total primary TKAs (n)	Median (IQR) age (yr)	Major revision[1] arthroplasties (n)	Cumulative percentage of major revision (95% CI)			
					1yr	3yr	5yr	7yr
All combinations (n=43)		**9,696**	**69 (62-76)**	**236**	**0.7 (0.5-0.9)**	**2.2 (1.9-2.5)**	**2.8 (2.4-3.1)**	**3.0 (2.6-3.4)**
LCS	LCS	6,754	69 (62-76)	148	0.6 (0.4-0.8)	2.0 (1.7-2.4)	2.5 (2.1-2.8)	2.6 (2.2-3.0)
Triathlon	Triathlon	791	69 (63-76)	3	0.1 (0.0-0.4)	0.5 (0.0-1.1)	n.a.	n.a.
ACS	ACS	409	69 (61-76)	13	2.2 (0.8-3.7)	3.3 (1.5-5.1)	n.a.	n.a.
Duracon	Duracon	274	69 (61-77)	3	0.0 (0.0-0.0)	0.0 (0.0-0.0)	0.4 (0.0-1.1)	0.4 (0.0-1.1)
Rotaglide	Rotaglide	265	69 (61-76)	34	1.5 (0.0-3.0)	6.9 (3.8-10.0)	11.3 (7.4-15.1)	14.3 (9.7-18.9)
Genesis II	Genesis II	196	68 (62-75)	5	0.5 (0.0-1.6)	3.8 (0.8-6.7)	n.a.	n.a.
NexGen	NexGen	178	70 (63-77)	5	1.3 (0.0-3.0)	2.9 (0.1-5.6)	3.8 (0.5-7.1)	n.a.
ACS LD	ACS LD	161	70 (61-76)	2	1.9 (0.0-4.6)	n.a.	n.a.	n.a.
Vanguard Complete Knee	Vanguard Complete Knee	149	67 (61-75)	7	2.8 (0.1-5.6)	4.8 (1.0-8.5)	4.8 (1.0-8.5)	4.8 (1.0-8.5)

[1] Revision of at least the femur or tibia component.
Please note: n.a. if <50 cases were at risk; THA: total hip arthroplasty; CI: confidence interval; IQR: interquartile range.

Only combinations with over 100 procedures have been listed, these combinations represented 94.7% of all registered cemented femur and tibia combinations.

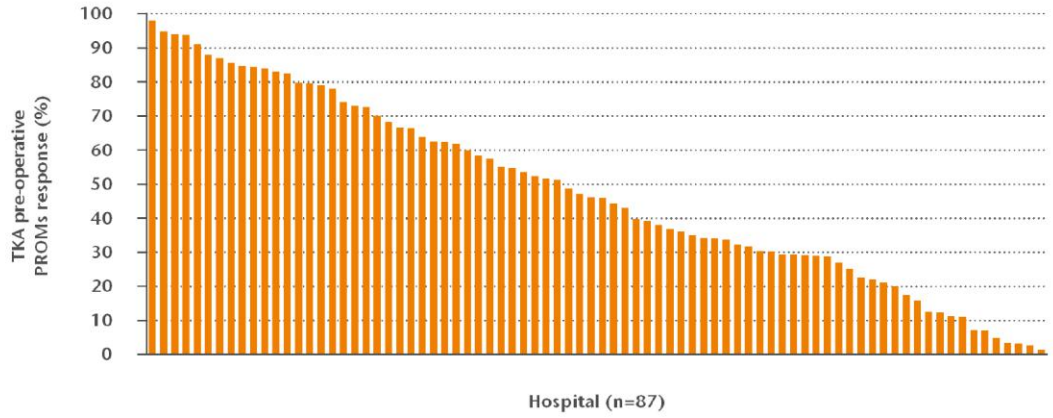
Results must be interpreted with caution. Patient characteristics like age and diagnosis, as well as procedure characteristics like the experience of the surgeon performing the procedure or patella resurfacing of the prosthesis may have influenced the cumulative revision percentages.

PROMs

Response

Pre-operative PROMs

FIGURE PRE-OPERATIVE PROMS RESPONSE PERCENTAGE OF PATIENTS WHO UNDERWENT A TKA FOR OSTEOARTHRITIS PER PROMS REGISTERING HOSPITAL IN THE NETHERLANDS IN 2017 (N=22,584).

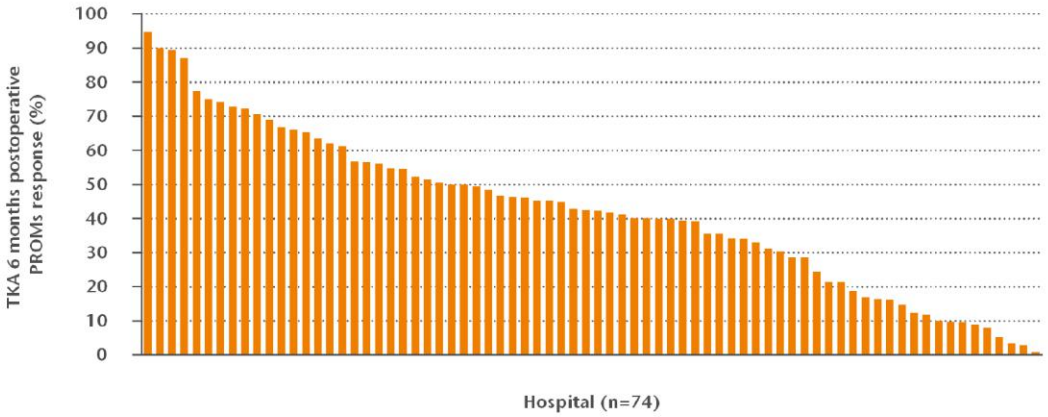


TKA: total knee arthroplasty; PROM: patient reported outcome measure.

Of all 22,584 patients who underwent a TKA for osteoarthritis in a pre-operative PROMs registering hospital, the mean pre-operative response rate was 56.8% (n=12,820).

Six months postoperative PROMs

FIGURE SIX MONTHS POSTOPERATIVE PROMS RESPONSE PERCENTAGE OF PATIENTS WHO UNDERWENT A TKA FOR OSTEOARTHRITIS (BETWEEN JANUARY 1ST AND JULY 1ST) PER PRE-OPERATIVE PROMS REGISTERING HOSPITAL IN THE NETHERLANDS IN 2017 (N=11,666).

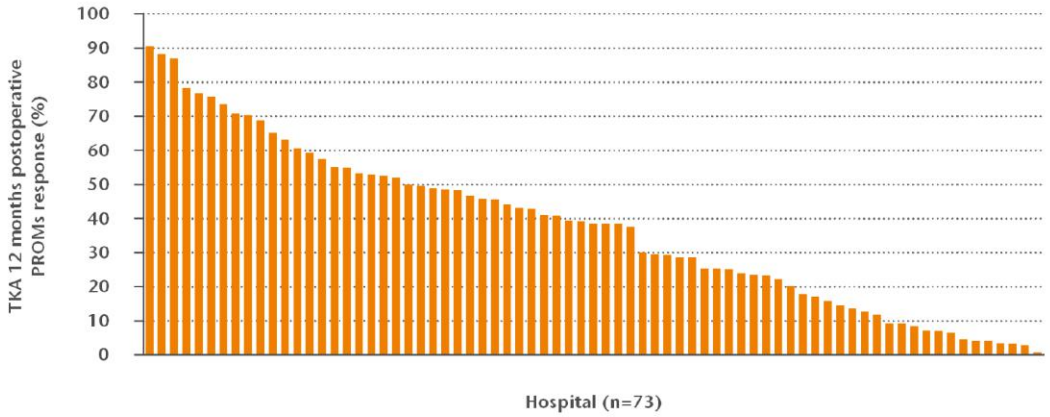


Please note: Of all hospitals in which pre-operative PROMs were registered in 2017, 12 hospitals did not register six months postoperative PROMs. One hospital registered six months postoperative PROMs after July 1st in 2017.
TKA: total knee arthroplasty; PROM: patient reported outcome measure.

Of all 11,666 patients who underwent a TKA for osteoarthritis in a pre-operative PROMs registering hospital between January 1st and July 1st 2017, the mean response rate of six months postoperative PROMs was 39.2% (n=4,574). The mean response rate of both pre-operative and six months postoperative PROMs was 34.2% (n=3,987).

Twelve months postoperative PROMs

FIGURE TWELVE MONTHS POSTOPERATIVE PROMS RESPONSE PERCENTAGE OF PATIENTS WHO UNDERWENT A TKA FOR OSTEOARTHRITIS PER PRE-OPERATIVE PROMS REGISTERING HOSPITAL IN THE NETHERLANDS IN 2016 (N=20,770).



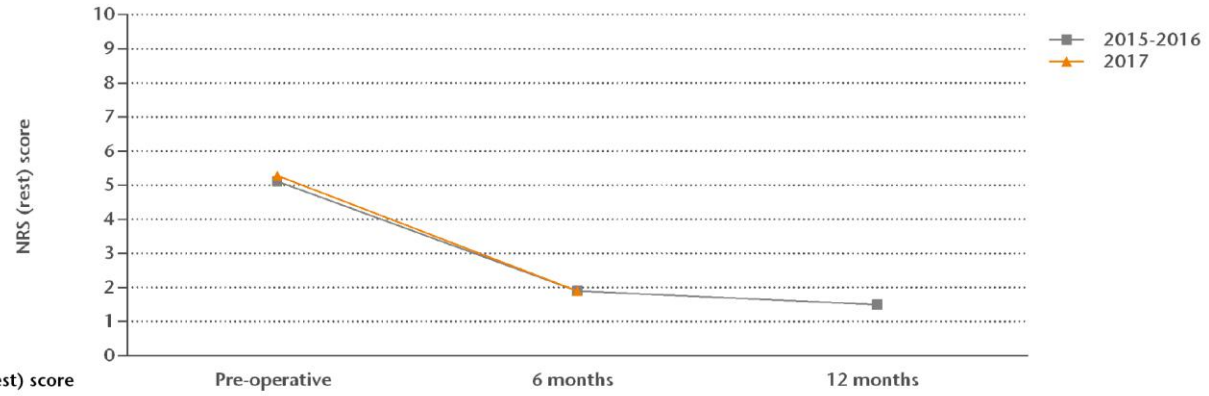
Please note: Of all hospitals in which pre-operative PROMs were registered in 2016 (n=81), 8 hospitals did not register twelve months postoperative PROMs. The twelve months postoperative PROMs response is not (yet) available for 2017.
TKA: total knee arthroplasty; PROM: patient reported outcome measure.

Of all 20,770 patients who underwent a TKA for osteoarthritis in a pre-operative PROMs registering hospital in 2016, the mean response rate of twelve months postoperative PROMs was 35.0% (n=7,261). The mean response rate of both pre-operative and twelve months postoperative PROMs was 29.6% (n=6,142).

Mean scores (pre-operative, 6 months and 12 months)

NRS (rest)

FIGURE MEAN PRE-OPERATIVE, 6 MONTHS AND 12 MONTHS NRS (REST) SCORES OF PATIENTS WHO UNDERWENT A TKA FOR OSTEOARTHRITIS IN THE NETHERLANDS IN 2015-2017.



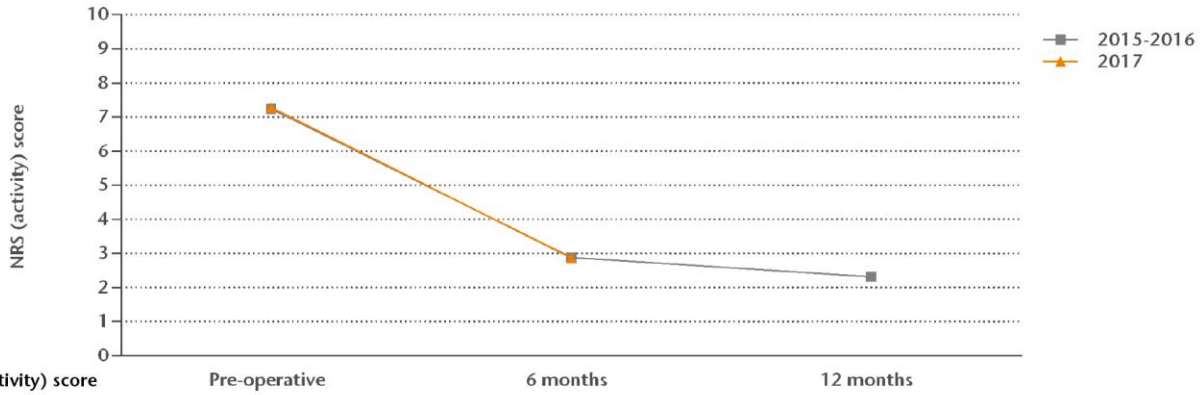
Year of TKA	n	mean (95% CI)	n	mean (95% CI)	n	mean (95% CI)
2015-2016	11,175	5.1 (5.1-5.2)	7,000	1.9 (1.8-1.9)	9,634	1.5 (1.5-1.6)
2017	12,247	5.3 (5.2-5.3)	5,221	1.9 (1.8-2.0)	n.a.	n.a.
Total	23,422	5.2 (5.2-5.2)	12,221	1.9 (1.9-1.9)	9,634	1.5 (1.5-1.6)

Please note: The 12 months NRS (rest) score is not (yet) available for 2017.
TKA: total knee arthroplasty.

The NRS (rest) score measures pain during rest. The score has a range of 0.0 to 10.0, with 0.0 representing no pain and 10.0 representing the most possible pain.

NRS (activity)

FIGURE MEAN PRE-OPERATIVE, 6 MONTHS AND 12 MONTHS NRS (ACTIVITY) SCORES OF PATIENTS WHO UNDERWENT A TKA FOR OSTEOARTHRITIS IN THE NETHERLANDS IN 2015-2017.



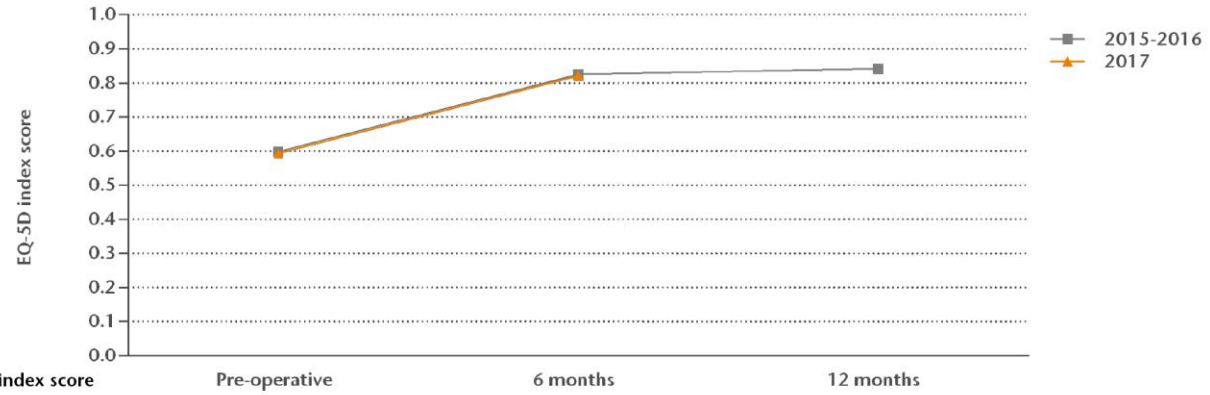
Year of TKA	n	mean (95% CI)	n	mean (95% CI)	n	mean (95% CI)
2015-2016	11,178	7.2 (7.2-7.3)	7,033	2.9 (2.8-2.9)	9,665	2.3 (2.3-2.4)
2017	12,242	7.3 (7.2-7.3)	5,221	2.9 (2.8-2.9)	n.a.	n.a.
Total	23,420	7.3 (7.2-7.3)	12,254	2.9 (2.8-2.9)	9,665	2.3 (2.3-2.4)

Please note: The 12 months NRS (activity) score is not (yet) available for 2017.
TKA: total knee arthroplasty.

The NRS (activity) score measures pain during activity. The score has a range of 0.0 to 10.0, with 0.0 representing no pain and 10.0 representing the most possible pain.

EQ5D index score

FIGURE MEAN PRE-OPERATIVE, 6 MONTHS AND 12 MONTHS EQ-5D INDEX SCORES OF PATIENTS WHO UNDERWENT A TKA FOR OSTEOARTHRITIS IN THE NETHERLANDS IN 2015-2017.



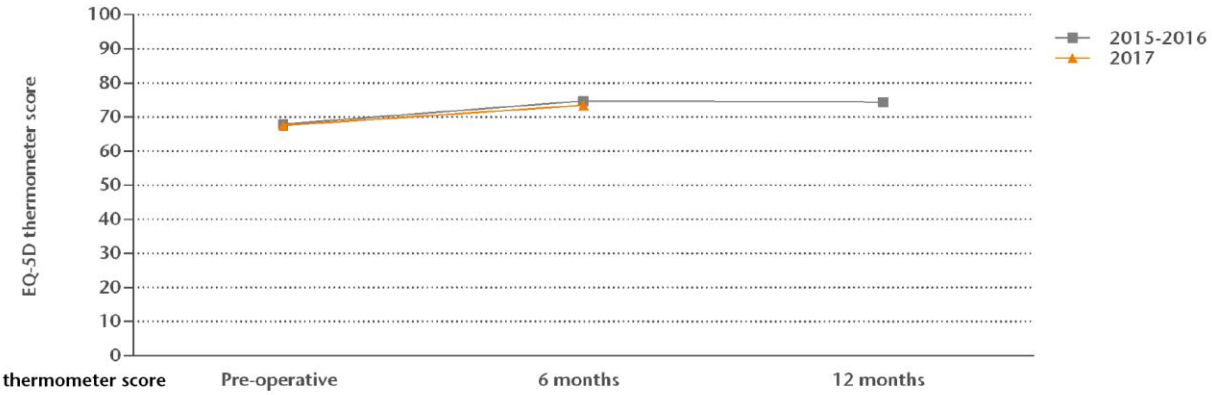
Year of TKA	n	mean (95% CI)	n	mean (95% CI)	n	mean (95% CI)
2015-2016	13,299	0.60 (0.59-0.60)	8,322	0.83 (0.82-0.83)	11,306	0.84 (0.84-0.84)
2017	12,559	0.59 (0.59-0.60)	5,293	0.82 (0.82-0.83)	n.a.	n.a.
Total	25,858	0.60 (0.59-0.60)	13,615	0.82 (0.82-0.83)	11,306	0.84 (0.84-0.84)

Please note: The 12 months EQ-5D index score is not (yet) available for 2017.
TKA: total knee arthroplasty.

The EQ-5D index score measures quality of life. The score has a range of -0.329 to 1.0, with 1.0 representing the best possible quality of life.

EQ5D thermometer

FIGURE MEAN PRE-OPERATIVE, 6 MONTHS AND 12 MONTHS EQ-5D THERMOMETER SCORES OF PATIENTS WHO UNDERWENT A TKA FOR OSTEOARTHRITIS IN THE NETHERLANDS IN 2015-2017.



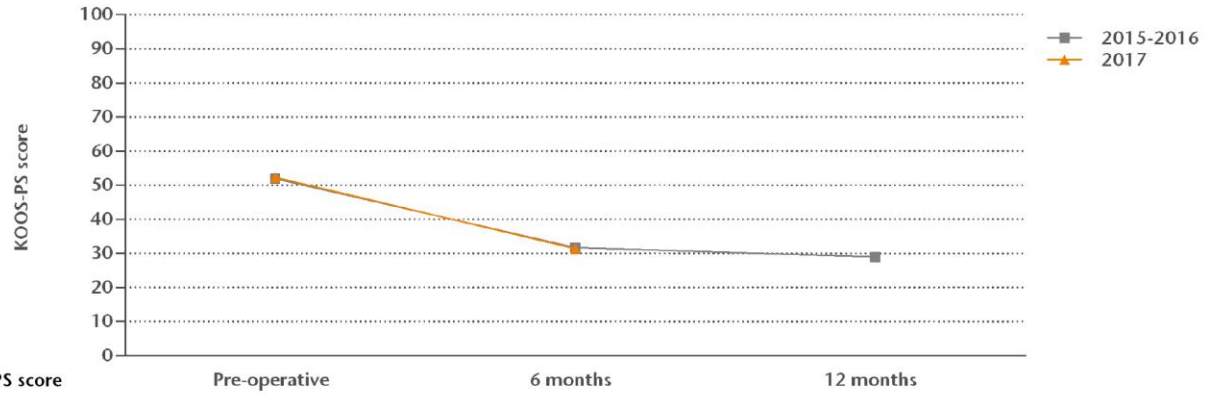
Year of TKA	n	mean (95% CI)	n	mean (95% CI)	n	mean (95% CI)
2015-2016	13,167	67.9 (67.6-68.2)	8,364	74.7 (74.3-75.1)	11,464	74.4 (74.0-74.8)
2017	12,583	67.5 (67.1-67.8)	5,368	73.4 (72.9-74.0)	n.a.	n.a.
Total	25,750	67.7 (67.5-67.9)	13,732	74.2 (73.9-74.5)	11,464	74.4 (74.0-74.8)

Please note: The 12 months EQ-5D thermometer score is not (yet) available for 2017.
TKA: total knee arthroplasty.

The EQ-5D thermometer score measures the health situation. The score has a range of 0.0 to 100.0, with 0.0 representing the worst possible health situation and 100.0 the best possible health situation.

KOOS-PS score

FIGURE MEAN PRE-OPERATIVE, 6 MONTHS AND 12 MONTHS KOOS-PS SCORES OF PATIENTS WHO UNDERWENT A TKA FOR OSTEOARTHRITIS IN THE NETHERLANDS IN 2015-2017.



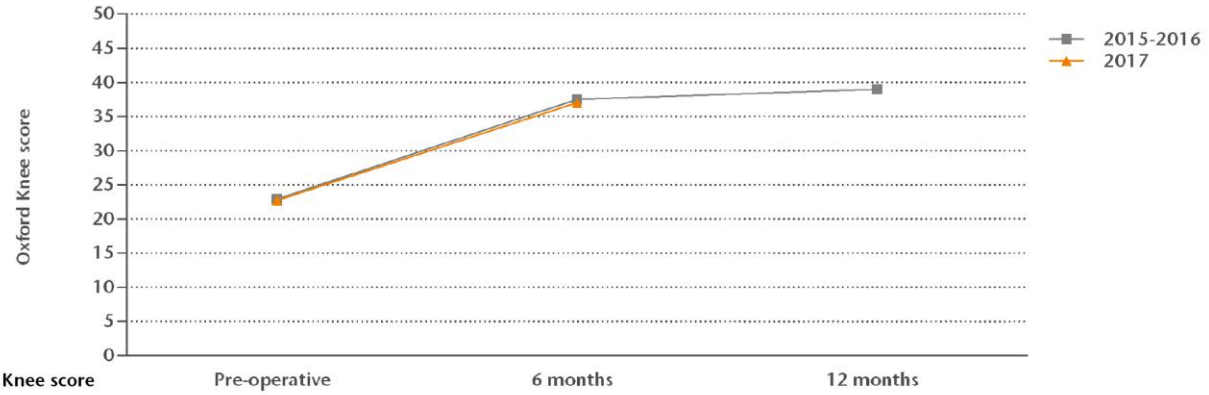
Year of TKA	n	mean (95% CI)	n	mean (95% CI)	n	mean (95% CI)
2015-2016	12,955	52.0 (51.7-52.2)	8,127	31.7 (31.4-32.0)	10,927	29.0 (28.7-29.3)
2017	12,427	52.3 (52.0-52.6)	5,091	31.4 (31.0-31.8)	n.a.	n.a.
Total	25,382	52.1 (51.9-52.3)	13,218	31.6 (31.3-31.8)	10,927	29.0 (28.7-29.3)

Please note: The 12 months KOOS-PS score is not (yet) available for 2017.
TKA: total knee arthroplasty.

The KOOS-PS score measures the physical functioning of patients with osteoarthritis to the knee. The score has a range of 0.0 to 100.0, with 0.0 representing no effort and 100.0 the most possible effort.

Oxford Knee score

FIGURE MEAN PRE-OPERATIVE, 6 MONTHS AND 12 MONTHS OXFORD KNEE SCORES OF PATIENTS WHO UNDERWENT A TKA FOR OSTEOARTHRITIS IN THE NETHERLANDS IN 2015-2017.



Year of TKA	n	mean (95% CI)	n	mean (95% CI)	n	mean (95% CI)
2015-2016	10,192	22.9 (22.8-23.1)	7,356	37.5 (37.3-37.7)	9,726	39.0 (38.8-39.2)
2017	11,324	22.7 (22.6-22.8)	4,899	37.0 (36.8-37.3)	n.a.	n.a.
Total	21,516	22.8 (22.7-22.9)	12,255	37.3 (37.2-37.5)	9,726	39.0 (38.8-39.2)

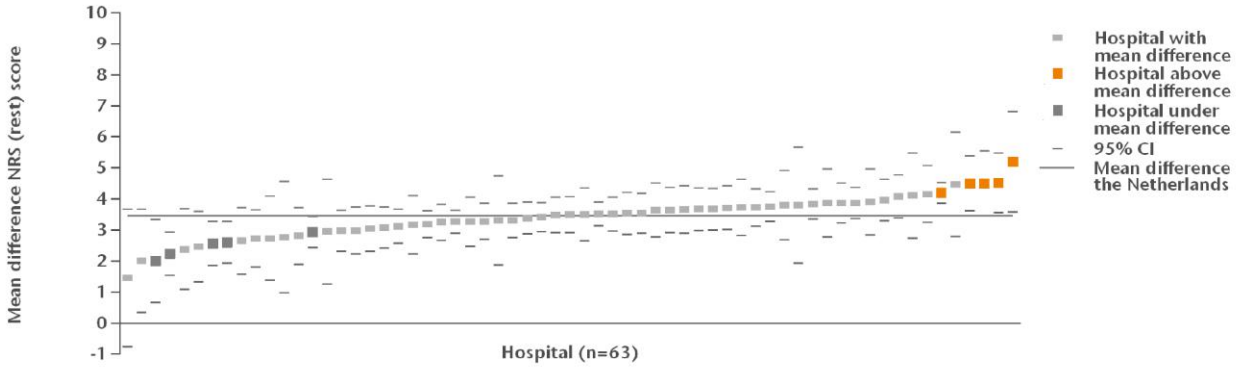
Please note: The 12 months Oxford Knee score is not (yet) available for 2017.
TKA: total knee arthroplasty.

The Oxford Knee score measures the physical functioning and pain of patients with osteoarthritis to the knee. The score has a range of 0.0 to 48.0, with 0.0 representing the most possible functional disability and 48.0 no functional disability.

Mean differences (pre-operative and 6 months) per hospital

NRS (rest)

FIGURE MEAN DIFFERENCE BETWEEN PRE-OPERATIVE AND 6 MONTHS POSTOPERATIVE NRS (REST) SCORES OF PATIENTS WHO UNDERWENT A TKA FOR OSTEOARTHRITIS PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=4,511).

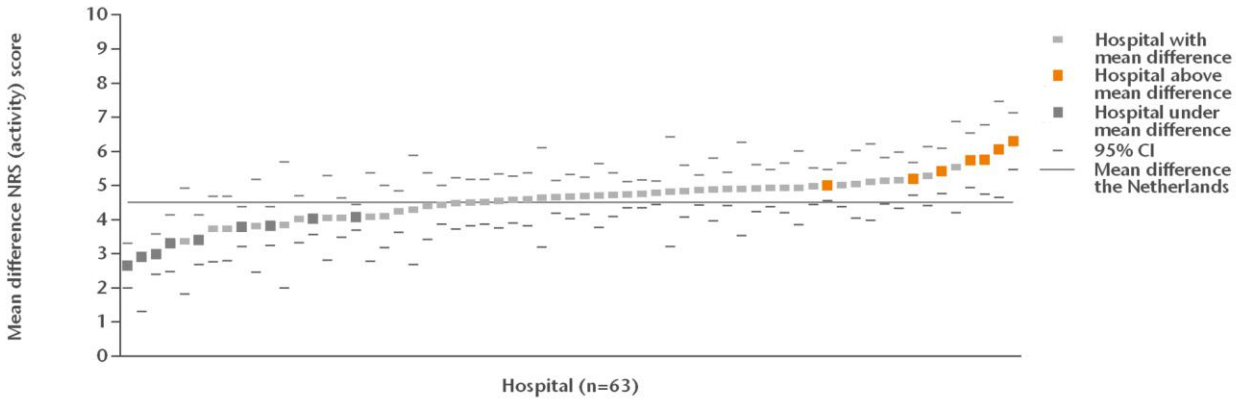


Please note: The 63 hospitals with a minimum of 10 PROMs (mean differences in NRS (rest) score) were included in this figure.
TKA: total knee arthroplasty.

The mean difference between pre-operative and 6 months postoperative NRS (rest) scores of patients who underwent a TKA for osteoarthritis in the Netherlands in 2017 was 3.5 (95% CI: 3.4-3.5).

NRS (activity)

FIGURE MEAN DIFFERENCE BETWEEN PRE-OPERATIVE AND 6 MONTHS POSTOPERATIVE NRS (ACTIVITY) SCORES OF PATIENTS WHO UNDERWENT A TKA FOR OSTEOARTHRITIS PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=4,505).

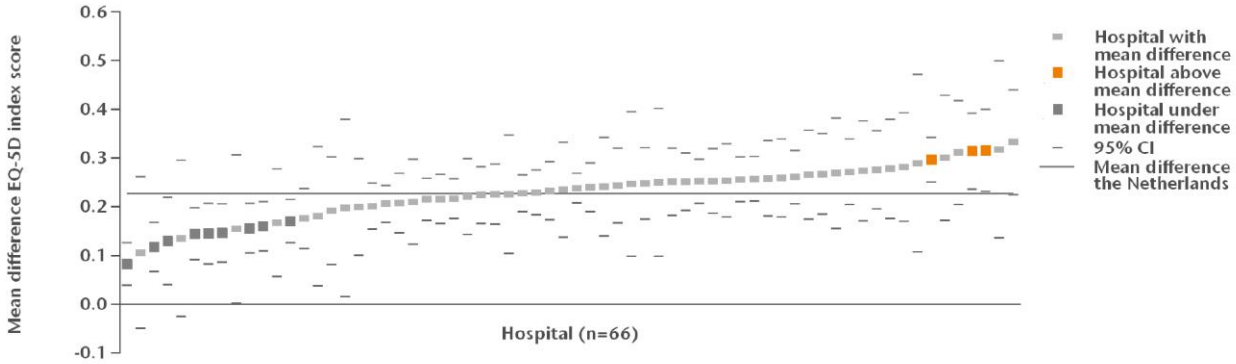


Please note: The 63 hospitals with a minimum of 10 PROMs (mean differences in NRS (activity) score) were included in this figure.
TKA: total knee arthroplasty.

The mean difference between pre-operative and 6 months postoperative NRS (activity) scores of patients who underwent a TKA for osteoarthritis in the Netherlands in 2017 was 4.5 (95% CI: 4.4-4.6).

EQ5D index score

FIGURE MEAN DIFFERENCE BETWEEN PRE-OPERATIVE AND 6 MONTHS POSTOPERATIVE EQ-5D INDEX SCORES OF PATIENTS WHO UNDERWENT A TKA FOR OSTEOARTHRITIS PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=4,581).

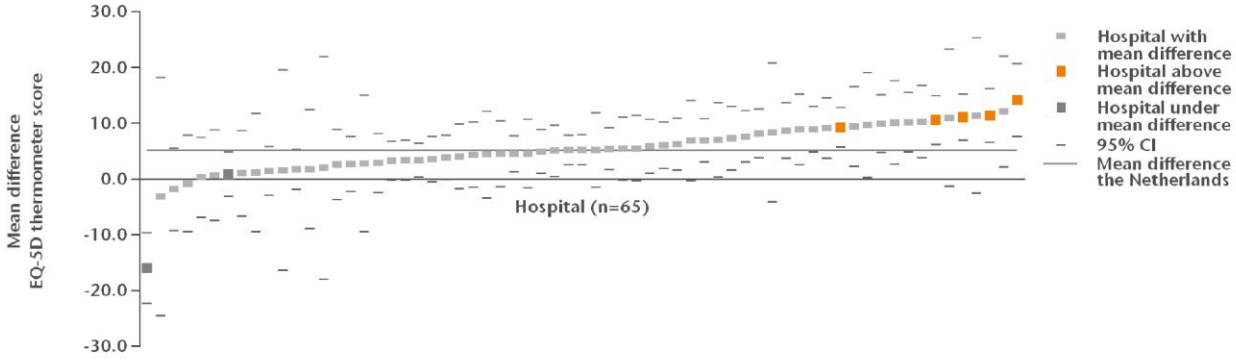


Please note: The 66 hospitals with a minimum of 10 PROMs (mean differences in EQ-5D index score) were included in this figure.
TKA: total knee arthroplasty.

The mean difference between pre-operative and 6 months postoperative EQ-5D index scores of patients who underwent a TKA for osteoarthritis in the Netherlands in 2017 was 0.22 (95% CI: 0.22-0.24).

