Online LROI annual report 2025

Joint arthroplasty data to 31 December 2024

Introduction

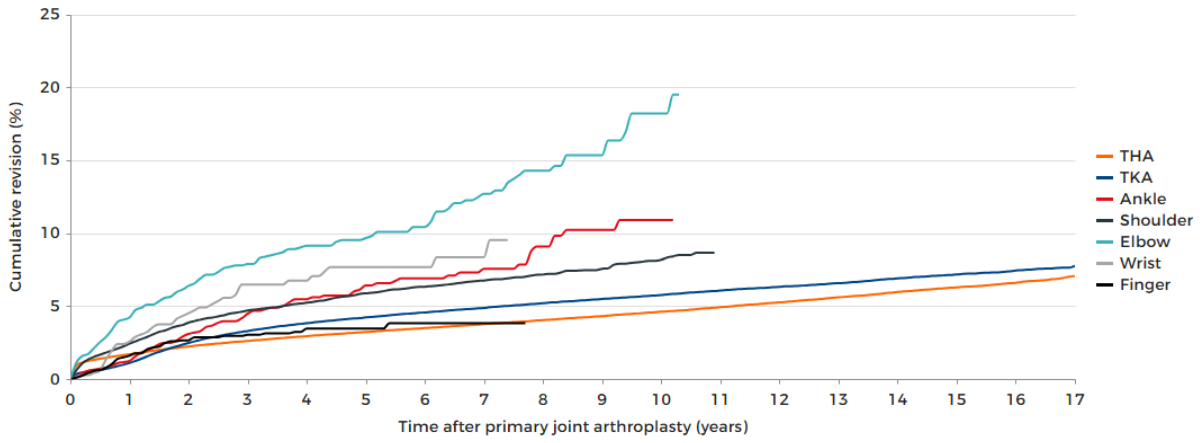
Welcome to LROI Report 2025

This online annual report 2025 of the Dutch Arthroplasty Register (LROI) contains trends and outcome information on primary and revision hip, knee, ankle, shoulder, elbow, wrist, and finger arthroplasties, as well as clubfoot treatments, in the Netherlands between 2007 and 2024. Since 2007, the LROI has been collecting data on hip and knee procedures, on ankle, shoulder and elbow procedures since 2014, on wrist and finger procedures since 2016, and on clubfoot treatments since 2022.

Survival outcomes

See below for two figures that present the outcomes of revision procedures in the Netherlands between 2007 and 2024. The first figure shows the revision rates for first revisions following primary total hip arthroplasty (THA), total knee arthroplasty (TKA), and arthroplasties of the ankle, shoulder, elbow, wrist, and finger joints. The second figure illustrates the revision rates for second revisions after an initial revision for primary THA, TKA, shoulder, and elbow arthroplasties.

FIGURE First revision outcomes of primary THA, TKA, ankle, shoulder, elbow, wrist and finger arthroplasties in the Netherlands in 2007-2024



THA: total hip arthroplasty; TKA: total knee arthroplasty

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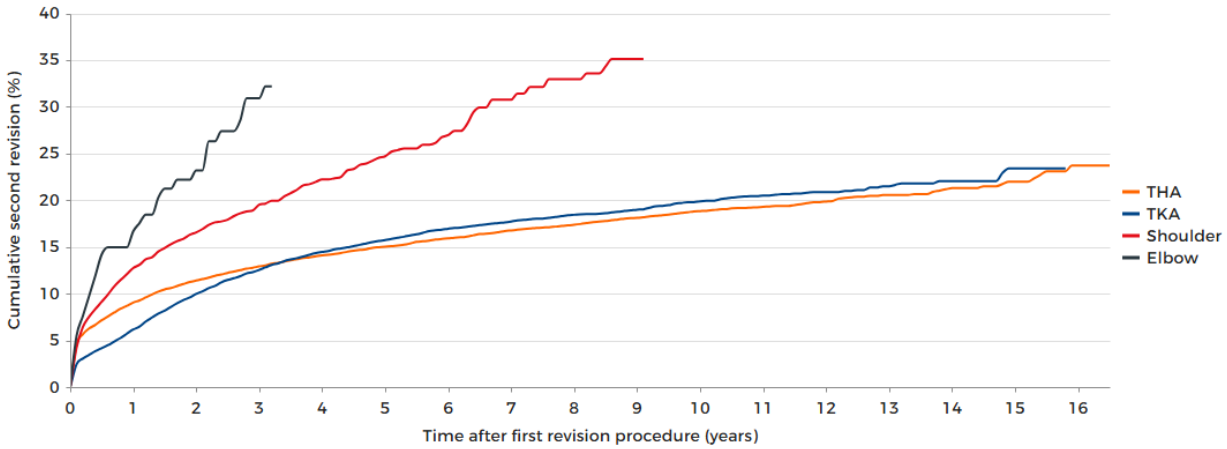
FIGURE Second revision outcomes of primary THA, TKA, shoulder and elbow arthroplasties after first revision procedure in the Netherlands in 2007-2024



THA: total hip arthroplasty; TKA: total knee arthroplasty

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Hip arthroplasty

In this section you will find all the information on hip arthroplasty

Numbers

Registered procedures

TABLE Number of registered hip arthroplasties per year of surgery (2007-2024) in the LROI in April 2025

Year of surgery	Total hip arthroplasty	Hemiarthroplasty	Resurfacing arthroplasty	Unknown/ missing	Revision arthroplasty	Total
2007	8,902	1,056	452	933	1,268	**12,611**
2008	15,452	1,524	731	395	1,858	**19,960**
2009	22,106	2,145	863	299	2,679	**28,092**
2010	23,914	2,423	610	295	2,951	**30,193**
2011	24,462	2,520	228	243	3,197	**30,650**
2012	25,818	2,898	10	329	3,766	**32,821**
2013	26,261	3,069	2	261	3,517	**33,110**
2014	28,193	3,766	0	151	3,583	**35,693**
2015	28,873	4,965	15	67	3,834	**37,754**
2016	29,573	5,451	16	99	3,883	**39,022**
2017	30,264	5,946	5	52	3,871	**40,138**
2018	31,634	6,386	2	25	3,843	**41,890**
2019	33,080	6,312	1	36	3,835	**43,264**
2020	27,249	6,547	0	18	3,465	**37,279**
2021	31,641	6,126	0	17	3,563	**41,347**
2022	36,751	6,496	0	27	3,615	**46,889**
2023	36,800	6,314	0	58	3,972	**47,144**
2024	37,136	6,017	0	14	3,782	**46,949**
Total (n)	**498,109**	**79,961**	**2,935**	**3,319**	**60,482**	**644,806**

Please note: The LROI is nearly complete as of 2010

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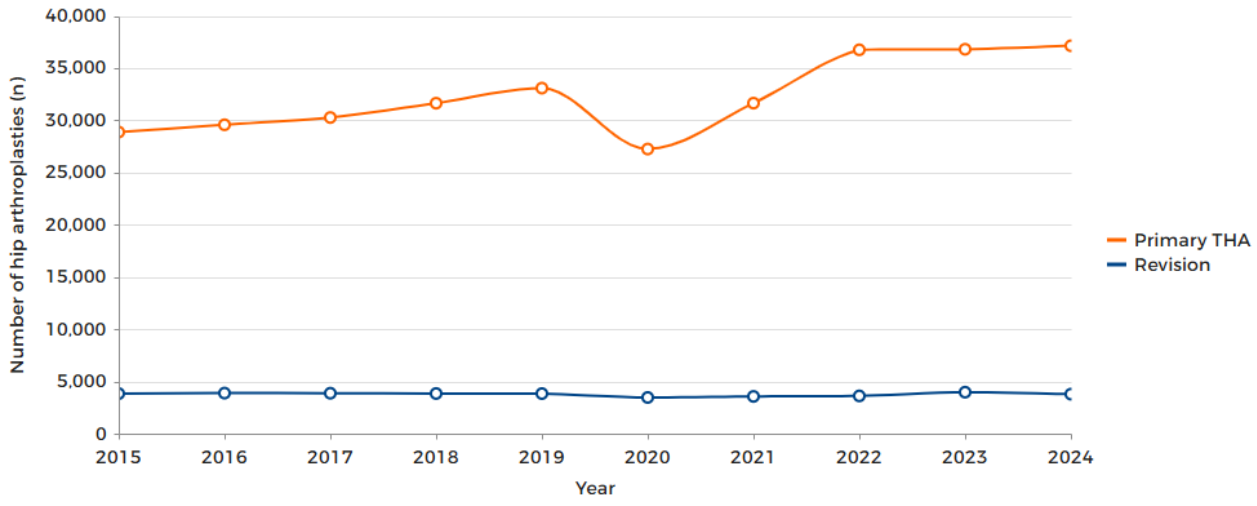
Type of procedures

FIGURE Number of primary total hip arthroplasties and hip revision arthroplasties registered in the LROI in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Primary THA	28,873	29,573	30,264	31,634	33,080	27,249	31,641	36,751	36,800	37,136	**323,001**
Revision	3,834	3,883	3,871	3,843	3,835	3,465	3,563	3,615	3,972	3,782	**37,663**
Total (n)	**32,707**	**33,456**	**34,135**	**35,477**	**36,915**	**30,714**	**35,204**	**40,366**	**40,772**	**40,918**	**360,664**

THA: total hip arthroplasty

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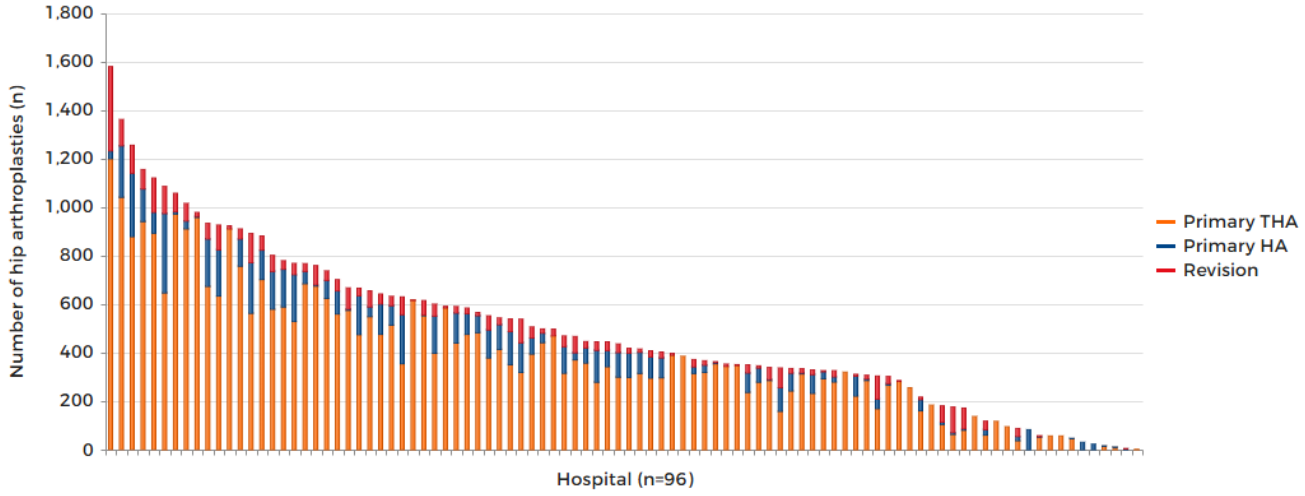
Out of 37,136 primary total hip arthroplasties that were performed in 2024, 3.0% (n=1,129) was performed bilaterally.

Type of procedure per hospital

FIGURE Number of primary total hip arthroplasties, hemiarthroplasties and hip revision arthroplasties per hospital in the Netherlands in 2024 (n=46,935)



THA: total hip arthroplasty; HA: hemiarthroplasty

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Total hip arthroplasty

In this section you will find all the information on total hip arthroplasty:

Patient characteristics

By diagnosis

TABLE Patient characteristics of all patients with a registered primary total hip arthroplasty by diagnosis in the Netherlands in 2024

	Osteoarthritis	Fracture	Osteonecrosis	Late post-traumatic	Dysplasia	Reumatoid arthritis	Post-Perthes disease	Tumour	Other	Total
N (%)	**32,060 (86.4)**	**2,145 (5.8)**	**860 (2.4)**	**785 (2.2)**	**581 (1.6)**	**111 (0.2)**	**82 (0.2)**	**84 (0.2)**	**428 (1.2)**	**37,136**
Mean age (years) (SD)	70.0 (9.7)	69.3 (8.8)	64.0 (14.7)	68.0 (13.3)	52.4 (13.3)	63.3 (14.8)	49.6 (14.7)	64.7 (11.5)	65.8 (15.1)	69.4 (10.4)
Age (years) (%)										
<50	2	2	15	9	38	17	50	10	12	4
50-59	12	10	18	12	33	12	28	18	15	13
60-69	29	34	26	25	18	28	13	36	24	29
70-79	41	46	27	37	9	38	4	29	34	40
>80	15	8	14	17	2	5	5	8	15	15
Gender (%)										
Men	37	37	50	42	27	21	74	39	41	37
Women	63	63	50	58	73	79	26	61	59	63
ASA score (%)										
ASA I	13	12	7	10	32	3	24	1	13	13
ASA II	60	55	52	52	59	63	57	24	58	59
ASA III-IV	27	32	41	37	9	34	18	75	28	28
Type of hospital (%)										
General	79	96	84	90	69	81	76	67	84	80
UMC	1	4	7	6	10	5	10	33	7	2
Private	20	0	9	4	22	14	15	0	9	18
Charnley-score (%)										
A One hip joint affected	39	8	37	42	49	27	71	23	34	38
B1 Both hip joints affected	32	3	13	4	27	23	11	5	17	29
B2 Contralateral hip joint with a total hip prosthesis	25	4	14	6	17	22	6	2	15	23
C Multiple joints affected or chronic disease that affects quality of life	3	1	4	2	3	23	4	2	6	3
Mean BMI (kg/m2) (SD)	27.4 (4.6)	25.1 (4.1)	26.9 (5.3)	25.6 (4.4)	26.3 (4.4)	26.9 (4.9)	28.2 (4.9)	26.6 (5.6)	26.9 (4.5)	27.2 (4.6)
Body Mass Index (kg/m2) (%)										
Underweight (<=18.5)	1	3	2	3	2	3	2	4	2	1
Normal weight (>18.5-25)	33	48	39	46	41	34	23	43	33	35
Overweight (>25-30)	41	33	34	33	36	37	40	30	39	41
Obesity (>30-40)	23	10	20	14	19	24	33	19	20	22
Morbid obesity (>40)	1	0	2	1	1	2	1	2	1	1
Smoking (%)										
No	91	84	79	82	89	94	85	88	85	91
Yes	8	14	19	17	11	6	11	10	11	9

Please note: diagnosis 'Other' (428; 1.2%) includes other (183), inflammatory arthritis (30), post-infectious osteoarthritis (21), and 194 primary total hip arthroplasties where the diagnosis was not registered.
General: general hospital; UMC: university medical centre; Private: private hospital; SD: standard deviation

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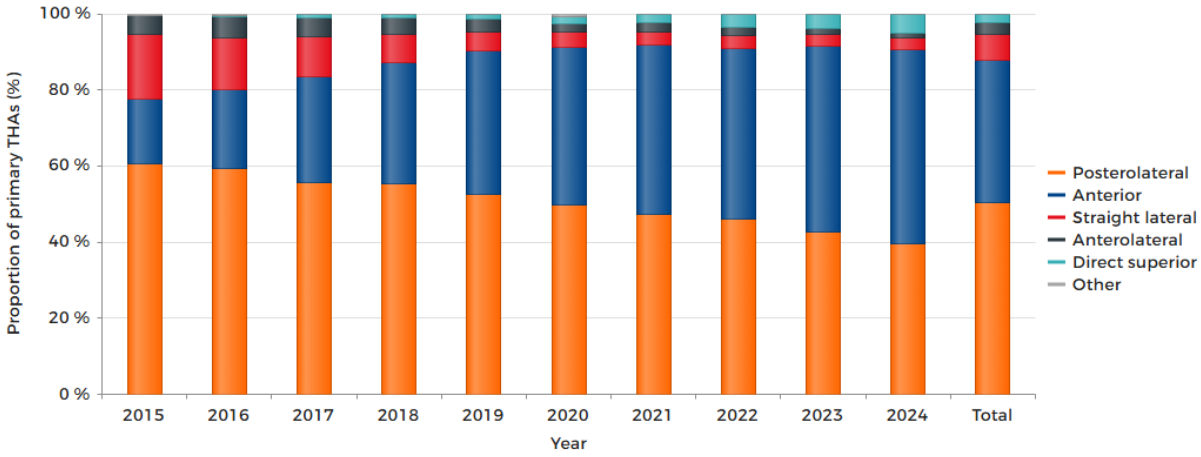
Procedure characteristics

Surgical approach

FIGURE Trend (proportion [%] per year) in surgical approach for performing a primary total hip arthroplasty in the Netherlands in 2015-2024

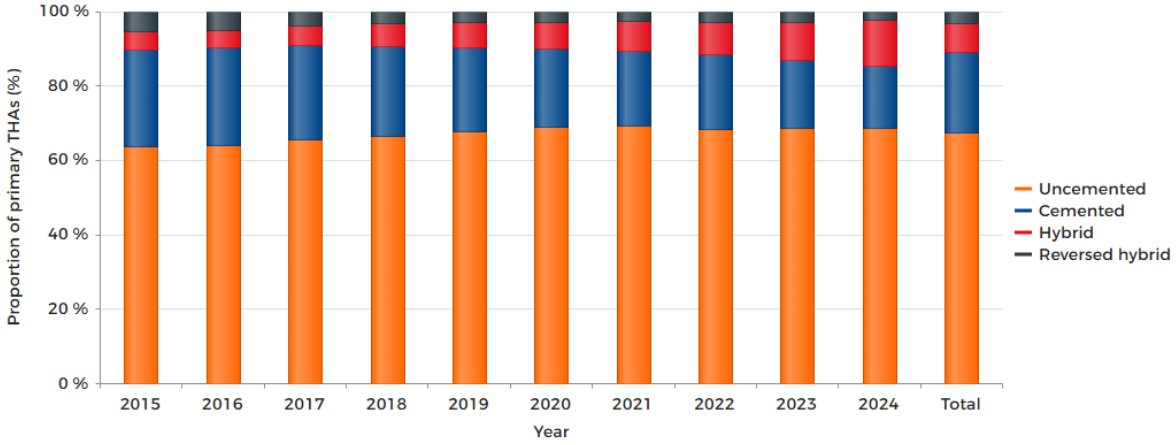


	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Posterolateral	60.64	59.30	55.63	55.18	52.42	49.88	47.33	45.95	42.74	39.58	50.33
Anterior	16.80	20.92	27.76	31.91	37.70	41.37	44.39	45.00	48.67	51.13	37.38
Straight lateral	17.02	13.49	10.62	7.38	5.19	4.08	3.51	3.37	3.06	2.84	6.75
Anterolateral	5.10	5.48	4.98	4.44	3.45	2.03	2.33	2.04	1.68	1.40	3.20
Direct superior	0	0.30	0.80	0.84	1.12	1.94	2.31	3.49	3.68	4.85	2.06
Other	0.44	0.52	0.21	0.24	0.11	0.71	0.13	0.15	0.18	0.21	0.28
Total (n)	**28,796**	**29,557**	**30,240**	**31,614**	**33,055**	**27,213**	**31,506**	**36,598**	**36,753**	**37,018**	**322,350**

THA: total hip arthroplasty

Fixation

FIGURE Trend (proportion [%] per year) in type of fixation in primary total hip arthroplasties in the Netherlands in 2015-2024

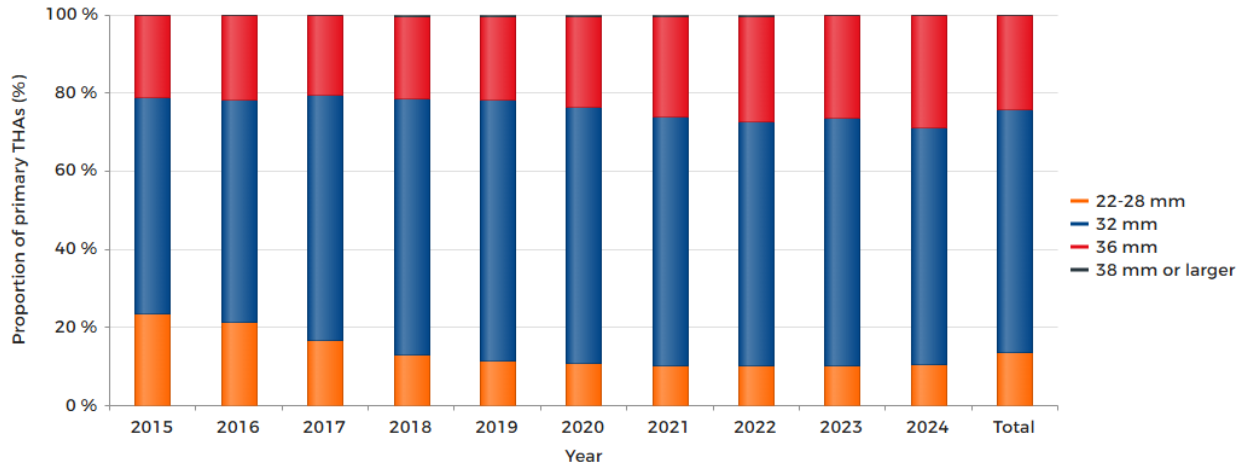


	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Uncemented	63.64	64.06	65.60	66.54	67.73	68.97	69.23	68.21	68.68	68.70	67.24
Cemented	26.08	26.06	25.27	24.08	22.67	20.97	20.26	20.16	18.12	16.75	21.80
Hybrid	4.91	4.90	5.28	6.27	6.69	7.10	7.90	8.64	10.39	12.33	7.64
Reversed hybrid	5.37	4.99	3.85	3.12	2.91	2.97	2.61	2.99	2.81	2.22	3.32
Total (n)	**28,746**	**29,421**	**29,829**	**31,452**	**32,848**	**27,040**	**31,409**	**36,575**	**36,650**	**36,938**	**320,908**

THA: total hip arthroplasty

Femoral head diameter

FIGURE Trend (proportion [%] per year) in femoral head component diameter in primary total hip arthroplasties in the Netherlands in 2015-2024

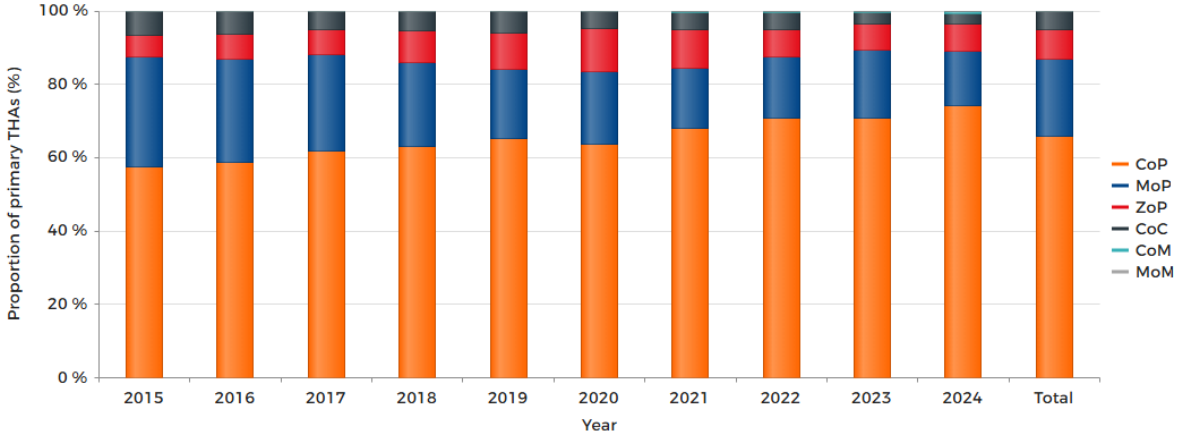


	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
22-28 mm	23.38	21.22	16.54	13.02	11.49	10.70	10.18	10.32	10.33	10.58	13.52
32 mm	55.57	57.00	63.03	65.52	66.64	65.54	63.83	62.19	63.20	60.54	62.32
36 mm	20.83	21.48	20.15	21.11	21.53	23.39	25.66	27.10	26.17	28.68	23.85
38 mm or larger	0.22	0.30	0.28	0.34	0.34	0.37	0.33	0.39	0.30	0.20	0.31
Total (n)	**28,619**	**28,781**	**29,493**	**30,812**	**31,558**	**25,268**	**31,087**	**36,099**	**36,303**	**36,332**	**314,352**

THA: total hip arthroplasty

Articulation

FIGURE Trend (proportion [%] per year) in articulation in primary total hip arthroplasties in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
CoP	57.45	58.72	61.73	63.20	65.37	63.79	67.91	70.85	70.73	74.22	65.87
MoP	29.92	28.24	26.23	22.69	18.56	19.69	16.45	16.55	18.71	14.77	20.84
ZoP	6.07	6.84	6.81	8.83	10.10	11.68	10.65	7.62	6.94	7.55	8.24
CoC	6.50	6.18	5.16	5.22	5.82	4.61	4.68	4.56	3.23	2.83	4.80
CoM	0.01	0.01	0.02	0.02	0.03	0.06	0.20	0.30	0.29	0.48	0.16
MoM	0.04	0.02	0.05	0.04	0.12	0.17	0.11	0.13	0.11	0.15	0.09
Total (n)	**28,155**	**28,353**	**29,134**	**30,302**	**31,041**	**24,718**	**30,688**	**35,204**	**35,607**	**35,667**	**308,869**

Please note: MoC was used in 4 (<0.01%) primary THAs in 2015-2024.

THA: total hip arthroplasty; CoP: Ceramics-on-polyethylene; MoP: Metal-on-polyethylene; CoC: Ceramics-on-ceramics; ZoP: Oxidized Zirconium-on-polyethylene; MoM: Metal-on-Metal; CoM: Ceramics-on-Metal; MoC: Metal-on-ceramics

Acetabulum

TABLE The most frequently registered acetabulum components in primary total hip arthroplasties in the Netherlands in 2020-2024

Year	2020	2021	2022	2023	2024
Acetabulum cemented (n)	**6,348**	**7,087**	**8,180**	**7,510**	**6,747**
Acetabulum name; Proportion (%)					
Avantage Cemented	16.43	19.53	17.54	19.28	19.77
FAL Cup	7.10	6.73	11.83	18.52	17.09
Muller low profile Durasul	15.39	18.70	16.12	16.66	14.21
IP Cup	13.50	12.98	12.80	13.29	14.01
Exeter Rimfit X3	9.20	6.63	7.33	6.92	7.80
IP Cup X-Linked	2.50	3.30	3.75	4.82	5.88
CCB cup Low Profile	4.96	4.66	4.62	4.87	5.13
Polarcup cemented	2.41	2.58	2.32	2.44	2.74
FAL Cup X-Linked	1.98	1.81	2.20	1.76	2.50
Reflection All Poly XLPE	3.32	3.17	2.36	2.01	1.97
Year	**2020**	**2021**	**2022**	**2023**	**2024**
Acetabulum uncemented (n)	**19,268**	**23,989**	**27,829**	**28,078**	**28,862**
Acetabulum name; Proportion (%)					
Allofit	32.18	35.24	37.62	39.02	39.00
Pinnacle	19.45	20.34	19.36	19.89	17.38
G7 PPS	1.32	5.77	9.25	7.58	9.06
R3	14.40	13.24	8.90	8.78	8.91
Trident	7.74	8.83	7.29	7.61	8.69
RM Pressfit Vitamys cup	4.26	3.67	3.70	3.61	3.68
Pinnacle Gription	2.39	2.19	2.42	1.72	2.71
Trident Tritanium	3.50	0.63	2.54	3.31	2.25
Delta-TT	1.62	1.50	1.74	2.29	2.22
Continuum	5.13	2.86	2.12	1.67	1.54

Femur

TABLE The most frequently registered femur components in primary total hip arthroplasties in the Netherlands in 2020-2024

Year	2020	2021	2022	2023	2024
Femur cemented (n)	**7,332**	**8,640**	**10,182**	**10,207**	**10,318**
Femur name; Proportion (%)					
Lubinus SPII	34.02	34.85	36.97	39.78	38.19
Original ME Muller	27.67	28.13	28.52	31.72	31.85
Taperloc Hip Cemented CoCr	2.67	6.17	6.01	5.06	7.75
Exeter	12.51	9.43	8.97	7.70	7.28
Twinsys stem Cemented	1.90	1.31	3.51	3.39	3.65
Avenir Muller	.	0.01	0.83	1.92	2.46
Polarstem cemented	0.01	0.02	0.31	1.23	2.29
CPT	1.62	3.65	3.23	2.56	2.14
C-Stem AMT	6.70	5.74	5.64	2.01	1.71
Spectron EF	2.82	2.69	1.86	1.13	0.78
Year	**2020**	**2021**	**2022**	**2023**	**2024**
Femur uncemented (n)	**17,616**	**22,167**	**25,711**	**25,897**	**25,742**
Femur name; Proportion (%)					
Taperloc Complete	27.21	30.59	31.51	29.65	33.65
Corail	20.25	20.07	19.37	18.41	17.69
Accolade II	7.76	9.93	11.26	12.15	12.21
Polarstem	14.59	13.70	10.10	9.33	9.27
Fitmore	1.90	4.26	3.59	5.62	6.79
Avenir Muller	1.15	2.19	5.23	5.09	4.14
Corail AMT	2.43	3.27	3.57	3.68	3.63
Twinsys stem Cementless	4.17	3.46	3.40	3.26	2.83
M/L Taper	3.05	2.10	2.33	2.37	2.44
Optimys stem	1.31	1.35	1.36	1.51	1.69

Bone cement

TABLE The most frequently registered bone cement used during primary total hip arthroplasties in the Netherlands in 2020-2024

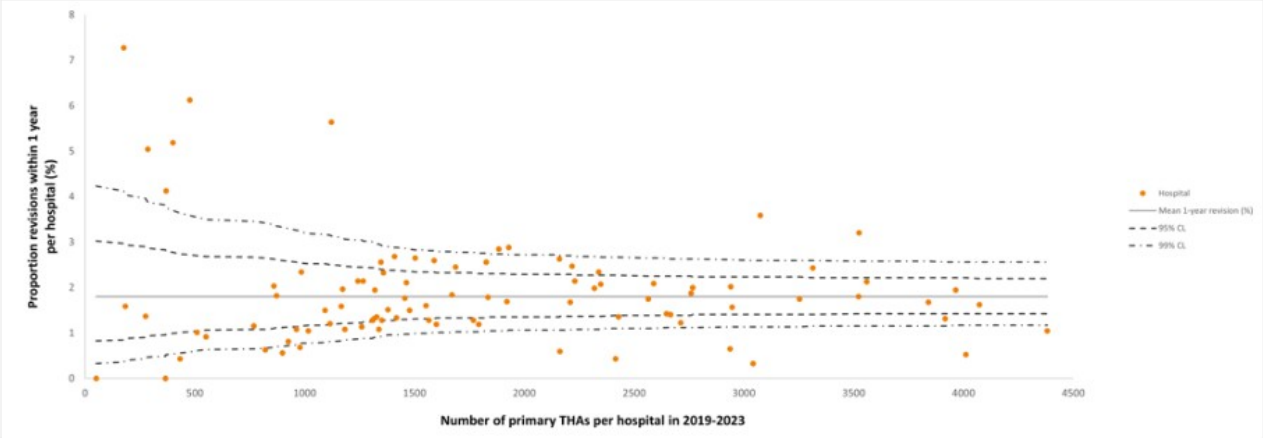
Year	2020	2021	2022	2023	2024
Bone cement pre-packed in a vacuum mixing system (n)	**4,120**	**5,145**	**6,390**	**6,289**	**6,755**
Cement name; Proportion (%)					
Palacos R+G	51.00	50.44	59.51	70.28	65.33
Refobacin Bone Cement R	41.55	44.02	35.02	27.06	34.20
Refobacin Plus Bone Cement	7.43	5.50	5.45	2.66	0.44
Year	**2020**	**2021**	**2022**	**2023**	**2024**
Separately packed bone cement (n)	**3,662**	**3,941**	**4,313**	**3,543**	**3,356**
Cement name; Proportion (%)					
Palacos R+G	82.61	87.54	88.69	82.08	84.59
Refobacin Bone Cement R	7.24	3.81	4.22	10.47	6.82
Palacos MV+G	4.21	3.65	4.34	3.84	5.57
Simplex ABC Tobra	0.14	0.10	0.51	1.52	1.28
Subiton G	3.17	2.51	1.21	0.62	0.63
Copal G+C	0.63	0.81	0.60	0.45	0.45
Simplex ABC EC	0.85	0.33	0.19	0.34	0.21
Refobacin Revision	0.44	0.20	0.14	0.28	0.21
Copal G+V	0.52	0.28	0.09	0.06	0.18

Survival

Short term revision

Overall revision per hospital

Funnel plot of proportion of hip revision arthroplasties within one year after a total hip arthroplasty per hospital in the Netherlands in 2019-2023 (n=165,093)



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

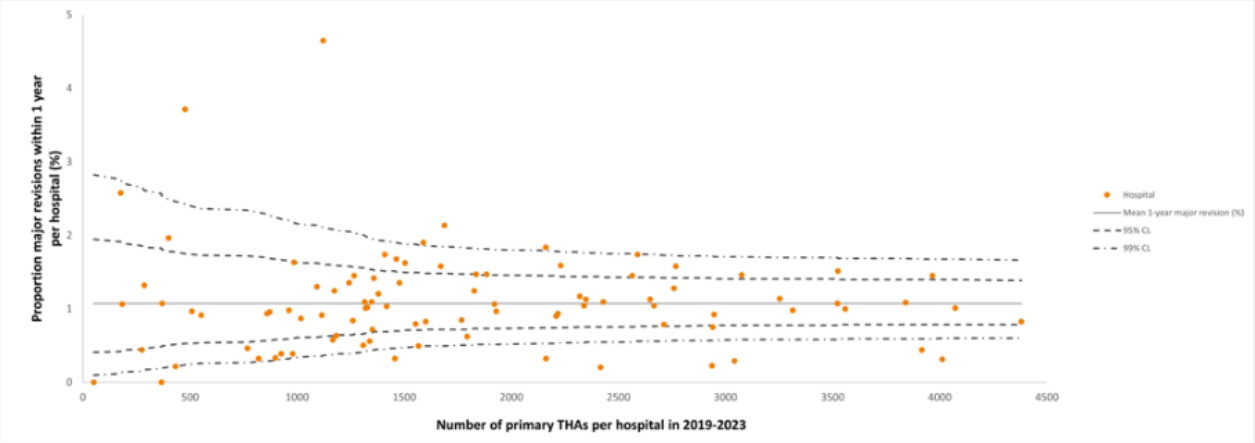
THA: total hip arthroplasty; CL: control limits.

The mean 1-year revision percentage is 1.80 in the Netherlands in 2019-2023.

Control limits indicate the plausible range of outcome if all hospitals perform equally well.

Major revision per hospital

Funnel plot of proportion of hip major revision arthroplasties within one year after a total hip arthroplasty per hospital in the Netherlands in 2019-2023 (n=165,093)



Please note: Major revision is defined as revision of at least acetabulum or femur compenent.

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

THA: total hip arthroplasty; CL: control limits.

The mean 1-year major revision percentage is 1.07 in the Netherlands in 2019-2023.
Control limits indicate the plausible range of outcome if all hospitals perform equally well.

By type of revision within 1 year

TABLE Cumulative 1-year revision percentage of primary total hip arthroplasties by type of revision in the Netherlands in 2019-2023 (n=165,093)

	Cumulative 1-year revision percentage
	Kaplan Meier (95% CI)
Any type of revision	1.77 (1.70-1.83)
Major revision	0.97 (0.92-1.02)
Only acetabulum	0.32 (0.29-0.35)
Only femur	0.45 (0.42-0.48)
Acetabulum and femur	0.20 (0.18-0.22)
Minor revision	0.77 (0.73-0.81)
DAIR	0.58 (0.54-0.61)
No DAIR	0.19 (0.17-0.21)

Any type of revision includes minor and major revisions as well as revision procedures that could not be classified as minor or major revision.
Major revision: revision of at least the acetabulum or femur component.
Minor revision: only inlay and/or femoral head exchange (including DAIR procedures).
THA: total hip arthroplasty; CI: confidence interval

In 2019-2023, 2,027 (1.2%) primary THAs were implanted in patients who died within one year after the primary procedure.

First major or minor revision within 1 year

TABLE Cumulative 1-year first revision percentage of primary total hip arthroplasties by type of first major or minor revision in the Netherlands in 2019-2023 (n=165,093)

	Cumulative 1-year first revision percentage
	Kaplan Meier (95% CI)
First major revision	0.97 (0.92-1.02)
Acetabulum	0.61 (0.57-0.64)
Femur	0.73 (0.68-0.77)
Minor revision	0.77 (0.73-0.81)
Inlay	0.38 (0.35-0.41)
Femoral head	0.73 (0.68-0.77)

First major revision: first revision of the acetabulum or femur component, regardless of whether a minor revision has already taken place. Therefor, the first three revision procedures were reviewed.
First minor revision: only inlay and/or femoral head exchange (including DAIR procedures).
THA: total hip arthroplasty; CI: confidence interval

In 2019-2023, 2,027 (1.2%) primary THAs were implanted in patients who died within one year after the primary procedure.

Reasons for revision within 1 year

TABLE Cumulative 1-year first revision percentage of primary total hip arthroplasties by type of first major or minor revision in the Netherlands in 2019-2023 (n=165,093)

	Cumulative 1-year first revision percentage
	Kaplan Meier (95% CI)
First major revision	0.97 (0.92-1.02)
Acetabulum	0.61 (0.57-0.64)
Femur	0.73 (0.68-0.77)
Minor revision	0.77 (0.73-0.81)
Inlay	0.38 (0.35-0.41)
Femoral head	0.73 (0.68-0.77)

First major revision: first revision of the acetabulum or femur component, regardless of whether a minor revision has already taken place. Therefor, the first three revision procedures were reviewed.
First minor revision: only inlay and/or femoral head exchange (including DAIR procedures).
THA: total hip arthroplasty; CI: confidence interval

In 2019-2023, 2,027 (1.2%) primary THAs were implanted in patients who died within one year after the primary procedure.

Time after primary THA

TABLE Time after primary total hip arthroplasty until short-term revision in the Netherlands in 2017-2021 (n=153,311)

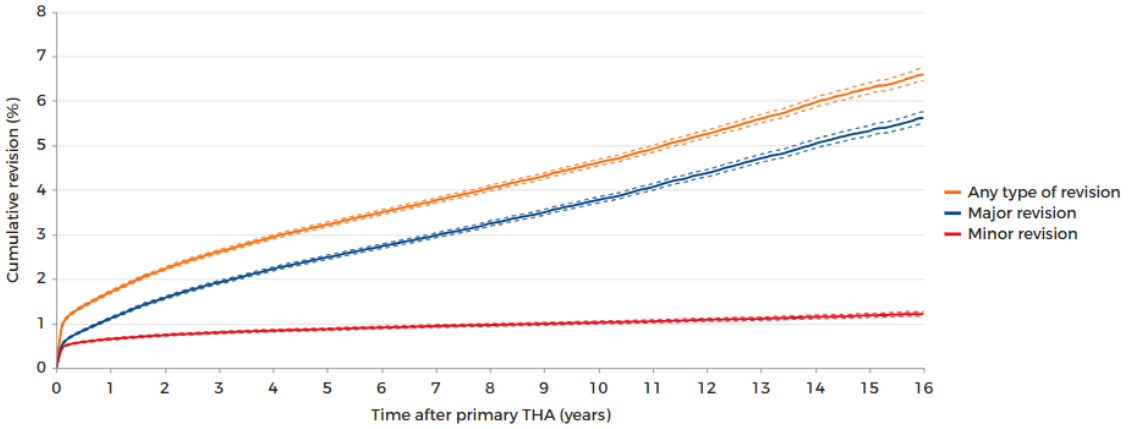
Time after primary THA	Percentage revisions (%)
Day 0-29	0.98
Day 30-182	0.60
Day 183-364	0.29
Day 365-730 (second year)	0.41
Day 731-1095 (third year)	0.31

THA: total hip arthroplasty

Long term revision

By type of revision

FIGURE Cumulative revision percentage (Kaplan-Meier; 95% CI) of total hip arthroplasties by type of revision in the Netherlands in 2007-2024 (n=496,430)



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	1yr	3yr	5yr	7yr	10yr	16yr
Any type of revision	1.64 (1.61-1.68)	2.58 (2.53-2.62)	3.19 (3.14-3.25)	3.73 (3.67-3.79)	4.58 (4.51-4.65)	6.57 (6.43-6.71)
Major revision	1.06 (1.03-1.09)	1.89 (1.85-1.93)	2.46 (2.41-2.51)	2.94 (2.89-3.00)	3.75 (3.68-3.81)	5.60 (5.46-5.73)
Minor revision	0.64 (0.62-0.66)	0.79 (0.76-0.81)	0.87 (0.84-0.89)	0.94 (0.91-0.96)	1.02 (0.98-1.05)	1.21 (1.16-1.26)

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

Any type of revision includes minor and major revisions as well as revision procedures that could not be classified as minor or major revision.

Major revision: first revision of the acetabulum or femur component, regardless of whether a minor revision has already taken place. Therefor, the first three revision procedures were reviewed.

Minor revision: only inlay and/or femoral head exchange (including DAIR procedures).

THA: total hip arthroplasty; CI: confidence interval.

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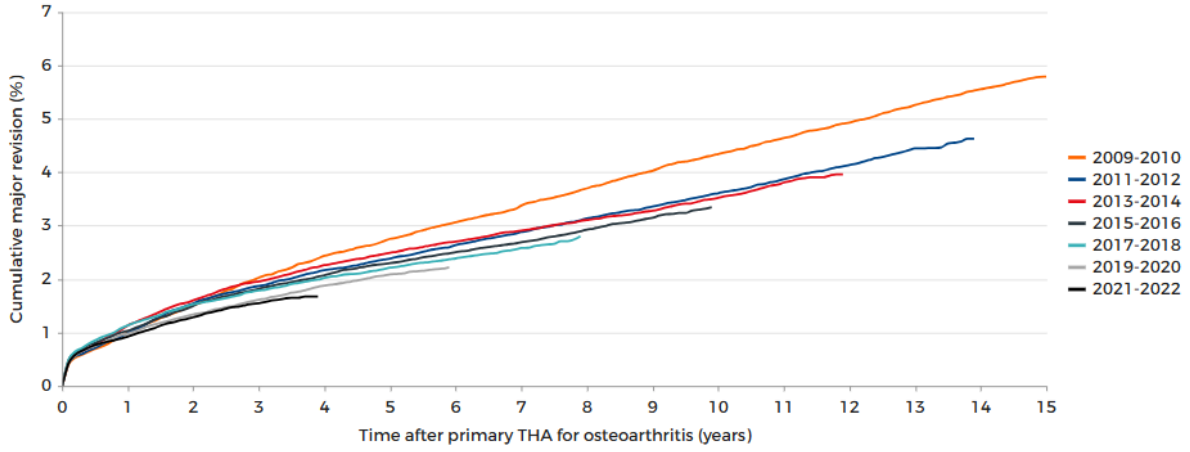
In 2007-2024, 86,913 (17.5%) primary THAs were implanted in patients who died within sixteen years after the primary diagnosis.

By procedure year

FIGURE Cumulative major revision percentage (Kaplan-Meier; 95% CI) of total hip arthroplasties for osteoarthritis by procedure year of primary THA in the Netherlands in 2009-2022



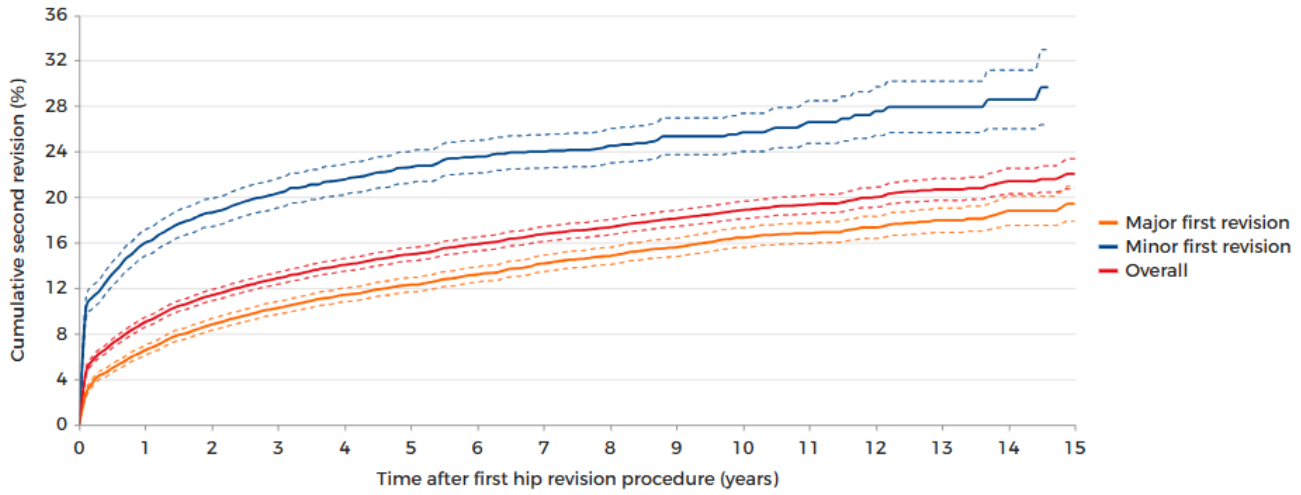
	Number (n)	1yr	3yr	5yr	7yr	10yr	15yr
2009-2010	38,354	0.94 (0.85-1.04)	1.98 (1.84-2.12)	2.71 (2.54-2.87)	3.31 (3.12-3.49)	4.31 (4.10-4.52)	5.78 (5.52-6.03)
2011-2012	42,846	0.93 (0.83-1.02)	1.85 (1.72-1.98)	2.36 (2.22-2.51)	2.84 (2.68-3.00)	3.58 (3.40-3.77)	n.a.
2013-2014	46,788	1.05 (0.96-1.14)	1.93 (1.81-2.06)	2.47 (2.32-2.61)	2.89 (2.73-3.04)	3.49 (3.32-3.67)	n.a.
2015-2016	50,311	1.00 (0.91-1.09)	1.79 (1.67-1.90)	2.28 (2.15-2.41)	2.66 (2.52-2.81)	3.35 (3.16-3.53)	n.a.
2017-2018	53,736	1.08 (0.99-1.16)	1.76 (1.65-1.88)	2.19 (2.06-2.31)	2.55 (2.41-2.69)	n.a.	n.a.
2019-2020	51,616	0.95 (0.87-1.04)	1.59 (1.48-1.69)	2.06 (1.94-2.19)	n.a.	n.a.	n.a.
2021-2022	58,859	0.88 (0.81-0.96)	1.54 (1.43-1.64)	n.a.	n.a.	n.a.	n.a.

Please note: n.a. if <50 cases were at risk.
Major revision precentage: first revision of the acetabulum or femur component, regardless of whether a minor revision has already taken place. Therefor, the first three revision procedures were reviewed.
THA: total hip arthroplasty; CI: confidence interval.

Re-revision

By type of first revision

FIGURE Cumulative second revision percentage (Kaplan-Meier; 95% CI) of total hip arthroplasties after a one-stage first revision by type of first revision in the Netherlands in 2007-2024 (n=17,219)

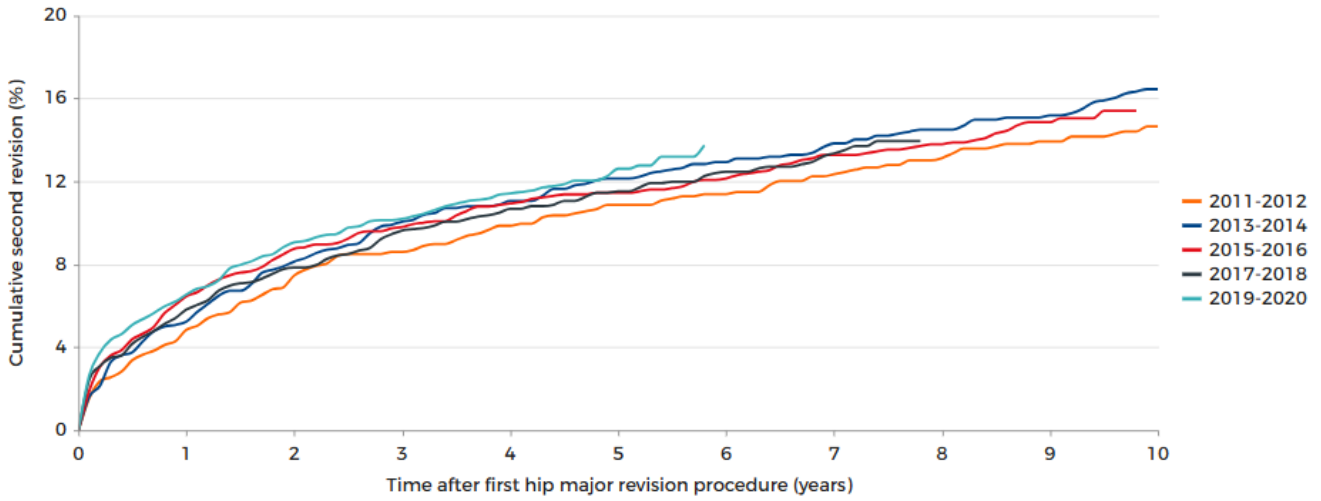


	Number (n)	1yr	3yr	5yr	7yr	10yr	15yr
Overall	17,219	8.69 (8.26-9.12)	12.74 (12.22-13.27)	14.93 (14.34-15.51)	16.69 (16.04-17.33)	18.81 (18.05-19.57)	22.05 (20.72-23.37)
Major first revision	12,764	6.25 (5.83-6.68)	10.16 (9.60-10.72)	12.25 (11.61-12.88)	14.09 (13.38-14.81)	16.44 (15.57-17.31)	19.43 (17.89-20.96)
Minor first revision	4,132	15.59 (14.46-16.72)	20.18 (18.90-21.47)	22.58 (21.19-23.96)	24.00 (22.54-25.47)	25.51 (23.87-27.15)	n.a.

Please note: Dotted lines represent the upper and lower limits of the 95% confidence interval.
One-stage revision: A single revision procedure to change (insertion, replacement and/or removal) one or more components of the prosthesis.
Major revision: revision of at least the acetabulum or femur component.
Minor revision: only inlay and/or femoral head exchange (including DAIR procedures).
CI: confidence interval.

By procedure year of first major revision

FIGURE Cumulative second revision percentage (Kaplan-Meier; 95% CI) of total hip arthroplasties after a one-stage first revision by procedure year of first major revision in the Netherlands in 2011-2020 (n=7,588)



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	Number (n)	1yr	3yr	5yr	7yr	10yr
2011-2012	1,100	4.29 (3.09-5.49)	8.59 (6.92-10.26)	10.85 (8.99-12.72)	12.23 (10.25-14.21)	14.64 (12.46-16.82)
2013-2014	1,311	5.08 (3.88-6.27)	9.90 (8.26-11.53)	12.13 (10.33-13.93)	13.64 (11.73-15.54)	16.43 (14.33-18.54)
2015-2016	1,538	6.05 (4.85-7.25)	9.72 (8.22-11.22)	11.44 (9.82-13.06)	13.26 (11.51-15.02)	n.a.
2017-2018	1,812	5.41 (4.37-6.46)	9.44 (8.08-10.81)	11.44 (9.94-12.95)	13.19 (11.54-14.85)	n.a.
2019-2020	1,827	6.20 (5.09-7.32)	10.12 (8.72-11.53)	12.24 (10.68-13.81)	n.a.	n.a.

Please note: n.a. if <50 cases were at risk.

Major revision: revision of at least the acetabulum or femur component.

One-stage revision: A single revision procedure to change (insertion, replacement and/or removal) one or more components of the prosthesis.

CI: confidence interval.

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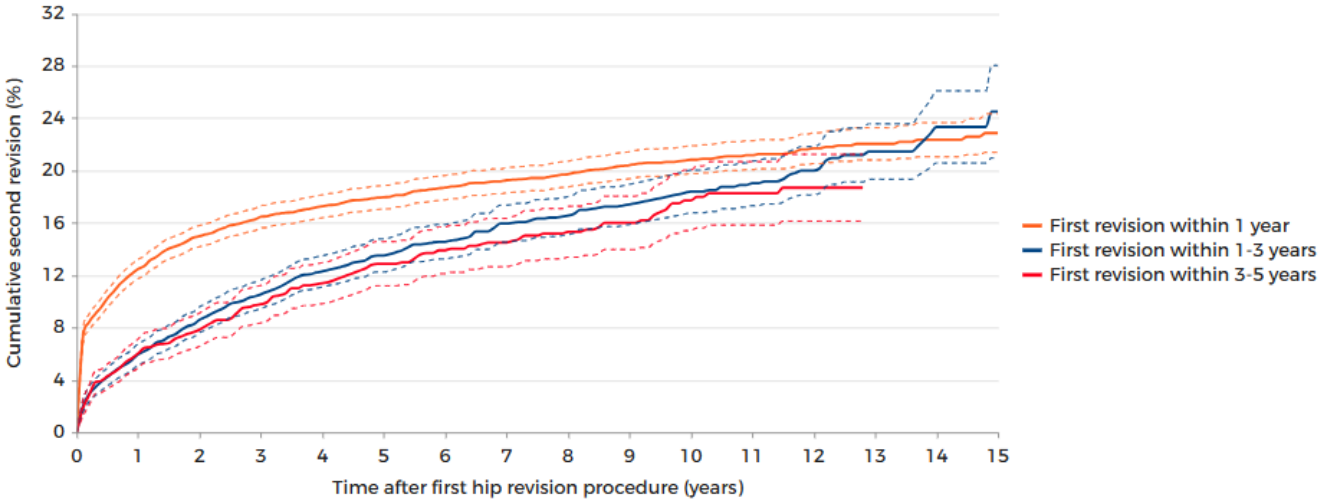
By time to first revision

FIGURE Cumulative second revision percentage (Kaplan-Meier; 95% CI) of total hip arthroplasties after a one-stage first revision by time to first revision in the Netherlands in 2007-2024 (n=13,093)



	Number (n)	1yr	3yr	5yr	7yr	10yr	15yr
First revision within 1 year	7,926	12.12 (11.39-12.85)	16.25 (15.40-17.10)	17.91 (17.01-18.81)	19.16 (18.21-20.12)	20.76 (19.70-21.83)	22.85 (21.38-24.33)
First revision within 1-3 years	3,335	5.53 (4.74-6.31)	10.38 (9.30-11.47)	13.50 (12.24-14.77)	15.94 (14.52-17.35)	18.29 (16.67-19.90)	24.48 (20.95-28.02)
First revision within 3-5 years	1,832	5.66 (4.59-6.74)	9.71 (8.28-11.13)	12.87 (11.19-14.56)	14.49 (12.64-16.34)	17.71 (15.39-20.03)	n.a.

Please note: Dotted lines represent the upper and lower limits of the 95% confidence interval.
One-stage revision: A single revision procedure to change (insertion, replacement and/or removal) one or more components of the prosthesis.
CI: confidence interval.

Reasons for second revision

TABLE Reasons for second revision within ten years in patients who underwent a second revision after a one-stage first revision of a total hip arthroplasty by type of first revision in the Netherlands in 2007-2024

	Major revision (n=1,515)	Minor revision (n=879)	Any type of revision (n=2,472)
Reasons for second revision	**Proportion (%)**	**Proportion (%)**	**Proportion (%)**
Infection	32.54	60.86	43.16
Dislocation	25.68	25.37	25.04
Loosening of acetabulum component	18.94	4.55	13.47
Loosening of femur component	17.62	4.44	12.66
Peri-prosthetic fracture	9.90	2.73	7.24
Inlay wear	3.17	2.96	2.99
Malposition or malalignment	1.91	0.68	1.42
Symptomatic MoM bearing	1.19	0.34	0.93
Peri-articular ossification	0.99	0.46	0.77
Other	11.02	6.83	9.71

One-stage revision: A single revision procedure to change (insertion, replacement and/or removal) one or more components of the prosthesis.
Major first revision: Revision of at least the acetabulum or femur component.
Minor first revision: Only inlay and/or femoral head exchange (including DAIR procedures).
Any type of first revision includes minor and major revisions as well as revision procedures that could not be classified as minor or major revision.
One patient may have more than one reason for second revision or re-surgery. As such, the total proportion is over 100%.
Please note: Malposition or malalignment has been registered since 2022.

Survival by component

By cemented component name - overall revision

TABLE Cumulative revision percentages of cemented primary total hip arthroplasties by prosthesis component combination of patients who underwent a THA for osteoarthritis in the Netherlands in 2007-2024 (n=99,087)

					Type of revision (n)						Cumulative revision percentage (95% CI)					
Femur component	Acetabulum component	Primary THAs (n)	Hospitals (n)	Median (IQR) age (yr)	Revisions (n)	Total revision	Only femur	Only acetabulum	Only femoral head/inlay	Unknown	1yr	5yr	7yr	10yr	16yr	
All cemented THAs for osteoarthritis		99,087	95	76 (71 - 81)	3,168	621	345	1,282	869	51	1.38 (1.31-1.46)	2.13 (2.04-2.23)	2.66 (2.55-2.77)	3.10 (2.98-3.21)	3.80 (3.65-3.94)	5.24 (4.98-5.49)
Lubinus SPII	IP Cup	16,636	21	77 (72 - 81)	461	71	55	209	120	6	1.14 (0.98-1.31)	1.98 (1.76-2.19)	2.56 (2.30-2.81)	2.88 (2.60-3.15)	3.24 (2.92-3.55)	4.10 (3.58-4.62)
Original ME Muller	MUller low profile Durasul	11,157	21	75 (71 - 80)	336	40	5	108	180	3	1.91 (1.66-2.17)	2.51 (2.21-2.81)	2.99 (2.65-3.32)	3.20 (2.84-3.56)	3.72 (3.27-4.16)	4.47 (3.70-5.25)
Lubinus SPII	FAL Cup	7,982	14	75 (71 - 80)	260	62	16	94	83	5	1.75 (1.46-2.04)	2.43 (2.08-2.78)	2.97 (2.57-3.38)	3.49 (3.03-3.95)	4.16 (3.59-4.74)	n.a.
Original ME Muller	MUller low profile	6,579	15	77 (73 - 81)	208	27	2	128	45	6	1.42 (1.13-1.71)	2.33 (1.96-2.69)	2.68 (2.28-3.08)	3.10 (2.66-3.54)	3.33 (2.86-3.81)	4.24 (3.44-5.04)
EXETER	EXETER RIMFIT X3	5,844	16	76 (69 - 80)	151	34	35	34	48	0	1.39 (1.09-1.70)	2.03 (1.66-2.41)	2.47 (2.04-2.89)	2.74 (2.28-3.20)	3.45 (2.82-4.09)	n.a.
Spectron EF	Reflection All Poly XLPE	5,095	18	77 (73 - 82)	138	52	16	44	26	0	0.67 (0.45-0.90)	1.47 (1.13-1.80)	1.93 (1.54-2.32)	2.57 (2.10-3.03)	3.04 (2.51-3.56)	3.52 (2.89-4.15)
STANMORE	STANMORE	3,383*	3	75 (70 - 80)	90	29	2	50	6	3	0.71 (0.43-1.00)	1.45 (1.04-1.86)	1.87 (1.41-2.34)	2.08 (1.59-2.58)	2.66 (2.07-3.25)	4.38 (3.02-5.73)
EXETER	EXETER CONTEMPORARY HOODED	2,827*	13	77 (72 - 81)	117	28	24	48	14	3	1.17 (0.78-1.57)	1.72 (1.24-2.20)	2.29 (1.73-2.85)	2.97 (2.32-3.62)	4.36 (3.51-5.21)	6.13 (4.80-7.46)
Lubinus SPII	SHP	2,506*	6	75 (71 - 80)	51	10	3	37	1	0	0.20 (0.02-0.38)	0.65 (0.33-0.97)	0.95 (0.56-1.34)	1.69 (1.17-2.22)	2.00 (1.42-2.59)	2.43 (1.75-3.12)
Original ME Muller	AVANTAGE Cemented	2,504*	20	77 (71 - 82)	93	4	4	11	73	1	3.09 (2.40-3.78)	3.90 (3.07-4.73)	4.57 (3.55-5.58)	4.80 (3.69-5.91)	n.a.	n.a.
EXETER	EXETER	2,447*	6	73 (68 - 79)	164	26	16	86	30	6	2.78 (2.13-3.43)	3.57 (2.83-4.31)	4.12 (3.33-4.91)	5.00 (4.13-5.88)	6.19 (5.21-7.18)	7.67 (6.49-8.85)
EXETER	EXETER CONTEMPORARY FLANGED	2,439*	7	75 (67 - 80)	93	20	9	53	9	2	0.78 (0.43-1.13)	1.42 (0.94-1.89)	1.99 (1.43-2.56)	2.28 (1.68-2.89)	3.35 (2.57-4.13)	6.40 (4.80-8.01)
STANMORE	SHP	2,097*	5	75 (71 - 79)	126	42	5	66	11	2	1.58 (1.05-2.12)	3.06 (2.31-3.80)	3.98 (3.13-4.83)	4.61 (3.69-5.53)	5.54 (4.50-6.59)	8.04 (6.35-9.73)
Lubinus SPII	IP Cup X-Linked	1,933	9	78 (73 - 82)	50	11	5	11	23	0	1.72 (1.13-2.31)	2.43 (1.68-3.18)	3.11 (2.19-4.04)	3.11 (2.19-4.04)	3.74 (2.47-5.00)	n.a.
CCA stem	CCB cup Low Profile	1,787*	4	77 (73 - 80)	71	11	13	17	29	1	2.02 (1.37-2.67)	2.78 (2.01-3.55)	3.24 (2.40-4.08)	3.66 (2.75-4.57)	4.52 (3.39-5.66)	6.10 (4.02-8.18)
Twinsys stem Cemented	CCB cup Low Profile	1,706	7	80 (76 - 83)	38	5	17	8	7	1	1.13 (0.61-1.64)	2.43 (1.57-3.29)	3.12 (2.08-4.17)	3.30 (2.20-4.39)	3.30 (2.20-4.39)	n.a.
C-Stem AMT	Marathon	1,540	6	79 (74 - 83)	21	2	3	0	16	0	1.04 (0.53-1.55)	1.38 (0.80-1.97)	1.38 (0.80-1.97)	1.38 (0.80-1.97)	n.a.	n.a.
STANMORE	EXCEED ABT Cemented	1,344*	6	76 (71 - 81)	34	6	1	16	11	0	1.04 (0.50-1.59)	1.51 (0.85-2.17)	2.13 (1.34-2.93)	2.95 (1.84-4.05)	3.29 (2.00-4.58)	n.a.
Lubinus SPII	AVANTAGE Cemented	1,277	20	78 (72 - 83)	45	7	2	4	31	1	2.97 (2.03-3.92)	3.29 (2.28-4.29)	4.11 (2.82-5.40)	4.60 (3.00-6.19)	4.60 (3.00-6.19)	n.a.
STANMORE	All Poly Arcom Cup	1,056*	3	74 (69 - 79)	25	5	4	15	0	1	0.29 (0.00-0.61)	1.39 (0.67-2.11)	1.81 (0.98-2.64)	1.93 (1.07-2.78)	2.52 (1.49-3.55)	n.a.
STANMORE	MULLER	879*	3	76 (72 - 81)	14	3	2	8	1	0	0.69 (0.14-1.23)	1.27 (0.52-2.01)	1.27 (0.52-2.01)	1.41 (0.62-2.20)	1.62 (0.73-2.52)	n.a.
Lubinus SPII	FAL Cup X-Linked	679	5	78 (74 - 81)	11	0	1	7	3	0	0.94 (0.19-1.69)	1.76 (0.66-2.85)	2.22 (0.80-3.64)	2.22 (0.80-3.64)	n.a.	n.a.
Spectron EF	Reflection All Poly	617*	11	77 (74 - 82)	54	13	0	37	4	0	0.81 (0.10-1.53)	1.81 (0.75-2.87)	2.69 (1.39-4.00)	3.25 (1.81-4.69)	6.62 (4.48-8.76)	11.40 (8.48-14.33)
EXETER	AVANTAGE Cemented	514	17	74 (66 - 81)	15	3	5	0	7	0	2.18 (0.90-3.45)	2.88 (1.39-4.37)	3.28 (1.60-4.96)	3.28 (1.60-4.96)	n.a.	n.a.
STANMORE	AVANTAGE Cemented	369*	11	79 (74 - 84)	11	0	1	0	10	0	2.18 (0.68-3.67)	3.01 (1.26-4.76)	3.01 (1.26-4.76)	3.01 (1.26-4.76)	n.a.	n.a.
Lubinus SPII	Polarcup cemented	304	5	75 (71 - 79)	5	1	1	0	3	0	1.39 (0.03-2.74)	1.89 (0.22-3.55)	n.a.	n.a.	n.a.	n.a.

* Denotes prosthesis combinations with no reported use in primary THAs in 2024.

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

Only combinations with over 250 procedures and reported by at least 3 hospitals have been listed.

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.

By cemented component name - major revision

TABLE Cumulative 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 2007-2024 (n=99,087)

					Cumulative revision percentage (95% CI)					
Femur component	**Acetabulum component**	**Primary THAs (n)**	**Median (IQR) age (yr)**	**Major revisions (n)**	**1yr**	**3yr**	**5yr**	**7yr**	**10yr**	**16yr**
All cemented THAs for osteoarthritis		**99,087**	**76 (71 - 81)**	**2,375**	**0.67 (0.62-0.72)**	**1.37 (1.30-1.45)**	**1.87 (1.78-1.96)**	**2.29 (2.19-2.40)**	**2.96 (2.83-3.09)**	**4.39 (4.14-4.64)**
Lubinus SPII	IP Cup	16.636	77 (72 - 81)	365	0.57 (0.45-0.68)	1.38 (1.19-1.56)	1.95 (1.72-2.18)	2.27 (2.02-2.52)	2.65 (2.36-2.94)	3.62 (3.09-4.14)
Original ME Muller	MUller low profile Durasul	11,157	75 (71 - 80)	167	0.62 (0.47-0.77)	1.12 (0.91-1.32)	1.50 (1.25-1.75)	1.63 (1.36-1.90)	2.03 (1.68-2.38)	2.71 (2.00-3.41)
Lubinus SPII	FAL Cup	7.982	75 (71 - 80)	186	0.79 (0.59-0.99)	1.49 (1.21-1.77)	2.07 (1.72-2.43)	2.59 (2.17-3.01)	3.27 (2.73-3.81)	n.a.
Original ME Muller	MUller low profile	6.579	77 (73 - 81)	164	0.89 (0.66-1.12)	1.73 (1.41-2.05)	2.05 (1.70-2.40)	2.43 (2.04-2.82)	2.66 (2.24-3.09)	3.49 (2.73-4.25)
EXETER	EXETER RIMFIT X3	5.844	76 (69 - 80)	109	0.74 (0.52-0.96)	1.34 (1.03-1.64)	1.75 (1.39-2.11)	2.03 (1.62-2.44)	2.61 (2.04-3.19)	n.a.
Spectron EF	Reflection All Poly XLPE	5.095	77 (73 - 82)	114	0.38 (0.21-0.55)	1.09 (0.80-1.38)	1.55 (1.20-1.91)	2.13 (1.71-2.56)	2.54 (2.06-3.03)	2.98 (2.39-3.58)
STANMORE	STANMORE	3.383*	75 (70 - 80)	82	0.54 (0.29-0.78)	1.27 (0.89-1.65)	1.66 (1.22-2.10)	1.88 (1.40-2.35)	2.40 (1.84-2.97)	4.13 (2.78-5.48)
EXETER	EXETER CONTEMPORARY HOODED	2.827*	77 (72 - 81)	103	0.71 (0.40-1.02)	1.22 (0.81-1.63)	1.76 (1.26-2.25)	2.39 (1.81-2.98)	3.90 (3.08-4.71)	5.67 (4.35-6.98)
Lubinus SPII	SHP	2.506*	75 (71 - 80)	50	0.20 (0.02-0.38)	0.61 (0.30-0.92)	0.91 (0.53-1.29)	1.65 (1.13-2.17)	1.96 (1.39-2.54)	2.39 (1.71-3.07)
Original ME Muller	AVANTAGE Cemented	2.504	77 (71 - 82)	23	0.42 (0.16-0.68)	1.05 (0.56-1.53)	1.48 (0.78-2.17)	1.71 (0.88-2.54)	n.a.	n.a.

* Denotes prosthesis combinations with no reported use in primary THAs in 2024.

Major revision precentage: first revision of the acetabulum or femur component, regardless of whether a minor revision has already taken place. Therefor, the first three revision procedures were reviewed.

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

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.

By uncemented component name - overall revision

TABLE Cumulative revision percentages of uncemented primary total hip arthroplasties by prosthesis component combination of patients who underwent a THA for osteoarthritis in the Netherlands in 2007-2024 (n=284,306)

					Type of revision (n)						Cumulative revision percentage (95% CI)					
Femur component	Acetabulum component	Primary THAs (n)	Hospitals (n)	Median (IQR) age (yr)	Revisions (n)	Total revision	Only femur	Only acetabulum	Only femoral head/inlay	Unknown	1yr	3yr	5yr	7yr	10yr	16yr
All uncemented THAs for osteoarthritis		**284,306**	**101**	**68 (62 - 74)**	**10,030**	**1,620**	**3,515**	**2,596**	**2,128**	**171**	**1.55 (1.51-1.60)**	**2.44 (2.38-2.50)**	**3.04 (2.97-3.11)**	**3.56 (3.48-3.63)**	**4.38 (4.29-4.48)**	**6.33 (6.14-6.52)**
Corail	Pinnacle	48,682	30	69 (63 - 75)	1,175	226	346	266	324	13	1.12 (1.03-1.22)	1.74 (1.62-1.86)	2.18 (2.04-2.32)	2.51 (2.35-2.67)	3.22 (3.02-3.43)	4.95 (4.20-5.69)
TAPERLOC Complete	Allofit	34,850	45	67 (61 - 73)	735	133	253	150	181	18	1.48 (1.35-1.61)	2.11 (1.94-2.27)	2.54 (2.34-2.73)	2.63 (2.43-2.84)	4.00 (1.43-6.57)	n.a.
Polarstem	R3	16,636	17	70 (63 - 76)	388	37	115	71	160	5	1.66 (1.46-1.86)	2.25 (2.01-2.48)	2.70 (2.42-2.99)	3.15 (2.72-3.58)	n.a.	n.a.
Alloclassic Zweymuller SL	Allofit	15,187	18	70 (64 - 77)	598	97	227	146	123	5	1.21 (1.04-1.39)	2.00 (1.78-2.23)	2.61 (2.35-2.87)	3.11 (2.82-3.39)	4.11 (3.76-4.45)	5.36 (4.87-5.85)
CLS Spotorno	Allofit	12,210	19	64 (58 - 69)	616	65	237	179	115	20	2.64 (2.36-2.93)	3.66 (3.32-4.00)	4.17 (3.80-4.53)	4.65 (4.26-5.03)	5.44 (5.00-5.88)	6.77 (5.90-7.63)
TAPERLOC Complete	EXCEED ABT	8,859*	11	69 (63 - 75)	216	38	80	44	50	4	1.40 (1.16-1.65)	1.86 (1.58-2.14)	2.16 (1.86-2.47)	2.44 (2.11-2.77)	2.69 (2.32-3.06)	n.a.
ACCOLADE II	TRIDENT	8,497	11	69 (62 - 75)	197	28	83	23	60	3	1.81 (1.52-2.10)	2.62 (2.24-3.00)	2.96 (2.47-3.44)	3.69 (2.50-4.89)	n.a.	n.a.
ACCOLADE	TRIDENT	7,608	10	69 (62 - 76)	389	53	204	53	77	2	1.40 (1.13-1.66)	2.83 (2.45-3.20)	3.68 (3.25-4.11)	4.41 (3.93-4.89)	5.34 (4.77-5.91)	n.a.
MALLORY HEAD STEMS	MALLORY HEAD	6,019*	15	65 (60 - 69)	250	31	24	112	77	6	1.41 (1.12-1.71)	2.25 (1.88-2.63)	2.68 (2.27-3.09)	3.20 (2.75-3.64)	3.74 (3.25-4.24)	5.41 (4.64-6.17)
Twinsys stem Cementless	RM Pressfit Vitamys cup	5,972	13	66 (60 - 72)	204	19	86	60	35	4	1.99 (1.63-2.35)	2.71 (2.28-3.13)	3.08 (2.61-3.54)	3.40 (2.89-3.91)	4.91 (4.12-5.71)	n.a.
TAPERLOC Complete	G7 PPS	5,855	18	70 (63 - 75)	110	16	35	22	33	4	1.57 (1.24-1.89)	2.19 (1.76-2.61)	n.a.	n.a.	n.a.	n.a.
ACCOLADE	TRIDENT TRITANIUM	4,539*	7	68 (62 - 74)	163	18	53	42	47	3	1.08 (0.78-1.38)	2.21 (1.79-2.64)	2.76 (2.28-3.24)	3.21 (2.68-3.73)	3.83 (3.20-4.45)	n.a.
Avenir Muller	Allofit	4,455	8	69 (62 - 75)	99	18	30	7	40	4	1.71 (1.32-2.10)	2.40 (1.89-2.92)	2.88 (2.19-3.58)	3.38 (2.40-4.36)	3.38 (2.40-4.36)	n.a.
FITMORE	Allofit	4,189	16	67 (62 - 73)	65	13	28	4	19	1	1.26 (0.91-1.61)	1.80 (1.33-2.27)	2.07 (1.51-2.63)	n.a.	n.a.	n.a.
Corail AMT	Pinnacle	3,941	20	69 (62 - 75)	47	5	8	9	24	1	0.89 (0.59-1.19)	1.27 (0.90-1.65)	1.42 (0.99-1.84)	1.42 (0.99-1.84)	n.a.	n.a.
TAPERLOC HIP system	EXCEED ABT	3,893*	14	68 (62 - 75)	136	23	37	43	25	8	1.18 (0.84-1.52)	2.31 (1.83-2.78)	2.69 (2.17-3.20)	2.91 (2.38-3.45)	3.34 (2.77-3.92)	n.a.
SL Plus	Bicon Plus	3,777*	5	70 (64 - 76)	315	49	156	85	22	3	1.70 (1.29-2.11)	3.97 (3.35-4.60)	5.40 (4.68-6.13)	6.49 (5.69-7.29)	7.90 (7.00-8.79)	10.48 (9.13-11.82)
TAPERLOC HIP system	MALLORY HEAD	3,670*	13	67 (61 - 71)	149	28	42	50	28	1	1.45 (1.06-1.83)	2.63 (2.11-3.15)	2.96 (2.41-3.51)	3.43 (2.83-4.02)	3.71 (3.09-4.33)	5.01 (4.06-5.96)
Twinsys stem Cementless	RM Pressfit cup	3,623	7	73 (68 - 78)	164	21	75	39	28	1	2.56 (2.04-3.08)	3.21 (2.63-3.79)	3.62 (3.00-4.25)	4.15 (3.46-4.84)	4.95 (4.11-5.78)	n.a.
TAPERLOC Complete	MALLORY HEAD	3,116*	14	67 (61 - 72)	119	20	26	32	40	1	2.09 (1.59-2.59)	3.06 (2.46-3.67)	3.36 (2.73-4.00)	3.65 (2.99-4.32)	4.01 (3.28-4.74)	n.a.
Alloclassic offset	Allofit	3,087	18	71 (65 - 77)	102	23	38	18	19	4	1.33 (0.93-1.74)	1.91 (1.43-2.40)	2.51 (1.94-3.08)	2.75 (2.14-3.36)	3.56 (2.80-4.32)	4.99 (3.73-6.24)
Synergy	Reflection	2,930*	14	66 (60 - 72)	169	13	77	33	45	1	2.12 (1.60-2.64)	2.70 (2.11-3.29)	3.09 (2.46-3.71)	3.59 (2.91-4.27)	4.39 (3.63-5.15)	7.70 (6.40-9.01)
Alloclassic Zweymuller SL	ALLOCLASSIC Zweymuller CSF	2,903*	8	69 (63 - 75)	149	19	64	27	37	2	1.11 (0.72-1.49)	2.65 (2.06-3.24)	3.27 (2.62-3.92)	3.53 (2.85-4.21)	4.37 (3.60-5.13)	6.38 (5.29-7.46)
ACCOLADE II	TRIDENT TRITANIUM	2,279	9	68 (61 - 74)	44	7	18	5	14	0	1.60 (1.07-2.14)	2.41 (1.65-3.16)	2.75 (1.74-3.76)	n.a.	n.a.	n.a.
Synergy	R3	2,104*	9	66 (60 - 72)	70	11	36	12	9	2	1.81 (1.24-2.38)	2.29 (1.65-2.93)	2.83 (2.12-3.55)	3.10 (2.35-3.84)	3.47 (2.66-4.29)	n.a.
SYMAX	TRIDENT	2,073*	4	69 (63 - 75)	77	7	21	20	28	1	0.58 (0.25-0.91)	1.66 (1.11-2.22)	2.22 (1.58-2.86)	2.80 (2.07-3.52)	3.25 (2.47-4.03)	4.37 (3.33-5.40)
Anthology	R3	1,898	5	65 (59 - 69)	65	9	20	20	16	0	2.08 (1.44-2.73)	2.63 (1.90-3.35)	3.26 (2.45-4.07)	3.40 (2.56-4.23)	3.73 (2.82-4.65)	n.a.
M/L Taper	Continuum	1,807	4	68 (62 - 73)	48	6	32	6	4	0	1.74 (1.14-2.35)	2.35 (1.62-3.07)	2.74 (1.92-3.56)	2.95 (2.04-3.87)	n.a.	n.a.
SYMAX	TRIDENT TRITANIUM	1,743*	5	67 (61 - 73)	104	12	47	30	14	1	2.30 (1.60-3.00)	3.59 (2.71-4.47)	3.95 (3.03-4.87)	4.78 (3.76-5.80)	5.42 (4.33-6.52)	n.a.
MALLORY HEAD STEMS	EXCEED ABT	1,637*	10	65 (59 - 71)	39	4	16	17	2	0	0.67 (0.28-1.07)	1.60 (0.99-2.21)	1.73 (1.09-2.36)	2.05 (1.36-2.74)	2.33 (1.59-3.08)	n.a.
OMNIFIT HA	TRIDENT	1,501*	8	63 (57 - 67)	160	22	76	26	32	4	3.07 (2.20-3.94)	4.48 (3.43-5.53)	6.26 (5.03-7.50)	7.73 (6.37-9.10)	9.58 (8.06-11.09)	11.53 (9.79-13.28)
Alloclassic Zweymuller SL	Continuum	1,283	7	71 (64 - 77)	38	7	15	4	11	1	1.56 (0.88-2.24)	2.14 (1.34-2.93)	2.50 (1.63-3.37)	2.79 (1.87-3.72)	3.06 (2.06-4.06)	n.a.
Optimys stem	RM Pressfit Vitamys cup	1,272	9	63 (56 - 70)	29	4	14	7	3	1	1.74 (1.00-2.47)	2.39 (1.49-3.30)	2.55 (1.60-3.50)	2.55 (1.60-3.50)	n.a.	n.a.
CLS Spotorno	RM Classic cup	1,177*	3	63 (58 - 68)	88	18	25	37	7	1	1.87 (1.10-2.65)	2.64 (1.73-3.56)	3.34 (2.31-4.37)	3.87 (2.76-4.98)	5.07 (3.80-6.34)	7.88 (6.21-9.56)
Corail	Pinnacle Gription	1,009	18	71 (64 - 76)	17	2	6	3	6	0	1.30 (0.56-2.03)	2.21 (1.12-3.30)	n.a.	n.a.	n.a.	n.a.
SL Plus	Hofer-Imhoff LUBRIMET	978*	3	70 (64 - 76)	66	14	33	11	6	2	1.13 (0.47-1.79)	2.27 (1.33-3.21)	3.56 (2.38-4.73)	4.44 (3.13-5.76)	5.61 (4.13-7.10)	7.74 (5.90-9.59)
Alloclassic Zweymuller SL	Trilogy	966*	5	68 (63 - 75)	35	10	10	7	8	0	1.35 (0.62-2.07)	2.18 (1.26-3.10)	2.60 (1.59-3.60)	2.92 (1.86-3.99)	3.59 (2.40-4.77)	3.70 (2.50-4.91)
Polarstem	Reflection	927*	3	70 (64 - 76)	21	7	4	2	8	0	1.08 (0.41-1.75)	1.63 (0.81-2.45)	1.97 (1.07-2.88)	2.21 (1.25-3.17)	2.51 (1.39-3.63)	n.a.
TAPERLOC Complete	Continuum	829*	11	68 (59 - 74)	23	6	7	4	6	0	1.93 (0.99-2.87)	2.68 (1.57-3.78)	2.82 (1.68-3.96)	n.a.	n.a.	n.a.
SL Plus	EP-Fit Plus	790*	3	68 (63 - 75)	48	10	25	12	1	0	1.27 (0.49-2.06)	3.08 (1.87-4.30)	3.75 (2.41-5.09)	4.88 (3.35-6.42)	5.66 (3.99-7.33)	7.10 (4.98-9.22)
CLS Spotorno	FITMORE	758*	5	66 (61 - 71)	42	4	21	6	10	1	1.85 (0.89-2.81)	2.38 (1.29-3.46)	2.64 (1.50-3.79)	3.33 (2.04-4.61)	4.33 (2.86-5.80)	6.01 (4.23-7.79)
H-MAX S	Delta-TT	702	4	64 (58 - 70)	39	5	17	8	9	0	3.87 (2.41-5.33)	5.24 (3.42-7.06)	5.60 (3.66-7.55)	6.64 (4.24-9.04)	8.23 (5.27-11.19)	n.a.
Optimys stem	RM Pressfit cup	664	4	70 (64 - 75)	13	2	6	1	4	0	1.62 (0.62-2.62)	2.22 (0.92-3.53)	2.70 (1.10-4.31)	2.70 (1.10-4.31)	n.a.	n.a.
FITMORE	G7 PPS	658	8	58 (53 - 69)	6	0	3	1	1	1	0.94 (0.19-1.69)	n.a.	n.a.	n.a.	n.a.	n.a.
CLS Spotorno	RM Pressfit cup	625*	5	66 (60 - 71)	61	6	25	21	5	4	3.05 (1.70-4.39)	4.36 (2.75-5.97)	5.69 (3.86-7.53)	6.56 (4.60-8.53)	7.80 (5.63-9.98)	11.43 (8.67-14.20)
CBH stem	RM Pressfit Vitamys cup	593*	4	65 (60 - 70)	25	8	8	7	2	0	1.01 (0.21-1.82)	2.38 (1.15-3.62)	3.25 (1.81-4.69)	3.96 (2.37-5.54)	4.14 (2.52-5.76)	n.a.
M/L Taper	Allofit	554	3	66 (60 - 72)	18	1	5	5	7	0	2.22 (0.98-3.47)	2.64 (1.27-4.00)	3.07 (1.58-4.55)	3.29 (1.75-4.83)	3.56 (1.93-5.19)	n.a.
CBH stem	RM Pressfit cup	551*	4	75 (69 - 79)	26	4	8	12	2	0	2.19 (0.96-3.42)	3.68 (2.10-5.27)	3.88 (2.25-5.51)	4.29 (2.57-6.00)	5.07 (3.15-6.99)	n.a.
Alloclassic Zweymuller SL	Trabecular Metal	547*	5	68 (62 - 75)	30	2	11	9	7	1	0.55 (0.00-1.17)	1.85 (0.71-2.98)	2.61 (1.26-3.95)	3.38 (1.84-4.91)	3.58 (2.00-5.16)	6.02 (3.76-8.29)

* Denotes prosthesis combinations with no reported use in primary THAs in 2024.

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

Only combinations with over 500 procedures and reported by at least 3 hospitals have been listed.

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.

By uncemented component name - major revision

TABLE Cumulative 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 2007-2024 (n=284,306)

Femur component	Acetabulum component	Primary THAs (n)	Median (IQR) age (yr)	Major revisions (n)	Cumulative revision percentage (95% CI)					
					1yr	3yr	5yr	7yr	10yr	16yr
All uncemented THAs for osteoarthritis		**284,306**	**68 (62 - 74)**	**8,101**	**1.08 (1.04-1.12)**	**1.86 (1.81-1.91)**	**2.40 (2.34-2.46)**	**2.86 (2.79-2.93)**	**3.62 (3.53-3.71)**	**5.40 (5.22-5.57)**
Corail	Pinnacle	48,682	69 (63 - 75)	896	0.68 (0.61-0.76)	1.24 (1.13-1.34)	1.64 (1.52-1.76)	1.92 (1.78-2.06)	2.54 (2.35-2.73)	4.22 (3.49-4.94)
TAPERLOC Complete	Allofit	34,850	67 (61 - 73)	565	1.03 (0.92-1.14)	1.60 (1.46-1.74)	2.03 (1.85-2.20)	2.11 (1.92-2.30)	3.48 (0.90-6.06)	n.a.
Polarstem	R3	16,636	70 (63 - 76)	240	0.86 (0.72-1.01)	1.34 (1.16-1.53)	1.75 (1.52-1.99)	2.17 (1.78-2.56)	n.a.	n.a.
Alloclassic Zweymuller SL	Allofit	15,187	70 (64 - 77)	487	0.86 (0.71-1.01)	1.54 (1.34-1.74)	2.08 (1.85-2.31)	2.45 (2.20-2.71)	3.34 (3.02-3.65)	4.54 (4.07-5.01)
CLS Spotorno	Allofit	12,210	64 (58 - 69)	507	1.95 (1.71-2.20)	2.86 (2.56-3.15)	3.33 (3.01-3.66)	3.78 (3.43-4.13)	4.54 (4.13-4.95)	5.85 (5.00-6.70)
TAPERLOC Complete	EXCEED ABT	8,859*	69 (63 - 75)	172	1.06 (0.85-1.28)	1.44 (1.19-1.69)	1.65 (1.38-1.92)	1.92 (1.62-2.21)	2.17 (1.83-2.50)	n.a.
ACCOLADE II	TRIDENT	8,497	69 (62 - 75)	138	1.25 (1.00-1.49)	1.82 (1.50-2.13)	2.09 (1.67-2.51)	2.82 (1.66-3.99)	n.a.	n.a.
ACCOLADE	TRIDENT	7,608	69 (62 - 76)	321	1.03 (0.80-1.25)	2.23 (1.90-2.57)	2.99 (2.60-3.38)	3.56 (3.13-3.99)	4.35 (3.83-4.87)	n.a.
MALLORY HEAD STEMS	MALLORY HEAD	6,019*	65 (60 - 69)	183	0.95 (0.70-1.19)	1.60 (1.29-1.92)	2.00 (1.64-2.35)	2.43 (2.03-2.82)	2.81 (2.38-3.24)	3.91 (3.25-4.57)
Twinsys stem Cementless	RM Pressfit Vitamys cup	5,972	66 (60 - 72)	172	1.50 (1.19-1.82)	2.20 (1.81-2.59)	2.52 (2.09-2.94)	2.88 (2.40-3.36)	4.33 (3.56-5.10)	n.a.

* Denotes prosthesis combinations with no reported use in primary THAs in 2024.

Major revision precentage: first revision of the acetabulum or femur component, regardless of whether a minor revision has already taken place. Therefor, the first three revision procedures were reviewed.

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

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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.

By bone cement

TABLE Cumulative revision percentages of the most frequently types of bone cement by type of mixing system in primary total hip arthroplasties of patients who underwent a THA for osteoarthritis in the Netherlands in 2007-2024

Bone cement	Primary THAs (n)	Median (IQR) age (yr)	Revisions (n)	Cumulative revision percentage (95% CI)					
				1yr	3yr	5yr	7yr	10yr	16yr
Separately packed	**84,460**	**75 (69 - 80)**	**3,044**	**1.35 (1.27-1.43)**	**2.20 (2.10-2.30)**	**2.74 (2.63-2.86)**	**3.21 (3.08-3.34)**	**4.06 (3.91-4.22)**	**5.84 (5.53-6.15)**
PALACOS R+G	66,310	75 (69 - 80)	2,324	1.40 (1.31-1.49)	2.26 (2.15-2.38)	2.79 (2.66-2.92)	3.22 (3.08-3.37)	3.99 (3.81-4.16)	5.76 (5.39-6.14)
Refobacin Bone Cement R	5,850	76 (71 - 80)	186	1.07 (0.81-1.34)	1.83 (1.47-2.18)	2.22 (1.83-2.62)	2.75 (2.30-3.19)	3.71 (3.16-4.27)	4.19 (3.57-4.81)
PALACOS MV+G	3,513	76 (72 - 81)	105	1.07 (0.73-1.41)	1.64 (1.21-2.07)	2.25 (1.74-2.77)	3.13 (2.49-3.77)	3.64 (2.91-4.37)	n.a.
Simplex ABC EC	1,790	68 (57 - 75)	100	1.74 (1.13-2.35)	2.61 (1.86-3.35)	3.62 (2.74-4.50)	4.01 (3.08-4.94)	5.72 (4.53-6.92)	11.19 (7.35-15.03)
Simplex ABC TOBRA	1,763	74 (68 - 79)	115	1.60 (1.01-2.19)	2.67 (1.91-3.43)	3.31 (2.46-4.16)	4.05 (3.10-5.01)	5.92 (4.74-7.11)	9.20 (7.23-11.17)
Simplex P	1,105*	76 (72 - 80)	26	0.82 (0.28-1.35)	1.65 (0.89-2.41)	1.65 (0.89-2.41)	1.87 (1.05-2.68)	2.47 (1.47-3.47)	n.a.
Refobacin Plus Bone Cement	490*	77 (72 - 81)	22	1.43 (0.38-2.48)	2.68 (1.24-4.12)	3.33 (1.73-4.94)	3.80 (2.07-5.52)	4.43 (2.50-6.35)	5.23 (3.02-7.43)
Simplex HV	475*	77 (72 - 81)	11	0.85 (0.02-1.67)	0.85 (0.02-1.67)	1.78 (0.56-3.01)	2.56 (1.06-4.05)	n.a.	n.a.
Biomet Plus Bone Cement	426	74 (70 - 79)	26	0.47 (0.00-1.12)	1.21 (0.16-2.26)	2.24 (0.79-3.69)	3.05 (1.35-4.76)	4.21 (2.18-6.23)	7.50 (4.46-10.54)
Subiton G	420	80 (76 - 83)	13	1.21 (0.16-2.27)	2.60 (1.00-4.19)	4.00 (1.77-6.24)	n.a.	n.a.	n.a.
PALAMED G	406*	75 (71 - 81)	12	0.25 (0.00-0.74)	0.50 (0.00-1.20)	1.03 (0.03-2.04)	1.58 (0.33-2.84)	2.79 (1.08-4.50)	3.53 (1.55-5.52)
CMW 1 GENTAMICIN Bone Cement	275*	72 (67 - 77)	11	1.09 (0.00-2.32)	1.84 (0.24-3.44)	1.84 (0.24-3.44)	1.84 (0.24-3.44)	2.82 (0.74-4.90)	n.a.
PALACOS R	260*	79 (74 - 83)	13	1.16 (0.00-2.46)	1.57 (0.04-3.10)	2.88 (0.77-4.99)	3.87 (1.38-6.37)	5.72 (2.51-8.93)	n.a.
PALAMED	256*	74 (70 - 79)	27	1.17 (0.00-2.49)	2.74 (0.74-4.74)	3.94 (1.55-6.34)	3.94 (1.55-6.34)	6.56 (3.44-9.67)	11.70 (7.53-15.87)
Pre-packed in a vacuum mixing system	**41,820**	**77 (71 - 81)**	**1,211**	**1.81 (1.68-1.94)**	**2.57 (2.41-2.74)**	**3.13 (2.94-3.32)**	**3.61 (3.39-3.84)**	**4.33 (4.02-4.65)**	**5.67 (4.65-6.69)**
PALACOS R+G	19,279	76 (71 - 81)	504	1.92 (1.72-2.12)	2.61 (2.36-2.86)	3.19 (2.89-3.50)	3.75 (3.33-4.16)	n.a.	n.a.
Refobacin Bone Cement R	17,779	77 (72 - 81)	576	1.89 (1.69-2.10)	2.71 (2.46-2.96)	3.30 (3.01-3.58)	3.79 (3.45-4.12)	4.53 (4.09-4.98)	n.a.
Refobacin Plus Bone Cement	3,978	77 (72 - 82)	113	1.03 (0.72-1.35)	1.85 (1.43-2.28)	2.28 (1.80-2.77)	2.74 (2.19-3.29)	3.37 (2.70-4.04)	n.a.
Cemex Genta	324*	80 (75 - 83)	9	0.93 (0.00-1.99)	1.89 (0.39-3.39)	2.24 (0.60-3.88)	2.24 (0.60-3.88)	3.48 (1.08-5.88)	n.a.

* Denotes types of bone cement with no reported use in primary THAs in 2024.

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

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Only types of bone cement with over 250 procedures have been listed.

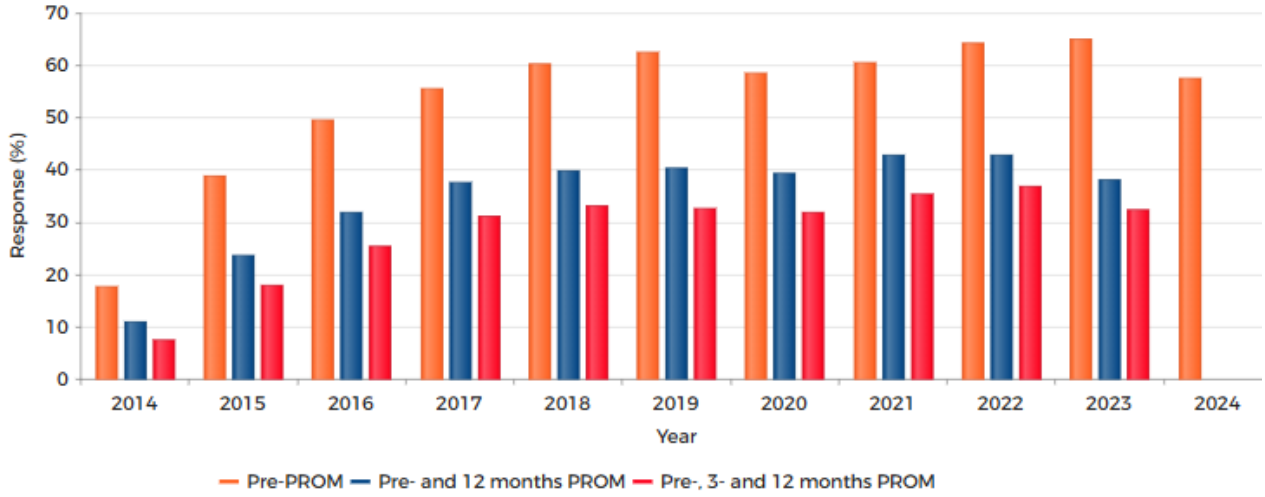
Results must be interpreted with caution. Patient characteristics like age and diagnosis, as well as procedure characteristics like the experience of the surgeon performing the procedure, femoral head size and articulation of the prosthesis may have influenced the cumulative revision percentages.

PROMs

Respons

Per year

FIGURE Pre-operative, 3 months and 12 months postoperative response percentage of patients who underwent a THA for osteoarthritis in the Netherlands in 2014-2024

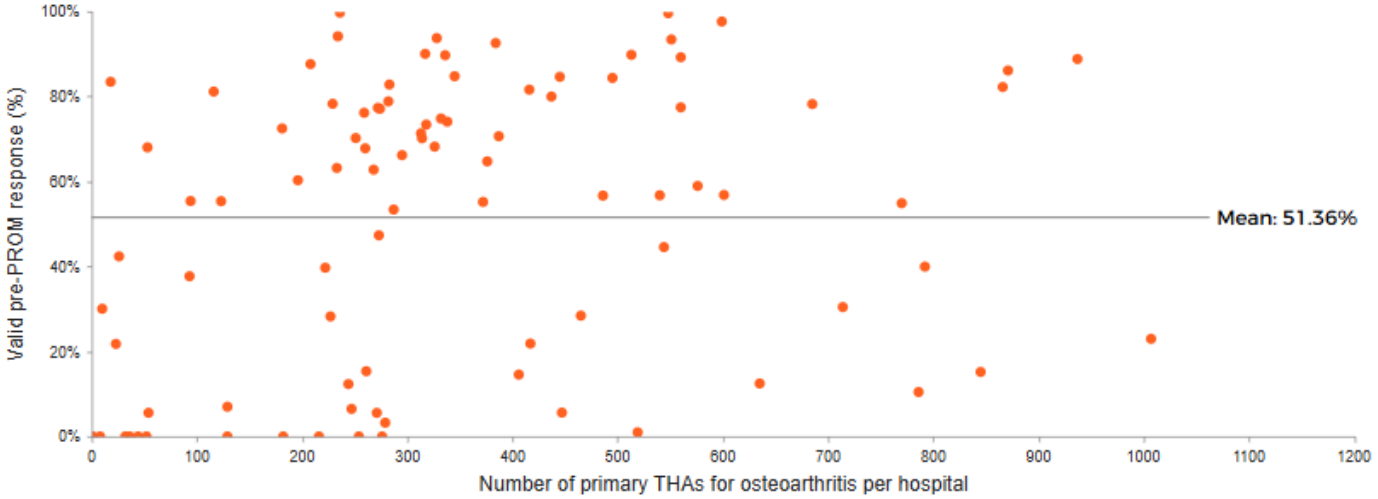


	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Pre-PROM	17.81	38.81	49.55	55.54	60.32	62.57	58.66	60.48	64.31	65.09	57.47
Pre- and 12 months PROM	11.02	23.60	31.81	37.73	39.86	40.29	39.42	42.74	42.90	38.10	n.a.
Pre-, 3- and 12 months PROM	7.58	18.01	25.51	31.17	33.14	32.55	31.81	35.32	36.98	32.32	n.a.
Total THAs for osteoarthritis (n)	**24,196**	**24,838**	**25,376**	**26,175**	**27,495**	**28,557**	**23,086**	**26,963**	**31,352**	**31,340**	**31,586**

Please note: The 12 months postoperative PROMs response percentage is not (yet) available for 2024.
THA: total hip arthroplasty; PROM: patient reported outcome measure.

Pre-PROM per hospital

FIGURE Scatterplot of pre-operative response percentage of patients who underwent a primary THA for osteoarthritis per hospital in the Netherlands in 2024



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

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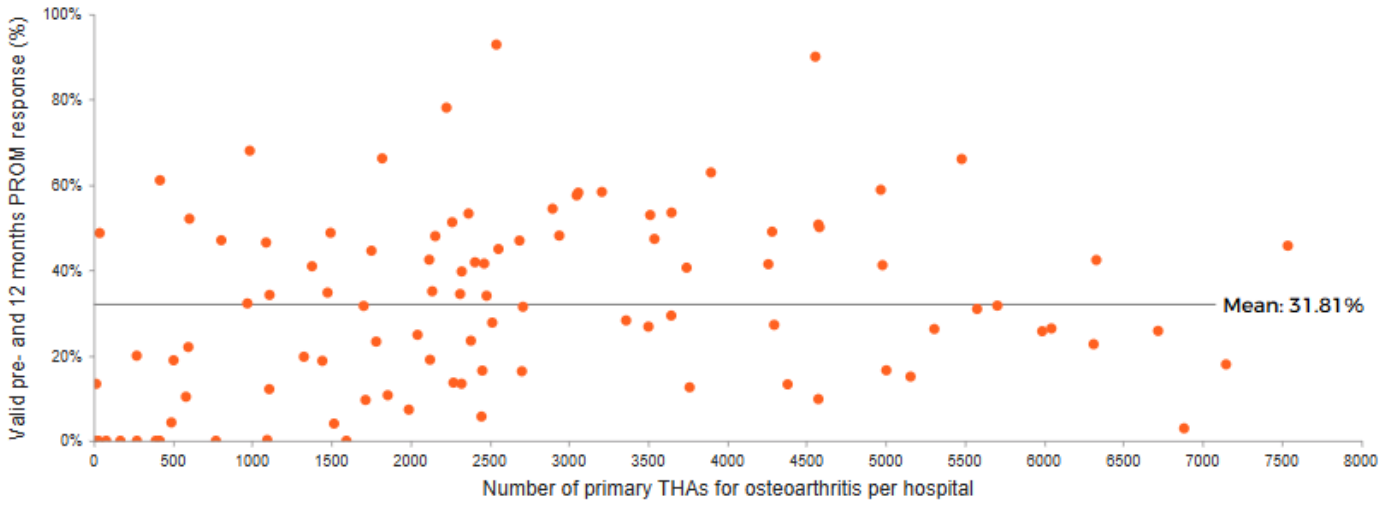
The mean pre-operative response rate is 51.4% in the Netherlands in 2024.

Of the 92 hospitals, 46 (51%) scored above the 60% response rate.

PROM trajectory per hospital

FIGURE Scatterplot of PROM trajectory (pre-operative and 12 months postoperative) response percentage of patients who underwent a primary THA for osteoarthritis per hospital in the Netherlands in 2014-2023



Please note: The 12 months postoperative PROMs response percentage is not (yet) available for 2024.

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

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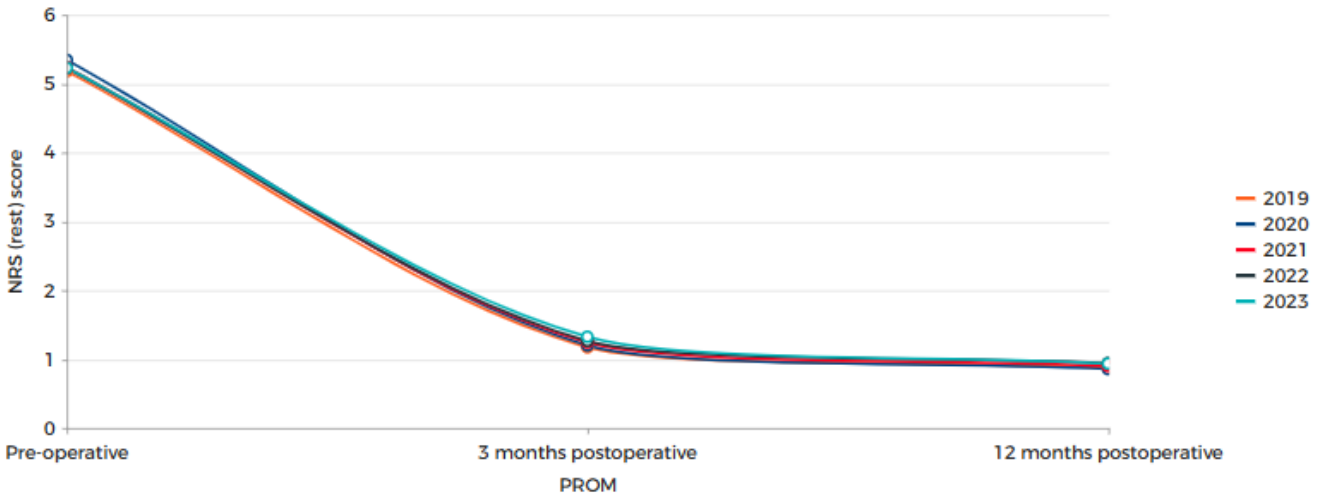
The mean PROM trajectory response rate was 31.8% in the Netherlands between 2014-2023.

Of the 100 hospitals, 8 (8%) scored above the 60% response rate.

Outcomes

NRS (rest)

FIGURE Mean (95% CI) pre-operative, 3 months and 12 months postoperative NRS (rest) scores of patients who underwent a THA for osteoarthritis in the Netherlands in 2019-2023



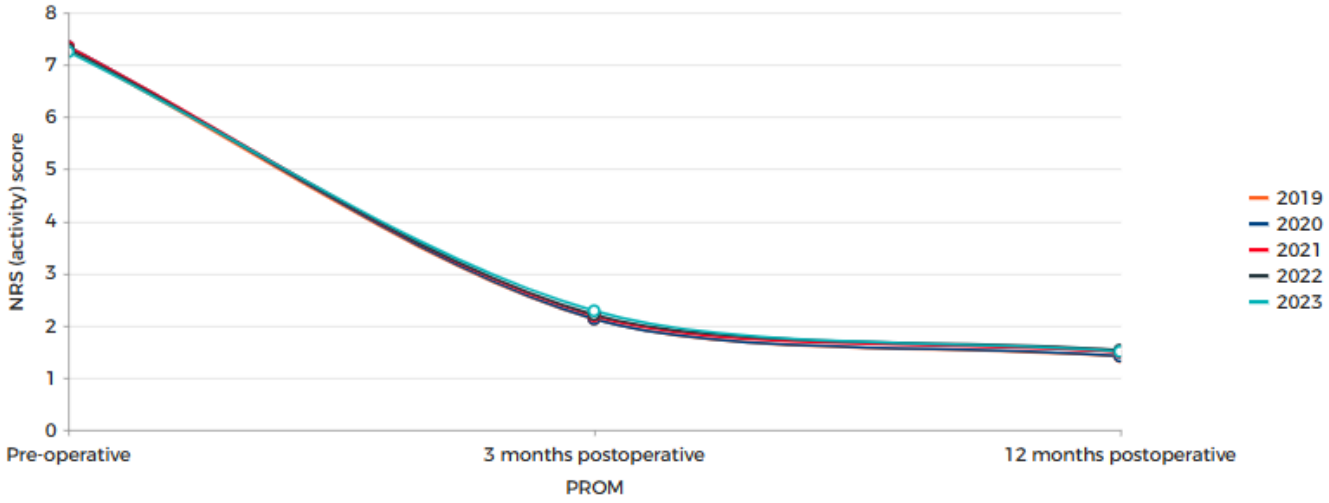
NRS (rest) score		Pre-operative	3 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	9,295	5.18 (5.13-5.23)	1.17 (1.14-1.21)	0.88 (0.84-0.91)
2020	7,344	5.35 (5.29-5.40)	1.20 (1.16-1.25)	0.86 (0.82-0.90)
2021	9,522	5.24 (5.19-5.29)	1.24 (1.21-1.28)	0.90 (0.87-0.94)
2022	11,594	5.22 (5.18-5.27)	1.27 (1.23-1.30)	0.94 (0.91-0.98)
2023	10,130	5.23 (5.18-5.28)	1.33 (1.29-1.37)	0.94 (0.90-0.97)
Total	47,885	5.24 (5.22-5.26)	1.25 (1.23-1.26)	0.91 (0.89-0.92)

THA: total hip arthroplasty; CI: confidence interval.

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 (95% CI) pre-operative, 3 months and 12 months postoperative NRS (activity) scores of patients who underwent a THA for osteoarthritis in the Netherlands in 2019-2023



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NRS (activity) score		Pre-operative	3 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	9,295	7.28 (7.24-7.32)	2.13 (2.08-2.17)	1.41 (1.36-1.45)
2020	7,344	7.34 (7.30-7.39)	2.13 (2.08-2.18)	1.42 (1.37-1.47)
2021	9,522	7.34 (7.30-7.38)	2.19 (2.14-2.23)	1.49 (1.44-1.53)
2022	11,594	7.30 (7.26-7.33)	2.21 (2.17-2.25)	1.53 (1.49-1.57)
2023	10,130	7.25 (7.21-7.29)	2.28 (2.24-2.33)	1.50 (1.46-1.55)
Total	47,885	7.30 (7.28-7.32)	2.19 (2.17-2.21)	1.48 (1.46-1.50)

THA: total hip arthroplasty; CI: confidence interval.

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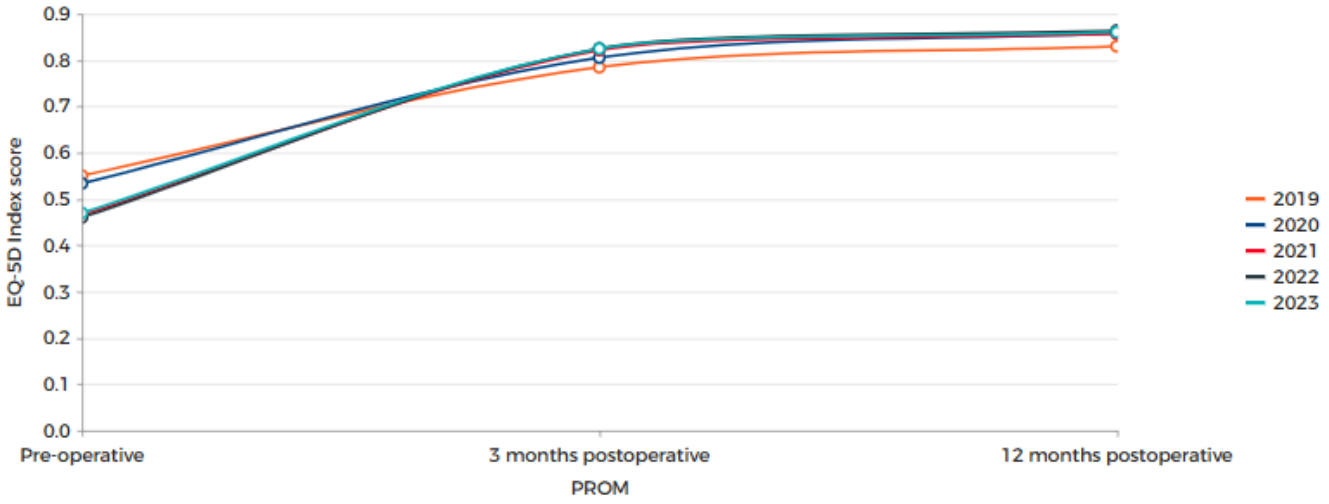
The NRS (activity) score measures pain during activity. The score has a range of 0.0 to 10.0, with 0.0 representing no pain and 10.0 representing the most possible pain.

EQ-5D Index score

FIGURE Mean (95% CI) pre-operative, 3 months and 12 months postoperative EQ-5D index scores of patients who underwent a THA for osteoarthritis in the Netherlands in 2019-2023



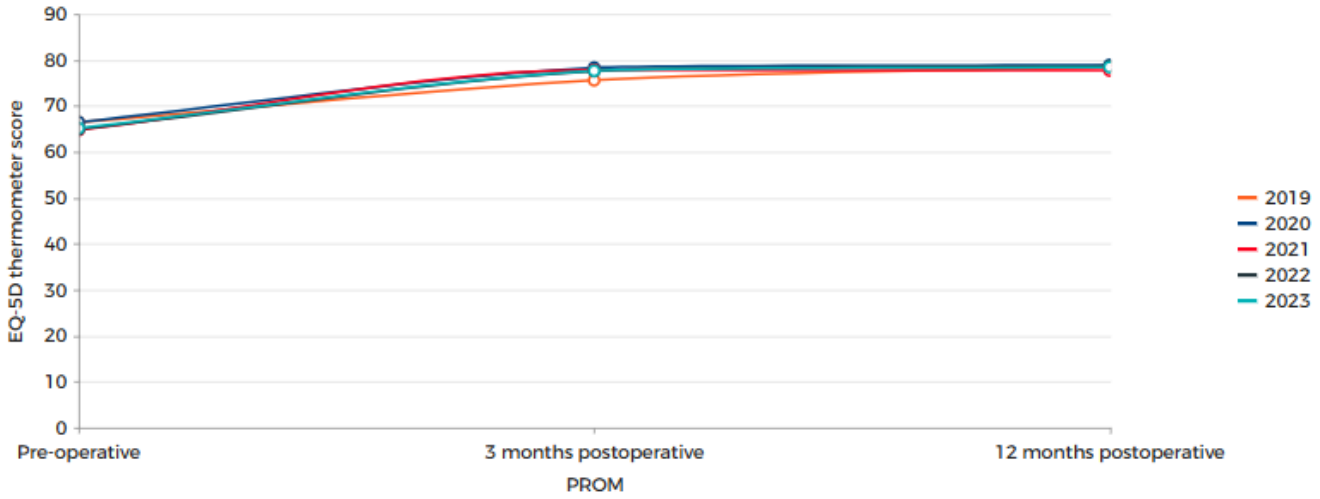
EQ-5D Index score		Pre-operative	3 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	9,295	0.55 (0.55-0.55)	0.78 (0.78-0.79)	0.83 (0.83-0.83)
2020	7,344	0.53 (0.53-0.54)	0.81 (0.80-0.81)	0.86 (0.85-0.86)
2021	9,522	0.46 (0.46-0.47)	0.82 (0.82-0.82)	0.86 (0.85-0.86)
2022	11,594	0.46 (0.46-0.47)	0.83 (0.82-0.83)	0.86 (0.86-0.87)
2023	10,130	0.47 (0.46-0.48)	0.82 (0.82-0.83)	0.86 (0.86-0.86)
Total	47,885	0.49 (0.49-0.49)	0.81 (0.81-0.82)	0.85 (0.85-0.86)

THA: total hip arthroplasty; CI: confidence interval.

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

FIGURE Mean (95% CI) pre-operative, 3 months and 12 months postoperative EQ-5D thermometer scores of patients who underwent a THA for osteoarthritis in the Netherlands in 2019-2023



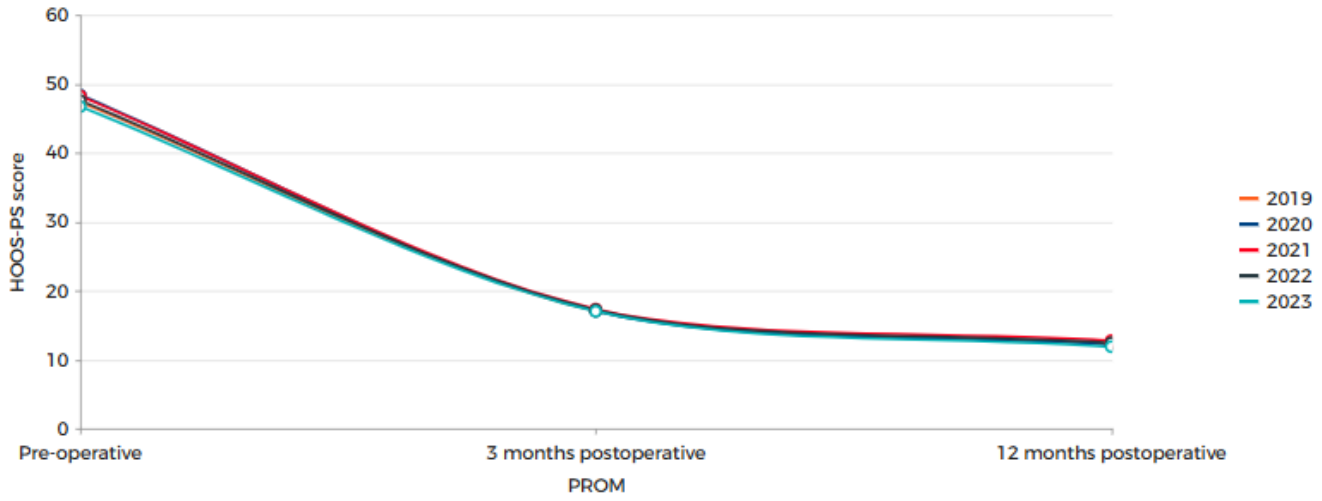
EQ-5D thermometer score		Pre-operative	3 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	9,295	66.42 (66.01-66.82)	75.57 (75.14-76.00)	78.47 (78.09-78.85)
2020	7,344	66.47 (66.00-66.94)	78.34 (77.94-78.74)	78.91 (78.50-79.32)
2021	9,522	64.75 (64.33-65.17)	77.85 (77.50-78.20)	77.71 (77.33-78.09)
2022	11,594	64.91 (64.54-65.28)	77.59 (77.26-77.92)	78.67 (78.34-79.00)
2023	10,130	65.17 (64.77-65.57)	77.65 (77.31-77.99)	78.45 (78.11-78.80)
Total	47,885	65.46 (65.28-65.64)	77.38 (77.21-77.54)	78.43 (78.27-78.59)

THA: total hip arthroplasty; CI: confidence interval.

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 (95% CI) pre-operative, 3 months and 12 months postoperative HOOS-PS scores of patients who underwent a THA for osteoarthritis in the Netherlands in 2019-2023



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HOOS-PS score		Pre-operative	3 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	9,295	47.34 (46.98-47.69)	17.06 (16.76-17.36)	12.31 (12.01-12.61)
2020	7,344	48.36 (47.96-48.76)	17.04 (16.71-17.37)	12.15 (11.83-12.48)
2021	9,522	48.22 (47.85-48.58)	17.31 (17.01-17.61)	12.74 (12.44-13.04)
2022	11,594	47.56 (47.23-47.88)	17.22 (16.95-17.48)	12.43 (12.16-12.70)
2023	10,130	46.70 (46.35-47.05)	16.99 (16.70-17.29)	11.87 (11.58-12.16)
Total	47,885	47.59 (47.43-47.75)	17.13 (17.00-17.26)	12.31 (12.18-12.44)

THA: total hip arthroplasty; CI: confidence interval.

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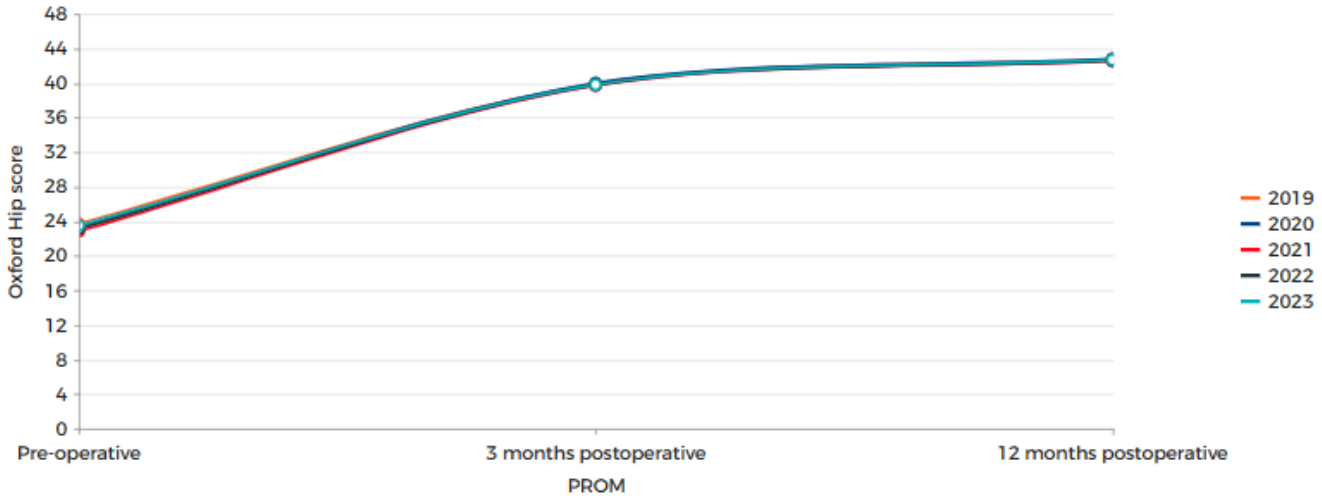
The HOOS-PS score measures the physical functioning of patients with osteoarthritis to the hip. The score has a range of 0.0 to 100.0, with 0.0 representing no effort and 100.0 the most possible effort.

Oxford Hip Score

FIGURE Mean (95% CI) pre-operative, 3 months and 12 months postoperative Oxford Hip scores of patients who underwent a THA for osteoarthritis in the Netherlands in 2019-2023



Oxford Hip score		Pre-operative	3 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	9,295	23.73 (23.56-23.90)	39.95 (39.80-40.09)	42.77 (42.63-42.91)
2020	7,344	23.31 (23.12-23.51)	40.01 (39.85-40.16)	42.80 (42.65-42.96)
2021	9,522	22.85 (22.68-23.03)	39.70 (39.55-39.85)	42.55 (42.41-42.69)
2022	11,594	23.13 (22.97-23.28)	39.78 (39.65-39.91)	42.58 (42.46-42.70)
2023	10,130	23.49 (23.32-23.66)	39.82 (39.68-39.96)	42.69 (42.56-42.83)
Total	47,885	23.30 (23.22-23.37)	39.84 (39.77-39.90)	42.67 (42.61-42.73)

THA: total hip arthroplasty; CI: confidence interval.

The Oxford Hip score measures the physical functioning and pain of patients with osteoarthritis to the hip. The score has a range of 0.0 to 48.0, with 0.0 representing no functional ability and 48.0 the most functional ability.

Hip hemiarthroplasty

In this section you will find all the information on hip hemiarthroplasty:

Patient characteristics

By specialism

TABLE Patient characteristics of all patients with a primary hemiarthroplasty by specialism in the Netherlands in 2024

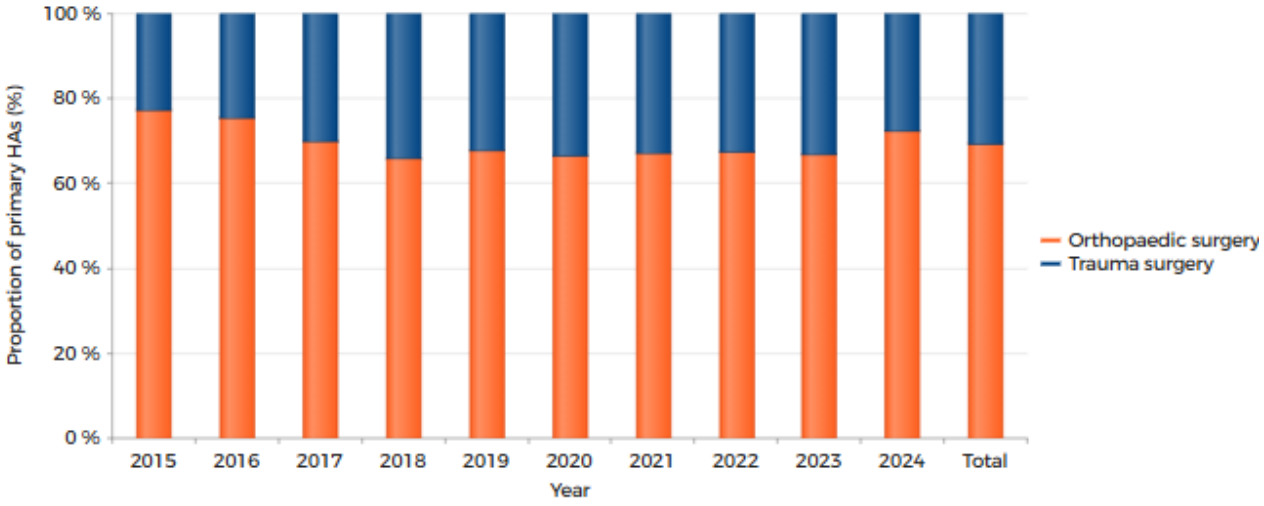
	Orthopaedic surgery	Trauma surgery	Total
N(%)	**4,345 (72.4)**	**1,660 (27.6)**	**6,017**
Mean age (years) (SD)	80.4 (9.3)	81.7 (7.6)	80.7 (8.9)
Age (years) (%)			
<50	1	0	0
50-59	2	1	2
60-69	7	5	7
70-79	30	30	30
>80	59	64	61
Gender (%)			
Men	37	37	37
Women	63	63	63
ASA score (%)			
ASA I	2	2	2
ASA II	30	29	29
ASA III-IV	68	69	69
Type of hospital (%)			
General	97	95	96
UMC	3	5	3
Private	0	0	0
Diagnosis (%)			
Fracture	88	92	89
Osteoarthritis	8	0	6
Post-traumatic	0	0	0
Tumour	0	0	1
Osteonecrosis	0	0	0
Dysplasia	0	0	0
Rheumatoid arthritis	0	0	0
Post-Perthes	0	0	0
Other	1	7	3
Mean BMI (kg/m2) (SD)	24.8 (4.4)	24.4 (4.5)	24.7 (4.4)
Body Mass Index (kg/m2) (%)			
Underweight (<=18.5)	5	4	5
Normal weight (>18.5-25)	49	47	55
Overweight (>25-30)	28	23	30
Obesity (>30-40)	9	6	9
Morbid obesity (>40)	0	0	0
Smoking (%)			
No	89	74	90
Yes	9	10	10

General: general hospital; UMC: university medical centre; Private: private hospital; SD: standard deviation

Procedure characteristics

Specialism

FIGURE Trend (proportion [%] per year) in specialism for performing a primary hemiarthroplasty in the Netherlands in 2015-2024

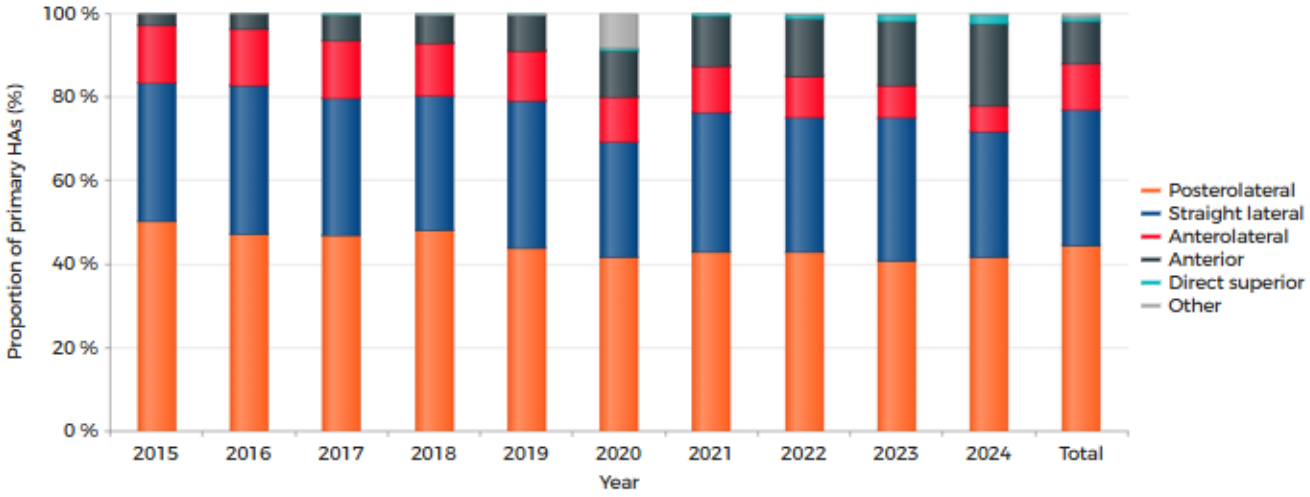


	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Orthopaedic surgery	77.19	75.35	69.89	66.04	67.70	66.53	67.29	67.40	66.72	72.36	69.34
Trauma surgery	22.81	24.65	30.11	33.96	32.30	33.47	32.71	32.60	33.28	27.64	30.66
Total (n)	**4,747**	**5,261**	**5,723**	**6,081**	**6,295**	**6,537**	**6,109**	**6,458**	**6,299**	**6,005**	**59,515**

HA: hemiarthroplasty

Surgical approach

FIGURE Trend (proportion [%] per year) in surgical approach for performing a primary hemiarthroplasty in the Netherlands in 2015-2024

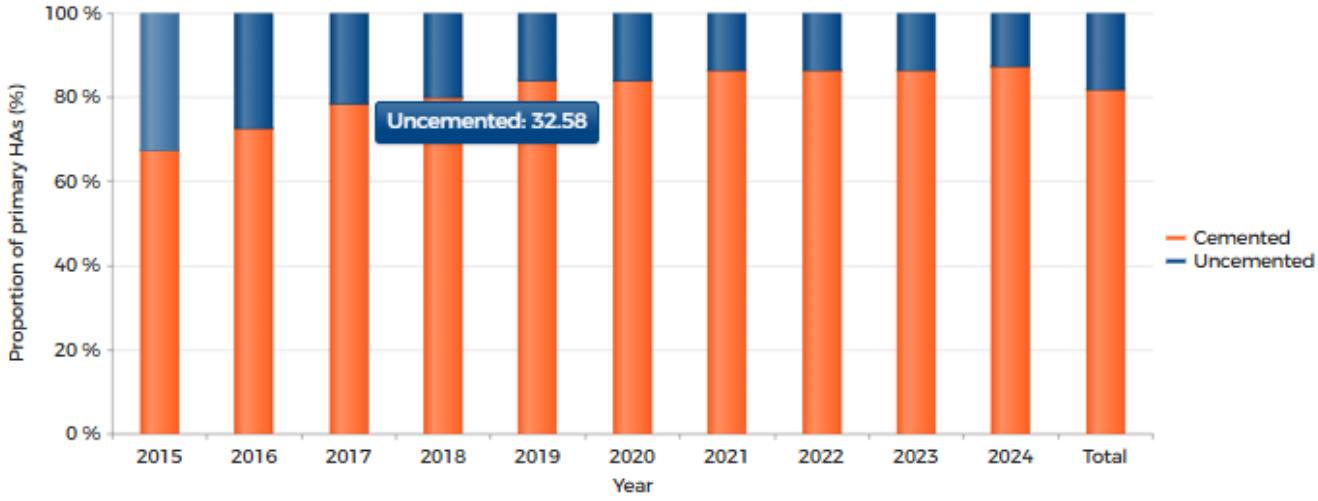


	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Posterolateral	50.26	47.36	46.83	48.25	43.73	41.61	42.82	42.86	40.87	41.81	44.45
Straight lateral	33.26	35.48	32.97	32.08	35.56	27.84	33.63	32.40	34.22	29.94	32.68
Anterolateral	13.60	13.41	13.87	12.64	11.69	10.47	10.98	9.79	7.80	6.09	10.94
Anterior	2.77	3.62	6.04	6.62	8.67	11.11	12.07	13.62	15.35	19.83	10.21
Direct superior	0	0	0.17	0.11	0.19	0.72	0.45	1.17	1.56	2.11	0.67
Other	0.11	0.13	0.12	0.29	0.16	8.26	0.05	0.17	0.21	0.22	1.05
Total (n)	**4,757**	**5,443**	**5,911**	**6,240**	**6,286**	**6,516**	**5,992**	**6,433**	**6,286**	**5,931**	**59,795**

HA: hemiarthroplasty

Fixation

FIGURE Trend (proportion [%] per year) in type of fixation in primary hemiarthroplasty in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Cemented	67.42	72.70	78.58	80.05	83.90	84.08	86.46	86.40	86.53	87.45	81.83
Uncemented	32.58	27.30	21.42	19.95	16.10	15.92	13.54	13.60	13.47	12.55	18.17
Total (n)	**4,693**	**5,345**	**5,811**	**6,111**	**6,187**	**6,349**	**6,047**	**6,389**	**6,228**	**5,799**	**58,959**

HA: hemiarthroplasty

Most frequently registered – Femur

TABLE The most frequently registered femur components in primary hemiarthroplasties in the Netherlands in 2020-2024

Year	2020	2021	2022	2023	2024
Femur (n)	**6,066**	**5,825**	**6,047**	**6,081**	**5,783**
Femur name; Proportion (%)					
Lubinus SPII	18.28	19.11	23.37	22.46	25.82
Original ME Muller	28.37	25.29	25.00	25.44	25.25
Corail Cemented	1.70	3.00	4.37	7.98	7.00
C-Stem AMT	4.75	6.75	5.62	5.38	5.10
Polarstem cemented	0.00	0.60	1.24	1.15	4.70
CPT	0.15	4.60	4.94	4.83	3.87
Lubinus Classic Plus	2.70	3.16	2.83	2.66	3.35
Exeter	4.86	1.42	3.26	1.96	3.11
Taperloc Perloc Complete	0.53	0.52	0.46	0.31	2.92
Alloclassic Zweymuller SL	3.51	3.12	1.97	3.14	2.77

Most frequently registered - Femoral head

TABLE The most frequently registered femoral head components in primary hemiarthroplasties in the Netherlands in 2020-2024

Year	2020	2021	2022	2023	2024
Femoral head component (n)	**6,105**	**5,768**	**6,052**	**6,054**	**5,664**
Femoral head name; Proportion (%)					
ZimmerBiomet Unipolar Head	33.51	28.28	26.69	27.24	28.11
Link CoCr head	18.98	22.04	25.96	22.98	23.64
Link Modular Cathcard Unipolar head	9.98	13.56	12.90	16.47	16.07
ZimmerBiomet Versys Endo	0.88	5.65	6.31	6.46	6.57
Link Modular trauma head	1.67	1.01	1.75	4.06	4.96
Smith & Nephew Oxinium head	0.07	0.57	0.78	0.68	3.99
Stryker UHR Unitrax	6.93	3.71	5.12	4.33	3.97
Mathys Stainless Steel head	11.01	9.41	8.74	7.30	3.53
ZimmerBiomet CoCr Modular Heads	0.28	0.97	1.27	0.89	2.86
Smith & Nephew Uni-polar	6.00	4.13	2.21	2.33	2.03

Most frequently registered - Bone cement

TABLE The most frequently registered bone cement used during primary hemiarthroplasties in the Netherlands in 2020-2024

Year	2020	2021	2022	2023	2024
Bone cement pre-packed in a vacuum mixing system (n)	**2,553**	**2,846**	**3,112**	**3,187**	**3,023**
Cement name; Proportion (%)					
Palacos R+G	48.69	49.79	49.23	56.86	51.51
Refobacin Bone Cement R	41.25	43.64	43.99	38.50	48.23
Refobacin Plus Bone Cement	10.07	6.50	6.78	4.64	0.17
Copal G+C	0.00	0.00	0.00	0.00	0.10
Year	**2020**	**2021**	**2022**	**2023**	**2024**
Separately packed bone cement (n)	**1,710**	**1,586**	**1,497**	**1,347**	**1,447**
Cement name; Proportion (%)					
Palacos R+G	64.15	76.04	79.49	65.33	68.07
Copal G+C	7.19	10.91	11.36	11.95	13.68
Palacos MV+G	4.80	6.05	6.35	7.20	8.78
Simplex ABC TOBRA	0.06	0.00	0.27	0.97	5.87
Simplex ABC EC	0.58	0.25	0.33	0.82	1.87
Refobacin Bone Cement R	16.37	1.13	1.14	12.77	1.45
Copal G+V	0.29	0.06	0.00	0.52	0.14
Refobacin Revision	0.23	0.06	0.07	0.07	0.07
Simplex P	1.40	0.00	0.07	0.00	0.07

Survival

Short term revision

TABLE Time after primary hemiarthroplasty until short-term revision in the Netherlands in 2017-2021 (n=31,156)

Time after primary HA	Percentage revisions (%)
Day 0-29	1.08
Day 30-182	0.67
Day 183-364	0.20
Day 365-730 (second year)	0.49
Day 731-1095 (third year)	0.30

HA: hemiarthroplasty

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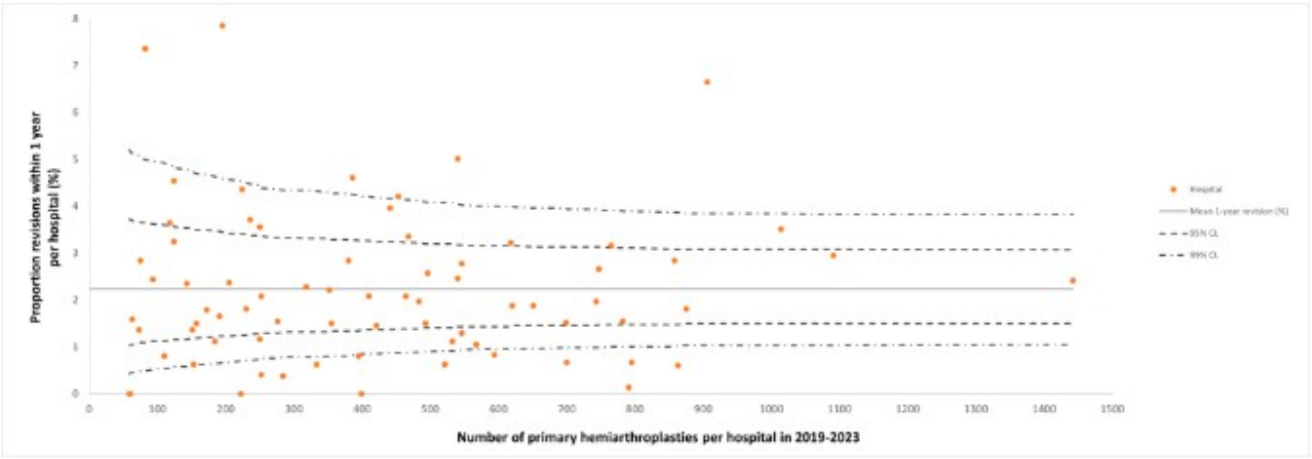
In 2017-2021, 13,798 (44.3%) primary HAs were implanted in patients who died within three years after the primary procedure.

Overall revision per hospital

Funnel plot of proportion of hip revision arthroplasties within one year after a hemiarthroplasty per hospital in the Netherlands in 2018-2022 (n=31,696)



Please note: The proportions of revisions within 1 year per hospital were adjusted for casemix factors age, gender, ASA score, BMI and smoking; CL: control limits.

The mean 1-year revision percentage is 2.24 in the Netherlands in 2019-2023.
Control limits indicate the plausible range of outcome if all hospitals perform equally well.

Revision and mortality rates within 1 year.

TABLE Revision procedures and mortality within 1 year after primary hemiarthroplasty by year in the Netherlands in 2019-2023 (n=31,696)

Procedure year	Number of hemiarthroplasties	Number of revisions	Percentage revisions	Number of deaths	Percentage deaths
2019	6,269	143	2.3%	1,412	22.5%
2020	6,514	135	2.1%	1,565	24.0%
2021	6,116	123	2.0%	1,455	23.8%
2022	6,490	157	2.4%	1,459	22.5%
2023	6,307	151	2.4%	1,196	19.0%

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By type of revision within 1 year

TABLE Cumulative 1-year revision percentage of primary hemiarthroplasties by type of revision in the Netherlands in 2019-2023 (n=31,696)

	Cumulative 1-year revision percentage
	Kaplan Meier (95% CI)
Any type of revision	2.35 (2.17-2.52)
Major revision	1.47 (1.33-1.61)
Minor revision	0.84 (0.74-0.95)
DAIR	0.67 (0.58-0.76)
No DAIR	0.17 (0.13-0.22)

Any type of revision includes minor and major revisions as well as revision procedures that could not be classified as minor or major revision.
Major revision: revision of the femur component.
Minor revision: only femoral head exchange (including DAIR procedures).
HA: hemiarthroplasty; CI: confidence interval

In 2019-2023, 7,087 (22.4%) primary HAs were implanted in patients who died within one year after the primary procedure.

Reasons for revision within 1 year

TABLE Reasons for revision within one year of primary hemiarthroplasties by type of revision in the Netherlands in 2019-2023

	Major revision (n=473)	Minor revision (n=255)	Any type of revision (n=709)
Reasons for revision	Proportion (%)	Proportion (%)	Proportion (%)
Infection	19.03	79.61	38.93
Dislocation	47.78	10.98	35.54
Peri-prosthetic fracture	15.22	1.96	10.72
Loosening of femur component	6.77	0.00	4.65
Malposition or malalignment	4.02	0.78	2.96
Girdlestone situation	2.75	0.00	1.27
Inlay wear	1.27	0.39	0.99
Peri-articular ossification	0.42	0.00	0.28
Symptomatic MoM bearing	0.00	0.00	0.00
Other	16.70	9.80	14.53

Major revision: first revision of the femur component, regardless of whether a minor revision has already taken place. Therefor, the first three revision procedures were reviewed.
Minor revision: only inlay and/or femoral head exchange (including DAIR procedures).
Any type of revision includes all first revisions, including revision procedures that could not be classified as minor or major revision.
Please note: one patient may have more than one reason for revision. As such, the total proportion is over 100%.
Please note: Malposition or malalignment has been registered since 2022.

Conversion to total hip arthroplasty

TABLE Conversions from primary hemiarthroplasty to total hip arthroplasty within 1 year in the period 2019-2023 (n=31,696)

Number of revision procedures	709
Number of conversions	338
Percentage conversions	47.7 %

Time after primary hemi

TABLE Time after primary hemiarthroplasty until short-term revision in the Netherlands in 2017-2021 (n=31,156)

Time after primary HA	Percentage revisions (%)
Day 0-29	1.08
Day 30-182	0.67
Day 183-364	0.20
Day 365-730 (second year)	0.49
Day 731-1095 (third year)	0.30

HA: hemiarthroplasty

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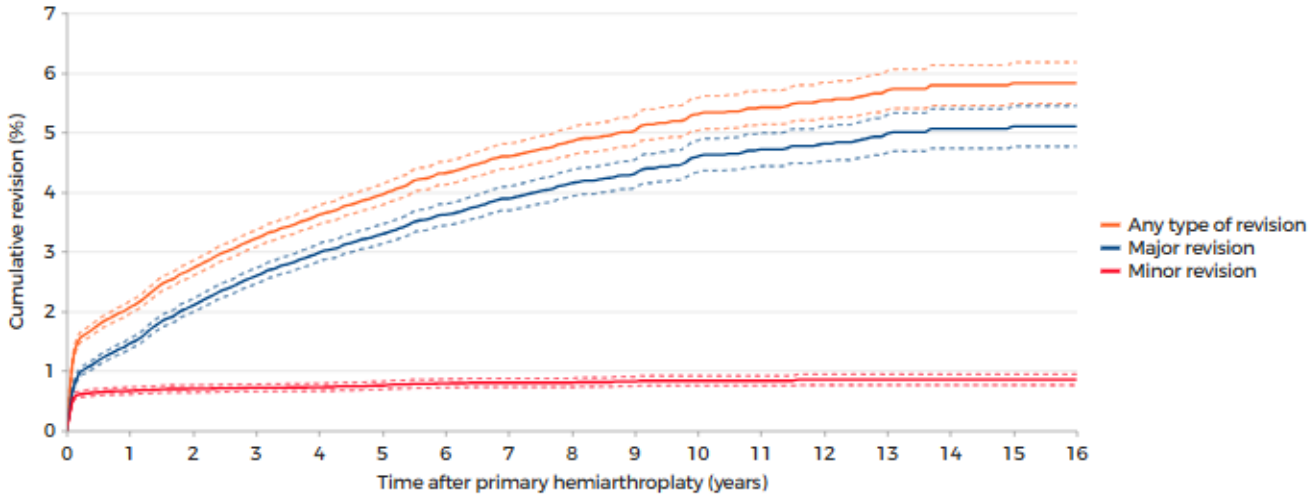
In 2017-2021, 13,798 (44.3%) primary HAs were implanted in patients who died within three years after the primary procedure.

Long term revision

By type of revision

FIGURE Cumulative revision percentage (Kaplan-Meier; 95% CI) of hemiarthroplasties by type of revision in the Netherlands in 2007-2024 (n=79,587)



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	1yr	3yr	5yr	7yr	10yr	16yr
Any type of revision	1.99 (1.89-2.10)	3.18 (3.04-3.32)	3.92 (3.75-4.10)	4.60 (4.38-4.81)	5.29 (5.01-5.56)	5.83 (5.48-6.17)
Major revision	1.39 (1.31-1.48)	2.55 (2.42-2.68)	3.26 (3.10-3.43)	3.89 (3.69-4.09)	4.56 (4.30-4.83)	5.10 (4.76-5.44)
Minor revision	0.66 (0.60-0.72)	0.72 (0.65-0.78)	0.75 (0.69-0.82)	0.80 (0.73-0.87)	0.83 (0.75-0.92)	0.85 (0.76-0.94)

Please note: Dotted lines represent the upper and lower limits of the 95% confidence interval.
Any type of revision includes minor and major revisions as well as revision procedures that could not be classified as minor or major revision.
Major revision: first revision of the femur component, regardless of whether a minor revision has already taken place. Therefor, the first three revision procedures were reviewed.
Minor revision: only femoral head exchange (including DAIR procedures).
HA: hemiarthroplasty; CI: confidence interval.

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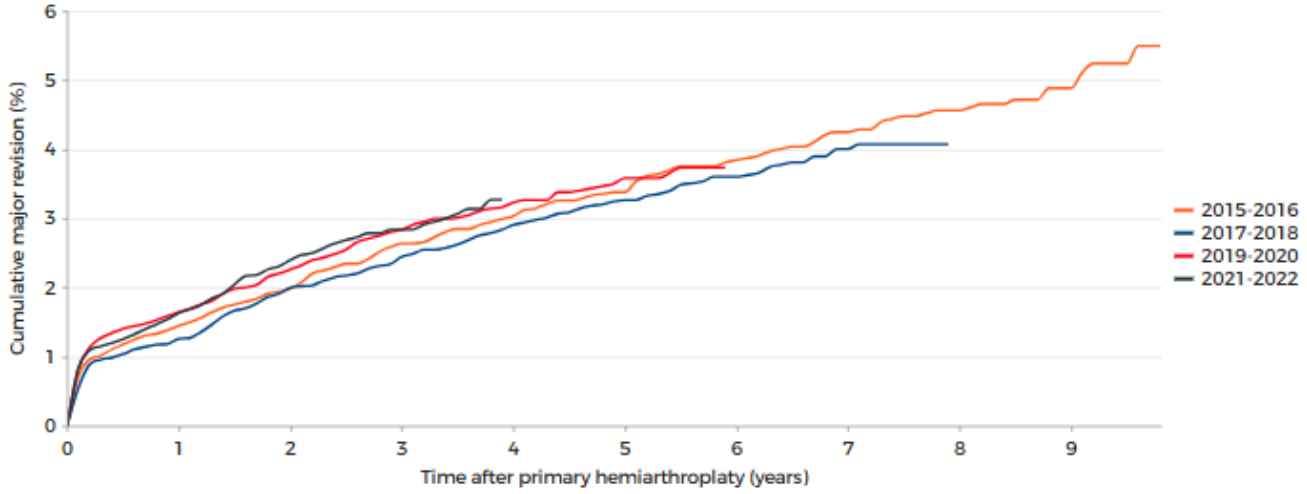
16,737 (21.0%) of primary hemiarthroplasties were implanted in patients who died within one year, 38,130 (47.9%) within five years, 44,733 (56.2%) within ten years, and 45,542 (57.2%) within sixteen years after the primary procedure.

It is important to note that the Kaplan-Meier method estimates the proportion of failed prostheses assuming patients live indefinitely.

By procedure year

FIGURE Cumulative major revision percentage (Kaplan-Meier; 95% CI) of hemiarthroplasties by procedure year of primary HA in the Netherlands in 2015-2024 (n=47,766)



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	Number (n)	1yr	3yr	5yr	7yr	10yr
2015-2016	10,376	1.38 (1.14-1.62)	2.59 (2.23-2.94)	3.38 (2.95-3.81)	4.25 (3.72-4.78)	5.50 (4.59-6.40)
2017-2018	12,257	1.18 (0.98-1.38)	2.34 (2.04-2.64)	3.24 (2.86-3.63)	4.00 (3.52-4.49)	n.a.
2019-2020	12,783	1.59 (1.36-1.82)	2.81 (2.48-3.13)	3.50 (3.11-3.90)	n.a.	n.a.
2021-2022	12,606	1.54 (1.31-1.76)	2.84 (2.50-3.18)	n.a.	n.a.	n.a.

Please note: n.a. if <50 cases were at risk.
Major revision precentage: first revision of the femur component, regardless of whether a minor revision has already taken place. Therefor, the first three revision procedures were reviewed.
HA: hemiarthroplasty; CI: confidence interval.

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13,057 (27.2%) of primary hemiarthroplasties were implanted in patients who died within one year, 29,029 (60.5%) within five years, and 32,354 (67.5%) within ten years

It is important to note that the Kaplan-Meier method estimates the proportion of failed prostheses assuming patients live indefinitely.

Survival by component

By cemented femur – fracture

TABLE Cumulative revision percentages of cemented primary hemiarthroplasties by femoral component in fracture patients treated by orthopaedic surgeons in the Netherlands in 2007-2024 (n=40,563)

					Type of revision (n)						Cumulative revision percentage (95% CI)					
Femur component	Primary HAs (n)	Hospitals (n)	Median (IQR) age (yr)	Revisions (n)	Total revision	Only femur	Only acetabulum	Only femoral head/inlay	Unknown	Of which conversion to THA	1yr	3yr	5yr	7yr	10yr	16yr
All cemented HAs for fracture	**40,563**	**76**	**83 (78 - 88)**	**1,075**	**241**	**45**	**518**	**254**	**17**	**704**	**1.78 (1.64-1.91)**	**2.85 (2.66-3.04)**	**3.47 (3.24-3.70)**	**4.06 (3.78-4.34)**	**4.52 (4.17-4.87)**	**4.73 (4.35-5.12)**
Original ME Muller	11,934	37	83 (78 - 88)	349	41	3	192	107	6	226	2.19 (1.92-2.47)	3.18 (2.83-3.54)	3.58 (3.18-3.98)	4.12 (3.62-4.61)	4.25 (3.72-4.78)	4.50 (3.87-5.12)
Lubinus SPII	10,026	28	83 (78 - 88)	217	54	3	109	48	3	156	1.41 (1.16-1.65)	2.51 (2.14-2.88)	2.94 (2.50-3.38)	3.62 (3.00-4.23)	4.28 (3.43-5.13)	4.47 (3.54-5.40)
EXETER	3,502	20	83 (78 - 88)	81	35	9	27	10	0	53	1.60 (1.17-2.04)	2.29 (1.74-2.84)	2.66 (2.05-3.27)	2.75 (2.11-3.38)	3.40 (2.55-4.26)	3.57 (2.66-4.49)
C-Stem AMT	2,296	5	84 (79 - 88)	62	16	13	16	17	0	23	2.08 (1.45-2.70)	3.15 (2.28-4.03)	4.40 (3.03-5.77)	n.a.	n.a.	n.a.
STANMORE	2,272*	13	83 (78 - 88)	57	15	1	35	5	1	47	0.82 (0.43-1.21)	1.79 (1.17-2.42)	3.09 (2.15-4.02)	4.32 (3.06-5.59)	5.62 (3.82-7.42)	n.a.
CCA stem	1,846	13	84 (79 - 89)	47	6	2	23	15	1	28	1.40 (0.84-1.96)	2.15 (1.41-2.90)	3.78 (2.52-5.04)	4.59 (3.04-6.13)	4.59 (3.04-6.13)	n.a.
Spectron EF	1,845	17	83 (78 - 88)	63	14	1	30	17	1	43	2.31 (1.59-3.03)	3.57 (2.60-4.54)	4.06 (2.98-5.13)	4.74 (3.42-6.06)	5.75 (3.84-7.67)	n.a.
Corail Cemented	1,044	6	83 (77 - 88)	33	10	1	19	3	0	27	2.16 (1.19-3.13)	4.38 (2.69-6.07)	6.51 (3.61-9.41)	n.a.	n.a.	n.a.
CPT	1,034	5	83 (77 - 87)	37	14	5	10	7	1	18	3.19 (2.06-4.31)	4.92 (3.12-6.71)	n.a.	n.a.	n.a.	n.a.
TAPERLOC Hip Cemented CoCr	646	5	85 (81 - 89)	14	4	0	10	0	0	14	0.34 (0.00-0.81)	2.16 (0.74-3.57)	3.92 (1.70-6.13)	4.59 (2.03-7.15)	n.a.	n.a.
Twinsys stem Cemented	356	5	84 (79 - 88)	13	3	1	4	4	1	6	2.22 (0.58-3.86)	3.53 (1.01-6.06)	4.89 (1.26-8.52)	n.a.	n.a.	n.a.
Basis	274*	8	85 (80 - 89)	8	4	0	4	0	0	8	1.16 (0.00-2.46)	3.16 (0.83-5.48)	3.16 (0.83-5.48)	4.22 (1.13-7.30)	4.22 (1.13-7.30)	n.a.
Polarstem cemented	227	3	82 (77 - 88)	6	1	2	2	1	0	3	2.34 (0.31-4.36)	n.a.	n.a.	n.a.	n.a.	n.a.
Charnley	157*	3	82 (77 - 87)	3	3	0	0	0	0	2	1.30 (0.00-3.09)	2.22 (0.00-4.75)	2.22 (0.00-4.75)	2.22 (0.00-4.75)	2.22 (0.00-4.75)	n.a.
CS Plus	134*	3	84 (78 - 88)	5	3	0	2	0	0	4	0.80 (0.00-2.36)	4.59 (0.10-9.08)	n.a.	n.a.	n.a.	n.a.
Conquest	130*	3	85 (78 - 88)	2	0	0	1	0	1	0	0.87 (0.00-2.56)	2.31 (0.00-5.58)	n.a.	n.a.	n.a.	n.a.
MV40 Hip Stem	98*	3	83 (77 - 88)	4	0	0	2	1	1	2	4.53 (0.17-8.90)	n.a.	n.a.	n.a.	n.a.	n.a.

* Denotes prosthesis combinations with no reported use in primary HAs in 2024.

Please note: n.a. if <50 cases were at risk; HA: hemiarthroplasty; CI: confidence interval; IQR: interquartile range.

Only combinations with over 50 procedures and reported by at least 3 hospitals have been listed.

8,600 (21.2%) of primary hemiarthroplasties were implanted in patients who died within one year, 19,736 (48.7%) within five years, 23,165 (57.1%) within ten years, and 23,553 (58.1%) within sixteen years after the primary procedure.

It is important to note that the Kaplan-Meier method estimates the proportion of failed prostheses assuming patients live indefinitely.

By uncemented femur – fracture

TABLE Cumulative revision percentages of uncemented primary hemiarthroplasties by femoral component in fracture patients treated by orthopaedic surgeons in the Netherlands in 2007-2024 (n=13,126)

					Type of revision (n)						Cumulative revision percentage (95% CI)					
Femur component	Primary HAs (n)	Hospitals (n)	Median (IQR) age (yr)	Revisions (n)	Total revision	Only femur	Only acetabulum	Only femoral head/inlay	Unknown	Of which conversion to THA	1yr	3yr	5yr	7yr	10yr	16yr
All uncemented HAs for fracture	**13,126**	**71**	**83 (78 - 88)**	**528**	**145**	**148**	**166**	**57**	**12**	**258**	**2.70 (2.41-2.99)**	**3.93 (3.55-4.30)**	**4.69 (4.25-5.12)**	**5.40 (4.90-5.91)**	**6.31 (5.68-6.94)**	**7.07 (6.19-7.95)**
ACCOLADE	1,988*	7	84 (79 - 88)	112	28	48	19	11	6	35	3.79 (2.92-4.66)	5.16 (4.11-6.21)	5.79 (4.65-6.93)	6.68 (5.39-7.96)	7.92 (6.35-9.50)	n.a.
DB10	1,651*	12	84 (78 - 88)	74	27	13	29	5	0	45	2.51 (1.72-3.30)	3.75 (2.74-4.77)	4.54 (3.38-5.71)	5.42 (4.07-6.76)	6.65 (4.99-8.30)	7.96 (5.71-10.21)
Alloclassic Zweymuller SL	1,501	18	84 (80 - 88)	62	13	15	28	4	2	36	2.84 (1.96-3.72)	4.28 (3.11-5.44)	4.58 (3.34-5.81)	5.75 (4.16-7.34)	6.43 (4.59-8.27)	6.96 (4.86-9.05)
Corail	1,278	12	83 (78 - 88)	31	3	4	22	2	0	25	1.06 (0.46-1.66)	2.71 (1.63-3.78)	3.56 (2.13-4.99)	4.28 (2.54-6.01)	5.20 (2.71-7.68)	n.a.
Twinsys stem Cementless	900	7	84 (79 - 88)	34	6	9	15	3	1	21	2.35 (1.33-3.37)	4.11 (2.53-5.69)	5.16 (3.19-7.14)	7.19 (4.17-10.21)	n.a.	n.a.
TAPERLOC Complete	749	16	84 (77 - 89)	22	6	5	6	5	0	10	2.48 (1.31-3.64)	3.10 (1.74-4.45)	3.41 (1.93-4.90)	3.41 (1.93-4.90)	n.a.	n.a.
SL Plus	393*	8	83 (77 - 88)	13	5	3	5	0	0	9	1.90 (0.50-3.30)	2.63 (0.92-4.35)	4.05 (1.73-6.38)	4.05 (1.73-6.38)	5.03 (2.04-8.02)	n.a.
SYMAX	203*	4	83 (78 - 87)	4	1	2	0	1	0	0	1.59 (0.00-3.39)	1.59 (0.00-3.39)	1.59 (0.00-3.39)	1.59 (0.00-3.39)	n.a.	n.a.
TAPERLOC HIP system	183*	7	84 (79 - 88)	9	4	1	2	2	0	5	2.54 (0.07-5.01)	3.31 (0.43-6.19)	5.75 (1.39-10.10)	5.75 (1.39-10.10)	n.a.	n.a.
Polarstem	120	4	80 (75 - 86)	6	2	3	0	1	0	2	4.66 (0.64-8.69)	n.a.	n.a.	n.a.	n.a.	n.a.
Alloclassic offset	118	6	85 (80 - 89)	7	1	3	3	0	0	4	4.48 (0.64-8.33)	5.63 (1.22-10.05)	n.a.	n.a.	n.a.	n.a.
Original ME Muller	65*	19	84 (77 - 89)	1	1	0	0	0	0	1	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Lubinus SPII	58	13	84 (76 - 90)	3	1	0	2	0	0	3	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

* Denotes prosthesis combinations with no reported use in primary HAs in 2024.

Please note: n.a. if <50 cases were at risk; HA: hemiarthroplasty; CI: confidence interval; IQR: interquartile range.

Only combinations with over 50 procedures and reported by at least 3 hospitals have been listed.

2,813 (21.4%) of primary hemiarthroplasties were implanted in patients who died within one year, 6,679 (50.9%) within five years, 8,177 (62.3%) within ten years, and 8,373 (63.8%) within sixteen years after the primary procedure.

It is important to note that the Kaplan-Meier method estimates the proportion of failed prostheses assuming patients live indefinitely.

By cemented femur - other diagnosis

TABLE Cumulative revision percentages of cemented primary hemiarthroplasties by femoral component in patients treated by orthopaedic surgeons for indications other than fracture in the Netherlands in 2007-2024 (n=3,631)

					Type of revision (n)						Cumulative revision percentage (95% CI)					
Femur component	Primary HAs (n)	Hospitals (n)	Median (IQR) age (yr)	Revisions (n)	Total revision	Only femur	Only acetabulum	Only femoral head/inlay	Unknown	Of which conversion to THA	1yr	3yr	5yr	7yr	10yr	16yr
All cemented HAs for non-fracture	**3,631**	**79**	**79 (72 - 85)**	**145**	**36**	**6**	**72**	**28**	**3**	**100**	**2.42 (1.90-2.93)**	**4.03 (3.30-4.77)**	**4.99 (4.12-5.85)**	**5.38 (4.46-6.31)**	**5.66 (4.66-6.66)**	**6.60 (5.25-7.96)**
Lubinus SPII	954	32	79 (71 - 85)	24	4	1	11	6	2	15	1.58 (0.75-2.40)	3.08 (1.76-4.39)	3.34 (1.93-4.75)	3.70 (2.13-5.27)	3.70 (2.13-5.27)	n.a.
Original ME Muller	718	33	80 (73 - 86)	34	10	0	17	7	0	26	3.13 (1.81-4.45)	4.76 (2.99-6.53)	5.75 (3.67-7.84)	6.15 (3.93-8.37)	6.82 (4.26-9.39)	n.a.
Exeter	407	21	77 (71 - 83)	18	6	1	9	2	0	13	1.77 (0.47-3.06)	3.06 (1.26-4.86)	4.54 (2.26-6.82)	4.97 (2.55-7.39)	4.97 (2.55-7.39)	n.a.
Stanmore	294*	11	79 (72 - 85)	8	0	0	6	2	0	6	0.70 (0.00-1.66)	2.27 (0.26-4.27)	3.40 (0.88-5.92)	4.29 (1.25-7.33)	n.a.	n.a.
CCA stem	199	13	83 (76 - 87)	7	2	0	3	1	1	5	3.26 (0.69-5.83)	3.99 (1.07-6.92)	3.99 (1.07-6.92)	3.99 (1.07-6.92)	3.99 (1.07-6.92)	n.a.
Spectron EF	199	16	79 (74 - 86)	14	2	0	10	2	0	10	4.40 (1.41-7.40)	7.31 (3.27-11.36)	8.20 (3.84-12.56)	8.20 (3.84-12.56)	n.a.	n.a.
Taperloc Hip Cemented CoCr	87	7	82 (77 - 87)	3	1	1	1	0	0	2	2.40 (0.00-5.67)	n.a.	n.a.	n.a.	n.a.	n.a.
Basis	78*	5	84 (79 - 88)	0	0	0	0	0	0	0	0.00 (0.00-0.00)	0.00 (0.00-0.00)	0.00 (0.00-0.00)	0.00 (0.00-0.00)	n.a.	n.a.
C-Stem AMT	75	5	82 (76 - 88)	1	0	0	0	1	0	0	1.36 (0.00-4.01)	n.a.	n.a.	n.a.	n.a.	n.a.
CPT	68	4	82 (77 - 88)	5	2	0	0	3	0	2	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

* Denotes prosthesis combinations with no reported use in primary HAs in 2024.

Please note: n.a. if <50 cases were at risk; HA: hemiarthroplasty; CI: confidence interval; IQR: interquartile range.

Only combinations with over 50 procedures and reported by at least 3 hospitals have been listed.

784 (21.6%) of primary hemiarthroplasties were implanted in patients who died within one year, 1,527 (42.1%) within five years, 1,832 (50.5%) within ten years, and 1,931 (53.2%) within sixteen years after the primary procedure.

It is important to note that the Kaplan-Meier method estimates the proportion of failed prostheses assuming patients live indefinitely.

By uncemented femur - other diagnosis

TABLE Cumulative revision percentages of uncemented primary hemiarthroplasties by femoral component in patients treated by orthopaedic surgeons for indications other than fracture in the Netherlands in 2007-2024 (n=1,787)

					Type of revision (n)						Cumulative revision percentage (95% CI)					
Femur component	Primary HAs (n)	Hospitals (n)	Median (IQR) age (yr)	Revisions (n)	Total revision	Only femur	Only acetabulum	Only femoral head/inlay	Unknown	Of which conversion to THA	1yr	3yr	5yr	7yr	10yr	16yr
All uncemented HAs for non-fracture	**1,787**	**88**	**77 (65 - 84)**	**93**	**23**	**19**	**33**	**16**	**2**	**47**	**3.01 (2.20-3.83)**	**4.34 (3.33-5.34)**	**5.34 (4.18-6.51)**	**6.09 (4.79-7.39)**	**6.85 (5.36-8.33)**	**7.64 (5.91-9.37)**
Alloclassic Zweymuller SL	288	17	82 (77 - 87)	11	2	4	3	2	0	4	2.87 (0.91-4.83)	3.30 (1.17-5.43)	4.28 (1.78-6.78)	4.28 (1.78-6.78)	4.28 (1.78-6.78)	4.28 (1.78-6.78)
Corail	174	15	74 (65 - 81)	7	0	2	4	1	0	4	1.16 (0.00-2.75)	2.43 (0.07-4.79)	3.25 (0.42-6.09)	n.a.	n.a.	n.a.
Taperloc Complete	159	20	70 (63 - 80)	4	0	2	2	0	0	2	1.95 (0.00-4.13)	1.95 (0.00-4.13)	3.41 (0.00-6.98)	n.a.	n.a.	n.a.
DB10	154*	8	83 (75 - 87)	7	1	0	4	2	0	5	2.09 (0.00-4.44)	5.18 (1.43-8.92)	5.18 (1.43-8.92)	5.18 (1.43-8.92)	5.18 (1.43-8.92)	n.a.
Accolade	71*	6	81 (75 - 86)	0	0	0	0	0	0	0	0.00 (0.00-0.00)	0.00 (0.00-0.00)	n.a.	n.a.	n.a.	n.a.
Taperloc Hip system	60*	9	66 (45 - 80)	5	2	0	3	0	0	4	1.69 (0.00-4.99)	n.a.	n.a.	n.a.	n.a.	n.a.
SL Plus	59*	7	82 (72 - 87)	4	2	1	1	0	0	3	1.75 (0.00-5.16)	n.a.	n.a.	n.a.	n.a.	n.a.