EQ5D thermometer

FIGURE MEAN DIFFERENCE BETWEEN PRE-OPERATIVE AND 6 MONTHS POSTOPERATIVE EQ-5D THERMOMETER SCORES OF PATIENTS WHO UNDERWENT A TKA FOR OSTEOARTHRITIS PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=4,642).

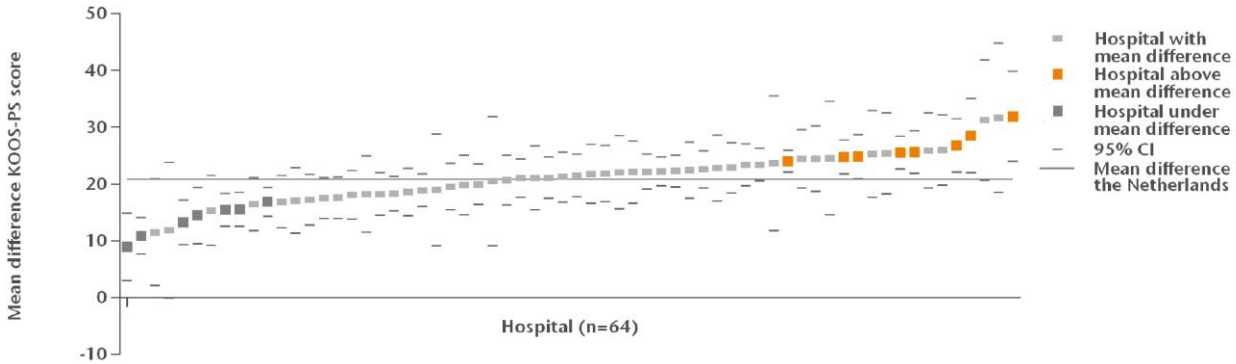


Please note: The 65 hospitals with a minimum of 10 PROMs (mean differences in EQ-5D thermometer score) were included in this figure.
TKA: total knee arthroplasty.

The mean difference between pre-operative and 6 months postoperative EQ-5D thermometer scores of patients who underwent a TKA for osteoarthritis in the Netherlands in 2017 was 5.1 (95% CI: 4.4-5.8).

KOOS-PS score

FIGURE MEAN DIFFERENCE BETWEEN PRE-OPERATIVE AND 6 MONTHS POSTOPERATIVE KOOS-PS SCORES OF PATIENTS WHO UNDERWENT A TKA FOR OSTEOARTHRITIS PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=4,340).

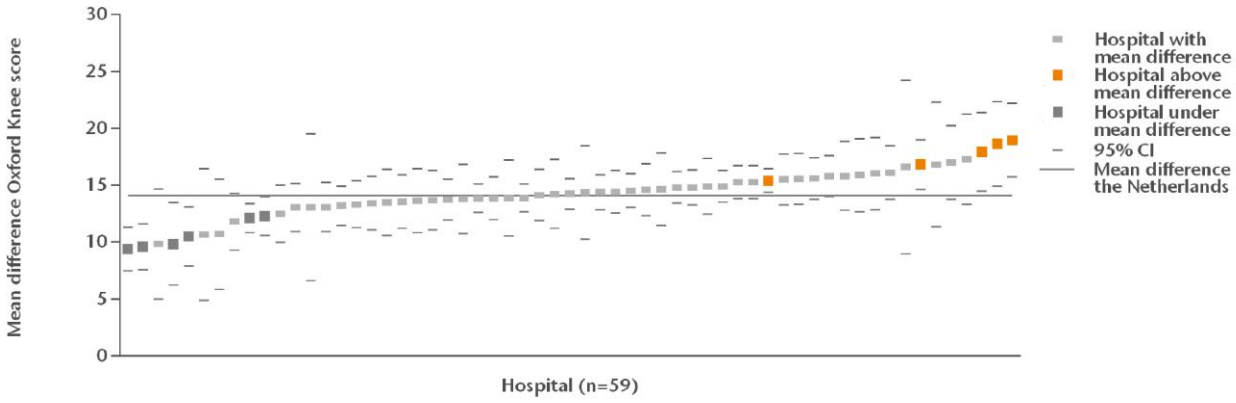


Please note: The 64 hospitals with a minimum of 10 PROMs (mean differences in KOOS-PS score) were included in this figure.
TKA: total knee arthroplasty.

The mean difference between pre-operative and 6 months postoperative KOOS-PS scores of patients who underwent a TKA for osteoarthritis in the Netherlands in 2017 was 20.8 (95% CI: 20.3-21.3).

Oxford Knee score

FIGURE MEAN DIFFERENCE BETWEEN PRE-OPERATIVE AND 6 MONTHS POSTOPERATIVE OXFORD KNEE SCORES OF PATIENTS WHO UNDERWENT A TKA FOR OSTEOARTHRITIS PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=4,228).



Please note: The 59 hospitals with a minimum of 10 PROMs (mean differences in Oxford Knee score) were included in this figure.
TKA: total knee arthroplasty.

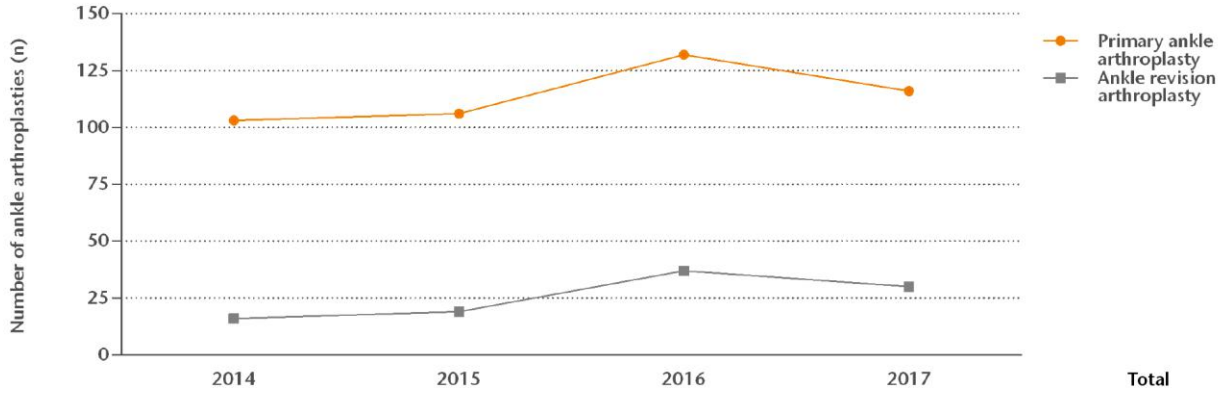
The mean difference between pre-operative and 6 months postoperative Oxford Knee scores of patients who underwent a TKA for osteoarthritis in the Netherlands in 2017 was 14.1 (95% CI: 13.8-14.4).

Ankle arthroplasty

Numbers

Procedures 2014-2017

FIGURE NUMBER OF PRIMARY ANKLE ARTHROPLASTIES AND ANKLE REVISION ARTHROPLASTIES REGISTERED IN THE LROI IN THE NETHERLANDS IN 2014-2017.

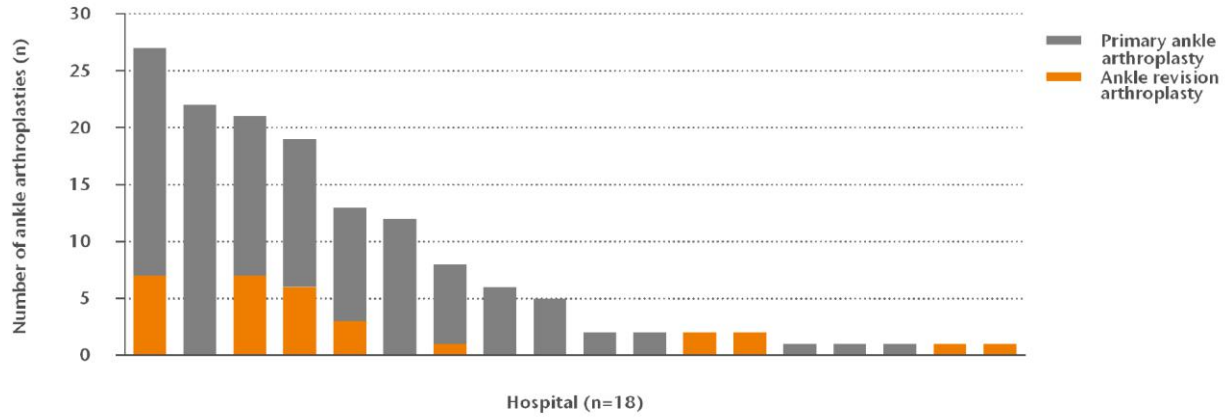


Year	2014	2015	2016	2017	Total
Type of procedure					
Primary ankle arthroplasty (n)	103	106	132	116	457
Ankle revision arthroplasty (n)	16	19	37	30	102
Total (n)	119	125	169	146	559

Two (1.7%) of the primary ankle arthroplasties that were performed in 2017 were performed bilaterally.

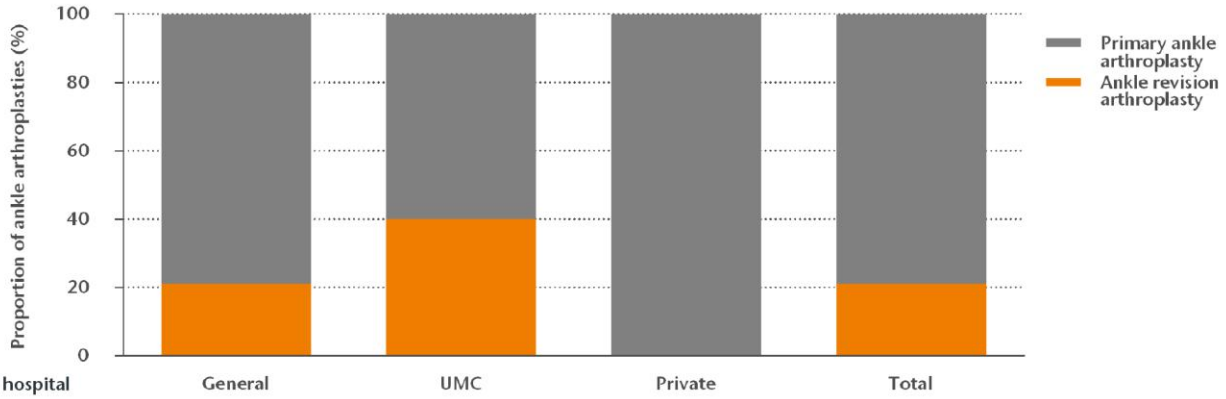
Type of procedure per hospital

FIGURE NUMBER OF PRIMARY ANKLE ARTHROPLASTIES AND ANKLE REVISION ARTHROPLASTIES PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=146).



Type of procedure by type of hospital

FIGURE PRIMARY ANKLE ARTHROPLASTIES AND ANKLE REVISION ARTHROPLASTIES (PROPORTION [%] PER CATEGORY) BY TYPE OF HOSPITAL IN THE NETHERLANDS IN 2017.



Type of hospital	General	UMC	Private	Total
Type of procedure				
Primary ankle arthroplasty (%)	78.7	60.0	100.0	79.5
Ankle revision arthroplasty (%)	21.3	40.0	0.0	20.5
Total (n)	122	10	14	146

General: general hospital; UMC: university medical centre; Private: private hospital.

Primary ankle arthroplasty

Demographics

Patient characteristics by diagnosis

TABLE PATIENT CHARACTERISTICS OF ALL PATIENTS WITH A REGISTERED PRIMARY ANKLE ARTHROPLASTY BY DIAGNOSIS IN THE NETHERLANDS IN 2017.

	Osteoarthritis (n=82)	No osteoarthritis[1] (n=31)	Total[2] (n=114)
Completeness (%)			100
Mean age (years) (SD)	66.0 (8.9)	63.1 (10.5)	65.2 (9.3)
Age (years) (%)			
<50	5	10	6
50-59	10	26	14
60-69	47	35	44
70-79	34	23	32
≥80	4	6	4
Gender (%)			
Men	57	52	56
Women	43	48	44
ASA score (%)			
I	24	23	24
II	65	48	60
III-IV	11	29	16
Type of hospital[3] (%)			
General	78	94	83
UMC	5	6	5
Private	17	0	12
Body Mass Index (kg/m²) (%)			
Underweight (≤18.5)	0	0	0
Normal weight (>18.5-25)	28	36	30
Overweight (>25-30)	50	42	48
Obesity (>30-40)	22	19	21
Morbid obesity (>40)	0	3	1
Charnley score (%)			
A One ankle joint affected	69	67	68
B1 Both ankle joints affected	12	18	14
B2 Contralateral ankle joint with an ankle prosthesis	1	4	2
C Multiple joints affected or chronic disease that affects quality of life	18	11	16
Smoking (%)			
No	94	87	92
Yes	6	13	8

[1] Another diagnosis than osteoarthritis registered as primary diagnosis, specifically post-traumatic (14%), rheumatoid arthritis (6%), inflammatory arthritis (2%), osteonecrosis (1%) or other primary diagnosis (4%).
[2] The primary diagnosis of 1 (0.9%) patient was not registered.
[3] In 2017, 11 general hospitals, 1 UMC and 2 private hospitals performed primary ankle arthroplasties.
General: general hospital; UMC: university medical centre; Private: private hospital; SD: standard deviation.

Previous surgery

TABLE PREVIOUS SURGERIES TO THE SAME JOINT IN PATIENTS WHO UNDERWENT A PRIMARY ANKLE ARTHROPLASTY IN THE NETHERLANDS IN 2017 (N=114).

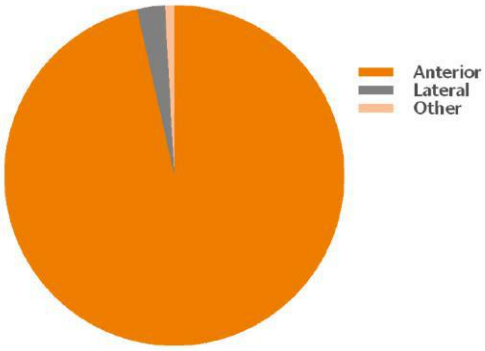
	Proportion[1] (%)
Previous surgery to the relevant ankle (total)	28.1
Osteosynthesis	17.5
Arthroscopy	11.4
Hindfoot surgery	4.4
Treatment of osteochondral bone defect	2.6
Synovectomy	2.6
Arthrodesis	1.8
Osteotomy	1.8
Ligament reconstruction	1.8
Other	2.6

[1] A patient may have undergone multiple previous surgeries to the same joint. As such, the total proportion is more than the total proportion of patients with one or more previous surgeries to the same joint.

Surgery

Surgical approach

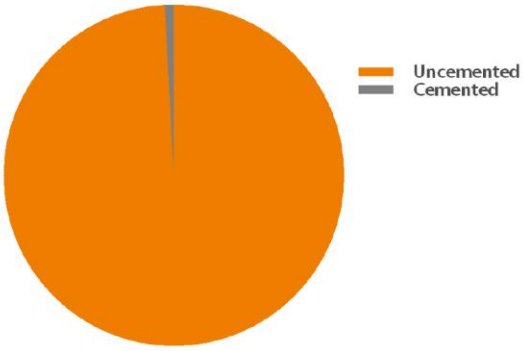
FIGURE SURGICAL APPROACH FOR PERFORMING A PRIMARY ANKLE ARTHROPLASTY IN THE NETHERLANDS IN 2017 (N=113).



Surgical approach	Number (n)	Proportion (%)
Anterior	109	96.4
Lateral	3	2.7
Other	1	0.9

Fixation

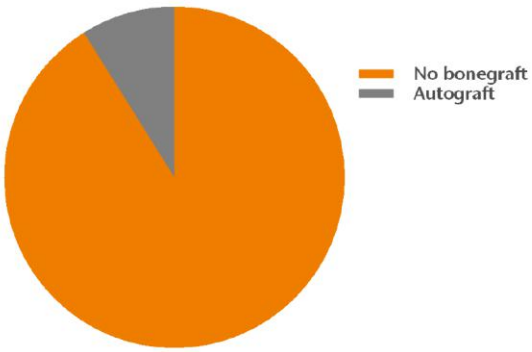
FIGURE TYPE OF FIXATION IN PRIMARY ANKLE ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=116).



Fixation	Number (n)	Proportion (%)
Uncemented	115	99.1
Cemented	1	0.9

Type of bonegraft

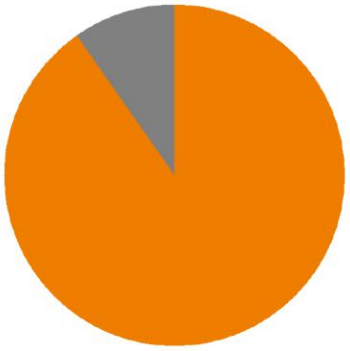
FIGURE TYPE OF BONEGRAFT IN PRIMARY ANKLE ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=112).



Type of bonegraft	Number (n)	Proportion (%)
No bonegraft	102	91.1
Autograft	10	8.9

Medial malleolus osteotomy

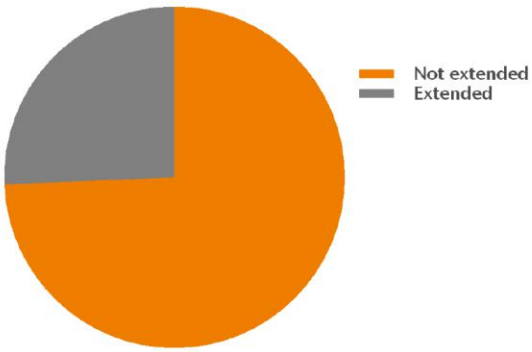
FIGURE MEDIAL MALLEOLUS OSTEOTOMY IN PRIMARY ANKLE ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=113).



Medial malleolus osteotomy	Number (n)	Proportion (%)
No	102	90.3
Yes	11	9.7

Extension heel cord

FIGURE EXTENSION HEEL CORD IN PRIMARY ANKLE ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=113).



Extension heel cord	Number (n)	Proportion (%)
Not extended	84	74.3
Extended	29	25.7

Most frequently registered ankle prostheses

TABLE THE FOUR REGISTERED PRIMARY TOTAL ANKLE ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=92).

Name	Proportion (%)
Salto	70.7
AAA OSG	21.7
Infinity	5.4
Box	2.2

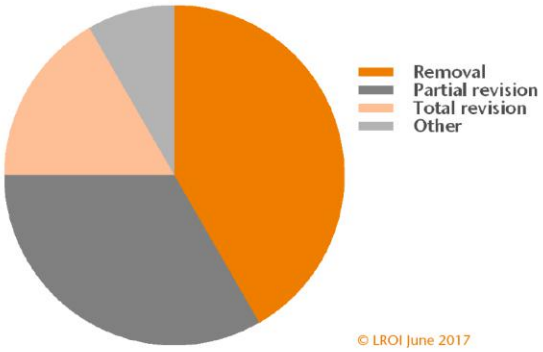
Please note: In 20 primary total ankle arthroplasties, the type of talus component was not registered.

In three primary ankle arthroplasties, the type of prosthesis was registered as 'other'. The type of prosthesis of one patient was not registered.

Ankle revision arthroplasty

Type of revision

FIGURE TYPE OF REVISION ARTHROPLASTY OF ANKLE REVISION ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=24).



Type of revision	Number (n)	Proportion (%)
Removal	10	41.7
Partial revision	8	33.3
Total revision	4	16.7
Other	2	8.3

In six ankle revision arthroplasties, the type of revision was not registered.

Reasons for revision

TABLE REASONS FOR REVISION OR RE-SURGERY IN PATIENTS WHO UNDERWENT AN ANKLE REVISION ARTHROPLASTY IN THE NETHERLANDS IN 2017 (N=30).

Reasons for revision	Proportion[1] (%)
Inlay wear	46.7
Loosening of talus component	36.7
Malalignment	30.0
Instability	26.7
Loosening of tibia component	20.0
Arthrofibrosis	10.0
Dislocation	10.0
Infection	3.3
Peri-prosthetic fracture	3.3

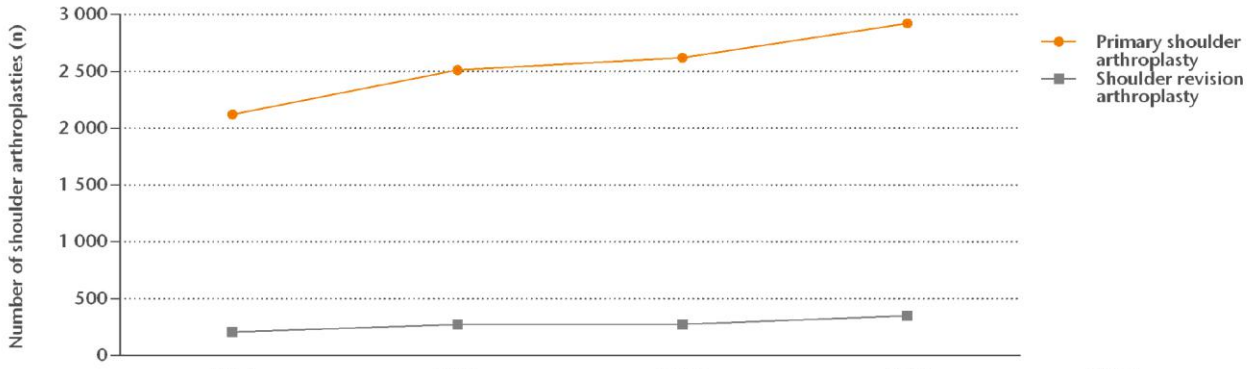
[1]A patient may have more than one reason for revision or re-surgery. As such, the total proportion is over 100%.

Shoulder arthroplasty

Numbers

Procedures 2014-2017

FIGURE NUMBER OF PRIMARY SHOULDER ARTHROPLASTIES AND SHOULDER REVISION ARTHROPLASTIES REGISTERED IN THE LROI IN THE NETHERLANDS IN 2014-2017.

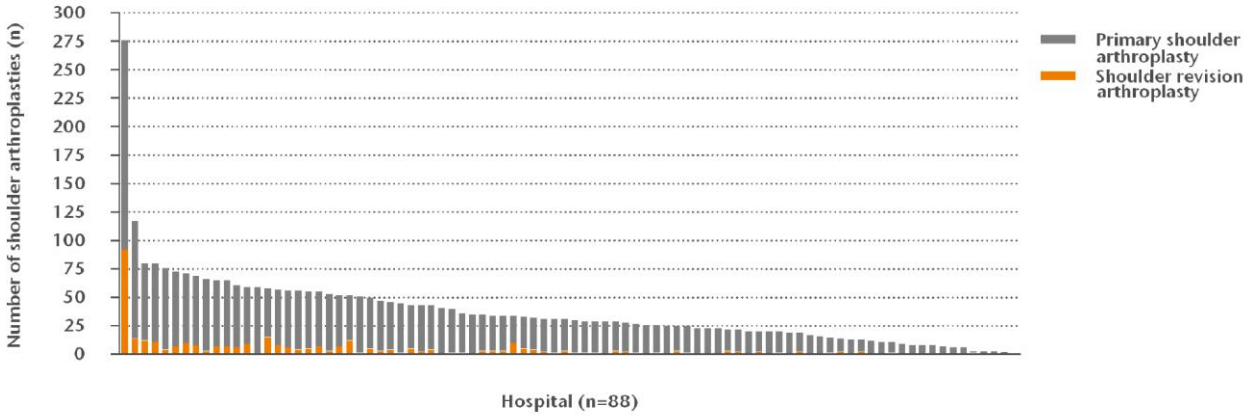


Year	2014	2015	2016	2017	Total
Type of procedure					
Primary shoulder arthroplasty (n)	2,121	2,511	2,620	2,922	10,174
Shoulder revision arthroplasty (n)	208	272	275	349	1,104
Total (n)	2,329	2,783	2,895	3,271	11,278

Out of 2,922 primary shoulder arthroplasties that were performed in 2017, 3% (n=92) was performed bilaterally.

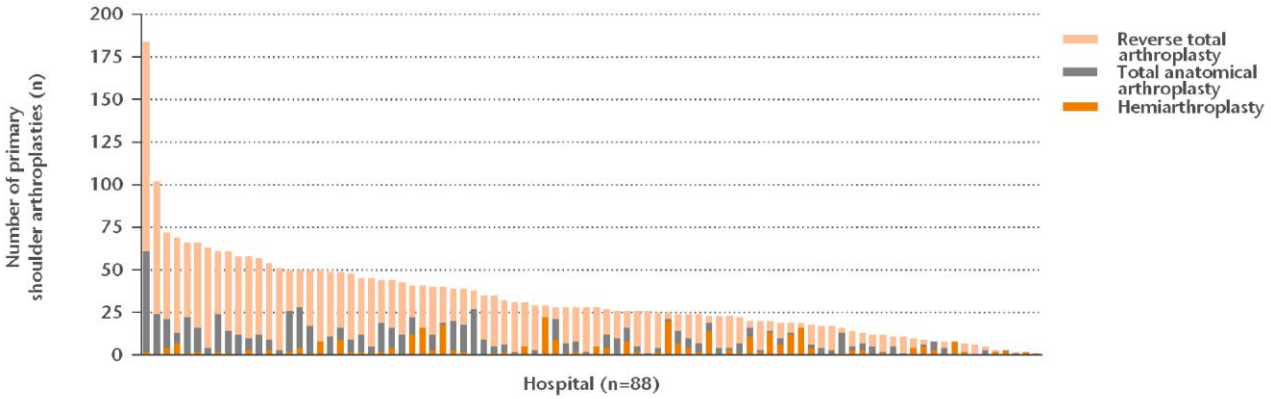
Type of procedure per hospital

FIGURE NUMBER OF PRIMARY SHOULDER ARTHROPLASTIES AND SHOULDER REVISION ARTHROPLASTIES PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=3,271).



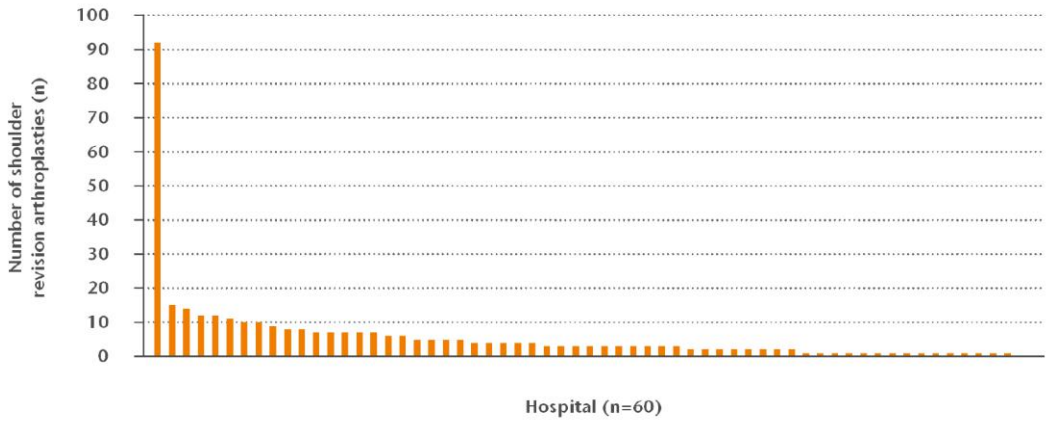
Type of primary shoulder prosthesis per hospital

FIGURE NUMBER OF PRIMARY SHOULDER ARTHROPLASTIES BY TYPE OF ARTHROPLASTY PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=2,903).



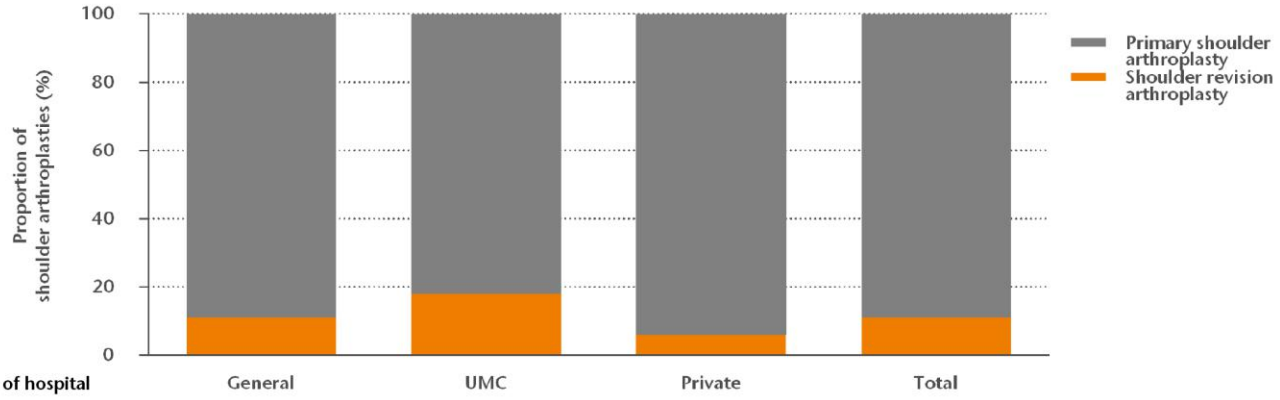
Revisions per hospital

FIGURE NUMBER OF SHOULDER REVISION ARTHROPLASTIES PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=349).



Type of procedure by type of hospital

FIGURE PRIMARY SHOULDER ARTHROPLASTIES AND SHOULDER REVISION ARTHROPLASTIES (PROPORTION [%] PER CATEGORY) BY TYPE OF HOSPITAL IN THE NETHERLANDS IN 2017.

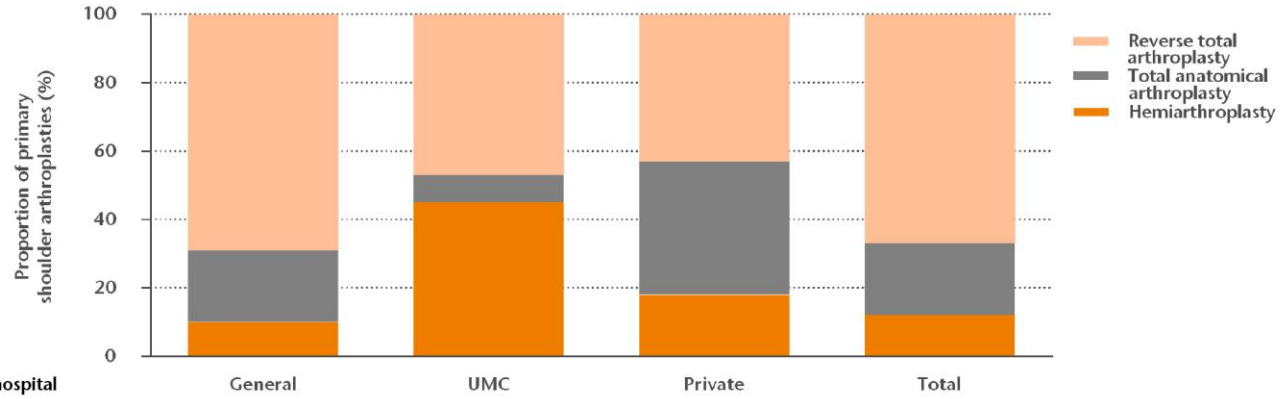


Type of hospital	General	UMC	Private	Total
Type of procedure				
Primary shoulder arthroplasty (%)	89.3	82.4	93.7	89.3
Shoulder revision arthroplasty (%)	10.7	17.6	6.3	10.7
Total (n)	2,987	108	176	3,271

General: general hospital; UMC: university medical centre; Private: private hospital.

Type of primary shoulder prosthesis by type of hospital

FIGURE TYPE OF PRIMARY SHOULDER ARTHROPLASTY (PROPORTION [%] PER CATEGORY) BY TYPE OF HOSPITAL IN THE NETHERLANDS IN 2017.

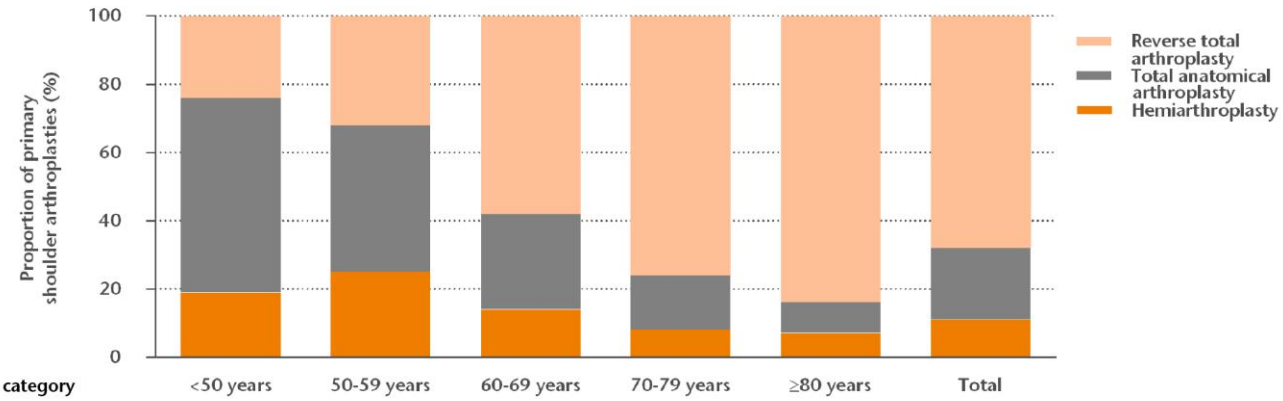


Type of hospital	General	UMC	Private	Total
Type of primary shoulder arthroplasty				
Reverse total shoulder arthroplasty (%)	69.3	47.2	42.4	67.2
Total anatomical shoulder arthroplasty (%)	20.8	7.9	39.4	21.4
Shoulder hemiarthroplasty (%)	9.9	44.9	18.2	11.4
Total (n)	2,649	89	165	2,903

Please note: In 19 (0.7%) primary shoulder arthroplasties, the type of primary shoulder arthroplasty was not registered in 2017.
General: general hospital; UMC: university medical centre; Private: private hospital.

Type of primary shoulder prosthesis by age category

FIGURE TYPE OF PRIMARY SHOULDER ARTHROPLASTY (PROPORTION [%] PER CATEGORY) BY AGE CATEGORY IN PATIENTS WITH A PRIMARY SHOULDER ARTHROPLASTY IN THE NETHERLANDS IN 2017.



Age category	<50 years	50-59 years	60-69 years	70-79 years	≥80 years	Total
Type of primary shoulder arthroplasty						
Reverse total arthroplasty (%)	24.3	31.5	57.5	76.3	83.6	67.7
Total anatomical arthroplasty (%)	56.8	43.1	28.2	16.0	9.0	21.2
Hemiarthroplasty (%)	18.9	25.4	14.3	7.7	7.4	11.1
Total (n)	74	232	739	1,233	530	2,808

Primary shoulder arthroplasty

Demographics

Patient characteristics by type of shoulder prosthesis

TABLE PATIENT CHARACTERISTICS OF ALL PATIENTS WITH A REGISTERED PRIMARY SHOULDER ARTHROPLASTY BY TYPE OF PRIMARY SHOULDER ARTHROPLASTY IN THE NETHERLANDS IN 2017.

	Reversed total shoulder arthroplasty (n=1,903)	Total anatomical shoulder arthroplasty (n=595)	Shoulder hemi-arthroplasty (n=313)	Total[1] (n=2,830)
Completeness (%)				98
Mean age (years) (SD)	73.5 (8.2)	66.0 (10.8)	67.4 (10.3)	71.3 (9.7)
Age (years) (%)				
<50	1	7	5	3
50-59	4	17	19	8
60-69	22	35	34	26
70-79	50	33	30	44
≥80	23	8	12	19
Gender (%)				
Men	24	29	29	25
Women	76	71	71	75
ASA score (%)				
I 6	13	8	8	
II 60	67	58	61	
III-IV	34	20	34	31
Type of hospital[2] (%)				
General	94	89	83	92
UMC	2	1	12	3
Private	4	10	5	5
Diagnosis (%)				
Osteoarthrosis	29	86	46	43
Cuff arthropathy	32	2	2	22
Fracture	16	2	30	15
Post-traumatic	11	4	7	9
Cuff rupture	6	0	0	4
Rheumatoid arthritis	3	2	5	3
Osteonecrosis	1	3	7	2
Other	2	1	3	2
Walch score (%)				
A1 Humeral head centered, minor erosion glenoid	53	40	65	51
A2 Humeral head centered, major erosion glenoid	26	34	22	27
B1 Humeral head subluxed posteriorly, posterior joint space narrow, subchondrial sclerosis and osteophytes	11	16	6	12
B2 Humeral head subluxed posteriorly retroverted, glenoid with posterior rim erosion	7	8	3	7
B3 Humeral head subluxed posteriorly more than 70 percent and glenoid retroversion more than 10 degrees	1	1	1	1
C Glenoid retroversion more than 25 degrees regardless of erosion	2	1	3	2
Body Mass Index (kg/m²) (%)				
Underweight (≤18.5)	1	1	2	1
Normal weight (>18,5-25)	28	24	27	27
Overweight (>25-30)	40	38	35	39
Obesity (>30-40)	29	34	30	30
Morbid obesity (>40)	2	3	6	3
Smoking (%)				
No	89	87	86	88
Yes	11	13	14	12

[1] Also contains 19 (0.7%) primary shoulder arthroplasties of which the type of prosthesis had not been registered.
[2] In 2017, 74 general hospitals, 5 UMCs and 6 private hospitals performed shoulder arthroplasties.
General: general hospital; UMC: university medical centre; Private: private hospital; SD: standard deviation.

The number of registered shoulder hemiarthroplasties in the LROI is not complete, since these procedures are also performed by trauma surgeons.

For 2017, only shoulder hemiarthroplasties that were carried out by orthopaedic surgeons were registered in the LROI.

Previous surgery by type of shoulder prosthesis

TABLE PREVIOUS SURGERIES TO THE SAME JOINT IN PATIENTS WHO UNDERWENT A PRIMARY SHOULDER ARTHROPLASTY IN THE NETHERLANDS IN 2017.

	Reverse total shoulder arthroplasty (n=1,903) Proportion[1] (%)	Total anatomical shoulder arthroplasty (n=595) Proportion[1] (%)	Shoulder hemiarthroplasty (n=313) Proportion[1] (%)
Previous surgery to the relevant shoulder (total)	16.5	12.8	10.9
Acromioplasty	6.8	4.0	3.5
Rotator cuff repair	7.9	1.7	2.2
Osteosynthesis	4.5	2.5	3.2
Stabilisation procedure	0.7	3.7	1.0
Distal clavicle resection	2.2	1.3	1.0
Other	3.0	4.2	2.6

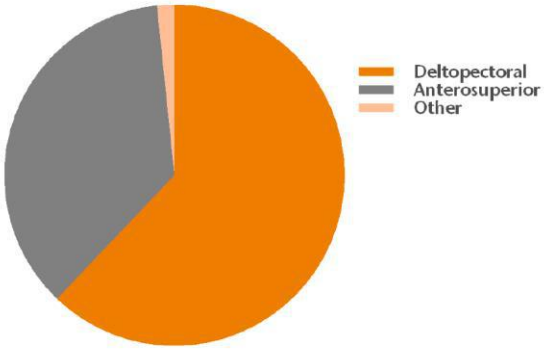
[1] A patient may have undergone multiple previous surgeries to the same joint. As such, the total proportion is more than the total proportion of patients with one or more previous surgeries to the same joint.

Reverse total shoulder arthroplasty

Surgical techniques

Surgical approach

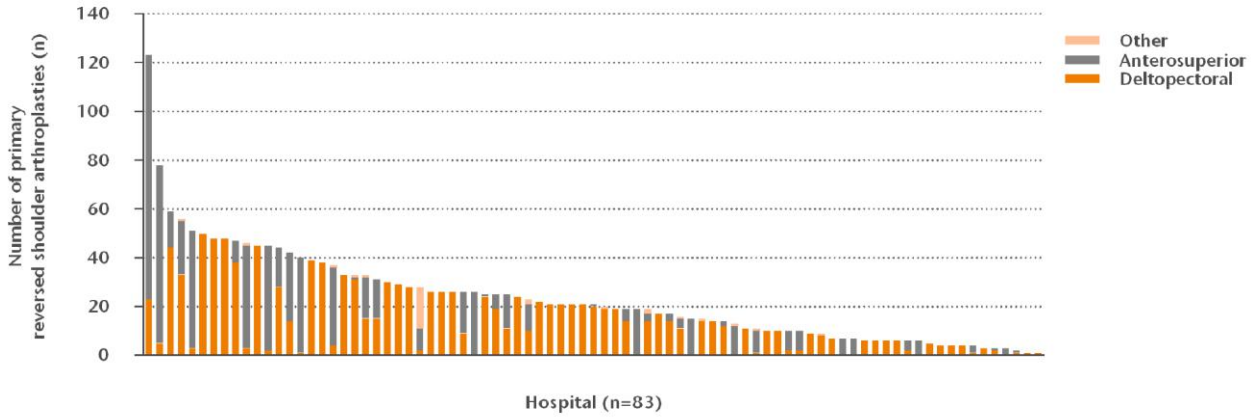
FIGURE SURGICAL APPROACH FOR PERFORMING A PRIMARY REVERSE TOTAL SHOULDER ARTHROPLASTY IN THE NETHERLANDS IN 2017 (N=1,948).



Surgical approach	Number (n)	Proportion (%)
Deltopectoral	1,210	62.1
Anterosuperior	706	36.2
Other	32	1.7

Surgical approach per hospital

FIGURE SURGICAL APPROACH FOR PERFORMING A PRIMARY REVERSE TOTAL SHOULDER ARTHROPLASTY PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=1,948).



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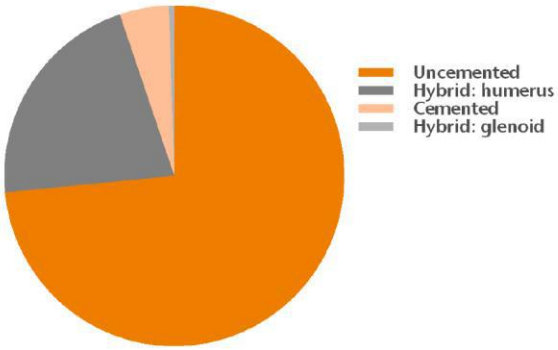
Fixation

FIGURE TYPE OF FIXATION IN PRIMARY REVERSE TOTAL SHOULDER ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=1,887).



Fixation	Number (n)	Proportion (%)
Uncemented	1,386	73.4
Hybrid: humerus	403	21.4
Cemented	88	4.7
Hybrid: glenoid	10	0.5

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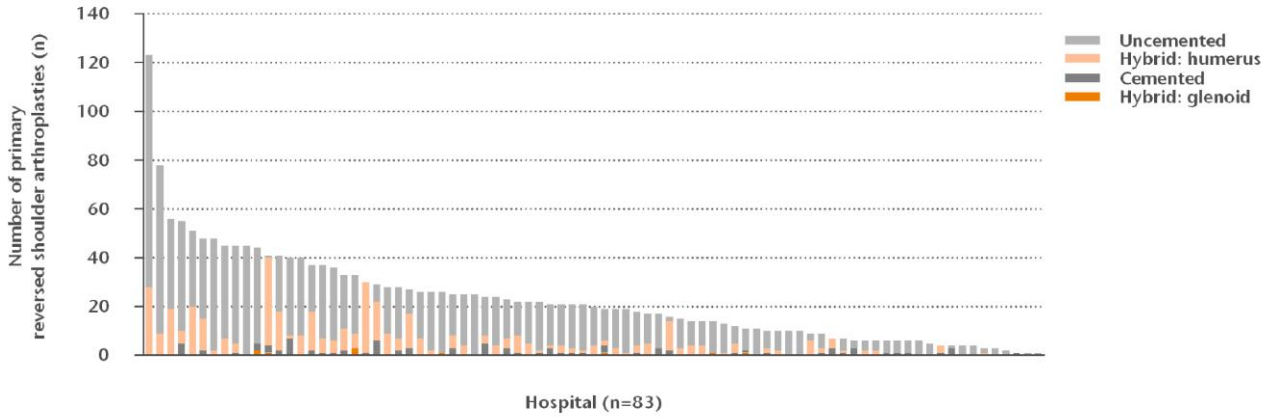
Fixation per hospital

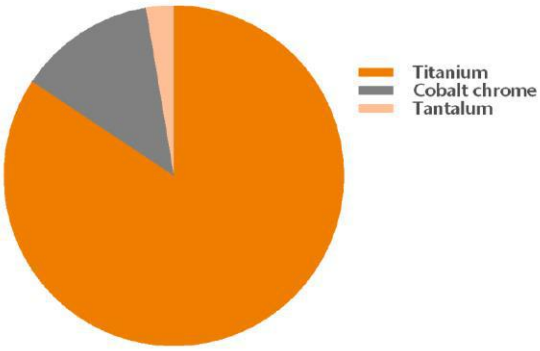
FIGURE TYPE OF FIXATION IN PRIMARY REVERSE TOTAL SHOULDER ARTHROPLASTIES PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=1,887).



Materials

Humeral stem component

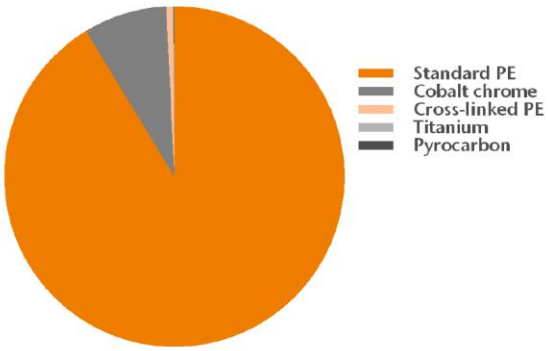
FIGURE HUMERAL STEM MATERIAL IN PRIMARY REVERSE TOTAL SHOULDER ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=1,710).



Humeral stem material	Number (n)	Proportion (%)
Titanium	1,442	84.3
Cobalt chrome	223	13.1
Tantalum	45	2.6

Humeral liner

FIGURE HUMERAL LINER MATERIAL IN PRIMARY REVERSE TOTAL SHOULDER ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=1,692).

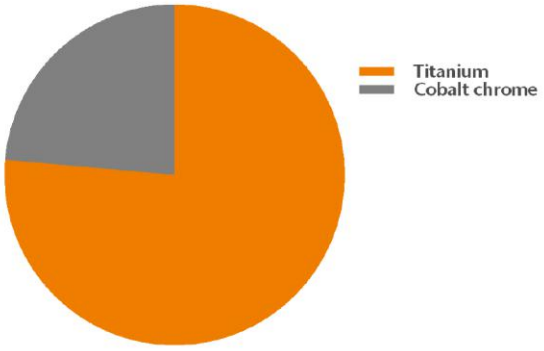


Humeral liner material	Number (n)	Proportion (%)
Standard PE	1,545	91.3
Cobalt chrome	134	7.9
Cross-linked PE	10	0.6
Titanium	2	0.1
Pyrocarbon	1	0.1

PE: polyethylene.

Metaphysis component

FIGURE METAPHYSIS MATERIAL IN PRIMARY REVERSE TOTAL SHOULDER ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=1,353).

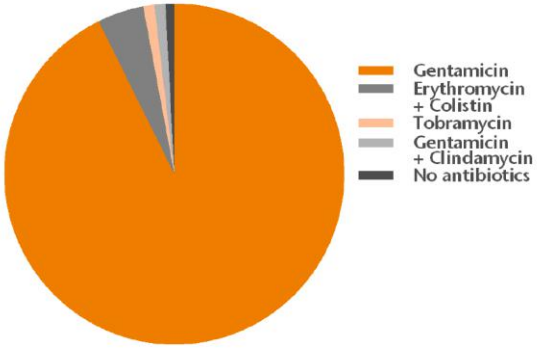


Metaphysis material	Number (n)	Proportion (%)
Titanium	1,034	76.4
Cobalt chrome	319	23.6

Bone cement

Antibiotics

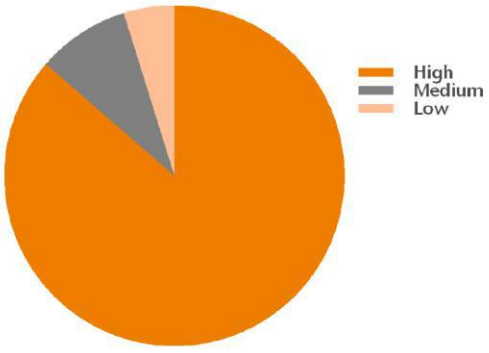
FIGURE ANTIBIOTICS IN BONE CEMENT IN PRIMARY REVERSE TOTAL SHOULDER ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=477).



Bone cement antibiotics	Number (n)	Proportion (%)
Gentamicin	442	92.6
Erythromycin + Colistin	21	4.4
Tobramycin	5	1.1
Gentamicin + Clindamycin	5	1.1
No antibiotics	4	0.8

Viscosity

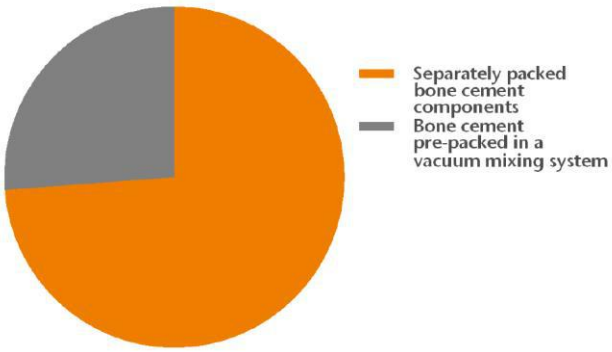
FIGURE BONE CEMENT VISCOSITY IN PRIMARY REVERSE TOTAL SHOULDER ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=477).



Bone cement viscosity	Number (n)	Proportion (%)
High	412	86.4
Medium	42	8.8
Low	23	4.8

Vacuum mixing system

FIGURE BONE CEMENT PRE-PACKED IN A VACUUM MIXING SYSTEM IN PRIMARY REVERSE TOTAL SHOULDER ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=477).



Vacuum mixing system	Number (n)	Proportion (%)
Separately packed bone cement components	352	73.8
Bone cement pre-packed in a vacuum mixing system	125	26.2

Most frequently registered components

TABLE THE FIVE MOST FREQUENTLY REGISTERED HUMERAL STEMS, HUMERAL LINERS, GLENOSPHERES, METAPHYSES AND GLENOID BASEPLATES IN PRIMARY REVERSE TOTAL SHOULDER ARTHROPLASTIES IN THE NETHERLANDS IN 2017.

Humeral stem (n=1,775) Name	Proportion (%)
Delta X-tend	34.4
Aequalis Reversed	14.4
Aequalis Ascend Flex	11.8
Comprehensive	10.8
Aequalis Reversed Fracture	6.3

Humeral liner (n=1,652) Name	Proportion (%)
Delta X-tend	32.9
Aequalis Reversed	15.3
Comprehensive	11.9
Aequalis Ascend Flex	11.8
Equinoxe	6.4

Glenosphere (n=1,779) Name	Proportion (%)
Delta X-tend	35.3
Aequalis Reversed	31.4
Comprehensive	11.4
TM Reverse Glenoid Heads	6.5
Equinoxe	6.1

Metaphysis (n=1,373) Name	Proportion (%)
Delta X-tend	33.8
Aequalis Reversed	18.4
Aequalis Ascend Flex	14.0
Comprehensive	13.5
Equinoxe	7.5

Glenoid baseplate (n=1,739) Name	Proportion (%)
Delta X-tend	35.1
Aequalis Reversed	31.5
Comprehensive	11.7
Equinoxe	6.0
Trabecular Metal Baseplate	5.9

Most frequently registered types of bone cement

TABLE THE MOST FREQUENTLY REGISTERED TYPES OF BONE CEMENT BY TYPE OF MIXING SYSTEM USED DURING PRIMARY REVERSE TOTAL SHOULDER ARTHROPLASTIES IN THE NETHERLANDS IN 2017.

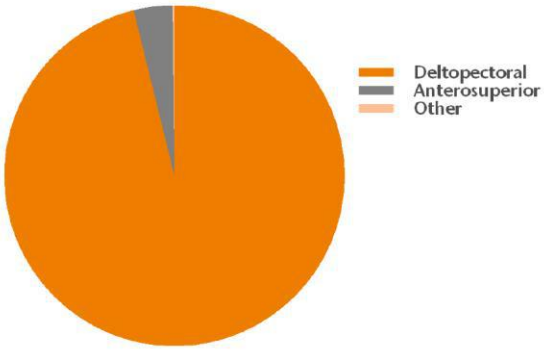
Separately packed bone cement components (n=352)		Bone cement pre-packed in a vacuum mixing system (n=124)	
Name	Proportion (%)	Name	Proportion (%)
Palacos R+G	62.5	Palacos R+G	48.4
Refobacin Bone Cement R	12.2	Refobacin Bone Cement R	43.5
Palacos LV+G	6.5	Refobacin Plus Bone Cement	7.3
Simplex ABC EC	6.0	Cemex Genta	0.8
Palacos MV+G	4.5		

Total anatomical shoulder arthroplasty

Surgical techniques

Surgical approach

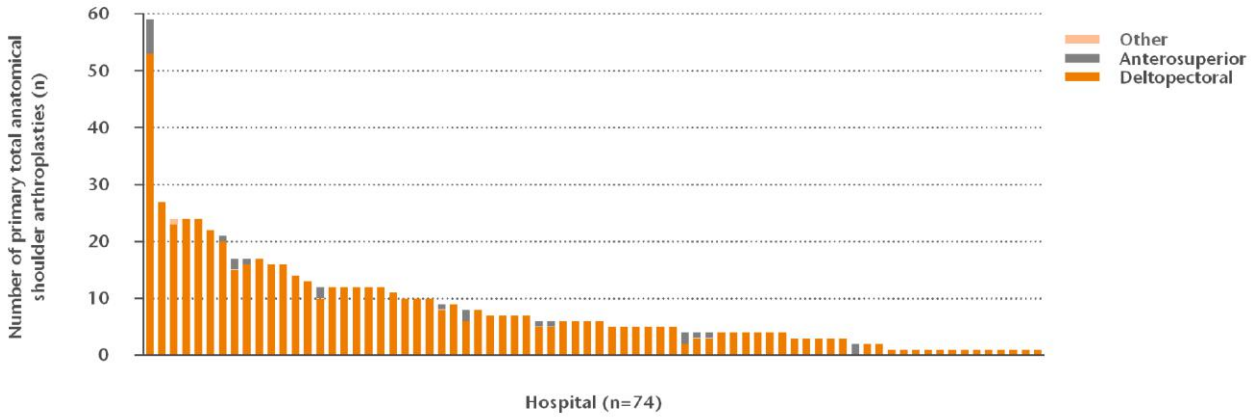
FIGURE SURGICAL APPROACH FOR PERFORMING A PRIMARY TOTAL ANATOMICAL SHOULDER ARTHROPLASTY IN THE NETHERLANDS IN 2017 (N=622).



Surgical approach	Number (n)	Proportion (%)
Deltopectoral	598	96.1
Anterosuperior	23	3.7
Other	1	0.2

Surgical approach per hospital

FIGURE SURGICAL APPROACH FOR PERFORMING A PRIMARY TOTAL ANATOMICAL SHOULDER ARTHROPLASTY PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=622).



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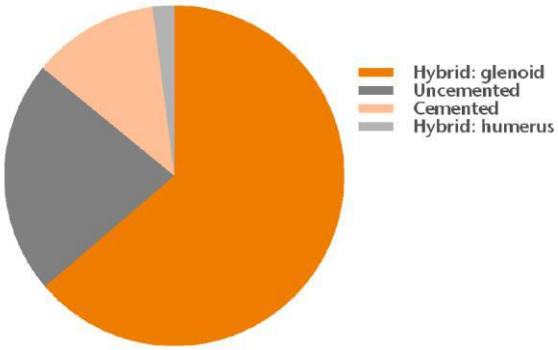
Fixation

FIGURE TYPE OF FIXATION IN PRIMARY TOTAL ANATOMICAL SHOULDER ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=582).



Fixation	Number (n)	Proportion (%)
Hybrid: glenoid	371	63.7
Uncemented	129	22.2
Cemented	70	12.0
Hybrid: humerus	12	2.1

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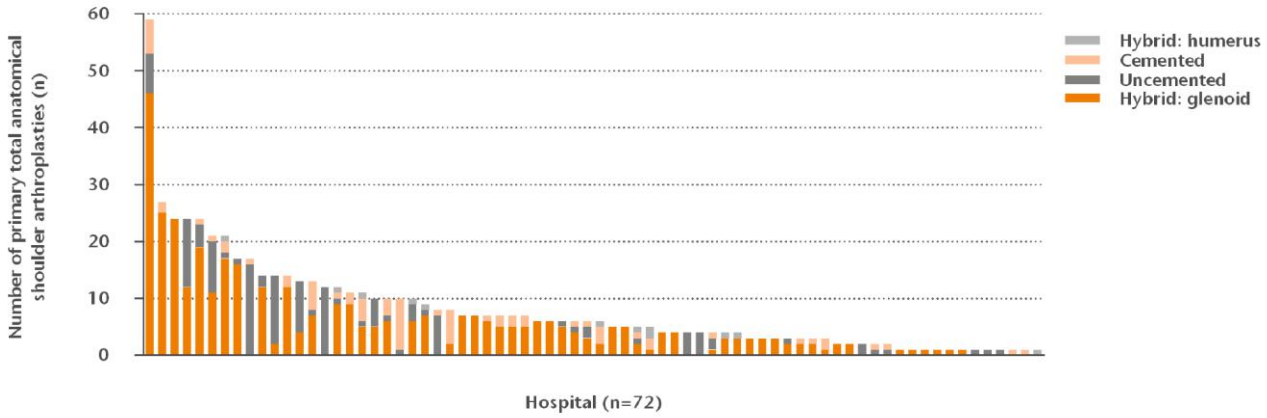
Fixation per hospital

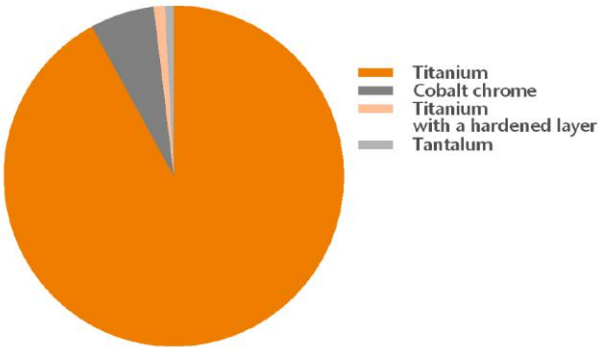
FIGURE TYPE OF FIXATION IN PRIMARY TOTAL ANATOMICAL SHOULDER ARTHROPLASTIES PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=582).



Materials

Humeral stem component

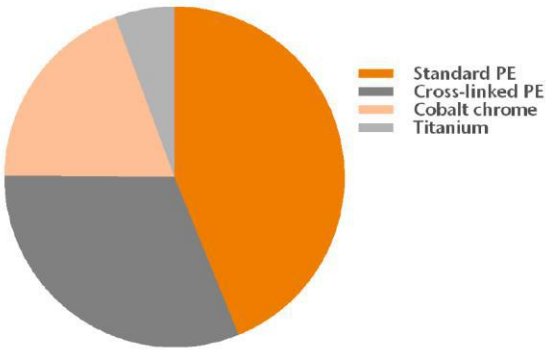
FIGURE HUMERAL STEM MATERIAL IN PRIMARY TOTAL ANATOMICAL SHOULDER ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=475).



Humeral stem material	Number (n)	Proportion (%)
Titanium	437	92.0
Cobalt chrome	29	6.1
Titanium with a hardened layer	5	1.1
Tantalum	4	0.8

Glenoid component

FIGURE GLENOID MATERIAL IN PRIMARY TOTAL ANATOMICAL SHOULDER ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=495).



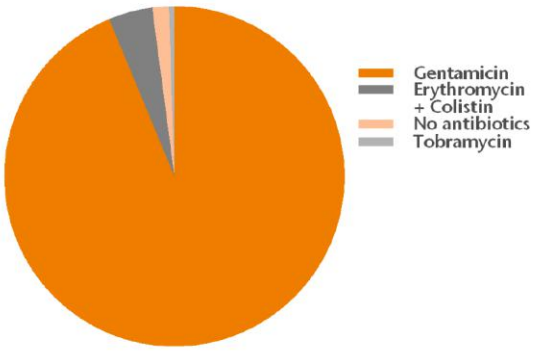
Glenoid material	Number (n)	Proportion (%)
Standard PE	217	43.8
Cross-linked PE	155	31.3
Cobalt chrome	95	19.2
Titanium	28	5.7

PE: polyethylene.

Bone cement

Antibiotics

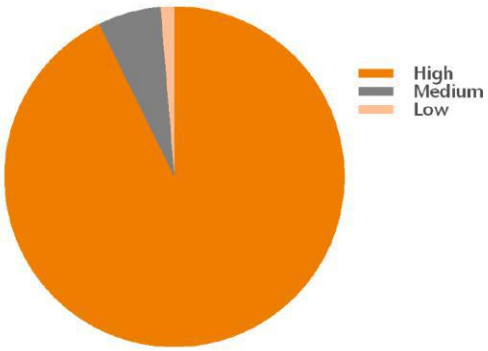
FIGURE ANTIBIOTICS IN BONE CEMENT IN PRIMARY TOTAL ANATOMICAL SHOULDER ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=383).



Bone cement antibiotics	Number (n)	Proportion (%)
Gentamicin	359	93.7
Erythromycin + Colistin	16	4.2
No antibiotics	6	1.6
Tobramycin	2	0.5

Viscosity

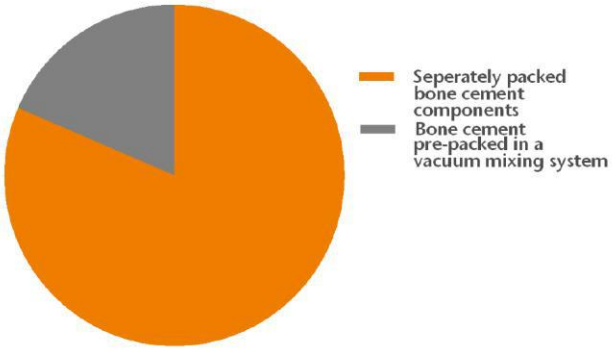
FIGURE VISCOSITY IN BONE CEMENT IN PRIMARY TOTAL ANATOMICAL SHOULDER ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=383).



Bone cement viscosity	Number (n)	Proportion (%)
High	355	92.7
Medium	23	6.0
Low	5	1.3

Vacuum mixing system

FIGURE BONE CEMENT PRE-PACKED IN A VACUUM MIXING SYSTEM IN PRIMARY TOTAL ANATOMICAL SHOULDER ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=383).



Vacuum mixing system	Number (n)	Proportion (%)
Separately packed bone cement components	312	81.5
Bone cement pre-packed in a vacuum mixing system	71	18.5

Most frequently registered components

TABLE THE FIVE MOST FREQUENTLY REGISTERED HUMERAL STEMS, HUMERAL HEADS AND GLENOID COMPONENTS IN PRIMARY TOTAL ANATOMICAL SHOULDER ARTHROPLASTIES IN THE NETHERLANDS IN 2017.

Humeral stem (n=505)

Name	Proportion (%)
Aequalis Ascend Flex	21.4
Comprehensive	14.7
Global Unite	14.5
Global AP	13.3
Affinis Short	5.7

Humeral head (n=516)

Name	Proportion (%)
Aequalis Ascend Flex	21.1
Global Unite/ Global AP	16.9
Comprehensive	14.9
Global AP	9.1
Eclipse	6.8

Glenoid (n=494)

Name	Proportion (%)
Global APG+	31.0
Aequalis Perform glenoid	18.6
Comprehensive	13.2
Aequalis Sferisch Glenoid	11.7
Affinis	5.3

Most frequently registered types of bone cement

TABLE THE MOST FREQUENTLY REGISTERED TYPES OF BONE CEMENT BY TYPE OF MIXING SYSTEM USED DURING PRIMARY TOTAL ANATOMICAL SHOULDER ARTHROPLASTIES IN THE NETHERLANDS IN 2017.