* Denotes prosthesis combinations with no reported use in primary HAs in 2024.

Please note: n.a. if <50 cases were at risk; HA: hemiarthroplasty; CI: confidence interval; IQR: interquartile range.

Only combinations with over 50 procedures and reported by at least 3 hospitals have been listed.

226 (12.6%) of primary hemiarthroplasties were implanted in patients who died within one year, 544 (30.4%) within five years, 719 (40.2%) within ten years, and 765 (42.8%) within sixteen years after the primary procedure.

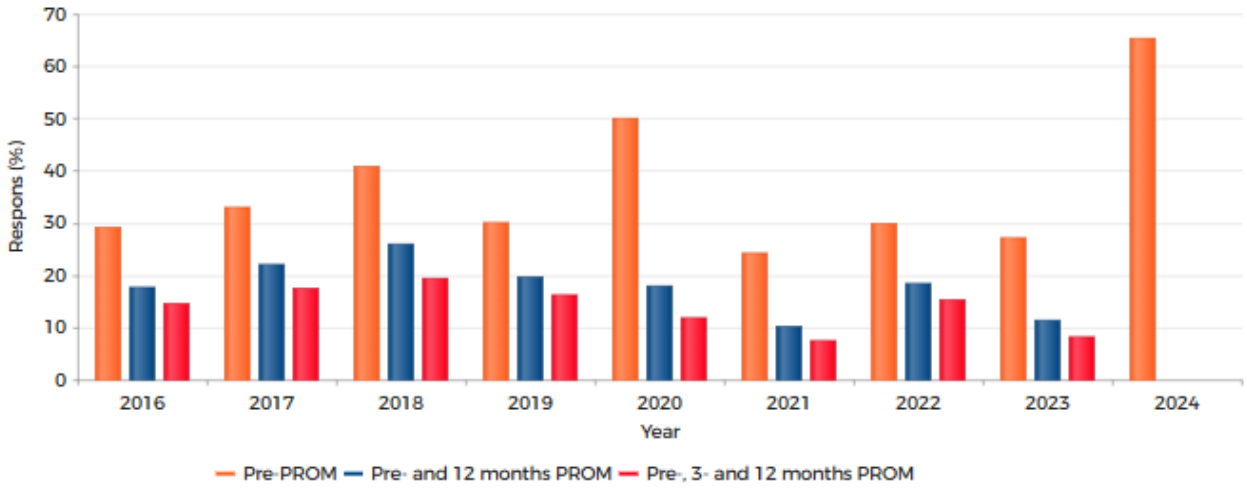
It is important to note that the Kaplan-Meier method estimates the proportion of failed prostheses assuming patients live indefinitely.

PROMs

Response

Response per year

FIGURE Pre-operative, 3 months and 12 months postoperative response percentage of patients who underwent a HA for osteoarthritis in the Netherlands in 2016-2024



	2016	2017	2018	2019	2020	2021	2022	2023	2024
Pre-PROM	29.11	33.04	40.79	30.05	50.00	24.30	30.00	27.27	65.35
Pre- and 12 months PROM	17.72	22.03	25.99	19.70	17.91	10.28	18.46	11.36	n.a.
Pre-, 3- and 12 months PROM	14.56	17.62	19.49	16.26	11.94	7.48	15.38	8.33	n.a.
Total HAs for osteoarthritis (n)	**158**	**227**	**277**	**203**	**134**	**107**	**130**	**132**	**329**

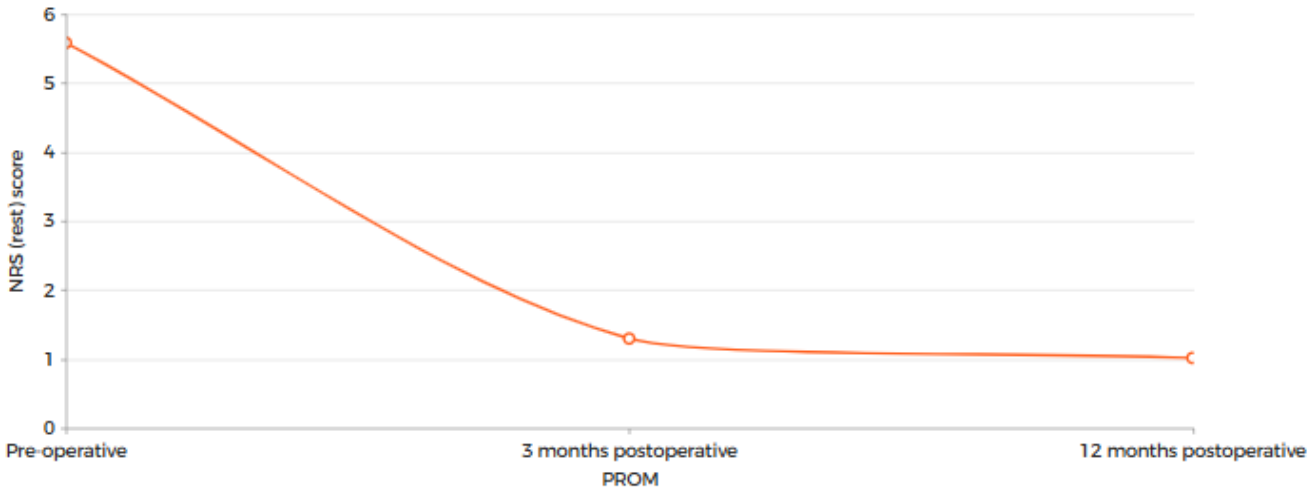
Please note: The 12 months postoperative PROMs response percentage is not (yet) available for 2024.
HA: hemiarthroplasty; PROM: patient reported outcome measure.

This figure includes hemiarthroplasties performed for osteoarthritis. For hemiarthroplasties performed for fractures, preoperative PROMs are often not available.

Outcomes

NRS (rest)

FIGURE Mean (95% CI) pre-operative, 3 months and 12 months postoperative NRS (rest) scores of patients who underwent a HA for osteoarthritis in the Netherlands in 2016-2023



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NRS (rest) score	Pre-operative	3 months postoperative	12 months postoperative
n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
205	5.58 (5.22-5.95)	1.30 (1.02-1.57)	1.02 (0.77-1.26)

HA: hemiarthroplasty; CI: confidence interval.

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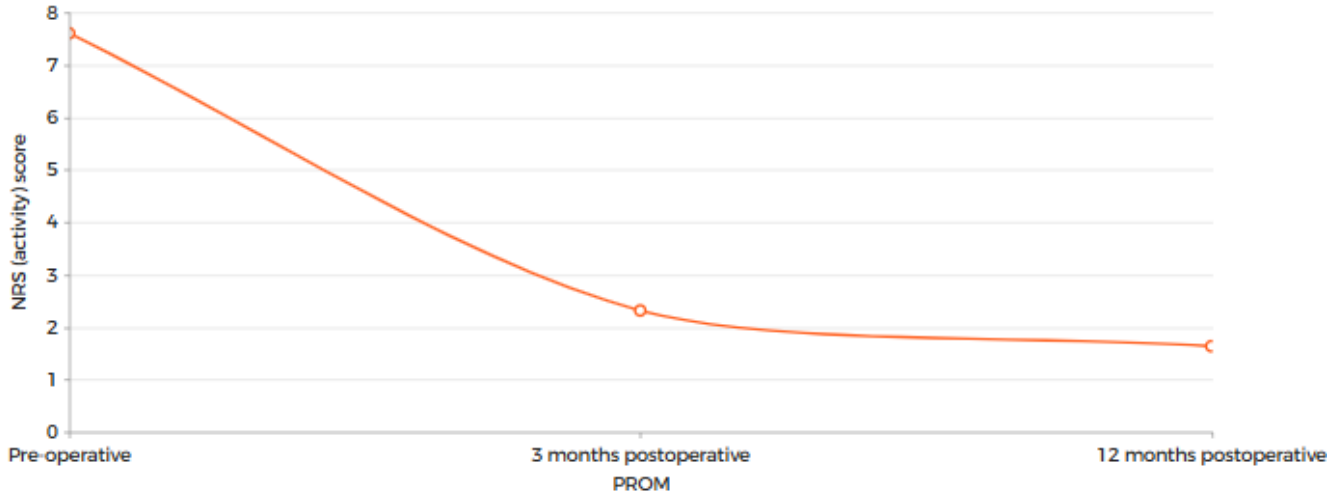
The NRS (rest) score measures pain during rest. The score has a range of 0.0 to 10.0, with 0.0 representing no pain and 10.0 representing the most possible pain.

NRS (activity)

FIGURE Mean (95% CI) pre-operative, 3 months and 12 months postoperative NRS (activity) scores of patients who underwent a HA for osteoarthritis in the Netherlands in 2016-2023



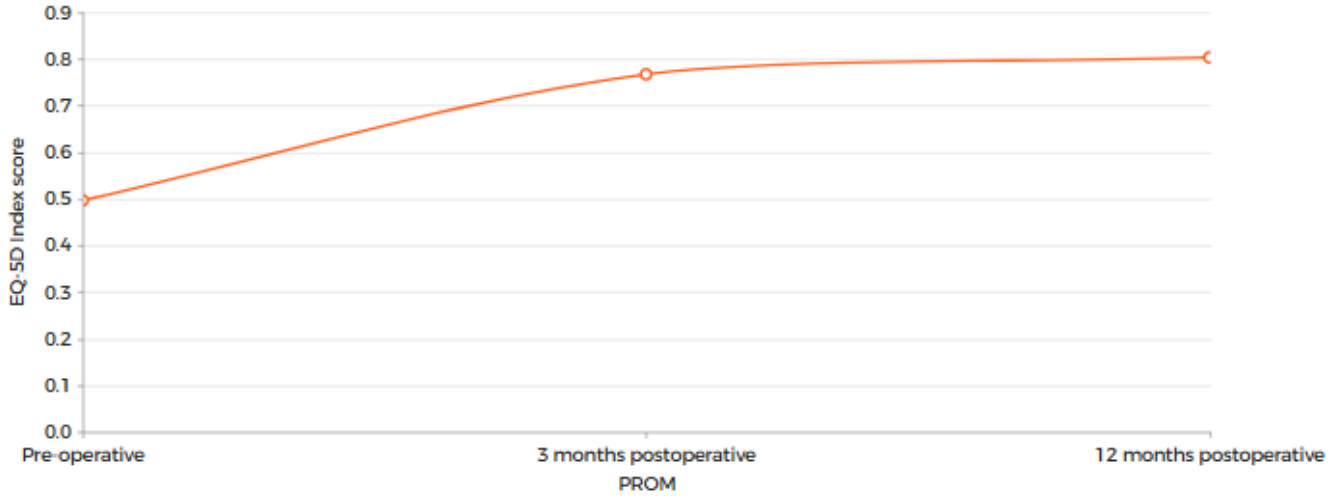
NRS (activity) score	Pre-operative	3 months postoperative	12 months postoperative
n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
205	7.60 (7.36-7.85)	2.32 (1.99-2.64)	1.64 (1.32-1.95)

HA: hemiarthroplasty; CI: confidence interval.

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.

EQ-5D Index score

FIGURE Mean (95% CI) pre-operative, 3 months and 12 months postoperative EQ-5D index scores of patients who underwent a HA for osteoarthritis in the Netherlands in 2016-2023



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EQ-5D Index score	Pre-operative	3 months postoperative	12 months postoperative
n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
205	0.50 (0.47-0.53)	0.77 (0.74-0.79)	0.80 (0.78-0.83)

HA: hemiarthroplasty; CI: confidence interval.

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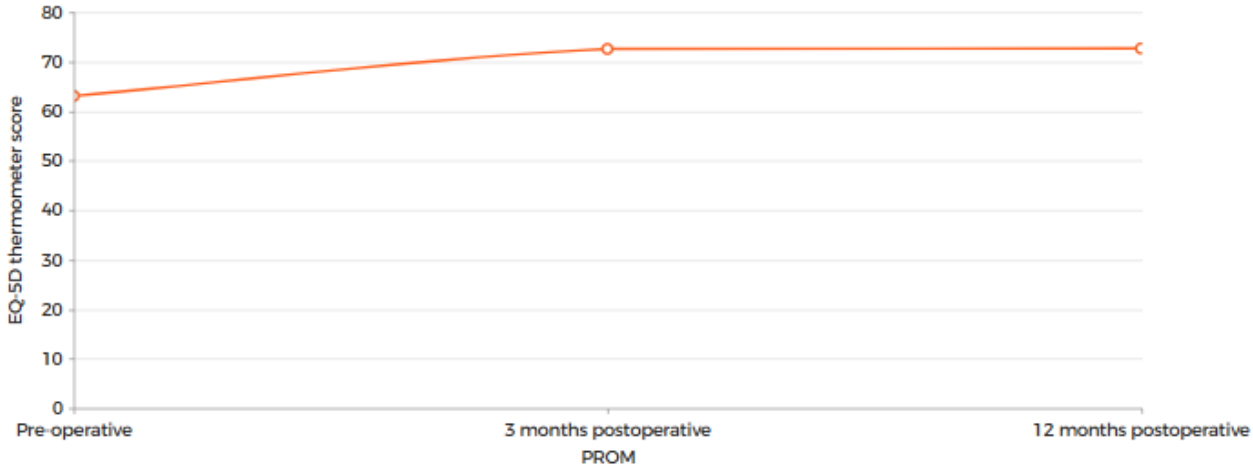
The EQ-5D index score measures quality of life. The score has a range of -0.329 to 1.0, with 1.0 representing the best possible quality of life.

EQ-5D thermometer

FIGURE Mean (95% CI) pre-operative, 3 months and 12 months postoperative EQ-5D thermometer scores of patients who underwent a HA for osteoarthritis in the Netherlands in 2016-2023



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EQ-5D thermometer score	Pre-operative	3 months postoperative	12 months postoperative
n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
205	63.07 (59.85-66.30)	72.57 (69.26-75.87)	72.66 (68.94-76.39)

HA: hemiarthroplasty; CI: confidence interval.

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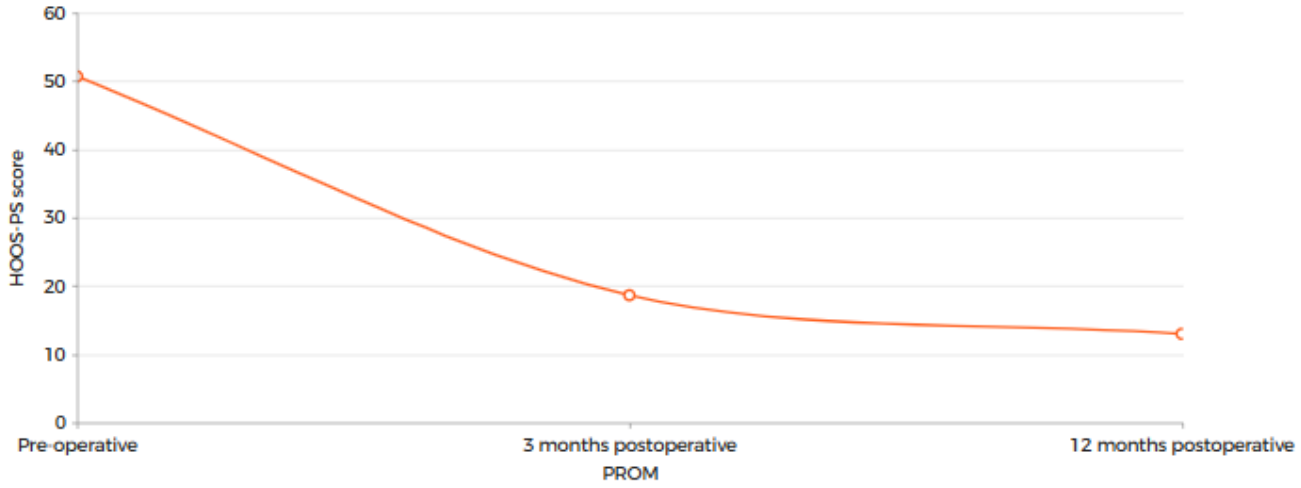
The EQ-5D thermometer score measures the health situation. The score has a range of 0.0 to 100.0, with 0.0 representing the worst possible health situation and 100.0 the best possible health situation.

HOOS-PS score

FIGURE Mean (95% CI) pre-operative, 3 months and 12 months postoperative HOOS-PS scores of patients who underwent a HA for osteoarthritis in the Netherlands in 2016-2023



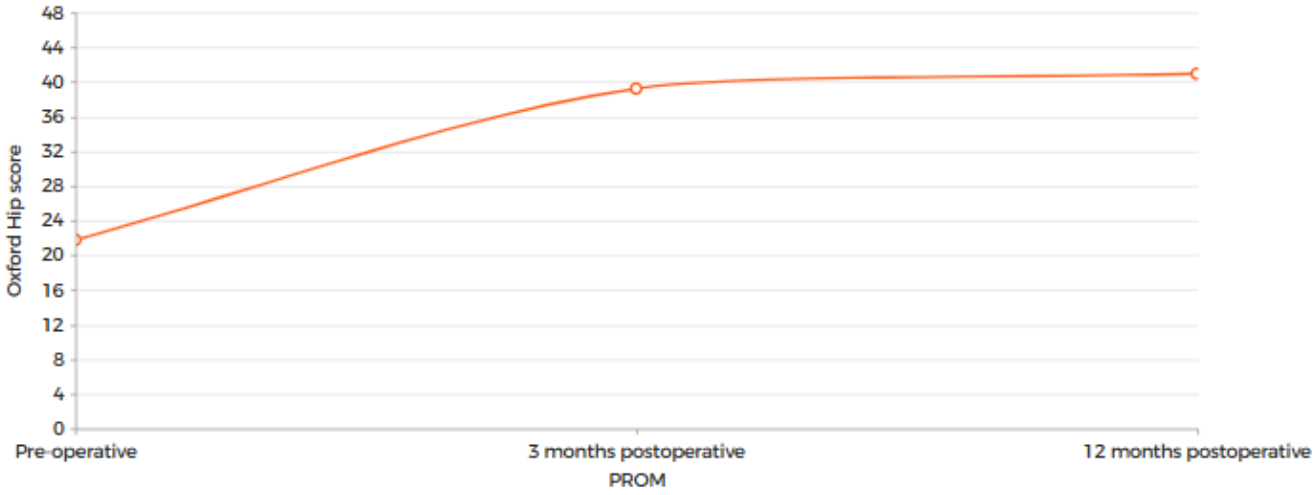
HOOS-PS score	Pre-operative	3 months postoperative	12 months postoperative
n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
205	50.68 (48.00-53.36)	18.65 (16.53-20.77)	12.99 (10.81-15.16)

HA: hemiarthroplasty; CI: confidence interval.

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 (95% CI) pre-operative, 3 months and 12 months postoperative Oxford Hip Scores of patients who underwent a HA for osteoarthritis in the Netherlands in 2016-2023



Oxford Hip Score	Pre-operative	3 months postoperative	12 months postoperative
n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
205	21.78 (20.60-22.96)	39.23 (38.29-40.17)	40.95 (39.89-42.01)

HA: hemiarthroplasty; CI: confidence interval.

The Oxford Hip score measures the physical functioning and pain of patients with osteoarthritis to the hip. The score has a range of 0.0 to 48.0, with 0.0 representing no functional ability and 48.0 the most functional ability.

Hip revision arthroplasty

In this section you will find all the information on hip revision arthroplasty:

Revision characteristics

Reasons for revision

TABLE Trend (proportion [%] per year) in reasons for revision in patients who underwent a hip revision arthroplasty in the Netherlands in 2015-2024

Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Hip revision arthroplasty (n)	**3,834**	**3,883**	**3,871**	**3,843**	**3,835**	**3,465**	**3,563**	**3,615**	**3,972**	**3,782**	**37,663**
Reasons for revision; Proportion (%)											
Infection	17.89	19.39	21.21	20.74	22.69	25.11	25.32	24.23	25.98	26.86	22.90
Loosening of acetabulum component	24.80	22.30	21.78	21.13	20.55	18.56	16.84	18.31	15.81	16.18	19.66
Dislocation	19.93	19.42	17.82	18.92	18.46	17.60	18.92	17.43	17.50	16.63	18.27
Loosening of femur component	19.51	18.77	18.16	19.20	17.18	16.97	17.15	15.49	14.48	14.25	17.13
Inlay wear	19.56	18.31	18.19	15.95	15.83	13.45	13.05	13.11	12.29	11.16	15.13
Peri-prosthetic fracture	11.37	12.46	14.65	14.36	14.50	17.06	16.22	16.82	16.64	17.27	15.10
Malposition or malalignment								6.61	7.15	8.06	
Girdlestone situation	5.74	6.05	5.24	4.79	4.51	4.33	4.86	4.20	4.46	3.44	4.77
Symptomatic MoM bearing	4.56	3.94	2.66	2.73	2.82	2.57	2.30	2.27	2.04	1.43	2.74
Peri-articular ossification	2.03	2.34	1.47	1.30	1.12	1.18	1.15	0.91	0.98	0.74	1.33
Other	11.27	10.61	10.07	11.27	12.78	10.79	11.82	10.37	10.12	11.05	11.01

One patient may have more than one reason for revision. As such, the total proportion is over 100%.
Please note: Malposition or malalignment has been registered since 2022.

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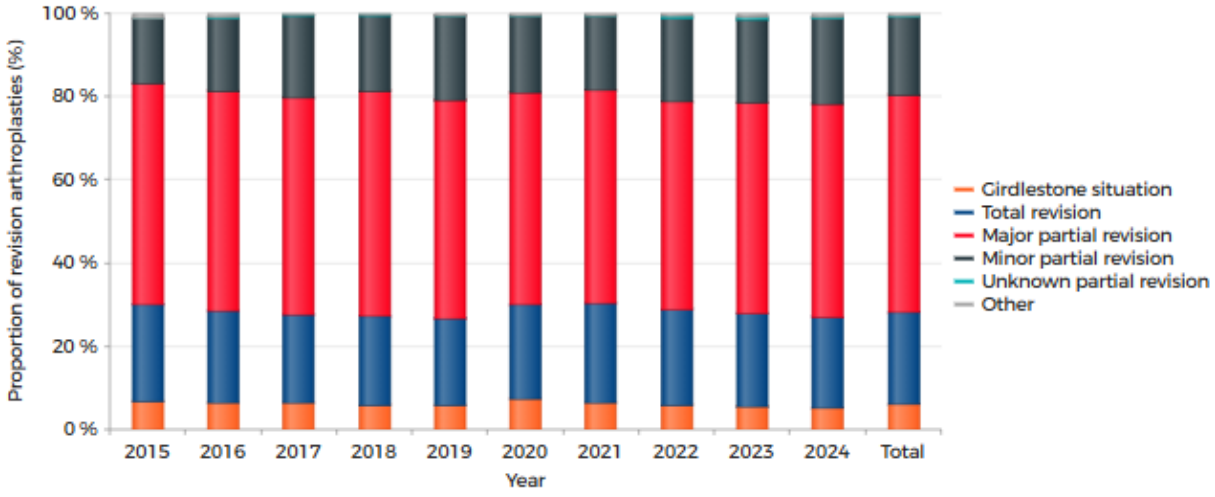
Type of revision

FIGURE Trend (proportion [%] per year) in type of revision in hip revision arthroplasties in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Girdlestone situation	6.74	6.53	6.32	5.87	5.92	7.51	6.32	5.72	5.46	5.33	6.16
Total revision	23.19	21.95	21.17	21.45	20.63	22.48	23.96	23.15	22.46	21.55	22.18
Major partial revision	53.07	52.85	52.18	53.96	52.58	51.13	51.26	49.90	50.57	51.30	51.90
Minor partial revision	15.77	17.55	19.87	18.07	20.14	18.39	17.84	19.93	20.11	20.44	18.82
Unknown partial revision	0.08	0.10	0.08	0.23	0.24	0.03	0.11	0.64	0.51	0.35	0.24
Other	1.15	1.01	0.39	0.42	0.50	0.46	0.51	0.67	0.91	1.04	0.71
Total (n)	**3,812**	**3,858**	**3,860**	**3,836**	**3,819**	**3,448**	**3,560**	**3,603**	**3,959**	**3,768**	**37,523**

Major partial revision: revision of at least acetabulum or femur component; Minor partial revision: only inlay and/or femoral head exchange (including DAIR procedures); Unknown partial revision: partial revision of which the revised components were unknown.

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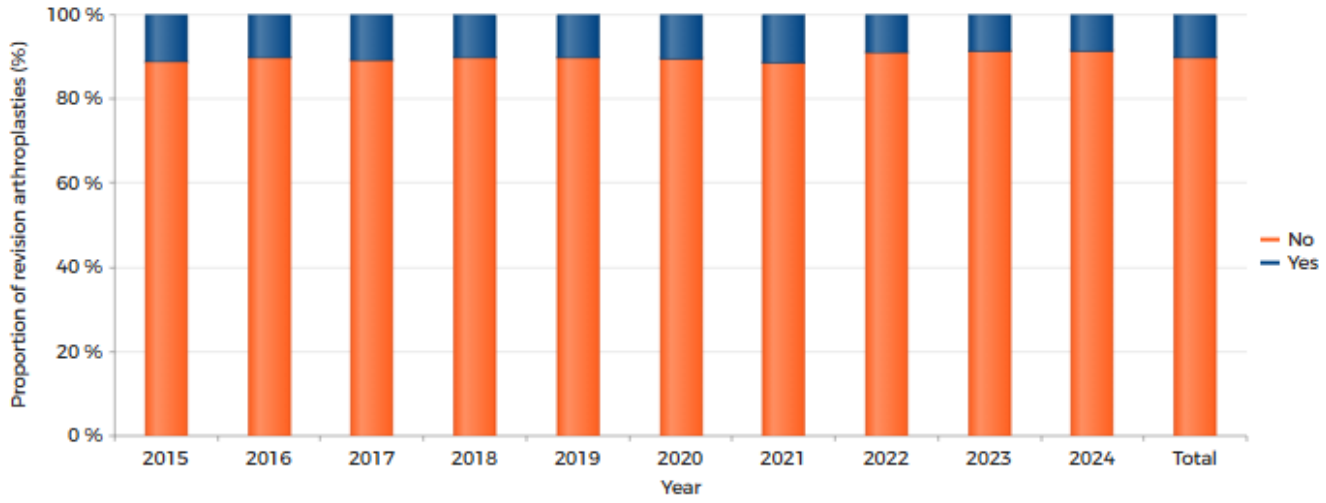
In 1,190 (62%) major partial hip revision arthroplasties the acetabulum component was revised and in 743 (38%) major partial revision arthroplasties the femur component was revised in 2024.

Conversion to total hip arthroplasty

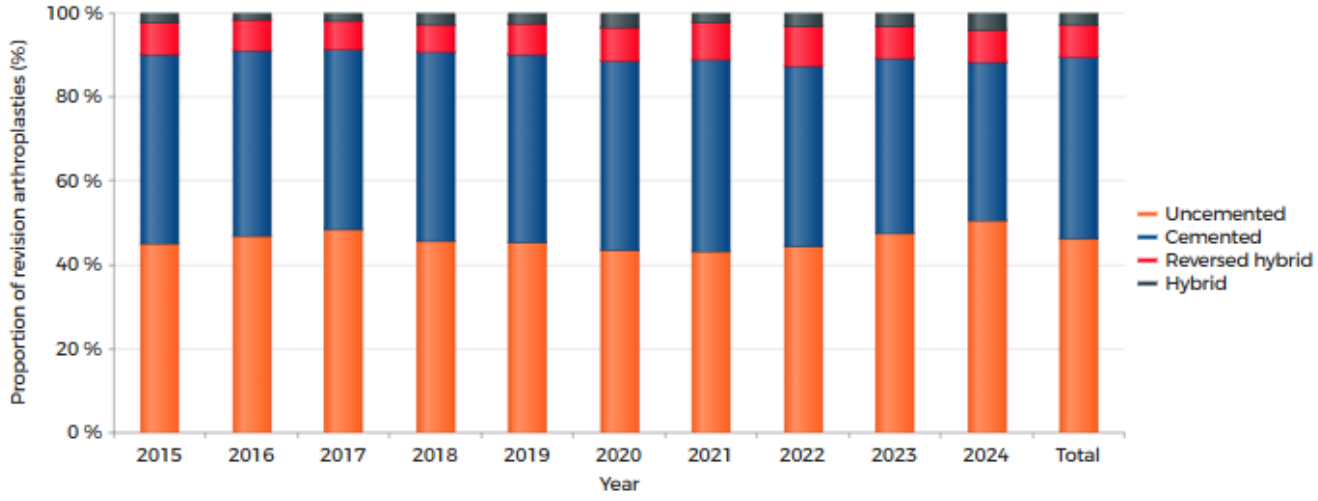
FIGURE Trend (proportion [%] per year) in conversions from hemiarthroplasty to total hip arthroplasty in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
No	88.83	89.84	89.28	89.86	89.95	89.62	88.50	91.04	91.28	91.39	89.99
Yes	11.17	10.16	10.72	10.14	10.05	10.38	11.50	8.96	8.72	8.61	10.01
Total (n)	**3,358**	**3,533**	**3,229**	**3,500**	**3,482**	**3,227**	**3,314**	**3,447**	**3,808**	**3,600**	**34,498**

Fixation

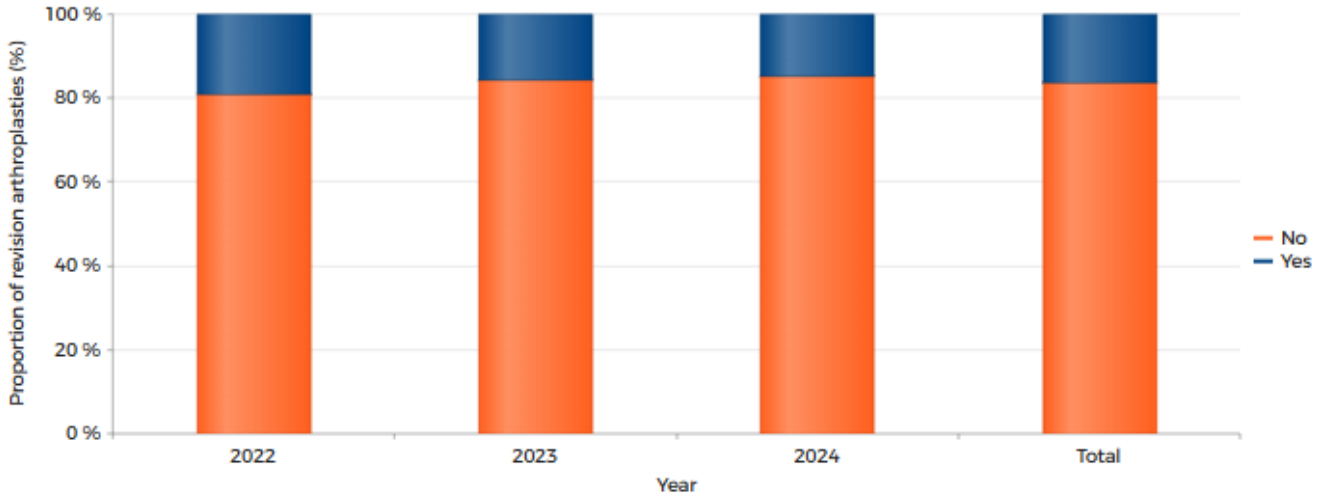
FIGURE Trend (proportion [%] per year) in type of fixation in hip revision arthroplasties in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Uncemented	45.03	46.87	48.47	45.83	45.55	43.69	43.23	44.56	47.40	50.54	46.18
Cemented	45.26	44.24	42.82	44.90	44.55	45.08	45.77	43.00	41.82	37.67	43.47
Reversed hybrid	7.51	7.34	6.73	6.61	7.31	7.88	8.79	9.24	7.84	7.93	7.70
Hybrid	2.20	1.55	1.98	2.66	2.60	3.36	2.21	3.21	2.94	3.85	2.65
Total (n)	**3,462**	**3,542**	**3,536**	**3,572**	**3,502**	**3,097**	**3,264**	**3,335**	**3,673**	**3,504**	**34,487**

Cement-in-cement

FIGURE Trend (proportion [%] per year) in use of cement-in-cement technique in hip revision arthroplasties in the Netherlands in 2015-2024



	2022	2023	2024	Total
No	80.85	84.47	85.14	83.60
Yes	19.15	15.53	14.86	16.40
Total (n)	**1,535**	**1,835**	**1,702**	**5,072**

Most frequently registered – Acetabulum

TABLE The most frequently registered acetabulum components in hip revision arthroplasties in the Netherlands in 2020-2024

Year	2020	2021	2022	2023	2024
Acetabulum cemented (n)	**1,674**	**1,891**	**1,807**	**1,969**	**1,765**
Acetabulum name; Proportion (%)					
Avantage Cemented	42.29	46.85	39.99	38.79	37.06
G7 - OSSEOTI	0.06	0.85	2.33	3.72	9.02
Polarcup cemented	10.75	9.20	9.43	8.92	8.17
BiMobile DM	0.90	1.22	2.55	6.88	5.39
Trabecular Metal	4.96	5.08	7.10	5.50	3.75
G7 PPS	0.00	0.48	1.00	0.82	3.46
Bi-Mentum Cemented Cups	0.12	3.75	3.88	1.94	3.29
Continuum	6.51	4.44	3.44	3.06	2.38
Redapt	1.49	1.53	1.94	0.87	2.33
Avantage Reload	2.69	1.96	2.00	2.34	1.82
Year	**2020**	**2021**	**2022**	**2023**	**2024**
Acetabulum uncemented (n)	**431**	**449**	**443**	**539**	**584**
Acetabulum name; Proportion (%)					
G7 - OSSEOTI	0.23	3.34	9.03	12.99	25.34
G7 PPS	0.00	2.00	3.84	2.97	10.10
Continuum	22.04	16.26	12.87	10.58	7.02
Allofit	6.96	11.14	9.71	8.53	5.31
Delta-One TT	11.60	10.47	8.58	7.24	4.97
Avantage Reload	9.98	7.57	7.00	8.53	4.97
Trident II Tritanium	0.00	0.45	2.93	4.82	4.62
Avantage Cemented	2.78	4.23	2.93	2.78	4.45
Bi-Mentum Press-fit	0.00	2.45	2.48	3.71	3.77
Redapt	2.55	2.90	3.39	1.86	3.42

Most frequently registered – Femur

TABLE The most frequently registered femur components in hip revision arthroplasties in the Netherlands in 2020-2024

Year	2020	2021	2022	2023	2024
Femur cemented (n)	**587**	**599**	**574**	**611**	**555**
Femur name; Proportion (%)					
Lubinus SPII	22.15	23.04	28.05	33.55	34.41
Exeter	25.04	21.54	22.13	17.35	21.62
Original ME Muller	10.90	7.01	10.63	10.64	9.01
Taperloc Hip Cemented CoCr	1.02	2.84	3.31	3.11	5.23
Spectron EF	7.50	5.01	4.88	3.60	4.68
C-Stem AMT	4.60	4.34	4.70	4.75	3.24
Polarstem cemented	0.00	0.83	1.05	1.96	3.06
CPT	6.81	11.52	5.40	5.73	3.06
Twinsys stem Cemented	2.39	2.00	2.61	3.93	2.88
MP Reconstruction Prosthesis	2.56	4.67	2.61	2.29	1.98
Year	**2020**	**2021**	**2022**	**2023**	**2024**
Femur uncemented (n)	**707**	**781**	**784**	**844**	**838**
Femur name; Proportion (%)					
Arcos	12.31	22.66	21.81	22.04	25.54
Restoration Modular	17.40	10.50	12.76	14.10	13.25
MP Reconstruction Prosthesis	12.87	18.82	16.33	12.68	12.41
Redapt	10.47	8.19	9.95	5.81	8.11
Wagner SL	3.39	3.84	2.81	5.45	3.94
Revitan	10.04	6.15	4.34	4.15	3.70
Taperloc Complete	3.11	2.94	3.32	3.44	3.70
Corail Revision	1.84	3.07	3.83	4.74	3.58
Reclaim Revision hip	1.27	1.02	2.17	2.49	3.34
Alloclassic SLL	3.11	3.20	3.44	3.67	2.51

Most frequently registered - Bone cement

TABLE The most frequently registered bone cement used during hip revision arthroplasties in the Netherlands in 2020-2024

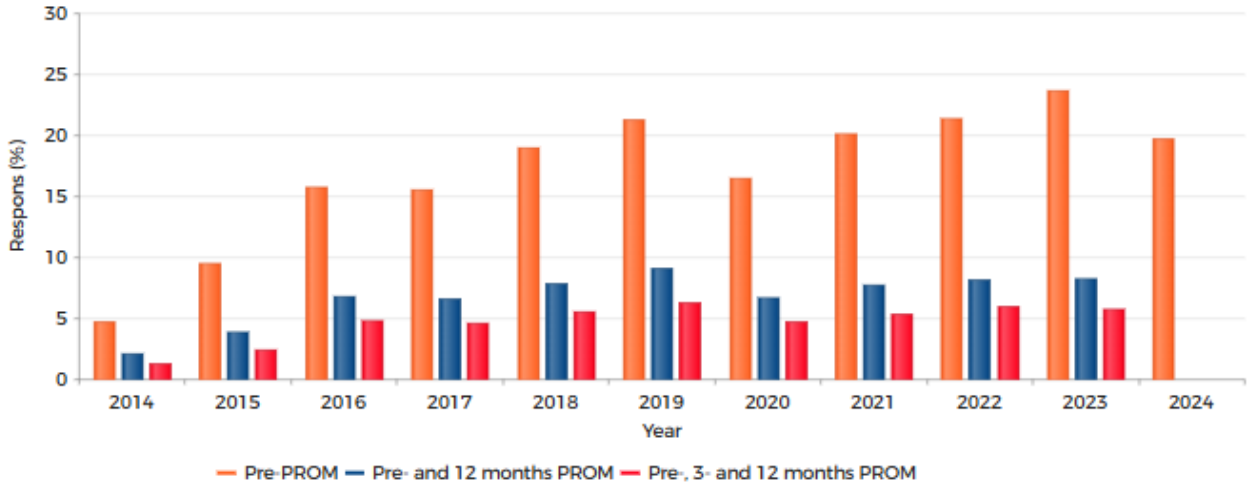
Year	2020	2021	2022	2023	2024
Bone cement pre-packed in a vacuum mixing system (n)	**460**	**575**	**565**	**580**	**640**
Cement name; Proportion (%)					
Palacos R+G	51.96	56.70	57.88	67.93	70.00
Refobacin Bone Cement R	40.65	36.52	35.93	29.31	26.56
Copal G+C	0.00	0.00	0.00	0.00	2.97
Refobacin Plus Bone Cement	5.87	2.78	3.89	2.76	0.47
Year	**2020**	**2021**	**2022**	**2023**	**2024**
Separately packed bone cement (n)	**901**	**912**	**871**	**868**	**651**
Cement name; Proportion (%)					
Palacos R+G	31.85	32.02	35.71	29.84	40.55
Copal G+C	29.63	35.31	29.28	36.41	18.89
Refobacin Revision	14.65	15.24	16.65	12.90	13.52
Copal G+V	5.99	6.47	5.40	5.88	7.83
Simplex ABC TOBRA	0.67	0.55	2.87	4.38	6.45
Palacos MV+G	4.00	3.07	4.71	3.80	5.38
Refobacin Bone Cement R	5.55	2.19	1.95	3.57	3.84
Subiton G	1.78	2.85	1.61	1.15	1.69
Simplex ABC EC	4.44	1.97	1.38	1.61	1.38
Cemex VancoCenx	1.00	0.22	0.34	0.35	0.15

PROMs

Response

per year

FIGURE Pre-operative, 3 months and 12 months postoperative response percentage of patients who underwent a hip revision arthroplasty in the Netherlands in 2014-2024



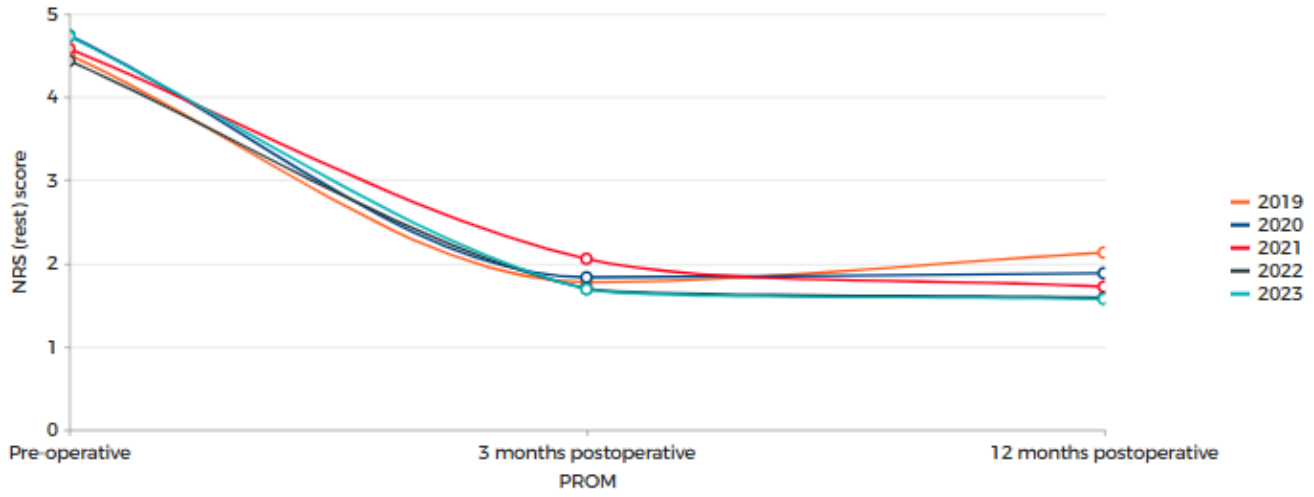
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Pre-PROM	4.71	9.53	15.75	15.47	18.92	21.27	16.41	20.08	21.34	23.65	19.73
Pre- and 12 months PROM	2.09	3.83	6.73	6.58	7.85	9.07	6.69	7.69	8.17	8.25	n.a.
Pre-, 3- and 12 months PROM	1.27	2.43	4.76	4.62	5.52	6.27	4.65	5.35	5.90	5.69	n.a.
Total revision arthroplasties (n)	**3,545**	**3,789**	**3,804**	**3,768**	**3,731**	**3,747**	**3,376**	**3,461**	**3,524**	**3,881**	**3,684**

Please note: The 12 months postoperative PROMs response percentage is not (yet) available for 2024.
PROM: patient reported outcome measure.

Outcomes

NRS (rest)

FIGURE Mean (95% CI) pre-operative, 3 months and 12 months postoperative NRS (rest) scores of patients who underwent a hip revision in the Netherlands in 2019-2023



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NRS (rest) score		Pre-operative	3 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	235	4.50 (4.13-4.88)	1.77 (1.49-2.05)	2.13 (1.78-2.48)
2020	157	4.74 (4.29-5.19)	1.83 (1.48-2.18)	1.88 (1.47-2.30)
2021	185	4.58 (4.18-4.98)	2.05 (1.68-2.43)	1.72 (1.37-2.07)
2022	208	4.44 (4.06-4.82)	1.70 (1.37-2.02)	1.59 (1.25-1.92)
2023	221	4.73 (4.36-5.10)	1.69 (1.40-1.98)	1.57 (1.26-1.88)
Total	1,006	4.59 (4.42-4.76)	1.80 (1.65-1.94)	1.78 (1.62-1.94)

CI: confidence interval

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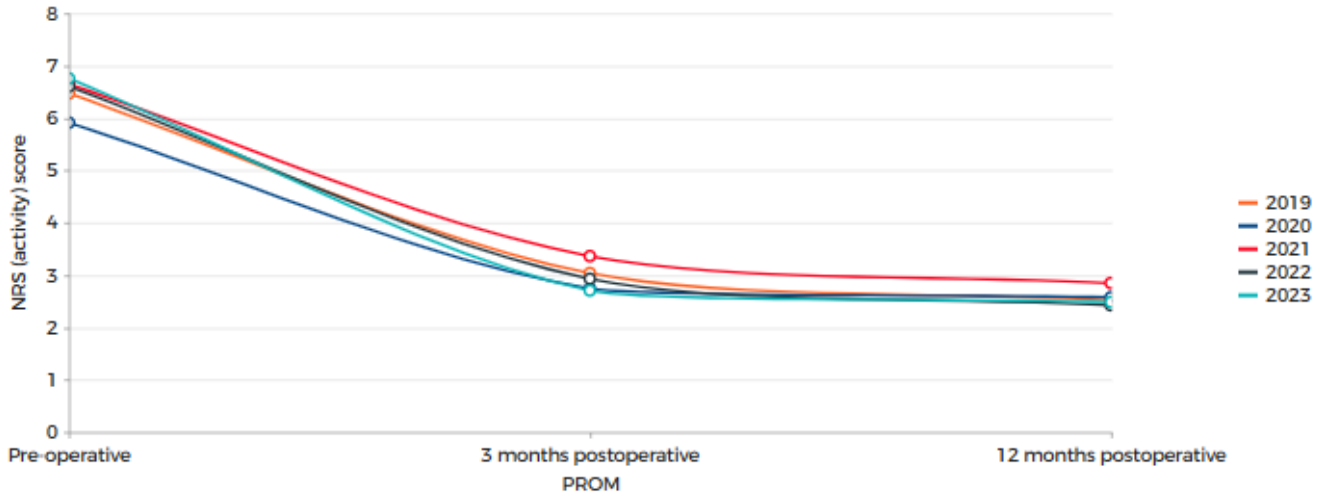
The NRS (rest) score measures pain during rest. The score has a range of 0.0 to 10.0, with 0.0 representing no pain and 10.0 representing the most possible pain.

NRS (activity)

FIGURE Mean (95% CI) pre-operative, 3 months and 12 months postoperative NRS (activity) scores of patients who underwent a hip revision in the Netherlands in 2019-2023



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NRS (activity) score		Pre-operative	3 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	235	6.47 (6.10-6.83)	3.04 (2.70-3.38)	2.52 (2.17-2.88)
2020	157	5.91 (5.42-6.41)	2.74 (2.33-3.16)	2.58 (2.13-3.03)
2021	185	6.65 (6.26-7.03)	3.36 (2.93-3.79)	2.85 (2.42-3.28)
2022	208	6.60 (6.25-6.96)	2.93 (2.55-3.30)	2.43 (2.04-2.81)
2023	221	6.76 (6.41-7.10)	2.71 (2.38-3.03)	2.48 (2.13-2.84)
Total	1,006	6.51 (6.33-6.68)	2.95 (2.79-3.12)	2.56 (2.38-2.73)

CI: confidence interval

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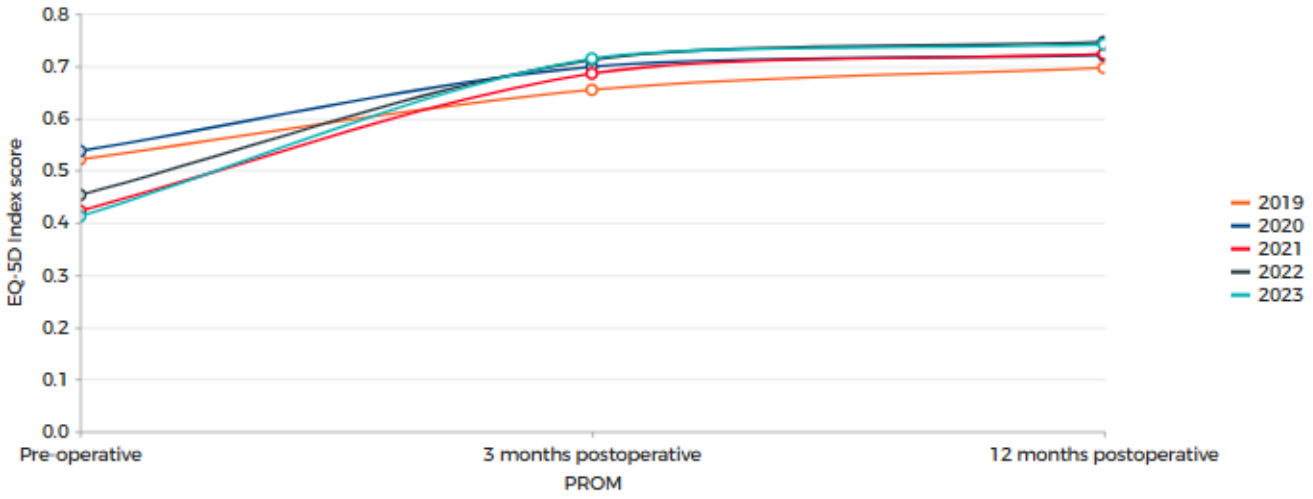
The NRS (activity) score measures pain during activity. The score has a range of 0.0 to 10.0, with 0.0 representing no pain and 10.0 representing the most possible pain.

EQ-5D index score

FIGURE Mean (95% CI) pre-operative, 3 months and 12 months postoperative EQ-5D index scores of patients who underwent a hip revision in the Netherlands in 2019-2023



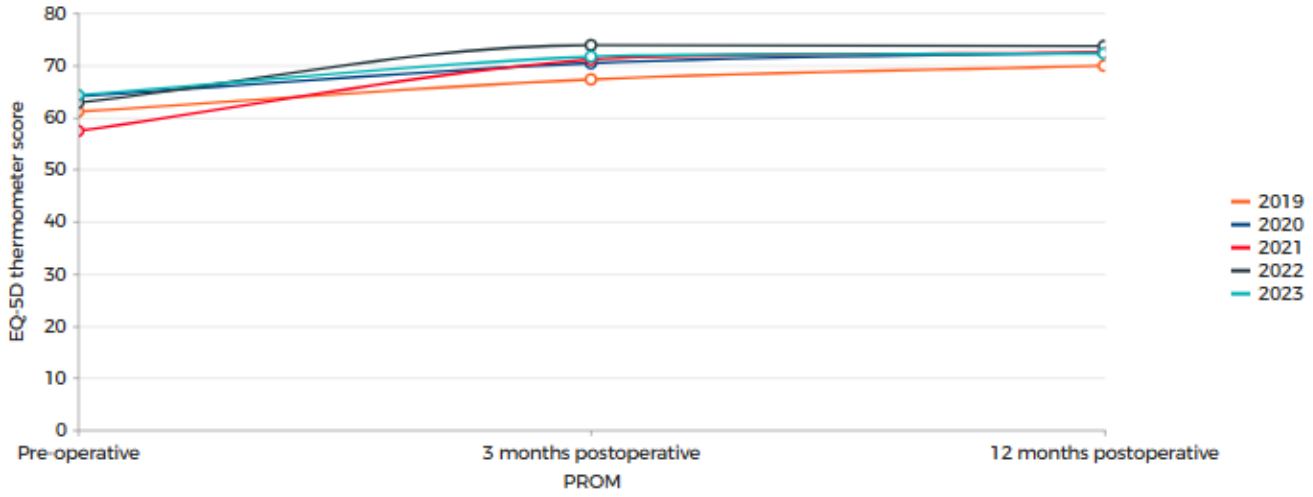
EQ-5D Index score		Pre-operative	3 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	235	0.52 (0.49-0.55)	0.65 (0.63-0.68)	0.70 (0.67-0.73)
2020	157	0.54 (0.50-0.57)	0.70 (0.67-0.73)	0.72 (0.68-0.76)
2021	185	0.42 (0.38-0.46)	0.69 (0.65-0.72)	0.72 (0.69-0.76)
2022	208	0.45 (0.41-0.49)	0.71 (0.68-0.74)	0.75 (0.71-0.78)
2023	221	0.41 (0.37-0.45)	0.71 (0.69-0.74)	0.74 (0.71-0.78)
Total	1,006	0.47 (0.45-0.48)	0.69 (0.68-0.71)	0.73 (0.71-0.74)

CI: confidence interval

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

FIGURE Mean (95% CI) pre-operative, 3 months and 12 months postoperative EQ-5D thermometer scores of patients who underwent a hip revision in the Netherlands in 2019-2023



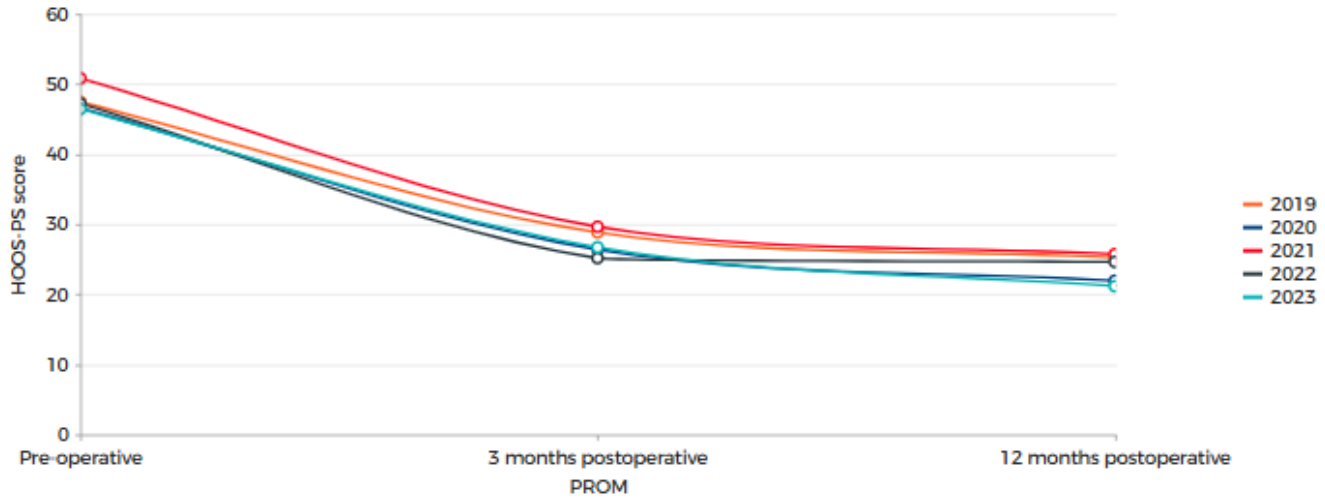
EQ-5D thermometer score		Pre-operative	3 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	235	61.06 (58.15-63.98)	67.25 (64.27-70.23)	69.87 (67.27-72.47)
2020	157	63.99 (60.49-67.50)	70.36 (67.53-73.19)	72.44 (69.34-75.53)
2021	185	57.36 (54.11-60.60)	71.09 (68.28-73.90)	72.43 (69.67-75.18)
2022	208	62.77 (59.74-65.80)	73.82 (71.62-76.02)	73.65 (71.17-76.12)
2023	221	64.24 (61.44-67.04)	71.64 (69.25-74.02)	72.22 (69.60-74.84)
Total	1,006	61.89 (60.51-63.26)	70.74 (69.54-71.94)	72.03 (70.83-73.23)

CI: confidence interval

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 (95% CI) pre-operative, 3 months and 12 months postoperative HOOS-PS scores of patients who underwent a hip revision in the Netherlands in 2019-2023



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HOOS-PS score		Pre-operative	3 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	235	47.46 (44.63-50.30)	28.86 (26.14-31.57)	25.29 (22.66-27.92)
2020	157	46.58 (42.91-50.25)	26.42 (23.25-29.59)	21.95 (18.70-25.19)
2021	185	50.83 (47.91-53.75)	29.65 (26.88-32.43)	25.74 (22.52-28.97)
2022	208	47.22 (44.41-50.03)	25.18 (22.65-27.71)	24.64 (21.80-27.48)
2023	221	46.46 (43.57-49.34)	26.73 (24.34-29.11)	21.18 (18.63-23.72)
Total	1,006	47.69 (46.36-49.02)	27.34 (26.14-28.54)	23.88 (22.60-25.16)

CI: confidence interval

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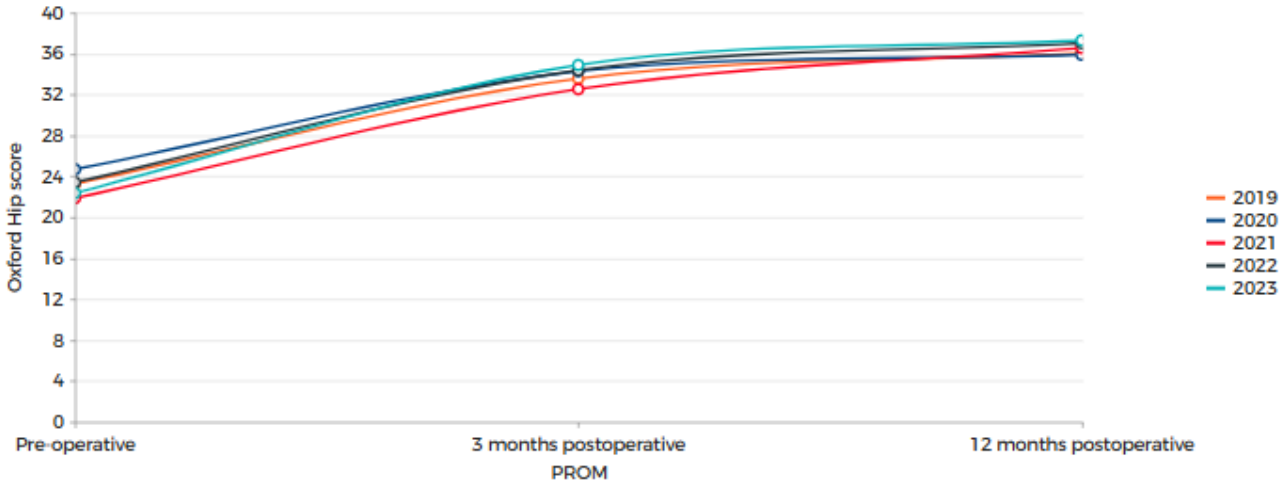
The HOOS-PS score measures the physical functioning of patients with osteoarthritis to the hip. The score has a range of 0.0 to 100.0, with 0.0 representing no effort and 100.0 the most possible effort.

Oxford Hip Score

FIGURE Mean (95% CI) pre-operative, 3 months and 12 months postoperative Oxford Hip scores of patients who underwent a hip revision in the Netherlands in 2019-2023



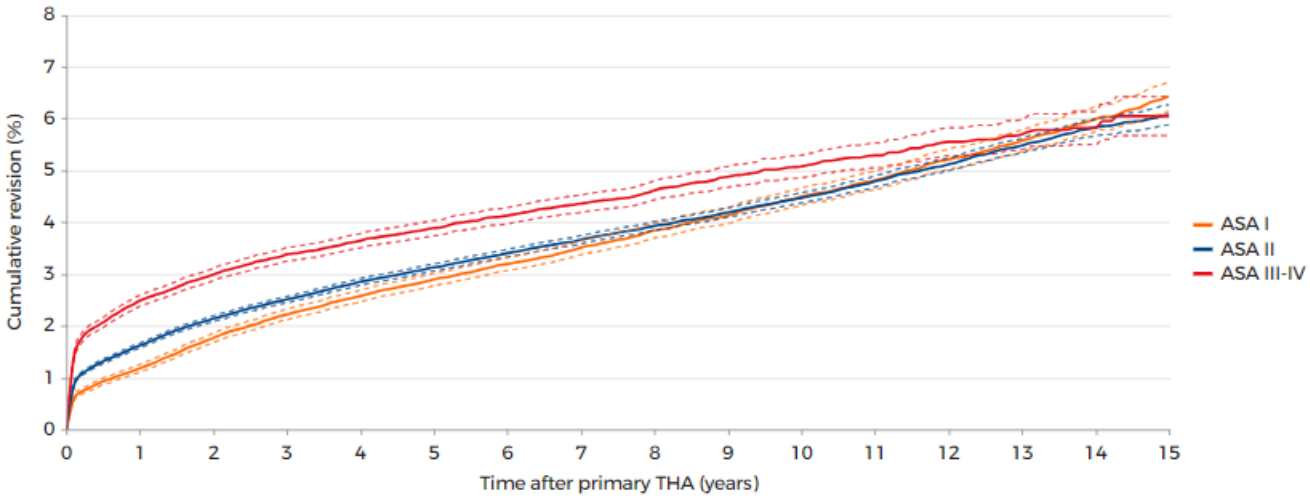
Oxford Hip score		Pre-operative	3 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	235	23.27 (21.91-24.63)	33.57 (32.30-34.83)	36.04 (34.74-37.34)
2020	157	24.69 (22.90-26.48)	34.28 (32.76-35.80)	35.89 (34.16-37.62)
2021	185	21.87 (20.47-23.27)	32.53 (31.06-33.99)	36.54 (35.10-37.99)
2022	208	23.42 (22.03-24.81)	34.38 (33.10-35.65)	37.02 (35.66-38.38)
2023	221	22.38 (20.94-23.82)	34.89 (33.70-36.08)	37.29 (36.02-38.56)
Total	1,006	23.08 (22.43-23.73)	33.96 (33.37-34.56)	36.60 (35.98-37.22)

CI: confidence interval

The Oxford Hip score measures the physical functioning and pain of patients with osteoarthritis to the hip. The score has a range of 0.0 to 48.0, with 0.0 representing no functional ability and 48.0 the most functional ability.

THA by ASA score

FIGURE Cumulative revision percentage (Kaplan-Meier; 95% CI) of total hip arthroplasties by ASA score in the Netherlands in 2007-2023 (n=446,604)



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	Number (n)	1yr	3yr	5yr	7yr	10yr	15yr
ASA I	85,106	1.13 (1.06-1.20)	2.18 (2.08-2.28)	2.86 (2.74-2.97)	3.46 (3.33-3.60)	4.45 (4.28-4.61)	6.37 (6.09-6.65)
ASA II	278,269	1.57 (1.52-1.61)	2.47 (2.41-2.53)	3.10 (3.03-3.17)	3.62 (3.55-3.70)	4.44 (4.34-4.54)	6.05 (5.86-6.24)
ASA III-IV	83,229	2.41 (2.30-2.51)	3.33 (3.20-3.46)	3.86 (3.71-4.01)	4.33 (4.17-4.50)	5.06 (4.84-5.28)	6.05 (5.67-6.42)

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

THA: total hip arthroplasty; CI: confidence interval.

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Knee arthroplasty

In this section you will find all the information on knee arthroplasty

Numbers

Registered procedures

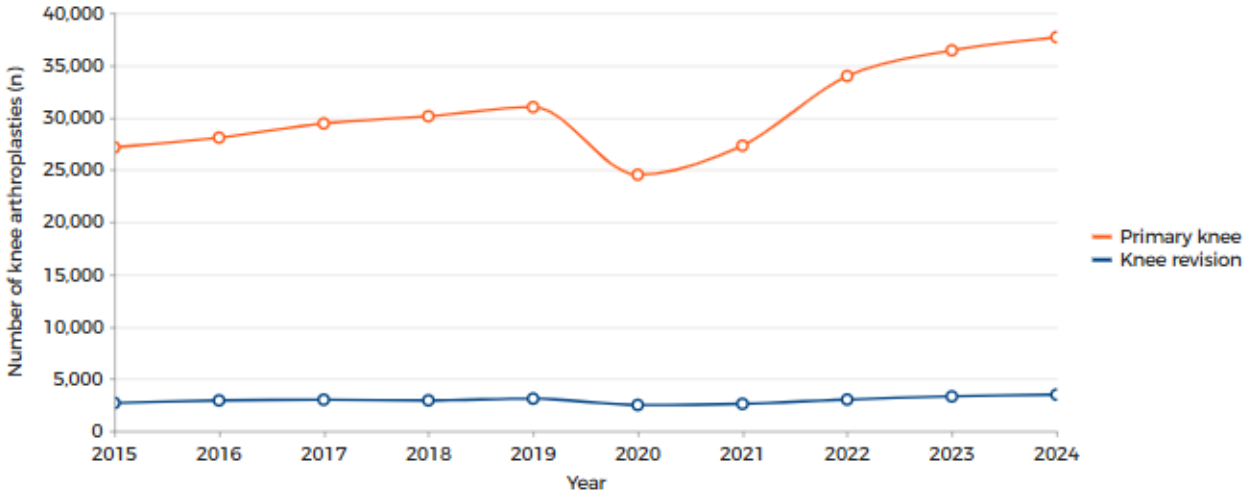
TABLE Number of registered knee arthroplasties per year of surgery (2007-2024) in the LROI in April 2025

Year of surgery	Total knee arthroplasty	Unicondylar knee arthroplasty	Patellofemoral knee arthroplasty	Unknown/ missing	Revision arthroplasty	Total
2007	7,034	779	47	878	595	**9,333**
2008	11,747	1,221	92	405	908	**14,373**
2009	16,792	1,547	139	175	1,300	**19,953**
2010	18,508	1,715	143	241	1,624	**22,231**
2011	19,521	1,587	116	208	1,794	**23,226**
2012	21,727	1,579	171	254	2,117	**25,848**
2013	22,300	1,805	135	207	2,309	**26,756**
2014	24,242	2,364	116	117	2,556	**29,395**
2015	24,244	2,694	156	48	2,685	**29,827**
2016	24,884	2,948	144	98	2,926	**31,000**
2017	25,555	3,662	168	43	2,997	**32,425**
2018	25,835	4,072	183	29	2,930	**33,049**
2019	25,885	4,888	175	43	3,101	**34,092**
2020	19,620	4,725	158	22	2,496	**27,021**
2021	21,518	5,666	108	13	2,602	**29,907**
2022	26,836	6,995	116	26	3,013	**36,986**
2023	28,343	7,927	126	33	3,309	**39,738**
2024	28,708	8,808	155	16	3,478	**41,165**
Total (n)	**393,299**	**64,982**	**2,448**	**2,856**	**42,740**	**506,325**

Please note: The LROI is nearly complete as of 2010

Type of procedures

FIGURE Number of primary knee arthroplasties and knee revision arthroplasties registered in the LROI in the Netherlands in 2015-2024

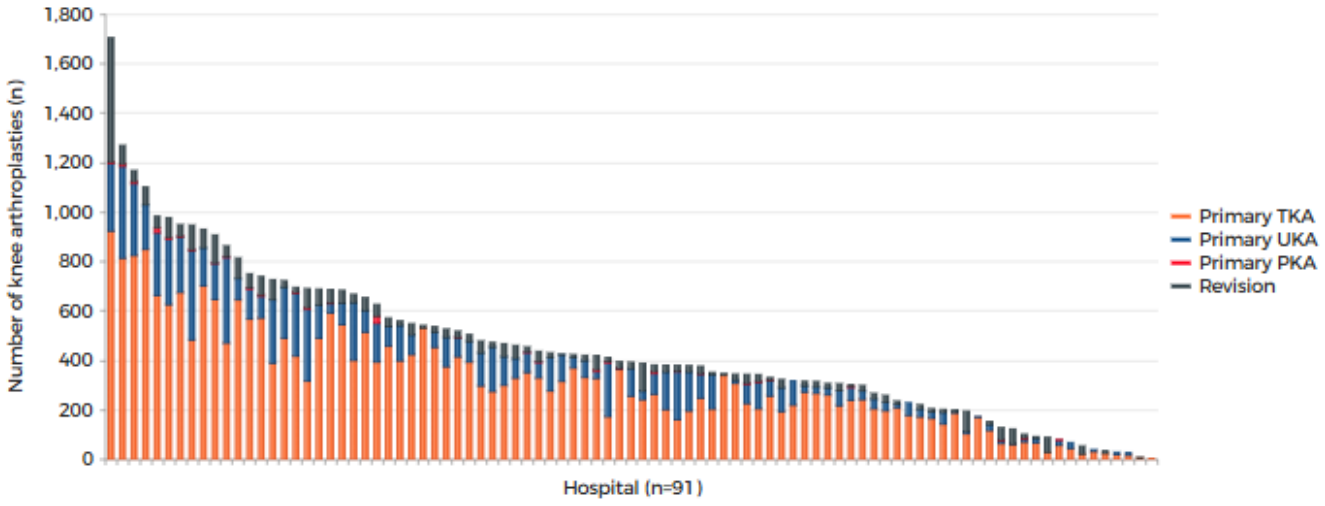


	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Primary knee	27,142	28,074	29,428	30,119	30,991	24,525	27,305	33,973	36,429	37,687	**305,673**
Knee revision	2,685	2,926	2,997	2,930	3,101	2,496	2,602	3,013	3,309	3,478	**29,537**
Total (n)	**29,827**	**31,000**	**32,425**	**33,049**	**34,092**	**27,021**	**29,907**	**36,986**	**39,738**	**41,165**	**335,210**

Out of 37,687 primary knee arthroplasties that were performed in 2024, 3.2% (n=1,218) was performed bilaterally.

Type of procedure per hospital

FIGURE Number of primary knee arthroplasties and knee revision arthroplasties per hospital in the Netherlands in 2024 (n=41,149)



TKA: total knee arthroplasty; UKA: unicondylar knee arthroplasty; PKA: patellofemoral knee arthroplasty

Total knee arthroplasty

In this section you will find all the information on total knee arthroplasty

Patient characteristics

By diagnosis

TABLE Patient characteristics of all patients with a registered primary total knee arthroplasty by type of diagnosis in the Netherlands in 2024

	Osteoarthritis	Post-traumatic	Rheumatoid arthritis	Osteonecrosis	Other	Total
N(%)	**27,663 (96.4)**	**456 (1.6)**	**210 (0.8)**	**124 (0.4)**	**255 (0.8)**	**28,708**
Mean age (years) (SD)	69.8 (8.5)	64 (9.4)	67.1 (9.6)	70.4 (10.9)	65.6 (13.9)	69.6 (8.7)
Age (years) (%)						
<50	1	6	5	3	12	1
50-59	12	25	17	8	11	12
60-69	33	41	33	33	34	33
70-79	42	24	39	35	31	41
>80	12	4	7	21	12	12
Gender (%)						
Men	38	45	28	31	45	38
Women	62	55	72	69	55	62
ASA score (%)						
ASA I	9	16	1	7	9	9
ASA II	61	61	62	58	57	61
ASA III-IV	30	22	37	34	32	30
Type of hospital (%)						
General	78	71	82	82	68	78
UMC	1	9	4	4	17	1
Private	21	20	13	14	15	21
Charnley-score (%)						
A One knee joint affected	34	63	24	51	40	35
B1 Both knee joints affected	36	17	32	10	21	36
B2 Contralateral knee with a TKA	25	5	21	10	9	25
C Multiple joints affected or chronic disease that affects quality of life	4	5	21	6	10	4
Mean BMI (kg/m2) (SD)	29.6 (4.9)	28.1 (4.7)	28.6 (4.7)	27.9 (4.2)	27.9 (5)	29.5 (4.9)
Body Mass Index (kg/m2) (%)						
Underweight (<=18.5)	0	1	1	0	2	0
Normal weight (>18.5-25)	18	27	21	27	21	18
Overweight (>25-30)	40	40	41	42	39	40
Obesity (>30-40)	38	30	34	30	26	38
Morbid obesity (>40)	3	1	1	0	1	3
Smoking (%)						
No	93	88	95	89	80	93
Yes	6	11	4	10	14	7

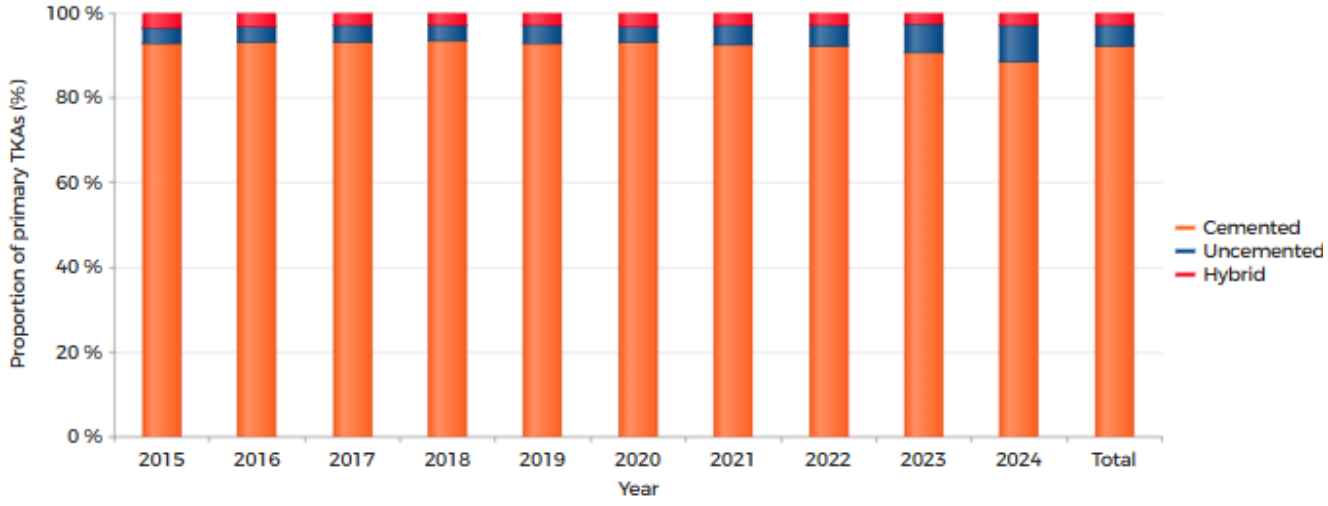
Please note: The diagnosis category 'Other' (255 cases: 1%) includes other (78), inflammatory arthritis (42), fracture (acute) (16), tumour (metastasis) (3), tumour (primary) (16) and 100 primary total knee arthroplasties where the diagnosis was not registered.

General: general hospital; UMC: university medical centre; Private: private hospital; SD: standard deviation

Procedure characteristics

Fixation

FIGURE Trend (proportion [%] per year) in type of fixation in primary total knee arthroplasties in the Netherlands in 2015-2024

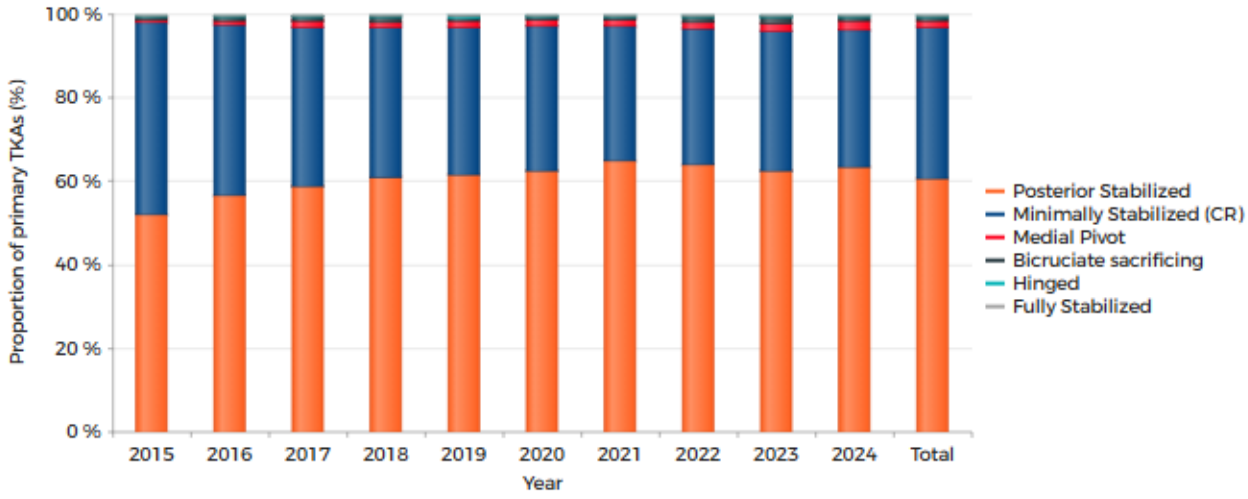


	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Cemented	93.04	93.29	93.38	93.57	92.83	93.28	92.49	92.27	90.95	88.50	92.27
Uncemented	3.59	3.64	3.94	3.71	4.48	3.63	4.81	5.12	6.73	8.89	4.96
Hybrid	3.37	3.07	2.68	2.72	2.69	3.09	2.69	2.61	2.32	2.61	2.77
Total (n)	**24,073**	**24,771**	**25,444**	**25,709**	**25,694**	**19,550**	**21,411**	**26,704**	**28,227**	**28,166**	**249,749**

TKA: total knee arthroplasty

Type of femur component

FIGURE Trend (proportion [%] per year) in type of femur component in primary total knee arthroplasties in the Netherlands in 2015-2024

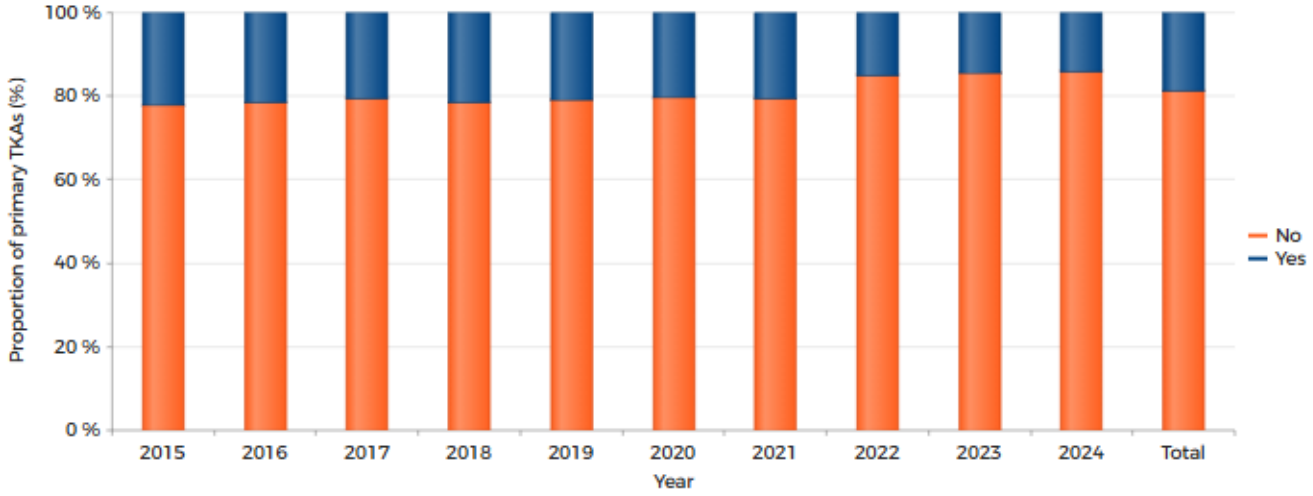


	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Posterior Stabilized	52.16	56.64	58.74	61.18	61.68	62.51	64.91	64.07	62.53	63.38	60.81
Minimally Stabilized (CR)	45.90	40.97	38.20	35.60	35.32	34.66	32.19	32.45	33.45	33.07	36.11
Medial Pivot	0.59	0.83	1.54	1.24	1.44	1.64	1.67	1.76	2.01	2.14	1.50
Bicruciate sacrificing	0.88	1.06	0.97	1.33	0.77	0.49	0.51	1.08	1.43	0.83	0.96
Hinged	0.24	0.24	0.25	0.31	0.35	0.40	0.42	0.33	0.37	0.41	0.33
Fully Stabilized	0.23	0.26	0.30	0.34	0.44	0.30	0.31	0.31	0.22	0.17	0.29
Total (n)	**23,868**	**23,757**	**23,980**	**24,994**	**24,865**	**18,185**	**21,149**	**26,399**	**27,910**	**28,318**	**243,425**

TKA: total knee arthroplasty

Implantation of patella

FIGURE Trend (proportion [%] per year) in implantation of patella in primary total knee arthroplasties in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
No	78.01	78.51	79.42	78.55	79.21	79.75	79.47	85.06	85.49	85.88	81.14
Yes	21.99	21.49	20.58	21.45	20.79	20.25	20.53	14.94	14.51	14.12	18.86
Total (n)	**24,080**	**24,711**	**25,334**	**25,661**	**25,651**	**19,346**	**21,367**	**26,648**	**28,208**	**28,552**	**249,558**

TKA: total knee arthroplasty

Most frequently registered - Total knee prostheses

TABLE The most frequently registered primary total knee arthroplasties in the Netherlands in 2020-2024

Year	2020	2021	2022	2023	2024
Total knee arthroplasties (n)	**18,185**	**21,149**	**26,400**	**27,128**	**27,910**
Femur name; Proportion (%)					
Genesis II	22.23	21.26	20.23	19.27	18.35
Persona	3.40	9.44	11.74	13.48	17.41
Attune	3.66	7.04	9.73	12.96	15.92
Triathlon	8.55	9.56	9.50	12.10	14.88
Vanguard Complete Knee	20.70	19.05	16.42	13.90	12.16
NexGen	19.46	17.32	17.51	13.70	9.38
PFC / SIGMA	8.54	7.27	6.72	6.32	4.18
Legion	0.15	0.16	0.13	0.14	1.92
balanSys	1.86	1.74	1.76	1.82	1.68
SAIPH	0.00	0.01	0.22	0.72	1.14

Most frequently registered - Bone cement

TABLE The most frequently registered bone cement used during primary total knee arthroplasties in the Netherlands in 2020-2024

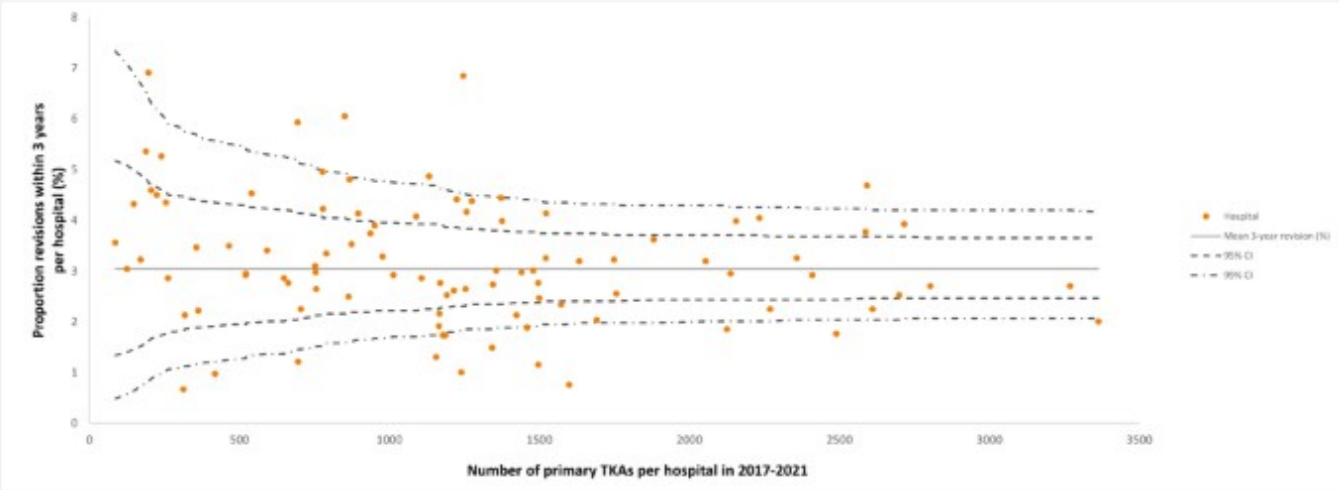
Year	2020	2021	2022	2023	2024
Bone cement pre-packed in a vacuum mixing system (n)	**9,042**	**12,436**	**16,475**	**16,713**	**17,606**
Cement name; Proportion (%)					
Palacos R+G	51.70	49.26	49.74	57.18	52.98
Refobacin Bone Cement R	39.36	45.16	43.73	37.57	46.00
Refobacin Plus Bone Cement	8.94	5.55	6.53	5.25	1.02
Copal G+C	0.00	0.00	0.00	0.00	0.01
Year	**2020**	**2021**	**2022**	**2023**	**2024**
Separately packed bone cement (n)	**7,120**	**6,281**	**6,868**	**5,974**	**4,856**
Cement name; Proportion (%)					
Palacos R+G	70.08	81.74	80.10	70.91	79.02
Subiton G	4.96	5.80	5.63	5.89	6.18
Refobacin Bone Cement R	16.70	5.83	6.16	15.05	5.44
PalacosS MV+G	3.15	2.37	3.07	3.23	4.90
Biomet Bone Cement R	1.57	3.49	4.16	4.18	4.16
Copal G+C	0.06	0.30	0.09	0.08	0.10
Biomet Plus Bone Cement	0.84	0.02	0.00	0.15	0.10
Refobacin Revision	0.06	0.19	0.10	0.27	0.06
Palacos R	0.00	0.00	0.01	0.00	0.02
Refobacin Plus Bone Cement	0.04	0.00	0.00	0.00	0.02

Survival

Short term revision

Overall revision per hospital

Funnel plot of proportion of knee revision arthroplasties within three years after a total knee arthroplasty per hospital in the Netherlands in 2017-2021 (n=117,945)



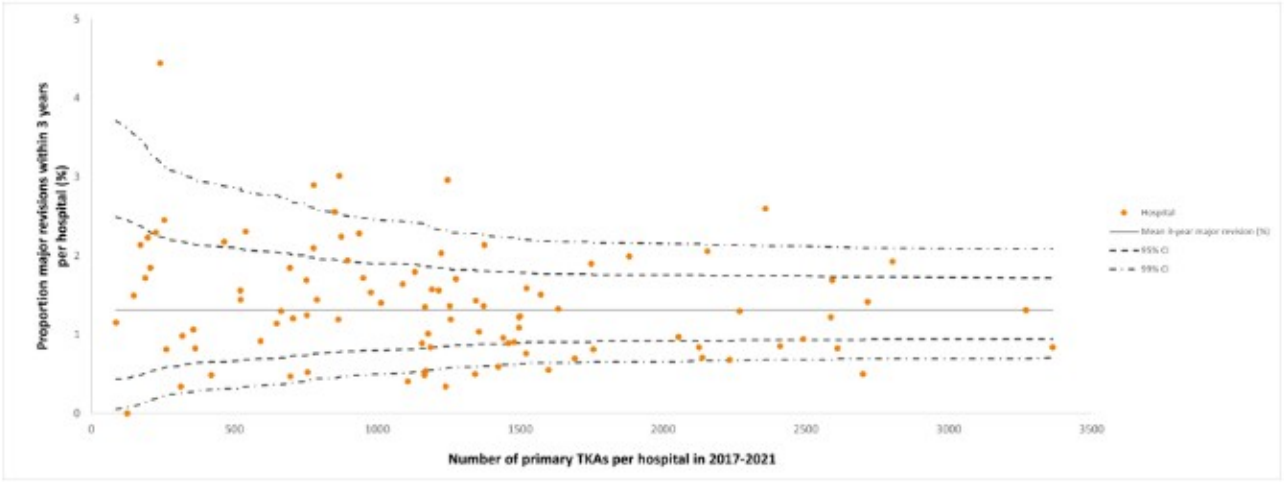
Please note: The proportion of revisions within 3 years per hospital were adjusted for casemix factors age, gender, ASA score and diagnosis (osteoarthritis versus other).

TKA: total knee arthroplasty; CL: control limits.

The mean 3-years revision percentage is 2.95 in the Netherlands in 2017-2021.
Control limits indicate the plausible range of outcome if all hospitals perform equally well.

Major revision per hospital

Funnel plot of proportion of knee major revision arthroplasties within three years after a total knee arthroplasty per hospital in the Netherlands in 2017-2021 (n=117,945)



Please note: Major revision is defined as revision of at least femur or tibia component.

Please note: The proportion of revisions within 3 years per hospital were adjusted for casemix factors age, gender, ASA score and diagnosis (osteoarthritis versus other).

TKA: total knee arthroplasty; CL: control limits.

The mean 3-years major revision percentage is 1.31 in the Netherlands in 2017-2021.
Control limits indicate the plausible range of outcome if all hospitals perform equally well.

By type of revision within 3 years

TABLE Cumulative 3-year revision percentage of primary total knee arthroplasties by type of revision in the Netherlands in 2017-2021 (n=117,945)

	Cumulative 3-year revision percentage
	Kaplan Meier (95% CI)
Any type of revision	3.03 (2.93-3.13)
Major revision	1.17 (1.11-1.23)
Only tibia	0.21 (0.18-0.24)
Only femur	0.11 (0.09-0.13)
Femur and tibia	0.85 (0.79-0.90)
Minor revision	1.81 (1.73-1.88)
DAIR	0.60 (0.55-0.64)
No DAIR	0.73 (0.69-0.78)
Patella addition	0.47 (0.43-0.51)

Any type of revision includes minor and major revisions as well as revision procedures that could not be classified as minor or major revision.
Major revision: revision of at least the femur or tibia component.
Minor revision: only inlay and/or patella exchange (including DAIR procedures).
TKA: total knee arthroplasty; CI: confidence interval

In 2017-2021, 3,979(3.4%) primary TKAs were implanted in patients who died within three years after the primary procedure.

First major or minor revision

TABLE Cumulative 3-year first revision percentage of primary total knee arthroplasties by type of first major or minor revision in the Netherlands in 2017-2021 (n=117,945)

	Cumulative 3-year first revision percentage
	Kaplan Meier (95% CI)
First major revision	1.30 (1.23-1.36)
Tibia	1.18 (1.12-1.25)
Femur	1.09 (1.03-1.15)
First minor revision	1.81 (1.73-1.88)
Inlay	1.29 (1.23-1.36)
Patella addition	0.78 (0.73-0.83)

First major revision: first revision of the femur or tibia component, regardless of whether a minor revision has already taken place. Therefor, the first three revision procedures were reviewed.
First minor revision: only inlay and/or patella exchange (including DAIR procedures).
TKA: total knee arthroplasty; CI: confidence interval

In 2017-2021, 3,979(3.4%) primary TKAs were implanted in patients who died within three years after the primary procedure.

Reasons for revision by type of revision

TABLE Reasons for revision within three years of primary total knee arthroplasties by type of revision in the Netherlands in 2017-2021

	Major revision (n=1,545)	Minor revision (n=2,128)	Any type of revision (n=3,588)
Reasons for revision	**Proportion (%)**	**Proportion (%)**	**Proportion (%)**
Infection	22.98	33.13	27.42
Patellar pain	10.74	35.57	26.20
Instability	30.23	21.62	25.03
Loosening of tibia component	28.41	0.23	11.79
Malalignment	26.86	1.03	11.65
Arthrofibrosis	11.13	6.11	8.33
Patellar dislocation	4.27	4.09	4.10
Loosening of femur component	8.16	0.19	3.51
Peri-prosthetic fracture	5.11	0.23	2.40
Revision after knee removal	4.01	0.56	1.76
Progression of osteoarthritis	0.19	2.63	1.64
Insert wear	0.32	1.08	0.81
Loosening of patella component	0.71	0.75	0.78
Other	5.57	12.64	10.03

Major revision: first revision of the femur or tibia component, regardless of whether a minor revision has already taken place. Therefor, the first three revision procedures were reviewed.
Minor revision: only inlay and/or patella exchange (including DAIR procedures).
Any type of revision includes all first revisions, including revision procedures that could not be classified as minor or major revision.
Please note: one patient may have more than one reason for revision. As such, the total proportion is over 100%.

Time after primary TKA

TABLE Time after primary total knee arthroplasty until short-term revision in the Netherlands in 2017-2021 (n=117,945)

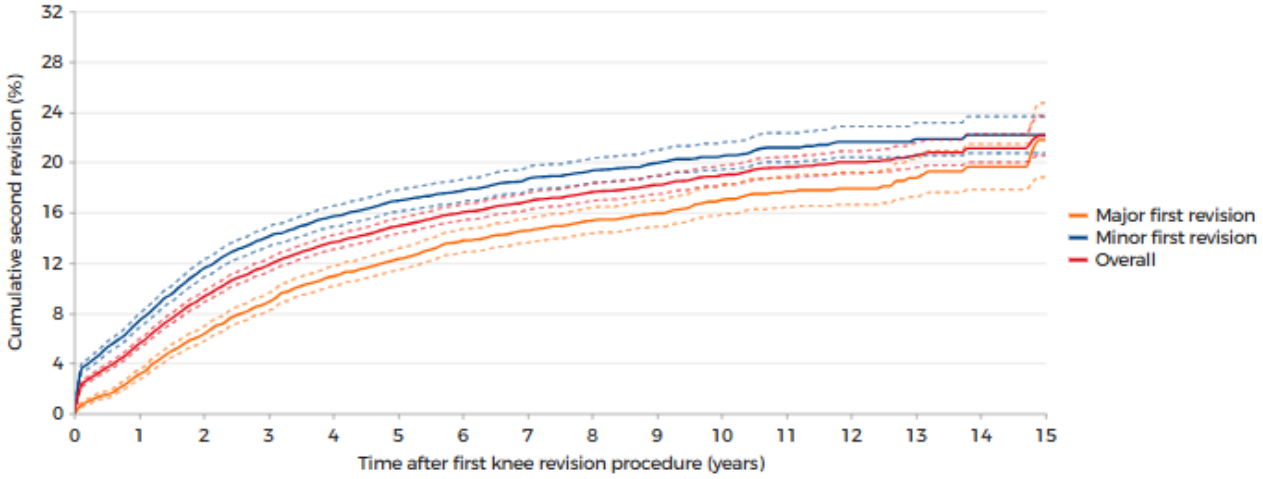
Time after primary TKA	Percentage revisions (%)
Day 0-29	0.38
Day 30-182	0.37
Day 183-364	0.38
Day 365-730 (second year)	1.20
Day 731-1095 (third year)	0.71

TKA: total knee arthroplasty

Long term revision

By type of revision

FIGURE Cumulative second revision percentage (Kaplan-Meier; 95% CI) of total knee arthroplasties after a one-stage first revision by type of first revision in the Netherlands in 2007-2024 (n=15,756)



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	Number (n)	1yr	3yr	5yr	7yr	10yr	15yr
Overall	16,576	5.11 (4.77-5.45)	11.57 (11.05-12.09)	14.82 (14.22-15.43)	16.74 (16.08-17.40)	18.85 (18.08-19.62)	22.10 (20.53-23.68)
Major first revision	7,380	2.74 (2.36-3.13)	8.62 (7.93-9.31)	12.14 (11.29-12.98)	14.51 (13.55-15.47)	16.85 (15.70-17.99)	21.75 (18.80-24.70)
Minor first revision	8,887	6.87 (6.33-7.41)	13.84 (13.07-14.61)	16.86 (16.00-17.73)	18.45 (17.52-19.38)	20.41 (19.34-21.47)	22.17 (20.72-23.63)

Please note: Dotted lines represent the upper and lower limits of the 95% confidence interval.
One-stage revision: A single revision procedure to change (insertion, replacement and/or removal) one or more components of the prosthesis (excluding patella addition).
Major revision: revision of at least the femur or tibia component.
Minor revision: only insert and/or patella exchange (excluding patella addition).
CI: confidence interval.

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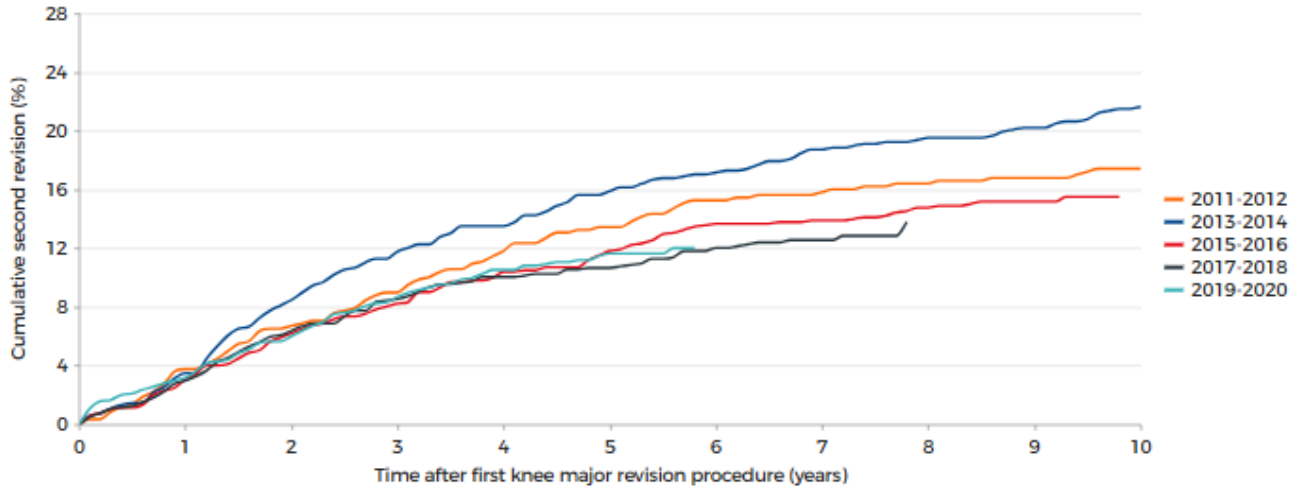
By procedure year

FIGURE Cumulative second revision percentage (Kaplan-Meier; 95% CI) of total knee arthroplasties after a one-stage first revision by procedure year of first major revision in the Netherlands in 2011-2020 (n=4,670)



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	Number (n)	1yr	3yr	5yr	7yr	10yr
2011-2012	590	3.59 (2.08-5.09)	8.97 (6.64-11.30)	13.43 (10.63-16.22)	15.63 (12.64-18.62)	17.42 (14.27-20.56)
2013-2014	837	3.12 (1.94-4.31)	11.28 (9.12-13.44)	15.63 (13.14-18.12)	18.71 (16.03-21.40)	21.49 (18.63-24.35)
2015-2016	1,052	2.47 (1.53-3.41)	8.03 (6.38-9.67)	11.50 (9.56-13.45)	13.88 (11.76-16.01)	n.a.
2017-2018	1,047	2.78 (1.78-3.78)	8.43 (6.74-10.13)	10.65 (8.76-12.54)	12.55 (10.49-14.61)	n.a.
2019-2020	1,144	2.98 (1.99-3.96)	8.32 (6.71-9.94)	11.47 (9.57-13.37)	n.a.	n.a.

Please note: n.a. if <50 cases were at risk.

One-stage revision: A single revision procedure to change (insertion, replacement and/or removal) one or more components of the prosthesis.

Major revision: revision of at least the femur or tibia component.

CI: confidence interval.

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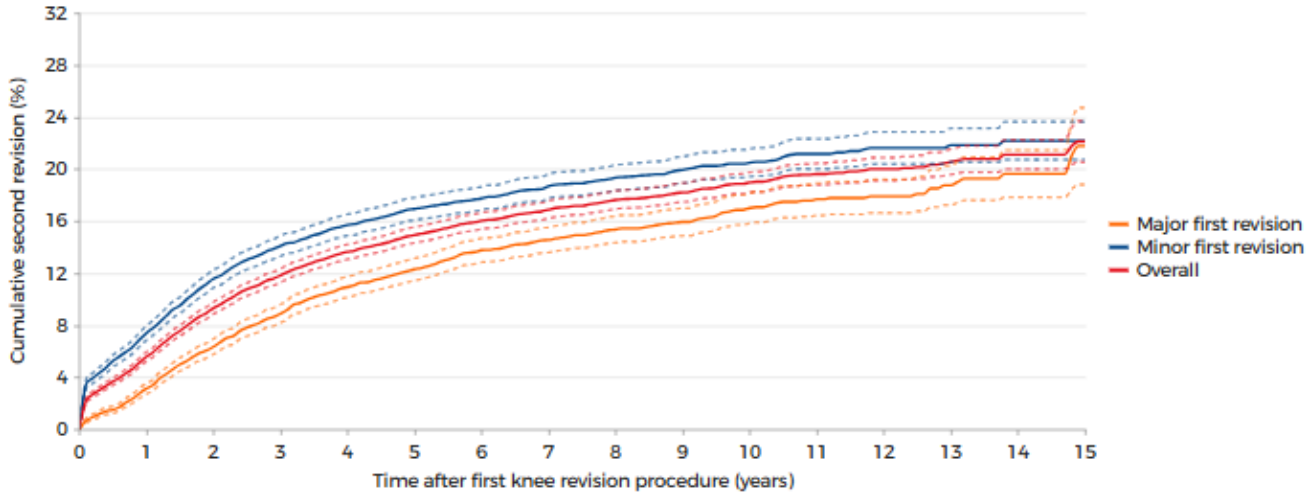
Rerevision

By type of first revision

FIGURE Cumulative second revision percentage (Kaplan-Meier; 95% CI) of total knee arthroplasties after a one-stage first revision by type of first revision in the Netherlands in 2007-2024 (n=15,756)



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	Number (n)	1yr	3yr	5yr	7yr	10yr	15yr
Overall	16,576	5.11 (4.77-5.45)	11.57 (11.05-12.09)	14.82 (14.22-15.43)	16.74 (16.08-17.40)	18.85 (18.08-19.62)	22.10 (20.53-23.68)
Major first revision	7,380	2.74 (2.36-3.13)	8.62 (7.93-9.31)	12.14 (11.29-12.98)	14.51 (13.55-15.47)	16.85 (15.70-17.99)	21.75 (18.80-24.70)
Minor first revision	8,887	6.87 (6.33-7.41)	13.84 (13.07-14.61)	16.86 (16.00-17.73)	18.45 (17.52-19.38)	20.41 (19.34-21.47)	22.17 (20.72-23.63)

Please note: Dotted lines represent the upper and lower limits of the 95% confidence interval.
One-stage revision: A single revision procedure to change (insertion, replacement and/or removal) one or more components of the prosthesis (excluding patella addition).
Major revision: revision of at least the femur or tibia component.
Minor revision: only insert and/or patella exchange (excluding patella addition).
CI: confidence interval.

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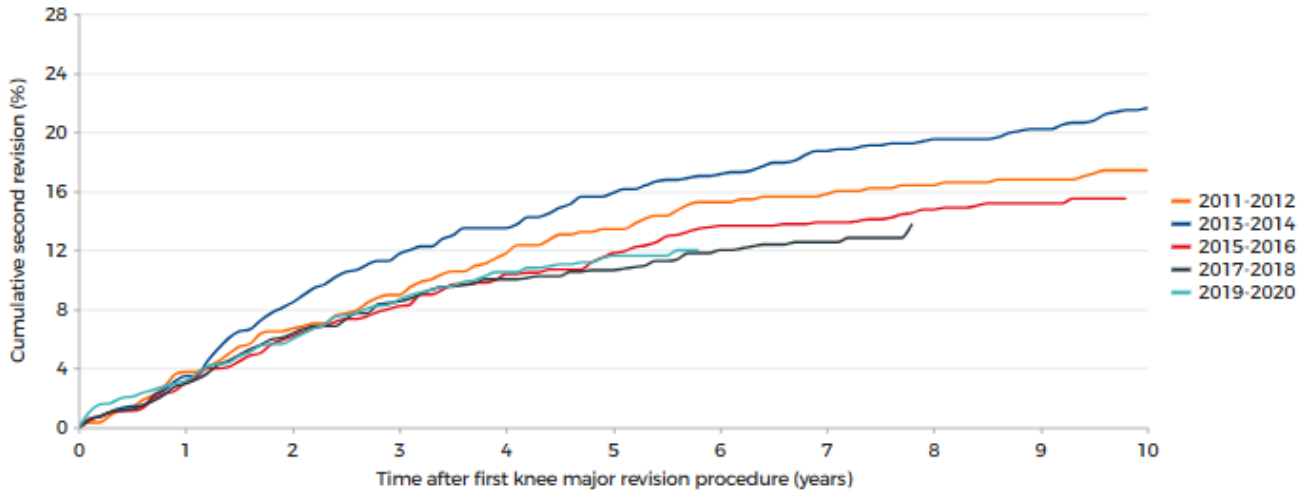
By procedure year of first major revision

FIGURE Cumulative second revision percentage (Kaplan-Meier; 95% CI) of total knee arthroplasties after a one-stage first revision by procedure year of first major revision in the Netherlands in 2011-2020 (n=4,670)



	Number (n)	1yr	3yr	5yr	7yr	10yr
2011-2012	590	3.59 (2.08-5.09)	8.97 (6.64-11.30)	13.43 (10.63-16.22)	15.63 (12.64-18.62)	17.42 (14.27-20.56)
2013-2014	837	3.12 (1.94-4.31)	11.28 (9.12-13.44)	15.63 (13.14-18.12)	18.71 (16.03-21.40)	21.49 (18.63-24.35)
2015-2016	1,052	2.47 (1.53-3.41)	8.03 (6.38-9.67)	11.50 (9.56-13.45)	13.88 (11.76-16.01)	n.a.
2017-2018	1,047	2.78 (1.78-3.78)	8.43 (6.74-10.13)	10.65 (8.76-12.54)	12.55 (10.49-14.61)	n.a.
2019-2020	1,144	2.98 (1.99-3.96)	8.32 (6.71-9.94)	11.47 (9.57-13.37)	n.a.	n.a.

Please note: n.a. if <50 cases were at risk.

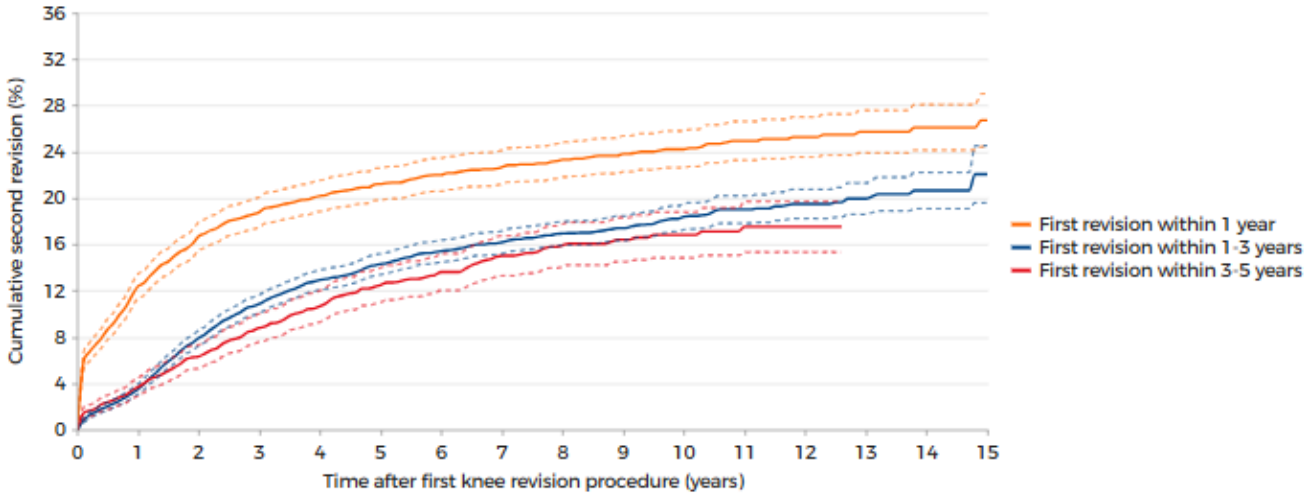
One-stage revision: A single revision procedure to change (insertion, replacement and/or removal) one or more components of the prosthesis.

Major revision: revision of at least the femur or tibia component.

CI: confidence interval.

By time to first revision

FIGURE Cumulative second revision percentage (Kaplan-Meier; 95% CI) of total knee arthroplasties after a one-stage first revision by time to first revision in the Netherlands in 2007-2024 (n=13,054)



	Number (n)	1yr	3yr	5yr	7yr	10yr	15yr
First revision within 1 year	3,894	11.52 (10.50-12.54)	18.60 (17.31-19.88)	21.17 (19.78-22.55)	22.55 (21.09-24.00)	24.21 (22.63-25.80)	26.72 (24.43-29.01)
First revision within 1-3 years	6,788	3.12 (2.70-3.54)	10.64 (9.87-11.42)	14.18 (13.28-15.08)	16.08 (15.11-17.06)	18.21 (17.10-19.33)	22.05 (19.59-24.52)
First revision within 3-5 years	2,372	3.38 (2.65-4.12)	8.55 (7.36-9.75)	12.33 (10.85-13.81)	14.90 (13.19-16.62)	16.81 (14.83-18.78)	n.a.

Please note: Dotted lines represent the upper and lower limits of the 95% confidence interval.
One-stage revision: A single revision procedure to change (insertion, replacement and/or removal) one or more components of the prosthesis (excluding patella addition).
CI: confidence interval.

Reasons for second revision by type of first revision

TABLE Reasons for second revision within ten years in patients who underwent a second revision after a one-stage first revision of a total knee arthroplasty by type of first revision in the Netherlands in 2007-2024

	Major revision (n=860)	Minor revision (n=998)	Any type of revision (n=1,939)
Reasons for second revision	**Proportion (%)**	**Proportion (%)**	**Proportion (%)**
Infection	24.42	50.80	38.89
Instability	31.40	24.65	27.54
Loosening of tibia component	19.42	12.02	15.37
Patellar pain	18.02	9.52	13.62
Malalignment	10.35	9.02	9.80
Loosening of femur component	11.40	4.31	7.68
Arthrofibrosis	8.14	4.51	6.24
Patellar dislocation	3.84	3.51	3.56
Insert wear	2.56	2.20	2.53
Loosening of patella component	2.67	1.30	2.06
Peri-prosthetic fracture	1.05	0.50	0.72
Progression of osteoarthritis	0.23	0.30	0.26
Other	7.67	5.91	6.81

One-stage revision: A single revision procedure to change (insertion, replacement and/or removal) one or more components of the prosthesis.
Major first revision: Revision of at least the femur or tibia component.
Minor first revision: Only insert and/or patella exchange (including DAIR procedures).
Any type of first revision includes minor and major revisions as well as revision procedures that could not be classified as minor or major revision.
One patient may have more than one reason for second revision or re-surgery. As such, the total proportion is over 100%.

Survival by component

By cemented component name - overall revision

TABLE Cumulative major revision percentages of cemented primary total knee arthroplasties by prosthesis component combination of patients who underwent a TKA for osteoarthritis in the Netherlands in 2007-2024 (n=336,805)

Femur component	Tibia component	Primary TKAs (n)	Median (IQR) age (yr)	Major revisions (n)	Cumulative revision percentage (95% CI)					
					1yr	3yr	5yr	7yr	10yr	16yr
All cemented TKAs for osteoarthritis		**336,805**	**70 (63 - 76)**	**8,039**	**0.34 (0.32-0.36)**	**1.48 (1.44-1.53)**	**2.08 (2.03-2.13)**	**2.52 (2.46-2.58)**	**3.14 (3.06-3.21)**	**4.31 (4.18-4.45)**
Genesis II	Genesis II	73,772	69 (63 - 76)	1,642	0.39 (0.34-0.43)	1.57 (1.48-1.67)	2.10 (1.99-2.21)	2.44 (2.32-2.57)	2.88 (2.73-3.02)	3.49 (3.26-3.73)
NexGen	NexGen	66,429	69 (63 - 76)	1,930	0.29 (0.25-0.33)	1.39 (1.29-1.48)	2.06 (1.94-2.18)	2.75 (2.61-2.89)	3.80 (3.62-3.98)	5.39 (5.05-5.73)
VANGUARD COMPLETE KNEE	VANGUARD COMPLETE KNEE	54,035	69 (63 - 75)	1,134	0.38 (0.33-0.44)	1.44 (1.34-1.55)	1.89 (1.77-2.02)	2.19 (2.06-2.33)	2.61 (2.45-2.78)	3.49 (3.17-3.80)
PFC / SIGMA	PFC / SIGMA	34,666	70 (63 - 76)	639	0.27 (0.21-0.32)	1.19 (1.07-1.31)	1.65 (1.50-1.79)	1.85 (1.70-2.01)	2.18 (2.01-2.36)	2.48 (2.25-2.70)
LCS	LCS	17,254	70 (63 - 76)	689	0.38 (0.29-0.47)	2.29 (2.06-2.51)	3.17 (2.90-3.44)	3.79 (3.50-4.09)	4.30 (3.98-4.63)	5.20 (4.62-5.77)
TRIATHLON	TRIATHLON	13,982	71 (64 - 76)	248	0.45 (0.33-0.56)	1.58 (1.35-1.81)	2.16 (1.87-2.45)	2.49 (2.16-2.83)	2.83 (2.42-3.24)	n.a.
Persona	Persona	13,650	69 (62 - 75)	82	0.23 (0.14-0.31)	0.85 (0.64-1.07)	1.53 (1.02-2.04)	1.96 (0.98-2.93)	2.42 (1.09-3.75)	n.a.
ATTUNE	ATTUNE	12,392	70 (63 - 76)	89	0.29 (0.19-0.39)	0.96 (0.73-1.20)	1.39 (1.04-1.75)	1.81 (1.27-2.35)	n.a.	n.a.
balanSys	balanSys	5,020	69 (62 - 76)	114	0.33 (0.17-0.50)	1.56 (1.19-1.94)	2.33 (1.85-2.81)	2.86 (2.30-3.42)	3.21 (2.59-3.84)	3.62 (2.85-4.40)
ACC V2	ACC V2	4,420*	71 (65 - 77)	121	0.14 (0.03-0.25)	1.08 (0.77-1.39)	1.49 (1.13-1.85)	1.94 (1.53-2.36)	2.38 (1.92-2.85)	3.38 (2.76-4.01)

* Denotes prosthesis combinations with no reported use in primary TKAs in 2024.

Please note: n.a. if <50 cases were at risk.

Majore revision: Revision of at least the femur or tibia component

TKA: total knee arthroplasty; CI: confidence interval; IQR: interquartile range.

Patient characteristics like age and diagnosis, as well as procedure characteristics like the experience of the surgeon performing the procedure of the prosthesis may have influenced the cumulative revision percentages.

By cemented component name - major revision

TABLE Cumulative major revision percentages of uncemented primary total knee arthroplasties by prosthesis component combination of patients who underwent a TKA for osteoarthritis in the Netherlands in 2007-2024 (n=19,289)

Femur component	Tibia component	Primary TKAs (n)	Median (IQR) age (yr)	Major revisions (n)	Cumulative revision percentage (95% CI)					
					1yr	3yr	5yr	7yr	10yr	16yr
All uncemented TKAs for osteoarthritis		**19,289**	**69 (62 - 75)**	**488**	**0.58 (0.46-0.69)**	**1.99 (1.77-2.20)**	**2.58 (2.32-2.83)**	**2.91 (2.64-3.19)**	**3.35 (3.04-3.67)**	**4.17 (3.68-4.66)**
LCS	LCS	8,931	70 (63 - 76)	255	0.58 (0.43-0.74)	2.15 (1.84-2.45)	2.64 (2.30-2.98)	2.77 (2.42-3.12)	3.01 (2.64-3.39)	3.33 (2.89-3.78)
TRIATHLON	TRIATHLON	3,277	68 (62 - 74)	41	0.46 (0.22-0.69)	0.88 (0.53-1.24)	1.29 (0.79-1.80)	1.76 (1.08-2.44)	2.43 (1.42-3.45)	n.a.
TRIATHLON	TRIATHLON TRITANIUM	1,896	68 (62 - 74)	6	0.30 (0.00-0.60)	n.a.	n.a.	n.a.	n.a.	n.a.
ATTUNE	ATTUNE	1,252	67 (61 - 73)	8	0.20 (0.00-0.48)	1.33 (0.29-2.37)	2.24 (0.19-4.29)	n.a.	n.a.	n.a.
ACS	ACS	907	69 (61 - 75)	21	1.06 (0.37-1.74)	2.16 (1.14-3.18)	2.74 (1.53-3.95)	3.00 (1.69-4.31)	3.00 (1.69-4.31)	n.a.
NexGen	NexGen	243	70 (63 - 77)	16	1.26 (0.00-2.67)	4.29 (1.69-6.89)	5.22 (2.34-8.10)	6.60 (3.19-10.02)	7.62 (3.70-11.54)	n.a.
Genesis II	Genesis II	240*	69 (63 - 76)	6	0.43 (0.00-1.27)	2.71 (0.57-4.85)	2.71 (0.57-4.85)	2.71 (0.57-4.85)	2.71 (0.57-4.85)	n.a.
ACS LD	ACS LD	234	70 (61 - 76)	9	1.30 (0.00-2.76)	3.50 (1.12-5.89)	3.97 (1.43-6.51)	3.97 (1.43-6.51)	n.a.	n.a.

* Denotes prosthesis combinations with no reported use in primary TKAs in 2024.

Please note: n.a. if <50 cases were at risk.

Majore revision: Revision of at least the femur or tibia component

TKA: total knee arthroplasty; CI: confidence interval; IQR: interquartile range.

Patient characteristics like age and diagnosis, as well as procedure characteristics like the experience of the surgeon performing the procedure of the prosthesis may have influenced the cumulative revision percentages.

By uncemented component name - overall revision

TABLE Cumulative revision percentages of uncemented primary total knee arthroplasties by prosthesis component combination of patients who underwent a TKA for osteoarthritis in the Netherlands in 2007-2024 (n=19,289)

Femur component	Tibia component	Primary TKAs (n)	Hospitals (n)	Median (IQR) age (yr)	Revisions (n)	Type of revision (n)						Cumulative revision percentage (95% CI)					
						Total revision	Patella addition	Only femur	Only tibia	Only insert/patella	Unknown	1yr	3yr	5yr	7yr	10yr	16yr
All uncemented TKAs for osteoarthritis		**19,289**	**95**	**69 (62 - 75)**	**796**	**291**	**116**	**16**	**127**	**236**	**10**	**0.99 (0.85-1.14)**	**3.42 (3.14-3.70)**	**4.25 (3.92-4.57)**	**4.80 (4.45-5.15)**	**5.41 (5.02-5.81)**	**6.54 (5.96-7.12)**
LCS	LCS	8,931	23	70 (63 - 76)	421	128	51	10	96	132	4	0.93 (0.73-1.13)	3.48 (3.10-3.87)	4.17 (3.74-4.59)	4.52 (4.08-4.97)	4.98 (4.50-5.46)	5.59 (5.00-6.18)
TRIATHLON	TRIATHLON	3,277	13	68 (62 - 74)	73	27	7	1	4	34	0	0.90 (0.57-1.23)	1.90 (1.38-2.42)	2.48 (1.80-3.15)	3.05 (2.22-3.89)	3.50 (2.46-4.53)	n.a.
TRIATHLON	TRIATHLON TRITANIUM	1,896	9	68 (62 - 74)	14	4	2	0	2	6	0	0.68 (0.24-1.13)	n.a.	n.a.	n.a.	n.a.	n.a.
ATTUNE	ATTUNE	1,252	12	67 (61 - 73)	22	4	6	0	0	12	0	0.80 (0.27-1.32)	3.71 (2.04-5.37)	3.71 (2.04-5.37)	n.a.	n.a.	n.a.
ACS	ACS	907	7	69 (61 - 75)	37	11	7	2	5	11	1	1.73 (0.86-2.60)	3.79 (2.45-5.13)	4.58 (3.04-6.12)	4.84 (3.23-6.46)	5.45 (3.64-7.26)	n.a.
NexGen	NexGen	243	24	70 (63 - 77)	21	11	1	1	3	5	0	1.67 (0.05-3.30)	5.55 (2.62-8.49)	7.00 (3.68-10.32)	8.38 (4.60-12.17)	10.29 (5.75-14.83)	n.a.
Genesis II	Genesis II	240	29	69 (63 - 76)	11	5	3	0	1	1	1	0.86 (0.00-2.05)	4.50 (1.77-7.22)	4.50 (1.77-7.22)	5.05 (2.13-7.97)	5.05 (2.13-7.97)	n.a.
ACS LD	ACS LD	234*	3	70 (61 - 76)	15	6	3	0	2	4	0	1.30 (0.00-2.75)	5.69 (2.68-8.69)	6.15 (3.03-9.28)	6.63 (3.39-9.88)	n.a.	n.a.
VANGUARD COMPLETE KNEE	VANGUARD COMPLETE KNEE	170	23	68 (61 - 74)	15	7	2	0	4	2	0	2.38 (0.07-4.68)	5.50 (2.00-9.00)	5.50 (2.00-9.00)	7.87 (3.55-12.19)	9.82 (4.81-14.82)	n.a.

* Denotes prosthesis combinations with no reported use in primary TKAs in 2024.

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

Only combinations with over 100 procedures and reported by at least 3 hospitals have been listed.

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 of the prosthesis may have influenced the cumulative revision percentages.

By uncemented component name - major revision

TABLE Cumulative revision percentages of the most frequently registered types of bone cement by type of mixing system in primary total knee arthroplasties in the Netherlands in 2007-2024

Bone cement	Primary TKAs (n)	Median (IQR) age (yr)	Revisions (n)	Cumulative revision percentage (95% CI)					
				1yr	3yr	5yr	7yr	10yr	16yr
Separately packed	**188,394**	**69 (63 - 76)**	**9,768**	**0.90 (0.85-0.94)**	**3.23 (3.14-3.31)**	**4.20 (4.11-4.30)**	**4.87 (4.77-4.98)**	**5.76 (5.65-5.88)**	**7.44 (7.24-7.63)**
PALACOS R+G	141,265	69 (63 - 76)	7,238	0.92 (0.87-0.97)	3.23 (3.13-3.32)	4.21 (4.10-4.31)	4.86 (4.74-4.98)	5.75 (5.62-5.89)	7.48 (7.23-7.72)
Refobacin Bone Cement R	13,619	69 (63 - 76)	749	0.83 (0.68-0.98)	3.11 (2.81-3.41)	3.99 (3.64-4.33)	4.91 (4.52-5.30)	6.36 (5.88-6.85)	8.37 (7.66-9.08)
PALACOS MV+G	8,447	70 (64 - 76)	400	0.79 (0.60-0.99)	3.04 (2.67-3.42)	4.01 (3.58-4.44)	4.77 (4.29-5.25)	5.32 (4.79-5.84)	n.a.
Simplex ABC EC	5,077*	69 (62 - 76)	361	0.93 (0.66-1.19)	3.70 (3.18-4.22)	4.98 (4.38-5.59)	5.96 (5.30-6.63)	7.01 (6.28-7.74)	9.15 (7.66-10.64)
Simplex ABC TOBRA	4,864*	66 (60 - 73)	234	0.78 (0.53-1.03)	2.24 (1.82-2.65)	3.01 (2.52-3.49)	3.56 (3.03-4.08)	4.48 (3.88-5.08)	6.32 (5.37-7.27)
Refobacin Plus Bone Cement	3,055	68 (60 - 75)	198	1.02 (0.66-1.37)	4.28 (3.56-5.00)	5.36 (4.56-6.16)	5.78 (4.95-6.62)	6.34 (5.46-7.22)	6.95 (5.97-7.93)
Subiton G	2,148	69 (61 - 75)	103	1.53 (1.00-2.07)	5.39 (4.31-6.47)	6.49 (5.21-7.78)	n.a.	n.a.	n.a.
PALACOS R	1,674	69 (62 - 76)	75	0.54 (0.19-0.89)	2.60 (1.83-3.37)	3.23 (2.37-4.08)	3.75 (2.82-4.67)	4.45 (3.44-5.47)	4.85 (3.76-5.93)
Biomet Plus Bone Cement	1,451	68 (61 - 76)	68	1.04 (0.52-1.57)	3.45 (2.50-4.41)	4.35 (3.28-5.42)	4.52 (3.43-5.61)	5.00 (3.82-6.18)	n.a.
PALAMED G	1,345*	70 (63 - 76)	64	0.22 (0.00-0.48)	2.25 (1.46-3.05)	3.18 (2.24-4.13)	3.50 (2.51-4.50)	4.01 (2.94-5.08)	5.39 (4.06-6.72)
Biomet Bone Cement R	1,301	69 (62 - 75)	42	0.75 (0.26-1.23)	3.26 (2.10-4.42)	5.00 (3.28-6.72)	6.05 (3.82-8.28)	6.05 (3.82-8.28)	n.a.
VERSABOND	631*	71 (63 - 78)	58	0.63 (0.01-1.25)	5.43 (3.65-7.20)	6.42 (4.50-8.35)	6.93 (4.93-8.93)	7.48 (5.40-9.56)	n.a.
cemSys 1G	547*	64 (58 - 69)	41	1.10 (0.22-1.97)	3.31 (1.80-4.81)	5.73 (3.77-7.69)	6.87 (4.73-9.01)	7.62 (5.33-9.92)	n.a.
Simplex P	398*	70 (62 - 77)	24	0.00 (0.00-0.00)	2.83 (1.18-4.48)	3.90 (1.96-5.84)	4.48 (2.40-6.57)	5.41 (3.10-7.73)	7.25 (4.35-10.15)
Simplex HV	377*	66 (61 - 73)	7	0.27 (0.00-0.78)	1.60 (0.33-2.87)	1.89 (0.50-3.28)	1.89 (0.50-3.28)	n.a.	n.a.
Synicem1G	334*	71 (65 - 77)	12	0.60 (0.00-1.43)	3.68 (1.63-5.72)	3.68 (1.63-5.72)	3.68 (1.63-5.72)	n.a.	n.a.
Pre-packed in a vacuum mixing system	**126,537**	**70 (63 - 76)**	**4,381**	**1.05 (1.00-1.11)**	**3.20 (3.09-3.30)**	**4.01 (3.89-4.14)**	**4.62 (4.48-4.77)**	**5.50 (5.31-5.70)**	**7.47 (6.85-8.08)**
Refobacin Bone Cement R	55,479	70 (64 - 76)	1,938	1.04 (0.96-1.13)	3.10 (2.94-3.26)	3.97 (3.78-4.16)	4.67 (4.45-4.90)	5.64 (5.34-5.95)	n.a.
PALACOS R+G	51,953	71 (64 - 76)	1,549	1.19 (1.09-1.28)	3.27 (3.10-3.45)	4.02 (3.80-4.23)	4.48 (4.23-4.73)	5.41 (4.80-6.03)	n.a.
Refobacin Plus Bone Cement	16,671	68 (62 - 74)	769	0.72 (0.59-0.84)	3.10 (2.83-3.37)	3.94 (3.63-4.25)	4.49 (4.15-4.82)	5.23 (4.85-5.61)	6.83 (6.02-7.63)
Cemex Genta	1,355*	71 (65 - 77)	103	1.04 (0.50-1.57)	4.91 (3.76-6.07)	5.68 (4.44-6.92)	6.31 (5.01-7.62)	7.46 (6.01-8.91)	n.a.

* Denotes types of bone cement with no reported use in primary TKAs in 2024.

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

Only types of bone cement with over 250 procedures have been listed.

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 of the prosthesis may have influenced the cumulative revision percentages.

By bone cement

TABLE Cumulative revision percentages of cemented primary total knee arthroplasties by prosthesis component combination of patients who underwent a TKA for osteoarthritis in the Netherlands in 2007-2024 (n=336,805)

Femur component	Tibia component	Primary TKAs (n)	Hospitals (n)	Median (IQR) age (yr)	Revisions (n)	Type of revision (n)						Cumulative revision percentage (95% CI)					
						Total revision	Patella addition	Only femur	Only tibia	Only insert/patella	Unknown	1yr	3yr	5yr	7yr	10yr	16yr
All cemented TKAs for osteoarthritis		**336,805**	**103**	**70 (63 - 76)**	**15,061**	**5,341**	**2,670**	**572**	**1,255**	**4,879**	**344**	**0.95 (0.92-0.99)**	**3.18 (3.12-3.24)**	**4.12 (4.05-4.20)**	**4.77 (4.69-4.85)**	**5.67 (5.57-5.77)**	**7.40 (7.23-7.57)**
Genesis II	Genesis II	73,772	56	69 (63 - 76)	3,776	883	805	264	279	1,469	76	1.19 (1.12-1.27)	3.83 (3.68-3.97)	4.88 (4.71-5.04)	5.51 (5.33-5.69)	6.36 (6.15-6.58)	8.12 (7.71-8.52)
NexGen	NexGen	66,429	46	69 (63 - 76)	3,067	1,325	309	81	356	925	71	0.85 (0.78-0.92)	2.71 (2.58-2.83)	3.70 (3.55-3.86)	4.53 (4.35-4.71)	5.75 (5.53-5.97)	7.66 (7.28-8.03)
VANGUARD COMPLETE KNEE	VANGUARD COMPLETE KNEE	54,035	35	69 (63 - 75)	2,213	787	379	53	150	794	50	0.99 (0.91-1.08)	3.02 (2.87-3.17)	3.75 (3.58-3.92)	4.28 (4.09-4.46)	4.97 (4.75-5.18)	6.44 (6.00-6.87)
PFC / SIGMA	PFC / SIGMA	34,666	22	70 (63 - 76)	1,377	438	283	33	97	491	35	0.89 (0.79-0.99)	2.91 (2.73-3.10)	3.65 (3.44-3.85)	4.01 (3.79-4.23)	4.60 (4.35-4.85)	5.11 (4.81-5.42)
LCS	LCS	17,254	24	70 (63 - 76)	865	470	90	34	148	110	13	0.61 (0.49-0.73)	3.11 (2.85-3.37)	4.15 (3.85-4.45)	4.79 (4.46-5.11)	5.33 (4.97-5.69)	6.64 (5.90-7.38)
TRIATHLON	TRIATHLON	13,982	24	71 (64 - 76)	521	139	77	23	52	223	7	1.43 (1.23-1.63)	3.55 (3.21-3.89)	4.30 (3.91-4.68)	4.78 (4.34-5.21)	5.60 (5.02-6.19)	n.a.
Persona	Persona	13,650	24	69 (62 - 75)	250	54	32	2	11	148	3	0.82 (0.66-0.98)	2.69 (2.32-3.06)	3.67 (3.03-4.30)	4.01 (3.08-4.94)	5.26 (3.27-7.25)	n.a.
ATTUNE	ATTUNE	12,392	24	70 (63 - 76)	205	59	47	7	13	75	4	0.73 (0.57-0.89)	2.32 (1.96-2.67)	2.85 (2.39-3.31)	3.58 (2.87-4.28)	n.a.	n.a.
balanSys	balanSys	5,020	9	69 (62 - 76)	267	79	94	7	18	63	6	0.96 (0.68-1.23)	4.31 (3.70-4.92)	5.51 (4.80-6.22)	6.27 (5.49-7.05)	7.20 (6.28-8.12)	8.47 (7.09-9.85)
AGC V2	AGC V2	4,420*	14	71 (65 - 77)	191	111	59	1	2	12	6	0.30 (0.14-0.46)	2.02 (1.61-2.44)	2.60 (2.12-3.07)	3.18 (2.65-3.71)	3.85 (3.26-4.44)	5.19 (4.44-5.94)
TC Plus	TC Plus	3,867*	3	70 (63 - 76)	148	81	33	2	5	22	5	0.65 (0.40-0.90)	2.34 (1.85-2.82)	3.13 (2.56-3.70)	3.48 (2.87-4.09)	4.26 (3.52-4.99)	5.92 (4.53-7.31)
Optetrak	Optetrak	3,073*	9	70 (62 - 76)	474	318	90	3	33	23	7	1.05 (0.69-1.41)	5.33 (4.53-6.13)	7.16 (6.23-8.08)	9.18 (8.13-10.22)	12.86 (11.60-14.12)	22.79 (20.50-25.09)
ACS	ACS	2,695	10	67 (60 - 73)	146	37	23	9	12	57	8	0.67 (0.36-0.98)	3.75 (3.03-4.48)	4.72 (3.91-5.53)	5.05 (4.21-5.88)	5.49 (4.62-6.37)	n.a.
SCORPIO NRG	SCORPIO	2,631*	8	70 (63 - 76)	145	54	47	10	4	29	1	0.84 (0.49-1.19)	3.16 (2.49-3.83)	4.48 (3.68-5.28)	5.11 (4.26-5.97)	5.66 (4.75-6.58)	n.a.
Journey II BCS	Journey BCS	2,407	9	68 (62 - 74)	122	22	40	0	0	57	3	0.94 (0.55-1.33)	4.04 (3.16-4.92)	5.40 (4.34-6.46)	6.36 (5.17-7.55)	8.80 (6.88-10.71)	n.a.
SCORPIO	SCORPIO	2,240*	10	71 (63 - 76)	124	67	23	3	6	21	4	0.31 (0.08-0.55)	2.35 (1.72-2.98)	3.19 (2.46-3.93)	3.74 (2.94-4.54)	4.71 (3.80-5.61)	6.48 (5.33-7.62)
MRK	MRK	2,081	7	70 (63 - 76)	47	22	11	0	0	12	2	0.30 (0.06-0.54)	1.46 (0.87-2.04)	2.66 (1.79-3.54)	3.48 (2.39-4.56)	4.82 (3.06-6.58)	n.a.
NexGen GSF	NexGen	1,347	8	68 (61 - 74)	40	25	5	0	2	7	1	0.45 (0.09-0.81)	1.48 (0.82-2.15)	2.45 (1.58-3.32)	2.75 (1.82-3.69)	3.35 (2.29-4.41)	n.a.
PFC / SIGMA	LCS	1,212*	9	66 (58 - 75)	59	31	11	3	1	11	2	0.33 (0.01-0.65)	1.93 (1.15-2.71)	2.88 (1.93-3.84)	3.89 (2.77-5.00)	4.51 (3.30-5.73)	6.24 (4.47-8.00)
Innex	Innex	1,126*	10	70 (62 - 77)	40	14	11	0	4	11	0	0.98 (0.40-1.55)	2.15 (1.30-2.99)	2.79 (1.82-3.76)	3.18 (2.14-4.21)	3.38 (2.31-4.45)	3.83 (2.65-5.02)
Journey BCS	Journey BCS	890*	8	66 (59 - 72)	146	17	61	1	3	62	2	1.13 (0.43-1.82)	6.84 (5.17-8.51)	8.36 (6.52-10.20)	10.22 (8.19-12.25)	12.34 (10.11-14.56)	22.55 (18.58-26.52)
Profix	Profix	772*	6	68 (61 - 76)	62	43	7	2	2	7	1	0.52 (0.01-1.03)	3.68 (2.34-5.02)	5.58 (3.94-7.21)	6.55 (4.77-8.32)	7.72 (5.79-9.65)	8.67 (6.58-10.76)
Legion	Genesis II	577	16	68 (61 - 75)	16	5	0	2	0	9	0	3.04 (1.01-5.06)	6.43 (2.15-10.71)	8.00 (2.80-13.20)	n.a.	n.a.	n.a.
Advance MP	Advance	314*	3	71 (65 - 78)	33	7	7	1	5	10	3	1.92 (0.40-3.44)	7.67 (4.72-10.62)	8.96 (5.80-12.13)	9.30 (6.08-12.53)	9.65 (6.36-12.93)	n.a.
MAXIM	VANGUARD COMPLETE KNEE	272*	5	70 (63 - 77)	14	3	3	1	2	5	0	1.47 (0.04-2.90)	2.94 (0.93-4.95)	3.31 (1.18-5.44)	4.06 (1.71-6.41)	4.81 (2.26-7.37)	5.19 (2.54-7.84)

* Denotes prosthesis combinations with no reported use in primary TKAs in 2024.

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

Only combinations with over 250 procedures and reported by at least 3 hospitals have been listed.

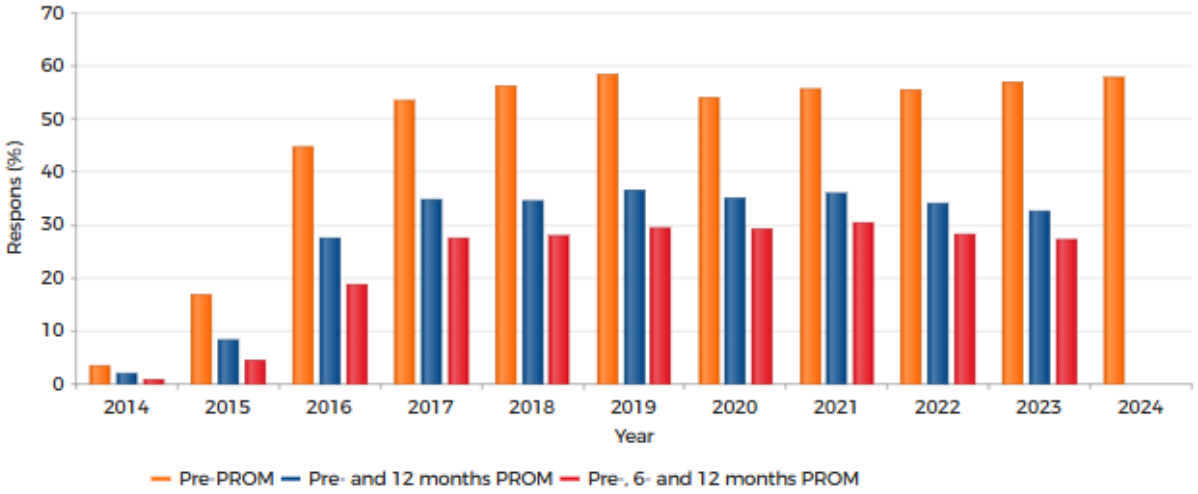
Results must be interpreted with caution. Patient characteristics like age and diagnosis, as well as procedure characteristics like the experience of the surgeon performing the procedure of the prosthesis may have influenced the cumulative revision percentages.

PROMs

Response

Per year

FIGURE Pre-operative, 6 months and 12 months postoperative response percentage of patients who underwent a TKA for osteoarthritis in the Netherlands in 2014-2024



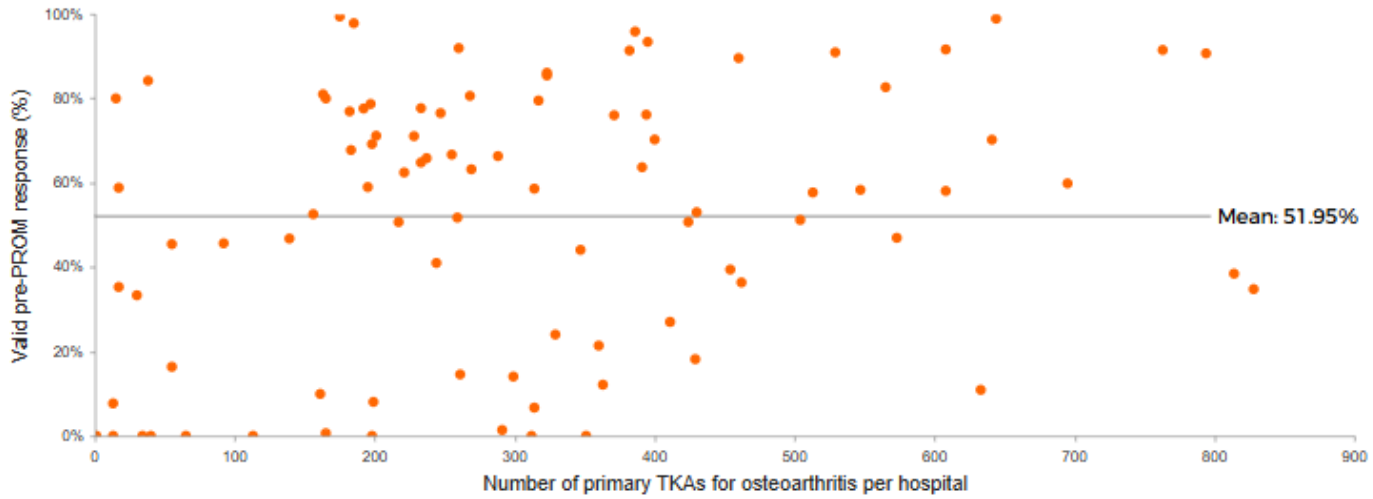
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Pre-PROM	3.45	16.81	44.66	53.40	56.12	58.42	53.99	55.64	55.47	56.79	57.94
Pre- and 12 months PROM	1.99	8.15	27.39	34.84	34.59	36.38	35.05	36.02	34.00	32.68	n.a.
Pre-, 6- and 12 months PROM	0.74	4.46	18.65	27.53	27.85	29.47	29.14	30.30	28.20	27.27	n.a.
Total TKAs for osteoarthritis (n)	**22,830**	**22,930**	**23,656**	**24,421**	**24,784**	**24,818**	**18,742**	**20,396**	**25,606**	**27,076**	**27,345**

Please note: The 12 months postoperative PROMs response percentage is not (yet) available for 2024.

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

Pre-PROM per hospital

FIGURE Scatterplot of pre-operative response percentage of patients who underwent a primary TKA for osteoarthritis per hospital in the Netherlands in 2024

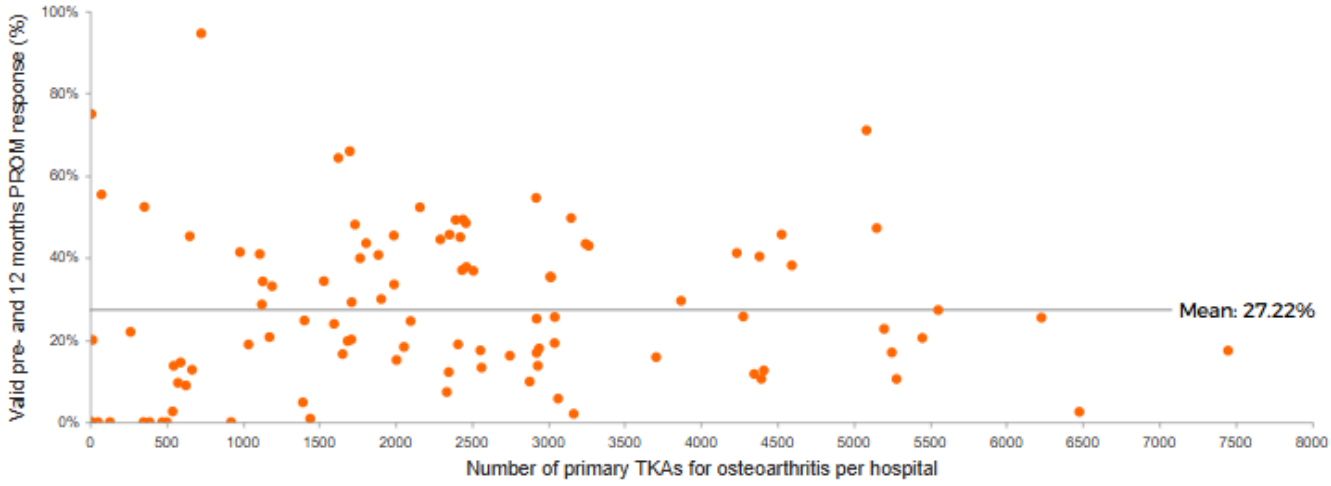


TKA: total knee arthroplasty; PROM: patient reported outcome measure.

The mean pre-operative response rate is 51.9% in the Netherlands in 2024.
Of the 90 hospitals, 41 (46%) scored above the 60% response rate.

PROM trajectory per hospital

FIGURE Scatterplot of PROM trajectory (pre-operative and 12 months postoperative) response percentage of patients who underwent a primary TKA for osteoarthritis per hospital in the Netherlands in 2014-2023



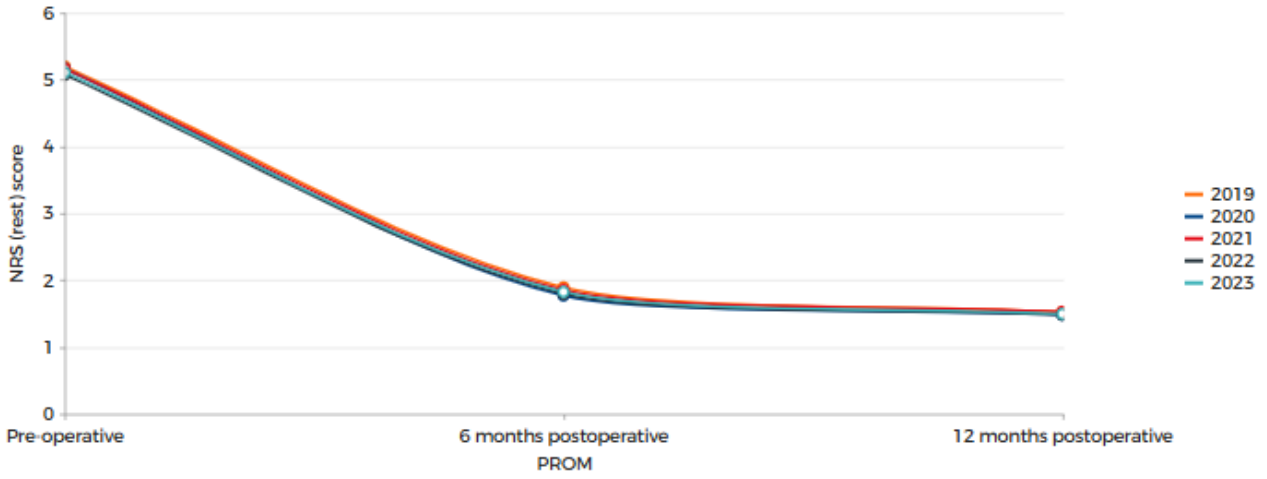
Please note: The 12 months postoperative PROMs response percentage is not (yet) available for 2024.
TKA: total knee arthroplasty; PROM: patient reported outcome measure.

The mean PROM trajectory response rate was 27.2% in the Netherlands between 2014-2023.
Of the 101 hospitals, 5 (5%) scored above the 60% response rate.

Outcomes

NRS (rest)

FIGURE Mean (95% CI) pre-operative, 6 months and 12 months postoperative NRS (rest) scores of patients who underwent a TKA for osteoarthritis in the Netherlands in 2014-2023



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NRS (rest) score		Pre-operative	6 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	7,315	5.20 (5.14-5.26)	1.89 (1.84-1.95)	1.53 (1.48-1.58)
2020	5,465	5.16 (5.10-5.23)	1.77 (1.71-1.83)	1.48 (1.43-1.54)
2021	6,182	5.16 (5.10-5.23)	1.86 (1.80-1.91)	1.53 (1.47-1.58)
2022	7,220	5.07 (5.01-5.13)	1.80 (1.75-1.85)	1.48 (1.43-1.53)
2023	7,383	5.11 (5.05-5.17)	1.83 (1.78-1.88)	1.50 (1.45-1.55)
Total	33,565	5.14 (5.11-5.17)	1.83 (1.81-1.86)	1.50 (1.48-1.53)

TKA: total knee arthroplasty; CI: confidence interval.

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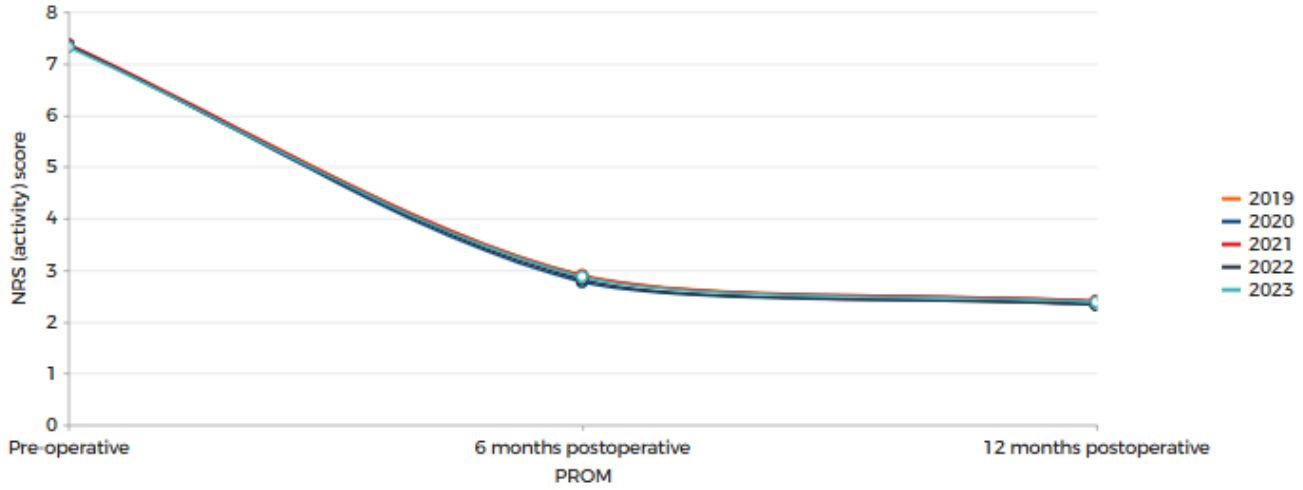
The NRS (rest) score measures pain during rest. The score has a range of 0.0 to 10.0, with 0.0 representing no pain and 10.0 representing the most possible pain.

NRS (activity)

FIGURE Mean (95% CI) pre-operative, 6 months and 12 months postoperative NRS (activity) scores of patients who underwent a TKA for osteoarthritis in the Netherlands in 2014-2023



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NRS (activity) score		Pre-operative	6 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	7,315	7.36 (7.31-7.40)	2.90 (2.84-2.96)	2.40 (2.34-2.45)
2020	5,465	7.36 (7.31-7.41)	2.77 (2.70-2.83)	2.34 (2.27-2.40)
2021	6,182	7.37 (7.32-7.42)	2.89 (2.82-2.95)	2.40 (2.34-2.47)
2022	7,220	7.35 (7.31-7.39)	2.81 (2.76-2.87)	2.32 (2.27-2.38)
2023	7,383	7.32 (7.27-7.36)	2.87 (2.82-2.93)	2.38 (2.33-2.44)
Total	33,565	7.35 (7.33-7.37)	2.85 (2.83-2.88)	2.37 (2.34-2.40)

TKA: total knee arthroplasty; CI: confidence interval.

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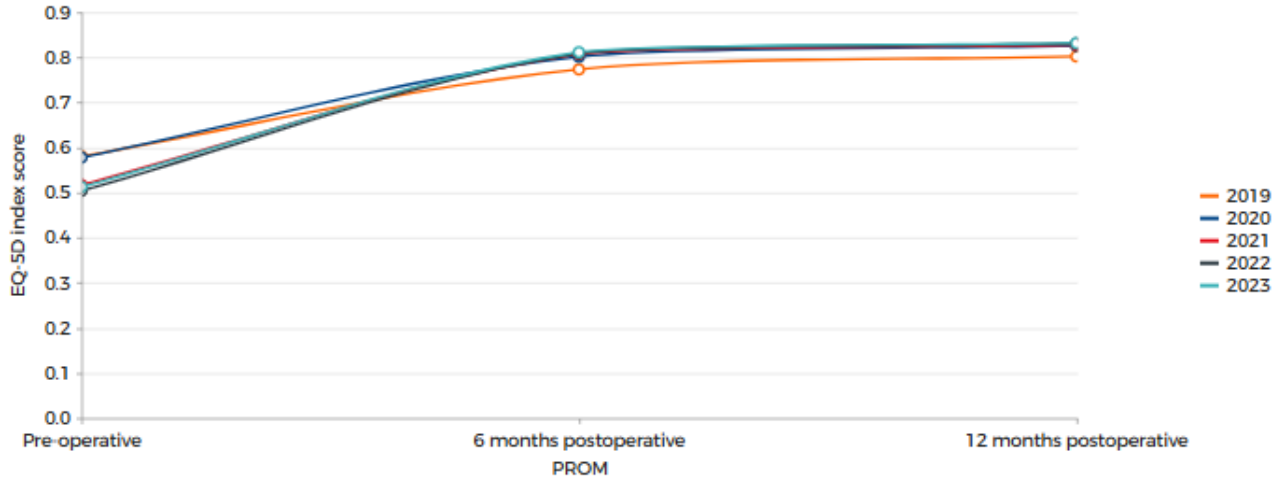
The NRS (activity) score measures pain during rest. The score has a range of 0.0 to 10.0, with 0.0 representing no pain and 10.0 representing the most possible pain.

EQ-5D Index score

FIGURE Mean (95% CI) pre-operative, 6 months and 12 months postoperative EQ-5D index scores of patients who underwent a TKA for osteoarthritis in the Netherlands in 2014-2023



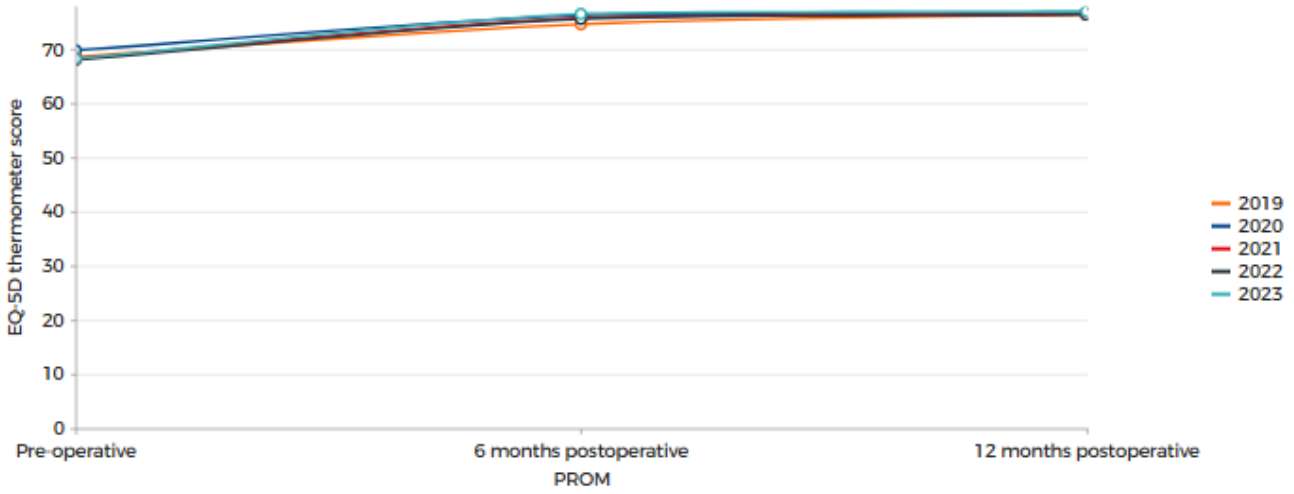
EQ-5D Index score		Pre-operative	6 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	7,315	0.58 (0.58-0.58)	0.77 (0.77-0.78)	0.80 (0.80-0.81)
2020	5,465	0.58 (0.57-0.58)	0.80 (0.80-0.81)	0.83 (0.82-0.83)
2021	6,182	0.52 (0.51-0.52)	0.81 (0.80-0.81)	0.83 (0.82-0.83)
2022	7,220	0.50 (0.50-0.51)	0.81 (0.80-0.81)	0.83 (0.83-0.84)
2023	7,383	0.51 (0.51-0.52)	0.81 (0.81-0.82)	0.83 (0.83-0.84)
Total	33,565	0.54 (0.53-0.54)	0.80 (0.80-0.80)	0.82 (0.82-0.83)

TKA: total knee arthroplasty; CI: confidence interval.

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

FIGURE Mean (95% CI) pre-operative, 6 months and 12 months postoperative EQ-5D thermometer scores of patients who underwent a TKA for osteoarthritis in the Netherlands in 2014-2023



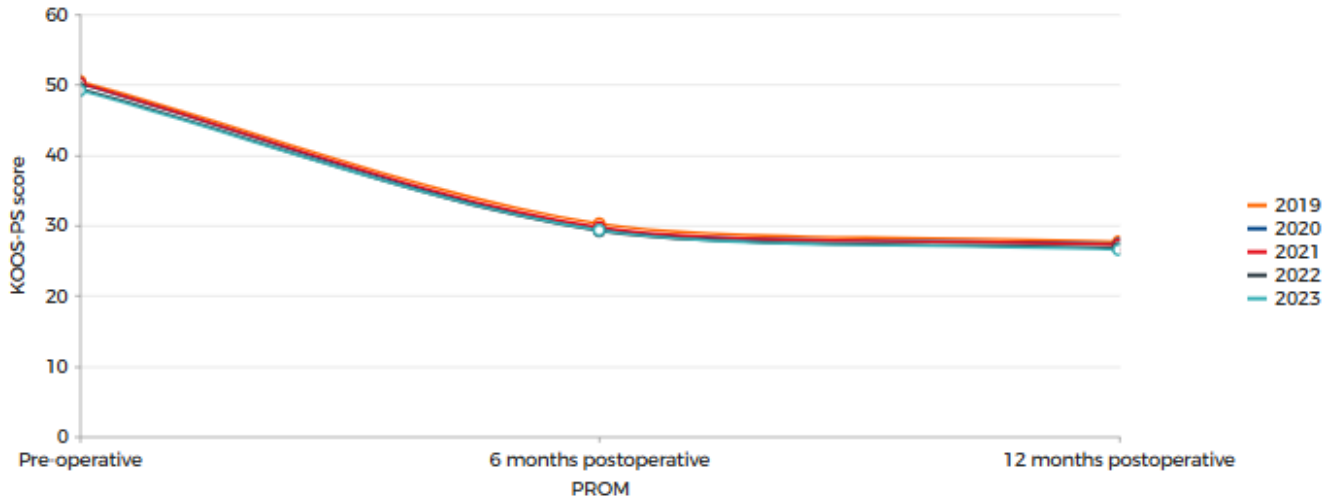
EQ-5D thermometer score		Pre-operative	6 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	7,315	68.66 (68.20-69.12)	74.68 (74.21-75.15)	76.51 (76.08-76.95)
2020	5,465	69.85 (69.33-70.36)	76.29 (75.80-76.78)	76.77 (76.28-77.26)
2021	6,182	68.33 (67.85-68.82)	75.84 (75.38-76.30)	76.50 (76.02-76.97)
2022	7,220	68.08 (67.64-68.53)	75.65 (75.21-76.08)	76.48 (76.06-76.90)
2023	7,383	68.32 (67.87-68.77)	76.58 (76.19-76.97)	77.09 (76.70-77.48)
Total	33,565	68.59 (68.38-68.80)	75.78 (75.58-75.98)	76.67 (76.47-76.87)

TKA: total knee arthroplasty; CI: confidence interval.

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 (95% CI) pre-operative, 6 months and 12 months postoperative KOOS-PS scores of patients who underwent a TKA for osteoarthritis in the Netherlands in 2014-2023



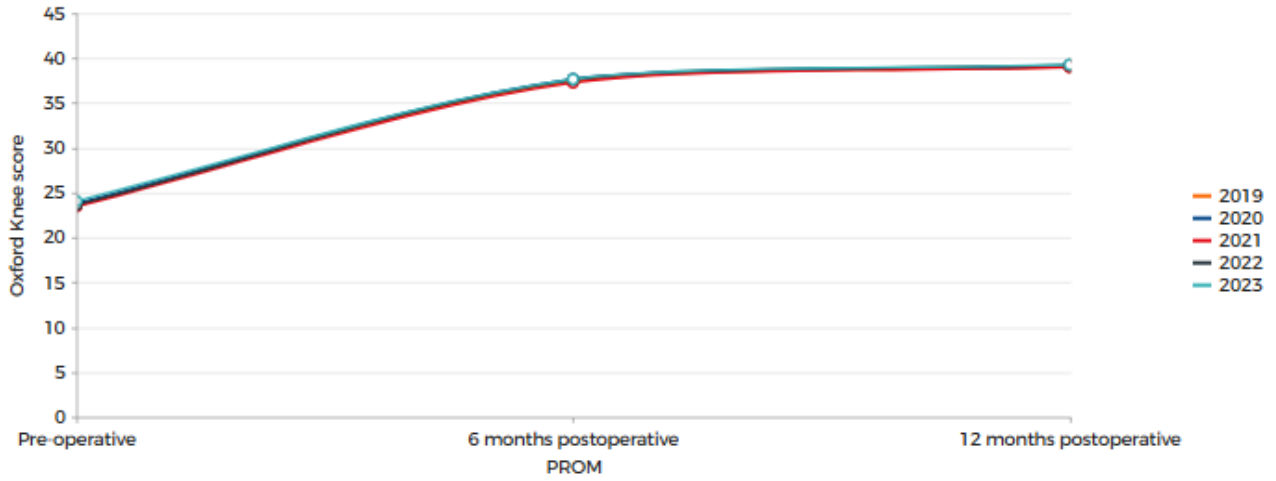
KOOS-PS score		Pre-operative	6 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	7,315	50.48 (50.14-50.82)	30.24 (29.91-30.56)	27.68 (27.33-28.03)
2020	5,465	50.14 (49.74-50.53)	29.47 (29.10-29.84)	27.34 (26.94-27.73)
2021	6,182	50.18 (49.81-50.55)	29.72 (29.36-30.08)	27.24 (26.86-27.62)
2022	7,220	49.43 (49.09-49.77)	29.22 (28.89-29.54)	26.76 (26.41-27.11)
2023	7,383	49.18 (48.84-49.52)	29.32 (29.00-29.64)	26.54 (26.19-26.89)
Total	33,565	49.87 (49.71-50.03)	29.60 (29.45-29.75)	27.10 (26.94-27.26)

TKA: total knee arthroplasty; CI: confidence interval.

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 (95% CI) pre-operative, 6 months and 12 months postoperative Oxford Knee scores of patients who underwent a TKA for osteoarthritis in the Netherlands in 2014-2023



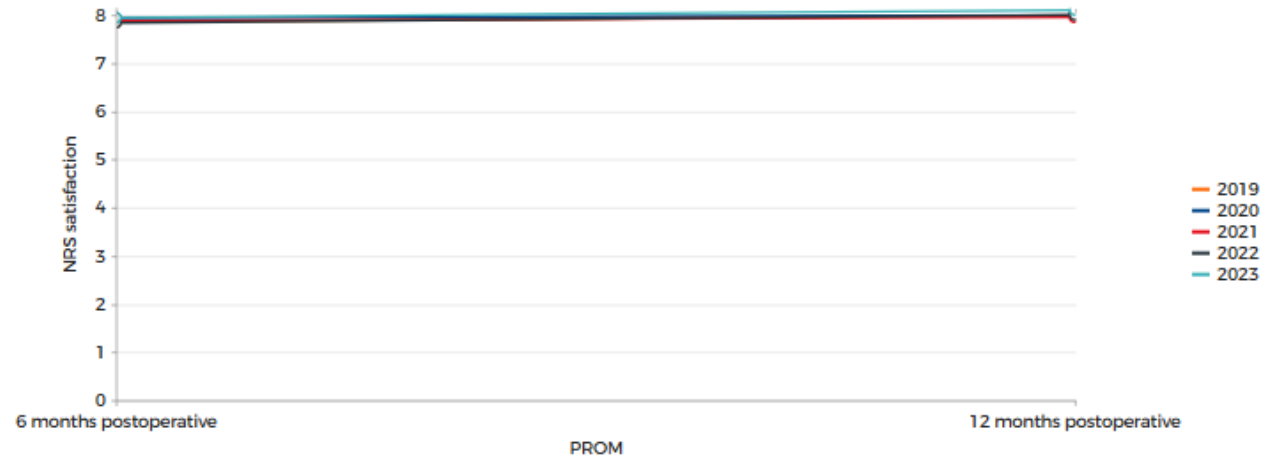
Oxford Knee score		Pre-operative	6 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	7,315	23.63 (23.45-23.80)	37.41 (37.23-37.60)	39.06 (38.87-39.24)
2020	5,465	23.84 (23.63-24.05)	37.67 (37.46-37.88)	39.08 (38.86-39.29)
2021	6,182	23.49 (23.30-23.68)	37.28 (37.08-37.48)	39.02 (38.82-39.22)
2022	7,220	23.65 (23.48-23.83)	37.60 (37.41-37.78)	39.25 (39.07-39.43)
2023	7,383	24.08 (23.91-24.26)	37.67 (37.49-37.85)	39.28 (39.09-39.46)
Total	33,565	23.74 (23.66-23.82)	37.53 (37.44-37.61)	39.14 (39.06-39.23)

TKA: total knee arthroplasty; CI: confidence interval.