Separately packed bone cement components (n=312)

Name	Proportion (%)
Palacos R+G	75.3
Refobacin Bone Cement R	8.3
Simplex ABC EC	5.1
semSys 1G	3.2
Refobacin Plus Bone Cement	2.2

Bone cement pre-packed in a vacuum mixing system (n=71)

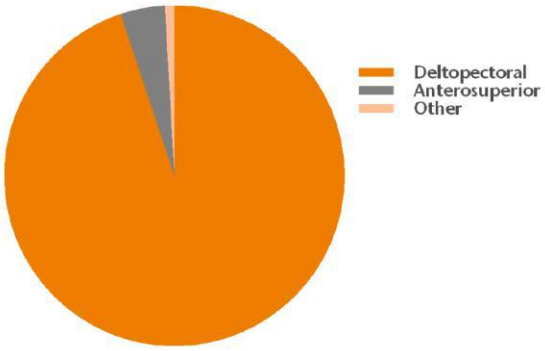
Name	Proportion (%)
Refobacin Bone Cement R	54.9
Palacos R+G	19.7
Refobacin Plus Bone Cement	18.3
Cemex Genta	5.6

Shoulder hemiarthroplasty

Surgical techniques

Surgical approach

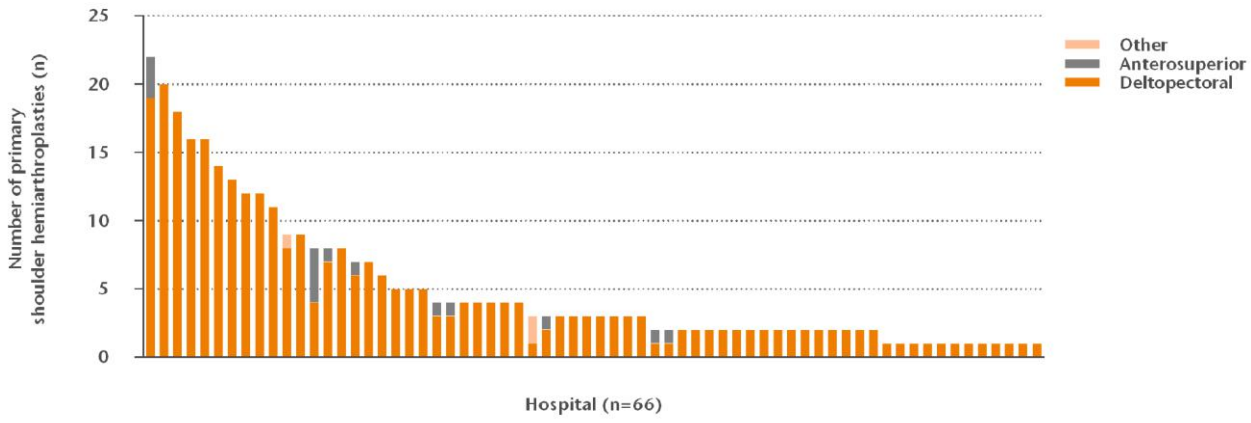
FIGURE SURGICAL APPROACH FOR PERFORMING A PRIMARY SHOULDER HEMIARTHROPLASTY IN THE NETHERLANDS IN 2017 (N=332).



Surgical approach	Number (n)	Proportion (%)
Deltopectoral	315	94.9
Anterosuperior	14	4.2
Other	3	0.9

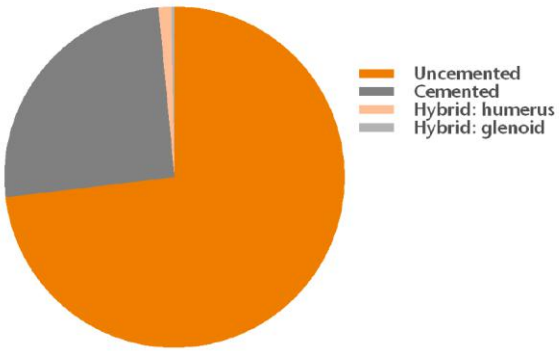
Surgical approach per hospital

FIGURE SURGICAL APPROACH FOR PERFORMING A PRIMARY SHOULDER HEMIARTHROPLASTY PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=332).



Fixation

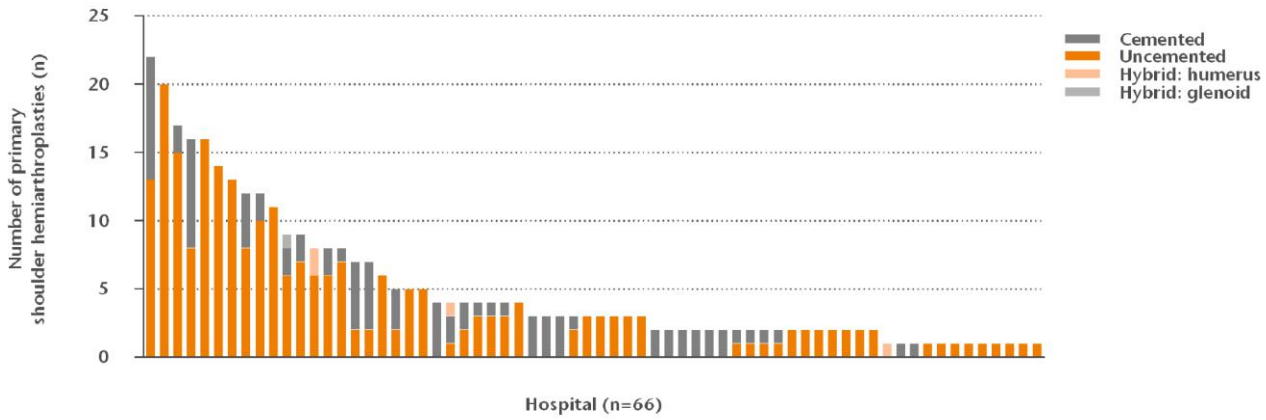
FIGURE TYPE OF FIXATION IN PRIMARY SHOULDER HEMIARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=331).



Fixation	Number (n)	Proportion (%)
Uncemented	242	73.1
Cemented	84	25.4
Hybrid: humerus	4	1.2
Hybrid: glenoid	1	0.3

Fixation per hospital

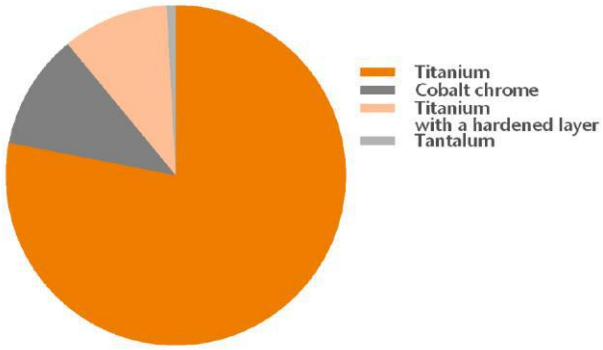
FIGURE TYPE OF FIXATION IN PRIMARY SHOULDER HEMIARTHROPLASTIES PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=331).



Materials

Humeral stem component

FIGURE HUMERAL STEM MATERIAL IN PRIMARY SHOULDER HEMIARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=228).

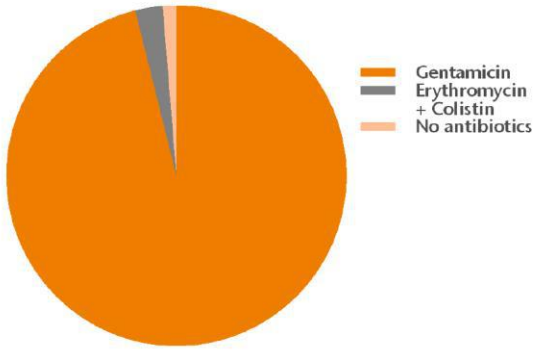


Humeral stem material	Number (n)	Proportion (%)
Titanium	178	78.1
Cobalt chrome	25	10.9
Titanium with a hardened layer	23	10.1
Tantalum	2	0.9

Bone cement

Antibiotics

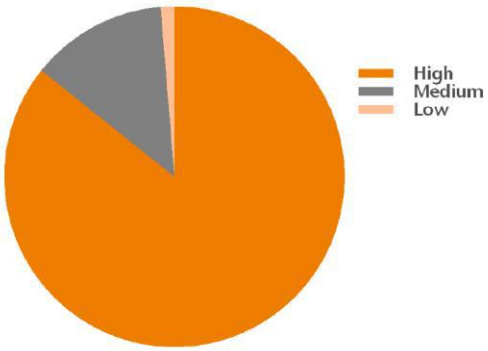
FIGURE ANTIBIOTICS IN BONE CEMENT IN PRIMARY SHOULDER HEMIARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=77).



Bone cement antibiotics	Number (n)	Proportion (%)
Gentamicin	74	96.1
Erythromycin + Colistin	2	2.6
No antibiotics	1	1.3

Viscosity

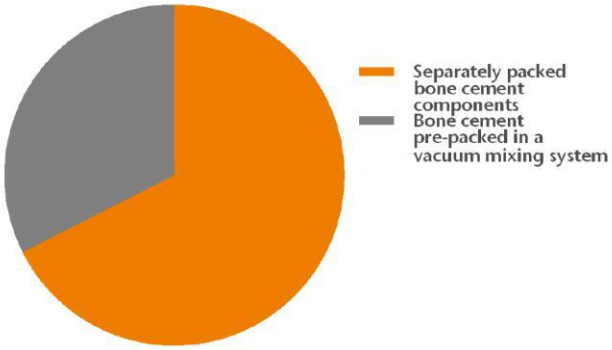
FIGURE VISCOSITY IN BONE CEMENT IN PRIMARY SHOULDER HEMIARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=77).



Bone cement viscosity	Number (n)	Proportion (%)
High	66	85.7
Medium	10	13.0
Low	1	1.3

Vacuum mixing system

FIGURE BONE CEMENT PRE-PACKED IN A VACUUM MIXING SYSTEM IN PRIMARY SHOULDER HEMIARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=77).



Vacuum mixing system	Number (n)	Proportion (%)
Separately packed bone cement components	52	67.5
Bone cement pre-packed in a vacuum mixing system	25	32.5

Most frequently registered components

TABLE THE FIVE MOST FREQUENTLY REGISTERED HUMERAL STEMS AND HUMERAL HEADS IN PRIMARY SHOULDER HEMIARTHROPLASTIES IN THE NETHERLANDS IN 2017.

Humeral stem (n=246)		Humeral head (n=250)	
Name	Proportion (%)	Name	Proportion (%)
Comprehensive	13.8	Aequalis humeral head	16.4
Aequalis Fracture hemi	13.4	Comprehensive	14.0
Global Unite	9.3	Global Unite/ Global AP	10.0
Sidus Baseplate	9.3	Sidus Heads	9.2
Aequalis Ascend Flex	8.5	Affinis Short	5.6

Most frequently registered types of bone cement

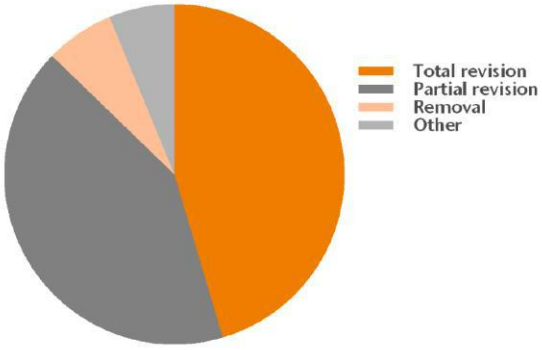
TABLE THE FIVE MOST FREQUENTLY REGISTERED TYPES OF BONE CEMENT USED DURING PRIMARY SHOULDER HEMIARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=77).

Name	Proportion (%)
Palacos R+G	48.1
Refobacin Bone Cement R	22.1
Refobacin Plus Bone Cement	11.7
Palacos MV+G	10.4
Simplex ABC EC	2.3

Shoulder revision arthroplasty

Type of revision

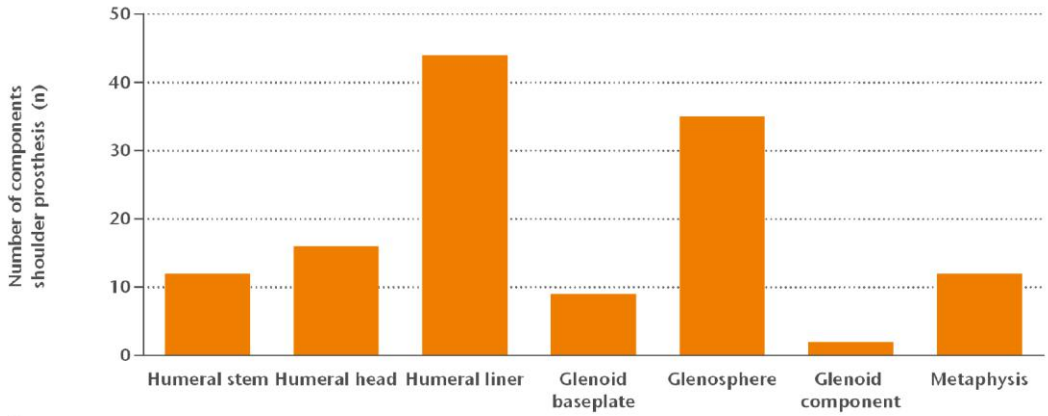
FIGURE TYPE OF REVISION ARTHROPLASTY OF SHOULDER REVISION ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=337).



Type of shoulder revision	Number (n)	Proportion (%)
Total revision	153	45.4
Partial revision	141	41.9
Removal	22	6.5
Other	21	6.2

Revised components in partial revisions

FIGURE REVISED COMPONENTS IN PARTIAL SHOULDER REVISION ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=141).



Revised component	Humeral stem	Humeral head	Humeral liner	Glenoid baseplate	Glenosphere	Glenoid component	Metaphysis
Number (n)	12	16	44	9	35	2	12
Proportion (%)	8.5	11.3	31.2	6.4	24.8	1.4	8.5

Please note: In 22 partial shoulder revision arthroplasties, the revised component(s) were not registered. More than one component can be replaced during a procedure.

Reasons for revision

TABLE REASONS FOR REVISION OR RE-SURGERY IN PATIENTS WHO UNDERWENT A SHOULDER REVISION ARTHROPLASTY IN THE NETHERLANDS IN 2017 (N=349).

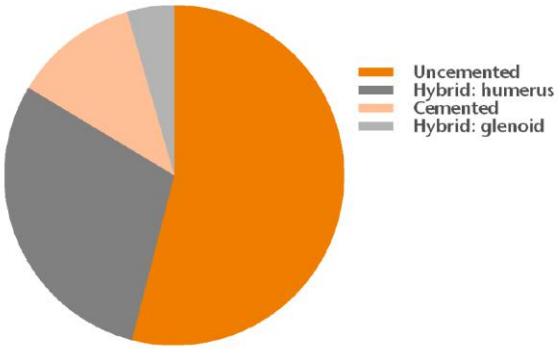
Reasons for revision	Proportion[1] (%)
Instability	26.6
Infection	21.2
Progression of osteoarthritis	16.9
Cuff rupture	14.3
Loosening of glenoid component	12.6
Cuff arthropathy	11.2
Malalignment	8.3
Peri-prosthetic fracture	5.2
Loosening of humeral component	4.6
Other	12.9

[1] One patient may have more than one reason for revision or re-surgery. As such, the total proportion is over 100%.

Surgery

Fixation

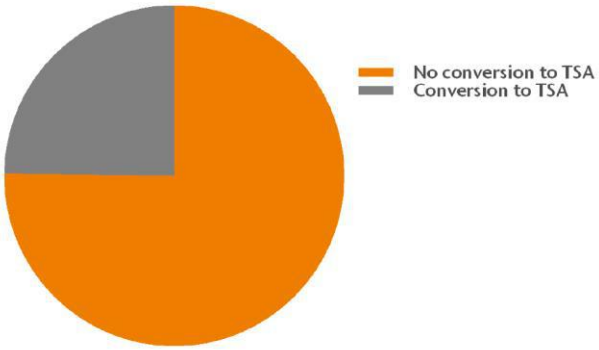
FIGURE TYPE OF FIXATION IN SHOULDER REVISION ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=311).



Fixation	Number (n)	Proportion (%)
Uncemented	168	54.0
Hybrid: humerus	92	29.6
Cemented	37	11.9
Hybrid: glenoid	14	4.5

Conversion to TSA

FIGURE CONVERSION OF A SHOULDER HEMIPROSTHESIS TO A TOTAL (ANATOMICAL OR REVERSE) SHOULDER PROSTHESIS IN THE NETHERLANDS IN 2017 (N=327).

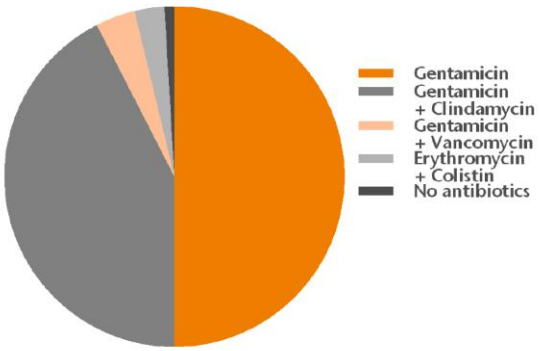


Conversion to TSA	Number (n)	Proportion (%)
No conversion to TSA	246	75.2
Conversion to TSA	81	24.8

TSA: total shoulder arthroplasty.

Bone cement antibiotics

FIGURE BONE CEMENT ANTIBIOTICS IN SHOULDER REVISION ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=106).



Bone cement antibiotics	Number (n)	Proportion (%)
Gentamicin	53	50.0
Gentamicin + Clindamycin	45	42.5
Gentamycin + Vancomycin	4	3.8
Erythromycin + Colistin	3	2.8
No antibiotics	1	0.9

Most frequently registered components

TABLE THE MOST FREQUENTLY REGISTERED HUMERAL STEMS, HUMERAL HEADS, HUMERAL LINERS, GLENOID BASEPLATES, GLENOSPHERES, GLENOID COMPONENTS AND METAPHYSES IN SHOULDER REVISION ARTHROPLASTIES IN THE NETHERLANDS IN 2017.

Humeral stem (n=160)

Name	Proportion (%)
Delta X-tend	46.9
Aequalis Reversed	11.3
Aequalis Reversed Fracture	8.8
Comprehensive	8.1
Aequalis Ascend Flex	5.0

Humeral head (n=47)

Name	Proportion (%)
Global AP	21.3
Aequalis humeral head	14.9
Comprehensive	12.8
Global Unite/ Global AP	10.6
Aequalis Ascend Flex	6.4

Humeral liner (n=213)

Name	Proportion (%)
Delta X-tend	53.1
Aequalis Reversed	13.6
Aequalis Reversed Fracture	8.5
Anatomical Inverse Humeral Poly Inlays	6.6
Aequalis Ascend Flex	6.1

Glenoid baseplate (n=149)

Name	Proportion (%)
Delta X-tend	52.3
Aequalis Reversed	22.8
Trabecular Metal Baseplate	9.4
Comprehensive	6.7
Affinis Inverse	2.0

Glenosphere (n=190)

Name	Proportion (%)
Delta X-tend	48.4
Aequalis Reversed	26.8
TM Reverse Glenoid Heads	8.4
Comprehensive	7.9
Univers Revers	2.6

Glenoid component (n=25)

Name	Proportion (%)
Global APG+	36.0
Comprehensive	16.0

Metaphysis (n=101)

Name	Proportion (%)
Delta X-tend	24.8
Aequalis Reversed	17.8
Comprehensive	15.8
Anatomical inverse Humeral	14.9
Aequalis Ascend Flex	10.9

Most frequently registered types of bone cement

TABLE THE FIVE MOST FREQUENTLY REGISTERED TYPES OF BONE CEMENT USED DURING SHOULDER REVISION ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=105).

Name	Proportion (%)
Copal G+C	34.3
Palacos R+G	23.8
Refobacin Bone Cement R	13.3
Refobacin Revision	8.6
Refobacin Plus Bone Cement	4.8

Survival

Revision within 1 year

By type of shoulder arthroplasty

TABLE CUMULATIVE 1-YEAR REVISION PERCENTAGE OF PRIMARY SHOULDER ARTHROPLASTIES BY TYPE OF SHOULDER ARTHROPLASTY IN THE NETHERLANDS IN 2014-2016.

Type of primary shoulder arthroplasty	Number of primary shoulder arthroplasties (n)	Cumulative 1-year revision percentage	
		Competing Risk (95% CI)	Kaplan Meier (95% CI)
Reverse total shoulder arthroplasty	4,321	2.2 (1.8-2.7)	2.4 (1.9-2.8)
Total anatomical shoulder arthroplasty	1,642	1.5 (1.0-2.2)	1.3 (0.7-1.8)
Shoulder hemiarthroplasty	1,190	3.0 (2.2-4.2)	2.6 (1.6-3.4)

In 2014-2016, 127 (1.8%) primary shoulder arthroplasties were implanted in patients who died within one year after the primary procedure.

Reasons for revision

TABLE REASONS FOR REVISION WITHIN ONE YEAR IN PATIENS THAT UNDERWENT A SHOULDER REVISION ARTHROPLASTY BY TYPE OF SHOULDER ARTHROPLASTY IN THE NETHERLANDS 2014-2016.

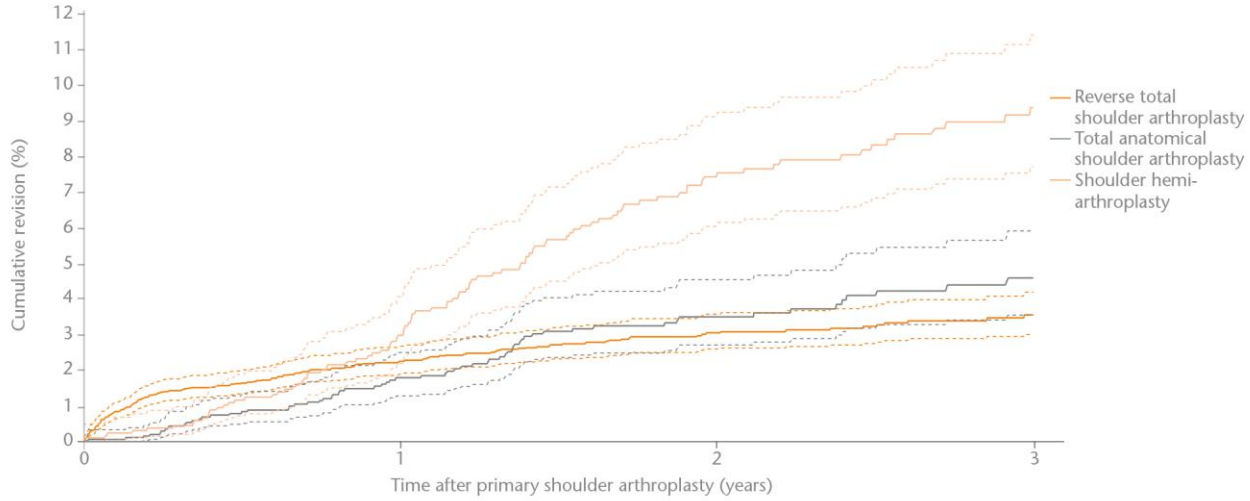
	Type of primary shoulder arthroplasty		
	Reverse total shoulder arthroplasty (n=102)	Total anatomical shoulder arthroplasty (n=25)	Shoulder hemiarthroplasty (n=36)
Reason for revision	Number of shoulder revisions[1] (n)		
Instability	35	7	7
Infection	33	3	3
Cuff rupture	n.a.	7	11
Malalignment	8	3	6
Cuff arthropathy	n.a.	6	9
Loosening of glenoid component	10	3	1
Loosening of humeral component	4	1	6
Peri-prosthetic fracture	5	0	1
Progression of osteoarthritis	0	0	7
Other	9	2	6

Please note: After a reverse total shoulder arthroplasty, the rotator cuff is no longer present.
[1] One patient may have more than one reason for revision.

Revision within 3 years

By type of shoulder arthroplasty

FIGURE CUMULATIVE REVISION PERCENTAGE OF PRIMARY SHOULDER ARTHROPLASTIES BY TYPE OF SHOULDER ARTHROPLASTY IN THE NETHERLANDS IN 2014-2017 (N=10,007).



Type of primary shoulder arthroplasty	Number of primary shoulder arthroplasties (n)	Cumulative 3-year revision percentage Competing Risk (95% CI)	Kaplan Meier (95% CI)
Reverse total shoulder arthroplasty	6,252	3.6 (3.0-4.2)	3.8 (3.2-4.4)
Total anatomical shoulder arthroplasty	2,248	4.6 (3.6-5.9)	4.6 (3.5-5.8)
Shoulder hemiarthroplasty	1,507	9.4 (7.7-11.4)	9.5 (7.7-11.4)

Dotted lines represent the upper and lower limits of the 95% confidence interval.

Reverse total shoulder arthroplasty by demographics

TABLE CUMULATIVE 3-YEAR REVISION PERCENTAGE OF PRIMARY REVERSE TOTAL SHOULDER ARTHROPLASTIES BY DEMOGRAPHICS IN THE NETHERLANDS IN 2014-2017.

	Number (n)	Cumulative 3-year revision percentage	
		Competing Risk (95% CI)	Kaplan Meier (95% CI)
Total	6,252	3.6 (3.0-4.2)	3.8 (3.2-4.4)
Gender			
Men	1,374	6.9 (5.3-9.1)	7.4 (5.4-9.3)
Women	4,865	2.7 (2.2-3.3)	2.8 (2.3-3.4)
Age (years)			
<50	40	n.a.	n.a.
50-59	202	n.a.	n.a.
60-69	1,322	5.1 (3.7-7.0)	5.2 (3.5-6.9)
70-79	3,144	3.4 (2.7-4.4)	3.6 (2.8-4.5)
≥80	1,532	2.2 (1.5-3.2)	2.5 (1.6-3.4)
Diagnosis			
Osteoarthritis	1,802	3.1 (2.2-4.4)	3.4 (2.2-4.5)
Other	4,425	4.1 (3.2-5.2)	4.0 (3.3-4.7)
ASA score			
I	352	4.1 (1.8-9.3)	4.5 (1.2-7.8)
II	3,823	3.6 (2.9-4.5)	3.8 (3.0-4.6)
III-IV	1,012	3.5 (2.6-4.6)	3.8 (2.8-4.7)
Walch score			
A1	3,098	3.7 (3.0-4.6)	3.9 (3.1-4.8)
A2	1,271	4.1 (2.8-6.1)	4.3 (2.6-6.0)
B1	645	3.1 (1.8-5.3)	3.5 (1.7-5.2)
B2	301	n.a.	n.a.
B3	90	n.a.	n.a.
C	48	n.a.	n.a.

Please note: n.a. if <50 cases were at risk; CI: confidence interval.

Total anatomical shoulder arthroplasty by demographics

TABLE CUMULATIVE 3-YEAR REVISION PERCENTAGE OF PRIMARY TOTAL ANATOMICAL SHOULDER ARTHROPLASTIES BY DEMOGRAPHICS IN THE NETHERLANDS IN 2014-2017.

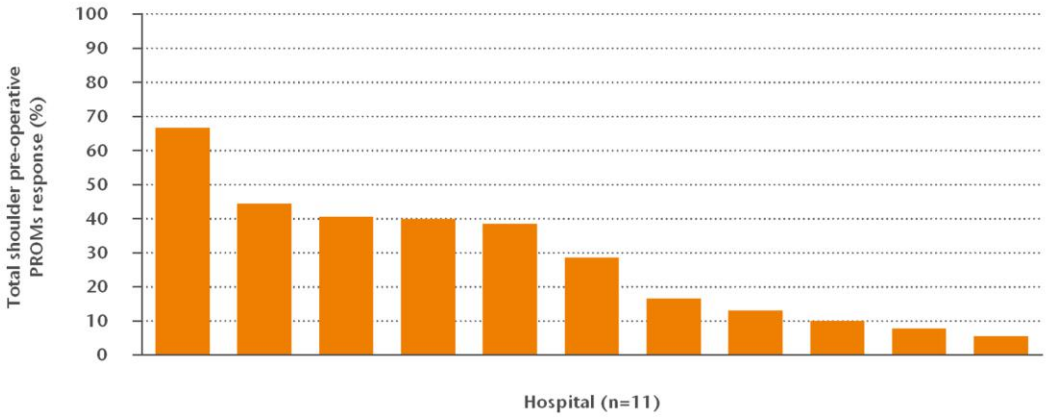
	Number (n)	Cumulative 3-year revision percentage	
		Competing Risk (95% CI)	Kaplan Meier (95% CI)
Total	2,248	4.6 (3.6-5.9)	4.6 (3.5-5.8)
Gender			
Men	633	4.9 (3.1-8.0)	5.0 (2.6-7.4)
Women	1,611	4.5 (3.3-6.1)	4.5 (3.2-5.9)
Age (years)			
<50	142	n.a.	n.a.
50-59	355	4.9 (2.9-8.3)	4.1 (1.8-6.3)
60-69	847	4.7 (3.1-7.0)	4.7 (2.8-6.6)
70-79	706	4.2 (2.5-7.1)	4.2 (2.0-6.4)
≥80	195	n.a.	n.a.
Diagnosis			
Osteoarthritis	1,817	4.0 (2.9-5.5)	4.1 (2.8-5.3)
Other	422	7.3 (4.6-11.7)	7.1 (4.2-10.0)
ASA score			
I	321	3.4 (1.5-7.8)	3.6 (0.8-6.3)
II	1,512	5.0 (3.7-6.8)	5.3 (3.7-6.8)
III-IV	399	3.3 (1.7-6.3)	3.1 (1.1-5.2)
Walch score			
A1	967	5.7 (4.1-8.0)	5.8 (3.8-7.7)
A2	611	3.4 (2.0-5.6)	3.4 (1.7-5.1)
B1	354	3.7 (1.7-8.2)	3.8 (0.7-6.8)
B2	129	n.a.	n.a.
B3	28	n.a.	n.a.
C	9	n.a.	n.a.

Please note: n.a. if <50 cases were at risk; CI: confidence interval.

PROMs

Response

FIGURE PRE-OPERATIVE PROMS RESPONSE PERCENTAGE OF PATIENTS WHO UNDERWENT A PRIMARY TOTAL (ANATOMICAL OR REVERSE) SHOULDER ARTHROPLASTY PER PRE-OPERATIVE PROMS REGISTERING HOSPITAL IN THE NETHERLANDS IN 2017 (N=241).



PROM: patient reported outcome measure.

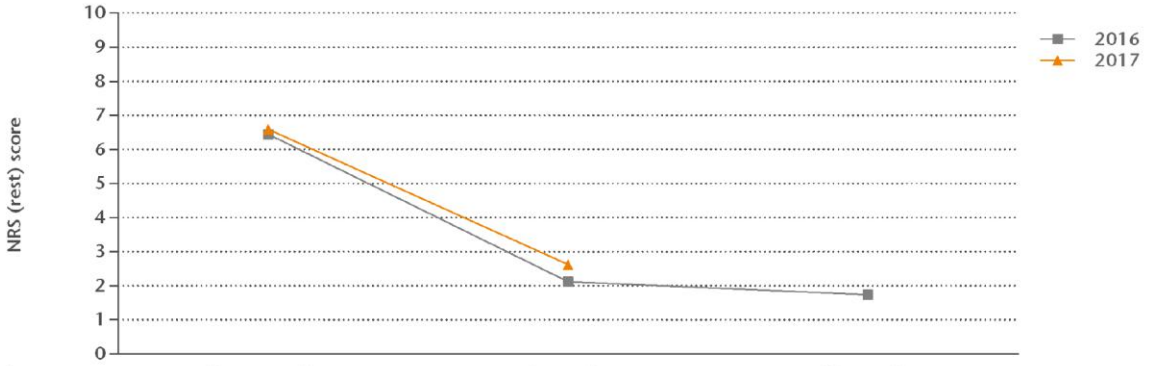
Of all 241 patients who underwent a primary total shoulder arthroplasty in a pre-operative PROMs registering hospital in 2017, the mean pre-operative response rate was 29.0% (n=70). Of the 195 patients between January and October 1st, the mean three months response rate was 20.5% (n=40).

Of all 286 patients who underwent a primary total shoulder arthroplasty in a pre-operative PROMs registering hospital in 2016, the mean twelve months response rate was 18.5% (n=53).

Mean scores (pre-operative, 3 months and 12 months)

NRS (rest)

FIGURE MEAN PRE-OPERATIVE, 3 MONTHS AND 12 MONTHS NRS (REST) SCORES OF PATIENTS WHO UNDERWENT A PRIMARY TOTAL (ANATOMICAL OR REVERSE) SHOULDER ARTHROPLASTY IN THE NETHERLANDS IN 2016-2017.



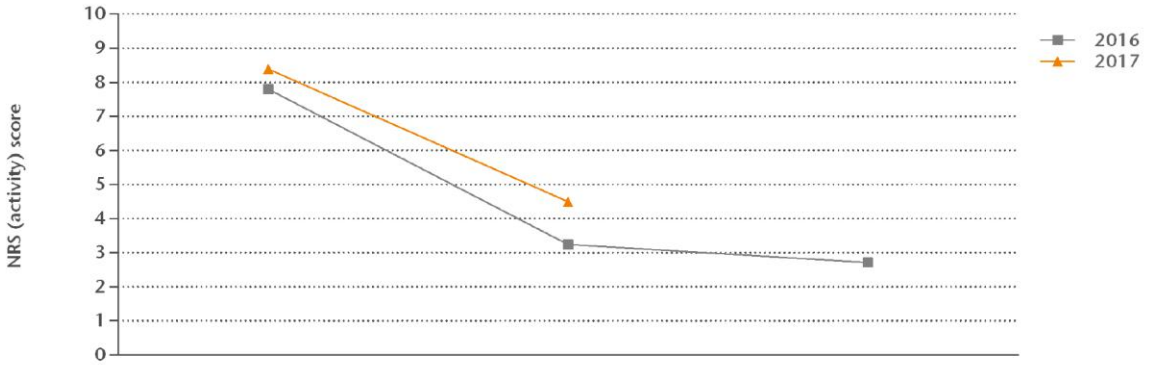
NRS (rest) score	Pre-operative		3 months		12 months	
Year of surgery	n	mean (95% CI)	n	mean (95% CI)	n	mean (95% CI)
2016	60	6.4 (5.8-7.1)	50	2.1 (1.5-2.7)	53	1.7 (1.1-2.4)
2017	69	6.6 (6.0-7.2)	40	2.6 (1.8-3.5)	n.a.	n.a.

Please note: The 12 months NRS (rest) score is not (yet) available for 2017.

The NRS (rest) score measures pain during rest. The score has a range of 0.0 to 10.0, with 0.0 representing no pain and 10.0 representing the most possible pain.

NRS (activity)

FIGURE MEAN PRE-OPERATIVE, 3 MONTHS AND 12 MONTHS NRS (ACTIVITY) SCORES OF PATIENTS WHO UNDERWENT A PRIMARY TOTAL (ANATOMICAL OR REVERSE) SHOULDER ARTHROPLASTY IN THE NETHERLANDS IN 2016-2017.



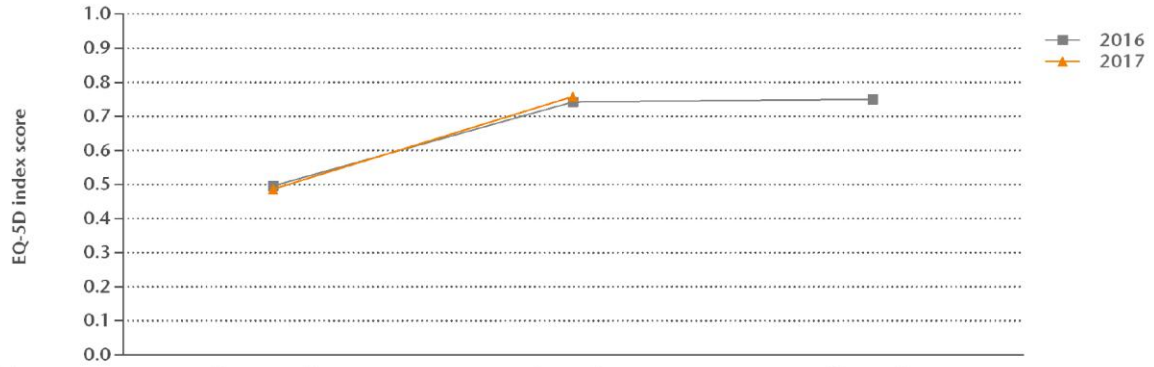
NRS (activity) score	Pre-operative		3 months		12 months	
Year of surgery	n	mean (95% CI)	n	mean (95% CI)	n	mean (95% CI)
2016	59	7.8 (7.3-8.3)	50	3.2 (2.6-3.9)	52	2.7 (1.9-3.5)
2017	69	8.4 (8.0-8.8)	40	4.5 (3.6-5.4)	n.a.	n.a.

Please note: The 12 months NRS (activity) score is not (yet) available for 2017.

The NRS (activity) score measures pain during activity.
The score has a range of 0.0 to 10.0, with 0.0 representing no pain and 10.0 representing the most possible pain.

EQ5D index score

FIGURE MEAN PRE-OPERATIVE, 3 MONTHS AND 12 MONTHS EQ-5D INDEX SCORES OF PATIENTS WHO UNDERWENT A PRIMARY TOTAL (ANATOMICAL OR REVERSE) SHOULDER ARTHROPLASTY IN THE NETHERLANDS IN 2016-2017.



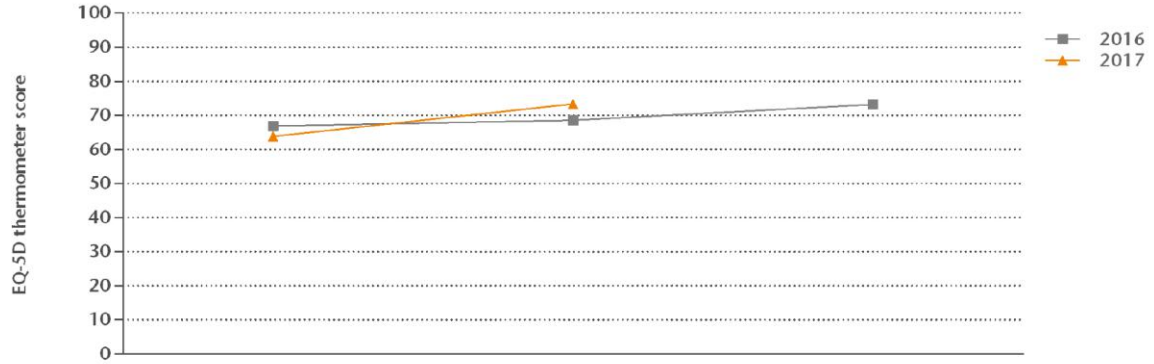
EQ-5D index score	Pre-operative		3 months		12 months	
Year of surgery	n	mean (95% CI)	n	mean (95% CI)	n	mean (95% CI)
2016	59	0.50 (0.41-0.58	51	0.74 (0.68-0.80)	51	0.75 (0.69-0.81)
2017	69	0.49 (0.41-0.56)	38	0.76 (0.69-0.83)	n.a.	n.a.

Please note: The 12 months EQ-5D index score is not (yet) available for 2017

The EQ-5D index score measures quality of life. The score has a range of -0.329 to 1.0, with 1.0 representing the best possible quality of life.

EQ5D thermometer

FIGURE MEAN PRE-OPERATIVE, 3 MONTHS AND 12 MONTHS EQ-5D THERMOMETER SCORES OF PATIENTS WHO UNDERWENT A PRIMARY TOTAL (ANATOMICAL OR REVERSE) SHOULDER ARTHROPLASTY IN THE NETHERLANDS IN 2016-2017.



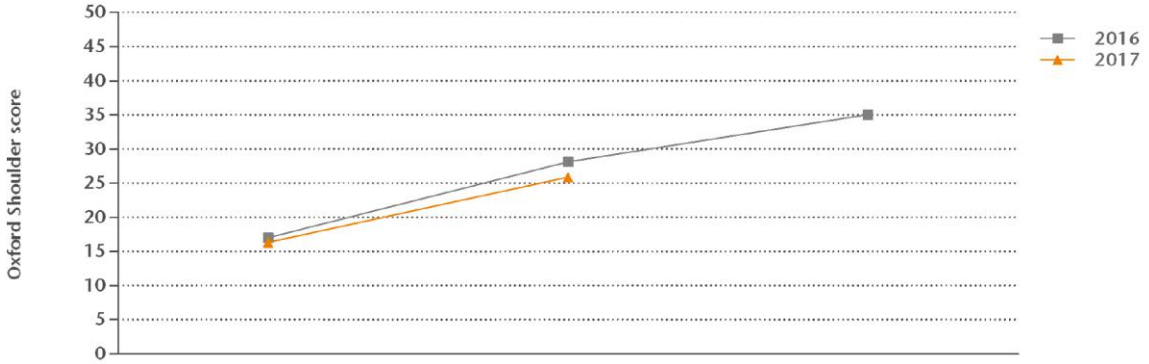
EQ-5D thermometer	Pre-operative		3 months		12 months	
Year of surgery	n	mean (95% CI)	n	mean (95% CI)	n	mean (95% CI)
2016	53	66.8 (62.6-71.1)	49	68.6 (64.0-73.1)	51	73.2 (69.6-76.8)
2017	69	63.8 (58.9-68.7)	40	73.3 (68.8-77.9)	n.a.	n.a.

Please note: The 12 months EQ-5D thermometer score is not (yet) available for 2017.

The EQ-5D thermometer score measures the health situation. The score has a range of 0.0 to 100.0, with 0.0 representing the worst possible health situation and 100.0 the best possible health situation.

Oxford Shoulder score

FIGURE MEAN PRE-OPERATIVE, 3 MONTHS AND 12 MONTHS OXFORD SHOULDER SCORES OF PATIENTS WHO UNDERWENT A PRIMARY TOTAL (ANATOMICAL OR REVERSE) SHOULDER ARTHROPLASTY IN THE NETHERLANDS IN 2016-2017.



Oxford Shoulder	Pre-operative		3 months		12 months	
Year of surgery	n	mean (95% CI)	n	mean (95% CI)	n	mean (95% CI)
2016	44	17.0 (14.8-19.3)	40	28.1 (24.5-31.5)	49	35.0 (32.2-37.8)
2017	65	16.3 (14.1-18.5)	40	25.9 (22.4-29.4)	n.a.	n.a.

Please note: The 12 months Oxford Shoulder score is not (yet) available for 2017.

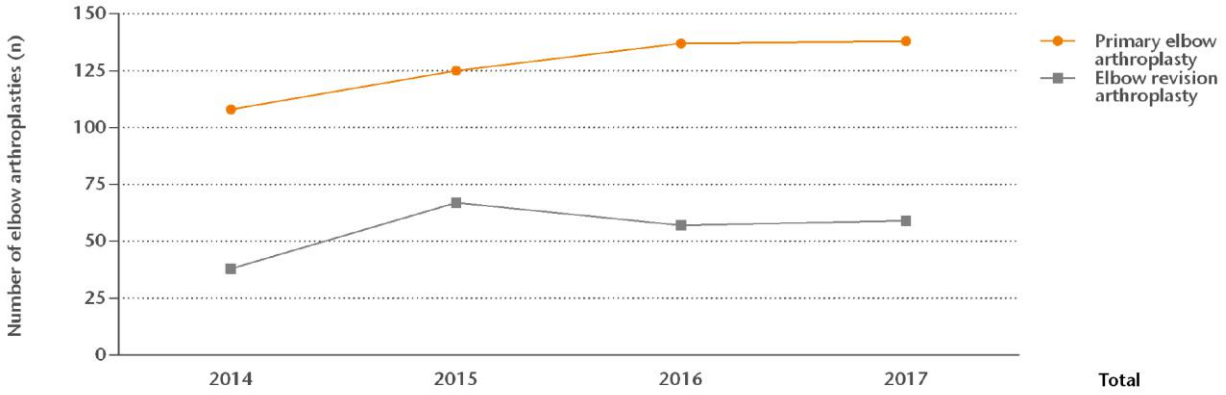
The Oxford Shoulder score measures the physical functioning and pain of patients with osteoarthritis to the shoulder. The score has a range of 0.0 to 48.0, with 48.0 representing no functional disability and 0.0 the most possible functional disability.

Elbow arthroplasty

Numbers

Procedures 2014-2017

FIGURE NUMBER OF PRIMARY ELBOW ARTHROPLASTIES AND ELBOW REVISION ARTHROPLASTIES REGISTERED IN THE LROI IN THE NETHERLANDS IN 2014-2017.

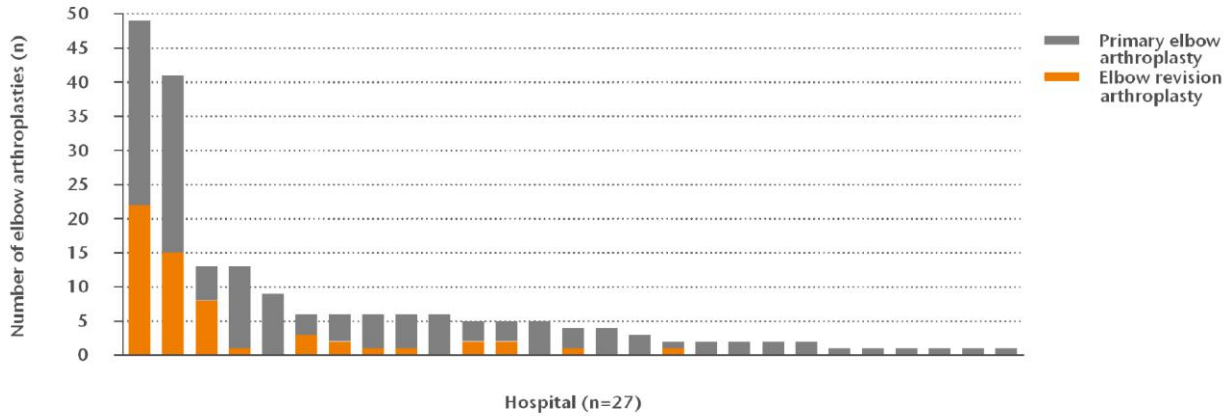


Year	2014	2015	2016	2017	Total
Type of procedure					
Primary elbow arthroplasty (n)	108	125	137	138	508
Elbow revision arthroplasty (n)	38	67	57	59	221
Total (n)	146	192	194	197	729

Out of 138 primary elbow arthroplasties that were performed in 2017, 3% (n=4) was performed bilaterally.

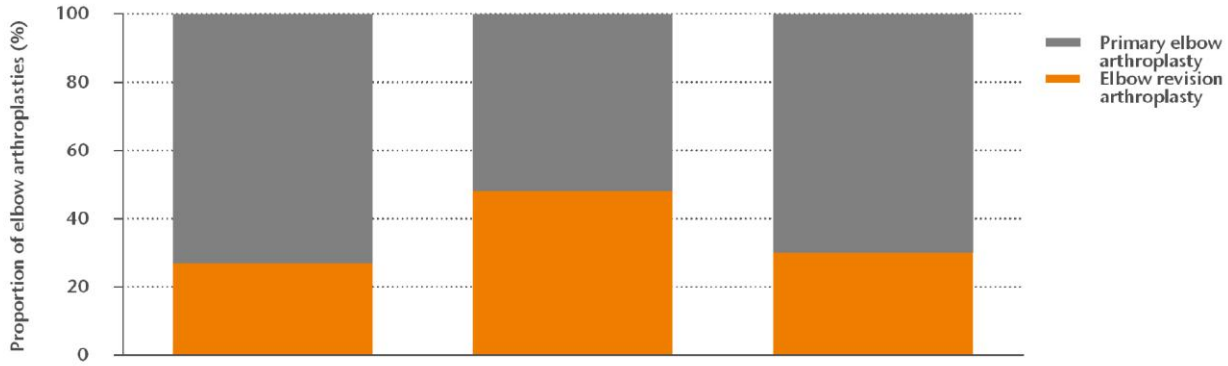
Type of procedure per hospital

FIGURE NUMBER OF PRIMARY ELBOW ARTHROPLASTIES AND ELBOW REVISION ARTHROPLASTIES PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=197).



Type of procedure by type of hospital

FIGURE PRIMARY ELBOW ARTHROPLASTIES AND ELBOW REVISION ARTHROPLASTIES (PROPORTION [%] PER CATEGORY) BY TYPE OF HOSPITAL IN THE NETHERLANDS IN 2017.

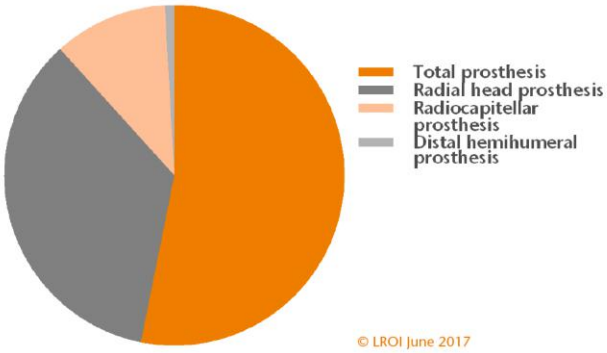


Type of hospital	General	UMC	Total
Type of procedure			
Primary elbow arthroplasty (%)	73.2	51.7	70.1
Elbow revision arthroplasty (%)	26.8	48.3	29.9
Total (n)	168	29	197

General: general hospital; UMC: university medical centre.

Type of primary elbow prosthesis

FIGURE TYPE OF PRIMARY ELBOW PROSTHESIS IN PRIMARY ELBOW ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=111).



Type of primary elbow prosthesis	Number (n)	Proportion (%)
Total prosthesis	59	53.2
Radial head prosthesis	39	35.1
Radiocapitellar prosthesis	12	10.8
Distal hemihumeral prosthesis	1	0.9

Please note: In 2017, the type of 27 (19.6%) primary elbow arthroplasties was not registered.

Primary elbow arthroplasty

Demographics

Patient characteristics by type of elbow prosthesis

TABLE PATIENT CHARACTERISTICS OF ALL PATIENTS WITH A REGISTERED PRIMARY ELBOW ARTHROPLASTY BY TYPE OF PRIMARY ELBOW ARTHROPLASTY IN THE NETHERLANDS IN 2017.

	Total arthroplasty[1] (n=60)	Radial head arthroplasty[2] (n=51)	Total[3] (n=134)
Completeness (%)			91
Mean age (years) (SD)	66.2 (11.1)	56.6 (12.6)	63.3 (12.6)
Age (years) (%)			
<50	12	21	15
50-59	13	22	16
60-69	27	35	34
70-79	35	16	27
≥80	13	6	8
Gender (%)			
Men	15	24	20
Women	85	76	80
ASA score (%)			
I	7	31	17
II	50	55	57
III-IV	43	14	26
Type of hospital[4] (%)			
General	80	96	89
UMC	20	4	11
Diagnosis (%)			
Late post-traumatic	33	39	33
Acute fracture	15	59	30
Rheumatoid arthritis	30	0	22
Osteoarthritis	18	2	13
Tumour	2	0	1
Other	2	0	1
Body Mass Index (kg/m²) (%)			
Underweight (≤18.5)	2	0	1
Normal weight (>18.5-25)	38	26	33
Overweight (>25-30)	40	35	37
Obesity (>30-40)	17	35	25
Morbid obesity (>40)	3	4	4
Smoking (%)			
No	95	96	94
Yes	5	4	6

[1] Including distal hemihumeral prostheses (n=1).
[2] Including radiocapitellar prostheses (n=12).
[3] Also contains 23 (17.2%) primary elbow arthroplasties of which the type of prosthesis had not been registered.
[4] In 2017, 21 general hospitals and 6 UMCs performed primary elbow arthroplasties.
General: general hospital; UMC: university medical centre; SD: standard deviation.

Previous surgery

TABLE PREVIOUS SURGERIES TO THE SAME JOINT IN PATIENTS WHO UNDERWENT A PRIMARY ELBOW ARTHROPLASTY IN THE NETHERLANDS IN 2017 (N=134).

	Proportion[1] (%)
Previous surgery to the relevant elbow (total)	35.1
Lateral arthrotomy	20.9
Osteosynthesis	20.1
Posterior arthrotomy	9.0
Plate or screw removal	7.5
Decompression ulnar nerve	5.2
Medial arthrotomy	3.7
Arthroscopy	1.5
Transposition ulnar nerve	1.5
Other	5.2

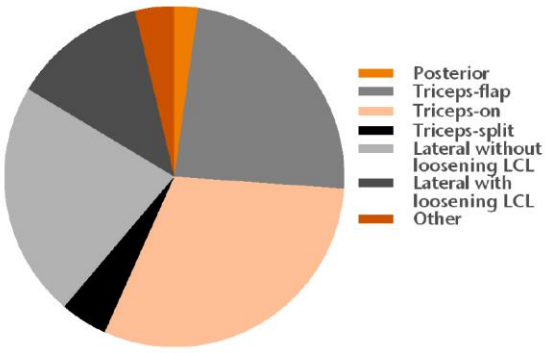
[1] A patient may have undergone multiple previous surgeries to the same joint. As such, the total proportion is more than the total proportion of patients with one or more previous surgeries to the same joint.

Surgery

Surgical techniques

Surgical approach

FIGURE SURGICAL APPROACH FOR PERFORMING A PRIMARY ELBOW ARTHROPLASTY IN THE NETHERLANDS IN 2017 (N=134).

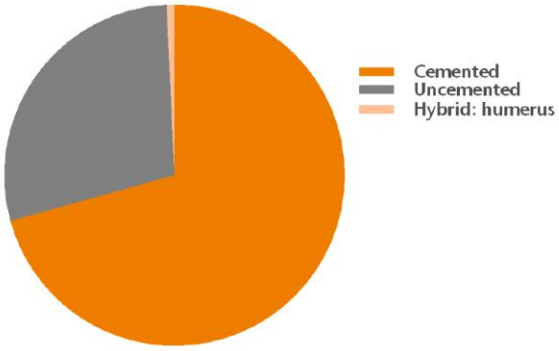


Surgical approach	Number (n)	Proportion (%)
Posterior	3	2.2
Triceps-flap	32	23.9
Triceps-on	41	30.6
Triceps-split	6	4.5
Lateral without loosening LCL	30	22.4
Lateral with loosening LCL	17	12.7
Other	5	3.7

For performing a primary elbow arthroplasty, a posterior approach was used in 61% of all cases and in 35% of all cases a lateral approach was used.

Fixation

FIGURE TYPE OF FIXATION IN PRIMARY ELBOW ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=133).

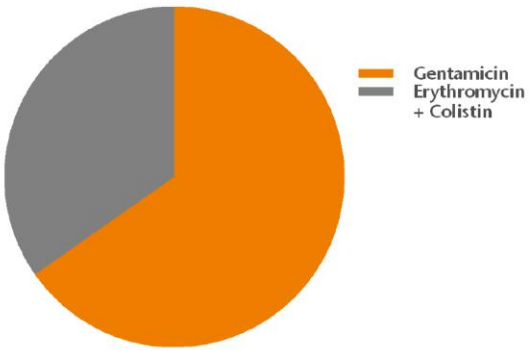


Fixation	Number (n)	Proportion (%)
Cemented	94	70.7
Uncemented	38	28.6
Hybrid: humerus	1	0.7

Bone cement

Antibiotics

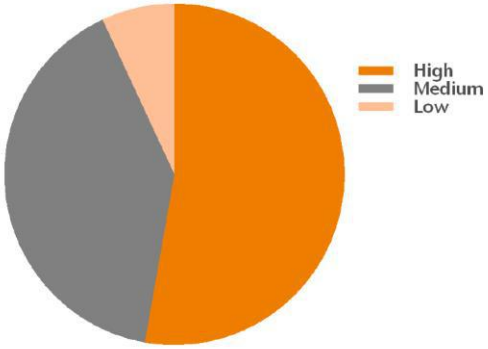
FIGURE ANTIBIOTICS IN BONE CEMENT IN PRIMARY ELBOW ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=72).



Bone cement antibiotics	Number (n)	Proportion (%)
Gentamicin	47	65.3
Erythromycin + Colistin	25	34.7

Viscosity

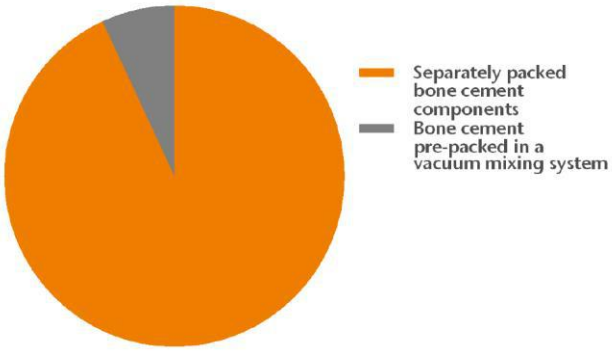
FIGURE VISCOSITY IN BONE CEMENT IN PRIMARY ELBOW ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=72).



Bone cement viscosity	Number (n)	Proportion (%)
High	38	52.8
Medium	29	40.3
Low	5	6.9

Vacuum mixing system

FIGURE BONE CEMENT PRE-PACKED IN A VACUUM MIXING SYSTEM IN PRIMARY ELBOW ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=72).



Vacuum mixing system	Number (n)	Proportion (%)
Separately packed bone cement components	67	93.1
Bone cement pre-packed in a vacuum mixing system	5	6.9

Most frequently registered elbow prostheses

TABLE THE FIVE REGISTERED TOTAL ELBOW ARTHROPLASTIES (INCLUDING DISTAL HEMIHUMERAL ARTHROPLASTIES) AND RADIAL HEAD ARTHROPLASTIES (INCLUDING RADIOCAPITELLAR ELBOW ARTHROPLASTIES) IN PRIMARY ELBOW ARTHROPLASTIES IN THE NETHERLANDS IN 2017.

Total elbow arthroplasties[1] (n=50)		Radial head arthroplasties[2] (n=33)	
Name	**Proportion (%)**	**Name**	**Proportion (%)**
Coonrad/Morrey	50.0	RHS	54.5
Latitude EV	22.0	Explor	30.3
Discovery	12.0	Anatomic Radial Head	6.1
NES	10.0	rHead	6.1
K Elbow	6.0	CRF	3.0

Please note: A total of 59 total elbow arthroplasties and 1 distal hemihumeral elbow arthroplasties were registered. Only 50 humeral components were registered for these types of elbow arthroplasties.
Please note: A total of 39 radial head arthroplasties and 12 radiocapitellar elbow arthroplasties were registered. Only 33 radial head components were registered for these types of elbow arthroplasties.
[1] Including distal hemihumeral prostheses (n=1).
[2] Including radiocapitellar prostheses (n=12).

Most frequently registered types of bone cement

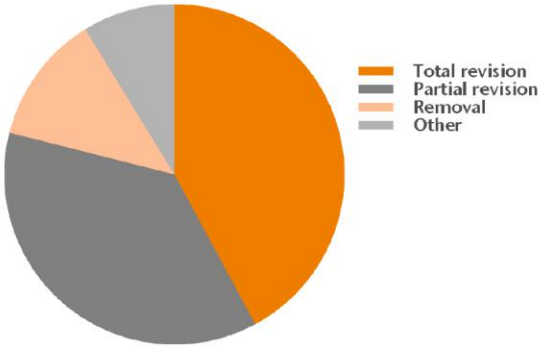
TABLE THE FIVE MOST FREQUENTLY REGISTERED TYPES OF BONE CEMENT USED DURING PRIMARY ELBOW ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=71).

Name	Proportion (%)
Palacos R+G	38.0
Simplex ABC EC	35.2
Refobacin Bone Cement R	8.5
Refobacin Plus Bone Cement	7.0
Palacos MV+G	5.6

Elbow revision arthroplasty

Type of revision

FIGURE TYPE OF REVISION ARTHROPLASTY OF ELBOW REVISION ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=57).

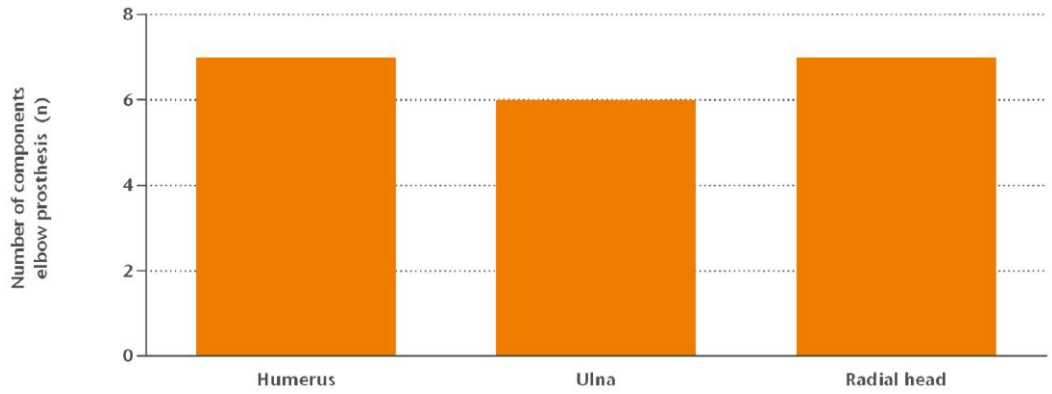


Type of elbow revision	Number (n)	Proportion (%)
Total revision	24	42.1
Partial revision	21	36.8
Removal	7	12.3
Other	5	8.8

Please note: In 2 (3%) elbow revision arthroplasties, the type of revision was not registered.

Revised components in partial revisions

FIGURE REVISED COMPONENTS IN PARTIAL ELBOW REVISION ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=21).



Revised component	Humerus	Ulna	Radial head
Number (n)	7	6	7
Proportion (%)	33.3	28.6	33.3

Please note: In 2 partial elbow revision arthroplasties, the revised component(s) were not registered. In 1 partial elbow revision arthroplasty more than one component was replaced during a procedure.

Reasons for revision

TABLE REASONS FOR REVISION OR RE-SURGERY IN PATIENTS WHO UNDERWENT AN ELBOW REVISION ARTHROPLASTY IN THE NETHERLANDS IN 2017 (N=59).

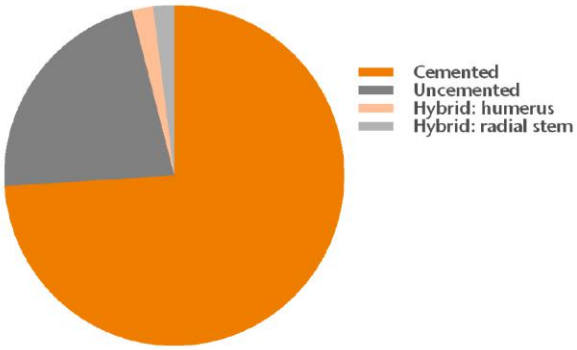
Reasons for revision	Proportion[1] (%)
Instability	39.0
Polyethylene wear	27.1
Metallosis	22.0
Loosening of radial head component	18.6
Loosening of ulnar component	18.6
Peri-prosthetic fracture	18.6
Loosening of humeral component	16.9
Infection	6.8
Other	20.3

[1]A patient may have more than one reason for revision or re-surgery. As such, the total proportion is over 100%.

Surgery

Fixation

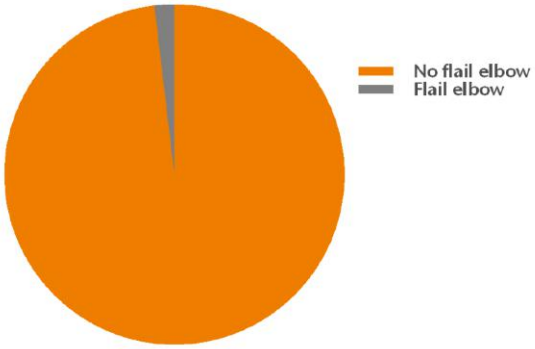
FIGURE TYPE OF FIXATION IN ELBOW REVISION ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=50).



Fixation	Number (n)	Proportion (%)
Cemented	37	84.0
Uncemented	11	22.0
Hybrid: humerus	1	2.0
Hybrid: radial stem	1	2.0

Flail elbow

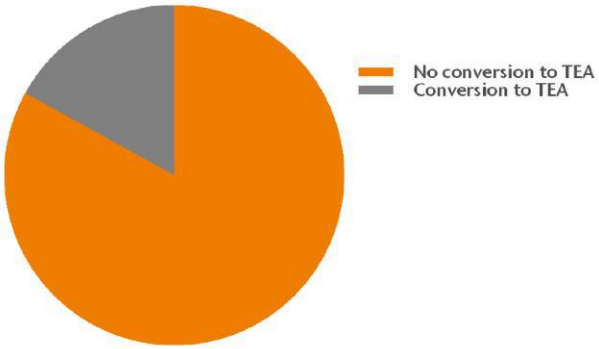
FIGURE FLAIL ELBOW IN ELBOW REVISION ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=53).



Flail elbow	Number (n)	Proportion (%)
No flail elbow	52	98.1
Flail elbow	1	1.9

Conversion to TEA

FIGURE CONVERSION OF A RADIAL HEAD ARTHROPLASTY TO A TOTAL ELBOW ARTHROPLASTY IN THE NETHERLANDS IN 2017 (N=53).

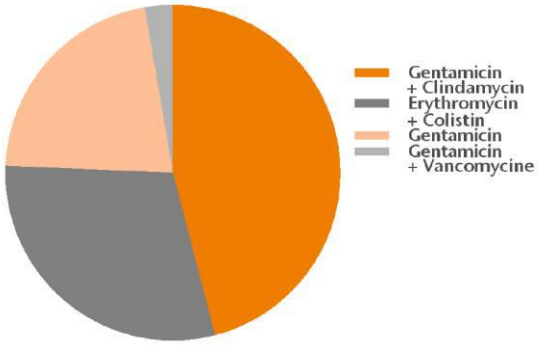


Conversion to TEA	Number (n)	Proportion (%)
No conversion to TEA	44	83.0
Conversion to TEA	9	17.0

TEA: total elbow arthroplasty.

Bone cement antibiotics

FIGURE BONE CEMENT ANTIBIOTICS IN ELBOW REVISION ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=37).



Bone cement antibiotics	Number (n)	Proportion (%)
Gentamicin + Clindamycin	17	46.0
Erythromycin + Colistin	11	29.7
Gentamicin	8	21.6
Gentamicin + Vandomycine	1	2.7

Most frequently registered components

TABLE THE REGISTERED HUMERUS, ULNA, RADIAL HEAD AND RADIAL STEM COMPONENTS IN ELBOW REVISION ARTHROPLASTIES IN THE NETHERLANDS IN 2017.

Humerus (n=26) Name	Proportion (%)
Latitude EV	61.5
Coonrad/Morrey	30.8
Discovery	3.8
Radio- Capitellum	3.8

Ulna (n=19) Name	Proportion (%)
Coonrad/Morrey	36.8
Latitude EV	36.8
Latitude	15.8
Discovery	5.3
NES	5.3

Radial head (n=3) Name	Proportion (%)
Latitude	33.3
RHS	33.3
rHead	33.3

Radial stem (n=3) Name	Proportion (%)
rHead	100

Most frequently registered types of bone cement

TABLE THE REGISTERED TYPES OF BONE CEMENT USED DURING ELBOW REVISION ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=36).