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 no functional ability and 48.0 the most functional ability.

NRS (satisfaction)

FIGURE Mean (95% CI) 6 months and 12 months postoperative NRS (satisfaction) scores of patients who underwent a TKA for osteoarthritis in the Netherlands in 2014-2023



NRS satisfaction		6 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)
2019	7,315	7.85 (7.80-7.90)	7.99 (7.94-8.04)
2020	5,465	7.94 (7.88-7.99)	8.00 (7.94-8.05)
2021	6,182	7.88 (7.83-7.93)	7.95 (7.90-8.00)
2022	7,220	7.84 (7.79-7.89)	8.00 (7.95-8.05)
2023	7,383	7.94 (7.90-7.99)	8.10 (8.06-8.15)
Total	33,565	7.89 (7.87-7.91)	8.01 (7.99-8.03)

TKA: total knee arthroplasty; CI: confidence interval.

The NRS (satisfaction) score measures patients' satisfaction with the outcome of after joint replacement. The score has a range of 0.0 to 10.0, with 0.0 representing very unsatisfied and 10.0 representing very satisfied.

Unicondylar knee arthroplasty

In this section you will find all the information on unicondylar knee arthroplasty

Patient characteristics

By diagnosis

TABLE Patient characteristics of all patients with a registered primary unicondylar knee arthroplasty by type of diagnosis in the Netherlands in 2024

	Osteoarthritis	Other	Total
N(%)	**8,638 (98.4)**	**133 (1.6)**	**8,808**
Mean age (years) (SD)	66.3 (8.6)	65.6 (10.8)	66.3 (8.6)
Age (years) (%)			
<50	2	7	2
50-59	21	20	21
60-69	39	37	39
70-79	32	26	32
>80	6	10	6
Gender (%)			
Men	47	53	47
Women	53	47	53
ASA score (%)			
ASA I	12	17	13
ASA II	66	65	66
ASA III-IV	22	18	22
Type of hospital (%)			
General	70	65	70
UMC	0	0	0
Private	30	35	30
Charnley-score (%)			
A One knee joint affected	43	52	43
B1 Both knee joints affected	35	18	35
B2 Contralateral knee with a TKA	20	5	19
C Multiple joints affected or chronic disease that affects quality of life	2	1	2
Mean BMI (kg/m2) (SD)	29 (4.4)	28 (4.5)	29 (4.4)
Body Mass Index (kg/m2) (%)			
Underweight (<=18.5)	0	1	0
Normal weight (>18.5-25)	19	28	19
Overweight (>25-30)	43	41	44
Obesity (>30-40)	35	28	36
Morbid obesity (>40)	1	1	1
Smoking (%)			
No	91	86	92
Yes	8	13	8

Please note: The diagnosis category 'Other' (133 cases: 2%) includes osteonecrosis (93), other (20), post-traumatic (16) and rheumatoid arthritis (4). In addition, there were 37 primary unicondylar knee arthroplasties for which no diagnosis was registered.

General: general hospital; UMC: university medical centre; Private: private hospital; SD: standard deviation

By unicondylar side

TABLE Patient characteristics of all patients with a registered primary unicondylar knee arthroplasty by unicondylar side in the Netherlands in 2024

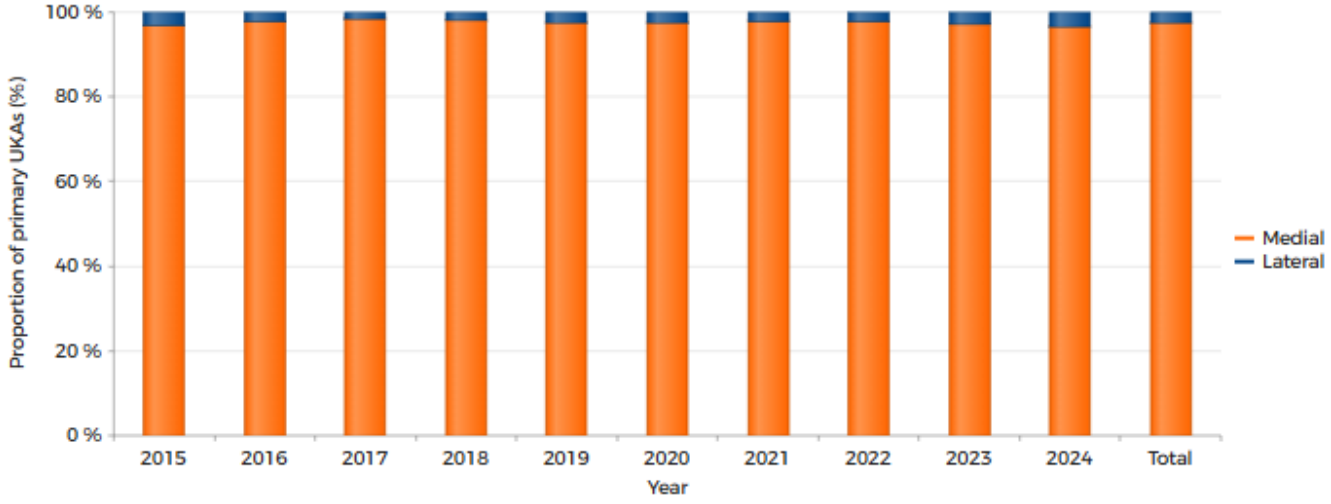
	Medial	Lateral	Total
N(%)	**8,084 (96.6)**	**281 (3.4)**	**8,808**
Mean age (years) (SD)	66.3 (8.6)	65.9 (10.5)	66.3 (8.6)
Age (years) (%)			
<50	2	6	2
50-59	21	24	21
60-69	40	33	39
70-79	32	28	32
>80	6	9	6
Gender (%)			
Men	48	29	47
Women	52	71	53
ASA score (%)			
ASA I	12	17	13
ASA II	66	65	66
ASA III-IV	21	18	22
Diagnosis (%)			
Osteoarthritis	98	98	98
Other	2	2	2
Type of hospital (%)			
General	69	57	70
UMC	0	0	0
Private	30	43	30
Charnley-score (%)			
A One knee joint affected	41	68	43
B1 Both knee joints affected	36	22	35
B2 Contralateral knee with a TKA	20	8	19
C Multiple joints affected or chronic disease that affects quality of life	2	2	2
Mean BMI (kg/m2) (SD)	29 (4.4)	27.9 (4.3)	29 (4.4)
Body Mass Index (kg/m2) (%)			
Underweight (<=18.5)	0	0	0
Normal weight (>18.5-25)	19	26	19
Overweight (>25-30)	44	45	44
Obesity (>30-40)	36	28	36
Morbid obesity (>40)	1	1	1
Smoking (%)			
No	93	92	92
Yes	7	8	8

General: general hospital; UMC: university medical centre; Private: private hospital; SD: standard deviation

Procedure characteristics

Unicondylar side

FIGURE Trend (proportion [%] per year) in medial and lateral unicondylar knee arthroplasties in the Netherlands in 2015-2024

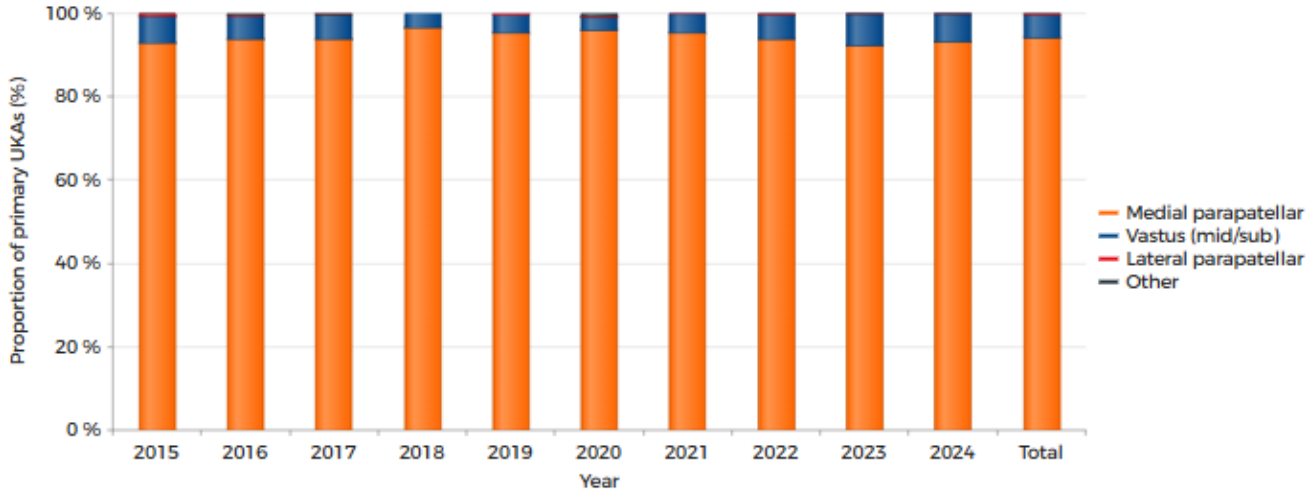


	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Medial	96.99	97.94	98.58	98.04	97.62	97.57	97.89	97.86	97.29	96.64	97.54
Lateral	3.01	2.06	1.42	1.96	2.38	2.43	2.11	2.14	2.71	3.36	2.46
Total (n)	**2,589**	**2,817**	**3,229**	**3,563**	**4,446**	**4,494**	**5,397**	**6,686**	**7,558**	**8,365**	**49,144**

UKA: unicondylar knee arthroplasty

Medial UKA approach

FIGURE Trend (proportion [%] per year) in surgical approach for performing a primary medial unicondylar knee arthroplasties in the Netherlands in 2015-2024

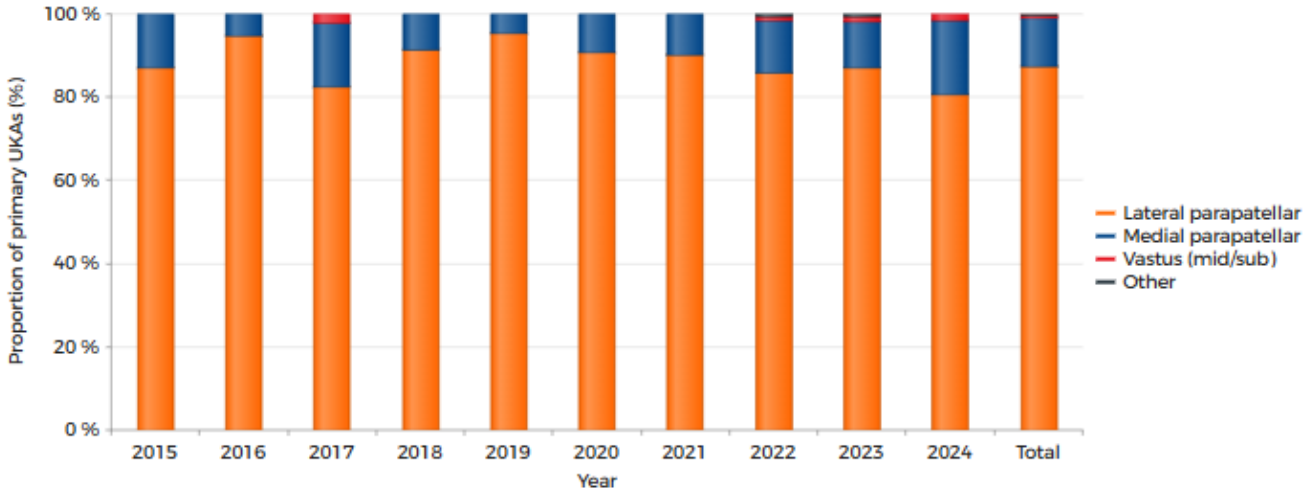


	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Medial parapatellar	92.91	93.82	93.78	96.65	95.55	96.14	95.45	93.90	92.40	93.20	94.22
Vastus (mid/sub)	6.57	5.70	5.91	3.35	4.27	3.06	4.43	5.93	7.48	6.68	5.54
Lateral parapatellar	0.40	0.22	0.13	0	0.18	0.07	0.11	0.11	0.10	0.10	0.12
Other	0.12	0.25	0.19	0	0	0.73	0	0.06	0.03	0.03	0.12
Total (n)	**2,497**	**2,752**	**3,183**	**3,491**	**4,333**	**4,376**	**5,256**	**6,522**	**7,330**	**7,894**	**47,634**

UKA: unicondylar knee arthroplasty

Lateral UKA approach

FIGURE Trend (proportion [%] per year) in surgical approach for performing a primary lateral unicondylar knee arthroplasties in the Netherlands in 2015-2024

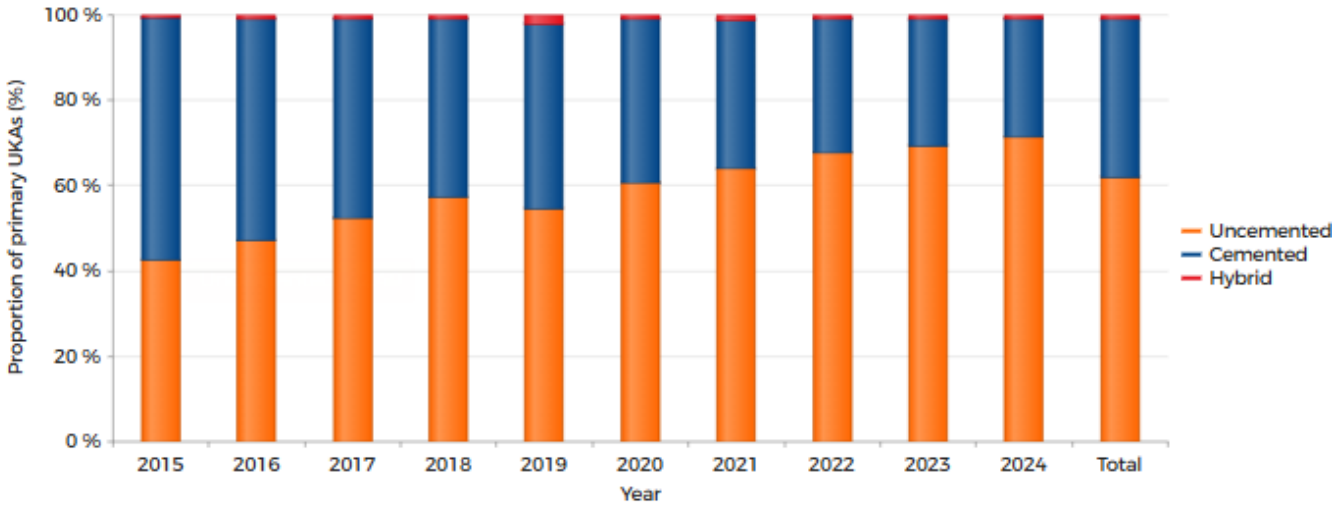


	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Lateral parapatellar	87.01	94.83	82.61	91.43	95.28	90.83	90.27	86.01	87.25	80.68	87.39
Medial parapatellar	12.99	5.17	15.22	8.57	4.72	9.17	9.73	12.59	10.78	17.80	11.68
Vastus (mid/sub)	0	0	2.17	0	0	0	0	0.70	1.47	1.52	0.76
Other	0	0	0	0	0	0	0	0.70	0.49	0	0.17
Total (n)	**77**	**58**	**46**	**70**	**106**	**109**	**113**	**143**	**204**	**264**	**1,190**

UKA: unicondylar knee arthroplasty

Medial UKA fixation

FIGURE Trend (proportion [%] per year) in type of fixation in primary medial unicondylar knee arthroplasties in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Uncemented	42.49	47.28	52.34	57.45	54.68	60.80	64.03	67.85	69.25	71.42	62.11
Cemented	56.99	51.71	46.81	41.55	43.31	38.26	34.89	31.35	29.84	27.73	36.89
Hybrid	0.52	1.02	0.85	1.00	2.01	0.94	1.08	0.80	0.91	0.85	0.99
Total (n)	**2,502**	**2,756**	**3,181**	**3,490**	**4,325**	**4,378**	**5,277**	**6,535**	**7,343**	**8,071**	**47,858**

UKA: unicondylar knee arthroplasty

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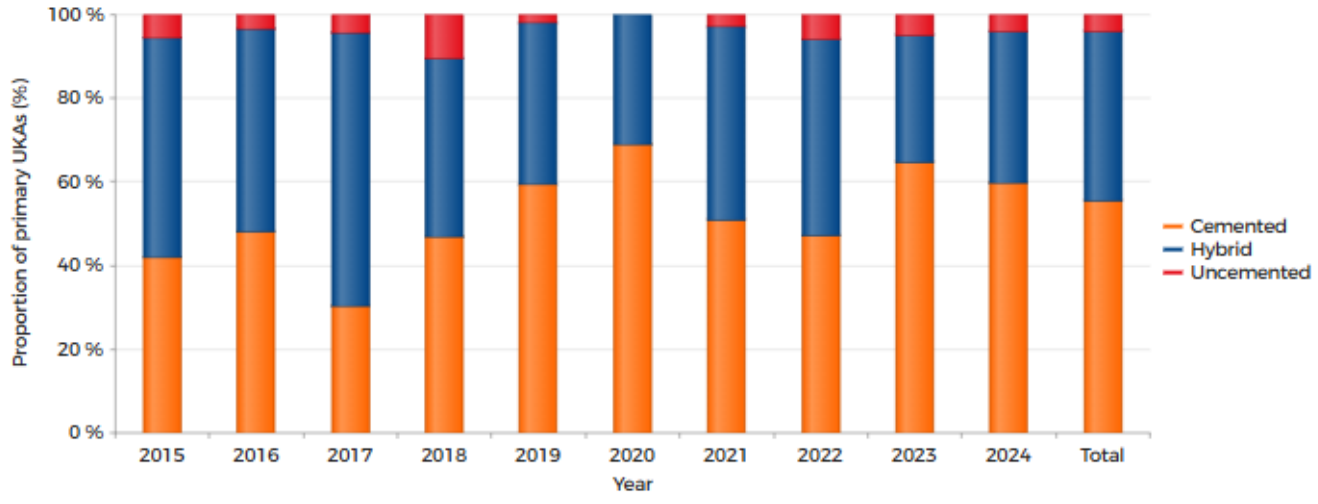
Lateral UKA fixation

FIGURE Trend (proportion [%] per year) in type of fixation in primary lateral unicondylar knee arthroplasties in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Cemented	41.89	48.28	30.43	47.06	59.41	68.87	50.91	47.14	64.85	59.86	55.57
Hybrid	52.70	48.28	65.22	42.65	38.61	31.13	46.36	47.14	30.20	36.20	40.29
Uncemented	5.41	3.45	4.35	10.29	1.98	0	2.73	5.71	4.95	3.94	4.14
Total (n)	**74**	**58**	**46**	**68**	**101**	**106**	**110**	**140**	**202**	**279**	**1,184**

UKA: unicondylar knee arthroplasty

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Most frequently registered - Unicondylar knee prostheses

TABLE The most frequently registered primary unicondylar knee arthroplasties in the Netherlands in 2020-2024

Year	2020	2021	2022	2023	2024
Unicondylar knee arthroplasties (n)	**4,072**	**5,467**	**6,859**	**7,719**	**8,593**
Femur name; Proportion (%)					
Oxford PKR Uncemented	58.87	65.76	68.60	70.63	72.18
Physica ZUK	17.41	16.57	15.18	13.07	13.77
Oxford PKR Cemented	19.94	13.99	11.72	10.97	9.30
Journey Uni	1.65	0.70	1.33	1.85	1.87
Restoris MCK	0.12	1.54	2.01	1.23	1.59

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Most frequently registered - Bone cement

TABLE The most frequently registered bone cement used during primary unicondylar knee arthroplasties in the Netherlands in 2020-2024

Year	2020	2021	2022	2023	2024
Bone cement pre-packed in a vacuum mixing system (n)	**629**	**935**	**1,113**	**998**	**1,245**
Cement name; Proportion (%)					
Palacos R+G	50.87	63.42	59.12	70.84	57.19
Refobacin Bone Cement R	43.40	34.97	38.81	26.85	41.85
Refobacin Plus Bone Cement	5.72	1.60	2.07	2.30	0.96
Year	**2020**	**2021**	**2022**	**2023**	**2024**
Separately packed bone cement (n)	**1,066**	**965**	**1,011**	**1,162**	**1,055**
Cement name; Proportion (%)					
Palacos R+G	70.17	78.86	79.33	74.61	75.73
Biomet Bone Cement R	5.44	7.36	10.78	8.61	13.08
Palacos MV+G	8.63	7.77	6.63	7.40	8.91
Refobacin Bone Cement R	10.79	2.69	0.30	6.54	0.57
Subiton G	2.91	2.49	2.47	2.67	1.61

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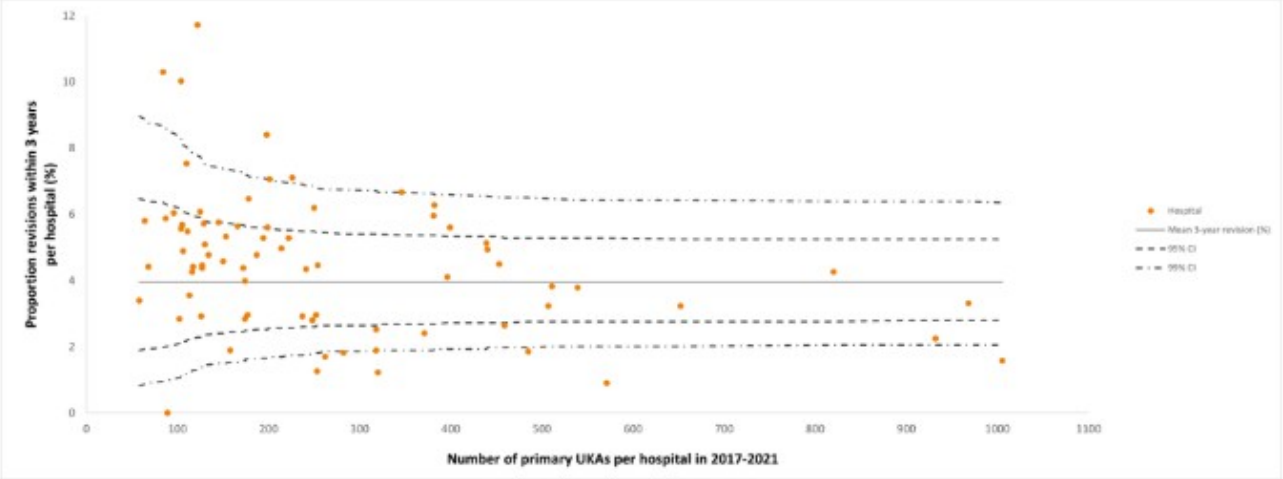
Survival

Short term revision

Overall revision per hospital

Funnel plot of proportion of knee revision arthroplasties within three years after a medial unicondylar knee arthroplasty per hospital in the Netherlands in 2017-2027 (n=20,601)

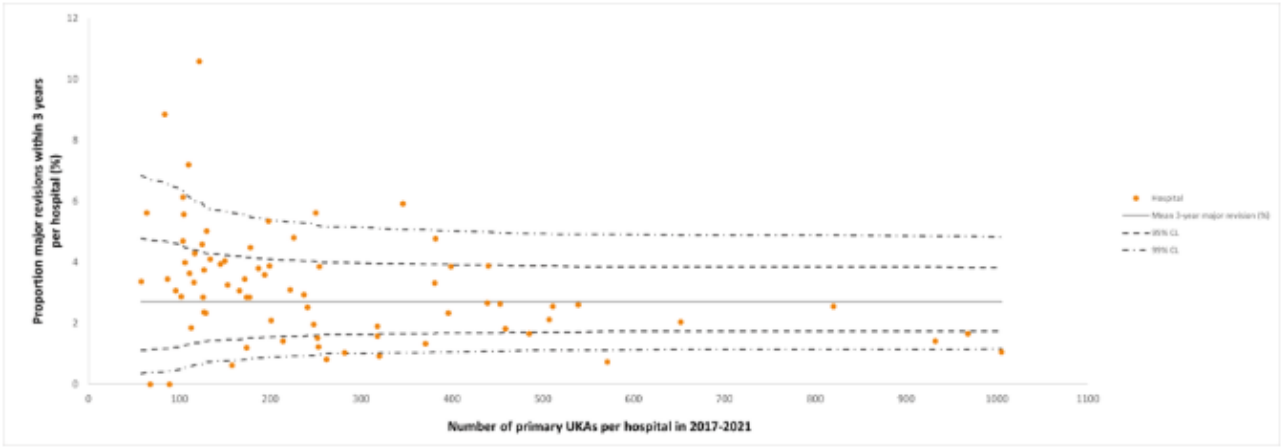


Please note: The proportion of revisions within 3 years per hospital were adjusted for casemix factors age, gender, ASA score and diagnosis (osteoarthritis versus other).
UKA: unicondylar knee arthroplasty; CL: control limits.

The mean 3-years revision percentage is 3.95 in the Netherlands in 2017-2021.
Control limits indicate the plausible range of outcome if all hospitals perform equally well.

Major revision per hospital

Funnel plot of proportion of knee major revision arthroplasties within three years after a medial unicondylar knee arthroplasty per hospital in the Netherlands in 2017-2021 (n=20,601)



Please note: The proportion of revisions within 3 years per hospital were adjusted for casemix factors age, gender, ASA score and diagnosis (osteoarthritis versus other).
UKA: unicondylar knee arthroplasty; CL: control limits.

The mean 3-years major revision percentage is 2.71 in the Netherlands in 2017-2021.
Control limits indicate the plausible range of outcome if all hospitals perform equally well.

By type of revision 3 years

TABLE Cumulative 3-year revision percentage of primary unicondylar knee arthroplasties by type of revision in the Netherlands in 2017-2021 (n=22,894)

	Cumulative 3-year revision percentage
	Kaplan Meier (95% CI)
Any type of revision	3.94 (3.69-4.19)
Major revision	2.44 (2.24-2.64)
Only tibia	0.09 (0.05-0.13)
Only femur	0.02 (0.00-0.03)
Femur and tibia	2.33 (2.13-2.52)
Minor revision	1.46 (1.30-1.62)
DAIR	0.30 (0.23-0.37)
No DAIR	1.15 (1.02-1.29)
Patella addition	0.00 (0.00-0.01)

Any type of revision includes minor and major revisions as well as revision procedures that could not be classified as minor or major revision.
Major revision: revision of at least the femur or tibia component.
Minor revision: only inlay and/or patella exchange (including DAIR procedures).
UKA: unicondylar knee arthroplasty; CI: confidence interval

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In 2017-2021, 421 (1.8%) primary UKAs were implanted in patients who died within three years after the primary procedure.

First major or minor revision

TABLE Cumulative 3-year first revision percentage of primary unicondylar knee arthroplasties by type of first major or minor revision in the Netherlands in 2017-2021 (n=22,894)

	Cumulative 3-year first revision percentage
	Kaplan Meier (95% CI)
First major revision	2.71 (2.50-2.92)
Tibia	2.69 (2.47-2.90)
Femur	2.63 (2.42-2.84)
First minor revision	1.46 (1.30-1.62)
Inlay	1.46 (1.30-1.61)
Patella addition	0.02 (0.00-0.03)

First major revision: first revision of the femur or tibia component, regardless of whether a minor revision has already taken place. Therefor, the first three revision procedures were reviewed.
First minor revision: only inlay and/or patella exchange (including DAIR procedures).
UKA: unicondylar knee arthroplasty; CI: confidence interval

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In 2017-2021, 421 (1.8%) primary UKAs were implanted in patients who died within three years after the primary procedure.

Conversion to total knee artroplasty

TABLE Conversions from primary unicondylar knee arthroplasty to total knee arthroplasty within 3 years in the period 2017-2021

Number of revision procedures	913
Number of conversions	481
Percentage conversions	52.7 %

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Reasons for revision by type of revision

TABLE Reasons for revision within three years of primary unicondylar knee arthroplasties by type of revision in the Netherlands in 2017-2021

	Major revision (n=631)	Minor revision (n=335)	Any type of revision (n=913)
Reasons for revision	**Proportion (%)**	**Proportion (%)**	**Proportion (%)**
Instability	20.44	27.76	21.47
Progression of osteoarthritis	28.05	0.30	18.29
Loosening of tibia component	21.55	0.60	15.01
Patellar pain	16.16	1.79	11.39
Infection	6.02	20.60	11.06
Malalignment	15.21	1.49	11.06
Peri-prosthetic fracture	9.03	2.69	7.01
Insert wear	1.11	5.07	2.63
Revision after knee removal	3.33	0.60	2.30
Loosening of femur component	2.85	0.00	1.86
Arthrofibrosis	2.22	0.60	1.75
Patellar dislocation	0.79	0.60	0.66
Loosening of patella component	0.16	0.00	0.11
Other	13.00	37.61	22.12

Major revision: first revision of the femur or tibia component, regardless of whether a minor revision has already taken place. Therefor, the first three revision procedures were reviewed.

Minor revision: only inlay and/or patella exchange (including DAIR procedures).

Any type of revision includes all first revisions, including revision procedures that could not be classified as minor or major revision.

Please note: one patient may have more than one reason for revision. As such, the total proportion is over 100%.

Time after primary UKA

TABLE Time after primary unicondylar knee arthroplasty until short-term revision in the Netherlands in 2017-2021 (n=22,894)

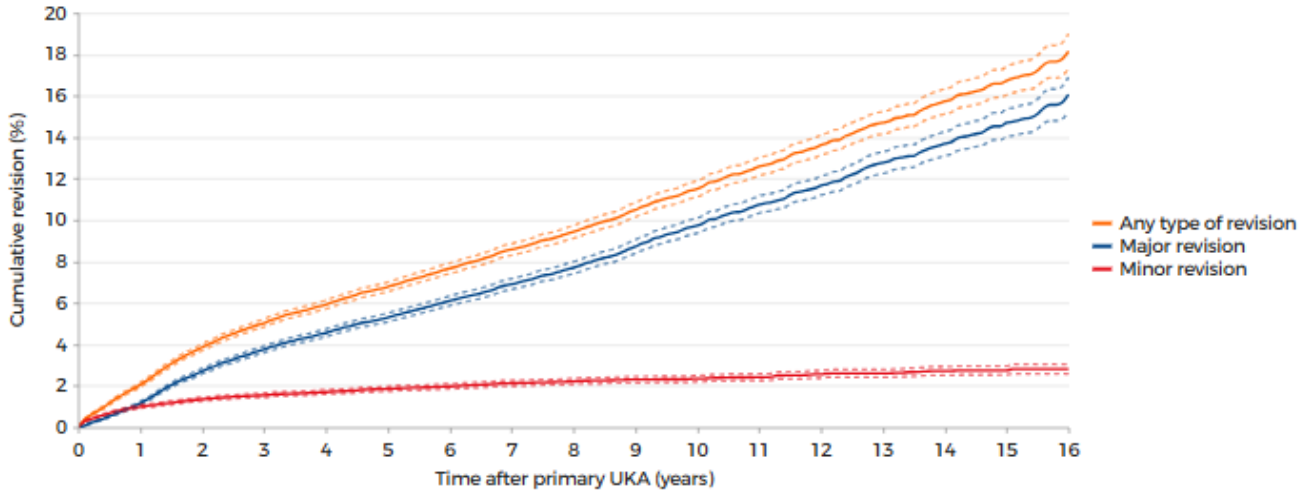
Time after primary UKA	Percentage revisions (%)
Day 0-29	0.24
Day 30-182	0.89
Day 183-364	0.64
Day 365-730 (second year)	1.32
Day 731-1095 (third year)	0.90

UKA: unicondylar knee arthroplasty

Long term revision

By type of revision

FIGURE Cumulative revision percentage (Kaplan-Meier; 95% CI) of unicondylar knee arthroplasties by type of revision in the Netherlands in 2007-2024 (n=64,773)



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	1yr	3yr	5yr	7yr	10yr	16yr
Any type of revision	1.87 (1.76-1.98)	4.94 (4.75-5.12)	6.70 (6.47-6.93)	8.52 (8.24-8.80)	11.43 (11.05-11.82)	17.77 (16.97-18.57)
Major revision	1.02 (0.94-1.10)	3.67 (3.51-3.83)	5.23 (5.03-5.44)	6.85 (6.59-7.11)	9.66 (9.30-10.03)	15.68 (14.90-16.46)
Minor revision	0.94 (0.86-1.01)	1.53 (1.43-1.63)	1.84 (1.73-1.96)	2.12 (1.99-2.25)	2.34 (2.19-2.49)	2.81 (2.58-3.04)

Please note: Dotted lines represent the upper and lower limits of the 95% confidence interval.
Any type of revision includes minor and major revisions as well as revision procedures that could not be classified as minor or major revision.
Major revision: first revision of the femur or tibia component, regardless of whether a minor revision has already taken place. Therefor, the first three revision procedures were reviewed.
Minor revision: only insert and/or patella exchange (including patella addition).
UKA: unicondylar knee arthroplasty; CI: confidence interval.

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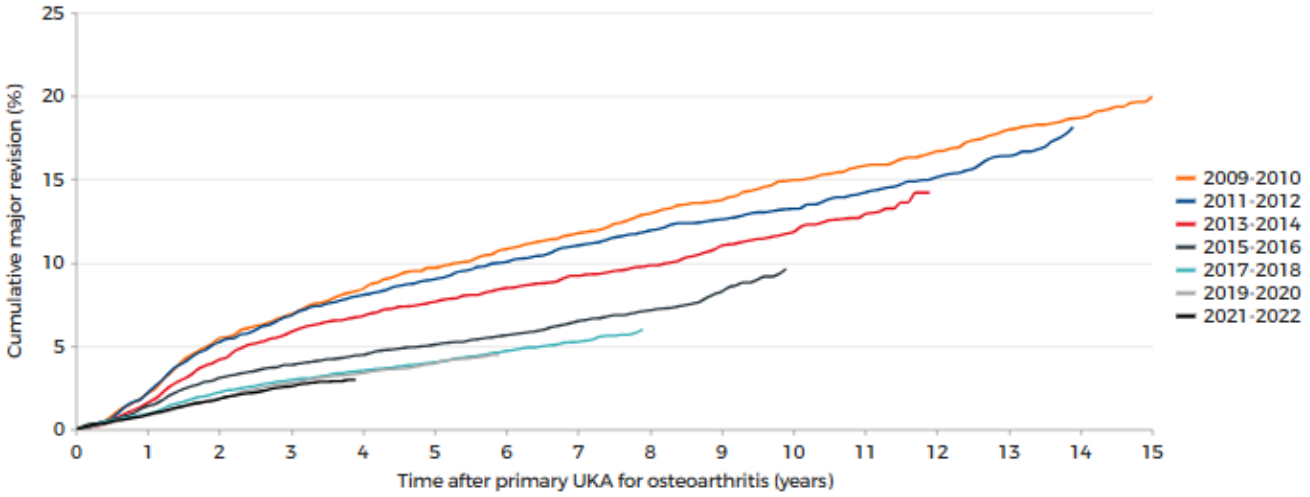
In 2007-2024, 3,341 (5.2%) primary UKAs were implanted in patients who died within sixteen years after the primary diagnosis

By procedure year

FIGURE Cumulative major revision percentage (Kaplan-Meier; 95% CI) of unicondylar knee arthroplasties for osteoarthritis by procedure year of primary UKA in the Netherlands in 2009-2024



	Number (n)	1yr	3yr	5yr	7yr	10yr	15yr
2009-2010	3,153	1.81 (1.35-2.28)	6.77 (5.89-7.65)	9.68 (8.64-10.72)	11.66 (10.53-12.79)	14.90 (13.63-16.16)	19.65 (18.21-21.10)
2011-2012	3,075	1.79 (1.32-2.26)	6.71 (5.82-7.59)	8.93 (7.92-9.94)	10.96 (9.85-12.08)	13.20 (11.98-14.41)	n.a.
2013-2014	4,039	1.34 (0.99-1.70)	5.63 (4.92-6.35)	7.55 (6.73-8.37)	9.20 (8.30-10.10)	11.74 (10.73-12.75)	n.a.
2015-2016	5,517	1.22 (0.93-1.51)	3.85 (3.34-4.36)	5.00 (4.43-5.58)	6.38 (5.72-7.03)	9.62 (8.51-10.72)	n.a.
2017-2018	7,588	0.86 (0.65-1.07)	2.88 (2.50-3.26)	3.96 (3.52-4.41)	5.22 (4.70-5.74)	n.a.	n.a.
2019-2020	9,385	0.78 (0.60-0.96)	2.70 (2.37-3.02)	3.89 (3.48-4.29)	n.a.	n.a.	n.a.
2021-2022	12,405	0.76 (0.61-0.91)	2.54 (2.25-2.83)	n.a.	n.a.	n.a.	n.a.

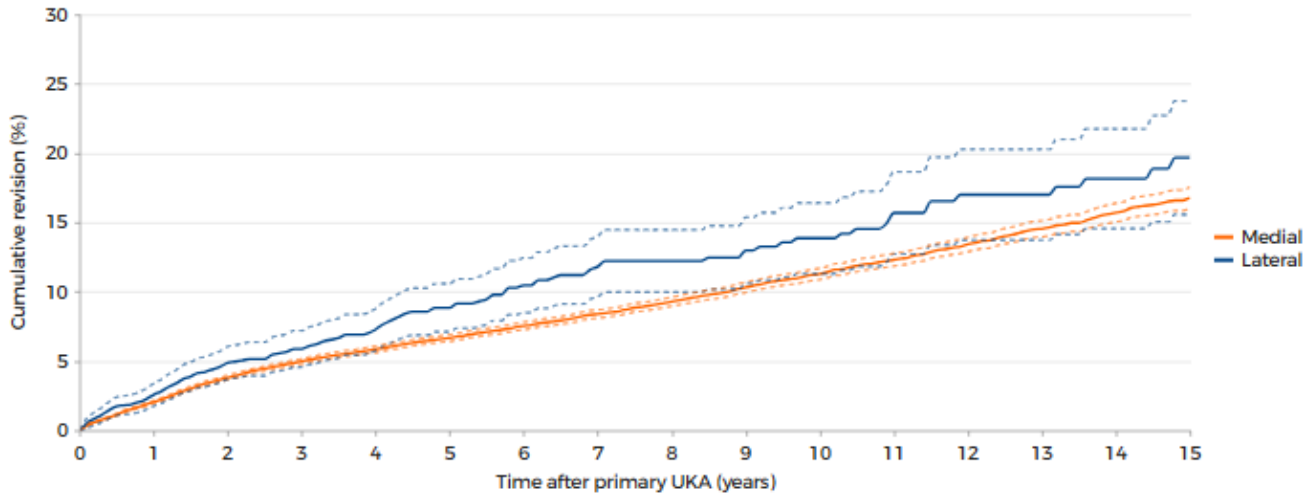
Please note: n.a. if <50 cases were at risk.

Major revision precentage: first revision of the femur or tibia component, regardless of whether a minor revision has already taken place. Therefor, the first three revision procedures were reviewed.

UKA: unicondylar knee arthroplasty

By unicondylar side

FIGURE Cumulative revision percentage (Kaplan-Meier; 95% CI) of unicondylar knee arthroplasties by unicondylar side of primary UKA in the Netherlands in 2007-2024 (n=60,273)



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	Number (n)	1yr	3yr	5yr	7yr	10yr	15yr
Medial	58,710	1.86 (1.74-1.97)	4.87 (4.68-5.07)	6.61 (6.37-6.84)	8.34 (8.05-8.63)	11.21 (10.81-11.61)	16.59 (15.85-17.34)
Lateral	1,563	2.26 (1.50-3.02)	5.88 (4.56-7.19)	8.85 (7.12-10.59)	11.61 (9.46-13.76)	13.86 (11.30-16.41)	19.67 (15.57-23.76)

UKA: unicondylar knee arthroplasty; CI: confidence interval.

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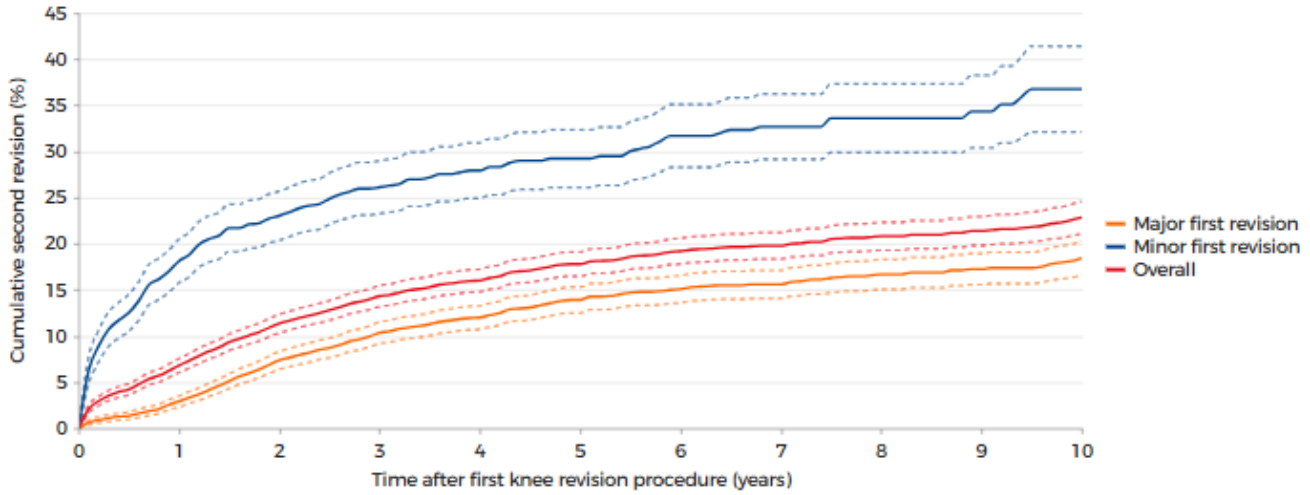
Rerevision

By type of first revision

FIGURE Cumulative second revision percentage (Kaplan-Meier; 95% CI) of unicondylar knee arthroplasties after a one-stage first revision by type of first revision in the Netherlands in 2007-2024 (n=4,403)



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	Number (n)	1yr	3yr	5yr	7yr	10yr
Overall	4,403	6.22 (5.49-6.95)	13.97 (12.84-15.09)	17.79 (16.48-19.11)	19.77 (18.34-21.20)	22.57 (20.86-24.28)
Major first revision	3,289	2.55 (1.99-3.10)	9.95 (8.80-11.09)	13.90 (12.50-15.30)	15.58 (14.06-17.10)	18.13 (16.32-19.95)
Minor first revision	1,080	17.02 (14.73-19.32)	25.96 (23.11-28.82)	29.22 (26.09-32.35)	32.69 (29.15-36.23)	36.75 (32.10-41.40)

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

One-stage revision: A single revision procedure to change (insertion, replacement and/or removal) one or more components of the prosthesis (excluding patella addition).

Major revision: revision of at least the femur or tibia component.

Minor revision: only insert and/or patella exchange (excluding patella addition).

CI: confidence interval.

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Survival by component

By cemented component name

TABLE Cumulative revision percentages of primary cemented unicondylar knee arthroplasties by prosthesis component combination of patients who underwent a UKA for osteoarthritis in the Netherlands in 2007-2024 (n=29,346)

Femur component	Tibia component	Primary UKAs (n)	Hospitals (n)	Median (IQR) age (yr)	Revisions (n)	Type of revision (n)						Cumulative revision percentage (95% CI)					
						Total revision	Patella addition	Only femur	Only tibia	Only insert/patella	Unknown	1yr	3yr	5yr	7yr	10yr	16yr
All cemented UKAs for osteoarthritis		29,346	100	64 (58 - 70)	2,783	2,279	7	13	41	416	27	1.62 (1.47-1.76)	5.35 (5.07-5.62)	7.44 (7.10-7.77)	9.36 (8.97-9.75)	12.45 (11.95-12.94)	18.84 (17.94-19.75)
OXFORD PKR Cemented	OXFORD PKR Cemented	16,206	74	64 (57 - 70)	1,874	1,509	5	11	25	303	21	1.73 (1.53-1.94)	5.71 (5.34-6.08)	7.88 (7.43-8.32)	9.81 (9.31-10.31)	12.98 (12.36-13.59)	19.89 (18.78-21.01)
Physica ZUK	Physica ZUK	6,828	35	64 (58 - 70)	234	192	0	0	1	41	0	0.79 (0.57-1.00)	3.03 (2.56-3.50)	3.85 (3.27-4.42)	5.13 (4.32-5.95)	7.59 (6.26-8.93)	11.09 (8.60-13.57)
Genesis Uni	Genesis Uni	1,244*	25	62 (56 - 69)	237	225	1	0	2	6	3	2.82 (1.90-3.74)	9.05 (7.45-10.65)	12.59 (10.74-14.44)	14.95 (12.95-16.95)	17.45 (15.30-19.60)	21.72 (19.06-24.38)
balanSys UNI	balanSys UNI	844	12	62 (57 - 70)	82	62	1	0	7	11	1	2.73 (1.60-3.86)	8.20 (6.11-10.30)	9.32 (7.04-11.61)	10.78 (8.20-13.36)	14.26 (11.00-17.52)	n.a.
Journey Uni	Journey Uni	827	9	63 (57 - 70)	43	38	0	2	1	1	1	1.18 (0.41-1.94)	4.64 (2.93-6.35)	6.92 (4.69-9.14)	8.49 (5.80-11.18)	n.a.	n.a.
Restoris MCK	Restoris MCK	427	3	69 (62 - 75)	4	2	0	0	0	2	0	1.02 (0.02-2.03)	1.02 (0.02-2.03)	n.a.	n.a.	n.a.	n.a.
TRIATHLON	TRIATHLON	196*	3	60 (54 - 65)	28	27	0	0	0	1	0	1.53 (0.00-3.25)	7.15 (3.54-10.76)	9.22 (5.16-13.28)	10.73 (6.22-15.23)	14.18 (8.39-19.98)	n.a.
HLS uni	HLS Uni	165*	3	58 (53 - 65)	39	38	0	0	0	1	0	2.42 (0.08-4.77)	9.11 (4.72-13.51)	16.44 (10.77-22.11)	19.52 (13.45-25.59)	20.79 (14.56-27.01)	n.a.
Allegretto	Allegretto	106*	4	57 (51 - 65)	24	20	0	0	4	0	0	6.60 (1.88-11.33)	12.26 (6.02-18.51)	17.98 (10.65-25.30)	20.05 (12.37-27.74)	n.a.	n.a.

* Denotes prosthesis combinations with no reported use in primary UKAs in 2024.

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

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Only combinations with over 100 procedures and reported by at least 3 hospitals have been listed.

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 of the prosthesis may have influenced the cumulative revision percentages.

By uncemented component

TABLE Cumulative revision percentages of primary uncemented unicondylar knee arthroplasties by prosthesis component combination of patients who underwent a UKA for osteoarthritis in the Netherlands in 2007-2024 (n=32,571)

Femur component	Tibia component	Primary UKAs (n)	Hospitals (n)	Median (IQR) age (yr)	Revisions (n)	Type of revision (n)						Cumulative revision percentage (95% CI)					
						Total revision	Patella addition	Only femur	Only tibia	Only insert/patella	Unknown	1yr	3yr	5yr	7yr	10yr	16yr
All uncemented UKAs for osteoarthritis		**32,571**	**82**	**65 (59 - 72)**	**1,530**	**861**	**2**	**8**	**35**	**615**	**9**	**2.05 (1.89-2.21)**	**4.30 (4.05-4.55)**	**5.56 (5.25-5.87)**	**7.18 (6.77-7.60)**	**9.71 (8.98-10.44)**	**15.91 (12.82-18.99)**
OXFORD PKR Uncemented	OXFORD PKR Uncemented	30,164	71	65 (59 - 72)	1,340	730	2	6	27	567	8	2.00 (1.84-2.17)	4.20 (3.94-4.45)	5.37 (5.05-5.69)	6.82 (6.40-7.25)	9.31 (8.56-10.07)	n.a.

* Denotes prosthesis combinations with no reported use in primary UKAs in 2024.

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

Only combinations with over 100 procedures and reported by at least 3 hospitals have been listed.

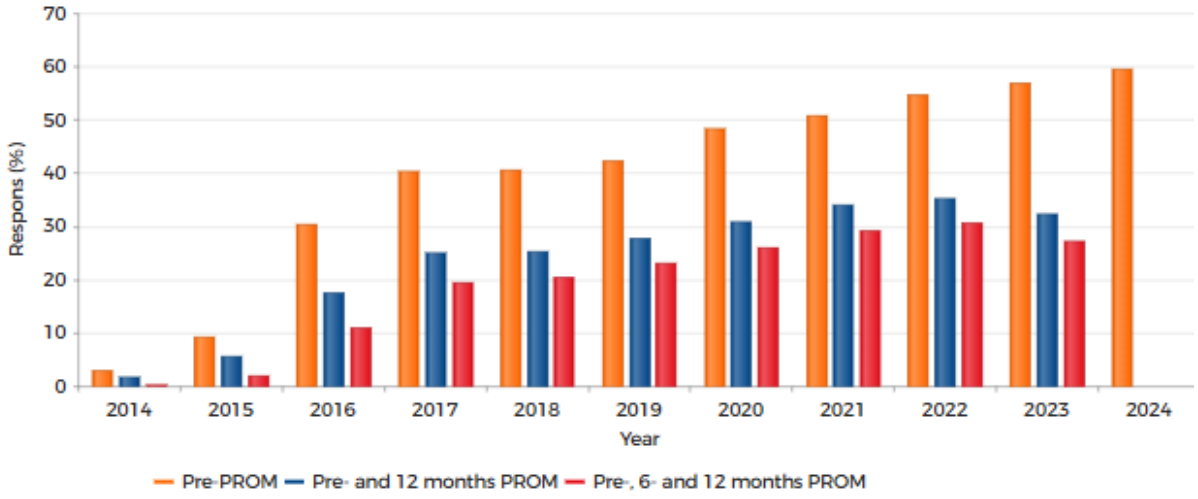
Results must be interpreted with caution. Patient characteristics like age and diagnosis, as well as procedure characteristics like the experience of the surgeon performing the procedure of the prosthesis may have influenced the cumulative revision percentages.

PROMs

Response

Per year

FIGURE Pre-operative, 6 months and 12 months postoperative response percentage of patients who underwent a UKA for osteoarthritis in the Netherlands in 2014-2024



	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Pre-PROM	2.87	9.18	30.48	40.33	40.59	42.31	48.43	50.76	54.71	56.91	59.55
Pre- and 12 months PROM	1.77	5.55	17.62	24.95	25.21	27.78	30.78	34.04	35.31	32.43	n.a.
Pre-, 6- and 12 months PROM	0.31	1.93	10.94	19.42	20.50	23.02	26.09	29.16	30.52	27.31	n.a.
Total UKAs for osteoarthritis (n)	**2,265**	**2,594**	**2,871**	**3,595**	**3,991**	**4,788**	**4,623**	**5,435**	**6,752**	**7,588**	**8,386**

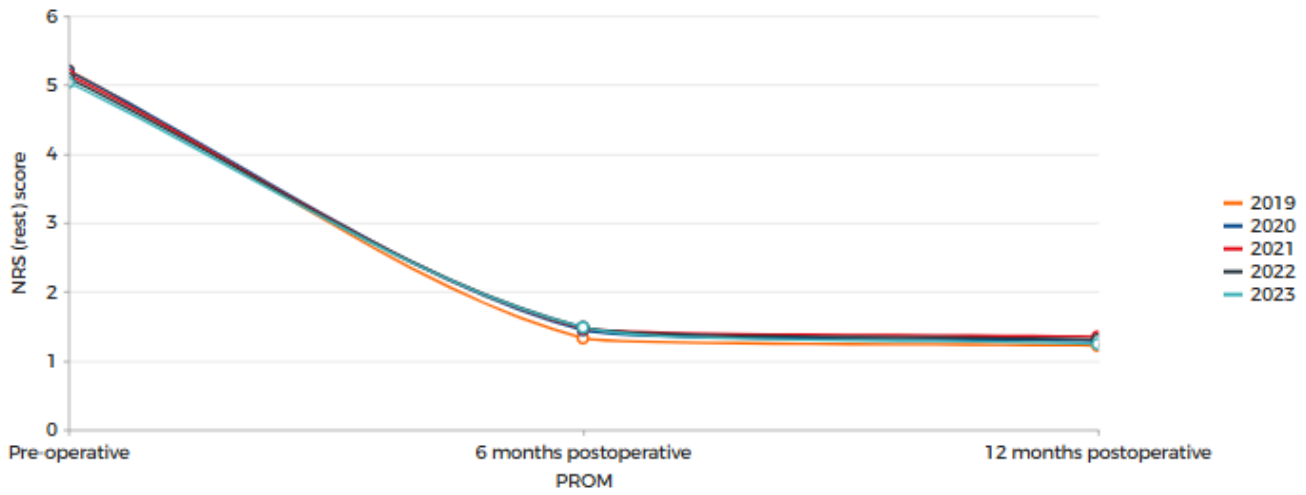
Please note: The 12 months postoperative PROMs response percentage is not (yet) available for 2024.

UKA: unicondylar knee arthroplasty; PROM: patient reported outcome measure.

Outcomes

NRS (rest)

FIGURE Mean (95% CI) pre-operative, 6 months and 12 months postoperative NRS (rest) scores of patients who underwent a UKA for osteoarthritis in the Netherlands in 2014-2023



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NRS (rest) score		Pre-operative	6 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	1,102	5.21 (5.07-5.36)	1.33 (1.21-1.44)	1.22 (1.10-1.33)
2020	1,206	5.20 (5.06-5.35)	1.45 (1.33-1.56)	1.28 (1.17-1.40)
2021	1,585	5.15 (5.03-5.27)	1.47 (1.37-1.57)	1.35 (1.25-1.45)
2022	2,061	5.10 (4.99-5.20)	1.49 (1.40-1.58)	1.31 (1.22-1.39)
2023	2,072	5.04 (4.93-5.14)	1.48 (1.39-1.57)	1.24 (1.16-1.33)
Total	8,026	5.12 (5.07-5.18)	1.45 (1.41-1.50)	1.28 (1.24-1.33)

UKA: unicondylar knee arthroplasty; CI: confidence interval.

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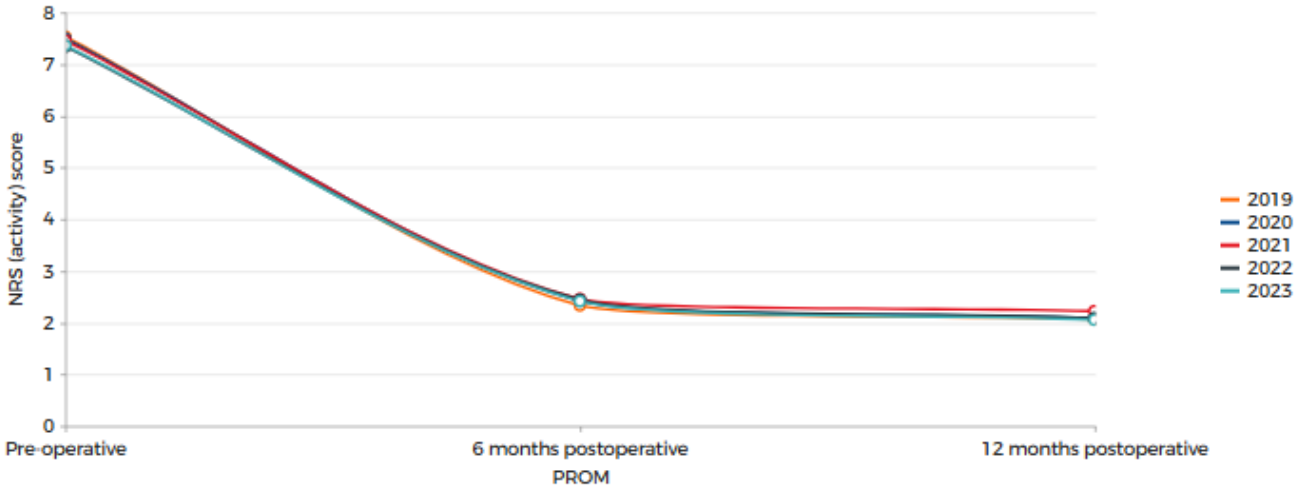
The NRS (rest) score measures pain during rest. The score has a range of 0.0 to 10.0, with 0.0 representing no pain and 10.0 representing the most possible pain.

NRS (activity)

FIGURE Mean (95% CI) pre-operative, 6 months and 12 months postoperative NRS (activity) scores of patients who underwent a UKA for osteoarthritis in the Netherlands in 2014-2023



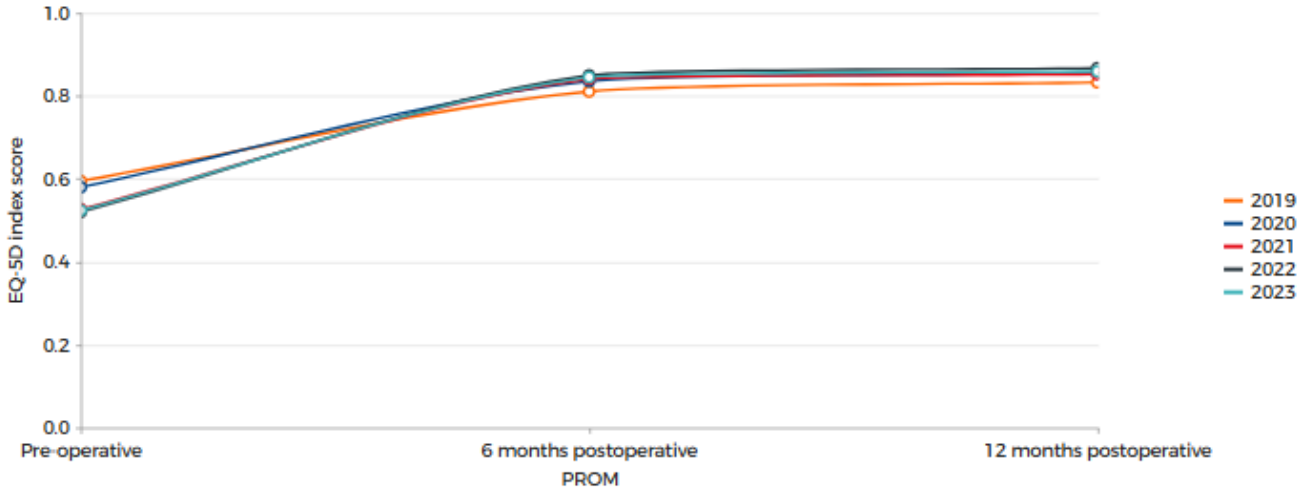
NRS (activity) score		Pre-operative	6 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	1,102	7.53 (7.43-7.63)	2.33 (2.19-2.47)	2.07 (1.93-2.21)
2020	1,206	7.49 (7.40-7.59)	2.42 (2.29-2.56)	2.09 (1.96-2.22)
2021	1,585	7.46 (7.38-7.54)	2.46 (2.34-2.58)	2.22 (2.10-2.34)
2022	2,061	7.34 (7.26-7.42)	2.45 (2.34-2.55)	2.09 (1.99-2.19)
2023	2,072	7.36 (7.29-7.44)	2.42 (2.31-2.52)	2.06 (1.95-2.16)
Total	8,026	7.42 (7.38-7.46)	2.42 (2.37-2.47)	2.10 (2.05-2.16)

UKA: unicondylar knee arthroplasty; CI: confidence interval.

The NRS (activity) 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.

EQ-5D Index score

FIGURE Mean (95% CI) pre-operative, 6 months and 12 months postoperative EQ-5D index scores of patients who underwent a UKA for osteoarthritis in the Netherlands in 2014-2023



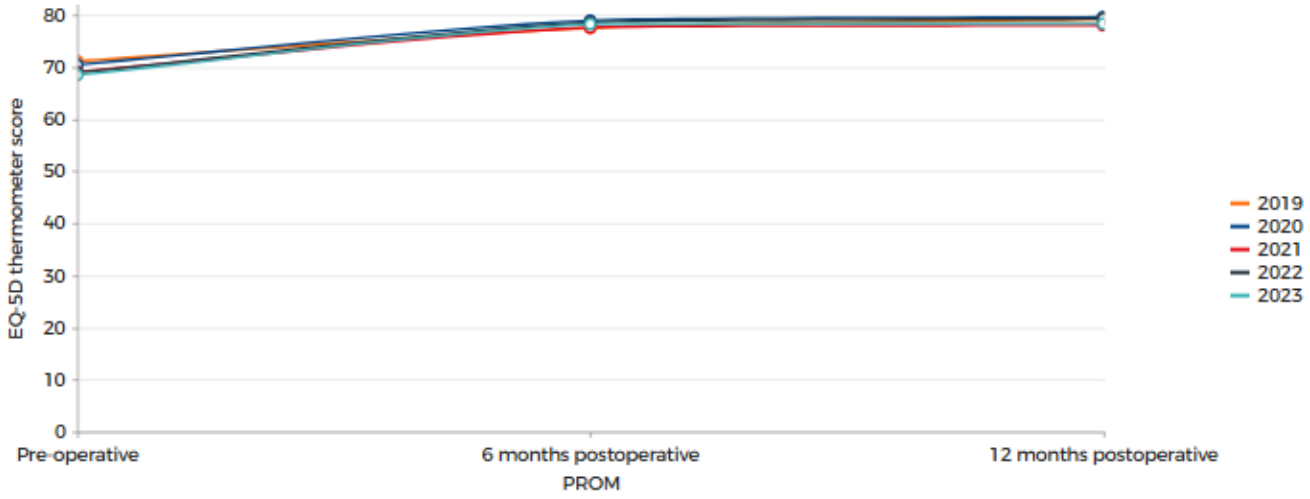
EQ-5D Index score		Pre-operative	6 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	1,102	0.59 (0.59-0.60)	0.81 (0.80-0.82)	0.83 (0.82-0.84)
2020	1,206	0.58 (0.57-0.59)	0.84 (0.83-0.84)	0.86 (0.85-0.86)
2021	1,585	0.53 (0.52-0.54)	0.84 (0.83-0.85)	0.85 (0.84-0.86)
2022	2,061	0.52 (0.51-0.53)	0.85 (0.84-0.86)	0.87 (0.86-0.87)
2023	2,072	0.52 (0.51-0.54)	0.85 (0.84-0.85)	0.86 (0.85-0.87)
Total	8,026	0.54 (0.54-0.55)	0.84 (0.84-0.84)	0.86 (0.85-0.86)

UKA: unicondylar knee arthroplasty; CI: confidence interval.

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

FIGURE Mean (95% CI) pre-operative, 6 months and 12 months postoperative EQ-5D thermometer scores of patients who underwent a UKA for osteoarthritis in the Netherlands in 2014-2023



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EQ-5D thermometer score		Pre-operative	6 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	1,102	71.09 (69.94-72.25)	77.47 (76.30-78.64)	79.14 (78.08-80.20)
2020	1,206	70.43 (69.35-71.51)	78.89 (77.93-79.85)	79.57 (78.65-80.48)
2021	1,585	69.03 (68.12-69.95)	77.58 (76.69-78.48)	77.99 (77.09-78.89)
2022	2,061	68.94 (68.09-69.79)	78.50 (77.75-79.24)	79.26 (78.55-79.97)
2023	2,072	68.45 (67.60-69.30)	78.22 (77.49-78.95)	78.30 (77.58-79.02)
Total	8,026	69.35 (68.92-69.77)	78.16 (77.77-78.55)	78.79 (78.42-79.17)

UKA: unicondylar knee arthroplasty; CI: confidence interval.

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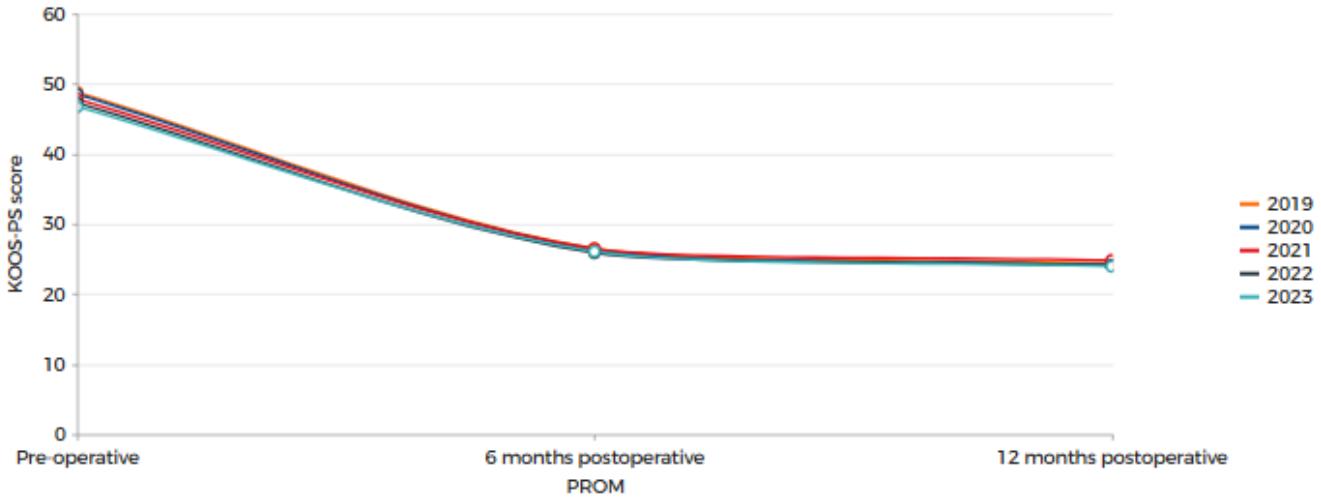
The EQ-5D thermometer score measures the health situation. The score has a range of 0.0 to 100.0, with 0.0 representing the worst possible health situation and 100.0 the best possible health situation.

KOOS-PS score

FIGURE Mean (95% CI) pre-operative, 6 months and 12 months postoperative KOOS-PS scores of patients who underwent a UKA for osteoarthritis in the Netherlands in 2014-2023



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KOOS-PS score		Pre-operative	6 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	1,102	48.82 (47.97-49.67)	26.50 (25.69-27.30)	24.39 (23.55-25.22)
2020	1,206	48.52 (47.69-49.36)	26.31 (25.57-27.05)	24.13 (23.32-24.94)
2021	1,585	47.84 (47.17-48.51)	26.47 (25.78-27.17)	24.83 (24.11-25.55)
2022	2,061	47.28 (46.66-47.89)	25.90 (25.31-26.48)	24.13 (23.53-24.73)
2023	2,072	46.73 (46.13-47.32)	26.08 (25.49-26.67)	23.95 (23.36-24.55)
Total	8,026	47.65 (47.34-47.96)	26.21 (25.91-26.50)	24.26 (23.95-24.57)

UKA: unicondylar knee arthroplasty; CI: confidence interval.

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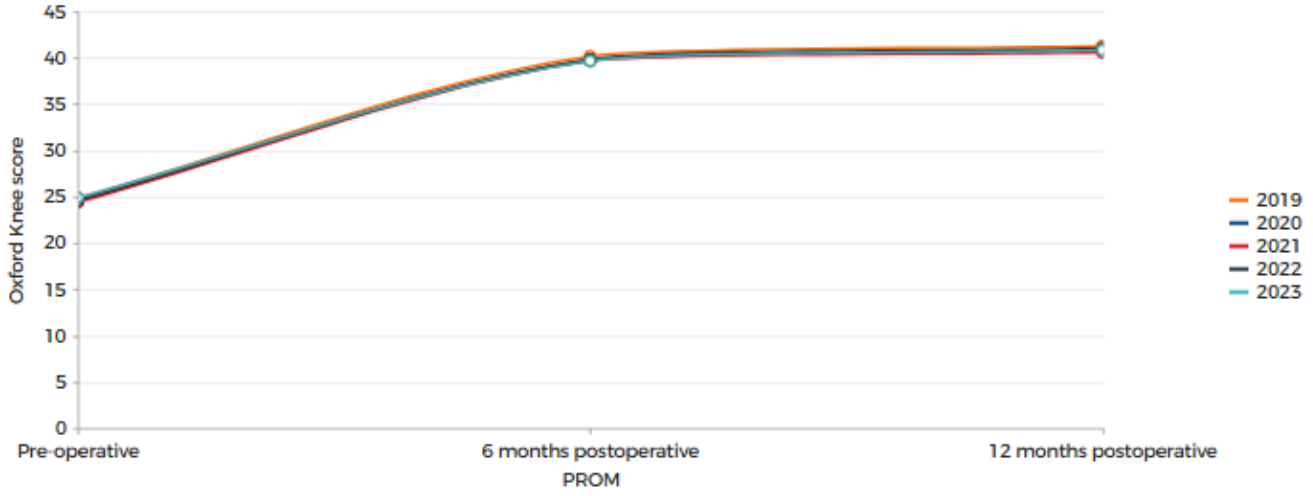
The KOOS-PS score measures the physical functioning of patients with osteoarthritis to the knee. The score has a range of 0.0 to 100.0, with 0.0 representing no effort and 100.0 the most possible effort.

Oxford Knee Score

FIGURE Mean (95% CI) pre-operative, 6 months and 12 months postoperative Oxford Knee scores of patients who underwent a UKA for osteoarthritis in the Netherlands in 2014-2023



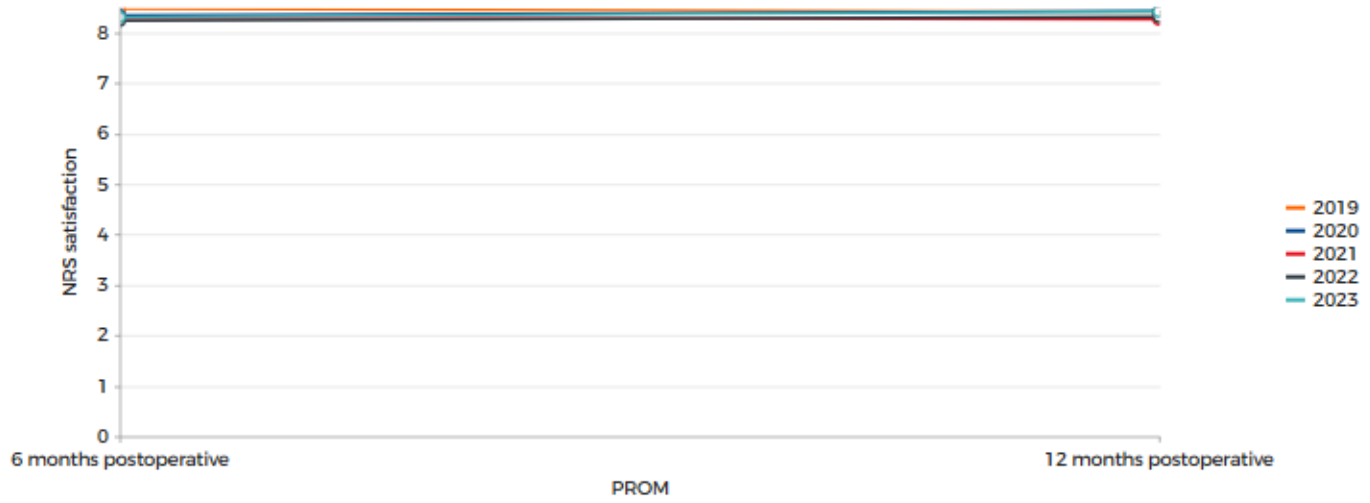
Oxford Knee score		Pre-operative	6 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	1,102	24.85 (24.41-25.29)	40.19 (39.77-40.61)	41.28 (40.85-41.70)
2020	1,206	24.54 (24.11-24.96)	39.78 (39.39-40.17)	40.86 (40.46-41.27)
2021	1,585	24.40 (24.04-24.75)	39.67 (39.31-40.04)	40.60 (40.24-40.96)
2022	2,061	24.64 (24.32-24.96)	39.86 (39.55-40.16)	41.02 (40.72-41.31)
2023	2,072	24.92 (24.60-25.24)	39.68 (39.36-40.00)	40.84 (40.53-41.15)
Total	8,026	24.68 (24.52-24.84)	39.80 (39.65-39.96)	40.90 (40.74-41.05)

UKA: unicondylar knee arthroplasty; CI: confidence interval.

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 no functional ability and 48.0 the most functional ability.

NRS (satisfaction)

FIGURE Mean (95% CI) 6 months and 12 months postoperative NRS (satisfaction) scores of patients who underwent a UKA for osteoarthritis in the Netherlands in 2014-2023



NRS satisfaction		6 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)
2019	1,102	8.47 (8.27-8.67)	8.41 (8.30-8.52)
2020	1,206	8.35 (8.25-8.45)	8.43 (8.32-8.53)
2021	1,585	8.29 (8.20-8.38)	8.26 (8.17-8.36)
2022	2,061	8.24 (8.16-8.32)	8.31 (8.23-8.39)
2023	2,072	8.31 (8.22-8.39)	8.42 (8.34-8.50)
Total	8,026	8.31 (8.27-8.36)	8.36 (8.32-8.40)

UKA: unicondylar knee arthroplasty; CI: confidence interval.

The NRS (satisfaction) score measures patients' satisfaction with the outcome of after joint replacement. The score has a range of 0.0 to 10.0, with 0.0 representing very unsatisfied and 10.0 representing very satisfied.

Patellofemoral knee arthroplasty

In this section you will find all the information on patellofemoral knee arthroplasty

Patient characteristics

Demographics

TABLE Patient characteristics of all patients with a registered primary patellofemoral knee arthroplasty in the Netherlands in 2024

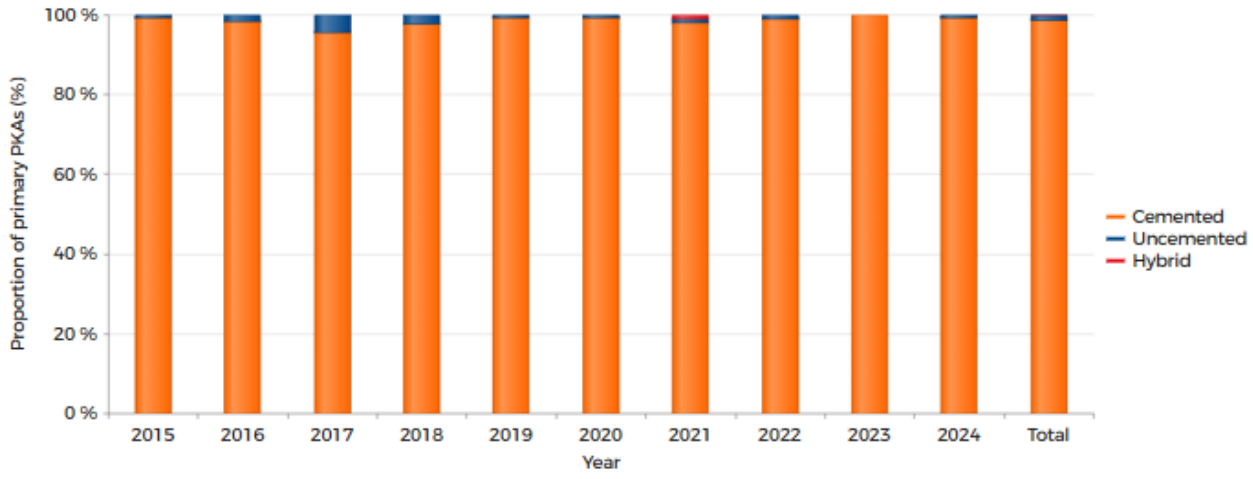
	PFA
N	**155**
Mean age (years) (SD)	58.5 (9.9)
Mean BMI (kg/m2) (SD)	27.8 (3.8)
Age (years) (%)	
<50	19
50-59	36
60-69	29
70-79	13
>80	3
Gender (%)	
Women	74
Men	26
ASA score (%)	
ASA I	24
ASA II	64
ASA III-IV	12
Diagnosis (%)	
Late post-traumatic	2
Osteoarthritis	98
Type of hospital (%)	
General	58
Private	37
UMC	5
Charnley score (%)	
A One knee joint affected	39
B1 Both knee joints affected	41
B2 Contralateral knee with a TKA	16
C Multiple joints affected or chronic disease that affects quality of life	1
Mean BMI (kg/m2) (SD)	27.8 (3.8)
BMI (kg/m2) (%)	
Normal weight (>18.5-25)	26
Overweight (>25-30)	51
Obesity (>30-40)	23
Smoking (%)	
No	93
Yes	7

PFA: patellofemoral knee arthroplasty; General: general hospital; UMC: university medical centre; Private: private hospital; SD: standard deviation.

Procedure characteristics

Fixation

FIGURE Trend (proportion [%] per year) in type of fixation in primary patellofemoral knee arthroplasties in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Cemented	99.35	98.61	95.83	97.80	99.43	99.37	98.13	99.13	100	99.35	98.65
Uncemented	0.65	1.39	4.17	2.20	0.57	0.63	0.93	0.87	0	0.65	1.28
Hybrid	0	0	0	0	0	0	0.93	0	0	0	0.07
Total (n)	**155**	**144**	**168**	**182**	**175**	**158**	**107**	**115**	**126**	**155**	**1,485**

PKA: patellofemoral knee arthroplasty

Most frequently registered - Patellofemoral knee prostheses

TABLE The most frequently registered primary patellofemoral knee arthroplasties in the Netherlands in 2020-2024

Year	2020	2021	2022	2023	2024
Patellofemoral knee arthroplasties (n)	**142**	**101**	**97**	**114**	**144**
Femur name; Proportion (%)					
Gender Solutions Patello-Femoral Joint	57.75	49.50	71.13	57.89	61.11
Journey PFJ	23.94	24.75	12.37	19.30	27.08
AVON	13.38	20.79	12.37	13.16	4.86
Patellofemoral Hermes	0.00	0.00	0.00	4.39	4.17
Restoris MCK	0.00	1.98	4.12	5.26	2.78

Most frequently registered - Bone cement

TABLE The most frequently registered bone cement used during primary patellofemoral knee arthroplasties in the Netherlands in 2020-2024

Year	2020	2021	2022	2023	2024
Bone cement pre-packed in a vacuum mixing system (n)	**41**	**43**	**36**	**45**	**66**
Cement name; Proportion (%)					
Palacos R+G	51.22	62.79	55.56	62.22	63.64
Refobacin Bone Cement R	34.15	25.58	30.56	31.11	36.36
Year	**2020**	**2021**	**2022**	**2023**	**2024**
Separately packed bone cement (n)	**87**	**50**	**57**	**59**	**54**
Cement name; Proportion (%)					
Palacos R+G	97.70	96.00	96.49	89.83	88.89
Subiton G	1.15	2.00	1.75	6.78	9.26
Palacos MV+G	0.00	0.00	0.00	1.69	1.85

Survival

Short term revision

By type of revision within 3 years

TABLE Cumulative 3-year revision percentage of primary patellofemoral knee arthroplasties by type of revision in the Netherlands in 2017-2021 (n=22,894)

	Cumulative 3-year revision percentage
	Kaplan Meier (95% CI)
Any type of revision	6.15 (4.45-7.86)
Major revision	5.76 (4.11-7.41)
Only tibia	0.00 (0.00-0.00)
Only femur addition	0.52 (0.01-1.03)
Femur and tibia	5.24 (3.66-6.82)
Minor revision	0.39 (0.00-0.84)
DAIR	0.00 (0.00-0.00)
No DAIR	0.26 (0.00-0.62)
Only patella	0.13 (0.00-0.39)

Any type of revision includes minor and major revisions as well as revision procedures that could not be classified as minor or major revision.
Major revision: revision of at least the femur or tibia component.
Minor revision: only inlay and/or patella exchange (including DAIR procedures).
PFA: patellofemoral knee arthroplasty; CI: confidence interval

In 2017-2021, 7 (0.9%) primary PFAs were implanted in patients who died within three years after the primary procedure.

First major or minor revision

TABLE Cumulative 3-year first revision percentage of primary patellofemoral knee arthroplasties by type of first major or minor revision in the Netherlands in 2017-2021 (n=767)

	Cumulative 3-year first revision percentage
	Kaplan Meier (95% CI)
First major revision	5.76 (4.11-7.41)
Tibia addition	5.24 (3.66-6.82)
Femur	5.76 (4.11-7.41)
First minor revision	0.39 (0.00-0.84)
Inlay	0.00 (0.00-0.00)
Patella	0.39 (0.00-0.84)

First major revision: first revision of the femur or tibia component, regardless of whether a minor revision has already taken place. Therefor, the first three revision procedures were reviewed.
First minor revision: only inlay and/or patella exchange (including DAIR procedures).
PFA: Patellofemoral knee arthroplasty; CI: confidence interval

In 2017-2021, 7 (0.9%) primary PFAs were implanted in patients who died within three years after the primary procedure.

Conversion to total knee arthroplasty

TABLE Conversions from primary patellofemoral knee arthroplasty to total knee arthroplasty within 3 years in the period 2017-2021

Number of revision procedures	49
Number of conversions	35
Percentage conversions	71.4 %

Reasons for revision by type of revision

TABLE Reasons for revision within three years of primary patellofemoral knee arthroplasties in the Netherlands in 2017-2021

	Any type of revision (n=49)
Reasons for revision	**Proportion (%)**
Progression of osteoarthritis	48.98
Patellar pain	28.57
Malalignment	12.24
Infection	10.20
Loosening of patella component	6.12
Patellar dislocation	4.08
Peri-prosthetic fracture	2.04
Revision after knee removal	2.04
Instability	0.00
Arthrofibrosis	0.00
Loosening of femur component	0.00
Insert wear	0.00
Other	8.16

Any type of revision includes all first revisions, including revision procedures that could not be classified as minor or major revision.

Please note: one patient may have more than one reason for revision. As such, the total proportion is over 100%.

Time after PFA until revision

TABLE Time after primary patellofemoral knee arthroplasty until short-term revision in the Netherlands in 2017-2021 (n=767)

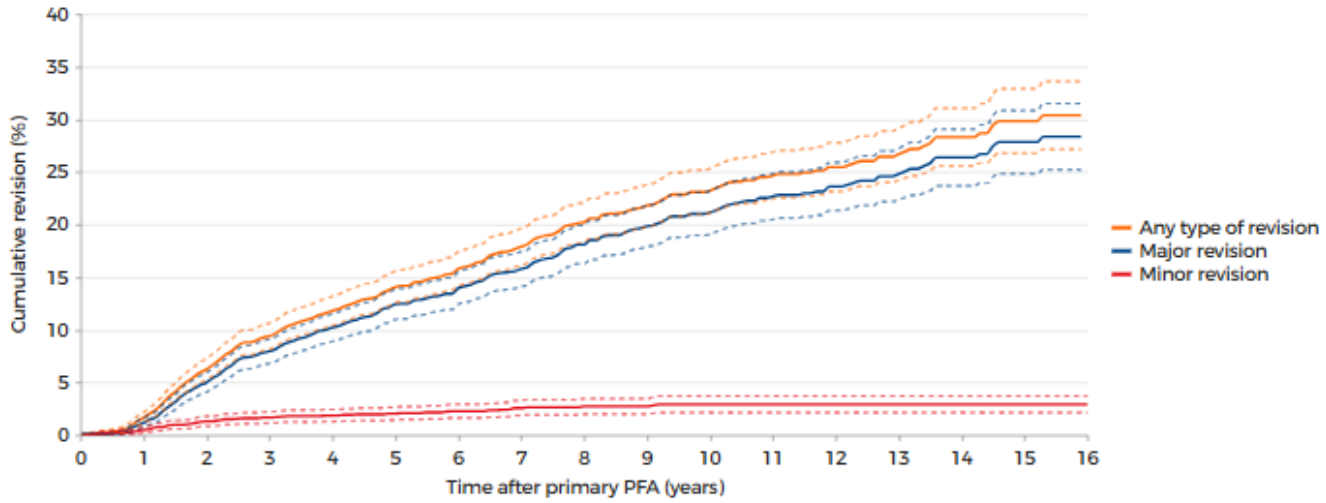
Time after primary PFA	Percentage revisions (%)
Day 0-29	0.00
Day 30-182	0.00
Day 183-364	0.65
Day 365-730 (second year)	3.26
Day 731-1095 (third year)	2.48

PFA: patellofemoral knee arthroplasty

Long term revision

By type of revision

FIGURE Cumulative revision percentage (Kaplan-Meier; 95% CI) of patellofemoral knee arthroplasties by type of revision in the Netherlands in 2007-2024 (n=2,390)



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	1yr	3yr	5yr	7yr	10yr	16yr
Any type of revision	1.31 (0.85-1.78)	9.25 (8.02-10.47)	13.77 (12.27-15.26)	17.67 (15.94-19.40)	23.09 (20.99-25.18)	30.37 (27.15-33.60)
Major revision	0.93 (0.53-1.32)	7.81 (6.67-8.95)	12.13 (10.70-13.55)	15.55 (13.90-17.20)	21.01 (18.98-23.05)	28.35 (25.21-31.50)
Minor revision	0.39 (0.14-0.65)	1.65 (1.11-2.18)	2.02 (1.42-2.62)	2.56 (1.86-3.26)	2.92 (2.13-3.70)	2.92 (2.13-3.70)

Please note: Dotted lines represent the upper and lower limits of the 95% confidence interval.
Any type of revision includes minor and major revisions as well as revision procedures that could not be classified as minor or major revision.
Major revision: first revision of the femur or tibia component, regardless of whether a minor revision has already taken place. Therefor, the first three revision procedures were reviewed.
Minor revision: only insert and/or patella exchange (including patella addition).
PFA: patellofemoral knee arthroplasty; CI: confidence interval.

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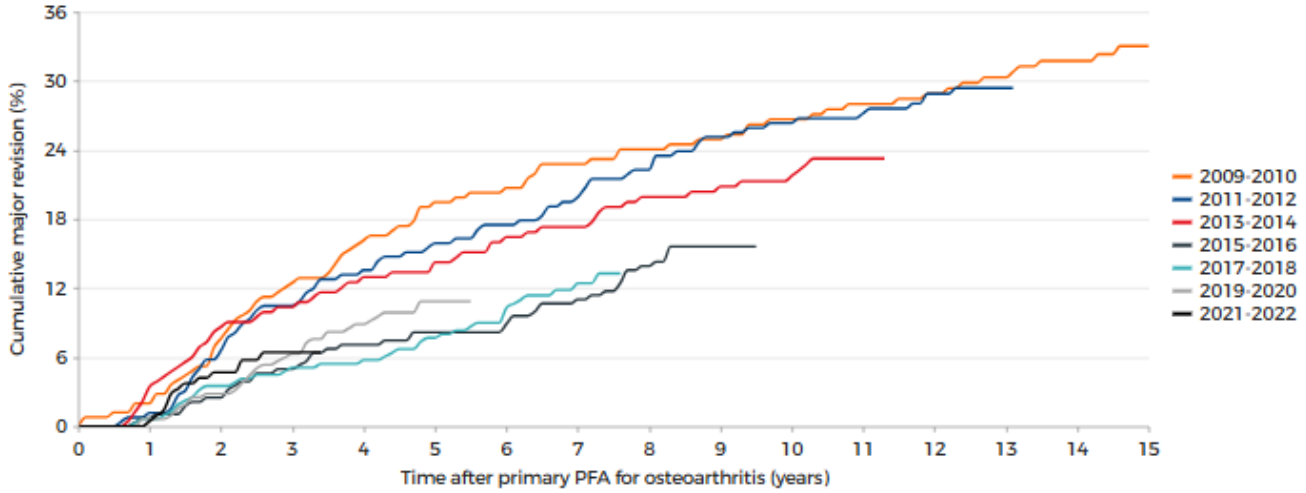
In 2007-2024, 127 (5.3%) primary PFAs were implanted in patients who died within sixteen years after the primary diagnosis

By procedure year

FIGURE Cumulative major revision percentage (Kaplan-Meier; 95% CI) of patellofemoral knee arthroplasties for osteoarthritis by procedure year of primary PFA in the Netherlands in 2009-2024



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	Number (n)	1yr	3yr	5yr	7yr	10yr	15yr
2009-2010	251	2.01 (0.27-3.75)	12.06 (8.01-16.11)	19.04 (14.14-23.95)	22.79 (17.54-28.05)	26.66 (21.10-32.23)	33.04 (26.95-39.13)
2011-2012	261	0.77 (0.00-1.84)	10.46 (6.72-14.19)	15.52 (11.10-19.94)	19.49 (14.64-24.34)	26.35 (20.93-31.78)	n.a.
2013-2014	232	2.16 (0.29-4.02)	10.36 (6.43-14.28)	13.39 (9.00-17.77)	17.31 (12.43-22.18)	21.29 (16.00-26.58)	n.a.
2015-2016	284	0.71 (0.00-1.68)	4.96 (2.43-7.50)	8.16 (4.97-11.36)	10.67 (7.06-14.28)	n.a.	n.a.
2017-2018	314	0.64 (0.00-1.52)	4.79 (2.42-7.15)	7.69 (4.73-10.64)	11.84 (8.19-15.50)	n.a.	n.a.
2019-2020	319	0.63 (0.00-1.50)	6.00 (3.38-8.61)	10.86 (7.33-14.40)	n.a.	n.a.	n.a.
2021-2022	215	0.00 (0.00-0.00)	6.42 (3.02-9.82)	n.a.	n.a.	n.a.	n.a.

Please note: n.a. if <50 cases were at risk.

Major revision precentage: first revision of the femur or tibia component, regardless of whether a minor revision has already taken place. Therefor, the first three revision procedures were reviewed.

PFA: patellofemoral knee arthroplasty

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Survival by component

By component

TABLE Cumulative revision percentages of primary patellofemoral knee arthroplasties by prosthesis component combination of patients who underwent a PFA for osteoarthritis in the Netherlands in 2007-2024 (n=2,258)

						Type of revision (n)				Cumulative revision percentage (95% CI)					
Femur component	Patella component	Primary PFAs (n)	Hospitals (n)	Median (IQR) age (yr)	Revisions (n)	Total revision	Only femur	Only insert/patella	Unknown	1yr	3yr	5yr	7yr	10yr	16yr
All PFAs for osteoarthritis		2,258	88	55 (48 - 62)	408	343	16	31	8	1.26 (0.78-1.73)	9.24 (7.98-10.50)	13.83 (12.28-15.38)	17.66 (15.88-19.45)	22.92 (20.77-25.08)	30.49 (27.01-33.96)
Gender Solutions Patello-Femoral Joint	NexGen	685	37	53 (48 - 60)	103	96	1	5	1	0.47 (0.00-0.99)	5.68 (3.85-7.51)	10.22 (7.76-12.69)	14.37 (11.39-17.34)	20.51 (16.57-24.45)	n.a.
Journey PFJ	Genesis II	393	34	55 (48 - 62)	73	55	6	9	3	1.62 (0.33-2.90)	10.73 (7.46-14.00)	12.75 (9.18-16.33)	18.14 (13.66-22.61)	25.10 (19.52-30.68)	n.a.
AVON	AVON	253	17	52 (47 - 59)	38	32	3	2	1	1.20 (0.00-2.55)	7.09 (3.84-10.34)	10.33 (6.40-14.25)	11.48 (7.29-15.67)	16.99 (11.38-22.59)	n.a.
Gender Solutions Patello-Femoral Joint	Persona	172	3	54 (48 - 61)	10	10	0	0	0	0.00 (0.00-0.00)	6.47 (1.75-11.19)	n.a.	n.a.	n.a.	n.a.

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

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Only combinations with over 100 procedures have been listed.

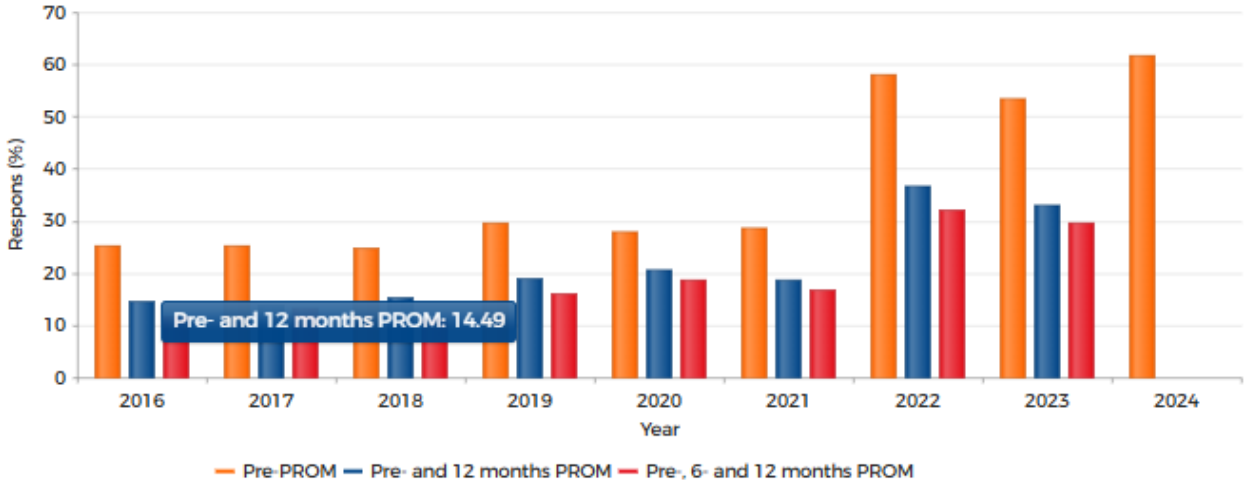
Results must be interpreted with caution. Patient characteristics like age and diagnosis, as well as procedure characteristics like the experience of the surgeon performing the procedure of the prosthesis may have influenced the cumulative revision percentages.

PROMs

Response

Per year

FIGURE Pre-operative, 6 months and 12 months postoperative response percentage of patients who underwent a PFA for osteoarthritis in the Netherlands in 2016-2024



	2016	2017	2018	2019	2020	2021	2022	2023	2024
Pre-PROM	25.36	25.32	24.71	29.76	27.92	28.71	58.04	53.39	61.64
Pre- and 12 months PROM	14.49	13.92	15.29	19.05	20.78	18.81	36.61	33.05	n.a.
Pre-, 6- and 12 months PROM	11.59	13.29	11.18	16.07	18.83	16.83	32.14	29.66	n.a.
Total PFAs for osteoarthritis (n)	**138**	**158**	**170**	**168**	**154**	**101**	**112**	**118**	**146**

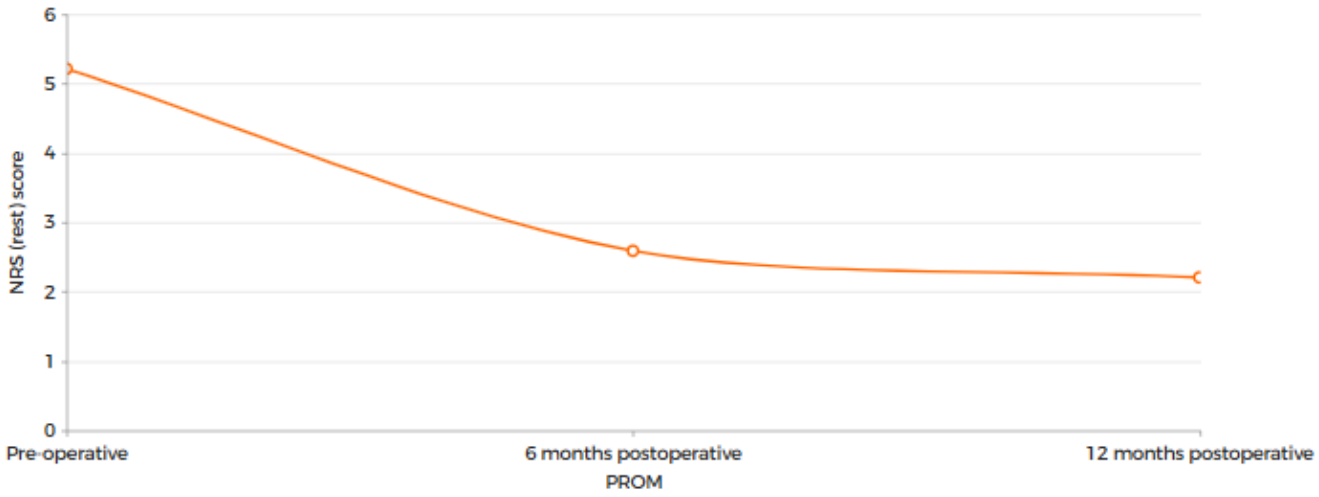
Please note: The 12 months postoperative PROMs response percentage is not (yet) available for 2024.

PFA: patellofemoral knee arthroplasty; PROM: patient reported outcome measure.

Outcomes

NRS (rest)

FIGURE Mean (95% CI) pre-operative, 6 months and 12 months postoperative NRS (rest) scores of patients who underwent a PFA for osteoarthritis in the Netherlands in 2016-2023



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NRS (rest) score	Pre-operative	6 months postoperative	12 months postoperative
n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
200	5.21 (4.86-5.57)	2.59 (2.24-2.94)	2.21 (1.86-2.55)

PFA: patellofemoral knee arthroplasty; CI: confidence interval.

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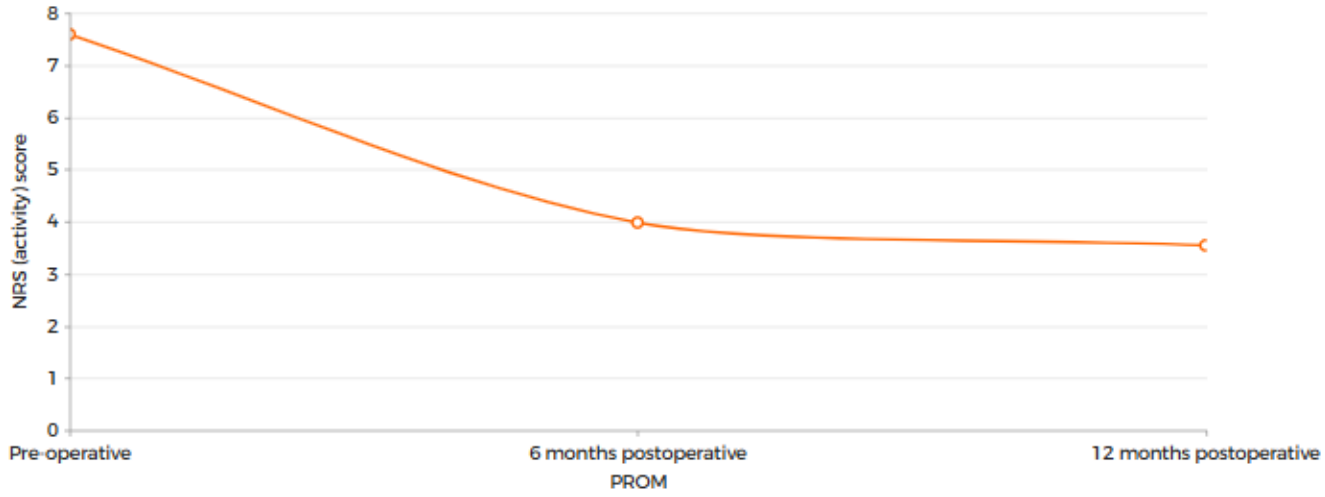
The NRS (rest) score measures pain during rest. The score has a range of 0.0 to 10.0, with 0.0 representing no pain and 10.0 representing the most possible pain.

NRS (activity)

FIGURE Mean (95% CI) pre-operative, 6 months and 12 months postoperative NRS (activity) scores of patients who underwent a PFA for osteoarthritis in the Netherlands in 2016-2023



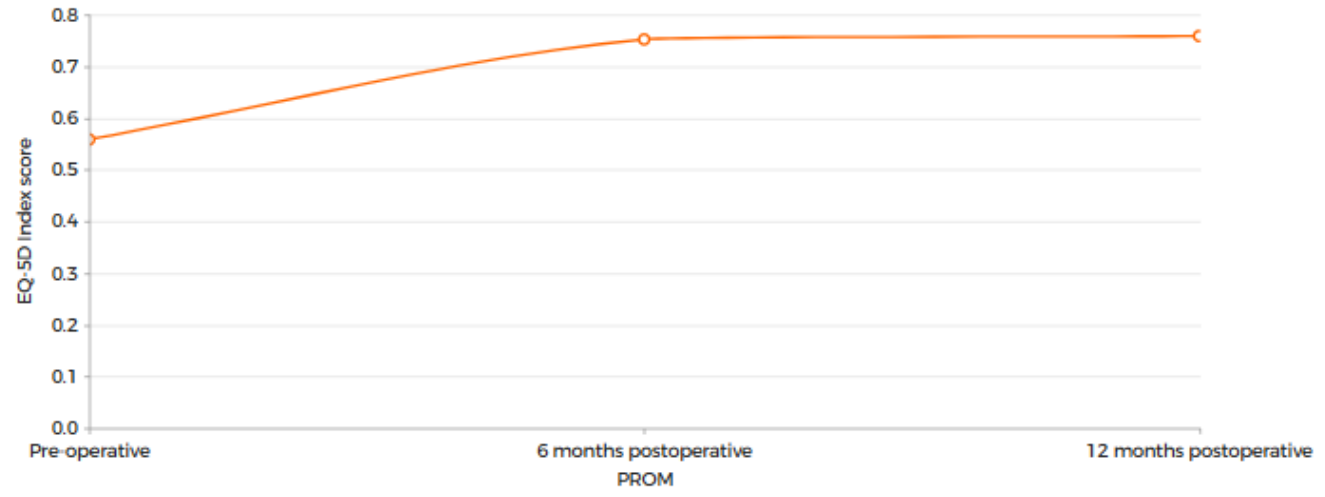
NRS (activity) score	Pre-operative	6 months postoperative	12 months postoperative
n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
200	7.59 (7.34-7.83)	3.98 (3.61-4.35)	3.54 (3.16-3.92)

PFA: patellofemoral knee arthroplasty; CI: confidence interval.

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.

EQ-5D Index score

FIGURE Mean (95% CI) pre-operative, 6 months and 12 months postoperative EQ-5D index scores of patients who underwent a PFA for osteoarthritis in the Netherlands in 2016-2023



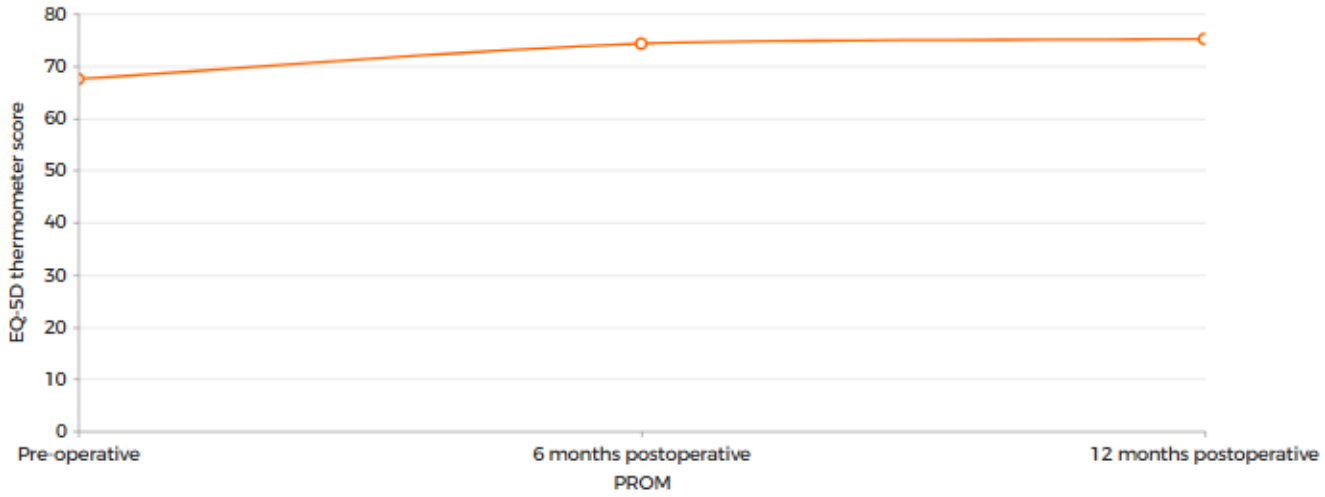
EQ-5D Index score	Pre-operative	6 months postoperative	12 months postoperative
n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
200	0.56 (0.53-0.59)	0.75 (0.73-0.78)	0.76 (0.73-0.79)

PFA: patellofemoral knee arthroplasty; CI: confidence interval.

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

FIGURE Mean (95% CI) pre-operative, 6 months and 12 months postoperative EQ-5D thermometer scores of patients who underwent a PFA for osteoarthritis in the Netherlands in 2016-2023



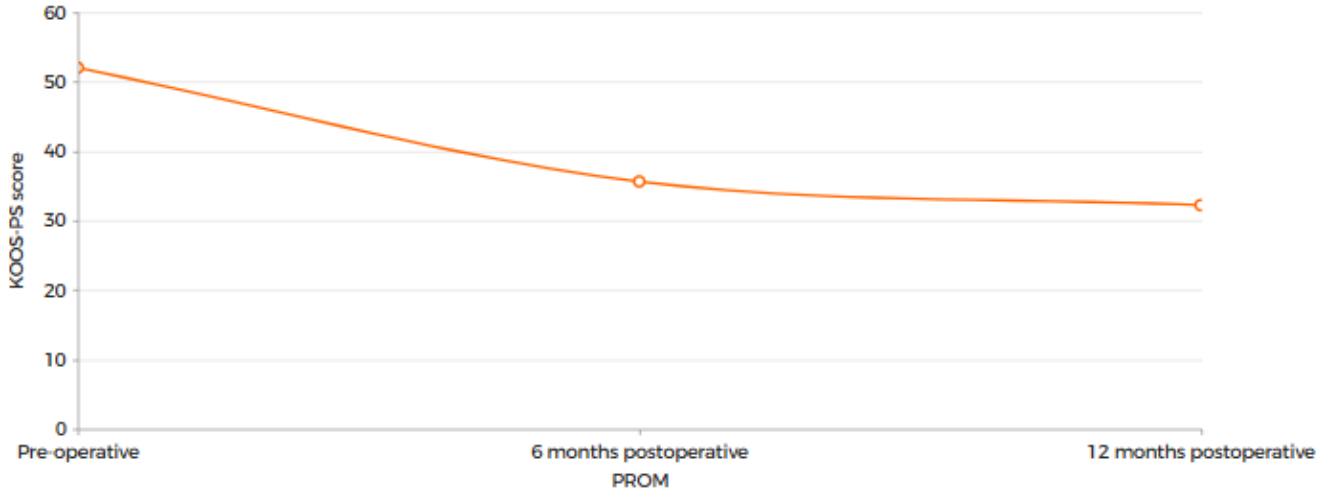
EQ-5D thermometer score	Pre-operative	6 months postoperative	12 months postoperative
n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
200	67.47 (64.67-70.27)	74.24 (71.98-76.50)	75.13 (72.80-77.46)

PFA: patellofemoral knee arthroplasty; CI: confidence interval.

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 (95% CI) pre-operative, 6 months and 12 months postoperative KOOS-PS scores of patients who underwent a PFA for osteoarthritis in the Netherlands in 2016-2023



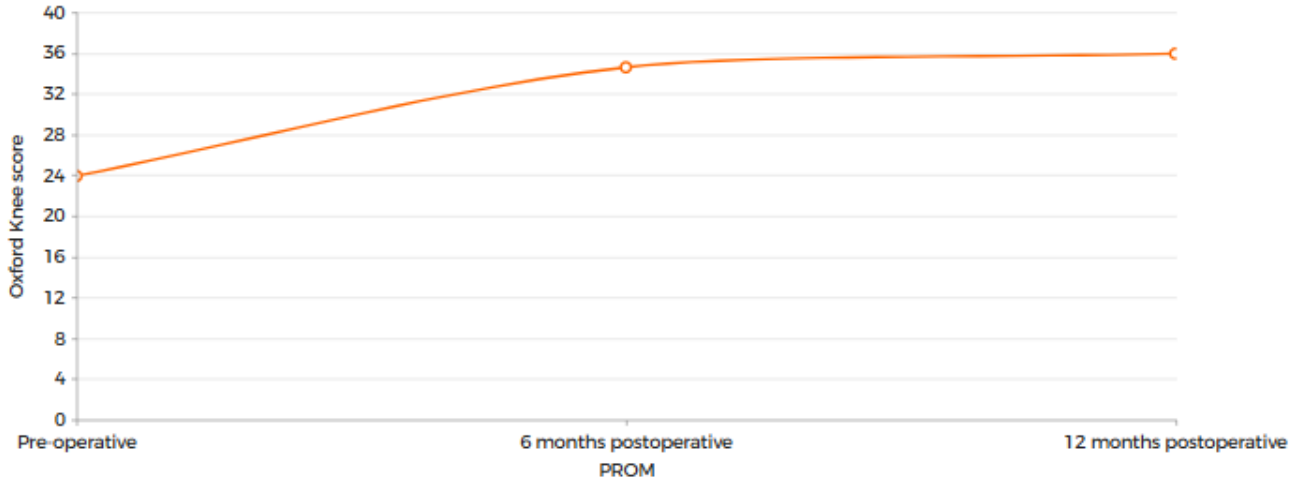
KOOS-PS score	Pre-operative	6 months postoperative	12 months postoperative
n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
200	52.04 (50.15-53.92)	35.64 (33.59-37.70)	32.24 (30.09-34.39)

PFA: patellofemoral knee arthroplasty; CI: confidence interval.

The KOOS-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 Knee Score

FIGURE Mean (95% CI) pre-operative, 6 months and 12 months postoperative Oxford Knee Scores of patients who underwent a PFA for osteoarthritis in the Netherlands in 2016-2023



Oxford Knee Score	Pre-operative	6 months postoperative	12 months postoperative
n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
200	23.92 (22.86-24.98)	34.59 (33.42-35.77)	35.93 (34.72-37.15)

PFA: patellofemoral knee arthroplasty; CI: confidence interval.

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 no functional ability and 48.0 the most functional ability.

NRS (satisfaction)

FIGURE Mean (95% CI) 6 months and 12 months postoperative NRS (satisfaction) scores of patients who underwent a PFA for osteoarthritis in the Netherlands in 2014-2023

NRS satisfaction	6 months postoperative	12 months postoperative
n	Mean (95% CI)	Mean (95% CI)
172	7.23 (6.90-7.55)	7.30 (6.95-7.66)

PFA: patellofemoral knee arthroplasty; CI: confidence interval.

The NRS (satisfaction) score measures patients' satisfaction with the outcome of after joint replacement. The score has a range of 0.0 to 10.0, with 0.0 representing very unsatisfied and 10.0 representing very satisfied.

Knee revision arthroplasty

In this section you will find all the information on knee revision arthroplasty

Revision characteristics

Reasons for revision

TABLE Trend (proportion [%] per year) in reasons for revision in patients who underwent a knee revision arthroplasty in the Netherlands in 2015-2024

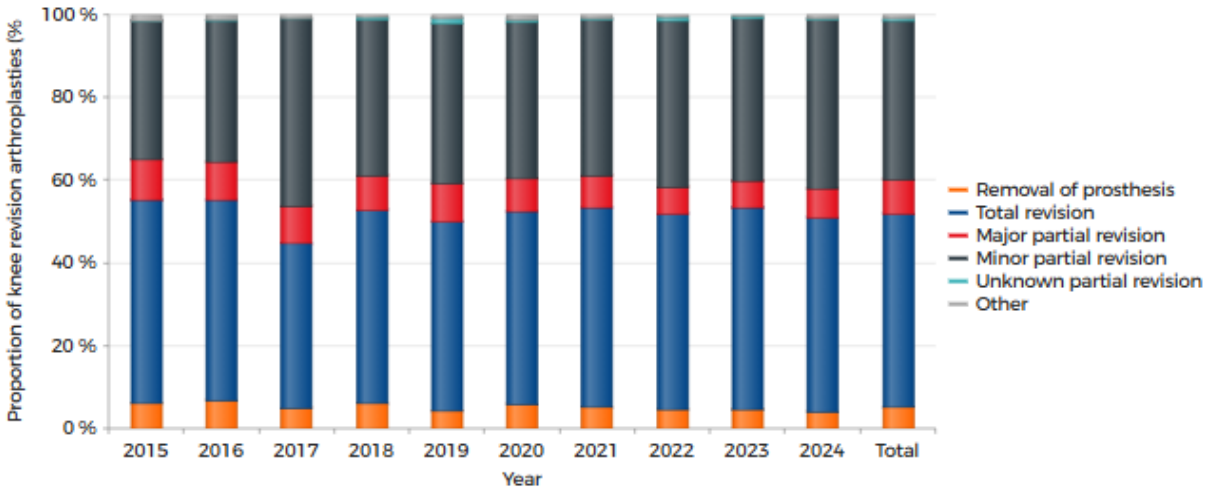
Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Knee revision arthroplasty (n)	**2,685**	**2,926**	**2,997**	**2,930**	**3,101**	**2,496**	**2,602**	**3,013**	**3,309**	**3,478**	**29,537**
Reasons for revision; Proportion (%)											
Instability	26.44	25.12	27.66	25.80	27.38	26.28	26.25	24.63	21.82	21.28	25.13
Infection	16.46	19.58	20.25	20.82	20.15	23.68	22.02	22.93	24.66	23.86	21.53
Patellar pain	23.05	21.46	19.72	18.94	20.15	18.71	17.76	23.96	22.51	24.55	21.22
Loosening of tibia component	20.60	21.87	20.92	19.49	20.74	19.55	19.02	18.62	16.74	17.54	19.44
Malalignment	14.67	13.88	11.34	10.72	10.16	10.62	11.03	8.89	10.15	9.03	10.97
Progression of osteoarthritis	8.27	9.26	8.21	8.70	7.97	7.57	8.95	11.98	12.69	12.74	9.77
Loosening of femur component	9.50	9.02	8.91	8.36	8.58	8.01	8.80	8.46	8.43	7.71	8.56
Inlay wear	7.82	7.55	6.77	6.55	7.13	6.97	7.72	10.26	8.95	8.77	7.90
Revision after knee removal	5.74	6.25	5.57	4.88	4.16	5.05	4.27	4.81	4.38	3.13	4.78
Arthrofibrosis	5.07	4.27	4.87	4.61	5.26	3.93	4.30	3.88	4.14	4.14	4.45
Patella dislocation	2.79	2.08	2.44	2.22	2.45	2.80	2.19	2.56	1.51	2.13	2.30
Peri-prosthetic fracture	2.27	1.71	1.77	1.54	1.90	2.60	2.65	2.56	2.63	2.99	2.27
Loosening of patella component	1.53	1.91	1.77	1.43	1.74	1.76	1.73	1.59	1.96	1.27	1.67
Bearing dislocation								3.72	4.11	4.05	
Other	8.64	8.30	7.41	7.68	7.80	7.49	8.65	8.70	7.56	8.05	8.02

One patient may have more than one reason for revision. As such, the total proportion is over 100%.

Please note: Bearing dislocation was not registered before 2022.

Type of revision

FIGURE Trend (proportion [%] per year) in type of revision in knee revision arthroplasties in the Netherlands in 2015-2024



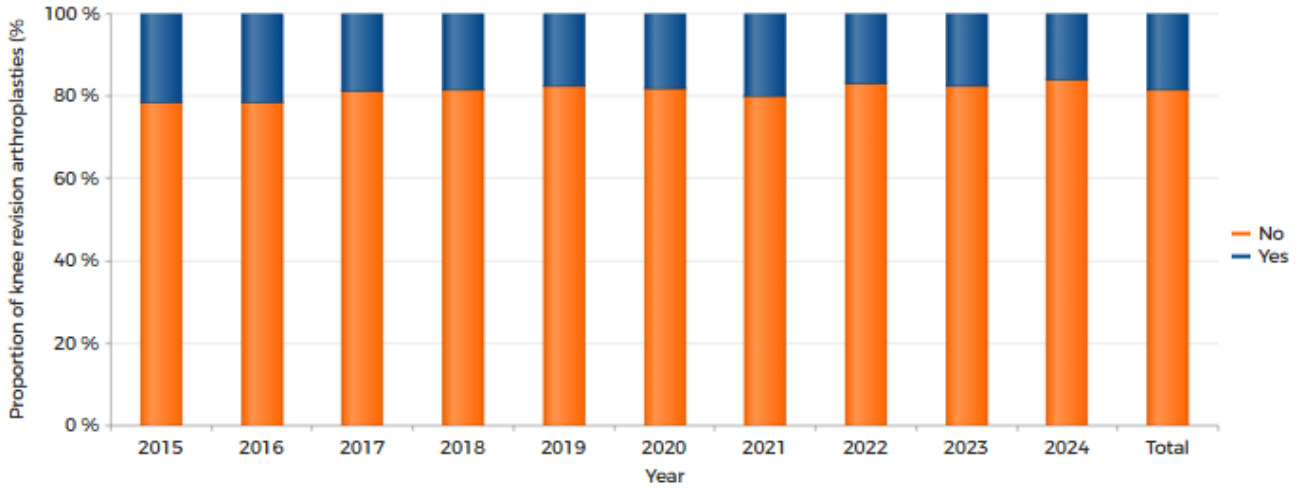
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Removal of prosthesis	6.16	6.67	4.80	6.20	4.40	5.98	5.28	4.73	4.69	4.12	5.25
Total revision	49.01	48.43	39.95	46.47	45.55	46.55	47.96	47.24	48.70	46.70	46.64
Major partial revision	9.94	9.46	8.81	8.46	9.29	8.03	7.82	6.46	6.42	7.11	8.13
Minor partial revision	33.25	34.02	45.39	37.50	38.63	37.56	37.63	40.01	39.34	40.71	38.54
Unknown partial revision	0.26	0.21	0.24	0.65	1.13	0.64	0.42	0.83	0.39	0.58	0.54
Other	1.38	1.20	0.82	0.72	1.00	1.24	0.89	0.73	0.45	0.78	0.90
Total (n)	**2,677**	**2,907**	**2,939**	**2,920**	**3,091**	**2,492**	**2,596**	**3,002**	**3,302**	**3,473**	**29,399**

Major partial revision: revision of at least femur or tibia component. Minor partial revision: Only insert and/patella exchange (including patella addition). Unknown partial revision: partial revision of which the revised components were unknown.

In 142 (57%) major partial knee revision arthroplasties the tibia component was revised and in 105 (43%) major partial revision arthroplasties the femur component was revised in 2024.

Conversion to TKA

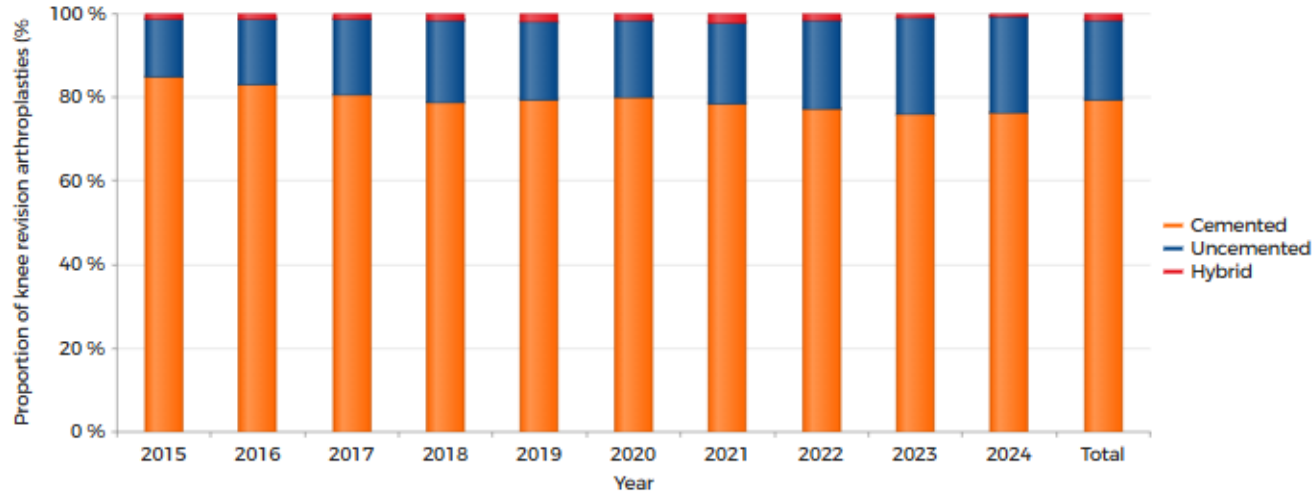
FIGURE Trend (proportion [%] per year) in conversion of a unicondylar or patellofemoral knee arthroplasty to a total knee arthroplasty in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
No	78.66	78.62	81.27	81.49	82.43	82.01	80.09	83.12	82.44	83.95	81.57
Yes	21.34	21.38	18.73	18.51	17.57	17.99	19.91	16.88	17.56	16.05	18.43
Total (n)	**2,245**	**2,638**	**2,771**	**2,637**	**2,778**	**2,285**	**2,401**	**2,902**	**3,241**	**3,409**	**27,307**

Fixation

FIGURE Trend (proportion [%] per year) in type of fixation in knee revision arthroplasties in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Cemented	84.84	83.11	80.81	78.80	79.38	80.12	78.44	77.24	76.21	76.27	79.36
Uncemented	13.92	15.57	17.96	19.55	18.87	18.42	19.37	21.11	22.78	23.08	19.26
Hybrid	1.24	1.31	1.24	1.65	1.75	1.46	2.19	1.65	1.01	0.65	1.39
Total (n)	**2,428**	**2,665**	**2,751**	**2,670**	**2,857**	**2,253**	**2,375**	**2,781**	**3,073**	**3,224**	**27,077**

Most frequenly registered - Femur components

TABLE The most frequently registered femur components in knee revision arthroplasties in the Netherlands in 2020-2024

Year	2020	2021	2022	2023	2024
Femur (n)	1,027	1,158	1,279	1,395	1,490
Femur name; Proportion (%)					
Legion	23.86	20.03	17.83	18.35	18.35
NexGen	18.50	18.65	19.62	17.49	17.49
Attune	2.53	4.15	8.84	10.11	10.11
Genesis II	8.67	7.51	9.70	9.46	9.46
Triathlon	8.57	8.46	7.97	8.46	8.46
Vanguard Complete Knee	5.55	7.94	6.72	7.31	7.31
Persona	0.88	2.16	3.05	5.95	5.95
Vanguard 360	6.33	6.04	6.33	4.66	4.66
PFC / SIGMA	6.04	5.53	3.99	4.16	4.16
RT Plus	3.41	3.97	3.99	3.51	3.51

Most frequenly registered - Tibia components

TABLE The most frequently registered tibia components in knee revision arthroplasties in the Netherlands in 2020-2024

Year	2020	2021	2022	2023	2024
Tibia (n)	**1,117**	**1,250**	**1,376**	**1,517**	**1,535**
Tibia name; Proportion (%)					
Attune	3.04	4.72	8.36	9.56	18.50
Legion	24.08	20.24	17.59	19.97	17.72
NexGen	15.94	15.52	17.59	16.28	16.03
Genesis II	4.92	4.80	7.05	6.92	7.49
Triathlon	8.95	9.04	8.65	8.77	7.17
Vanguard 360	7.07	7.52	6.76	5.67	6.51
Persona	0.81	2.00	2.83	5.27	4.82
RT Plus	4.39	5.76	5.31	5.14	4.76
Vanguard Complete Knee	4.03	5.52	5.60	5.01	3.91
Rotation Hinged Knee	3.49	3.28	4.07	2.90	2.87

Most frequenly registered - Insert components

TABLE The most frequently registered insert components in knee revision arthroplasties in the Netherlands in 2020-2024

Year	2020	2021	2022	2023	2024
Insert (n)	**1,755**	**1,974**	**2,248**	**2,537**	**2,784**
Insert name; Proportion (%)					
Genesis II	26.21	24.42	23.75	24.16	25.61
ATTUNE	2.22	3.14	5.83	7.57	12.39
NexGen	16.30	14.13	14.50	12.73	11.89
Vanguard Complete Knee	7.92	8.66	8.85	8.47	7.97
Triathlon	7.18	7.95	8.05	8.28	7.40
Oxford PKR	5.24	5.93	7.38	7.53	7.04
Persona	0.85	1.72	2.76	4.85	4.17
Vanguard SSK	4.22	4.00	4.36	3.19	3.45
RT Plus	2.91	3.50	3.47	3.74	3.16
Legion	4.44	4.61	3.47	2.96	2.77

Most frequenly registered - Patella components

TABLE The most frequently registered patella components in knee revision arthroplasties in the Netherlands in 2020-2024

Year	2020	2021	2022	2023	2024
Patella (n)	**947**	**945**	**988**	**1,030**	**1,155**
Patella name; Proportion (%)					
Genesis II	50.58	44.97	44.53	49.71	51.95
Vanguard	13.20	15.03	17.51	15.05	11.26
Attune	2.64	3.81	5.97	7.77	11.00
NexGen	12.78	12.38	10.63	9.32	9.26
Persona	1.27	2.12	3.95	3.79	4.94
PFC / SIGMA	5.39	6.03	4.76	4.17	3.38
balanSys	2.01	2.75	2.33	2.62	2.77
Triathlon	5.49	7.51	4.86	4.47	2.68
LCS	2.75	2.12	1.92	1.07	0.95
AGC	0.53	0.85	0.61	0.97	0.69

Most frequenly registered - Bone cement

TABLE The most frequently registered bone cement used during knee revision arthroplasties in the Netherlands in 2020-2024

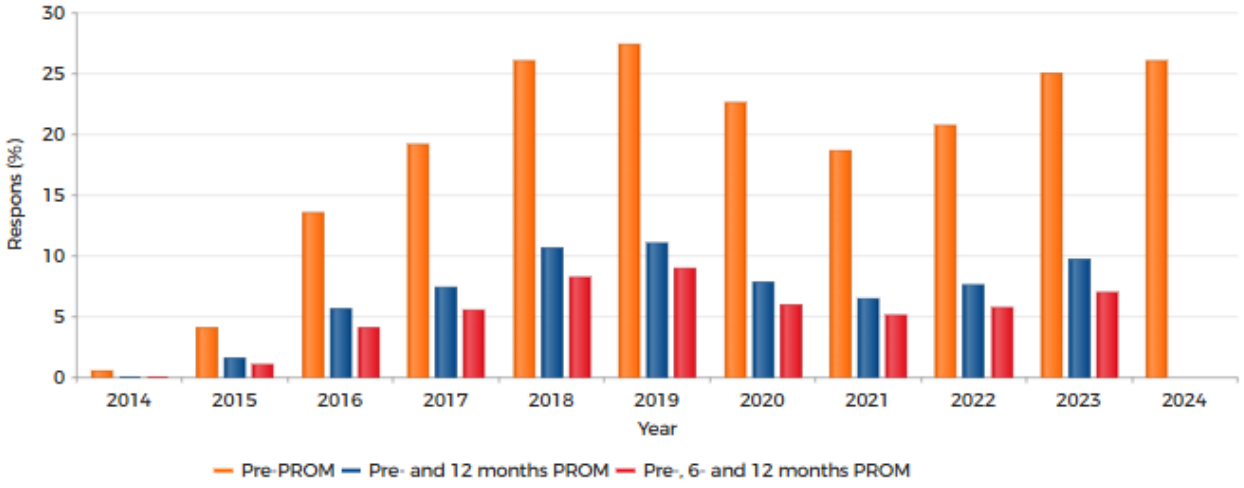
Year	2020	2021	2022	2023	2024
Bone cement pre-packed in a vacuum mixing system (n)	**488**	**674**	**801**	**864**	**1,269**
Cement name; Proportion (%)					
Palacos R+G	50.20	48.66	48.44	57.06	66.04
Refobacin Bone Cement R	39.75	41.10	43.45	38.31	31.99
Copal G+C	0.00	0.00	0.00	0.00	1.65
Refobacin Plus Bone Cement	6.15	8.01	6.62	4.63	0.24
Refobacin Revision	3.89	2.08	1.50	0.00	0.08
Year	**2020**	**2021**	**2022**	**2023**	**2024**
Separately packed bone cement (n)	**1,009**	**1,007**	**1,012**	**1,053**	**777**
Cement name; Proportion (%)					
Palacos R+G	30.62	33.76	32.51	27.26	44.14
Copal G+C	38.16	38.93	39.92	43.97	25.74
Refobacin Revision	12.69	12.31	14.23	11.78	13.13
Subiton G	4.26	4.67	4.15	3.89	6.05
Copal G+V	4.46	5.16	4.25	4.27	3.99
Cemex VancoGenx	1.09	0.89	0.79	1.61	2.19
Palacos MV+G	1.78	1.59	1.88	2.56	1.93
Refobacin Bone Cement R	6.05	1.89	1.98	3.42	1.54
Biomet Bone Cement R	0.50	0.40	0.00	0.57	0.51
Simplex ABC Tobra	0.00	0.00	0.20	0.19	0.26

PROMs

Response

Per year

FIGURE Pre-operative, 6 months and 12 months postoperative response percentage of patients who underwent a knee revision arthroplasty in the Netherlands in 2014-2024



	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Pre-PROM	0.53	4.03	13.55	19.21	26.09	27.35	22.65	18.69	20.75	25.02	26.05
Pre- and 12 months PROM	0.04	1.54	5.67	7.40	10.62	10.99	7.85	6.49	7.57	9.65	n.a.
Pre-, 6- and 12 months PROM	0.04	1.00	4.10	5.57	8.22	9.01	5.96	5.10	5.72	7.03	n.a.
Total knee revision arthroplasties (n)	**2,459**	**2,604**	**2,804**	**2,853**	**2,833**	**2,984**	**2,433**	**2,510**	**2,921**	**3,214**	**3,359**

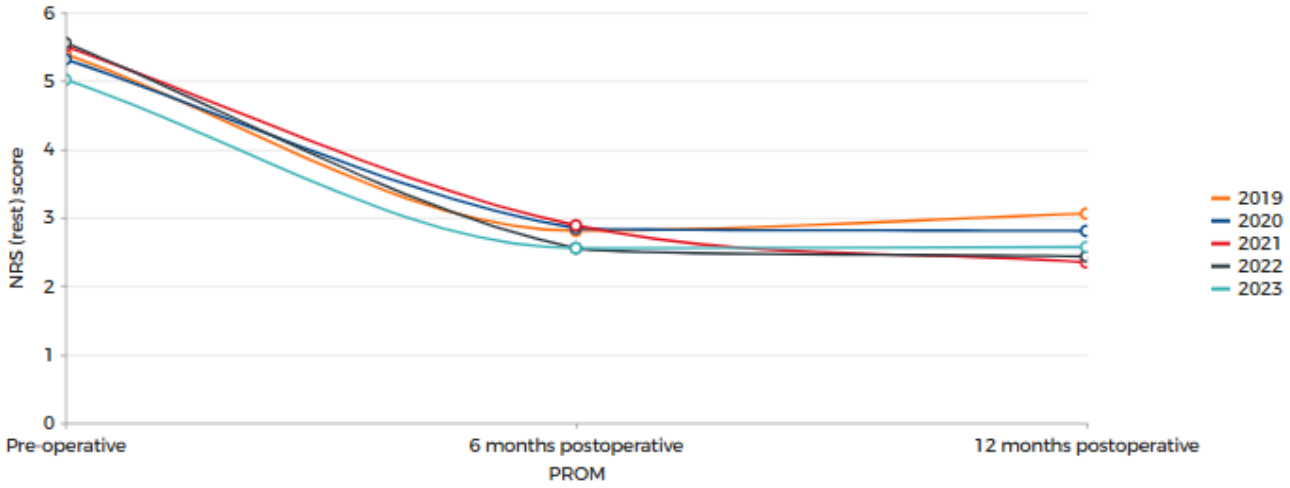
Please note: The 12 months postoperative PROMs response percentage is not (yet) available for 2024.

PROM: patient reported outcome measure.

Outcomes

NRS (rest)

FIGURE Mean (95% CI) pre-operative, 6 months and 12 months postoperative NRS (rest) scores of patients who underwent a knee revision in the Netherlands in 2019-2023



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NRS (rest) score		Pre-operative	6 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	269	5.39 (5.10-5.69)	2.81 (2.50-3.12)	3.06 (2.73-3.39)
2020	145	5.32 (4.90-5.74)	2.85 (2.44-3.26)	2.81 (2.37-3.25)
2021	128	5.50 (5.06-5.95)	2.89 (2.40-3.38)	2.35 (1.89-2.80)
2022	167	5.56 (5.18-5.93)	2.56 (2.17-2.94)	2.43 (2.06-2.81)
2023	226	5.02 (4.68-5.36)	2.56 (2.22-2.89)	2.57 (2.21-2.94)
Total	935	5.34 (5.18-5.50)	2.72 (2.56-2.89)	2.70 (2.52-2.87)

CI: confidence interval

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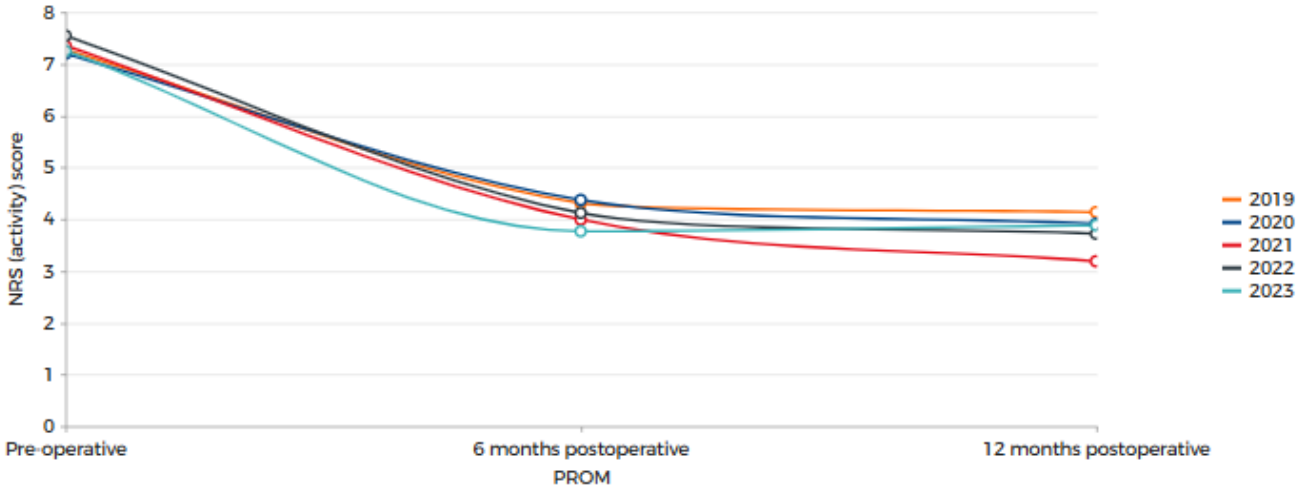
The NRS (rest) score measures pain during rest. The score has a range of 0.0 to 10.0, with 0.0 representing no pain and 10.0 representing the most possible pain.

NRS (activity)

FIGURE Mean (95% CI) pre-operative, 6 months and 12 months postoperative NRS (activity) scores of patients who underwent a knee revision in the Netherlands in 2014-2023



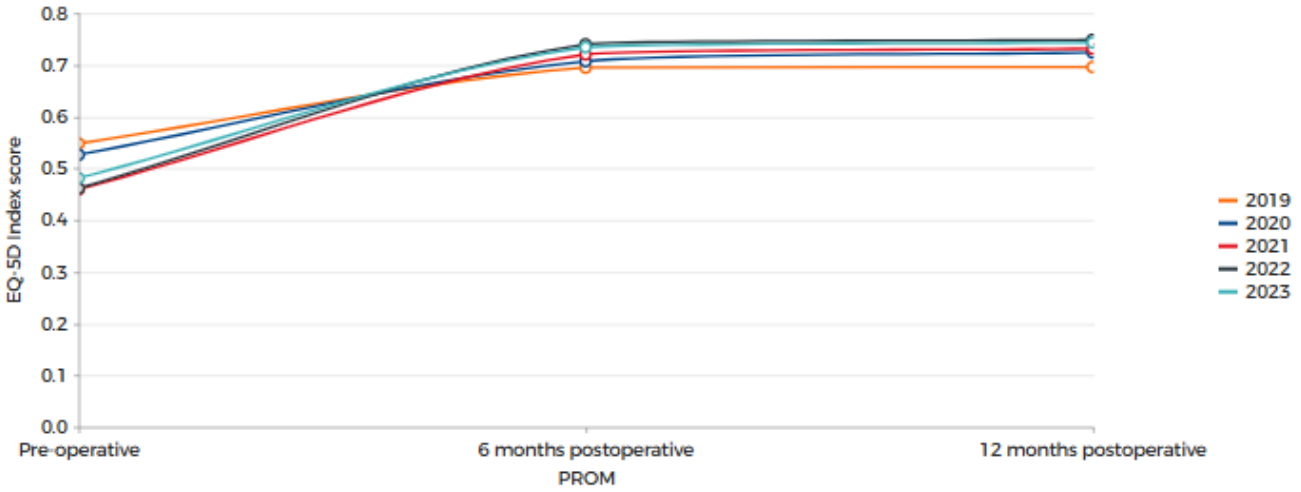
NRS (activity) score		Pre-operative	6 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	269	7.27 (7.02-7.53)	4.31 (3.98-4.63)	4.14 (3.80-4.48)
2020	145	7.20 (6.86-7.53)	4.37 (3.92-4.83)	3.91 (3.43-4.39)
2021	128	7.35 (7.00-7.70)	3.99 (3.48-4.50)	3.19 (2.68-3.69)
2022	167	7.54 (7.27-7.82)	4.12 (3.72-4.53)	3.72 (3.29-4.15)
2023	226	7.25 (6.97-7.53)	3.77 (3.38-4.15)	3.88 (3.49-4.28)
Total	935	7.31 (7.18-7.44)	4.11 (3.93-4.29)	3.84 (3.65-4.02)

CI: confidence interval

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.

EQ-5D Index score

FIGURE Mean (95% CI) pre-operative, 6 months and 12 months postoperative EQ-5D index scores of patients who underwent a knee revision in the Netherlands in 2014-2023



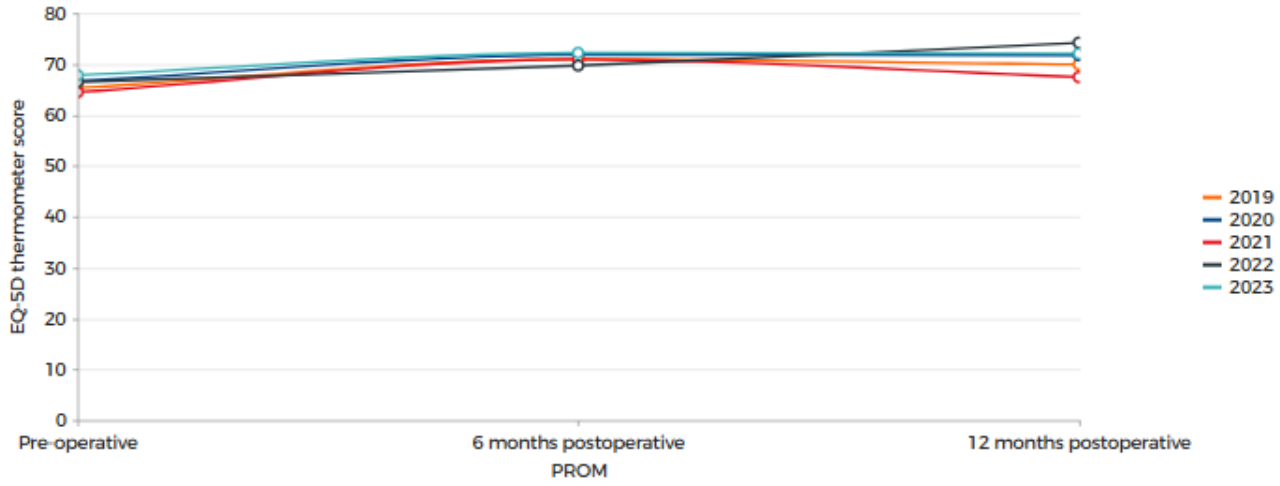
EQ-5D Index score		Pre-operative	6 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	269	0.55 (0.53-0.57)	0.69 (0.67-0.72)	0.70 (0.67-0.72)
2020	145	0.53 (0.49-0.56)	0.71 (0.67-0.74)	0.72 (0.69-0.76)
2021	128	0.46 (0.41-0.51)	0.72 (0.68-0.76)	0.73 (0.69-0.77)
2022	167	0.46 (0.42-0.50)	0.74 (0.71-0.77)	0.75 (0.72-0.78)
2023	226	0.48 (0.44-0.52)	0.73 (0.70-0.77)	0.74 (0.71-0.78)
Total	935	0.50 (0.49-0.52)	0.72 (0.70-0.73)	0.73 (0.71-0.74)

CI: confidence interval

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

FIGURE Mean (95% CI) pre-operative, 6 months and 12 months postoperative EQ-5D thermometer scores of patients who underwent a knee revision in the Netherlands in 2014-2023



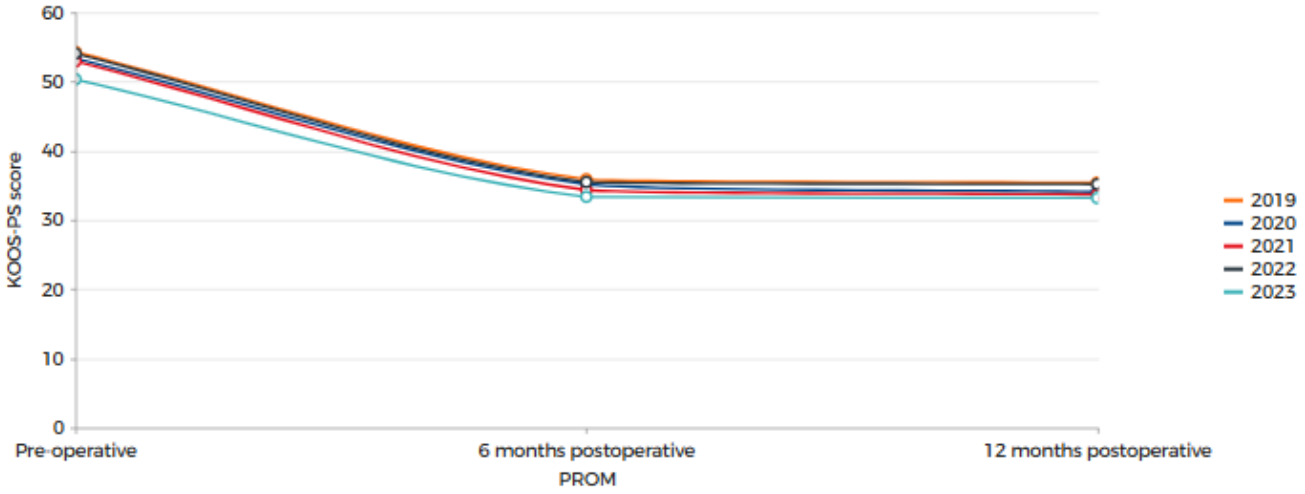
EQ-5D thermometer score		Pre-operative	6 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	269	65.32 (62.95-67.70)	70.95 (68.49-73.40)	69.93 (67.46-72.40)
2020	145	66.67 (63.16-70.19)	71.84 (69.03-74.64)	71.73 (68.46-75.01)
2021	128	64.50 (60.66-68.33)	70.94 (67.48-74.39)	67.46 (63.13-71.78)
2022	167	66.50 (63.36-69.65)	69.71 (66.45-72.98)	74.21 (71.24-77.17)
2023	226	67.81 (64.99-70.63)	72.22 (69.52-74.92)	72.08 (69.52-74.65)
Total	935	66.21 (64.87-67.55)	71.16 (69.87-72.44)	71.11 (69.77-72.44)

CI: confidence interval

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 (95% CI) pre-operative, 6 months and 12 months postoperative KOOS-PS scores of patients who underwent a knee revision in the Netherlands in 2014-2023



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KOOS-PS score		Pre-operative	6 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	269	54.30 (52.31-56.28)	35.88 (34.13-37.64)	35.39 (33.21-37.58)
2020	145	53.35 (50.82-55.88)	35.18 (32.71-37.65)	34.08 (31.54-36.61)
2021	128	52.94 (50.14-55.74)	34.35 (31.50-37.19)	33.71 (30.86-36.55)
2022	167	54.07 (51.73-56.42)	35.50 (33.19-37.81)	35.18 (32.69-37.67)
2023	226	50.35 (48.39-52.31)	33.37 (31.21-35.54)	33.19 (30.93-35.44)
Total	935	53.02 (52.00-54.03)	34.91 (33.92-35.90)	34.40 (33.31-35.48)

CI: confidence interval

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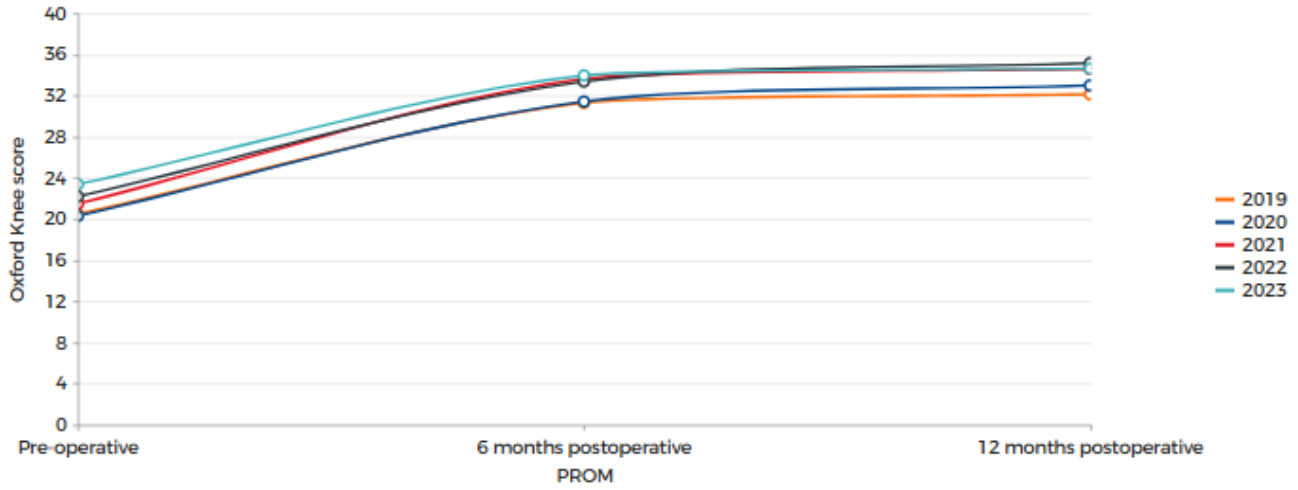
The KOOS-PS score measures the physical functioning of patients with osteoarthritis to the hip. The score has a range of 0.0 to 100.0, with 0.0 representing no effort and 100.0 the most possible effort.

Oxford Knee Score

FIGURE Mean (95% CI) pre-operative, 6 months and 12 months postoperative Oxford Knee scores of patients who underwent a knee revision in the Netherlands in 2014-2023



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Oxford Knee score		Pre-operative	6 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	269	20.49 (19.57-21.42)	31.29 (30.20-32.38)	32.12 (30.93-33.32)
2020	145	20.30 (19.04-21.57)	31.42 (29.83-33.01)	32.98 (31.33-34.64)
2021	128	21.48 (20.04-22.92)	33.63 (32.01-35.26)	34.59 (32.93-36.26)
2022	167	22.20 (21.02-23.37)	33.37 (31.97-34.77)	35.16 (33.85-36.46)
2023	226	23.37 (22.35-24.39)	33.97 (32.65-35.28)	34.63 (33.31-35.94)
Total	935	21.60 (21.09-22.11)	32.64 (32.03-33.25)	33.74 (33.11-34.37)

CI: confidence interval

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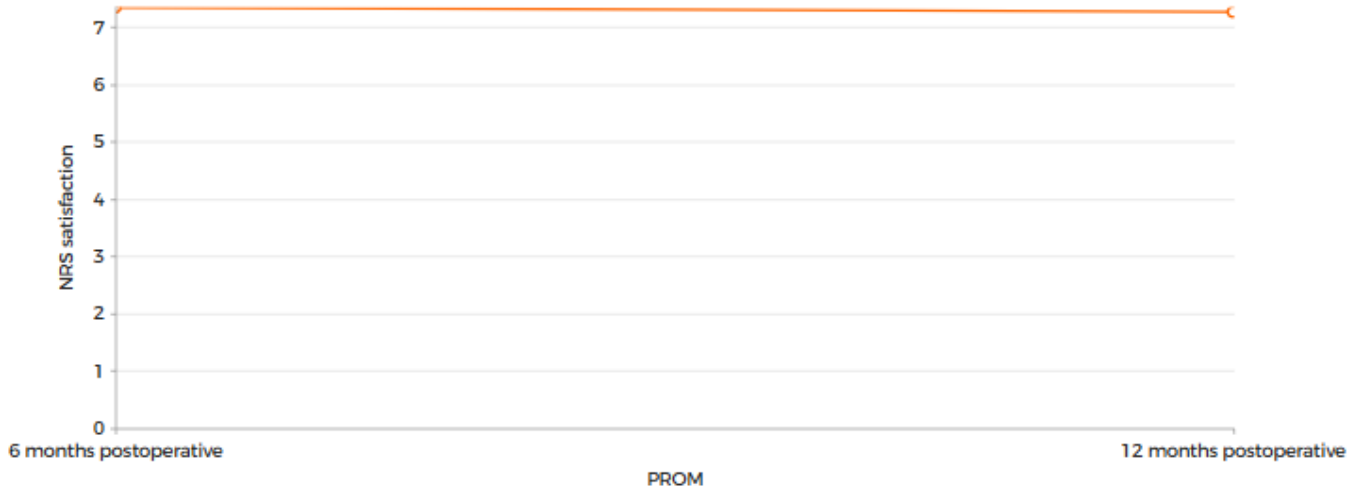
The Oxford Knee score measures the physical functioning and pain of patients with osteoarthritis to the knee. The score has a range of 0.0 to 48.0, with 0.0 representing no functional ability and 48.0 the most functional ability.

NRS (satisfaction)

FIGURE Mean (95% CI) 6 months and 12 months postoperative NRS (satisfaction) scores of patients who underwent a knee revision in the Netherlands in 2014-2023



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NRS satisfaction		6 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)
2019	269	7.16 (6.89-7.43)	7.16 (6.86-7.45)
2020	145	7.02 (6.66-7.39)	7.02 (6.60-7.43)
2021	128	7.35 (6.98-7.72)	6.92 (6.47-7.38)
2022	167	7.04 (6.67-7.40)	7.27 (6.93-7.61)
2023	226	6.99 (6.65-7.32)	7.15 (6.82-7.48)
Total	42,942	7.97 (7.95-7.99)	8.07 (8.05-8.09)

CI: confidence interval.

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The NRS (satisfaction) score measures patients' satisfaction with the outcome of after joint replacement. The score has a range of 0.0 to 10.0, with 0.0 representing very unsatisfied and 10.0 representing very satisfied.

Ankle arthroplasty

Numbers

Registered procedures

TABLE Number of registered ankle arthroplasties per year of surgery (2014-2024) in the LROI in April 2025

Year of surgery	Total ankle arthroplasty	Other	Unknown/ missing	Revision arthroplasty	Total
2014	102	0	1	16	**119**
2015	105	0	0	19	**124**
2016	125	6	1	37	**169**
2017	111	3	1	31	**146**
2018	143	1	1	29	**174**
2019	134	2	1	30	**167**
2020	122	0	1	26	**149**
2021	125	0	0	26	**151**
2022	115	1	0	22	**138**
2023	167	1	0	24	**192**
2024	192	0	0	35	**227**
Total (n)	**1,441**	**14**	**6**	**295**	**1,756**

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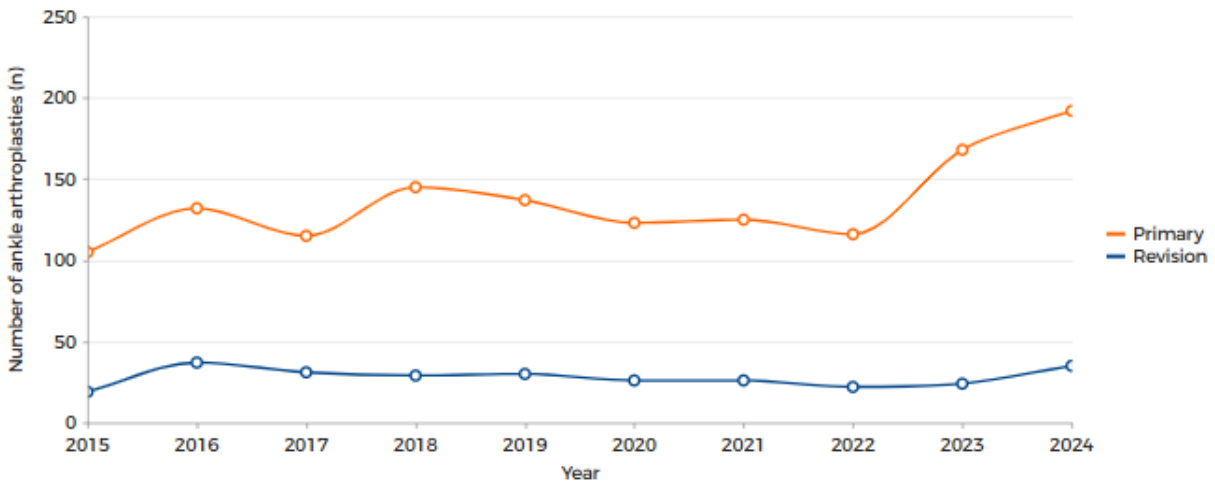
Type of procedures

FIGURE Number of primary ankle arthroplasties and ankle revision arthroplasties registered in the LROI in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Primary	105	132	115	145	137	123	125	116	168	192	**1,358**
Revision	19	37	31	29	30	26	26	22	24	35	**279**
Total (n)	**124**	**169**	**146**	**174**	**167**	**149**	**151**	**138**	**192**	**227**	**1,637**

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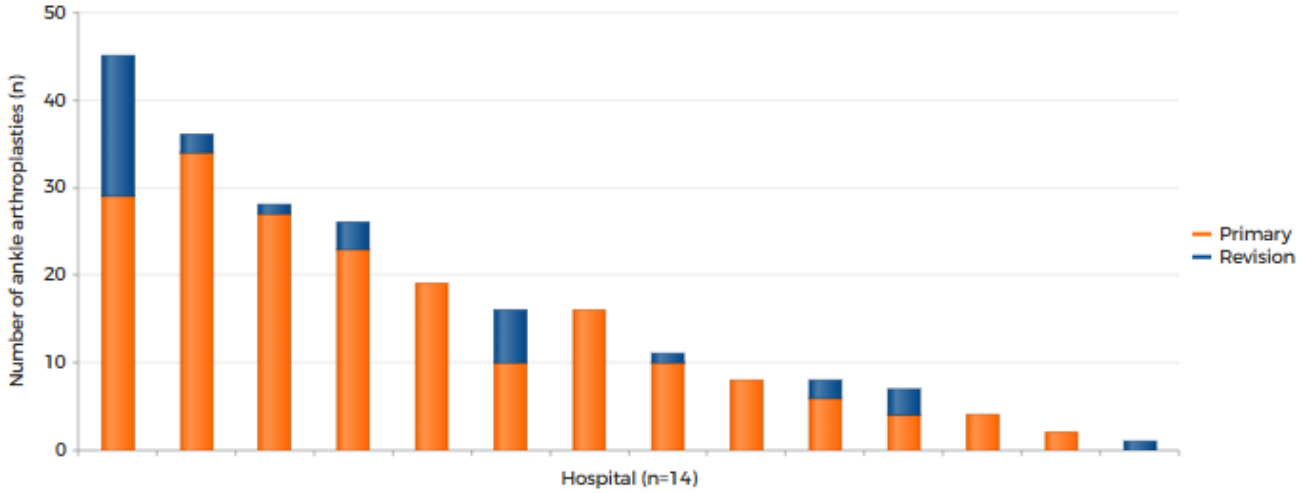
Type of procedure per hospital

FIGURE Number of primary ankle arthroplasties and ankle revision arthroplasties per hospital in the Netherlands in 2024 (n=227)



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Primary ankle arthroplasty

In this section you will find all the information on primary ankle arthroplasty

Patient characteristics

By diagnosis

TABLE Patient characteristics of all patients with a registered primary ankle arthroplasty by diagnosis in the Netherlands in 2024

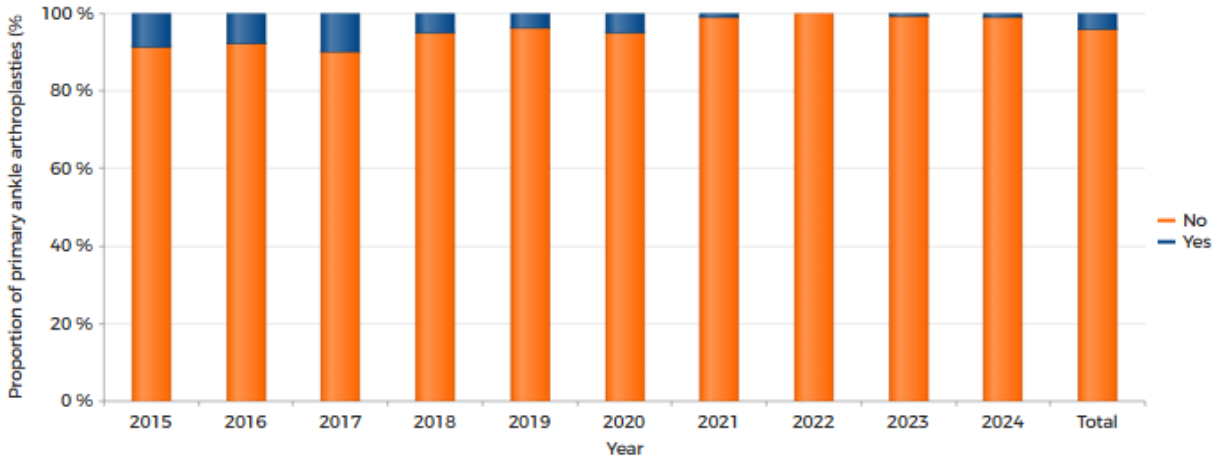
	Osteoarthritis	No osteoarthritis	Total
N(%)	**166 (86.4)**	**26 (13.6)**	**192**
Mean age (years) (SD)	70.8 (7)	67.7 (10.2)	70.4 (7.6)
Age (years) (%)			
<50	0	8	1
50-59	7	12	7
60-69	33	35	33
70-79	48	35	46
>80	13	12	13
Gender (%)			
Men	67	65	67
Women	33	35	33
ASA score (%)			
ASA I	12	4	11
ASA II	67	77	69
ASA III-IV	20	19	20
Type of hospital (%)			
General	57	85	60
UMC	6	0	5
Private	37	15	34
Charnley-score (%)			
A One ankle joint affected	69	85	71
B1 Both ankle joints affected	17	0	15
B2 Contralateral ankle joint with a total ankle prosthesis	6	0	5
C Multiple joints affected or chronic disease that affects quality of life	8	15	9
Mean BMI (kg/m2) (SD)	27.5 (4.2)	28.5 (4.5)	27.6 (4.2)
Body Mass Index (kg/m2) (%)			
Underweight (<=18.5)	1	0	1
Normal weight (>18.5-25)	32	35	33
Overweight (>25-30)	39	31	38
Obesity (>30-40)	27	35	28
Morbid obesity (>40)	1	0	1
Smoking (%)			
No	92	88	94
Yes	5	12	6

No osteoarthritis: another diagnosis than osteoarthritis registered as primary diagnosis, specifically post-traumatic (n=19) and rheumatoid arthritis (n=7).
General: general hospital; UMC: university medical centre; Private: private hospital; SD: standard deviation

Procedure characteristics

Medial malleolus osteotomy

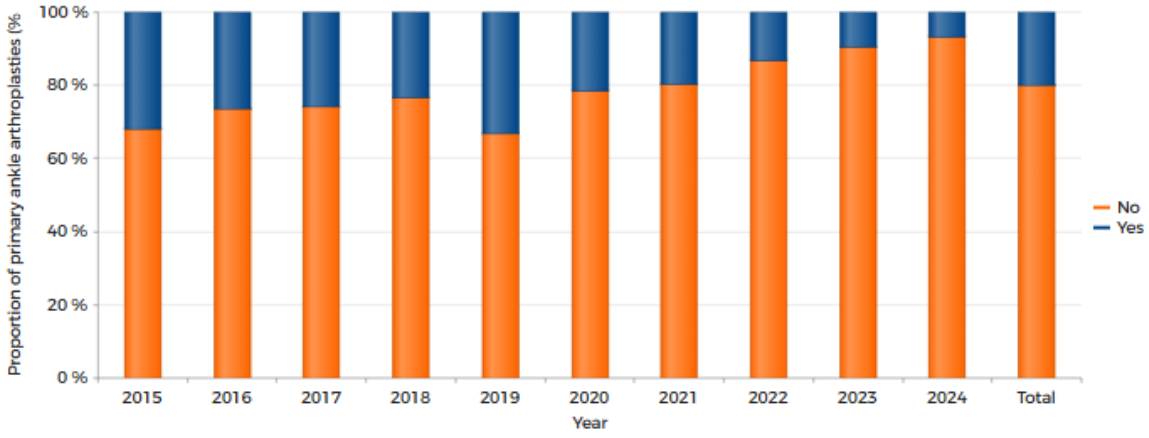
FIGURE Trend (proportion [%] per year) in medial malleolus osteostomy in primary ankle arthroplasty in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
No	91.26	92.31	90.18	95.07	96.32	95.04	99.19	100	99.40	98.95	96.11
Yes	8.74	7.69	9.82	4.93	3.68	4.96	0.81	0	0.60	1.05	3.89
Total (n)	**103**	**130**	**112**	**142**	**136**	**121**	**124**	**112**	**168**	**190**	**1,338**

Extension heel cord

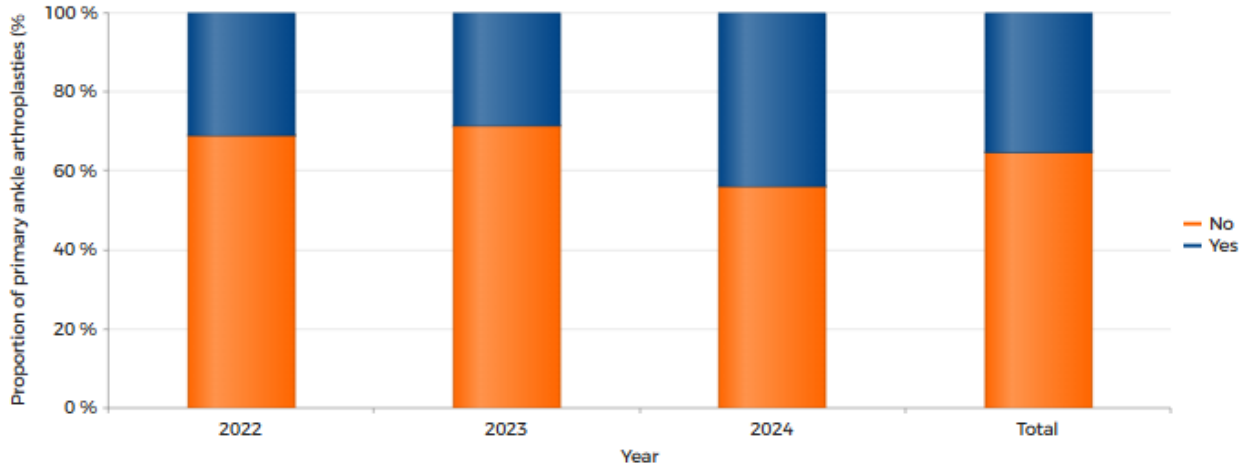
FIGURE Trend (proportion [%] per year) in heel cord extension in primary ankle arthroplasty in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
No	67.96	73.64	74.11	76.76	66.91	78.51	80.49	86.84	90.48	93.12	79.96
Yes	32.04	26.36	25.89	23.24	33.09	21.49	19.51	13.16	9.52	6.88	20.04
Total (n)	**103**	**129**	**112**	**142**	**136**	**121**	**123**	**114**	**168**	**189**	**1,337**

PSI

FIGURE Trend (proportion [%] per year) in PSI in primary ankle arthroplasty in the Netherlands in 2022-2024

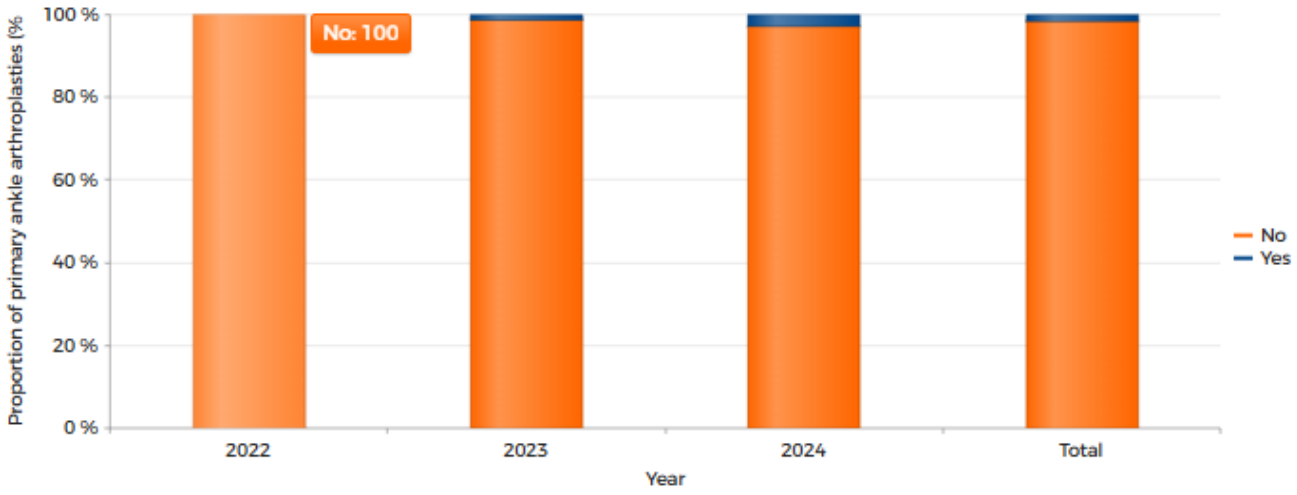


	2022	2023	2024	Total
No	68.87	71.43	56.25	64.59
Yes	31.13	28.57	43.75	35.41
Total (n)	**106**	**168**	**192**	**466**

PSI: patient-specific instrumentation

Navigation

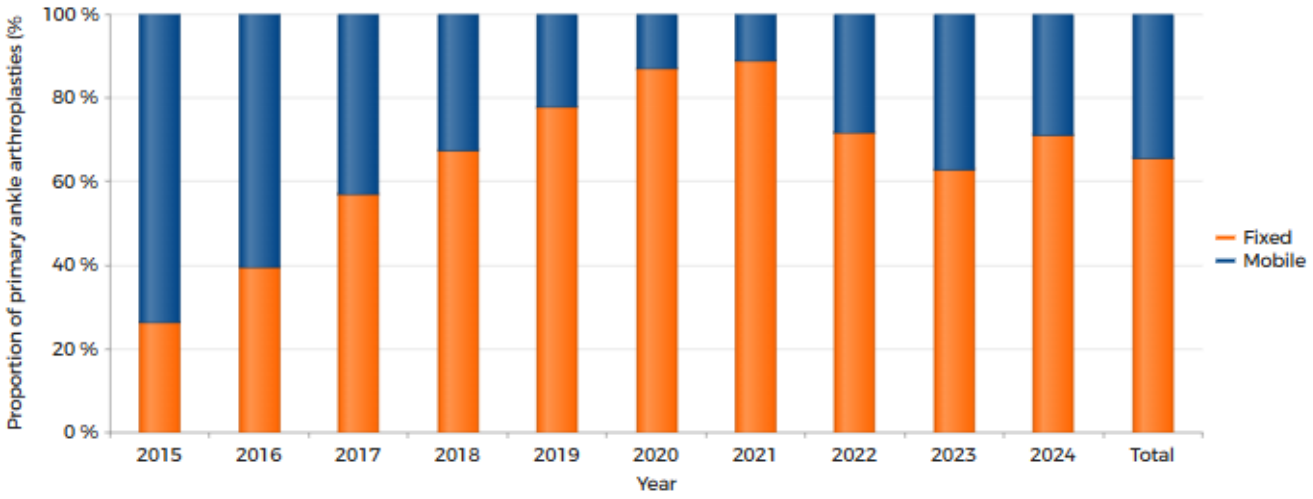
FIGURE Trend (proportion [%] per year) in navigation in primary ankle arthroplasty in the Netherlands in 2022-2024



	2022	2023	2024	Total
No	100	98.80	97.38	98.49
Yes	0	1.20	2.62	1.51
Total (n)	**106**	**167**	**191**	**464**

Type bearing

FIGURE Trend (proportion [%] per year) in tibial bearing type in primary ankle arthroplasty in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Fixed	26.32	39.56	57.14	67.54	77.78	87.23	88.89	71.72	62.73	71.20	65.63
Mobile	73.68	60.44	42.86	32.46	22.22	12.77	11.11	28.28	37.27	28.80	34.38
Total (n)	**95**	**91**	**84**	**114**	**108**	**94**	**90**	**99**	**161**	**184**	**1,120**

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Most frequently registered- ankle prostheses

TABLE The most frequently registered primary ankle arthroplasties in the Netherlands in 2020-2024

Year	2020	2021	2022	2023	2024
Total ankle arthroplasties (n)	**116**	**115**	**110**	**161**	**179**
Name; Proportion (%)					
Infinity	36.21	33.91	54.55	60.25	66.48
Hintegra Regular	0.00	0.00	0.00	16.15	20.11
Salto	51.72	59.13	39.09	19.25	6.70
Inbone	1.72	1.74	0.00	1.86	3.35
Taric	0.00	0.00	0.00	2.48	2.23
Quantum	0.00	0.00	0.00	0.00	1.12

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Survival

Short term revision

Revision within 1 year

TABLE Revision procedures within 1 year after primary ankle arthroplasty by year in the Netherlands in 2014-2023

Procedure year	Number of primary ankle arthroplasties	Number of revisions	Percentage revisions
2014	103	0	0.0%
2015	105	3	2.9%
2016	131	0	0.0%
2017	115	0	0.0%
2018	145	2	1.4%
2019	137	1	0.7%
2020	123	1	0.8%
2021	125	2	1.6%
2022	116	2	1.7%
2023	168	3	1.8%

Time after primary ankle

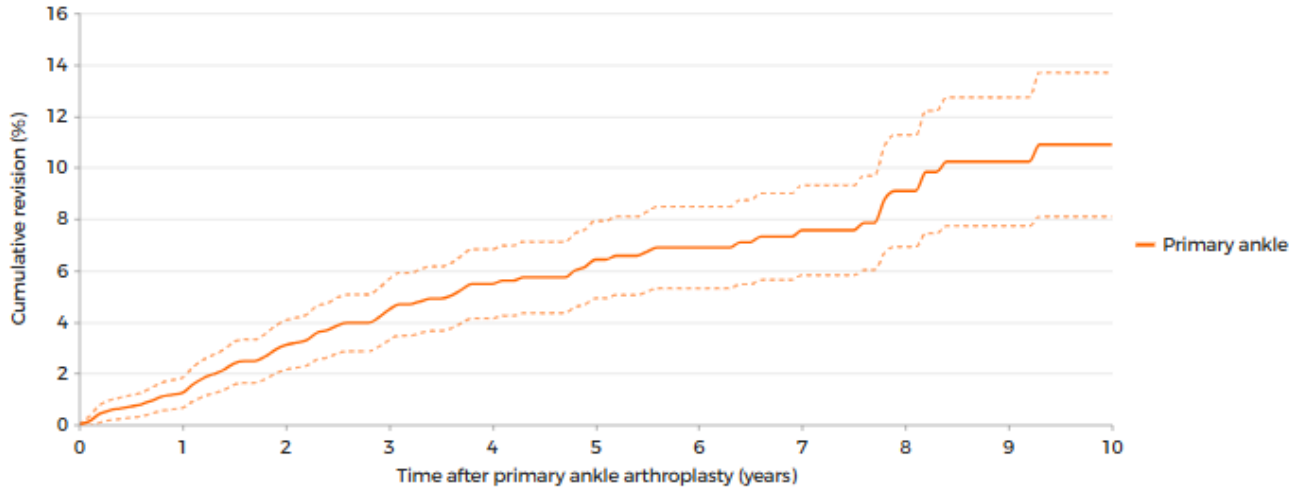
TABLE Time after primary ankle arthroplasty until short-term revision in the Netherlands in 2014-2021 (n=984)

Time after primary ankle	Percentage revisions (%)
Day 0-29	0.10
Day 30-182	0.20
Day 183-364	0.61
Day 365-730 (second year)	2.03
Day 731-1095 (third year)	1.22

Long term revision

Overall revision

FIGURE Cumulative revision percentage (Kaplan-Meier; 95% CI) of primary ankle arthroplasties in the Netherlands in 2014-2024 (n=1,460)



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	1yr	3yr	5yr	7yr	10yr
Primary ankle	1.16 (0.59-1.73)	4.16 (3.02-5.30)	6.13 (4.68-7.59)	7.31 (5.63-8.99)	10.89 (8.09-13.69)

Please note: Dotted lines represent the upper and lower limits of the 95% confidence interval.
Please note: The number of registered ankle revision arthroplasties is not complete.
CI: confidance interval.