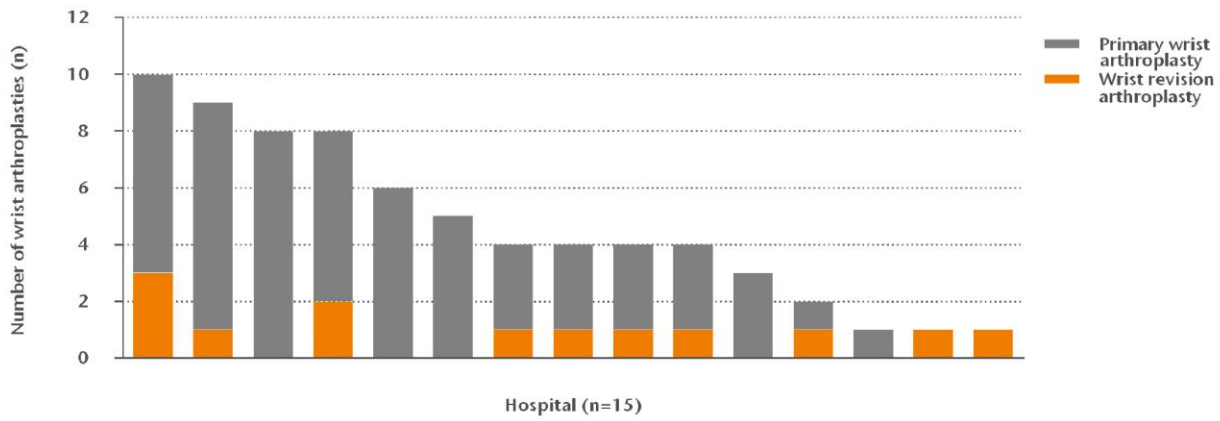
Name	Proportion (%)
Simplex ABC EC	30.6
Copal G+C	27.8
Refobacin Revision	19.4
Palacos R+G	11.1
Refobacin Bone Cement R	5.5
Palacos MV+G	2.8
Refobacin Bone Cement LV	2.8

Wrist arthroplasty

Numbers

Type of procedure per hospital

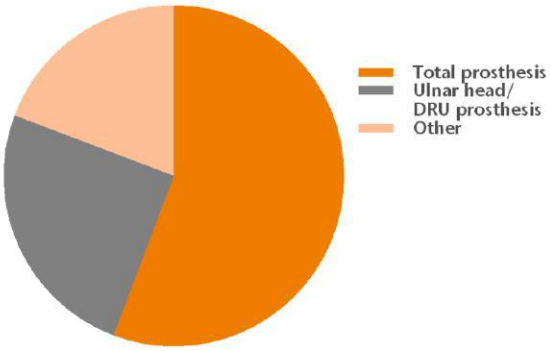
FIGURE NUMBER OF PRIMARY WRIST ARTHROPLASTIES AND WRIST REVISION ARTHROPLASTIES PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=70).



Of all 57 primary wrist arthroplasties in 2017, 51 were performed in a general hospital and 6 in a university medical centre. Of all 13 wrist revision arthroplasties, 11 were performed in a general hospital and 2 in a university medical centre.

Type of primary wrist prosthesis

FIGURE TYPE OF PRIMARY WRIST PROSTHESIS IN PRIMARY WRIST ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=52).



Type of primary wrist prosthesis	Number (n)
Total prosthesis	29
Ulnar head/ DRU prosthesis	13
Other	10

Please note: In five primary wrist arthroplasties, the type of prosthesis was not registered.
DRU: distal radio-ulnar.

Primary wrist arthroplasty

Demographics

Patient characteristics

TABLE PATIENT CHARACTERISTICS OF ALL PATIENTS WITH A REGISTERED PRIMARY WRIST ARTHROPLASTY IN THE NETHERLANDS IN 2017.

	Primary wrist arthroplasty (n=56)
Completeness (%)	68
Mean age (years) (SD)	59.1 (12.1)
Age (years) (n)	
<50	8
50-59	17
60-69	22
70-79	9
≥80	0
Gender (n)	
Men	27
Women	29
ASA score (n)	
I	23
II	23
III-IV	8
Type of hospital (n)	
General	50
UMC	6
Diagnosis (n)	
Osteoarthritis	30
Late post-traumatic	12
Rheumatoid arthritis	6
Inflammatory arthritis	2
Other	3
Specialism (n)	
Plastic surgery	28
Orthopaedic surgery	26
Body Mass Index (kg/m²) (n)	
Underweight (≤18.5)	0
Normal weight (>18.5-25)	16
Overweight (>25-30)	23
Obesity (>30-40)	12
Morbid obesity (>40)	1
Smoking (n)	
No	43
Yes	7

Please note: Numbers may not add up to the total number of patients with a primary wrist arthroplasty due to missings.
Please note: In 2017, 11 general hospitals and 2 UMCs performed primary wrist arthroplasties.
General: general hospital; UMC: university medical centre; SD: standard deviation.

Out of 57 primary wrist arthroplasties that were performed in 2017, one was performed bilaterally.

Previous surgery

TABLE PREVIOUS SURGERIES TO THE SAME JOINT IN PATIENTS WHO UNDERWENT A PRIMARY WRIST ARTHROPLASTY IN THE NETHERLANDS IN 2017 (N=56).

	Number[1] (n)
Previous surgery to the relevant wrist (total)	14
ORIF of a distal radius fracture	4
Proximal row carpectomy	3
Corrective osteotomy radius	1
Corrective osteotomy ulna	1
ORIF of a carpal fracture	1
Partial radial styloidectomy	1
Partial arthrodesis	1
Sauvé-Kapandji procedure	1
Stabilisation of perilunate dislocation	1
Total arthrodesis	1
Intercarpal stabilisation/ligament reconstruction	0
Other	5

ORIF: open reduction and internal fixation.
[1] A patient may have undergone multiple previous surgeries to the same joint. As such, the total number is more than the total number of patients with one or more previous surgeries to the same joint.

Surgery

Most frequently registered components

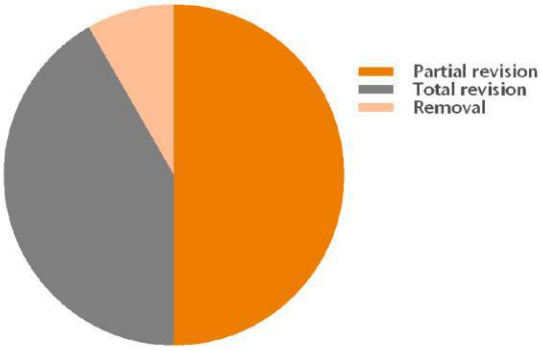
TABLE THE MOST FREQUENTLY REGISTERED CARPAL AND RADIAL STEM COMPONENTS IN PRIMARY WRIST ARTHROPLASTIES IN THE NETHERLANDS IN 2017.

Carpal (n=29)		Radial stem (n=16)	
Name	**Number (n)**	**Name**	**Number (n)**
Freedom	14	Freedom	9
Amandys	7	Universal 2	6
Universal 2	6	Maestro	1
Maestro	1		
RCPI	1		

Wrist revision arthroplasty

Type of revision

FIGURE TYPE OF REVISION ARTHROPLASTY OF WRIST REVISION ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=12).



Type of revision	Number (n)
Partial revision	6
Total revision	5
Removal	1

Please note: In one wrist revision arthroplasty, the type of revision was not registered.

Reasons for revision

TABLE REASONS FOR REVISION IN PATIENTS WHO UNDERWENT A WRIST REVISION ARTHROPLASTY IN THE NETHERLANDS IN 2017 (N=13).

Reasons for revision	Number[1] (n)
Lysis of components	3
Dislocation	2
Implant fracture	2
Instability	2
Loosening of carpal component	2
Peri-prosthetic fracture	1
Infection	0
Loosening of radial component	0
Loosening of ulnar component	0
Other	4

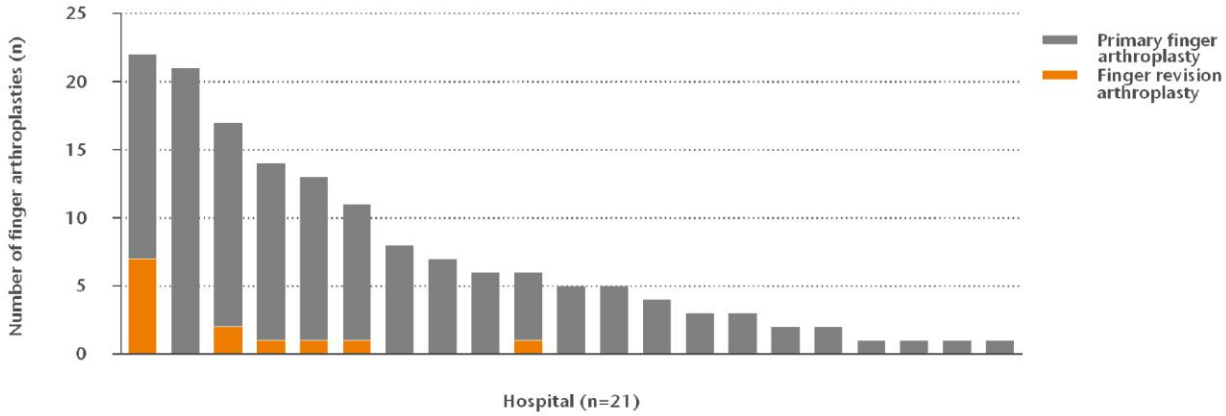
[1] One patient may have more than one reason for revision or re-surgery.

Finger arthroplasty

Numbers

Type of procedure per hospital

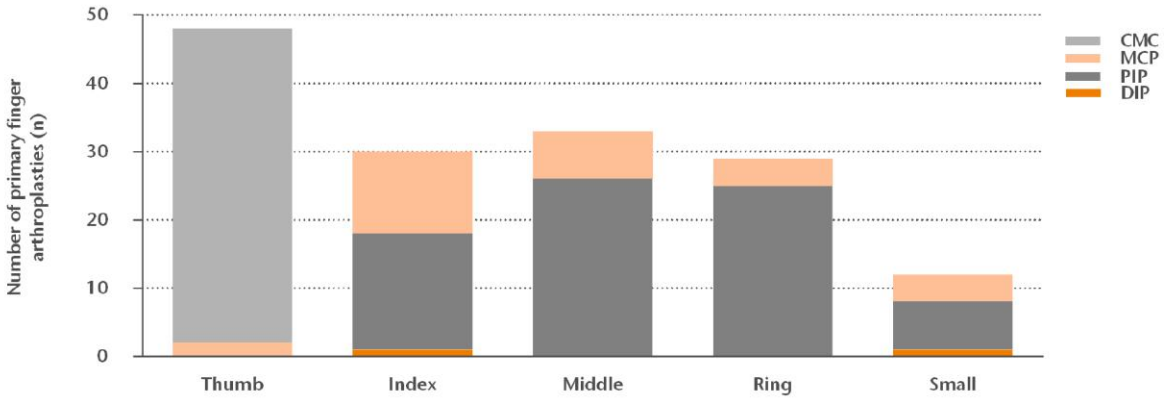
FIGURE NUMBER OF PRIMARY FINGER ARTHROPLASTIES AND FINGER REVISION ARTHROPLASTIES PER HOSPITAL IN THE NETHERLANDS IN 2017 (N=153).



Of all 140 primary finger arthroplasties in 2017, 134 were performed in a general hospital, 3 in a university medical centre and 3 in a private hospital. All 13 finger revision arthroplasties were performed in a general hospital.

Type of primary finger prosthesis

FIGURE TYPE OF PRIMARY FINGER PROSTHESIS IN PRIMARY FINGER ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=152).



Finger	Thumb	Index	Middle	Ring	Small
Finger joint					
CMC (n)	46	n.a.	n.a.	n.a.	n.a.
MCP (n)	2	12	7	4	4
PIP (n)	n.a.	17	26	25	7
DIP (n)	0	1	0	0	1
Total (n)	48	31	33	29	12

Please note: In one primary finger arthroplasty to the index finger, the type of finger joint was not registered.

Primary finger arthroplasty

Demographics

Patient characteristics

TABLE PATIENT CHARACTERISTICS OF ALL PATIENTS WITH A REGISTERED PRIMARY FINGER ARTHROPLASTY IN THE NETHERLANDS IN 2017.

	Primary finger arthroplasty (n=120)
Completeness (%)	63
Mean age (years) (SD)	62.3 (10.5)
Age (years) (n)	
<50	9
50-59	38
60-69	44
70-79	24
≥80	5
Gender (n)	
Men	33
Women	87
ASA score (n)	
I	43
II	61
III-IV	13
Type of hospital (n)	
General	114
UMC	3
Private	3
Diagnosis (n)	
Osteoartritis	96
Rheumatoid arthritis	10
Late post-traumatic	5
Other	3
Specialism (n)	
Plastic surgery	76
Orthopaedic surgery	40
Body Mass Index (kg/m²) (n)	
Underweight (≤18.5)	1
Normal weight (>18.5-25)	28
Overweight (>25-30)	45
Obesity (>30-40)	32
Morbid obesity (>40)	1
Smoking (n)	
No	98
Yes	14

Please note: Numbers may not add up to the total number of patients with a primary finger arthroplasty due to missings.
Please note: In 2017, 19 general hospitals, 1 UMC and 1 private performed primary finger arthroplasties.
General: general hospital; UMC: university medical centre; Private: private hospital; SD: standard deviation.

In 2017, 140 primary finger arthroplasties were performed. 105 patients underwent one procedure, 11 patients underwent two procedures, 3 patients underwent three procedures and 1 patient underwent four procedures in 2017.

Previous surgery

TABLE PREVIOUS SURGERIES TO THE SAME JOINT IN PATIENTS WHO UNDERWENT A PRIMARY FINGER ARTHROPLASTY IN THE NETHERLANDS IN 2017 (N=120).

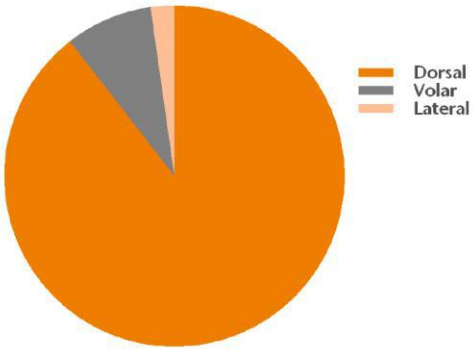
	Number (n)
Previous surgery to the relevant finger (total)	4
Interposition spacer	4
Ligament reconstruction	1
Correction osteotomy	0
Arthrodesis	0
Interposition arthroplasty	0
Other	2

[1] A patient may have undergone multiple previous surgeries to the same joint. As such, the total number is more than the total number of patients with one or more previous surgeries to the same joint.

Surgery

Surgical approach

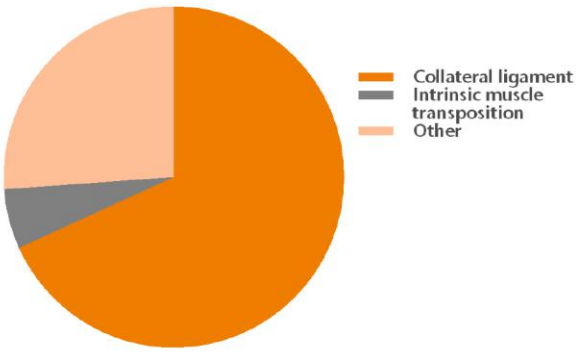
FIGURE SURGICAL APPROACH FOR PERFORMING A PRIMARY FINGER ARTHROPLASTY IN THE NETHERLANDS IN 2017 (N=133).



Surgical approach	Number (n)	Proportion (%)
Dorsal	119	89.5
Volar	11	8.3
Lateral	3	2.2

Soft tissue stabilisation

FIGURE TYPE OF STABILISATION IN PRIMARY FINGER ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=88).

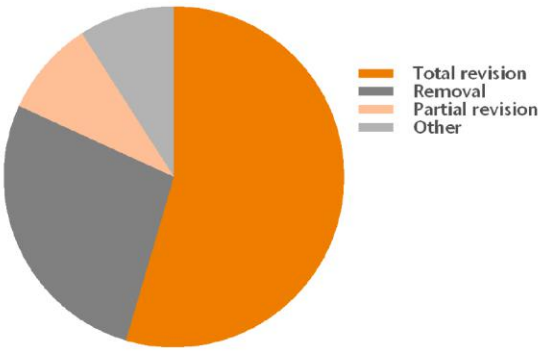


Stabilisation	Number (n)	Proportion (%)
Collateral ligament	60	68.2
Intrinsic muscle transposition	5	5.7
Other	23	26.1

Finger revision arthroplasty

Type of revision

FIGURE TYPE OF REVISION ARTHROPLASTY OF FINGER REVISION ARTHROPLASTIES IN THE NETHERLANDS IN 2017 (N=11).



Type of revision	Number (n)
Total revision	6
Removal	3
Partial revision	1
Other	1

Please note: In two finger revision arthroplasties, the type of revision was not registered.

Reasons for revision

TABLE REASONS FOR REVISION OR RE-SURGERY IN PATIENTS WHO UNDERWENT A FINGER REVISION ARTHROPLASTY IN THE NETHERLANDS IN 2017 (N=13).

Reasons for revision	Number[1] (n)
Dislocation	4
Loosening of distal component	4
Loosening of proximal component	2
Bone resorption of distal component	2
Bone resorption of proximal component	0
Infection	0
Instability	0
Peri-prosthetic fracture	0
Implant fracture	0
Other	6

[1] One patient may have more than one reason for revision or re-surgery.

Data quality

Number of registered procedures

Hip

TABLE NUMBER OF REGISTERED HIP ARTHROPLASTIES PER YEAR OF SURGERY (2007-2017) IN THE LROI IN APRIL 2018.

	Type of hip arthroplasty						
Year of surgery	Total arthroplasty (n)	Hemi-arthroplasty (n)	Resurfacing arthroplasty (n)	Other (n)	Unknown/ missing (n)	Revision arthroplasty (n)	Total (n)
2007	8,665	938	449	379	910	1,269	12,610
2008	15,139	1,362	734	411	442	1,857	19,945
2009	21,483	2,046	865	629	373	2,677	28,073
2010	23,338	2,343	608	644	303	2,952	30,188
2011	23,875	2,395	227	667	291	3,197	30,652
2012	25,384	2,789	10	608	278	3,767	32,836
2013	26,124	3,019	1	166	290	3,517	33,117
2014	28,181	3,735	0	29	165	3,583	35,693
2015	28,879	4,920	15	21	81	3,833	37,749
2016	29,662	5,326	16	28	108	3,879	39,019
2017	29,937	5,916	3	28	60	3,911	39,855
Total	260,667	34,789	2,928	3,610	3,301	34,442	339,737

Please note: In previous annual reports of the Dutch Arthroplasty Register (LROI), type of hip arthroplasty was based on the registered type of prosthesis. As of this annual report, type of hip arthroplasty is based on the registered (product numbers of) hip components.

The LROI is nearly complete as of 2010. Therefore, a dotted line was inserted between 2009 and 2010.

Knee

TABLE NUMBER OF REGISTERED KNEE ARTHROPLASTIES PER YEAR OF SURGERY (2007-2017) IN THE LROI IN JUNE 2018.

	Type of knee arthroplasty						
Year of surgery	Total arthroplasty (n)	Unicondylar knee arthroplasty (n)	Patellofemoral knee arthroplasty (n)	Other (n)	Unknown/ missing (n)	Revision arthroplasty (n)	Total (n)
2007	7,037	773	47	42	840	596	9,335
2008	11,747	1,211	92	61	356	908	14,375
2009	16,789	1,547	139	62	114	1,301	19,952
2010	18,488	1,717	144	78	167	1,624	22,218
2011	19,513	1,586	116	80	130	1,794	23,219
2012	21,703	1,576	172	92	177	2,115	25,835
2013	22,305	1,803	135	29	185	2,309	26,766
2014	24,236	2,365	116	27	94	2,559	29,397
2015	24,237	2,691	157	10	41	2,684	29,820
2016	24,869	2,946	144	5	99	2,923	30,986
2017	25,400	3,609	167	12	33	3,037	32,258
Total	216,324	21,824	1,429	498	2,236	21,850	264,161

Please note: In previous annual reports of the Dutch Arthroplasty Register (LROI), type of knee arthroplasty was based on the registered type of prosthesis. As of this annual report, type of knee arthroplasty is based on the registered (product numbers of) knee components.

The LROI is nearly complete as of 2010. Therefore, a dotted line was inserted between 2009 and 2010.

Ankle

TABLE NUMBER OF REGISTERED ANKLE ARTHROPLASTIES PER YEAR OF SURGERY (2014-2017) IN THE LROI IN APRIL 2018.

	Type of ankle arthroplasty			
Year of surgery	Total arthroplasty (n)	Other (n)	Revision arthroplasty (n)	Total[1] (n)
2014	102	0	16	119
2015	106	0	19	125
2016	125	6	37	169
2017	112	3	30	146
Total	445	9	102	559

[1] In 0.7% (n=3) primary ankle arthroplasties the type of primary ankle prosthesis has not been registered.

Shoulder

TABLE NUMBER OF REGISTERED SHOULDER ARTHROPLASTIES PER YEAR OF SURGERY (2014-2017) IN THE LROI IN APRIL 2018.

	Type of shoulder arthroplasty				
Year of surgery	Reversed arthroplasty (n)	Total anatomical arthroplasty (n)	Hemi-arthroplasty (n)	Revision arthroplasty (n)	Total[1] (n)
2014	1,165	465	459	208	2,329
2015	1,491	580	425	272	2,783
2016	1,686	601	315	275	2,895
2017	1,949	622	332	349	3,271
Total	6,291	2,268	1,531	1,104	11,278

[1] In 0.8% (n=84) primary shoulder arthroplasties the type of primary shoulder prosthesis has not been registered.

Elbow

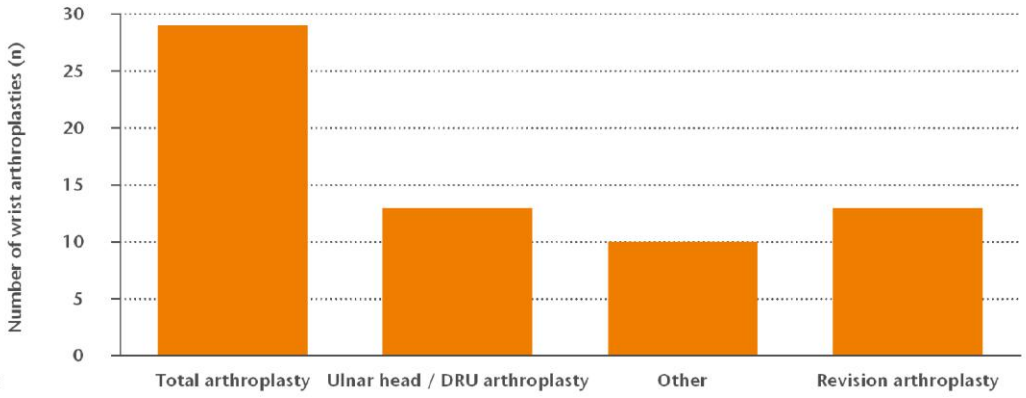
TABLE NUMBER OF REGISTERED ELBOW ARTHROPLASTIES PER YEAR OF SURGERY (2014-2017) IN THE LROI IN APRIL 2018.

	Type of elbow arthroplasty							
Year of surgery	Total arthroplasty (n)	Distal hemihumeral arthroplasty (n)	Radial head arthroplasty (n)	Radiocapitellar arthroplasty (n)	Lateral resurfacing arthroplasty (n)	Other (n)	Revision arthroplasty (n)	Total[1] (n)
2014	72	5	23	0	0	0	38	146
2015	78	4	41	1	0	0	67	192
2016	67	2	45	13	0	2	57	194
2017	59	1	39	12	0	0	59	197
Total	276	12	148	26	0	2	221	729

[1] In 8.7% (n=44) primary elbow arthroplasties the type of primary elbow prosthesis has not been registered.

Wrist

FIGURE NUMBER OF REGISTERED WRIST ARTHROPLASTIES PERFORMED IN 2017 IN THE LROI IN APRIL 2018 (N=70)[1].

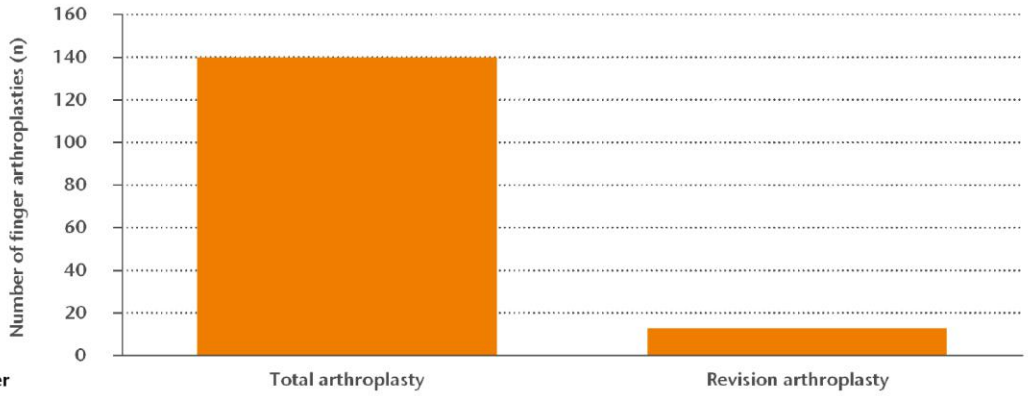


Type of wrist	Total arthroplasty	Ulnar head / DRU arthroplasty	Other	Revision arthroplasty
Number (n)	29	13	10	13
Proportion (%)	41.4	18.6	14.3	18.6

[1] In 7.1% (n=5) primary wrist arthroplasties the type of primary wrist prosthesis has not been registered.
DRU: distal radio-ulnar.

Finger

FIGURE NUMBER OF REGISTERED FINGER ARTHROPLASTIES PERFORMED IN 2017 IN THE LROI IN APRIL 2018 (N=153).



Type of finger	Total arthroplasty	Revision arthroplasty
Number (n)	140	13
Proportion (%)	91.5	8.5

Coverage and completeness

TABLE COMPLETENESS OF REGISTERING HOSPITALS AND COMPLETENESS OF REGISTERED ARTHROPLASTIES IN THE LROI BASED ON THE HOSPITAL INFORMATION SYSTEM IN 2017.

	Number of hospitals in LROI[1]	Completeness of registering hospitals[2] (%)	Median [range] number of registrations	Completeness of registrations[3] (%)
Hip arthroplasties		100		
Primary total hip arthroplasties	97		277 [4-835]	99
Primary hip hemiarthroplasties (orthopaedic surgeon)	81		34 [1-357]	96
Primary hip hemiarthroplasties (trauma surgeon)	43		29 [1-113]	64
Hip revision arthroplasties	92		30 [1-329]	98
Knee arthroplasties		99		
Primary knee arthroplasties	100		275 [3-777]	100
Knee revision arthroplasties	99		23 [1-440]	98
Ankle arthroplasties		Unknown		
Primary ankle arthroplasties	14		7 [1-22]	100
Ankle revision arthroplasties	9		2 [1-7]	87
Shoulder arthroplasties		98		
Primary shoulder arthroplasties	88		28 [1-184]	98
Shoulder revision arthroplasties	60		3 [1-92]	90
Elbow arthroplasties		Unknown		
Primary elbow arthroplasties	27		3 [1-27]	91
Elbow revision arthroplasties	12		2 [1-22]	87
Wrist arthroplasties		Unknown		
Primary wrist arthroplasties (orthopaedic surgeon)	5		5 [2-8]	71
Primary wrist arthroplasties (plastic surgeon)	8		3 [1-8]	64
Wrist revision arthroplasties (orthopaedic surgeon)	5		1 [1-3]	18
Wrist revision arthroplasties (plastic surgeon)	5		1 [1-1]	25
Finger arthroplasties		Unknown		
Primary finger arthroplasties (orthopaedic surgeon)	7		2 [1-15]	53
Primary finger arthroplasties (plastic surgeon)	14		5 [1-19]	67
Finger revision arthroplasties (orthopaedic surgeon)	2		2 [1-2]	17
Finger revision arthroplasties (plastic surgeon)	4		1 [1-7]	24

[1] Number of hospitals that performed arthroplasties in accordance with their hospital information system in 2017.
[2] Proportion of total number of hospitals that performed arthroplasties in 2017 (based on Vektis data). For ankle, elbow, wrist and finger arthroplasties, no specific DBC/DOT code was available, therefore no comparison could be made.
[3] Completeness of number of registered arthroplasties in the LROI in September 2018, compared to the total number of arthroplasties performed (based on the hospital information system) in 2017. This pertains only to hospitals that submitted data for comparison.

Vektis is a care information centre. Vektis collects and analyses data on the costs and quality of health care in the Netherlands. Vektis data mainly originates from reimbursement files of health care insurers. Therefore, Vektis has national data on medication use and use of aiding devices, data on primary health care and data on Diagnosis Treatment Combinations (DBCs/DOT) in hospitals and any other types of insured care in the Netherlands. In addition, Vektis collects demographic data, based on surveys among insurers and results of quality studies[1].

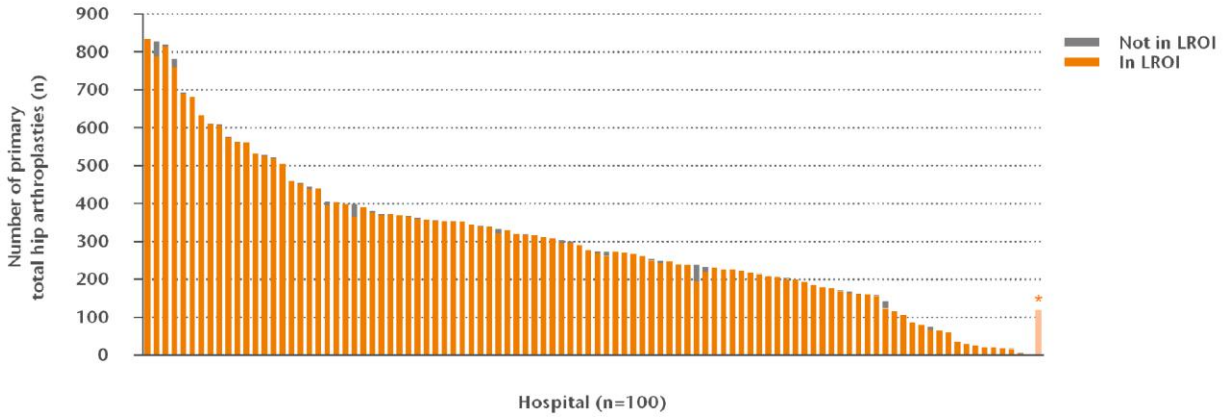
[1]www.vektis.nl

Completeness per hospital

Hip

Primary total hip arthroplasties

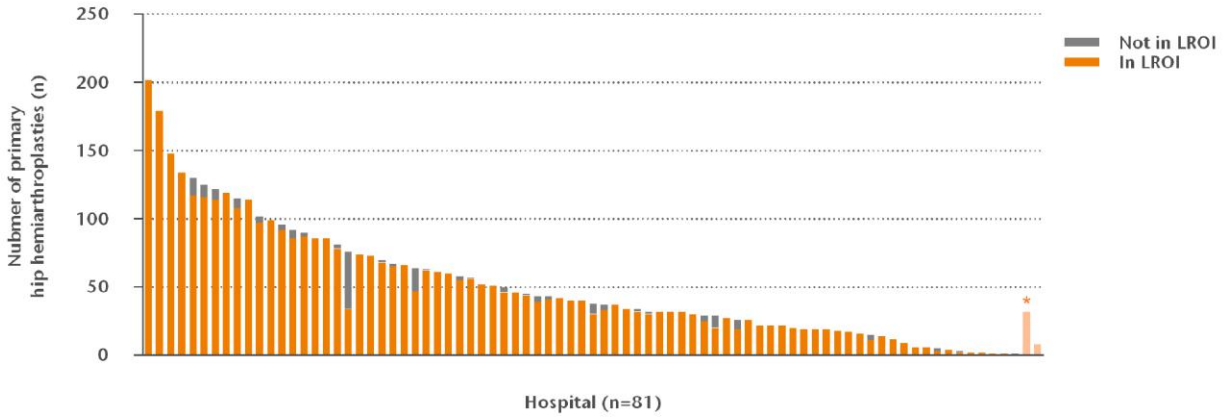
FIGURE NUMBER OF PROCEDURES PERFORMED (BASED ON THE HOSPITAL INFORMATION SYSTEM) AND THE NUMBER OF REGISTERED PROCEDURES IN THE LROI PER HOSPITAL FOR PRIMARY TOTAL HIP ARTHROPLASTIES IN 2017.



* No data provided for comparison by the hospital.