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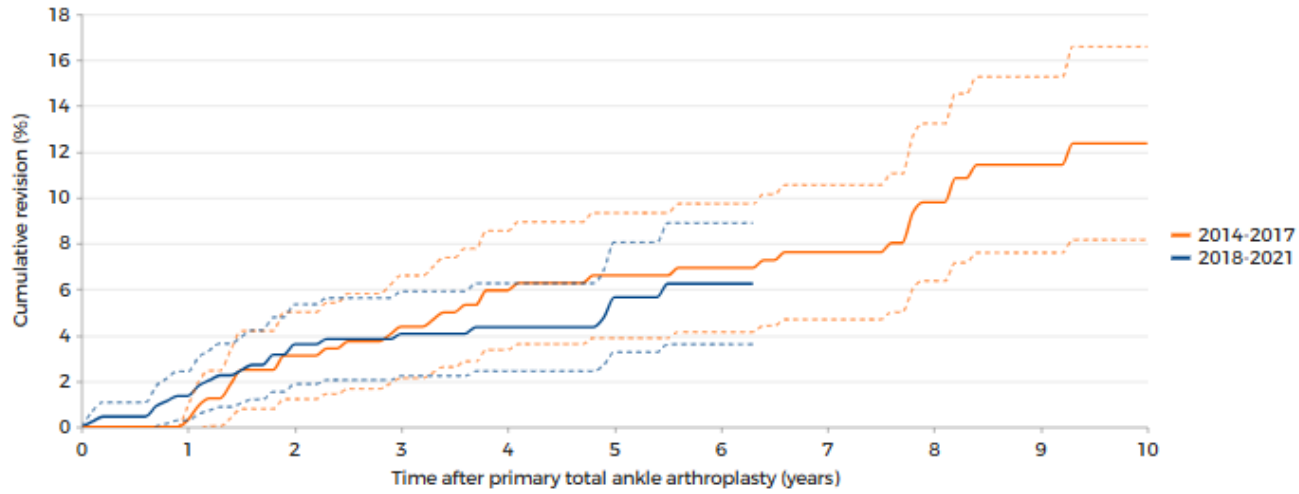
In 2014-2024, 93 (6.4%) primary ankle arthroplasties were implanted in patients who died within ten years after the primary procedure.

By procedure year

FIGURE Cumulative revision percentage (Kaplan-Meier; 95% CI) of primary total ankle arthroplasties for osteoarthritis by procedure year of primary arthroplasty in the Netherlands in 2014-2024



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	Number (n)	1yr	3yr	5yr	7yr	10yr
2014-2017	323	0.00 (0.00-0.00)	4.05 (1.89-6.21)	6.60 (3.87-9.33)	7.62 (4.69-10.55)	12.37 (8.16-16.58)
2018-2021	445	1.35 (0.28-2.42)	3.84 (2.05-5.63)	4.77 (2.69-6.84)	n.a.	n.a.

Please note: Dotted lines represent the upper and lower limits of the 95% confidence intervall; n.a. if <50 cases were at risk.
CI: confidence interval.

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Ankle revision arthroplasty

In this section you will find all the information on ankle revision arthroplasty

Revision characteristics

Reasons for revision

TABLE Trend (proportion [%] per year) in reasons for revision in patients who underwent a ankle revision arthroplasty in the Netherlands in 2016-2024

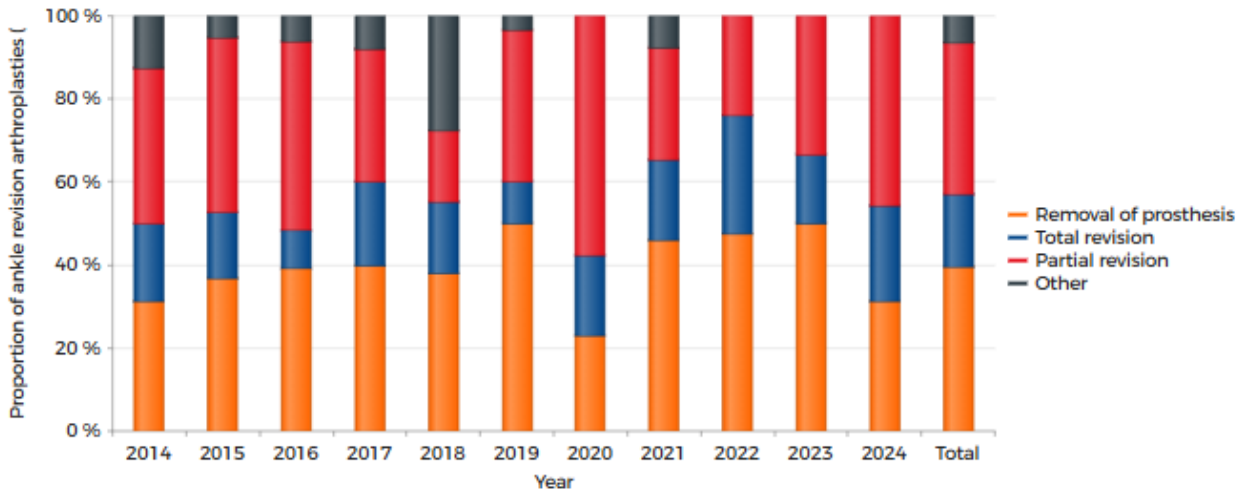
Year	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Ankle revision arthroplasty (n)	**37**	**31**	**29**	**30**	**26**	**26**	**22**	**24**	**35**	**260**
Reasons for revision; Proportion (%)										
Cyst formation	21.62	41.94	41.38	53.33	23.08	53.85	31.82	45.83	40.00	38.85
Inlay wear	35.14	45.16	31.03	40.00	30.77	30.77	22.73	37.50	37.14	35.00
Loosening of talus component	29.73	38.71	37.93	40.00	11.54	30.77	31.82	33.33	40.00	33.08
Loosening of tibia component	18.92	22.58	34.48	26.67	19.23	23.08	36.36	29.17	28.57	26.15
Malalignment	8.11	29.03	24.14	26.67	11.54	15.38	22.73	29.17	14.29	19.62
Instability	8.11	25.81	20.69	26.67	19.23	7.69	4.55	16.67	14.29	16.15
Infection	13.51	3.23	24.14	10.00	11.54	15.38	4.55	12.50	25.71	13.85
Peri-articular arthrofibrosis	5.41	9.68	3.45	6.67	23.08	26.92	4.55	12.50	0.00	9.62
Dislocation	5.41	9.68	6.90	10.00	7.69	3.85	0.00	0.00	0.00	
Peri-prosthetic fracture	0.00	3.23	3.45	3.33	7.69	0.00	4.55	0.00	14.29	4.23
Malposition	0.00	0.00	0.00	0.00	0.00	3.85	13.64	12.50	5.71	
Revision after ankle prosthesis removal	0.00	0.00	0.00	0.00	0.00	7.69	0.00	4.17	2.86	
Other	5.41	0.00	10.34	10.00	15.38	3.85	13.64	4.17	2.86	6.92

Please note: As of 2022, the registration form has changed. Malposition and removal after ankle revision were not registered before 2022, while dislocation is no longer registered from 2022 onwards..

One patient may have more than one reason for revision. As such, the total proportion is over 100%.

Type of revision

FIGURE Trend (proportion [%] per year) in type of revision in ankle revision arthroplasties in the Netherlands in 2015-2024



	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Removal of prosthesis	31.25	36.84	39.39	40	37.93	50	23.08	46.15	47.62	50	31.43	39.44
Total revision	18.75	15.79	9.09	20	17.24	10	19.23	19.23	28.57	16.67	22.86	17.61
Partial revision	37.50	42.11	45.45	32	17.24	36.67	57.69	26.92	23.81	33.33	45.71	36.62
Other	12.50	5.26	6.06	8	27.59	3.33	0	7.69	0	0	0	6.34
Total (n)	**16**	**19**	**33**	**25**	**29**	**30**	**26**	**26**	**21**	**24**	**35**	**284**

Please note in 11 ankle revision arthroplasties, the type of revision was not registered.

Shoulder arthroplasty

In this section you will find all the information on shoulder arthroplasty

Numbers

Registered procedures

TABLE Number of registered shoulder arthroplasties per year of surgery (2014-2024) in the LROI in April 2025

Year of surgery	Reversed shoulder arthroplasty	Total anatomical shoulder arthroplasty	Hemi shoulder arthroplasty	Resurfacing shoulder arthroplasty	Other	Unknown/ missing	Revision arthroplasty	Total
2014	1,246	398	374	89	0	13	208	**2,328**
2015	1,578	501	354	70	0	7	272	**2,782**
2016	1,748	519	299	39	0	14	274	**2,893**
2017	1,991	562	304	38	0	10	346	**3,251**
2018	2,140	629	250	35	0	6	334	**3,394**
2019	2,430	600	211	22	0	3	353	**3,619**
2020	2,159	478	161	16	0	4	309	**3,127**
2021	2,451	586	168	10	0	37	329	**3,581**
2022	2,881	628	186	14	2	1	345	**4,057**
2023	3,293	680	158	13	3	3	472	**4,622**
2024	3,508	629	143	15	4	2	492	**4,793**
Total (n)	**25,425**	**6,210**	**2,608**	**361**	**9**	**100**	**3,734**	**38,447**

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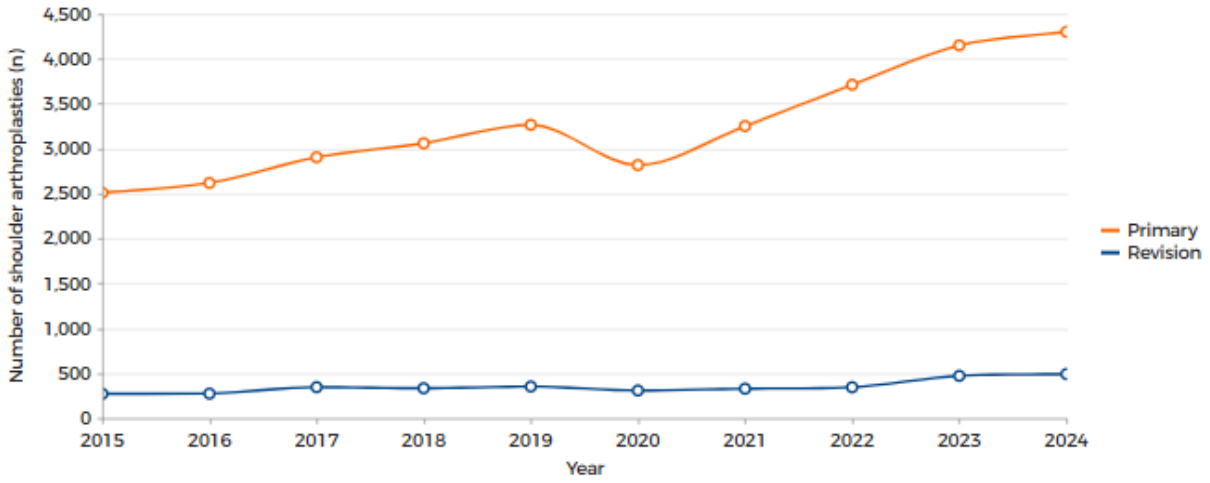
Type of procedures

FIGURE Number of primary shoulder arthroplasties and shoulder revision arthroplasties registered in the LROI in the Netherlands 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Primary	2,510	2,619	2,905	3,060	3,266	2,818	3,252	3,712	4,150	4,301	**32,593**
Revision	272	274	346	334	353	309	329	345	472	492	**3,526**
Total (n)	**2,782**	**2,893**	**3,251**	**3,394**	**3,619**	**3,127**	**3,581**	**4,057**	**4,622**	**4,793**	**36,119**

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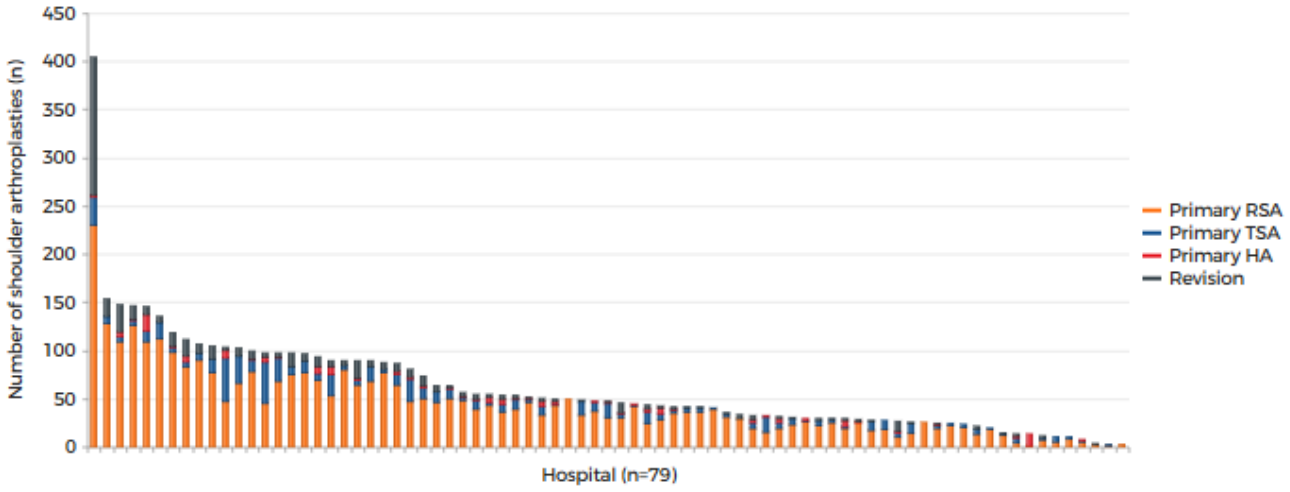
Type of procedure per hospital

FIGURE Number of primary shoulder arthroplasties and shoulder revision arthroplasties per hospital in the Netherlands in 2024 (n=4,772)



RSA: reversed shoulder arthroplasty; TSA: total anatomical shoulder arthroplasty; HA: hemiarthroplasty

Reversed total shoulder arthroplasty

Patient characteristics

by diagnosis

TABLE Patient characteristics of all patients with a registered primary reverse total shoulder arthroplasty by diagnosis in the Netherlands in 2024

	Osteoarthritis	Cuff arthropathy	Fracture	Late post-traumatic	Unrecoverable cuff rupture	Other	Total
N(%)	**1,233 (35.2)**	**803 (22.8)**	**699 (20)**	**335 (9.6)**	**218 (6.2)**	**220 (6.2)**	**3,508**
Mean age (years) (SD)	74.3 (7.6)	74 (7.3)	72.8 (8.6)	69.7 (10.3)	71.2 (7.4)	70 (10)	73.1 (8.3)
Age (years) (%)							
<50	0	0	0	4	0	2	1
50-59	3	2	6	12	7	11	5
60-69	21	23	25	27	32	29	24
70-79	52	53	48	41	49	45	50
>80	24	22	21	16	12	14	21
Gender (%)							
Men	26	35	21	21	43	21	27
Women	74	65	79	79	57	79	73
ASA score (%)							
ASA I	4	5	5	8	5	5	5
ASA II	54	53	49	49	57	56	53
ASA III-IV	42	42	45	42	39	39	42
Type of hospital (%)							
General	91	85	98	94	88	91	91
UMC	1	1	2	2	0	1	1
Private	8	14	0	4	12	7	8
Specialism (%)							
Orthopaedic surgeon	100	100	96	99	100	98	99
Trauma surgeon	0	0	4	1	0	2	1
Walch-score (%)							
A1	21	52	83	60	82	43	42
A2	36	28	7	22	11	31	30
B1	12	10	1	10	5	7	11
B2	16	6	1	4	1	6	10
B3	9	2	1	2	1	4	5
C	3	0	0	1	0	3	2
Mean BMI (kg/m2) (SD)	28.5 (5.4)	28 (4.8)	27.6 (5.7)	28 (5.5)	28.4 (5.1)	28 (5)	28.1 (5.3)
Body Mass Index (kg/m2) (%)							
Underweight (<=18.5)	1	1	2	1	0	1	1
Normal weight (>18.5-25)	26	30	33	31	27	26	29
Overweight (>25-30)	40	39	35	37	41	42	39
Obesity (>30-40)	30	28	24	28	27	25	28
Morbid obesity (>40)	2	2	3	2	3	3	2
Smoking (%)							
No	94	91	89	83	94	88	92
Yes	6	8	10	16	6	11	8

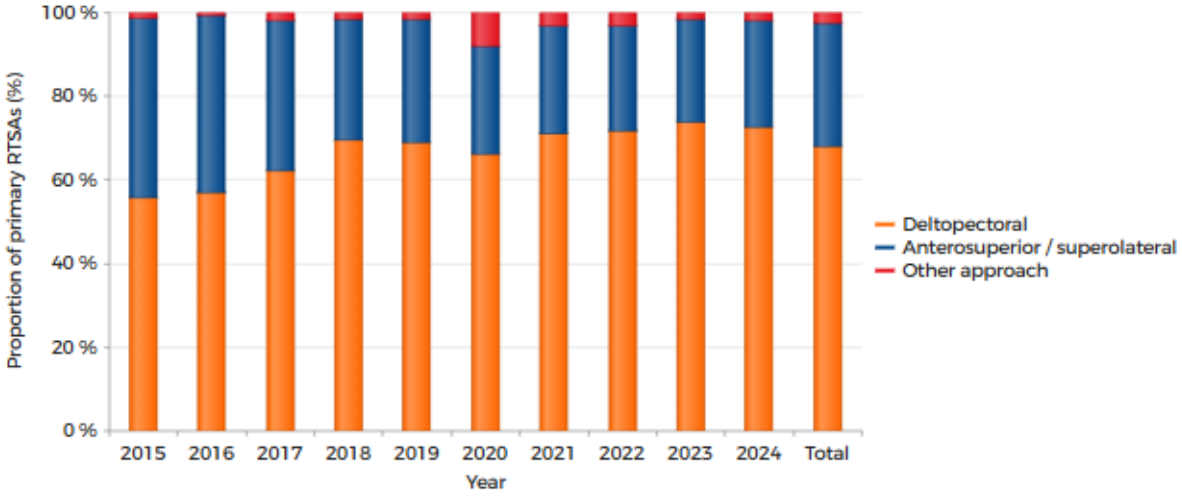
Please note: diagnosis 'Other' (220; 6.2%) includes other (81), reumatoid arthritis (39), osteonecrosis (29), chronic (sub)dislocation (27), inflammatory arthritis (5), tumour (7), and 32 primary reverse total shoulder arthroplasties where the diagnosis was not registered.

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

Procedure characteristics

Surgical approach

FIGURE Trend (proportion [%] per year) in surgical approach for performing a primary reverse total shoulder arthroplasty in the Netherlands in 2015-2024

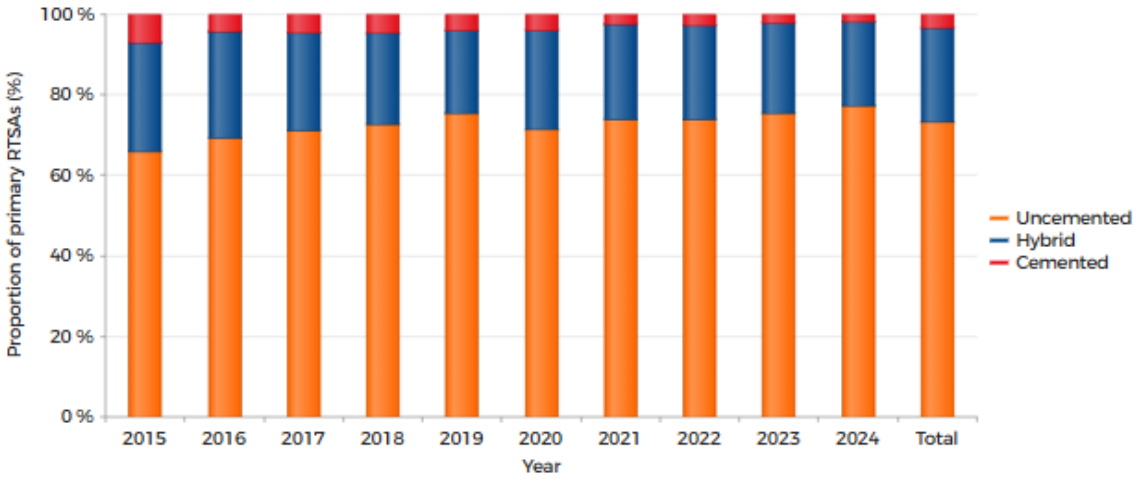


	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Deltopectoral	55.73	56.95	62.18	69.55	69.15	66.28	71.24	71.65	73.87	72.84	68.25
Anterosuperior / superolateral	43.18	42.36	36.06	28.77	29.28	25.62	25.74	25.22	24.72	25.32	29.32
Other approach	1.08	0.69	1.76	1.68	1.57	8.10	3.03	3.13	1.41	1.84	2.44
Total (n)	**1,570**	**1,747**	**1,991**	**2,138**	**2,425**	**2,147**	**2,444**	**2,843**	**3,253**	**3,361**	**23,919**

RTSA: reverse total shoulder arthroplasty

Fixation

FIGURE Trend (proportion [%] per year) in type of fixation in primary reverse total shoulder arthroplasties in the Netherlands in 2015-2024

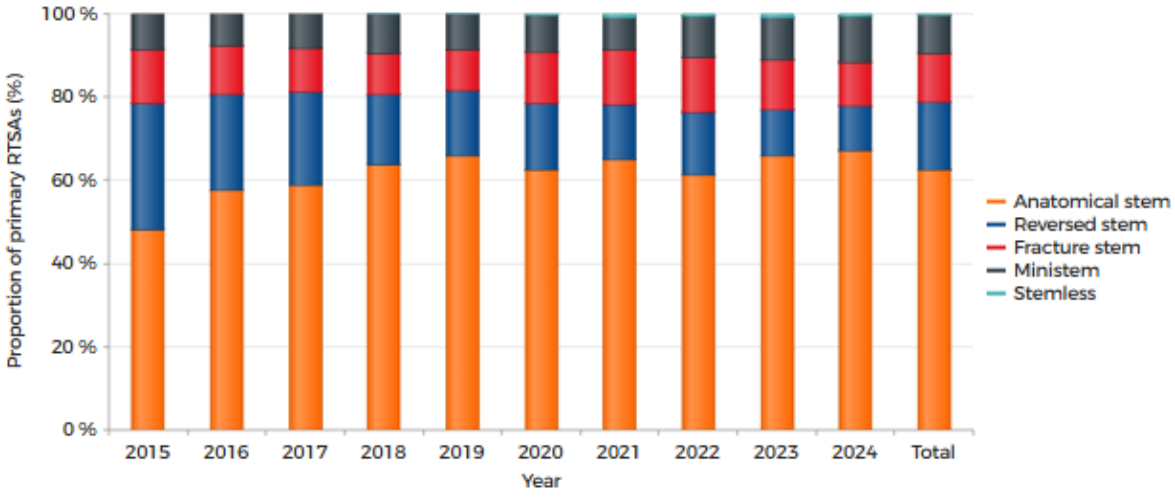


	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Uncemented	66.09	69.40	71.18	72.77	75.49	71.46	73.98	73.96	75.49	77.28	73.41
Hybrid	26.83	26.36	24.25	22.51	20.63	24.50	23.45	23.40	22.44	21.00	23.17
Cemented	7.07	4.24	4.58	4.73	3.87	4.04	2.57	2.64	2.07	1.71	3.42
Total (n)	**1,569**	**1,745**	**1,988**	**2,137**	**2,428**	**2,151**	**2,448**	**2,880**	**3,289**	**3,504**	**24,139**

RTSA: reverse total shoulder arthroplasty

Type humeral stem

FIGURE Trend (proportion [%] per year) in type of humeral stem in primary reverse total shoulder arthroplasties in the Netherlands in 2015-2024

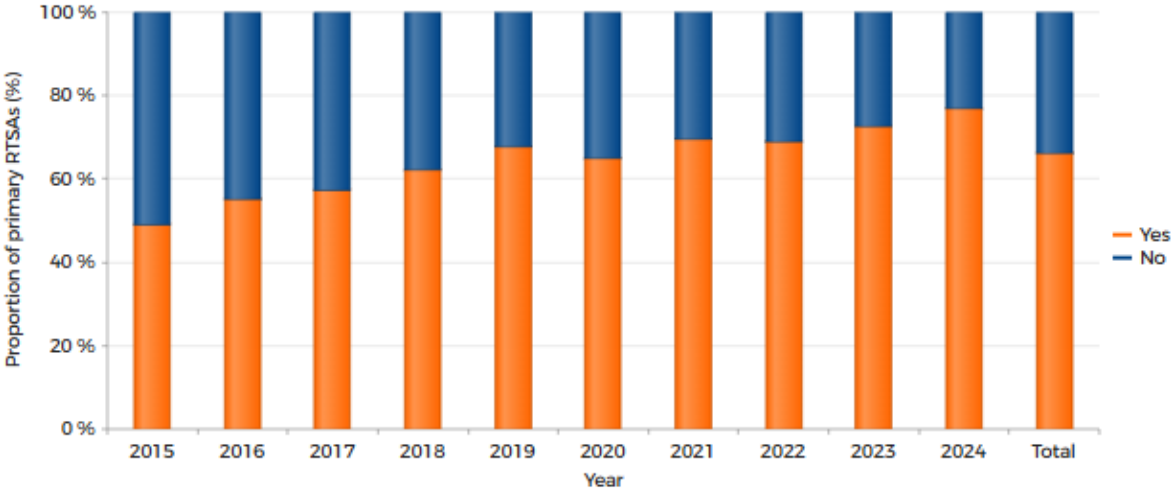


	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Anatomical stem	48.19	57.64	58.89	63.84	66.00	62.54	65.11	61.44	65.84	67.25	62.65
Reversed stem	30.44	23.14	22.46	16.73	15.60	15.91	13.18	15.03	11.18	10.62	16.19
Fracture stem	12.76	11.60	10.25	10.07	9.94	12.44	13.18	13.00	11.80	10.44	11.53
Ministem	8.61	7.61	8.40	9.31	8.42	8.91	7.75	9.92	10.37	11.12	9.27
Stemless	0	0	0	0.05	0.04	0.21	0.77	0.60	0.81	0.56	0.37
Total (n)	**1,544**	**1,655**	**1,834**	**1,966**	**2,244**	**1,930**	**2,336**	**2,661**	**3,077**	**3,371**	**22,618**

RTSA: reverse total shoulder arthroplasty

Modular humeral stem

FIGURE Trend (proportion [%] per year) in modular humeral stem in primary reverse total shoulder arthroplasties in the Netherlands in 2015-2024

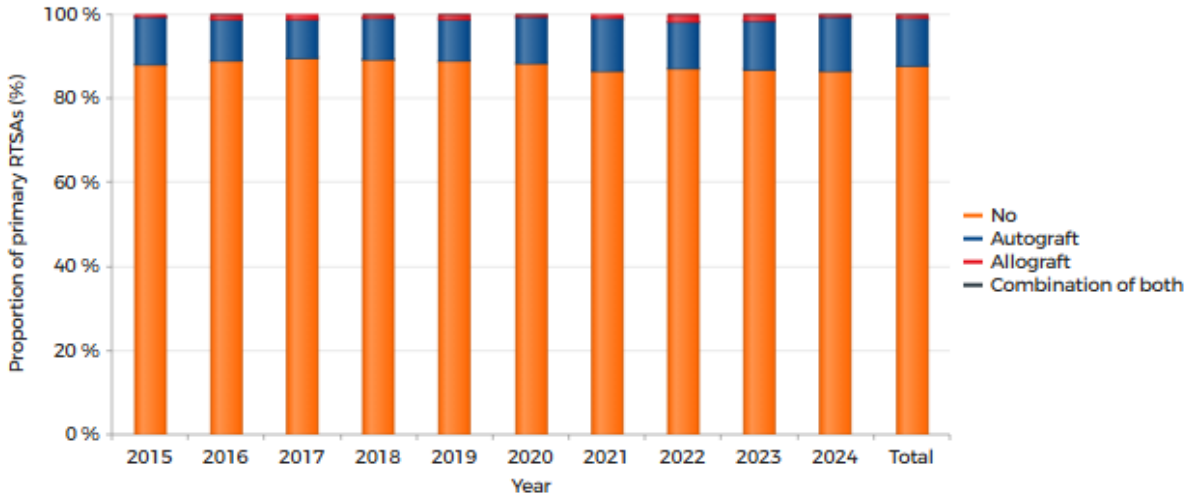


	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Yes	49.19	55.18	57.35	62.13	67.91	64.89	69.66	68.91	72.62	76.85	66.35
No	50.81	44.82	42.65	37.87	32.09	35.11	30.34	31.09	27.38	23.15	33.65
Total (n)	**1,541**	**1,660**	**1,836**	**1,967**	**2,244**	**1,931**	**2,340**	**2,663**	**3,079**	**3,369**	**22,630**

RTSA: reverse total shoulder arthroplasty

Bonegraft

FIGURE Trend (proportion [%] per year) in type of bonegraft in primary reverse total shoulder arthroplasties in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
No	88.10	88.88	89.66	89.32	88.82	88.21	86.37	87.21	86.94	86.64	87.82
Autograft	11.44	9.90	9.17	9.81	9.98	11.09	12.64	11.06	11.67	12.78	11.13
Allograft	0.46	1.11	1.17	0.82	1.07	0.65	0.99	1.62	1.32	0.55	1.00
Combination of both	0	0.12	0	0.05	0.13	0.05	0	0.11	0.06	0.03	0.05
Total (n)	**1,512**	**1,717**	**1,963**	**2,069**	**2,335**	**2,138**	**2,421**	**2,838**	**3,255**	**3,473**	**23,721**

RTSA: reverse total shoulder arthroplasty

Most frequently registered humeral stems, humeral liners, glenospheres, metaphyses and glenoid baseplates

TABLE The most frequently registered humeral stems, humeral liners, glenospheres, metaphyses and glenoid baseplates in primary reverse total shoulder arthroplasties in the Netherlands in 2020-2024

Year	2020	2021	2022	2023	2024
Humeral stem (n)	**1,931**	**2,340**	**2,663**	**3,080**	**3,372**
Name; Proportion (%)					
Delta X-tend	30.81	27.48	30.34	28.44	27.19
Aequalis Ascend Flex	14.09	16.07	13.63	17.21	18.95
Comprehensive Mini	8.91	7.74	9.91	10.36	11.12
SMR stem Cementless	3.73	4.66	3.27	5.55	7.38
Global Unite	3.42	4.27	5.56	5.81	6.58
Aequalis Reversed Fractuur	7.20	7.05	6.68	6.36	5.31
Univers Revers	2.28	1.62	2.33	2.50	4.03
Affinis Inverse	3.63	3.55	4.96	3.73	3.71
Equinoxe	3.94	4.53	5.26	5.26	3.50
Comprehensive Fracture	3.31	3.25	3.30	3.05	3.05
Year	**2020**	**2021**	**2022**	**2023**	**2024**
Humeral liner (n)	**1,900**	**2,274**	**2,549**	**2,940**	**3,234**
Name; Proportion (%)					
Delta X-tend	34.26	31.88	37.03	35.82	34.76
Aequalis Ascend Flex	15.37	20.23	15.69	19.69	21.34
Comprehensive	13.26	12.09	14.87	14.93	15.46
SMR reversed liner	4.00	5.32	3.22	5.41	8.10
Aequalis Reversed Fractuur	6.53	6.60	6.24	5.68	4.61
Univers Revers	2.16	1.63	2.31	2.65	4.21
Equinoxe	5.00	5.10	5.49	5.54	3.71
Affinis Inverse	3.26	3.30	4.98	3.47	3.49
Aequalis Reversed II	7.32	6.07	5.34	3.98	1.95
TM Reverse shoulder	3.05	2.11	2.47	0.99	1.05
Year	**2020**	**2021**	**2022**	**2023**	**2024**
Glenosphere (n)	**1,841**	**2,245**	**2,664**	**3,097**	**3,377**
Name; Proportion (%)					
Delta X-tend	28.73	27.71	35.36	33.58	33.05
Aequalis Reversed II	26.94	26.19	20.68	22.76	20.25
Comprehensive	13.53	12.43	14.68	13.92	14.72
Perform Reversed	5.11	9.58	7.06	8.49	10.16
SMR reversed head	4.40	5.61	4.32	6.62	9.09
Univers Revers	2.34	1.69	2.21	2.45	3.79
Equinoxe	5.38	5.17	5.26	5.30	3.46
Affinis Inverse Vitamys	2.39	1.78	3.72	1.81	2.75
TM Reverse Glenoid Heads	8.37	6.77	3.68	1.81	1.36
Affinis Inverse	2.12	2.49	2.70	3.04	1.21

Year	2020	2021	2022	2023	2024
Metaphysis (n)	**1,487**	**1,782**	**2,049**	**2,419**	**2,758**
Name; Proportion (%)					
Delta X-tend	29.32	28.28	34.50	31.71	30.42
Aequalis Ascend Flex	19.10	24.35	18.25	23.11	26.36
Comprehensive	16.27	14.42	17.96	17.40	16.97
SMR reversed body	5.72	6.68	4.25	6.95	8.96
Global Unite Fracture	3.16	3.93	4.88	4.09	4.71
Univers Revers	2.69	1.52	2.44	3.14	4.57
Equinoxe	6.86	6.51	6.78	6.74	4.28
Aequalis Reversed II	9.15	7.58	6.78	4.75	2.21
Affinis Fracture Inverse	1.34	0.45	1.76	0.87	0.87
Anatomical inverse Humeral Cups	6.32	6.17	2.05	1.07	0.47
Year	**2020**	**2021**	**2022**	**2023**	**2024**
Glenoid baseplate (n)	**1,934**	**2,258**	**2,599**	**2,971**	**3,319**
Name; Proportion (%)					
Delta X-tend	33.61	29.76	36.44	34.87	33.75
Aequalis Reversed II	25.59	26.13	21.59	24.07	20.70
Comprehensive	12.72	12.36	15.12	14.74	15.06
Perform Reversed	4.65	9.39	7.23	7.91	10.09
SMR uncemented glenoid	4.08	5.36	3.12	5.02	7.98
Equinoxe	3.93	4.87	5.16	5.35	3.56
Universal Glenoid	2.28	1.68	2.08	0.98	2.08
Affinis Fracture Inverse	0.00	0.58	2.73	1.41	2.05
Univers Revers	0.00	0.00	0.15	1.58	1.87
Trabecular Metal Baseplate	8.01	6.64	3.89	1.88	1.42

Most frequently registered 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 2020-2024

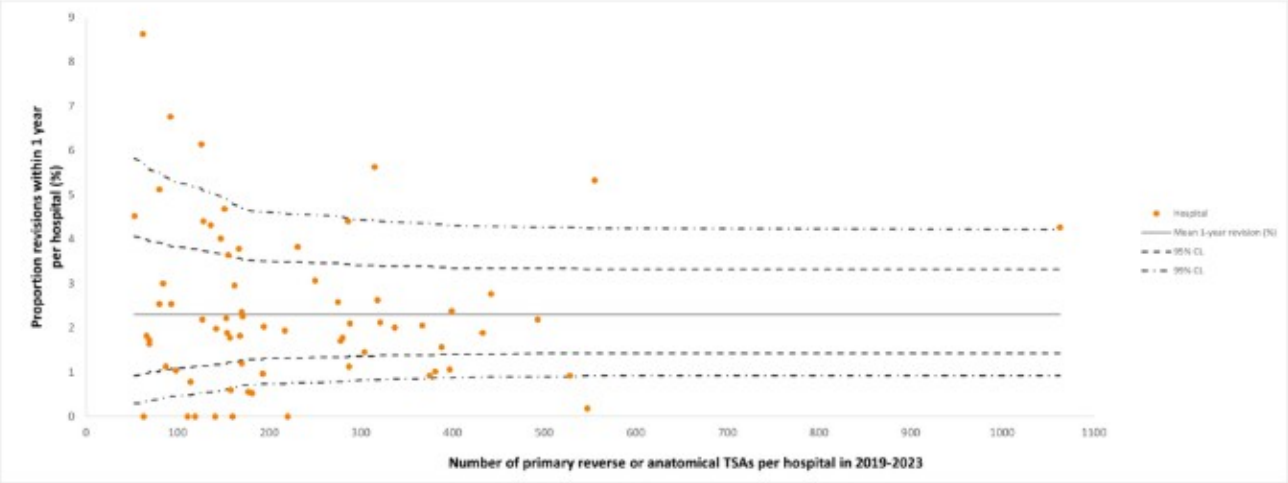
Year	2020	2021	2022	2023	2024
Bone cement pre-packed in a vacuum mixing system (n)	**307**	**385**	**427**	**420**	**409**
Cement name; Proportion (%)					
Palacos R+G	57.33	58.96	48.01	68.57	63.33
Refobacin Bone Cement R	31.92	34.29	45.67	29.29	36.19
Refobacin Plus Bone Cement	10.75	6.75	6.32	2.14	0.49
Year	**2020**	**2021**	**2022**	**2023**	**2024**
Separately packed bone cement components (n)	**218**	**183**	**242**	**250**	**248**
Cement name; Proportion (%)					
Palacos R+G	59.17	80.87	69.01	62.80	56.45
Copal G+C	3.21	2.73	12.81	16.80	18.95
Palacos MV+G	7.80	4.37	5.79	8.00	10.48
Refobacin Bone Cement R	14.68	3.28	3.31	9.20	7.66
Simplex ABC EC	5.05	0.55	0.00	1.20	2.82
Palacos LV+G	2.75	4.92	4.13	0.80	1.21
Biomet Bone Cement R	0.92	2.19	2.48	0.40	1.21
Biomet Plus Bone Cement	1.38	0.00	0.00	0.00	0.40
Copal G+V	0.00	0.00	0.41	0.40	0.40
Refobacin Revision	0.00	0.55	0.41	0.40	0.40

Survival

Short term revision

Overall revision per hospital

Funnel plot of proportion of shoulder revision arthroplasties within one year after a total (reverse or anatomical) shoulder arthroplasty per hospital in the Netherlands in 2019-2023 (n=16,133)



Please note: The proportions of revisions within 1 year per hospital were adjusted for casemix factor diagnosis (fracture versus other).
TSA: total shoulder arthroplasty; CL: control limits.

The mean 1-year revision percentage is 2.31 in the Netherlands in 2019-2023.
Control limits indicate the plausible range of outcome if all hospitals perform equally well.

By type of revision within 1 year

TABLE Cumulative 1-year revision percentage of primary reverse total shoulder arthroplasties by type of revision in the Netherlands in 2019-2023 (n=13,169)

	Cumulative 1-year revision percentage - Kaplan Meier (95% CI)
Any type of revision	2.47 (2.20-2.73)
Major revision	1.05 (0.87-1.22)
Only humeral stem	0.21 (0.13-0.28)
Only glenoid baseplate	0.39 (0.28-0.50)
Humeral stem and glenoid baseplate	0.31 (0.22-0.41)
Minor revision	1.38 (1.18-1.58)
DAIR	0.39 (0.28-0.50)
No DAIR	0.99 (0.82-1.16)

Any type of revision includes minor and major revisions as well as revision procedures that could not be classified as minor or major revision.
Major revision: Revision of at least the humeral stem or glenoid baseplate component.
Minor revision: Only liner and/or metaphysis exchange (including DAIR procedures).
CI: confidence interval.

In 2019-2023, 242 (1.8%) primary reverse total shoulder arthroplasties were implanted in patients who died within one year after the primary procedure.

Time after primary reversed TSA

TABLE Time after primary reverse total shoulder arthroplasty until short-term revision in the Netherlands in 2016-2021 (n=11,134)

Time after primary reverse TSA	Percentage revisions (%)
Day 0-29	0.57
Day 30-182	1.39
Day 183-364	0.62
Day 365-730 (second year)	0.94
Day 731-1095 (third year)	0.56

TSA: total shoulder arthroplasty

Reasons for revision

TABLE Reasons for revision within one year in patients that underwent a shoulder revision arthroplasty after a primary reverse total shoulder arthroplasty in the Netherlands in 2019-2023 (n=582)

Reasons for revision	Proportion (%)
Instability	42.23
Infection	29.91
Loosening of glenoid component	12.02
Malalignment	7.62
Peri-prosthetic fracture	6.45
Loosening of humeral component	4.99
Progression of osteoarthritis	0.59
Cuff arthropathy	n.a.
Cuff rupture	n.a.
Other	11.73

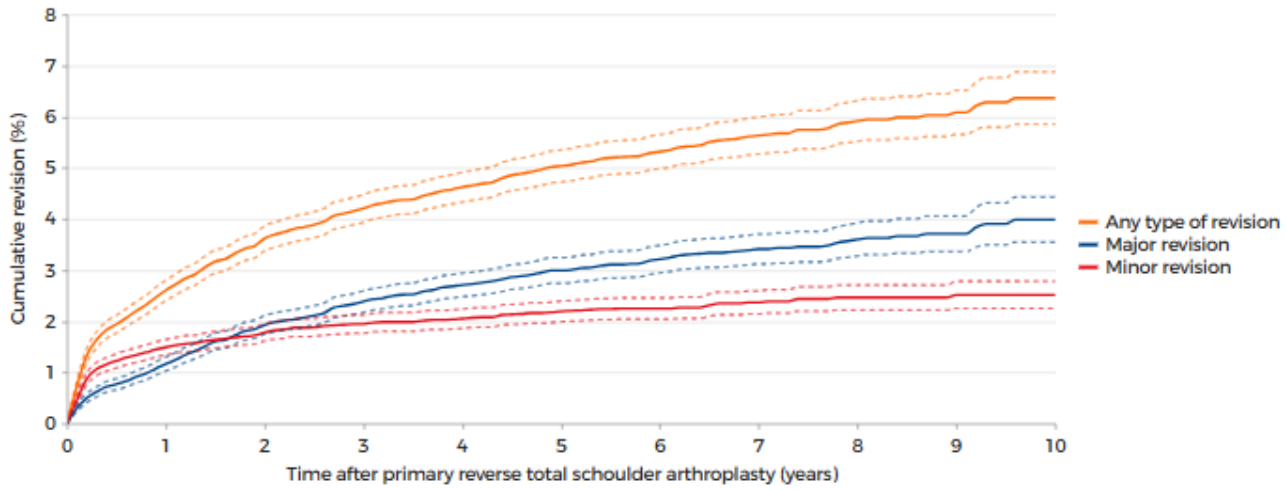
Please note: After a reverse total shoulder arthroplasty, the rotater cuff is no longer present.

Please note: One patient may have more than one reason of revision.

Long term revision

By type of revision

FIGURE Cumulative revision percentage (Kaplan-Meier; 95% CI) of primary reverse total shoulder arthroplasties by type of revision in the Netherlands in 2014-2024 (n=25,340)



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	1yr	3yr	5yr	7yr	10yr
Any type of revision	2.47 (2.27-2.66)	4.16 (3.89-4.42)	5.02 (4.70-5.33)	5.61 (5.25-5.97)	6.37 (5.85-6.88)
Major revision	1.07 (0.94-1.20)	2.33 (2.13-2.54)	2.99 (2.74-3.24)	3.39 (3.10-3.68)	3.99 (3.55-4.43)
Minor revision	1.45 (1.30-1.60)	1.94 (1.76-2.12)	2.17 (1.97-2.37)	2.37 (2.14-2.59)	2.52 (2.25-2.78)

Please note: Dotted lines represent the upper and lower limits of the 95% confidence interval.
Any type of revision includes minor and major revisions as well as revision procedures that could not be classified as minor or major revision.
Major revision: Revision of at least the humeral stem or glenoid baseplate component.
Minor revision: Only liner and/or metaphysis exchange (including DAIR procedures).
RTSA: reverse total shoulder arthroplasty; CI: confidence interval.

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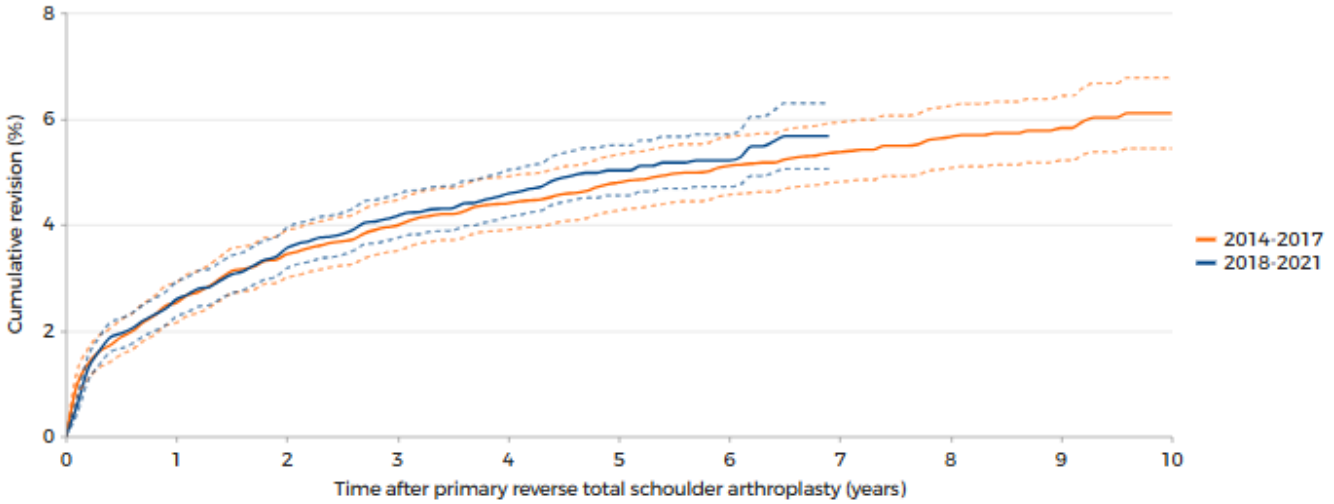
In 2007-2024, 3,772 (14.9%) primary RTSAs were implanted in patients who died within ten years after the primary diagnosis

By procedure year

FIGURE Cumulative revision percentage (Kaplan-Meier; 95% CI) of primary reverse total shoulder arthroplasties by procedure year of primary arthroplasty in the Netherlands (n=15,683)



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	Number (n)	1yr	3yr	5yr	7yr	10yr
2014-2017	6,536	2.46 (2.09-2.84)	3.95 (3.47-4.43)	4.76 (4.23-5.28)	5.35 (4.79-5.91)	6.10 (5.44-6.77)
2018-2021	9,147	2.41 (2.09-2.72)	4.10 (3.69-4.51)	5.02 (4.55-5.50)	5.67 (5.05-6.29)	n.a.

Please note: Dotted lines represent the upper and lower limits of the 95% confidence intervall; n.a. if <50 cases were at risk.
CI: confidence interval.

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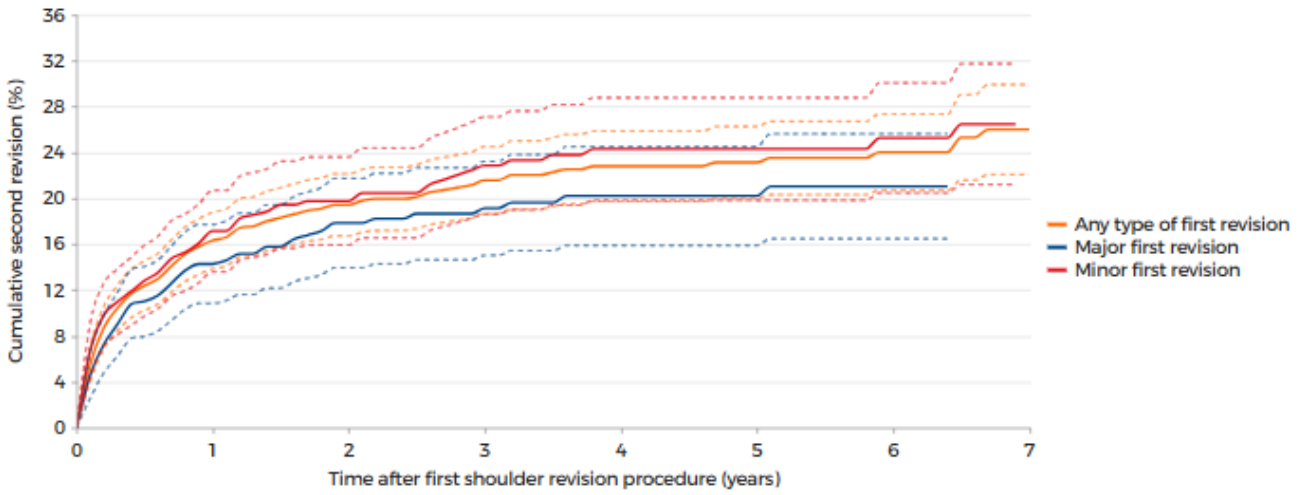
Re-revision

By type of first revision

FIGURE Cumulative second revision percentage (Kaplan-Meier; 95% CI) of reverse total shoulder arthroplasties after a one-stage first revision by type of first revision in the Netherlands in 2014-2024 (n=922)



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	Number (n)	1yr	3yr	5yr	7yr
Any type of first revision	922	15.79 (13.36-18.21)	21.15 (18.27-24.03)	23.14 (20.01-26.27)	26.01 (22.08-29.93)
Major first revision	427	14.28 (10.83-17.72)	18.66 (14.64-22.68)	20.20 (15.90-24.51)	n.a.
Minor first revision	466	16.08 (12.64-19.52)	22.44 (18.25-26.63)	24.31 (19.84-28.78)	26.48 (21.21-31.75)

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

One-stage revision: A single revision procedure to change (insertion, replacement and/or removal) one or more components of the prosthesis.

Major revision: Revision of at least the humeral stem or glenoid baseplate component.

Minor revision: Only liner and/or metaphysis exchange (including DAIR procedures).

CI: confidence interval.

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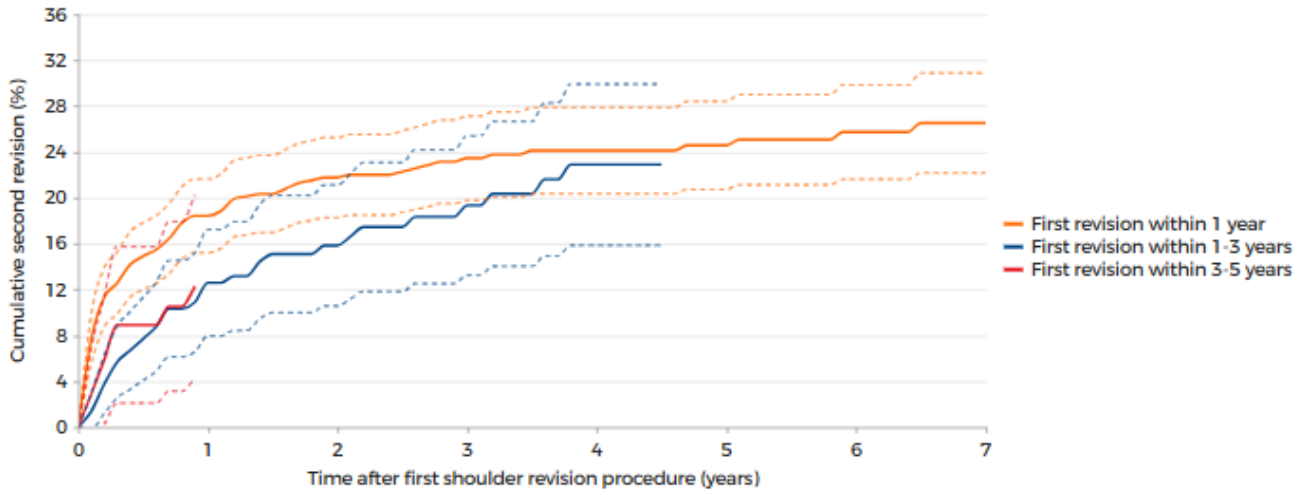
By time to first revision

FIGURE Cumulative second revision percentage (Kaplan-Meier; 95% CI) of reverse total shoulder arthroplasties after a one-stage first revision by time to first revision in the Netherlands in 2014-2024 (n=872)



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	Number (n)	1yr	3yr	5yr	7yr
First revision within 1 year	588	18.43 (15.22-21.64)	23.15 (19.51-26.79)	24.58 (20.74-28.42)	26.54 (22.18-30.89)
First revision within 1-3 years	219	10.90 (6.58-15.21)	18.36 (12.52-24.19)	n.a.	n.a.
First revision within 3-5 years	70	12.25 (4.27-20.24)	n.a.	n.a.	n.a.

Please note: Dotted lines represent the upper and lower limits of the 95% confidence interval.
One-stage revision: A single revision procedure to change (insertion, replacement and/or removal) one or more components of the prosthesis.
CI: confidence interval.

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Reasons for second revision

TABLE Reasons for second revision in patients who underwent a second revision after a one-stage first revision of a reverse total shoulder arthroplasty in the Netherlands in 2014-2024

	Second revision (n=186)
Reasons for second revision	**Proportion (%)**
Instability	44.62
Infection	38.71
Malalignment	8.06
Loosening of glenosphere component	8.06
Loosening of humeral stem component	3.23
Peri-prosthetic fracture	5.38
Other	9.68

One-stage revision: A single revision procedure to change (insertion, replacement and/or removal) one or more components of the prosthesis.
One patient may have more than one reason for second revision or re-surgery. As such, the total proportion is over 100%.

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Survival by component

By osteoarthritis

TABLE Cumulative revision percentages of primary reverse total shoulder arthroplasties by prosthesis component combination of patients who underwent a RTSA for osteoarthritis in the Netherlands in 2014-2024 (n=8,166)

						Type of revision (n)				Cumulative revision percentage (95% CI)				
Humeral stem component	Glenosphere component	Primary RTSAs (n)	Hospital (n)	Median (IQR) age (yr)	Revisions (n)	Total revision	Partial major	Partial minor	Other	1yr	3yr	5yr	7yr	10yr
All RTSAs for osteoarthritis		**8,166**	**89**	**76 (71 - 80)**	**258**	**77**	**81**	**82**	**13**	**1.65 (1.37-1.94)**	**3.12 (2.70-3.54)**	**4.02 (3.51-4.53)**	**4.35 (3.78-4.93)**	**4.67 (3.92-5.43)**
Delta X-tend	Delta X-tend	2.295	29	75 (71 - 80)	44	11	11	15	5	0.78 (0.41-1.15)	1.88 (1.26-2.49)	2.28 (1.57-2.99)	2.47 (1.67-3.26)	2.68 (1.78-3.57)
Aequalis Ascend Flex	Aequalis Reversed II	978	29	76 (70 - 80)	43	16	14	12	1	2.66 (1.61-3.72)	3.91 (2.56-5.27)	6.31 (4.26-8.35)	7.44 (4.89-9.98)	n.a.
Aequalis Reversed II	Aequalis Reversed II	842	30	76 (72 - 80)	33	10	9	13	1	2.27 (1.26-3.28)	3.61 (2.32-4.91)	3.93 (2.56-5.29)	4.14 (2.72-5.57)	4.90 (2.86-6.95)
COMPREHENSIVE MINI	COMPREHENSIVE	830	28	76 (71 - 80)	13	3	7	3	0	0.76 (0.15-1.36)	1.83 (0.78-2.88)	2.23 (0.92-3.53)	2.23 (0.92-3.53)	n.a.
Aequalis Ascend Flex	Perform Reversed	431	23	76 (71 - 81)	21	4	10	6	1	4.04 (2.09-5.98)	4.89 (2.63-7.16)	7.30 (3.82-10.78)	n.a.	n.a.
Equinoxe	Equinoxe	423	5	76 (71 - 81)	19	4	6	9	0	1.26 (0.16-2.36)	4.45 (2.22-6.67)	5.92 (3.17-8.67)	6.96 (3.57-10.36)	n.a.
SMR stem Cementless	SMR reversed head	297	11	77 (73 - 80)	6	3	1	0	1	0.76 (0.00-1.80)	2.47 (0.25-4.69)	3.72 (0.44-6.99)	n.a.	n.a.
Global Unite	Delta X-tend	245	12	75 (70 - 79)	4	1	1	2	0	1.40 (0.00-2.98)	2.50 (0.00-5.14)	n.a.	n.a.	n.a.
Anatomical Shoulder Stems	TM Reverse Glenoid Heads	240	3	75 (71 - 80)	17	7	4	6	0	2.52 (0.53-4.50)	4.34 (1.70-6.97)	8.26 (4.25-12.26)	9.16 (4.82-13.51)	n.a.
Affinis Inverse	Affinis Inverse	183	10	76 (72 - 79)	6	3	2	1	0	1.72 (0.00-3.65)	3.84 (0.80-6.88)	3.84 (0.80-6.88)	n.a.	n.a.
Affinis Inverse	Affinis Inverse Vitamys	159	6	75 (71 - 79)	4	1	1	2	0	1.48 (0.00-3.52)	4.11 (0.00-8.21)	n.a.	n.a.	n.a.
UNIVERS REVERS	UNIVERS REVERS	111	4	75 (69 - 80)	3	0	1	2	0	1.82 (0.00-4.32)	1.82 (0.00-4.32)	n.a.	n.a.	n.a.

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

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Only combinations with over 50 procedures and reported by at least 3 hospitals have been listed.

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 of the prosthesis may have influenced the cumulative revision percentages.

By fracture

TABLE Cumulative revision percentages of primary reverse total shoulder arthroplasties by prosthesis component combination of patients who underwent a RTSA for fracture in the Netherlands in 2014-2024 (n=4,670)

						Type of revision (n)				Cumulative revision percentage (95% CI)				
Humeral stem component	Glenosphere component	Primary RTSAs (n)	Hospital (n)	Median (IQR) age (yr)	Revisions (n)	Total revision	Partial major	Partial minor	Other	1yr	3yr	5yr	7yr	10yr
All RTSAs for fracture		**4,670**	**80**	**74 (69 - 79)**	**178**	**35**	**49**	**79**	**10**	**2.76 (2.28-3.24)**	**3.97 (3.37-4.58)**	**4.51 (3.82-5.21)**	**5.04 (4.21-5.88)**	**5.04 (4.21-5.88)**
Aequalis Reversed Fractuur	Aequalis Reversed II	1.056	31	75 (69 - 79)	16	3	2	9	2	1.48 (0.74-2.23)	1.61 (0.82-2.39)	1.61 (0.82-2.39)	1.61 (0.82-2.39)	n.a.
Delta X-tend	Delta X-tend	980	27	74 (69 - 80)	52	10	10	27	3	3.88 (2.65-5.11)	5.50 (3.99-7.01)	5.91 (4.30-7.52)	6.31 (4.53-8.08)	n.a.
COMPREHENSIVE FRACTURE	COMPREHENSIVE	518	18	75 (70 - 80)	13	2	4	5	1	1.58 (0.49-2.67)	2.77 (1.18-4.35)	3.33 (1.41-5.24)	3.33 (1.41-5.24)	n.a.
Global Unite	Delta X-tend	350	14	74 (70 - 80)	9	3	1	3	2	1.93 (0.39-3.47)	2.47 (0.61-4.32)	n.a.	n.a.	n.a.
Equinoxe	Equinoxe	230	4	73 (69 - 78)	9	2	3	4	0	2.19 (0.29-4.09)	3.42 (0.89-5.95)	5.07 (1.01-9.13)	n.a.	n.a.
Aequalis Flex Revive	Perform Reversed	229	3	73 (67 - 77)	15	3	3	9	0	6.04 (2.71-9.37)	8.65 (4.26-13.05)	n.a.	n.a.	n.a.
SMR stem Cementless	SMR reversed head	145	8	73 (67 - 78)	4	0	1	3	0	1.72 (0.00-4.10)	n.a.	n.a.	n.a.	n.a.
Anatomical Shoulder Stems	TM Reverse Glenoid Heads	125	3	73 (67 - 77)	12	0	9	3	0	8.18 (3.32-13.03)	9.15 (3.98-14.32)	n.a.	n.a.	n.a.
COMPREHENSIVE MINI	COMPREHENSIVE	86	13	74 (67 - 80)	4	1	3	0	0	3.82 (0.00-8.07)	n.a.	n.a.	n.a.	n.a.
Affinis Fracture	Affinis Inverse	56*	5	77 (73 - 82)	1	0	0	1	0	n.a.	n.a.	n.a.	n.a.	n.a.

* Denotes prosthesis combinations with no reported use in primary RTSAs in 2024.

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

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Only combinations with over 50 procedures and reported by at least 3 hospitals have been listed.

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 of the prosthesis may have influenced the cumulative revision percentages.

By cuff arthropathy

TABLE Cumulative revision percentages of primary reverse total shoulder arthroplasties by prosthesis component combination of patients who underwent a RTSA for cuff arthropathy in the Netherlands in 2014-2024 (n=6,495)

						Type of revision (n)				Cumulative revision percentage (95% CI)				
Humeral stem component	Glenosphere component	Primary RTSAs (n)	Hospital (n)	Median (IQR) age (yr)	Revisions (n)	Total revision	Partial major	Partial minor	Other	1yr	3yr	5yr	7yr	10yr
All RTSAs for cuff arthropathy		**6,495**	**89**	**75 (70 - 79)**	**289**	**73**	**82**	**111**	**20**	**2.30 (1.93-2.67)**	**3.97 (3.46-4.48)**	**4.91 (4.31-5.51)**	**5.77 (5.06-6.47)**	**6.66 (5.72-7.60)**
Delta X-tend	Delta X-tend	1,929	30	74 (69 - 78)	70	13	10	41	5	2.11 (1.45-2.77)	3.25 (2.41-4.10)	3.81 (2.86-4.77)	4.34 (3.26-5.42)	5.37 (3.86-6.88)
Aequalis Reversed II	Aequalis Reversed II	875	26	75 (71 - 79)	44	9	14	16	4	2.31 (1.31-3.30)	3.70 (2.42-4.98)	4.59 (3.14-6.04)	5.63 (3.93-7.34)	6.51 (4.41-8.61)
COMPREHENSIVE MINI	COMPREHENSIVE	772	22	75 (71 - 79)	14	5	5	4	0	0.67 (0.08-1.26)	1.86 (0.81-2.91)	2.40 (1.11-3.68)	2.40 (1.11-3.68)	n.a.
Aequalis Ascend Flex	Aequalis Reversed II	724	29	74 (69 - 78)	37	7	17	12	1	3.02 (1.75-4.30)	3.99 (2.47-5.50)	5.69 (3.57-7.80)	7.66 (4.83-10.48)	n.a.
Aequalis Ascend Flex	Perform Reversed	289	12	74 (70 - 79)	22	6	8	4	4	6.17 (3.23-9.11)	8.77 (5.12-12.41)	n.a.	n.a.	n.a.
Equinoxe	Equinoxe	192	4	76 (70 - 80)	13	4	5	4	0	1.60 (0.00-3.40)	3.37 (0.71-6.03)	6.84 (2.62-11.07)	n.a.	n.a.
Affinis Inverse	Affinis Inverse	186	7	75 (72 - 79)	12	3	3	6	0	3.26 (0.69-5.82)	5.02 (1.82-8.23)	6.64 (2.78-10.49)	7.67 (3.36-11.97)	n.a.
SMR stem Cementless	SMR reversed head	182	8	76 (70 - 79)	3	0	2	1	0	0.56 (0.00-1.65)	1.48 (0.00-3.59)	1.48 (0.00-3.59)	n.a.	n.a.
Anatomical Shoulder Stems	TM Reverse Glenoid Heads	163	3	76 (71 - 80)	11	5	2	4	0	1.89 (0.00-4.00)	5.12 (1.66-8.57)	6.71 (2.66-10.76)	n.a.	n.a.
UNIVERS REVERS	UNIVERS REVERS	160	4	74 (70 - 78)	11	2	3	2	3	5.33 (1.72-8.93)	6.46 (2.27-10.65)	8.15 (2.89-13.41)	n.a.	n.a.
Global Unite	Delta X-tend	101	10	74 (69 - 79)	2	0	1	0	1	0.00 (0.00-0.00)	n.a.	n.a.	n.a.	n.a.
Affinis Inverse	Affinis Inverse Vitamys	86	6	75 (68 - 80)	4	2	1	1	0	4.33 (0.00-9.15)	n.a.	n.a.	n.a.	n.a.

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

Only combinations with over 50 proceduresand reported by at least 3 hospitals have been listed.

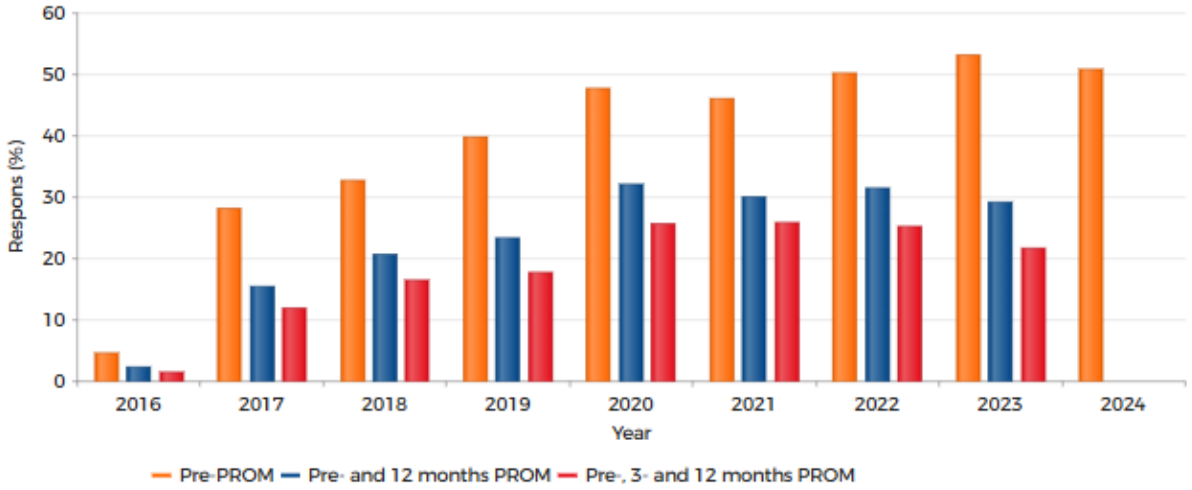
Results must be interpreted with caution. Patient characteristics like age and diagnosis, as well as procedure characteristics like the experience of the surgeon performing the procedure of the prosthesis may have influenced the cumulative revision percentages.

PROMs

Response

Per year

FIGURE Pre-operative, 3 months and 12 months postoperative response percentage of patients who underwent a primary reverse total shoulder arthroplasty for osteoarthritis in the Netherlands in 2016-2024

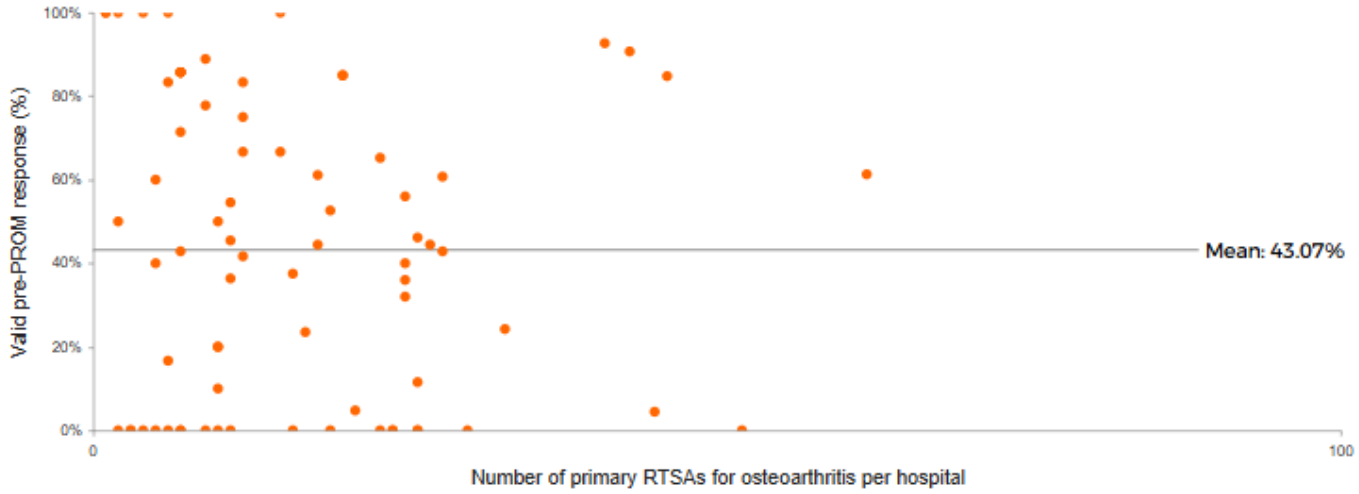


	2016	2017	2018	2019	2020	2021	2022	2023	2024
Pre-PROM	4.52	28.13	32.62	39.78	47.73	46.00	50.25	53.20	50.86
Pre- and 12 months PROM	2.26	15.38	20.57	23.37	32.17	30.00	31.38	29.22	n.a.
Pre-, 3- and 12 months PROM	1.51	11.87	16.49	17.80	25.70	25.86	25.13	21.77	n.a.
Reverse total shoulder arthroplasty for osteoarthritis (n)	**398**	**455**	**564**	**646**	**572**	**700**	**800**	**859**	**987**

Please note: The 12 months postoperative PROMs response percentage is not (yet) available for 2024.
PROM: patient reported outcome measure.

Per pre-PROM per hospital

FIGURE Scatterplot of pre-operative response percentage of patients who underwent a primary reverse total shoulder arthroplasty for osteoarthritis per hospital in the Netherlands in 2024



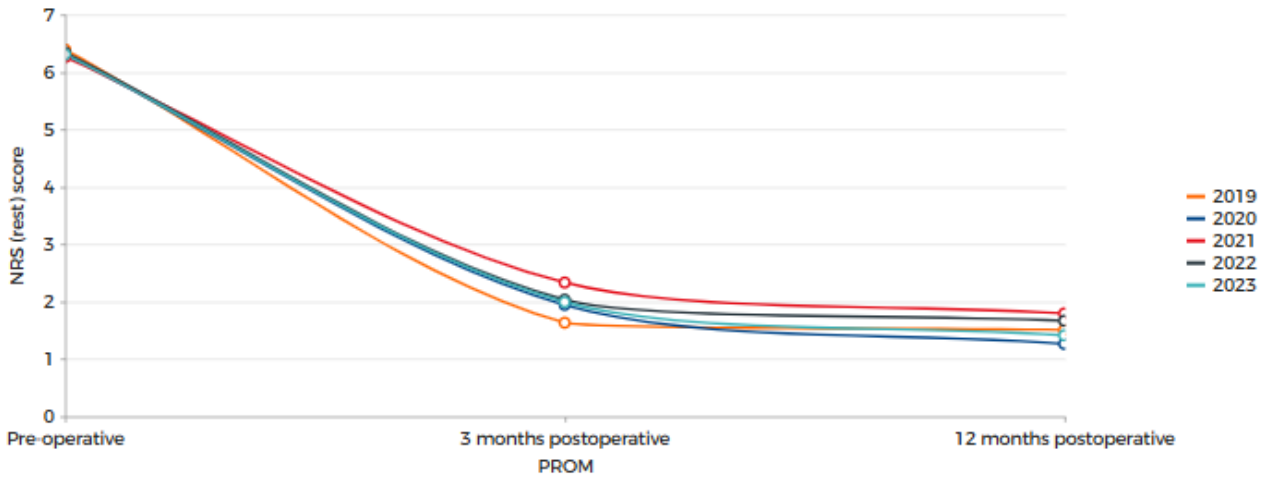
PROM: patient reported outcome measure; RTSA: reverse total shoulder arthropalsty

The mean pre-operative response rate is 43.1% in the Netherlands in 2024.
Of the 75 hospitals, 28 (37%) scored above the 60% response rate.