Primary hip hemiarthroplasties (orthopaedic surgeon)

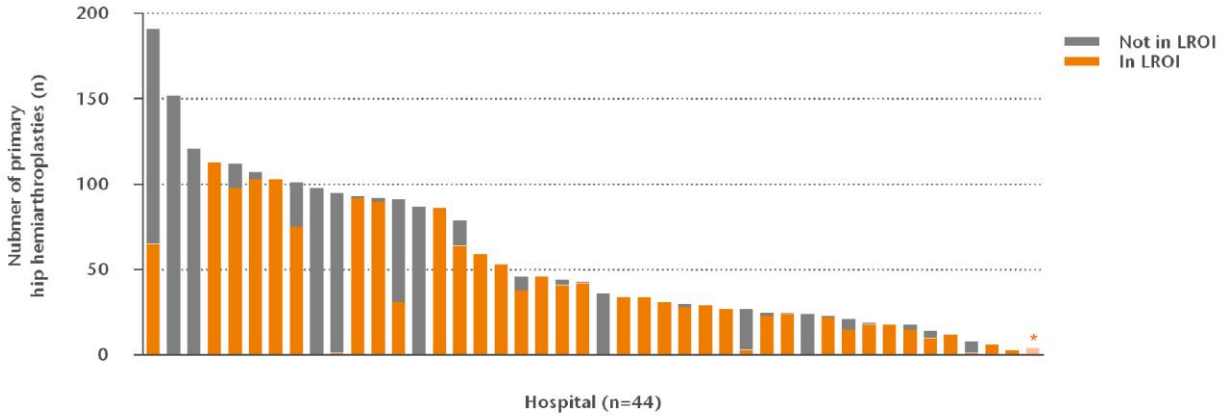
FIGURE NUMBER OF PROCEDURES PERFORMED (BASED ON THE HOSPITAL INFORMATION SYSTEM) AND THE NUMBER OF REGISTERED PROCEDURES IN THE LROI PER HOSPITAL FOR PRIMARY HIP HEMIARTHROPLASTIES (PERFORMED BY AN ORTHOPAEDIC SURGEON) IN 2017.



* No data provided for comparison by the hospital.
Please note: 1 hospital registered a primary hip hemiarthroplasty in the LROI but not in the hospital information system.

Primary hip hemiarthroplasties (trauma surgeon)

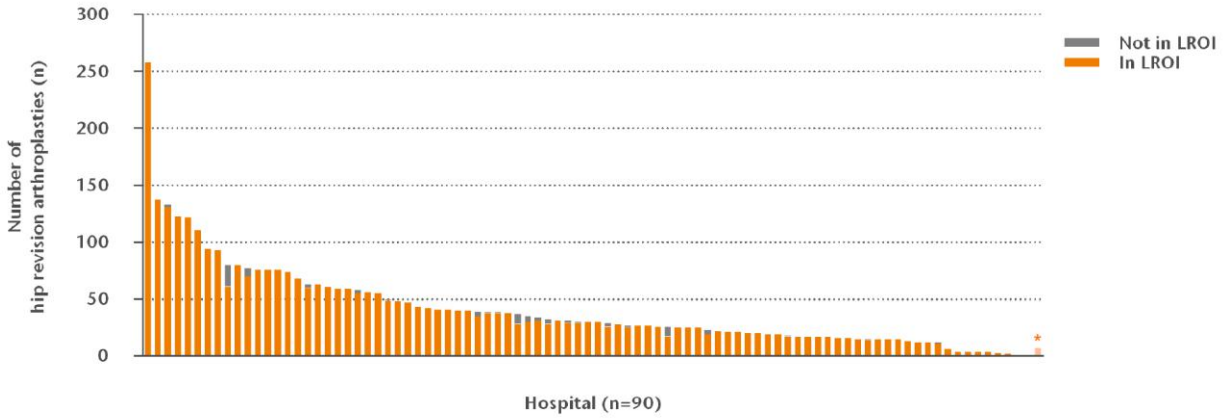
FIGURE NUMBER OF PROCEDURES PERFORMED (BASED ON THE HOSPITAL INFORMATION SYSTEM) AND THE NUMBER OF REGISTERED PROCEDURES IN THE LROI PER HOSPITAL FOR PRIMARY HIP HEMIARTHROPLASTIES (PERFORMED BY A TRAUMA SURGEON) IN 2017.



* No data provided for comparison by the hospital.
Please note: 4 hospitals registered a primary hip hemiarthroplasty in the LROI but not in the hospital information system.

Hip revision arthroplasties

FIGURE NUMBER OF PROCEDURES PERFORMED (BASED ON THE HOSPITAL INFORMATION SYSTEM) AND THE NUMBER OF REGISTERED PROCEDURES IN THE LROI PER HOSPITAL FOR HIP REVISION ARTHROPLASTIES IN 2017.

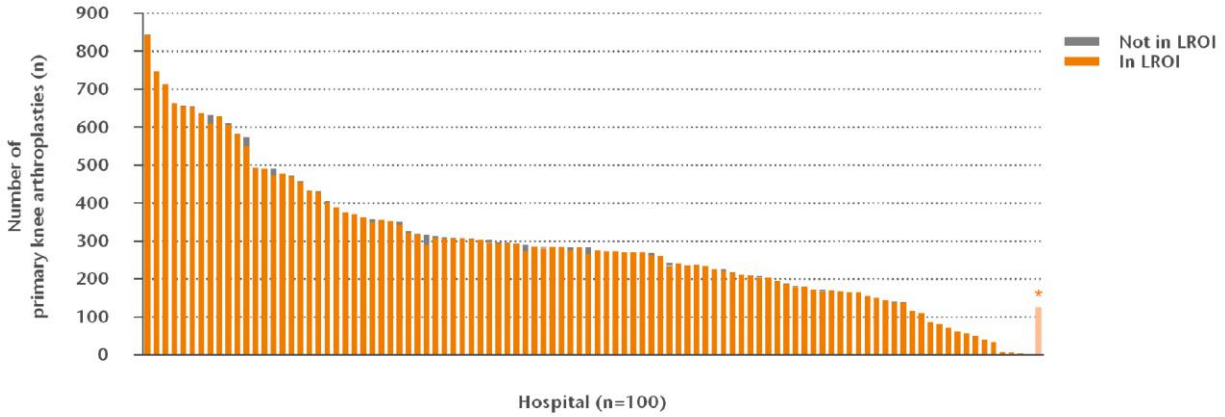


* No data provided for comparison by the hospital.

Knee

Primary knee arthroplasties

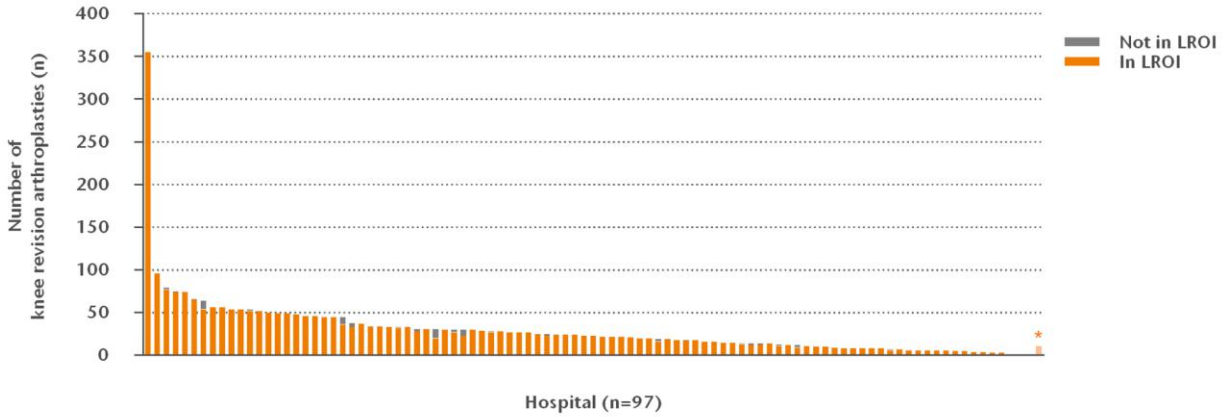
FIGURE NUMBER OF PROCEDURES PERFORMED (BASED ON THE HOSPITAL INFORMATION SYSTEM) AND THE NUMBER OF REGISTERED PROCEDURES IN THE LROI PER HOSPITAL FOR PRIMARY KNEE ARTHROPLASTIES IN 2017.



* No data provided for comparison by the hospital.

Knee revision arthroplasties

FIGURE NUMBER OF PROCEDURES PERFORMED (BASED ON THE HOSPITAL INFORMATION SYSTEM) AND THE NUMBER OF REGISTERED PROCEDURES IN THE LROI PER HOSPITAL FOR KNEE REVISION ARTHROPLASTIES IN 2017.

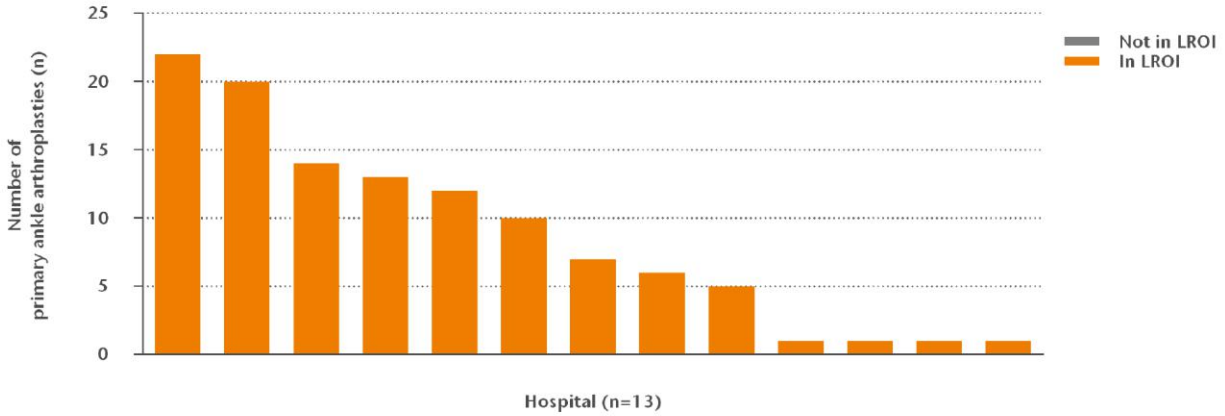


* No data provided for comparison by the hospital.
Please note: 1 hospital registered a knee revision arthroplasty in the LROI but not in the hospital information system.

Ankle

Primary ankle arthroplasties

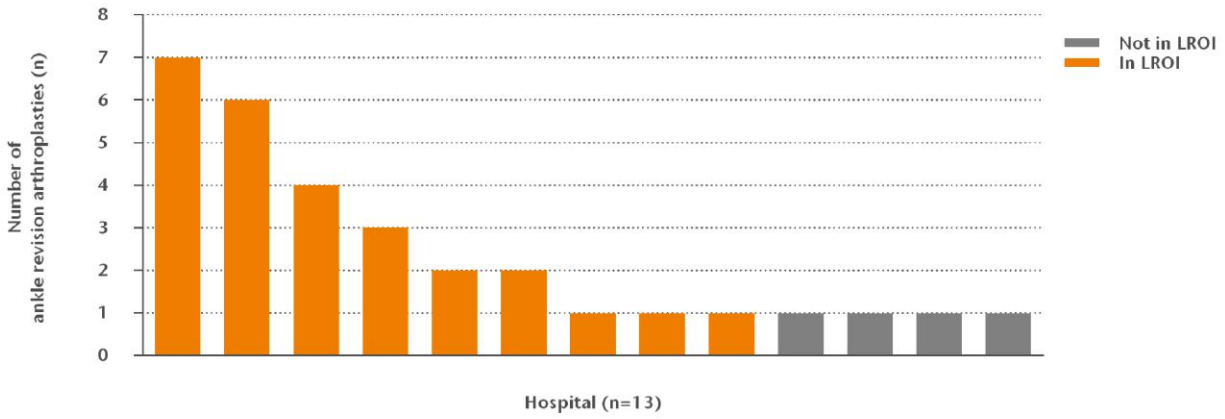
FIGURE NUMBER OF PROCEDURES PERFORMED (BASED ON THE HOSPITAL INFORMATION SYSTEM) AND THE NUMBER OF REGISTERED PROCEDURES IN THE LROI PER HOSPITAL FOR PRIMARY ANKLE ARTHROPLASTIES IN 2017.



Please note: 1 hospital registered a primary ankle arthroplasty in the LROI but not in the hospital information system.

Ankle revision arthroplasties

FIGURE NUMBER OF PROCEDURES PERFORMED (BASED ON THE HOSPITAL INFORMATION SYSTEM) AND THE NUMBER OF REGISTERED PROCEDURES IN THE LROI PER HOSPITAL FOR ANKLE REVISION ARTHROPLASTIES IN 2017.

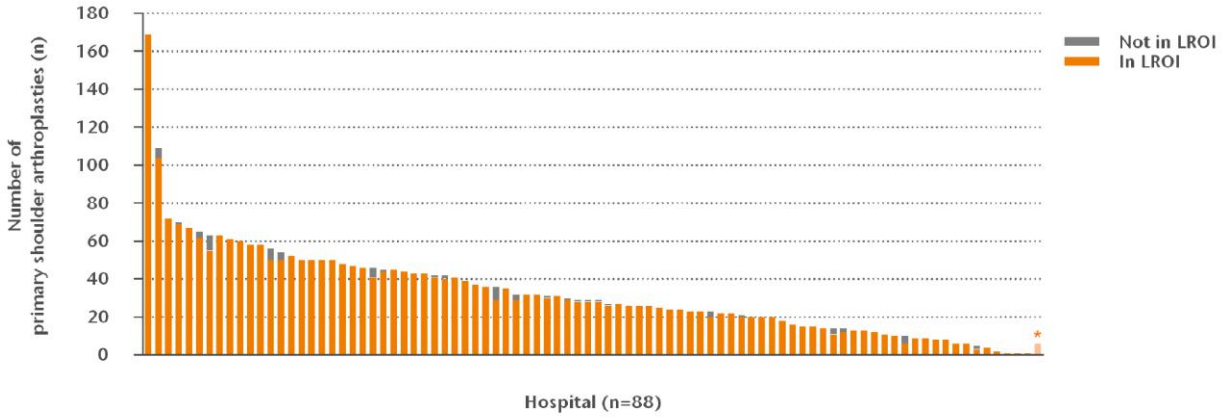


Please note: 1 hospital registered a ankle revision arthroplasty in the LROI but not in the hospital information system.

Shoulder

Primary shoulder arthroplasties

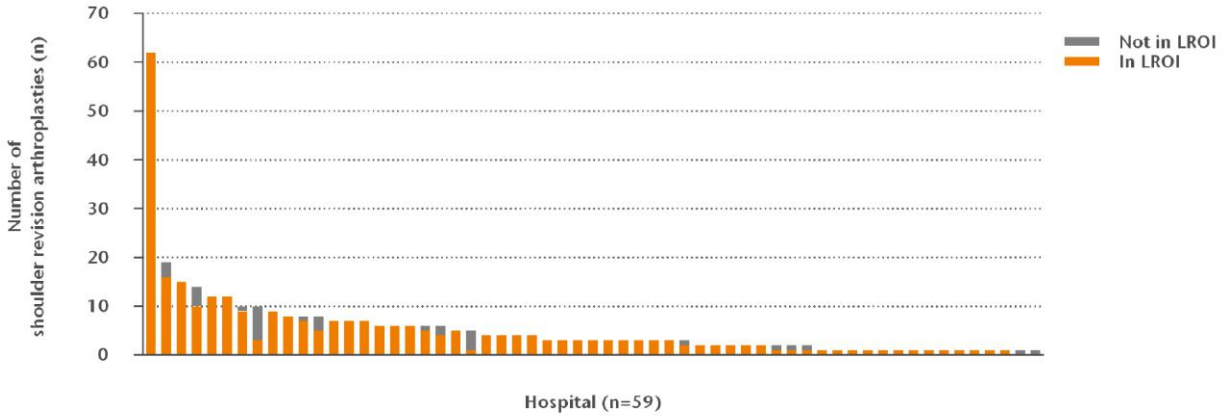
FIGURE NUMBER OF PROCEDURES PERFORMED (BASED ON THE HOSPITAL INFORMATION SYSTEM) AND THE NUMBER OF REGISTERED PROCEDURES IN THE LROI PER HOSPITAL FOR PRIMARY SHOULDER ARTHROPLASTIES IN 2017.



* No data provided for comparison by the hospital.

Shoulder revision arthroplasties

FIGURE NUMBER OF PROCEDURES PERFORMED (BASED ON THE HOSPITAL INFORMATION SYSTEM) AND THE NUMBER OF REGISTERED PROCEDURES IN THE LROI PER HOSPITAL FOR SHOULDER REVISION ARTHROPLASTIES IN 2017.

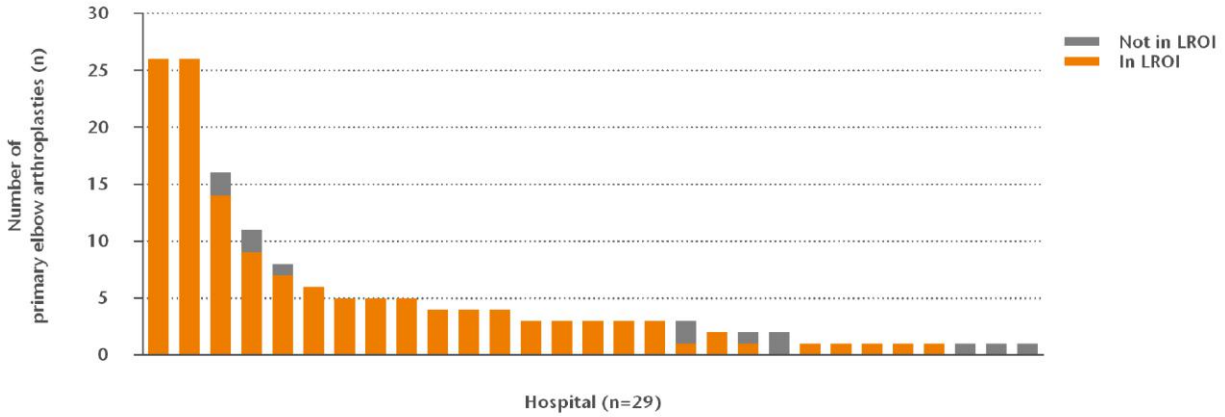


Please note: 4 hospitals registered a shoulder revision arthroplasty in the LROI but not in the hospital information system.

Elbow

Primary elbow arthroplasties

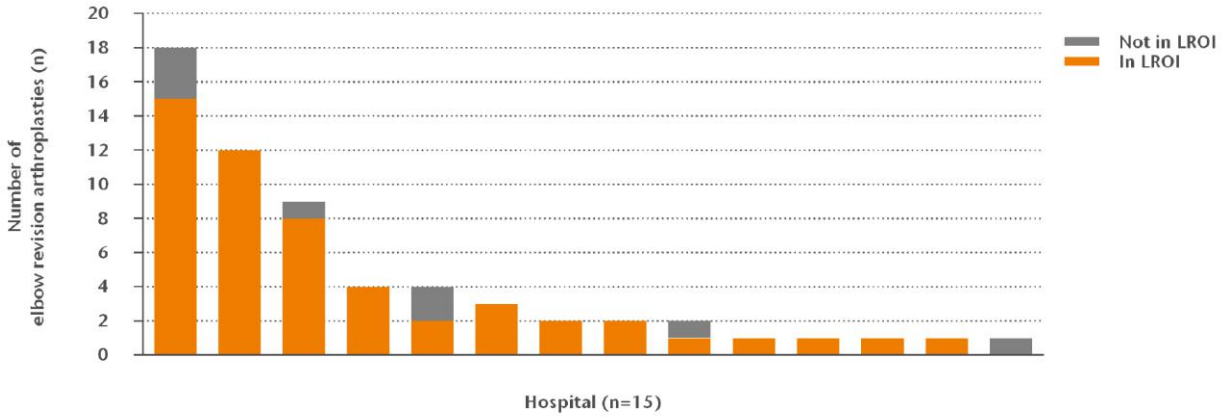
FIGURE NUMBER OF PROCEDURES PERFORMED (BASED ON THE HOSPITAL INFORMATION SYSTEM) AND THE NUMBER OF REGISTERED PROCEDURES IN THE LROI PER HOSPITAL FOR PRIMARY ELBOW ARTHROPLASTIES IN 2017.



Please note: 3 hospitals registered a primary elbow arthroplasty in the LROI but not in the hospital information system.

Elbow revision arthroplasties

FIGURE NUMBER OF PROCEDURES PERFORMED (BASED ON THE HOSPITAL INFORMATION SYSTEM) AND THE NUMBER OF REGISTERED PROCEDURES IN THE LROI PER HOSPITAL FOR ELBOW REVISION ARTHROPLASTIES IN 2017.

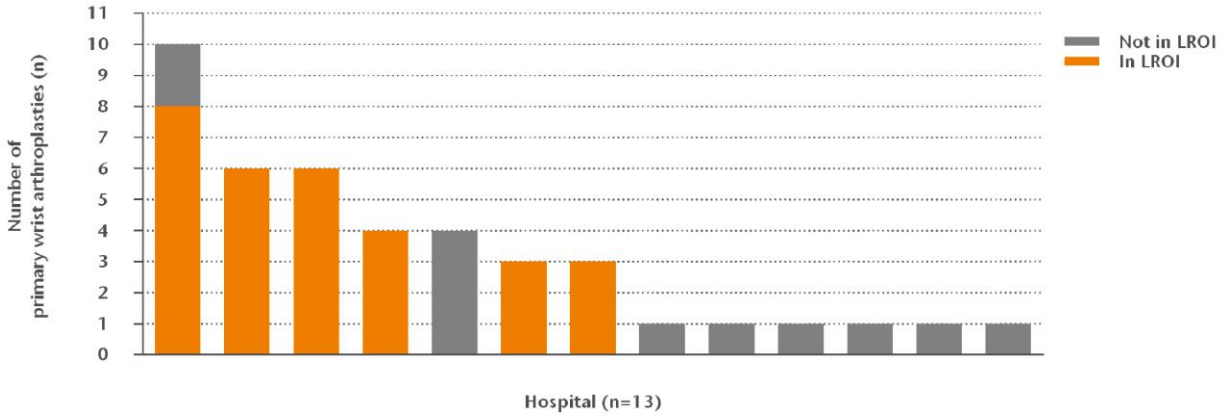


Please note: 1 hospital registered a elbow revision arthroplasty in the LROI but not in the hospital information system.

Wrist

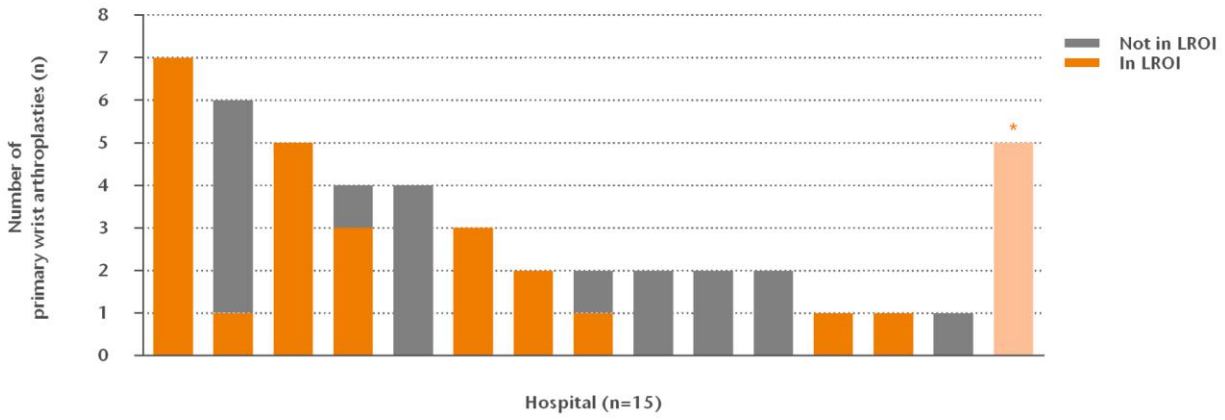
Primary wrist arthroplasties (orthopaedic surgeon)

FIGURE NUMBER OF PROCEDURES PERFORMED (BASED ON THE HOSPITAL INFORMATION SYSTEM) AND THE NUMBER OF REGISTERED PROCEDURES IN THE LROI PER HOSPITAL FOR PRIMARY WRIST ARTHROPLASTIES (PERFORMED BY AN ORTHOPAEDIC SURGEON) IN 2017.



Primary wrist arthroplasties (plastic surgeon)

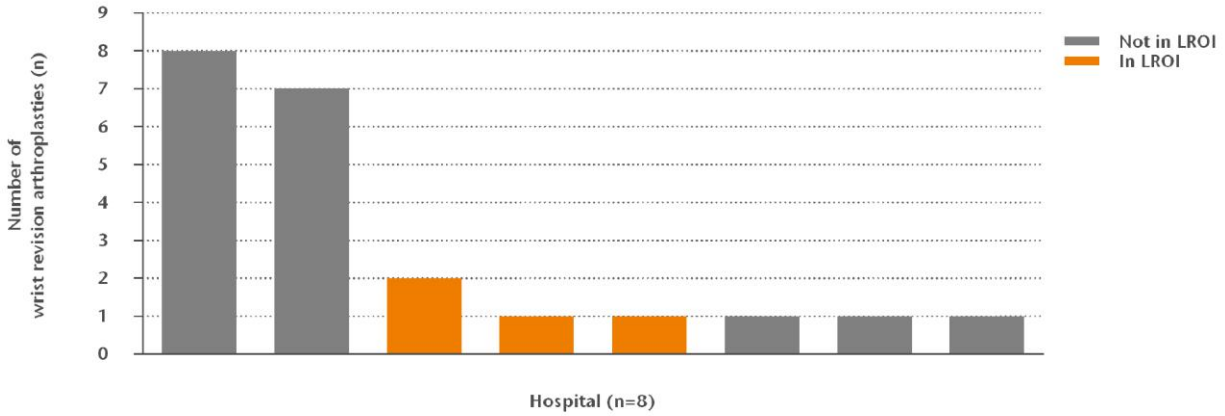
FIGURE NUMBER OF PROCEDURES PERFORMED (BASED ON THE HOSPITAL INFORMATION SYSTEM) AND THE NUMBER OF REGISTERED PROCEDURES IN THE LROI PER HOSPITAL FOR PRIMARY WRIST ARTHROPLASTIES (PERFORMED BY A PLASTIC SURGEON) IN 2017.



* No data provided for comparison by the hospital.

Wrist revision arthroplasties (orthopaedic surgeon)

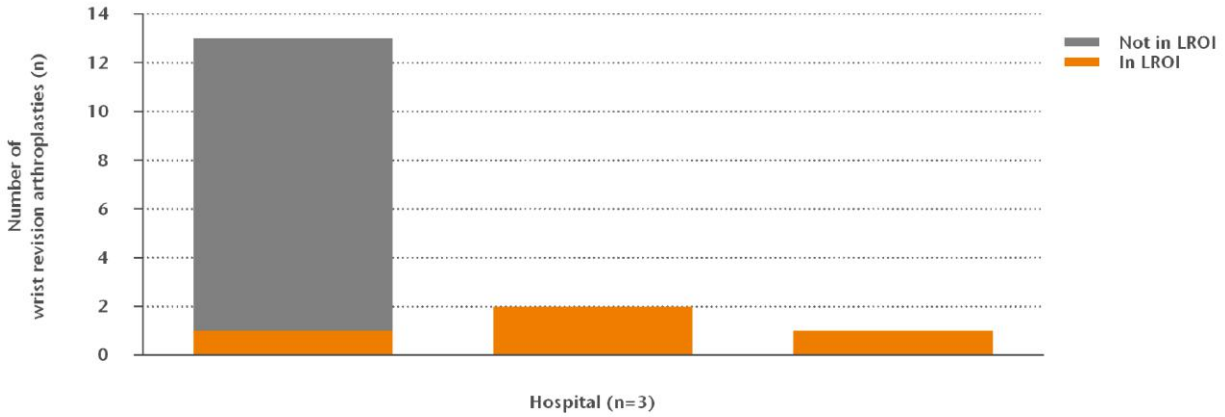
FIGURE NUMBER OF PROCEDURES PERFORMED (BASED ON THE HOSPITAL INFORMATION SYSTEM) AND THE NUMBER OF REGISTERED PROCEDURES IN THE LROI PER HOSPITAL FOR WRIST REVISION ARTHROPLASTIES (PERFORMED BY AN ORTHOPAEDIC SURGEON) IN 2017.



Please note: 2 hospitals registered a wrist revision arthroplasty in the LROI but not in the hospital information system.

Wrist revision arthroplasties (plastic surgeon)

FIGURE NUMBER OF PROCEDURES PERFORMED (BASED ON THE HOSPITAL INFORMATION SYSTEM) AND THE NUMBER OF REGISTERED PROCEDURES IN THE LROI PER HOSPITAL FOR WRIST REVISION ARTHROPLASTIES (PERFORMED BY A PLASTIC SURGEON) IN 2017.

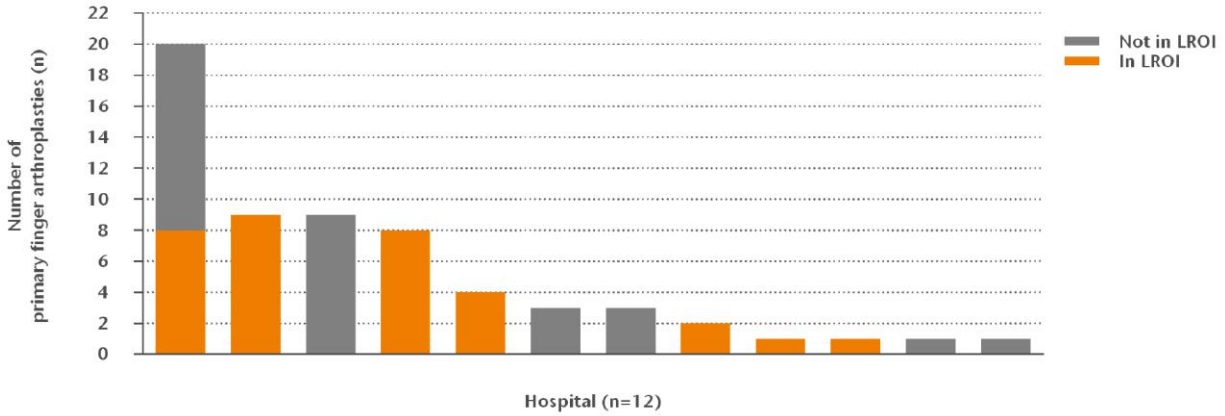


Please note: 2 hospitals registered a wrist revision arthroplasty in the LROI but not in the hospital information system.

Finger

Primary finger arthroplasties (orthopaedic surgeon)

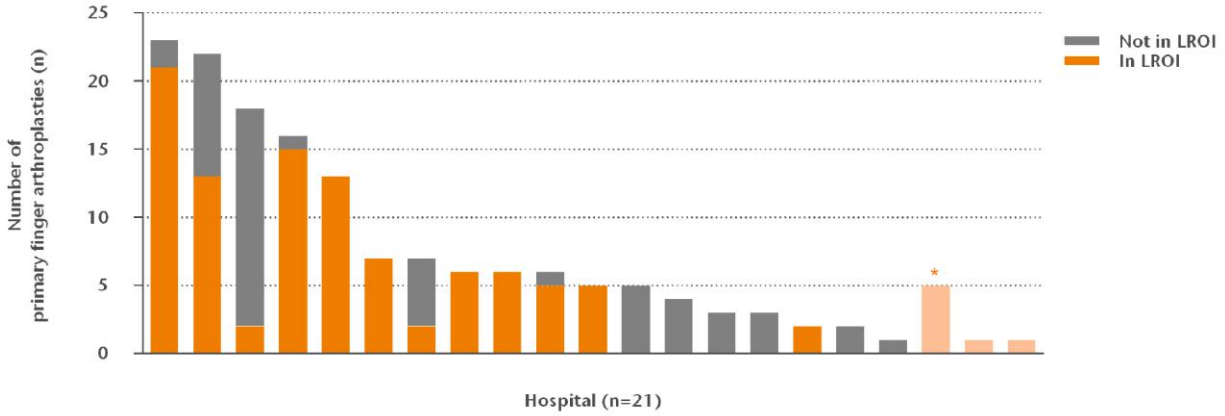
FIGURE NUMBER OF PROCEDURES PERFORMED (BASED ON THE HOSPITAL INFORMATION SYSTEM) AND THE NUMBER OF REGISTERED PROCEDURES IN THE LROI PER HOSPITAL FOR PRIMARY FINGER ARTHROPLASTIES (PERFORMED BY AN ORTHOPAEDIC SURGEON) IN 2017.



Please note: 1 hospital registered a primary finger arthroplasty in the LROI but not in the hospital information system.

Primary finger arthroplasties (plastic surgeon)

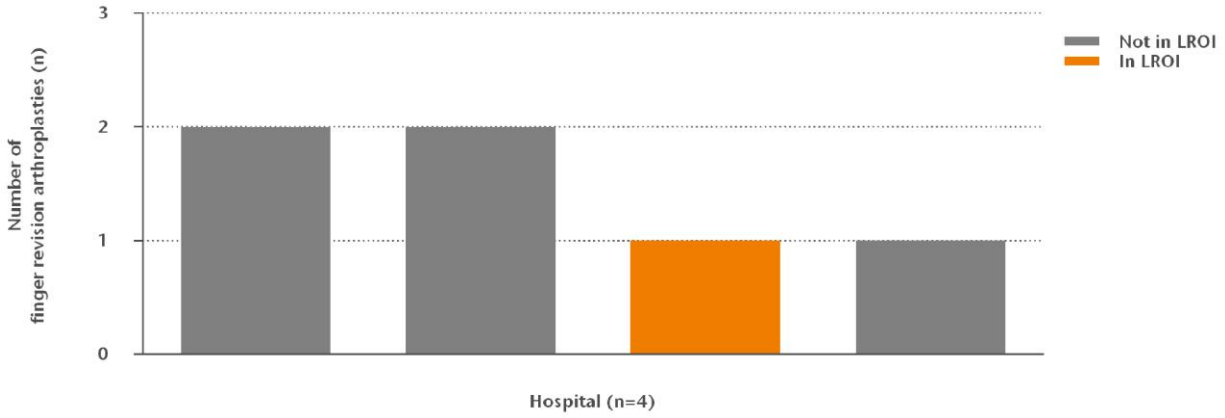
FIGURE NUMBER OF PROCEDURES PERFORMED (BASED ON THE HOSPITAL INFORMATION SYSTEM) AND THE NUMBER OF REGISTERED PROCEDURES IN THE LROI PER HOSPITAL FOR PRIMARY FINGER ARTHROPLASTIES (PERFORMED BY A PLASTIC SURGEON) IN 2017.



* No data provided for comparison by the hospital.
Please note: 1 hospital registered a primary finger arthroplasty in the LROI but not in the hospital information system.

Finger revision arthroplasties (orthopaedic surgeon)

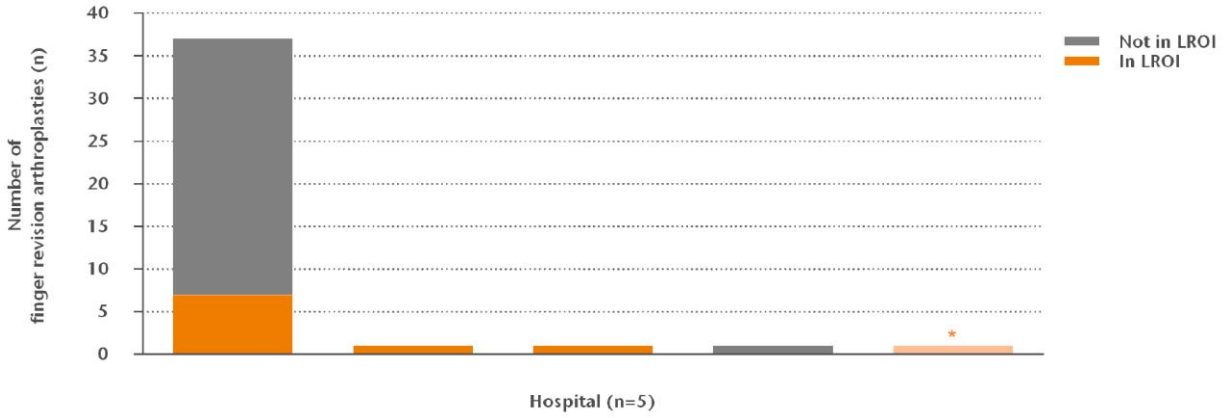
FIGURE NUMBER OF PROCEDURES PERFORMED (BASED ON THE HOSPITAL INFORMATION SYSTEM) AND THE NUMBER OF REGISTERED PROCEDURES IN THE LROI PER HOSPITAL FOR FINGER REVISION ARTHROPLASTIES (PERFORMED BY AN ORTHOPAEDIC SURGEON) IN 2017.



Please note: 2 hospitals registered a finger revision arthroplasty in the LROI but not in the hospital information system.

Finger revision arthroplasties (plastic surgeon)

FIGURE NUMBER OF PROCEDURES PERFORMED (BASED ON THE HOSPITAL INFORMATION SYSTEM) AND THE NUMBER OF REGISTERED PROCEDURES IN THE LROI PER HOSPITAL FOR FINGER REVISION ARTHROPLASTIES (PERFORMED BY A PLASTIC SURGEON) IN 2017.

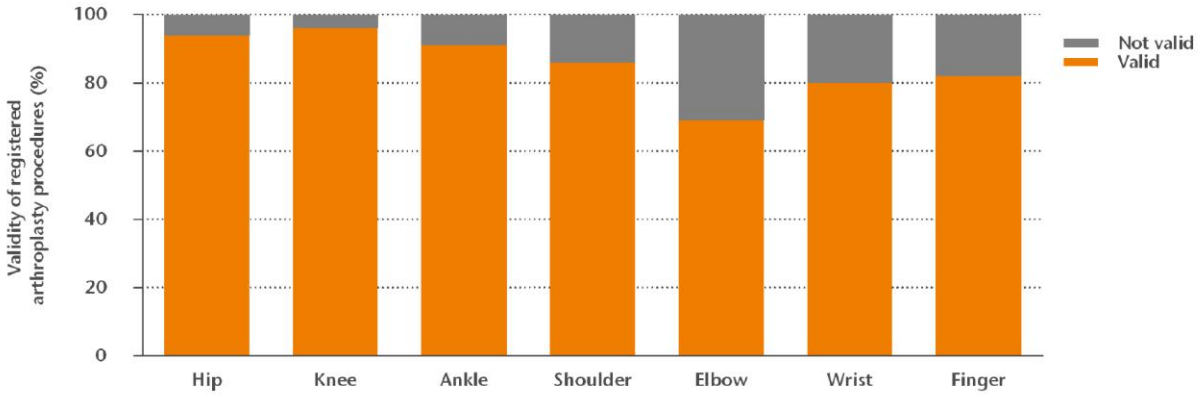


* No data provided for comparison by the hospital.

Validity

Overall validity

FIGURE VALIDITY (PROPORTION [%] PER JOINT) OF THE REGISTRATION OF PROCEDURES IN THE LROI IN 2017.



	Hip	Knee	Ankle	Shoulder	Elbow	Wrist	Finger
Number of procedures (n)	39,855	32,258	146	3,271	197	70	153
Validity registered procedures (%)	94.4	95.8	91.1	86.1	68.5	80.0	82.4

Validity per variable

TABLE OVERVIEW OF VALIDITY BY VARIABLE FOR EACH JOINT OF HIP, KNEE, ANKLE, SHOULDER, ELBOW, WRIST AND FINGER ARTHROPLASTIES REGISTERED IN THE LROI IN THE NETHERLANDS IN 2017.

	Hip	Knee	Ankle	Shoulder	Elbow	Wrist	Finger
Number of arthroplasties (n)	39,855	32,258	146	3,271	197	70	153
Number of primary arthroplasties (n)	35,944	29,221	116	2,922	138	57	140
Number of revision arthroplasties (n)	3,911	3,037	30	349	59	13	13
General characteristics	%	%	%	%	%	%	%
Gender	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Encrypted citizen service number	99.0	99.6	100.0	99.7	98.5	98.6	96.7
HIS patient number	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Date of birth	100.0	100.0	100.0	99.9	100.0	100.0	100.0
Type of procedure	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Operating side	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Postal code	99.7	99.8	100.0	99.6	98.0	97.1	96.7
BMI	98.0	99.5	100.0	99.0	71.1	94.3	89.5
Smoking	97.5	97.4	100.0	99.1	98.0	90.0	94.1
ASA score	99.6	99.7	100.0	97.8	97.5	97.1	96.7
Fixation	99.7	99.7	94.5	99.4	97.5	91.4	91.5
Primary arthroplasty characteristics	%	%	%	%	%	%	%
Diagnosis	99.8	99.8	99.1	99.4	97.8	94.7	95.0
Charnley/Walch score	98.9	99.6	99.1	86.5	n.a.	n.a.	n.a.
Prosthesis	99.8	99.9	99.1	99.4	80.4	91.2	100.0
Surgical approach	99.7	99.9	97.4	99.5	97.1	91.2	95.0
Revision arthroplasty characteristics	%	%	%	%	%	%	%
Type of revision	99.6	99.5	80.0	96.6	96.6	92.3	84.6
Charnley score	97.3	97.2	n.a.	n.a.	n.a.	n.a.	n.a.
Reason for revision	99.0	99.1	96.7	98.9	96.6	92.3	92.3

Please note: Validity by variable as determined in April 2018.
HIS: hospital information system; BMI: body mass index.

General

Traceability

National Implant Registry (LIR)
As of January 2019, healthcare providers are obliged to provide implant data to the National Implant Registry (LIR). The Ministry of Health, Welfare and Sport (VWS) aims to ensure that all implants in the Netherlands can be traced in case of any implant failure.
Orthopaedic surgeons, cardiologists, plastic surgeons and gynaecologists already register implants in their quality registers, ensuring traceability. Until now, the LIR ensured traceability of a limited number of implant types, by a link with these quality registers. This will be extended as of January 2019. From then on, implant data must be provided directly from the Electronic Patient Record System (EPRs) to the LIR. A condition of the NOV (and with it NVVC, NVOG, NVPC and the Federation of Medical Specialists) to participate with this trajectory of VWS is that the registration burden does not increase, that implants are scannable and that delivery of data from the EPR to the existing quality registers is guaranteed.

Methodology of survival analyses

Methodology of survival analyses

The life span of a joint prosthesis is the time between implantation of a primary prosthesis and the time of the first revision. However, patients may die before the prosthesis needs to be revised (Figure).

Link between primary and revision arthroplasties

In order to assess a prosthesis' life span, follow-up time of all primary prostheses was examined. This was done by linking revision arthroplasties to the primary arthroplasties in the LROI by means of the encrypted Citizen Service Number (BSN). In this way, the correct revision arthroplasty can be linked anonymously to a primary arthroplasty. In about 11% of the arthroplasties, the encrypted BSN was not entered into the system, mainly in the first years of registration. Links between these primary and revision arthroplasties were established based on the LROI hospital number and the LROI patient number. As such, revision arthroplasties have been linked to primary arthroplasties of a patient when the patient underwent primary and revision arthroplasty on the same joint in the same hospital.

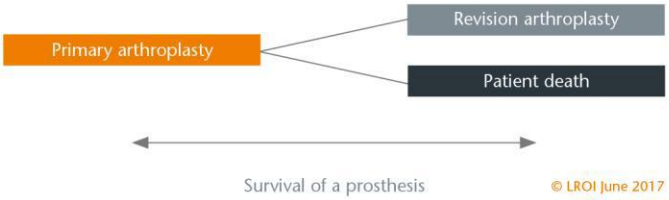
Kaplan Meier survival analysis

Survival of a prosthesis may be determined in various ways. Traditionally, the Kaplan Meier method is used. This method was developed for situations with one possible end point (such as death of the patient). However, in order to calculate survival of a prosthesis at least two end points are important: revision of the prosthesis and death of the patient. The Kaplan Meier method estimates the proportion of failed prostheses if patients would live on forever. However, a number of patients dies before the prosthesis requires revision. Consequently, fewer revisions are carried out than could be expected based on the model. That is why this method overrates the chance of revision.

Competing risk survival analysis

The competing risk method allows monitoring for several end points. When an end point occurs (such as death), other end points will no longer be available (such as prosthesis revision). The cumulative incidence (summed occurrence of an end point) will be calculated. Death of a patient is a final end point, the prosthesis will no longer be revised and this finalizes the period that a prosthesis lasts. The time at risk will be the period from primary implantation to death.

FIGURE SURVIVAL OF A PROSTHESIS.



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Method comparison

In order to get a clearer picture of the difference in results between the Kaplan Meier method and competing risk method we have calculated the revision percentage within 8 years using both methods. The revision percentage was calculated for patients who underwent a total hip arthroplasty according to age group over the period 2007-2016.

This comparison shows that the revision percentage calculated by means of the Kaplan Meier method results in a higher chance of revision within 8 years. The difference is more pronounced in groups of patients with a higher chance of the competing event (death of the patient), as we can see in the groups of elderly patients (Table). This difference is still relatively minor, but will increase as follow-up extends. Consequently, this Annual Report estimates the chance of revision of a prosthesis by means of the competing risk method. However, for comparability with other arthroplasty registries Kaplan Meier revision rates are also shown.

TABLE CUMULATIVE 8-YEAR REVISION PERCENTAGE OF PRIMARY TOTAL HIP ARTHROPLASTIES BY AGE IN THE NETHERLANDS IN 2007-2016.

		Cumulative 8-year revision percentage	
	Number (n)	Competing risk (95% CI)	Kaplan Meier (95% CI)
Age (years)			
<50	10,165	7.0 (6.2-7.8)	7.1 (6.3-7.9)
50-59	27,931	6.0 (5.6-6.5)	6.1 (5.7-6.6)
60-69	72,516	4.7 (4.5-5.0)	5.0 (4.6-5.2)
70-79	82,027	3.8 (3.6-4.0)	4.1 (3.8-4.3)
≥80	34,265	2.7 (2.5-2.9)	2.9 (2.7-3.2)

Please note: The primary outcome in a Kaplan Meier analysis is prosthesis survival, while this is the revision percentage of prostheses in the competing risk method. In order to compare methods, survival as determined by means of the Kaplan Meier analysis is converted into the revision percentage (100% - survival% = revision%).
CI: confidence interval.

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Developments

PROMs animation

The Dutch Arthroplasty Register (LROI) and Netherlands Orthopaedic Association (NOV) have collectively developed an explanatory animation about PROMs questionnaires. The animation 'Uw ervaring telt' (Your experience counts), explains how we use these data to improve orthopaedic care even further. We hope the animation provides more clarity to patients and motivates them to take the questionnaire, increasing the response. Orthopaedic departments may show the animation in, for example, their waiting room, on their website or before the questionnaire is taken. www.zorgvoorbeweging.nl/patientervaring

Van Rens Foundation grants

In December 2017, the board of the Van Rens Foundation granted a financial contribution to three research projects. After assessment by external referees, the Scientific Advisory Board held a blind vote, determined a ranking and drafted an advice. This advice was presented to the boards of LROI and Van Rens Foundation. The following projects receive a grant and start their research in 2018:

- What makes a best performing hospital in hip and knee replacement? Quality Improvement using joint registry data.
- Effectiveness of dual mobility cups for preventing dislocation after primary total hip arthroplasty by a posterolateral approach and their cost-effectiveness compared to conventional cups in elderly patients.
- Development of a preoperative prediction tool for pain and functional outcome after TKA using Dutch Arthroplasty register (LROI) data.

New privacy legislation

As of May 2018, the new legislation *General Data Protection Regulation (GDPR)* stands. From that moment on, the same privacy legislation applies to all countries of the European Union. The LROI has taken the following precautions:

- The existing participation agreement between LROI and hospitals has been revised. The participation agreement establishes rules for participation in the LROI and the use of data entrusted to the LROI.
- LROI regulations and the data breach procedure have been revised and a *Data Protection Impact Assessment (DPIA)* has been conducted.

Participating hospitals

General hospitals

Admiraal de Ruyter ziekenhuis H(O) K S
Albert Schweitzer Ziekenhuis H(O+T) K S W(P) F(O+P)
Alrijne Ziekenhuis H(O) K S
Amphia Ziekenhuis H(O) K S E
Antonius Ziekenhuis H(O) K S
Bernhoven H(O) K S W(P) F(P)
BovenIJ Ziekenhuis H(O+T) K
Bravis Ziekenhuis H(O) K A S E F(O)
Canisius-Wilhelmina Ziekenhuis H(O) K S W(O+P)
Catharina Ziekenhuis H(O) K S
Centraal Militair Hospitaal H(O) K
Deventer Ziekenhuizen H(O+T) K S
Diakonessenhuis Utrecht/ Zeist H(O) K S E W(P) F(P)
ETZ (Sint Elisabeth Ziekenhuis en TweeStedenZiekenhuis) H(O) K S E F(P)
Elkerliek Ziekenhuis H(O) K S
Flevoziekenhuis H(O+T) K S
Franciscus Gasthuis & Vlietland, location Sint Franciscus Gasthuis H(O) K S W(P) F(P)
Franciscus Gasthuis & Vlietland, location Vlietland Ziekenhuis H(O+T) K S F(O)
GelreZiekenhuizen, location Apeldoorn H(O+T) K A S W(O) F(O)
GelreZiekenhuizen, location Zutphen H(O) K S
Groene Hart Ziekenhuis H(O) K S W(O)
Haaglanden Medisch Centrum H(O+T) K S
HagaZiekenhuis H(O+T) K A S F(O)
Havenziekenhuis H(O) K S
Het Van Weel-Bethesda Ziekenhuis H(O+T) K S
IJsselland Ziekenhuis H(O) K S
Ikazia Ziekenhuis H(O) K S
Isala Diaconessenhuis Meppel H(O+T) K S E
Isala Zwolle H(O+T) K S F(P)
Jeroen Bosch Ziekenhuis H(O+T) K S W(P) F(O+P)
LangeLand Ziekenhuis H(O+T) K S F(P)
Laurentius Ziekenhuis H(O) K S E
Maasstad Ziekenhuis H(O) K S E
Martini Ziekenhuis H(O) K A S W(P) F(P)
Máxima Medisch Centrum H(O+T) K S E
MC Slotervaart H(O+T) K A S E
MC Zuiderzee H(O+T) K S
Meander Medisch Centrum H(O+T) K S
Medisch Centrum Leeuwarden H(O+T) K S W(P) F(P)
Medisch Spectrum Twente H(O) K S
Noordwest Ziekenhuisgroep, location Alkmaar H(O+T) K A S E W(O) F(O)
Noordwest Ziekenhuisgroep, location Den Helder H(O+T) K S E
OCON H(O) K S
OLVG, locations Oost and West H(O+T) K A S E
Ommelander Ziekenhuisgroep Groningen H(O+T) K S
Reinier de Graaf Groep H(O+T) K A S E F(O)
Rijnstate H(O+T) K S E W(P) F(P)
Rivas Zorggroep H(O) K S
Rode Kruis Ziekenhuis H(O+T) K S
Röpcke Zweers Ziekenhuis H(O+T) K S

Sint Maartenskliniek, location Boxmeer H(O+T) K
Sint Maartenskliniek, location Nijmegen H(O) K A S E
Sint Maartenskliniek, location Woerden H(O) K A S
Slingeland Ziekenhuis H(O+T) K S
Spaarne Gasthuis H(O) K A S
Spijkenisse Medisch Centrum H(O) K S
St. Anna Ziekenhuis H(O) K A S
St. Antonius Ziekenhuis H(O) K S
St. Jans Gasthuis H(O) K S E
Streekziekenhuis Koningin Beatrix H(O+T) K S
Tergooi H(O+T) K S E
Treant Zorggroep, location Refaja Ziekenhuis H(O+T) K S
Treant Zorggroep, location Scheper Ziekenhuis H(O+T) K S
Treant Zorggroep, location Bethesda Ziekenhuis H(O) K
VieCuri MC H(O+T) K S E F(P)
Waterlandziekenhuis H(O) K S
Westfriesgasthuis H(O) K S
Wilhelmina Ziekenhuis H(O) K S
Zaans Medisch Centrum H(O) K S
ZGT (Ziekenhuisgroep Twente) H(O+T)
Ziekenhuis Amstelland H(O) K A S
Ziekenhuis Gelderse Vallei H(O+T) K S
Ziekenhuis Nij Smellinghe H(O) K S
Ziekenhuis Rivierenland H(O+T) K S
Ziekenhuis St. Jansdal H(O) K S
Ziekenhuis Tjongerschans H(O+T) K S
ZorgSaam Zeeuws-Vlaanderen H(O) K S
Zuyderland, location Atrium MC H(O) K S E W(O) F(O)
Zuyderland, location Orbis Medisch Zorgconcern H(O) K S E

H: hip; K: knee; A: ankle; S: shoulder; E: elbow; W: wrist; F: finger.
O: orthopaedic surgery; T: trauma surgery; P: plastic surgery.

University medical centres

Academisch Medisch Centrum Amsterdam H(O+T) K E
Erasmus MC H(O+T) K S E
Leids Universitair Medisch Centrum H(O) K A S E
Maastricht UMC+ H(O+T) K A S E W(O) F(O)
Radboudumc H(O+T) K S E
Universitair Medisch Centrum Groningen H(O+T) K A S E W(O)
Universitair Medisch Centrum Utrecht H(O) K
VUmc Amsterdam H(O) K

H: hip; K: knee; A: ankle; S: shoulder; E: elbow; W: wrist.
O: orthopaedic surgery; T: trauma surgery.

Private hospitals

Acibadem International Medical Center H(O) K
Annatommie MC H(O) K S
AVE Orthopedische Klinieken H(O) K A S
Bergman Clinics H(O) K A S

DC Klinieken Lairesse K
Eisenhower Kliniek H(O) K
Kliniek ViaSana H(O) K S
KneeClinic K
Medinovakliniek, location Breda H(O+T) K S
Medinovakliniek, location Klein Rosendael H(O) K S
Medinovakliniek, location Zestienhoven H(O) K S
Orthoparc Kliniek H(O) K
Orthopedium H(O) K S
Park Medisch Centrum H(O) K
Reinaert Kliniek H(O) K
The Hand Clinic F(P)
Victoria Kliniek H(O) K

H: hip; K: knee; A: ankle; S: shoulder; F: finger.
O: orthopaedic surgery; T: trauma surgery; P: plastic surgery.

Definitions and abbreviations

Definitions

Acetabulum component
The part of a hip prosthesis that is implanted into the acetabulum – the socket part of a ball and socket joint

Allograft
Transplant of bone tissue from a different body

Arthrodesis
A procedure in which a natural joint is fused together

Arthrofibrosis
Rigidity of the joint as a consequence of connective tissue adhesion

Arthroscopy
Keyhole surgery to examine and treat joint disorders

Arthrotomy
Opening a joint during surgery

Articulation
The two surfaces that move together (articulate) in a total joint replacement

ASA score
The American Society of Anaesthesiologists (ASA) score is a scoring system for grading the overall physical condition of the patient, as follows: I – fit and healthy; II – mild disease, not incapacitating; III – incapacitating systemic disease; IV – life threatening disease

Autograft
Transplant of bone tissue originating from the patient's own body

Bilaterality
Replacing the same joint on both sides of the body by means of a prosthesis within a specific period

Body Mass Index
Index for weight compared to body length (kg/m2); ≤18.5: underweight; >18.5-25: normal weight; >25-30: overweight; >30-40: obesity; >40: morbid obesity

Bonegraft
Bone transplant

Bone resorption
Process by which osteoclasts break down bone tissue

Carpal component
Part of a wrist prosthesis that is implanted in the patient's carpal bones

Case mix
Term used to describe variation in the population, relating to factors such as diagnosis, patient age, gender and health condition

Cement
Material (polymethyl methacrylate) used to fixate joint replacements to bone

Charnley score
Clinical classification system; A: one joint affected; B1: both joints affected; B2: contralateral joint with a prosthesis; C: several joints affected or a chronic disease that affects quality of life

Competing risk survival analyse
Method to calculate survival taking into account various outcomes, in this case revision and death

Completeness
The completeness of the number of registered procedures in the LROI, based on a comparison with the hospital information system of every hospital that performs hip and/or knee arthroplasty in the Netherlands

Cuff arthropathy
Osteoarthritis of the shoulder joint as a consequence of the tendons around the shoulder joint being affected

Cuff rupture
Rupture of a tendon of the muscles that are around the shoulder joint

Cumulative incidence
The added up incidence over a specific period of an event (such as revision of a prosthesis or death of a patient)

Cumulative revision percentage
Added up revision percentage over a specific time period

Difference score
Difference in calculating score between pre-operative and 3, 6 or 12 months postoperative scores

Distal component
Part of a finger prosthesis that replaces the distal phalanx

Distal hemihumeral prosthesis
Elbow prosthesis in which the distal part of the humerus (upper arm bone) is replaced

Dual mobility cup
Acetabular component that consists of a dual cup and, therefore, has two independent articulation points

EQ-5D index score
The EQ-5D index score measures quality of life. The score has a range of -0.329 to 1.0, with 1.0 representing the best possible quality of life.

EQ-5D thermometer score
The EQ-5D thermometer score measures the health situation. The score has a range of 0.0 to 100.0, with 0.0 representing the worst possible health situation and 100.0 the best possible health situation.

Femur component
Part of a hip or knee prosthesis that is implanted into the femur (thigh bone)

Femoral head component
Part of a hip prosthesis that is implanted on top of the femoral component of a hip prosthesis and moves inside the acetabular component or the cup of the hip joint

Flail elbow
Situation after removal of an elbow prosthesis in which no joint is present any more between the upper and lower arm

Girdlestone situation
Revision procedure to a hip in which the hip joint or hip prosthesis is removed and no new prosthesis is implanted (often because of a bacterial infection)

Glenoid baseplate
Part of a reversed shoulder prosthesis: a metal plate that is screwed into the glenoid (shoulder cup) of the shoulder blade, on which the glenosphere is fixed

Glenoid component
The part of a shoulder prosthesis that is placed in the glenoid; the cup-shaped notch of the shoulder blade

Glenoid liner
Intermediate component (inside layer) of a total anatomical shoulder prosthesis that will be placed in a glenoid component (most often a metal one)

Glenosphere
The part of a reversed shoulder prosthesis that is placed on the glenoid baseplate which is screwed into the glenoid and is spherical in shape

HOOS-PS score
The HOOS-PS score measures the physical functioning of patients with osteoarthritis to the hip. The score has a range of 0.0 to 100.0, with 0.0 representing no effort and 100.0 the most possible effort.

Hybrid fixation
Fixation of a prosthesis in which (most often) one of both parts of a prosthesis is cemented and the other one uncemented

Humerus component
The part of a shoulder or elbow prosthesis that replaces the humerus (upper arm bone). The humeral component of a shoulder prosthesis may consist of two parts: the humeral head and the humeral stem component

Humeral liner
Intermediate component (inner layer) of a reversed shoulder prosthesis that will be placed in a metaphysical component

Inlay
Intermediate component (inner layer), made of polyethylene

Insert
Intermediate component (inner layer), made of polyethylene that is placed in the tibial component of a knee prosthesis

Kaplan Meier survival analysis
Method to calculate survival, in which only one end point is possible, in this case revision

KOOS-PS score
The KOOS-PS score measures the physical functioning of patients with osteoarthritis to the knee. The score has a range of 0.0 to 100.0, with 0.0 representing no effort and 100.0 the most possible effort.

Lateral collateral ligament
Lateral (outer) knee ligament or elbow ligament

Lateral resurfacing arthroplasty
Elbow prosthesis in which only the lateral side of the joint is replaced

Major revision
Revision of at least the acetabular or femoral component (hip) or femoral or tibial component (knee)

Malalignment
Strain on a part of the body due to an abnormal position of a joint component with respect to other components

Medial malleolus osteotomy
Surgical approach of the ankle in which the medial malleolus (protruding part of the tibia on the inside of the ankle) is incised and later re-fixed to be able to have better access to the inside of the joint

Meniscectomy
Meniscus removal

Metallosis
Deposition of metal debris in soft tissues of the body

Metaphysis component
The part of a shoulder prosthesis that replaces the metaphysis (upper part) of the humerus (upper arm bone)

Minor revision
Revision of only inlay and/or femoral head component (hip) or only insert and/or patella exchange (knee)

NRS score
Numeric Rating Scale score. The NRS (rest) score measures pain during rest. The NRS (activity) score measures pain during activity. The score has a range of 0.0 to 10.0, with 0.0 representing no pain and 10.0 representing the most possible pain

Olecranon
The most proximal part of the ulna

Open Reduction and Internal Fixation surgery
Type of surgery to treat a bone fracture where the broken bone is reduced or put back into place, followed by internal fixation using devices (screws, plates, rods, or pins) to hold the broken bone together

Osteoarthritis
Disorder in which the cartilage of a joint is affected

Osteochondral bone defect
Defect of the joint surface in which both cartilage and underlying bone are affected

Osteonecrosis
Cellular death of bone tissue

Osteosynthesis
Securing broken bone parts together with plates, pins and/or screws

Osteotomy
Incise the bone in order to correct the position, to shorten or lengthen the bone

Oxford Hip score
The Oxford Hip score measures the physical functioning and pain of patients with osteoarthritis to the hip. The score has a range of 12.0 to 60.0, with 12.0 representing no functional disability and 60.0 the most possible functional disability.

Oxford Knee score
The Oxford Knee score measures the physical functioning and pain of patients with osteoarthritis to the knee. The score has a range of 0.0 to 48.0, with 0.0 representing the most possible functional disability and 48.0 no functional disability.

Patella addition
Knee revision procedure in which only a patella component was added to the primary knee prosthesis

Patella component
Part of a knee prosthesis that is implanted on the inner side of the knee cap

Patellofemoral prosthesis
Two-piece knee prosthesis that provides a prosthetic (knee) articulation surface between the patella and trochlea (furrow) of the thigh bone (femur)

Primary prosthesis
The first time (primary) a prosthesis is implanted to replace the original joint

PROMs
Patient Reported Outcome Measures

Proximal component
Part of a finger prosthesis that replaces the proximal phalanx

Radial head component
Part of an elbow prosthesis that replaces the head of the radius (spoke-bone)

Radial head prosthesis
Elbow prosthesis in which only the head of the radius (spoke-bone) is replaced

Radial stem component
Part of an elbow or wrist prosthesis that is implanted in the shaft of the patient's radius (spoke-bone)

Resurfacing hip arthroplasty
Hip prosthesis in which the cup (acetabulum) is replaced and a metal cap is implanted on top of the femoral head

Resurfacing shoulder arthroplasty
Shoulder prosthesis in which a metal cap is implanted on top of the humeral head

Reversed hybrid fixation hip prosthesis
Fixation of a hip prosthesis in which the acetabular component is cemented and the femoral component is uncemented

Reversed shoulder prosthesis
Adjusted type of total shoulder arthroplasty in which the parts are implanted in a reversed manner. A sphere (glenosphere) is implanted onto the glenoid and a stem with cup in the shaft of the shoulder head

Revision arthroplasty
Any change (insertion, replacement and/or removal) of one or more components of the prosthesis

Sauvé Kapandji procedure
Arthrodesis of a natural wrist joint and construction of a new wrist joint by splitting the ulna

Shoulder hemiarthroplasty
Shoulder hemiarthroplasty with humeral stem, stemless hemi shoulder prosthesis (without humeral stem) or resurfacing shoulder hemiarthroplasty

Synovectomy
Removal of inflamed mucosa in a joint

Talus component
Part of an ankle prosthesis that is inserted in the talus (ankle bone)

Tibia component
Part of a knee or ankle prosthesis that is inserted in the tibia (shin bone)

Total arthroplasty
Arthroplasty in which the entire joint of a patient is replaced

Ulnar component
Part of an elbow or wrist prosthesis that is inserted in the ulna

Ulnar nerve
One of the three nerves that runs along the elbow. This nerve largely runs along the ulna

Unicondylar knee arthroplasty
Replacement of half the knee (either inner or outer side) by a prosthesis

Validity
Level of accuracy and completeness of registered data

Walch score
Clinical classification system for level and type of wear of a shoulder joint; A1: humeral head centred, minimal erosion of shoulder cup; A2: humeral head centred, substantial erosion of shoulder cup; B1: Posterior subluxation of humeral head, posterior joint cavity narrow, subchondral sclerosis and osteophytes; B2: posterior subluxation of humerus head, retroversion of shoulder cup with posterior erosion; C: retroversion of shoulder cup over 25 degrees, irrespective of erosion

Abbreviations

ASA	American Society of Anaesthesiologists
BMI	Body Mass Index
BSN	Citizen Service Number
CI	Confidence Interval
CMC	Carpometacarpal [finger joint]
DIP	Distal interphalangeal [finger joint]
DRU	Distal Radio-ulnar [prosthesis]
EPRs	Electronic Patient Record System
GDPR	General Data Protection Regulation
HIS	Hospital Information System
IQR	Interquartile range
LIR	National Implant Registry
LROI	Dutch Arthroplasty Register
MCP	Metacarpophalangeal [finger joint]
NOV	Netherlands Orthopaedic Association
NRS	Numeric Rating Scale
NVOG	Dutch Society for Obstetrics and Gynaecology
NVPC	Dutch Society for Plastic and Reconstructive Surgery
NVVC	Netherlands Society of Cardiology
ORIF	Open Reduction Internal Fixation
PE	Polyethylene
PIP	Proximal interphalangeal [finger joint]
PROM	Patient Reported Outcome Measure
SD	Standard Deviation
TEA	Total Elbow Arthroplasty
THA	Total Hip Arthroplasty
TKA	Total Knee Arthroplasty
TSA	Total Shoulder Arthroplasty
UMC	University Medical Centre
VWS	[Ministry of] Health, Welfare and Sport