Outcomes

NRS (rest)

FIGURE Mean (95% CI) pre-operative, 3 months and 12 months postoperative NRS (rest) scores of patients who underwent a primary reverse total shoulder arthroplasty for osteoarthritis in the Netherlands in 2019-2023



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NRS (rest) score		Pre-operative	3 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	115	6.39 (5.96-6.82)	1.63 (1.28-1.99)	1.51 (1.09-1.93)
2020	147	6.31 (5.94-6.67)	1.95 (1.56-2.33)	1.27 (0.92-1.61)
2021	182	6.26 (5.94-6.59)	2.33 (1.95-2.72)	1.79 (1.44-2.15)
2022	201	6.34 (6.03-6.64)	2.04 (1.73-2.34)	1.67 (1.34-2.00)
2023	189	6.31 (6.00-6.61)	1.99 (1.66-2.33)	1.41 (1.10-1.73)
Total	834	6.32 (6.17-6.47)	2.02 (1.86-2.18)	1.54 (1.39-1.70)

CI: confidence interval

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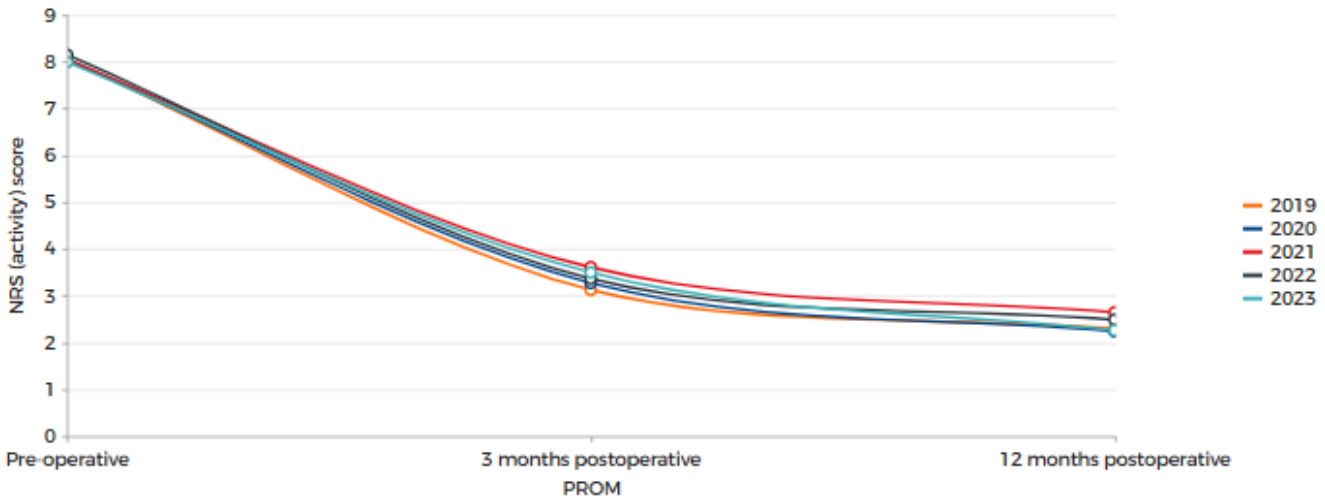
The NRS (rest) score measures pain during rest. The score has a range of 0.0 to 10.0, with 0.0 representing no pain and 10.0 representing the most possible pain.

NRS (activity)

FIGURE Mean (95% CI) pre-operative, 3 months and 12 months postoperative NRS (activity) scores of patients who underwent a primary reverse total shoulder arthroplasty for osteoarthritis in the Netherlands in 2019-2023



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NRS (activity) score		Pre-operative	3 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	115	8.05 (7.74-8.37)	3.13 (2.64-3.61)	2.30 (1.83-2.77)
2020	147	8.05 (7.78-8.32)	3.27 (2.84-3.71)	2.24 (1.82-2.66)
2021	182	8.04 (7.83-8.25)	3.61 (3.23-3.99)	2.64 (2.25-3.04)
2022	201	8.15 (7.97-8.33)	3.37 (3.01-3.72)	2.49 (2.11-2.87)
2023	189	7.99 (7.76-8.22)	3.50 (3.14-3.85)	2.26 (1.90-2.63)
Total	834	8.06 (7.95-8.16)	3.40 (3.22-3.57)	2.40 (2.22-2.58)

CI: confidence interval

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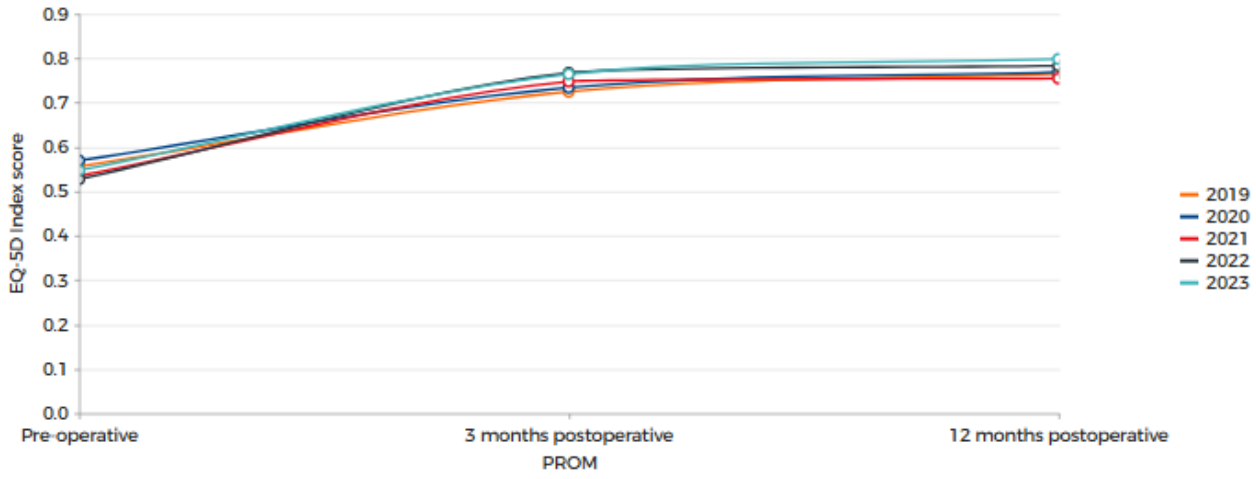
The NRS (activity) score measures pain during activity. The score has a range of 0.0 to 10.0, with 0.0 representing no pain and 10.0 representing the most possible pain.

EQ-5D index score

FIGURE Mean (95% CI) pre-operative, 3 months and 12 months postoperative EQ-5D Index scores of patients who underwent a primary reverse total shoulder arthroplasty for osteoarthritis in the Netherlands in 2019-2023



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EQ-5D index score		Pre-operative	3 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	115	0.56 (0.52-0.60)	0.72 (0.69-0.76)	0.77 (0.73-0.80)
2020	147	0.57 (0.54-0.60)	0.73 (0.70-0.77)	0.77 (0.73-0.80)
2021	182	0.54 (0.50-0.57)	0.75 (0.72-0.77)	0.75 (0.72-0.79)
2022	201	0.53 (0.49-0.56)	0.77 (0.74-0.79)	0.78 (0.75-0.81)
2023	189	0.55 (0.51-0.58)	0.76 (0.74-0.79)	0.80 (0.77-0.82)
Total	834	0.54 (0.53-0.56)	0.75 (0.74-0.76)	0.78 (0.76-0.79)

CI: confidence interval

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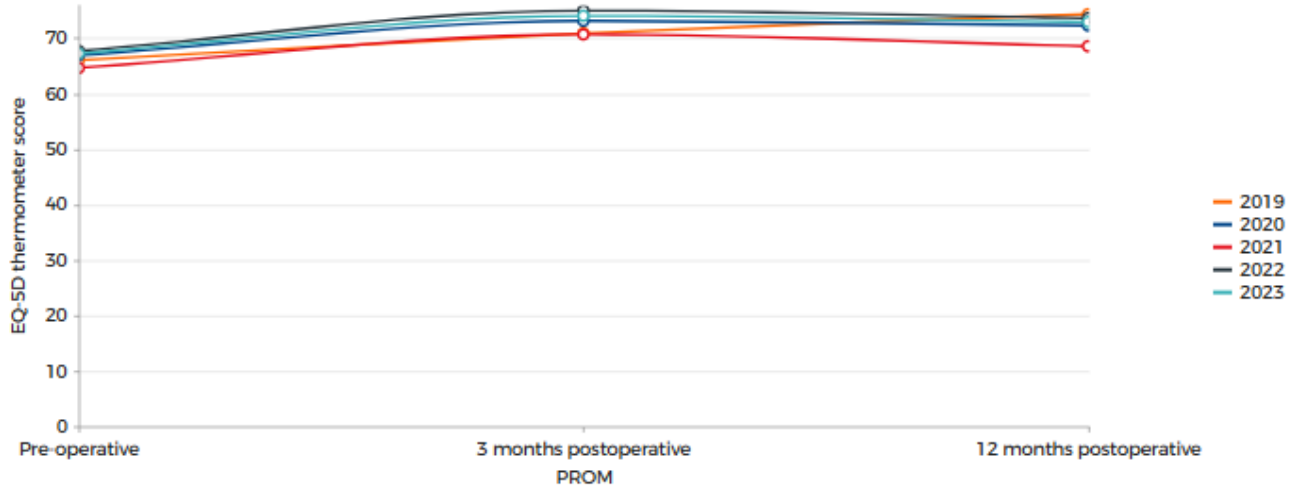
The EQ-5D index score measures quality of life. The score has a range of -0.329 to 1.0, with 1.0 representing the best possible quality of life.

EQ-5D thermometer

FIGURE Mean (95% CI) pre-operative, 3 months and 12 months postoperative EQ-5D thermometer scores of patients who underwent a primary reverse total shoulder arthroplasty for osteoarthritis in the Netherlands in 2019-2023



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EQ-5D thermometer score		Pre-operative	3 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	115	66.05 (62.78-69.32)	70.90 (67.03-74.77)	74.32 (70.83-77.82)
2020	147	66.93 (64.11-69.75)	73.13 (70.07-76.19)	72.28 (68.98-75.59)
2021	182	64.64 (61.57-67.72)	70.69 (67.86-73.53)	68.55 (65.02-72.09)
2022	201	67.70 (65.05-70.35)	74.99 (72.50-77.48)	73.62 (70.74-76.49)
2023	189	67.25 (64.39-70.10)	74.05 (71.60-76.49)	72.92 (70.16-75.68)
Total	834	66.55 (65.24-67.87)	72.96 (71.69-74.23)	72.20 (70.77-73.62)

CI: confidence interval

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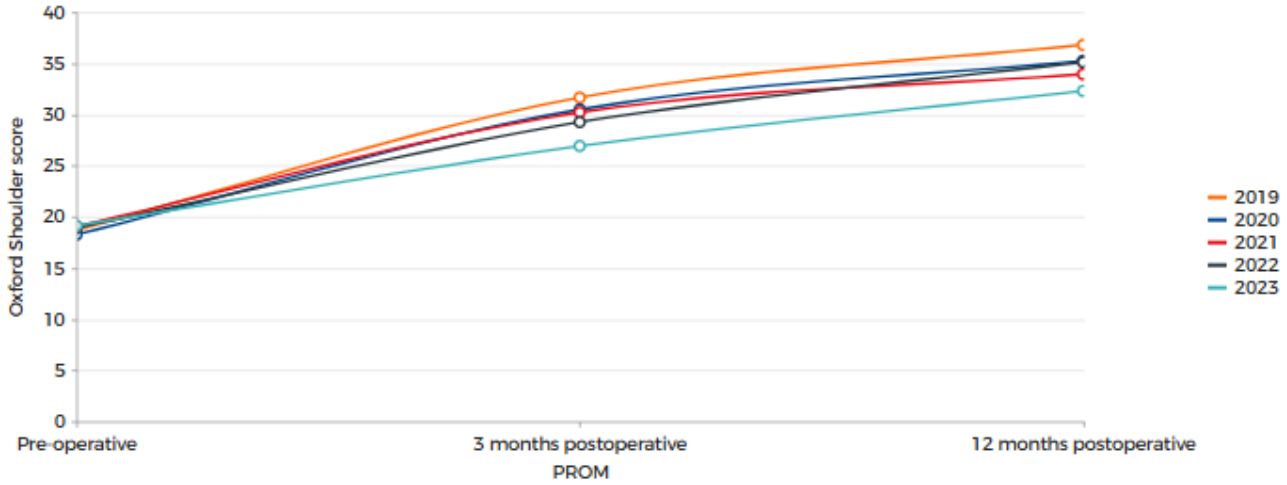
The EQ-5D thermometer score measures the health situation. The score has a range of 0.0 to 100.0, with 0.0 representing the worst possible health situation and 100.0 the best possible health situation.

Oxford Shoulder Score

FIGURE Mean (95% CI) pre-operative, 3 months and 12 months postoperative Oxford Shoulder scores of patients who underwent a primary reverse total shoulder arthroplasty for osteoarthritis in the Netherlands in 2019-2023



Oxford Shoulder score		Pre-operative	3 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	115	18.71 (17.09-20.33)	31.65 (29.72-33.58)	36.80 (34.84-38.77)
2020	147	18.26 (16.87-19.64)	30.49 (28.60-32.38)	35.25 (33.31-37.19)
2021	182	19.06 (18.00-20.13)	30.22 (28.76-31.67)	33.94 (32.24-35.63)
2022	201	18.90 (17.86-19.93)	29.26 (27.67-30.85)	35.13 (33.43-36.82)
2023	189	19.13 (18.00-20.26)	26.92 (25.28-28.57)	32.30 (30.38-34.23)
Total	834	18.85 (18.31-19.38)	29.47 (28.72-30.23)	34.48 (33.65-35.30)

CI: confidence interval

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 0.0 representing no functional ability and 48.0 the most functional ability.

Total anatomical shoulder arthroplasty

In this section you will find information on total anatomical shoulder arthroplasty:

Patient characteristics

By diagnosis

TABLE Patient characteristics of all patients with a registered primary total anatomical shoulder arthroplasty by diagnosis in the Netherlands in 2024

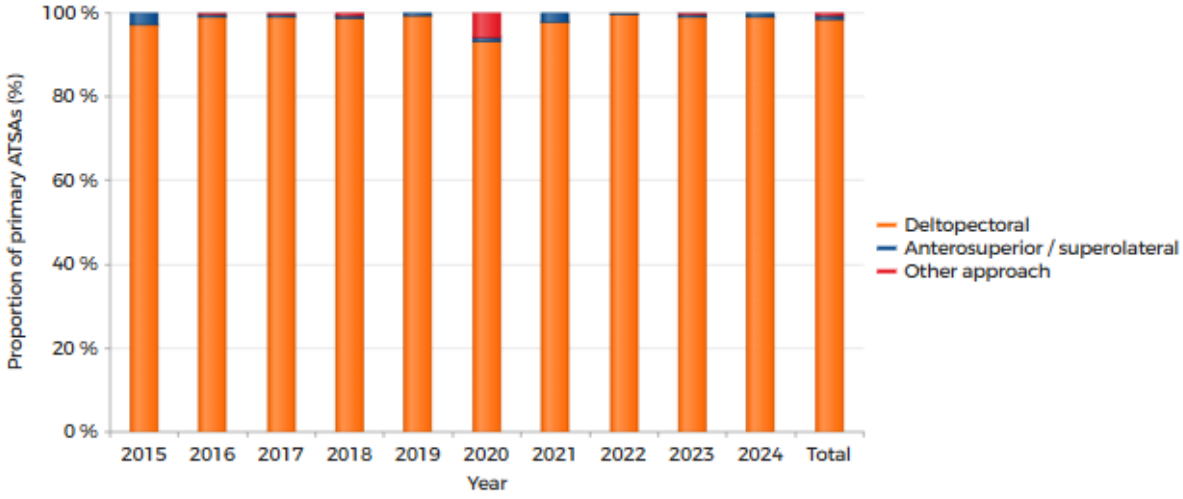
	Osteoarthritis	Other	Total
N(%)	**568 (90.4)**	**61 (9.6)**	**629**
Mean age (years) (SD)	65.5 (8.4)	64.6 (10.2)	65.4 (8.6)
Age (years) (%)			
<50	4	10	4
50-59	21	21	21
60-69	42	36	41
70-79	31	28	30
>80	3	5	3
Gender (%)			
Men	38	46	39
Women	62	54	61
ASA score (%)			
ASA I	11	10	11
ASA II	63	51	62
ASA III-IV	26	36	27
Type of hospital (%)			
General	75	87	76
UMC	2	0	2
Private	23	13	22
Specialism (%)			
Orthopaedic surgeon	99	100	100
Trauma surgeon	0	0	0
Walch-score (%)			
A1	34	54	36
A2	37	27	36
B1	15	6	15
B2	10	8	10
B3	2	0	2
C	1	2	1
Mean BMI (kg/m2) (SD)	28.6 (5.2)	28.2 (5.1)	28.5 (5.2)
Body Mass Index (kg/m2) (%)			
Underweight (<=18.5)	0	0	0
Normal weight (>18.5-25)	27	28	28
Overweight (>25-30)	36	36	38
Obesity (>30-40)	30	21	31
Morbid obesity (>40)	3	3	3
Smoking (%)			
No	88	75	87
Yes	11	25	13

Please note: diagnosis 'Other' (61; 9.6%) includes late post-traumatic (22), osteonecrosis (11), cuff arthropathy (10), other (5), reumatoid arthritis (4), fracture (1), and 8 primary total anatomical shoulder arthroplasties where the diagnosis was not registered.
General: general hospital; UMC: university medical centre; Private: private hospital; SD: standard deviation.

Procedure characteristics

Surgical approach

FIGURE Trend (proportion [%] per year) in surgical approach for performing a primary total anatomical shoulder arthroplasty in the Netherlands in 2015-2024

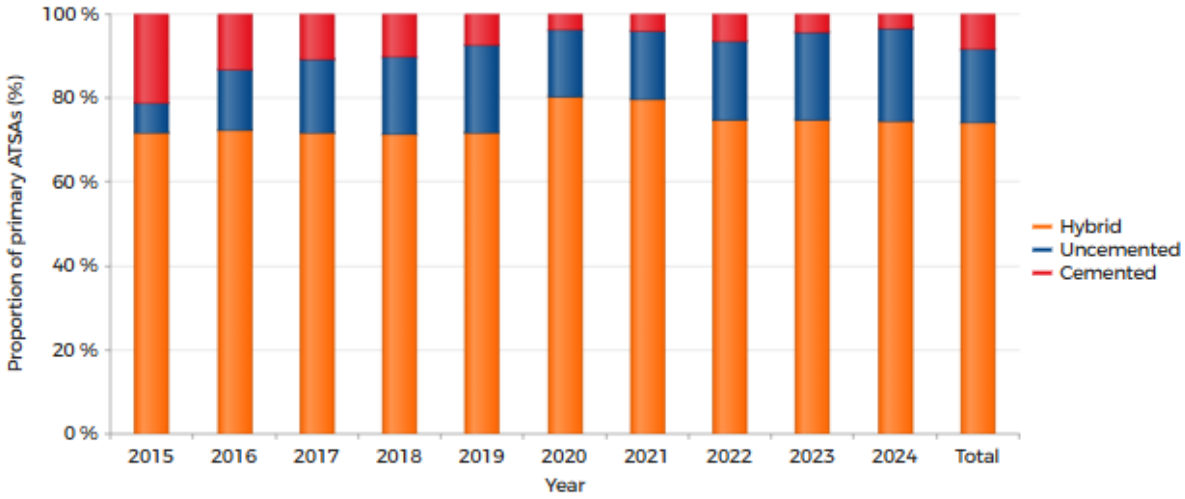


	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Deltopectoral	97.38	99.04	99.11	98.73	99.33	93.18	97.91	99.67	99.10	99.16	98.39
Anterosuperior / superolateral	2.62	0.77	0.71	0.64	0.67	0.85	2.09	0.33	0.60	0.84	0.98
Other approach	0	0.19	0.18	0.64	0	5.97	0	0	0.30	0	0.63
Total (n)	**496**	**519**	**561**	**629**	**597**	**469**	**574**	**608**	**670**	**593**	**5,716**

ATSA: total anatomical shoulder arthroplasty

Fixation

FIGURE Trend (proportion [%] per year) in type of fixation in primary total anatomical shoulder arthroplasties in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Hybrid	71.69	72.45	71.71	71.50	71.67	80.46	79.66	74.96	74.78	74.44	74.27
Uncemented	7.23	14.26	17.44	18.31	21	15.97	16.41	18.50	20.80	22.04	17.52
Cemented	21.08	13.29	10.85	10.19	7.33	3.57	3.93	6.54	4.42	3.51	8.21
Total (n)	**498**	**519**	**562**	**628**	**600**	**476**	**585**	**627**	**678**	**626**	**5,799**

ATSA: total anatomical shoulder arthroplasty

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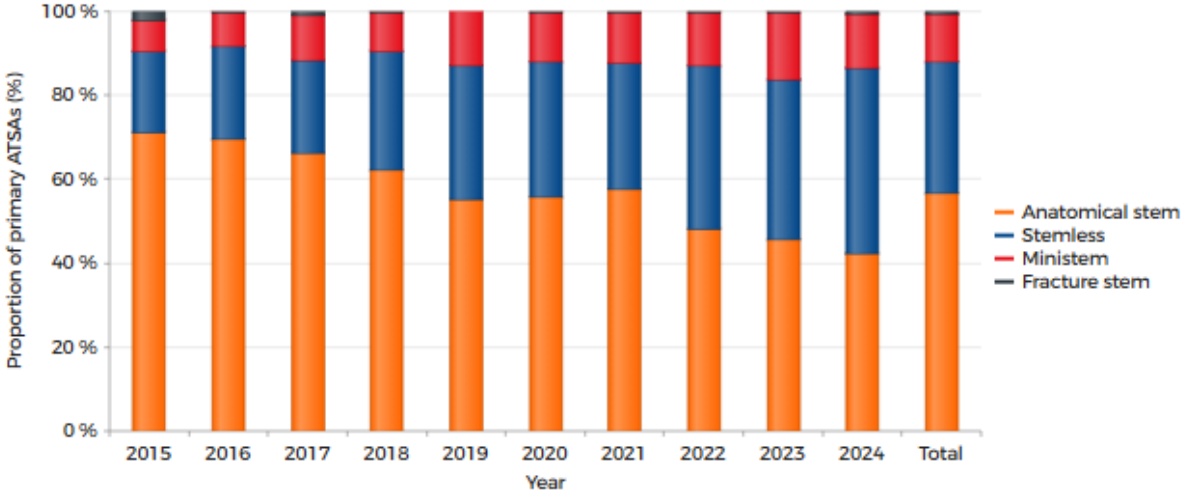
Type humeral stem

FIGURE Trend (proportion [%] per year) in type of humeral stem in primary total anatomical shoulder arthroplasties in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Anatomical stem	71.10	69.58	66.11	62.38	55.21	55.79	57.75	48.11	45.85	42.44	56.66
Stemless	19.27	22.08	22.25	28.17	31.85	32.11	30.04	39.14	38.04	43.99	31.31
Ministem	7.34	8.13	10.60	9.26	12.93	11.84	12.02	12.57	15.95	13.06	11.55
Fracture stem	2.29	0.21	1.04	0.19	0	0.26	0.19	0.18	0.17	0.52	0.47
Total (n)	**436**	**480**	**481**	**529**	**518**	**380**	**516**	**557**	**602**	**582**	**5,081**

ATSA: total anatomical shoulder arthroplasty

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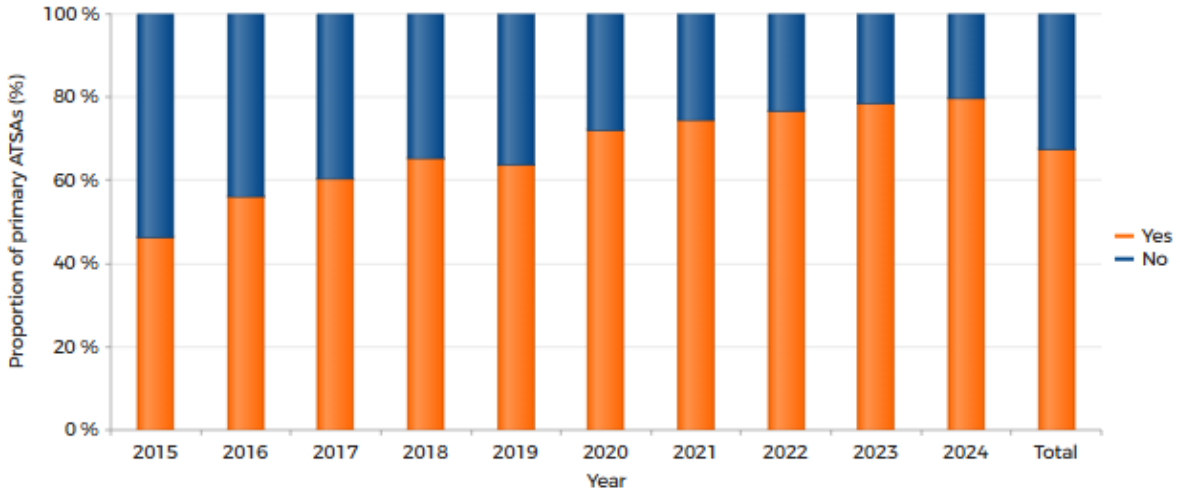
Modular humeral stem

FIGURE Trend (proportion [%] per year) in modular humeral stem in primary total anatomical shoulder arthroplasties in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Yes	46.33	56.16	60.29	65.28	63.79	72.24	74.64	76.65	78.49	79.82	67.44
No	53.67	43.84	39.71	34.72	36.21	27.76	25.36	23.35	21.51	20.18	32.56
Total (n)	**436**	**479**	**481**	**504**	**486**	**353**	**481**	**484**	**516**	**451**	**4,671**

ATSA: total anatomical shoulder arthroplasty

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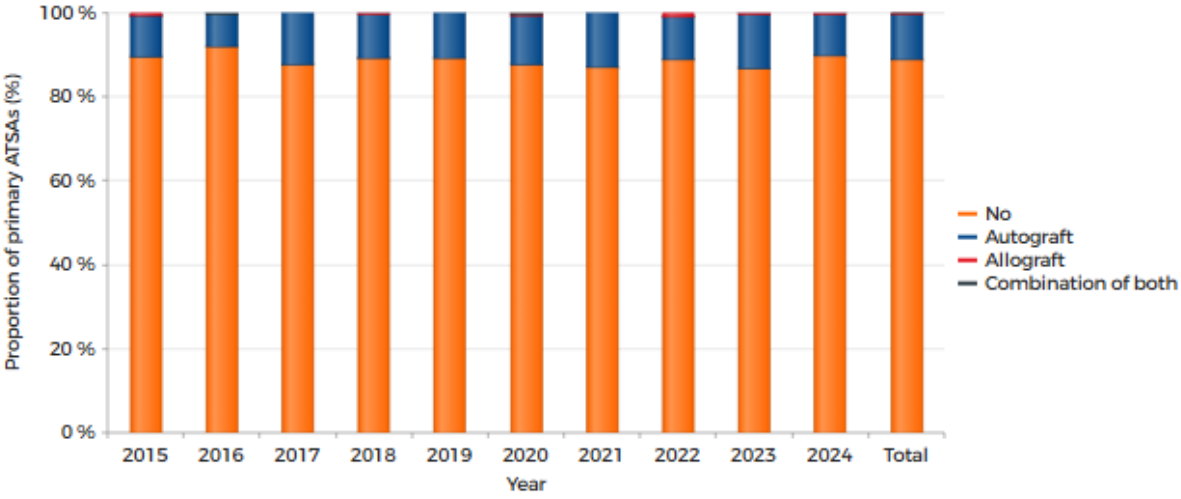
Bonegraft

FIGURE Trend (proportion [%] per year) in type of bonegraft in primary total anatomical shoulder arthroplasties in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
No	89.71	92.11	87.59	89.20	89.24	87.61	87.25	89.05	86.95	89.97	88.84
Autograft	9.67	7.69	12.41	10.63	10.76	11.73	12.75	10.12	12.59	9.71	10.84
Allograft	0.62	0	0	0.17	0	0.44	0	0.83	0.46	0.32	0.29
Combination of both	0	0.20	0	0	0	0.22	0	0	0	0	0.04
Total (n)	**486**	**507**	**556**	**602**	**567**	**452**	**557**	**603**	**659**	**618**	**5,607**

ATSA: total anatomical shoulder arthroplasty

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Most frequently registered humeral stem, humeral head, glenoid

TABLE The most frequently registered humeral stems, humeral heads and glenoid components in primary total anatomical shoulder arthroplasties in the Netherlands in 2020-2024

Year	2020	2021	2022	2023	2024
Humeral stem (n)	**380**	**516**	**557**	**602**	**582**
Name; Proportion (%)					
Aequalis Ascend Flex	33.95	36.82	33.57	34.55	30.76
Global Icon	7.11	6.59	12.57	13.46	20.10
SMR Stemless	7.63	5.04	9.52	10.80	12.89
Affinis Short	8.68	7.75	9.87	13.62	10.82
Global Unite	11.58	8.33	7.90	7.31	7.73
Comprehensive Nano	7.37	10.47	10.95	9.63	5.84
Eclipse	1.32	1.74	0.90	0.33	2.41
Comprehensive Mini	3.16	4.26	2.69	2.33	2.23
Equinoxe	0.79	3.49	2.69	1.66	2.06
Simpliciti Shoulder System	3.68	1.36	2.33	2.49	1.89
Year	**2020**	**2021**	**2022**	**2023**	**2024**
Humeral head (n)	**393**	**531**	**571**	**606**	**575**
Name; Proportion (%)					
Aequalis Ascend Flex	35.37	36.91	33.80	34.49	31.13
Global Icon	6.62	6.59	12.78	13.20	20.00
SMR head	8.40	7.53	9.11	10.73	12.87
Affinis Short	7.89	7.34	8.93	13.20	10.43
Comprehensive	10.43	14.50	13.13	12.21	8.52
Global Unite/ Global AP	16.03	12.62	10.86	8.09	8.17
Simpliciti Shoulder System	4.58	2.45	2.63	3.30	3.13
Eclipse	3.31	3.01	3.33	2.15	2.43
Equinoxe	1.78	3.39	2.45	1.65	2.09
Sidus Heads	4.33	5.08	2.63	0.66	0.87
Year	**2020**	**2021**	**2022**	**2023**	**2024**
Glenoid (n)	**392**	**541**	**573**	**613**	**581**
Name; Proportion (%)					
Aequalis Perform Keeled	27.55	27.73	26.00	27.08	20.83
Global APG+	23.47	17.93	24.78	21.53	27.88
Comprehensive	11.22	14.97	13.79	13.05	7.75
Aequalis Perform Pegged	9.44	10.54	9.77	11.09	13.77
SMR TT hybrid glenoid	2.55	4.99	5.76	7.99	11.36
Affinis Vitamys	2.81	5.18	4.71	6.53	5.85
Affinis	5.87	2.40	4.36	5.38	3.61
SMR uncemented glenoid	4.34	4.44	1.40	1.96	1.89
Equinoxe Cage	1.79	3.33	2.62	1.63	2.24
Affinis Vitamys uncemented	0.00	0.00	0.52	1.47	1.38

Most frequently registered 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 2020-2024

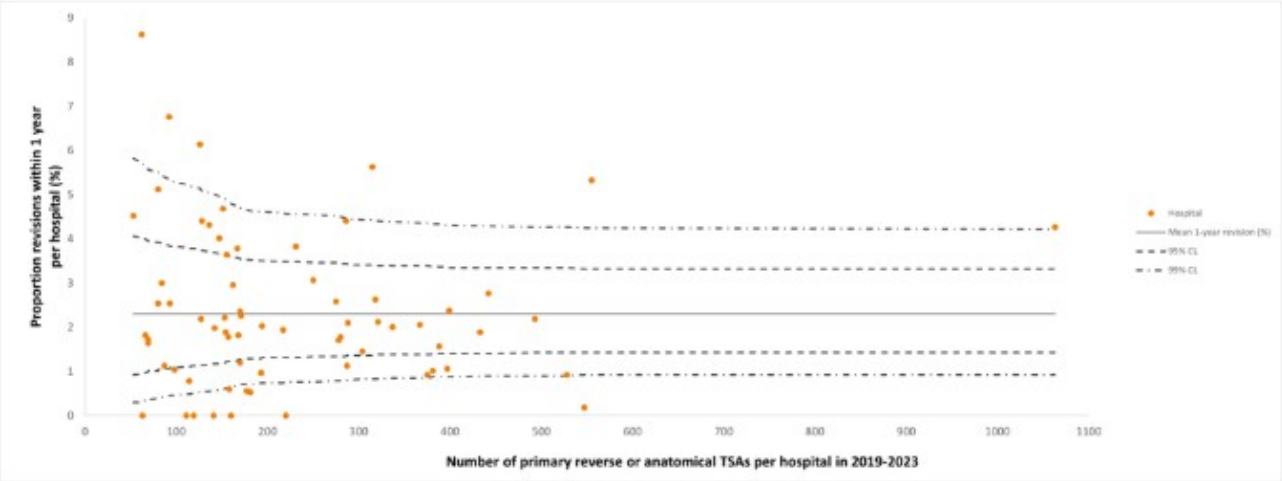
Year	2020	2021	2022	2023	2024
Bone cement pre-packed in a vacuum mixing system (n)	**182**	**284**	**325**	**308**	**278**
Cement name; Proportion (%)					
Palacos R+G	53.85	44.01	40.31	48.05	51.08
Refobacin Bone Cement R	36.81	49.30	49.85	45.78	46.40
Refobacin Plus Bone Cement	9.34	6.69	9.85	6.17	2.52
Year	**2020**	**2021**	**2022**	**2023**	**2024**
Separately packed bone cement components (n)	**134**	**129**	**121**	**123**	**106**
Cement name; Proportion (%)					
Palacos R+G	61.94	78.29	46.28	41.46	48.11
Copal G+C	0.00	0.00	24.79	23.58	25.47
Simplex ABC EC	12.69	6.98	14.05	11.38	11.32
Subiton G	2.24	2.33	3.31	4.88	6.60
Refobacin Bone Cement R	19.40	5.43	4.13	15.45	5.66
Biomet Bone Cement R	2.24	3.88	3.31	2.44	1.89
COPAL G+V	0.00	0.00	0.00	0.00	0.94

Survival

Short term revision

Overall revision per hospital

Funnel plot of proportion of shoulder revision arthroplasties within one year after a total (reverse or anatomical) shoulder arthroplasty per hospital in the Netherlands in 2019-2023 (n=16,133)



Please note: The proportions of revisions within 1 year per hospital were adjusted for casemix factor diagnosis (fracture versus other).
TSA: total shoulder arthroplasty; CL: control limits.

The mean 1-year revision percentage is 2.31 in the Netherlands in 2019-2023.
Control limits indicate the plausible range of outcome if all hospitals perform equally well.

By type of revision within 1 year

TABLE Time after primary total anatomical shoulder arthroplasty until short-term revision in the Netherlands in 2016-2021 (n=2,842)

Time after primary anatomical TSA	Percentage revisions (%)
Day 0-29	0.14
Day 30-182	0.49
Day 183-364	0.74
Day 365-730 (second year)	1.97
Day 731-1095 (third year)	0.95

TSA: total shoulder arthroplasty

Time after primary anatomical TSA

TABLE Time after primary total anatomical shoulder arthroplasty until short-term revision in the Netherlands in 2016-2021 (n=2,842)

Time after primary anatomical TSA	Percentage revisions (%)
Day 0-29	0.14
Day 30-182	0.49
Day 183-364	0.74
Day 365-730 (second year)	1.97
Day 731-1095 (third year)	0.95

TSA: total shoulder arthroplasty

Reasons for revision by type of revision

TABLE Reasons for revision within one year in patients that underwent a shoulder revision arthroplasty after a primary total anatomical shoulder arthroplasty in the Netherlands in 2019-2023 (n=56)

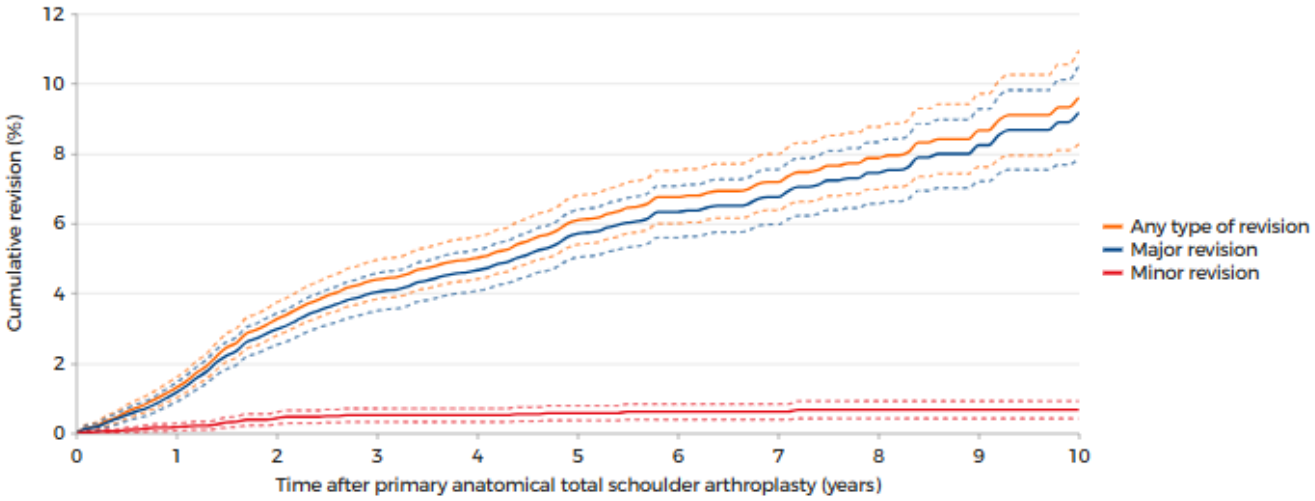
Reasons for revision	Proportion (%)
Cuff rupture	41.94
Instability	16.13
Loosening of glenoid component	16.13
Malalignment	12.90
Peri-prosthetic fracture	9.68
Loosening of humeral component	6.45
Cuff arthropathy	6.45
Infection	3.23
Progression of osteoarthritis	0.00
Other	12.90

Please note: One patient may have more than one reason of revision.

Long term revision

By type of revision

FIGURE Cumulative revision percentage (Kaplan-Meier; 95% CI) of primary anatomical total shoulder arthroplasties by type of revision in the Netherlands in 2014-2024 (n=6,193)



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	1yr	3yr	5yr	7yr	10yr
Any type of revision	1.14 (0.87-1.41)	4.32 (3.76-4.87)	5.99 (5.30-6.68)	7.18 (6.37-7.98)	9.32 (8.09-10.55)
Major revision	1.00 (0.75-1.26)	3.96 (3.43-4.49)	5.61 (4.93-6.28)	6.75 (5.97-7.54)	8.89 (7.67-10.11)
Minor revision	0.15 (0.05-0.25)	0.51 (0.32-0.70)	0.57 (0.36-0.78)	0.61 (0.38-0.83)	0.66 (0.42-0.91)

Please note: Dotted lines represent the upper and lower limits of the 95% confidence interval.
Any type of revision includes minor and major revisions as well as revision procedures that could not be classified as minor or major revision.
Major revision: Revision of at least the humeral stem or glenoid component.
Minor revision: Only liner and/or metaphysis exchange (including DAIR procedures).
ATSA: anatomical total shoulder arthroplasty; CI: confidence interval.

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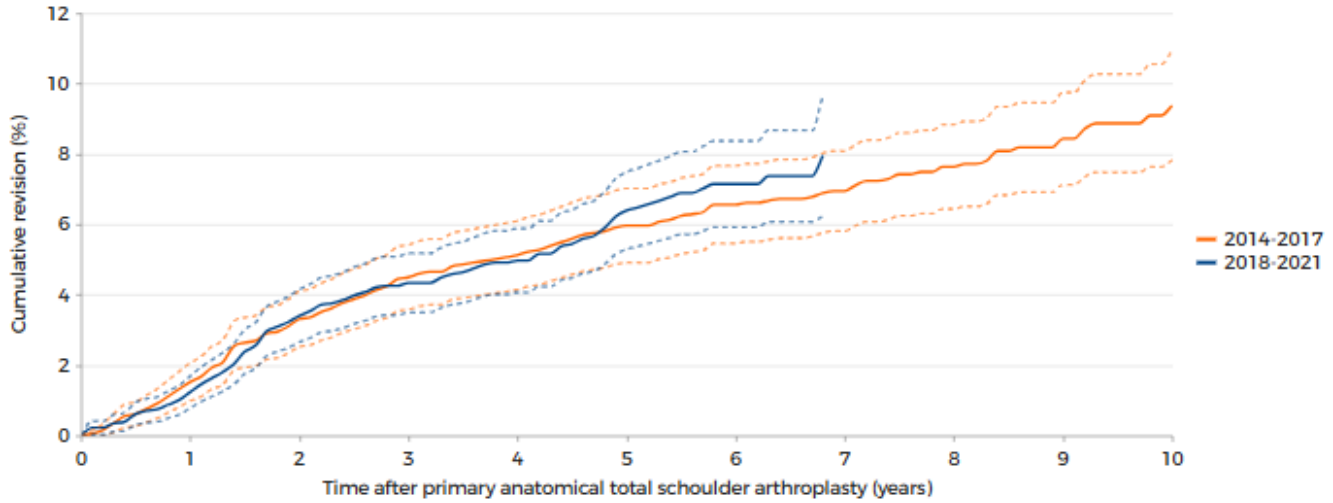
In 2007-2024, 403 (6.5%) primary ATSAs were implanted in patients who died within ten years after the primary diagnosis

By procedure year

FIGURE Cumulative revision percentage (Kaplan-Meier; 95% CI) of primary anatomical total shoulder arthroplasties by procedure year of primary arthroplasty in the Netherlands in 2014-2024 (n=4,257)



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	Number (n)	1yr	3yr	5yr	7yr	10yr
2014-2017	1,976	1.32 (0.81-1.82)	4.44 (3.53-5.36)	5.91 (4.87-6.96)	6.95 (5.81-8.08)	9.09 (7.64-10.55)
2018-2021	2,281	1.01 (0.60-1.42)	4.25 (3.42-5.08)	6.22 (5.15-7.30)	n.a.	n.a.

Please note: Dotted lines represent the upper and lower limits of the 95% confidence intervall; n.a. if <50 cases were at risk.
CI: confidence interval.

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Re-revision

Second revision

FIGURE Cumulative second revision percentage (Kaplan-Meier; 95% CI) of total anatomical shoulder arthroplasties after a one-stage first revision in the Netherlands in 2014-2024 (n=310)

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	Number (n)	1yr	3yr	5yr
Overall	310	6.18 (3.41-8.95)	11.55 (7.59-15.50)	12.20 (8.07-16.33)

Please note: Dotted lines represent the upper and lower limits of the 95% confidence interval.
One-stage revision: A single revision procedure to change (insertion, replacement and/or removal) one or more components of the prosthesis.
CI: confidence interval.

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Reasons for second revision

TABLE Reasons for second revision in patients who underwent a second revision after a one-stage first revision of a total anatomical shoulder arthroplasty in the Netherlands in 2014-2024

	Second revision (n=35)
Reasons for second revision	**Proportion (%)**
Infection	31.43
Loosening of glenoid component	20.00
Instability	17.14
Cuff rupture	11.43
Peri-prosthetic fracture	11.43
Loosening of humeral stem component	5.71
Other	17.14

One-stage revision: A single revision procedure to change (insertion, replacement and/or removal) one or more components of the prosthesis.

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

Survival by component

TABLE Cumulative revision percentages of primary anatomical total shoulder arthroplasties by prosthesis component combination of patients who underwent a ATSA for osteoarthritis in the Netherlands in 2014-2024 (n=5,455)

						Type of revision (n)				Cumulative revision percentage (95% CI)				
Humeral stem component	**Glenoid component**	**Primary ATSAs (n)**	**Hospital (n)**	**Median (IQR) age (yr)**	**Revisions (n)**	**Total revision**	**Partial major**	**Partial minor**	**Other**	**1yr**	**3yr**	**5yr**	**7yr**	**10yr**
All ATSAs for osteoarthritis		**5,455**	**89**	**67 (60 - 72)**	**272**	**160**	**78**	**12**	**20**	**0.99 (0.72-1.26)**	**3.83 (3.27-4.39)**	**5.38 (4.67-6.08)**	**6.60 (5.77-7.44)**	**8.98 (7.61-10.35)**
Aequalis Ascend Flex	Aequalis Perform Keeled	828	25	68 (62 - 73)	14	7	6	1	0	0.38 (0.00-0.81)	1.82 (0.79-2.85)	1.82 (0.79-2.85)	3.19 (1.00-5.37)	n.a.
Global Unite	Global APG+	454	19	67 (61 - 73)	20	9	7	2	2	1.62 (0.43-2.81)	3.94 (2.04-5.85)	4.67 (2.53-6.80)	5.09 (2.81-7.37)	n.a.
COMPREHENSIVE NANO	COMPREHENSIVE	432	21	66 (61 - 72)	17	12	3	0	2	1.17 (0.15-2.18)	2.83 (1.17-4.49)	5.12 (2.69-7.56)	5.12 (2.69-7.56)	n.a.
Global AP	Global APG+	381	17	66 (60 - 71)	23	18	2	1	1	1.05 (0.03-2.08)	3.45 (1.61-5.30)	5.22 (2.93-7.51)	5.96 (3.46-8.45)	7.59 (4.24-10.95)
GLOBAL ICON	Global APG+	358	14	65 (58 - 70)	12	9	1	1	0	0.61 (0.00-1.44)	4.82 (1.81-7.84)	n.a.	n.a.	n.a.
Aequalis Ascend Flex	Aequalis Perform Pegged	353	23	68 (62 - 73)	18	8	7	2	1	0.91 (0.00-1.94)	5.26 (2.55-7.97)	5.93 (2.94-8.93)	8.43 (4.39-12.47)	n.a.
Affinis Short	Affinis	219	7	70 (65 - 75)	2	1	1	0	0	0.00 (0.00-0.00)	1.18 (0.00-2.81)	1.18 (0.00-2.81)	1.18 (0.00-2.81)	n.a.
Aequalis Ascend Flex	Aequalis Spherical Glenoid	170*	16	67 (60 - 73)	17	5	9	1	2	0.00 (0.00-0.00)	4.17 (1.15-7.20)	7.25 (3.30-11.20)	9.24 (4.77-13.70)	n.a.
Affinis Short	Affinis Vitamys	156	7	61 (56 - 67)	4	2	0	1	1	2.22 (0.00-4.70)	3.36 (0.05-6.66)	n.a.	n.a.	n.a.
SMR Stemless	SMR TT hybrid glenoid	140	9	66 (60 - 73)	0	0	0	0	0	0.00 (0.00-0.00)	n.a.	n.a.	n.a.	n.a.
COMPREHENSIVE MINI	COMPREHENSIVE	126	18	65 (61 - 72)	9	2	4	2	1	2.40 (0.00-5.08)	5.90 (1.65-10.15)	7.04 (2.29-11.79)	n.a.	n.a.
Aequalis Primair	Aequalis Spherical Glenoid	113*	13	69 (63 - 75)	6	5	1	0	0	1.77 (0.00-4.20)	3.56 (0.13-6.98)	3.56 (0.13-6.98)	3.56 (0.13-6.98)	n.a.
Aequalis Press-fit	Aequalis Spherical Glenoid	111*	8	70 (65 - 76)	5	4	1	0	0	0.90 (0.00-2.66)	2.73 (0.00-5.78)	3.69 (0.14-7.23)	5.00 (0.67-9.34)	n.a.
Sidus Baseplate	Anatomical Shoulder Glenoids	104	6	63 (55 - 68)	13	11	1	1	0	0.99 (0.00-2.92)	9.34 (3.52-15.15)	n.a.	n.a.	n.a.
SMR Stemless	SMR uncemented glenoid	81*	8	61 (56 - 67)	12	1	9	0	2	3.70 (0.00-7.82)	12.75 (5.35-20.15)	15.61 (7.46-23.76)	n.a.	n.a.
Equinoxe	Equinoxe Cage	70	4	66 (59 - 71)	4	1	3	0	0	1.54 (0.00-4.53)	n.a.	n.a.	n.a.	n.a.
SMR stem Cementless	SMR uncemented glenoid	56*	5	69 (62 - 73)	9	1	8	0	0	1.79 (0.00-5.25)	9.03 (1.48-16.58)	n.a.	n.a.	n.a.
Simpliciti Shoulder System	Aequalis Perform Pegged	55	7	67 (61 - 72)	3	2	0	0	1	n.a.	n.a.	n.a.	n.a.	n.a.

* Denotes prosthesis combinations with no reported use in primary ATSAs in 2024.

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

Only combinations with over 50 procedures and reported by at least 3 hospitals have been listed.

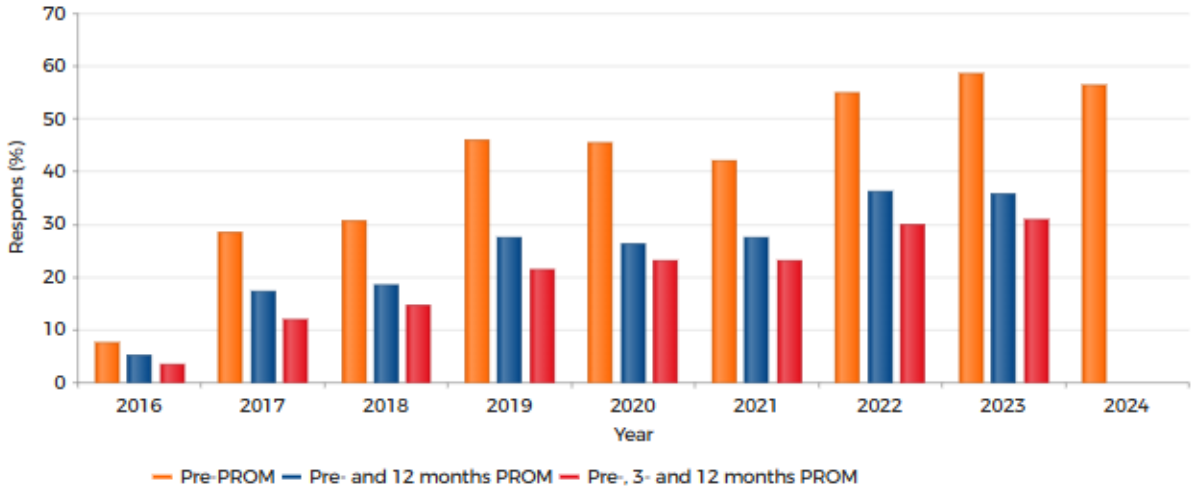
Results must be interpreted with caution. Patient characteristics like age and diagnosis, as well as procedure characteristics like the experience of the surgeon performing the procedure of the prosthesis may have influenced the cumulative revision percentages.

PROMs

Response

Per year

FIGURE Pre-operative, 3 months and 12 months postoperative response percentage of patients who underwent a primary total anatomical shoulder arthroplasty for osteoarthritis in the Netherlands in 2016-2024

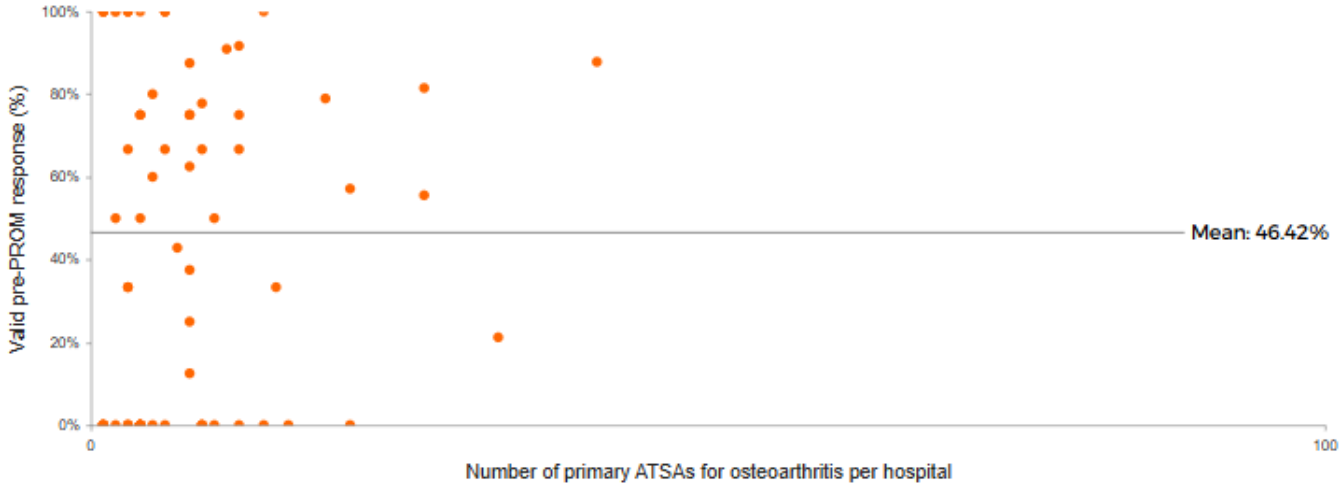


	2016	2017	2018	2019	2020	2021	2022	2023	2024
Pre-PROM	7.61	28.35	30.63	45.85	45.52	42.01	55.02	58.68	56.39
Pre- and 12 months PROM	5.08	17.19	18.46	27.39	26.37	27.35	36.14	35.85	n.a.
Pre-, 3- and 12 months PROM	3.30	11.83	14.60	21.37	23.13	22.98	29.92	30.75	n.a.
Total anatomical shoulder arthroplasty for osteoarthritis (n)	**394**	**448**	**493**	**482**	**402**	**457**	**498**	**530**	**493**

Please note: The 12 months postoperative PROMs response percentage is not (yet) available for 2024.
PROM: patient reported outcome measure.

Per pre-PROM per hospital

FIGURE Scatterplot of pre-operative response percentage of patients who underwent a primary total anatomical shoulder arthroplasty for osteoarthritis per hospital in the Netherlands in 2024



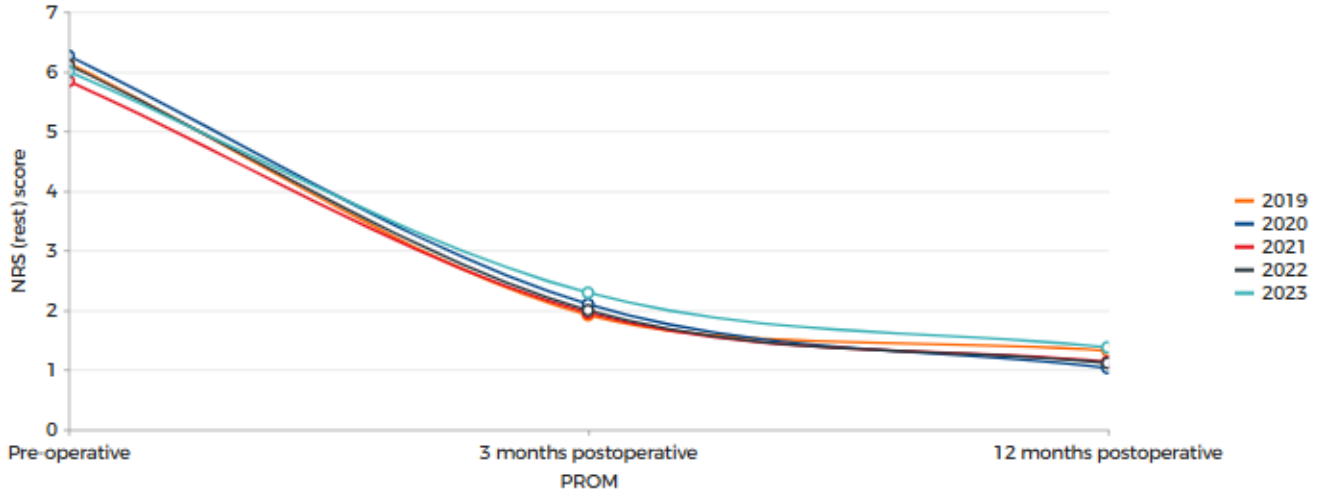
PROM: patient reported outcome measure; ATSA: total anatomical shoulder arthroplasty

The mean pre-operative response rate is 46.4% in the Netherlands in 2024.
Of the 72 hospitals, 33 (46%) scored above the 60% response rate.

Outcomes

NRS (rest)

FIGURE Mean (95% CI) pre-operative, 3 months and 12 months postoperative NRS (rest) scores of patients who underwent a primary total anatomical shoulder arthroplasty for osteoarthritis in the Netherlands in 2019-2023



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NRS (rest) score		Pre-operative	3 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	103	6.14 (5.69-6.59)	1.92 (1.47-2.37)	1.32 (0.89-1.76)
2020	94	6.26 (5.82-6.70)	2.10 (1.61-2.59)	1.03 (0.66-1.40)
2021	105	5.84 (5.37-6.31)	1.96 (1.54-2.39)	1.14 (0.75-1.52)
2022	149	6.11 (5.76-6.46)	2.00 (1.66-2.34)	1.12 (0.79-1.44)
2023	163	6.00 (5.65-6.35)	2.29 (1.90-2.69)	1.38 (1.02-1.74)
Total	614	6.06 (5.88-6.24)	2.07 (1.89-2.26)	1.21 (1.05-1.38)

CI: confidence interval

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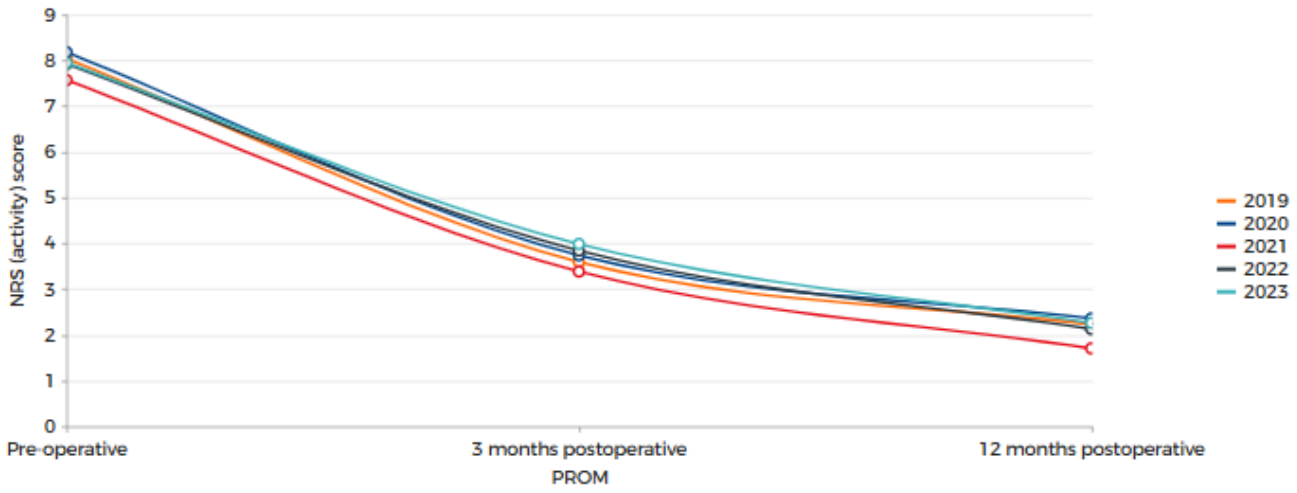
The NRS (rest) score measures pain during rest. The score has a range of 0.0 to 10.0, with 0.0 representing no pain and 10.0 representing the most possible pain.

NRS (activity)

FIGURE Mean (95% CI) pre-operative, 3 months and 12 months postoperative NRS (activity) scores of patients who underwent a primary total anatomical shoulder arthroplasty for osteoarthritis in the Netherlands in 2019-2023



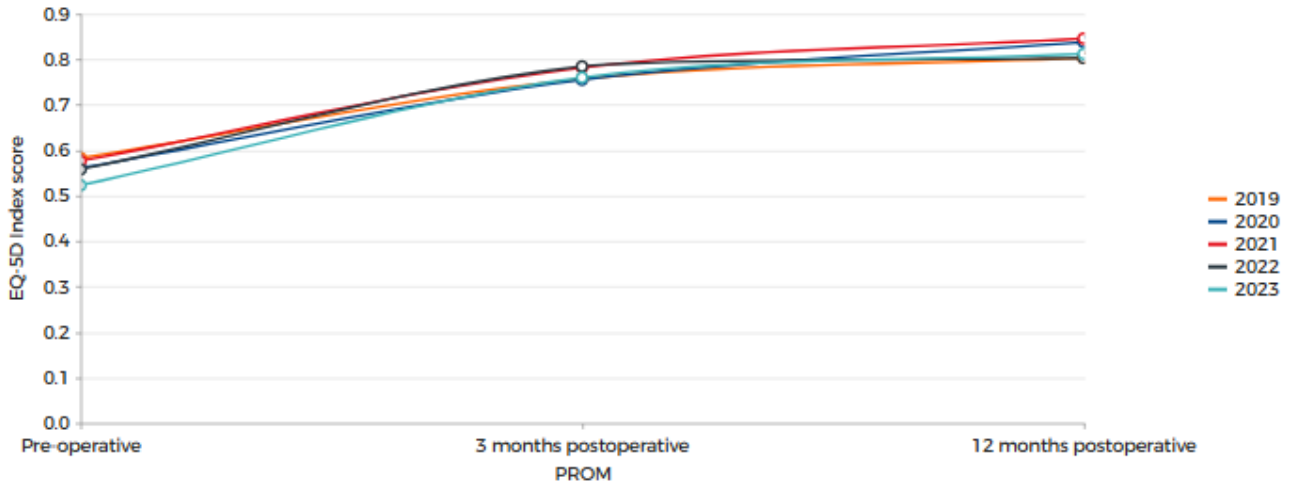
NRS (activity) score		Pre-operative	3 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	103	8.04 (7.69-8.39)	3.60 (3.07-4.13)	2.23 (1.70-2.77)
2020	94	8.18 (7.87-8.49)	3.74 (3.23-4.25)	2.36 (1.85-2.87)
2021	105	7.57 (7.19-7.95)	3.39 (2.90-3.87)	1.71 (1.26-2.16)
2022	149	7.92 (7.66-8.18)	3.84 (3.44-4.25)	2.13 (1.75-2.51)
2023	163	7.94 (7.70-8.19)	3.99 (3.57-4.41)	2.26 (1.87-2.66)
Total	614	7.93 (7.79-8.06)	3.75 (3.54-3.95)	2.14 (1.95-2.34)

CI: confidence interval

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.

EQ-5D index score

FIGURE Mean (95% CI) pre-operative, 3 months and 12 months postoperative EQ-5D Index scores of patients who underwent a primary total anatomical shoulder arthroplasty for osteoarthritis in the Netherlands in 2019-2023



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EQ-5D Index score		Pre-operative	3 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	103	0.58 (0.55-0.62)	0.76 (0.73-0.79)	0.80 (0.77-0.84)
2020	94	0.56 (0.52-0.60)	0.76 (0.72-0.79)	0.84 (0.80-0.87)
2021	105	0.58 (0.53-0.62)	0.78 (0.75-0.82)	0.85 (0.82-0.87)
2022	149	0.56 (0.52-0.60)	0.78 (0.76-0.81)	0.80 (0.77-0.84)
2023	163	0.52 (0.48-0.56)	0.76 (0.73-0.79)	0.81 (0.78-0.84)
Total	614	0.56 (0.54-0.57)	0.77 (0.76-0.78)	0.82 (0.80-0.83)

CI: confidence interval

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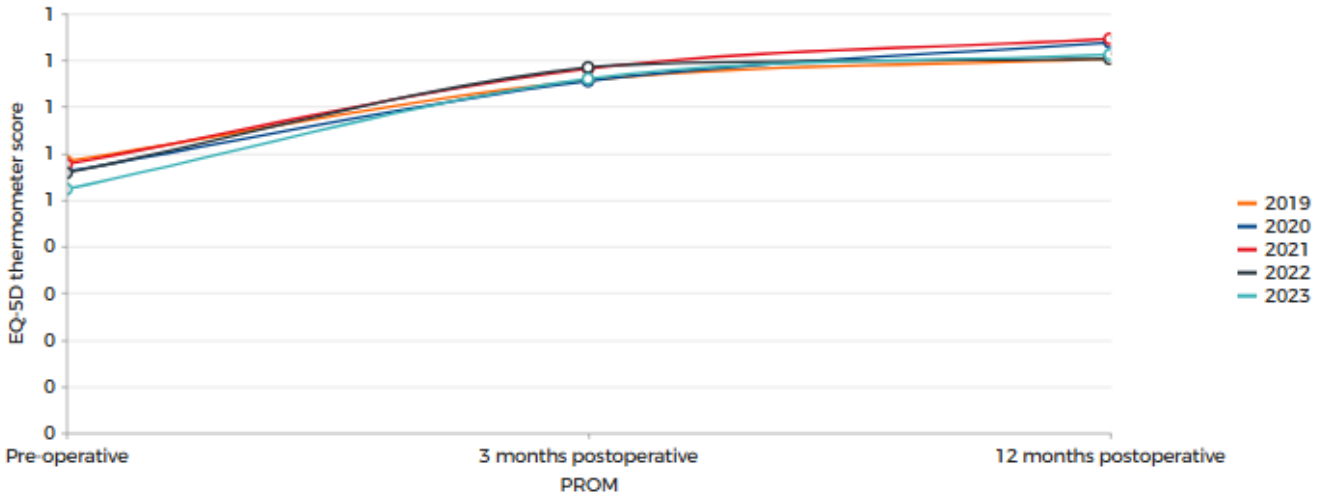
The EQ-5D index score measures quality of life. The score has a range of -0.329 to 1.0, with 1.0 representing the best possible quality of life.

EQ-5D thermometer

FIGURE Mean (95% CI) pre-operative, 3 months and 12 months postoperative EQ-5D thermometer scores of patients who underwent a primary total anatomical shoulder arthroplasty for osteoarthritis in the Netherlands in 2019-2023



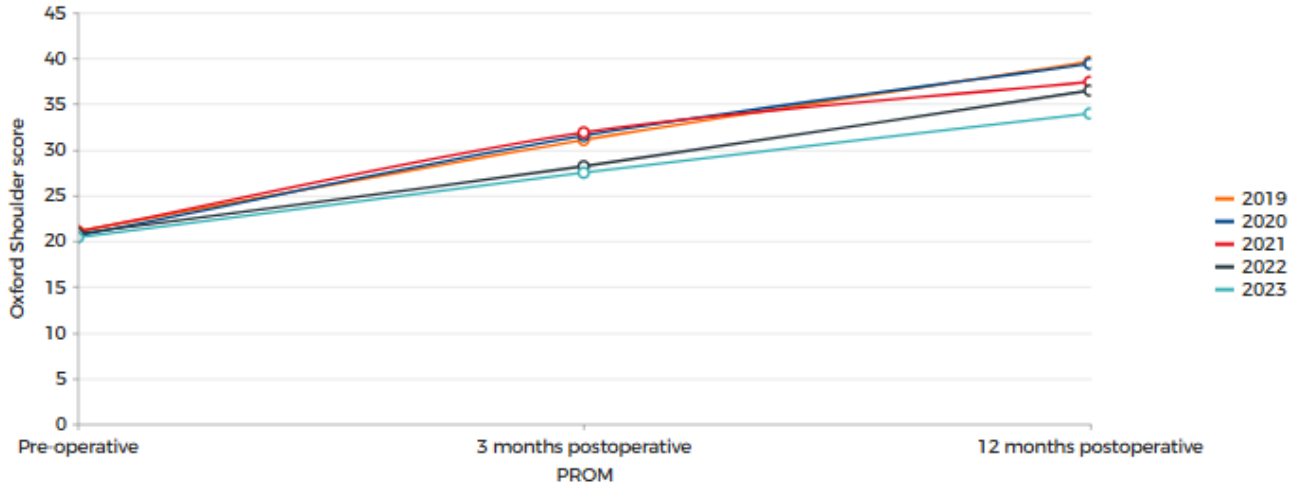
EQ-5D thermometer score		Pre-operative	3 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	103	0.58 (0.55-0.62)	0.76 (0.73-0.79)	0.80 (0.77-0.84)
2020	94	0.56 (0.52-0.60)	0.76 (0.72-0.79)	0.84 (0.80-0.87)
2021	105	0.58 (0.53-0.62)	0.78 (0.75-0.82)	0.85 (0.82-0.87)
2022	149	0.56 (0.52-0.60)	0.78 (0.76-0.81)	0.80 (0.77-0.84)
2023	163	0.52 (0.48-0.56)	0.76 (0.73-0.79)	0.81 (0.78-0.84)
Total	614	0.56 (0.54-0.57)	0.77 (0.76-0.78)	0.82 (0.80-0.83)

CI: confidence interval

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 (95% CI) pre-operative, 3 months and 12 months postoperative Oxford Shoulder scores of patients who underwent a primary total anatomical shoulder arthroplasty for osteoarthritis in the Netherlands in 2019-2023



Oxford Shoulder Score		Pre-operative	3 months postoperative	12 months postoperative
Procedure year	n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
2019	103	21.09 (19.47-22.71)	31.07 (28.99-33.14)	39.63 (37.93-41.32)
2020	94	20.56 (19.11-22.02)	31.54 (29.58-33.50)	39.40 (37.70-41.10)
2021	105	21.04 (19.52-22.56)	31.89 (29.99-33.78)	37.42 (35.19-39.65)
2022	149	20.83 (19.64-22.01)	28.19 (26.39-29.99)	36.48 (34.84-38.12)
2023	163	20.40 (19.25-21.56)	27.48 (25.83-29.13)	33.96 (31.94-35.99)
Total	614	20.75 (20.15-21.35)	29.66 (28.82-30.50)	36.97 (36.10-37.84)

CI: confidence interval

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 0.0 representing no functional ability and 48.0 the most functional ability.

Hemi shoulder arthroplasty

Patient characteristics

By diagnosis

TABLE Patient characteristics of all patients with a registered shoulder hemiarthroplasty by diagnosis in the Netherlands in 2024

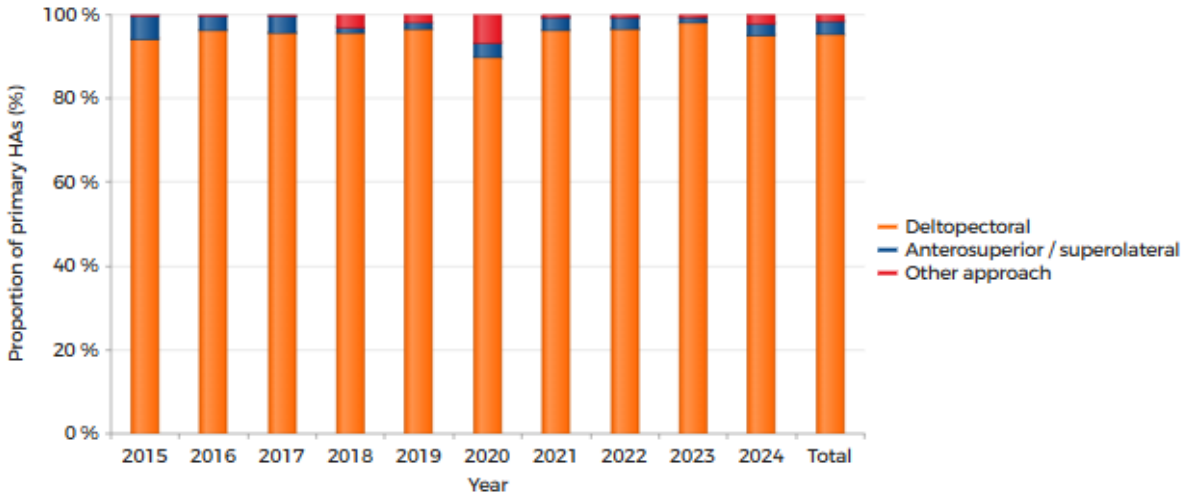
	Osteoarthritis	Fracture	Other	Total
N(%)	**67 (46.8)**	**29 (20.2)**	**47 (32.8)**	**143**
Mean age (years) (SD)	62.5 (11)	62.3 (10.7)	59.2 (14.7)	61.4 (12.3)
Age (years) (%)				
<50	9	10	17	12
50-59	28	31	32	30
60-69	40	28	34	36
70-79	15	28	4	14
>80	7	3	13	8
Gender (%)				
Men	37	41	53	43
Women	63	59	47	57
ASA score (%)				
ASA I	16	10	2	10
ASA II	58	45	64	57
ASA III-IV	25	45	34	32
Type of hospital (%)				
General	81	90	66	78
UMC	1	10	28	12
Private	18	0	6	10
Specialism (%)				
Orthopaedic surgeon	100	83	100	97
Trauma surgeon	0	17	0	3
Walch-score (%)				
A1	36	100	59	49
A2	34	0	26	32
B1	6	0	4	5
B2	10	0	0	7
B3	3	0	0	2
C	4	0	4	4
Mean BMI (kg/m2) (SD)	29.5 (5.4)	29.3 (6.6)	26.3 (4.7)	28.4 (5.6)
Body Mass Index (kg/m2) (%)				
Underweight (<=18.5)	1	0	6	3
Normal weight (>18.5-25)	9	31	32	22
Overweight (>25-30)	52	31	40	46
Obesity (>30-40)	25	24	17	23
Morbid obesity (>40)	7	7	2	6
Smoking (%)				
No	82	66	81	79
Yes	18	31	19	21

Please note: diagnosis 'Other' (47; 32.8%) includes osteonecrosis (18), late post-traumatic (12), other (5), reumatoid arthritis (4), tumor (3), cuff arthropathy (1), inflammatory arthritis (1) and 3 primary shoulder hemiarthroplasties where the diagnosis was not registered.
General: general hospital; UMC: university medical centre; Private: private hospital; SD: standard deviation.

Procedure characteristics

Surgical approach

FIGURE Trend (proportion [%] per year) in surgical approach for performing a primary shoulder hemiarthroplasty in the Netherlands in 2015-2024

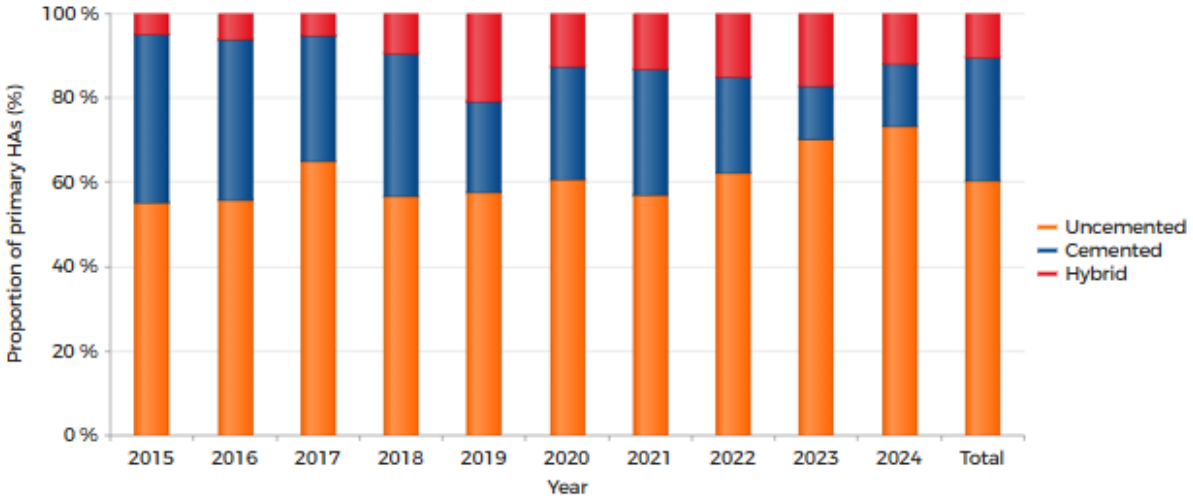


	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Deltopectoral	94.30	96.32	95.72	95.60	96.68	90	96.41	96.65	98.09	94.96	95.49
Anterosuperior / superolateral	5.41	3.34	3.95	1.20	1.42	3.13	2.99	2.79	1.27	2.88	3.07
Other approach	0.28	0.33	0.33	3.20	1.90	6.88	0.60	0.56	0.64	2.16	1.44
Total (n)	**351**	**299**	**304**	**250**	**211**	**160**	**167**	**179**	**157**	**139**	**2,217**

HA: shoulder hemiarthroplasty

Fixation

FIGURE Trend (proportion [%] per year) in type of fixation in primary shoulder hemiarthroplasties in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Uncemented	55.11	55.89	65.02	56.80	57.82	60.63	57.14	62.37	70.25	73.24	60.40
Cemented	40.06	38.05	29.70	33.60	21.33	26.88	29.76	22.58	12.66	14.79	29.14
Hybrid	4.83	6.06	5.28	9.60	20.85	12.50	13.10	15.05	17.09	11.97	10.46
Total (n)	**352**	**297**	**303**	**250**	**211**	**160**	**168**	**186**	**158**	**142**	**2,227**

HA: shoulder hemiarthroplasty

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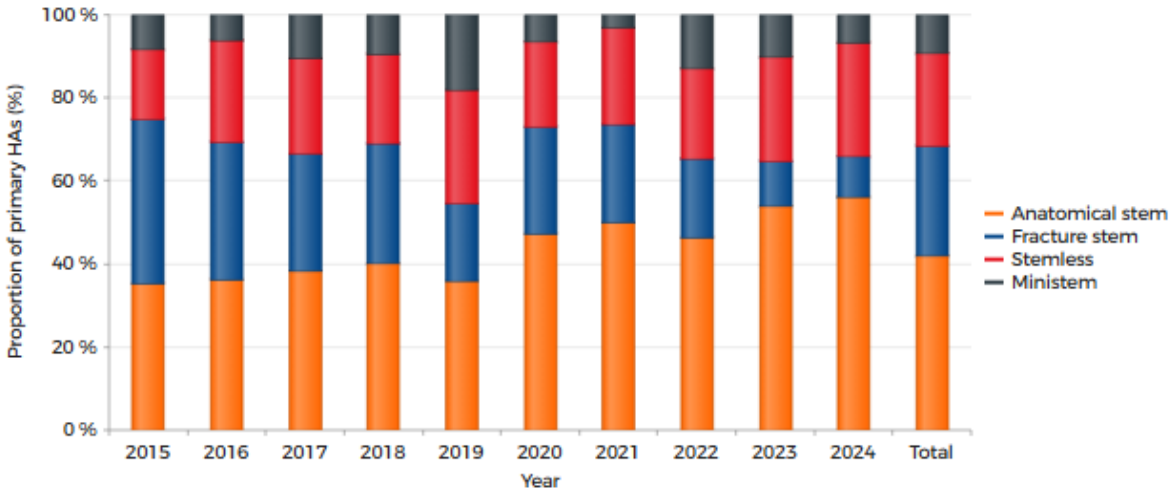
Type humeral stem

FIGURE Trend (proportion [%] per year) in type of humeral stem in primary shoulder hemiarthroplasties in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Anatomical stem	35.33	36.16	38.31	40.09	35.93	47.14	50	46.30	54	56.06	42.09
Fracture stem	39.52	33.21	28.23	28.77	18.56	25.71	23.72	19.14	10.67	9.85	26.22
Stemless	16.77	24.35	22.98	21.70	27.54	20.71	23.08	21.60	25.33	27.27	22.57
Ministem	8.38	6.27	10.48	9.43	17.96	6.43	3.21	12.96	10	6.82	9.13
Total (n)	**334**	**271**	**248**	**212**	**167**	**140**	**156**	**162**	**150**	**132**	**1,972**

HA: shoulder hemiarthroplasty

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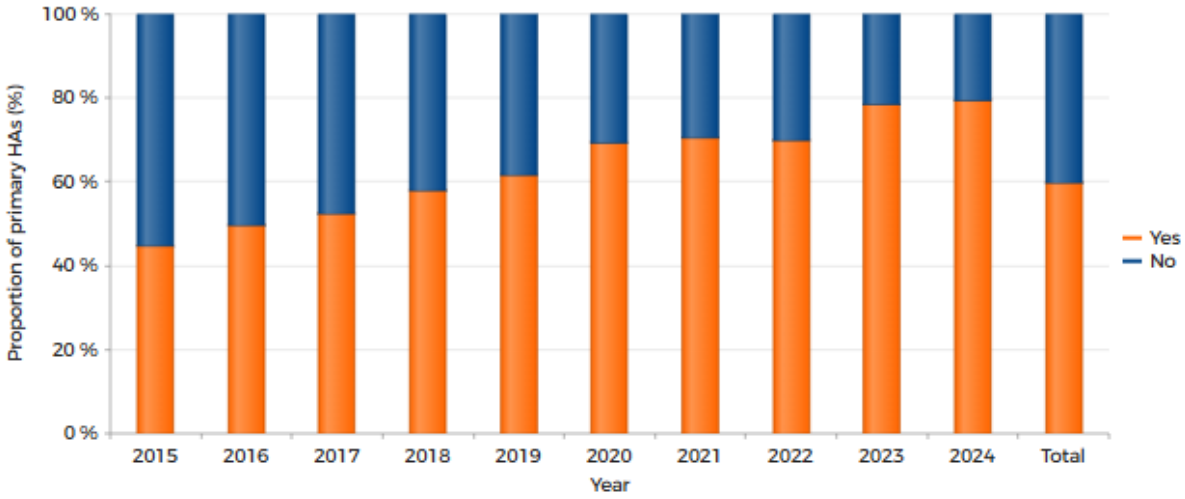
Modular humeral stem

FIGURE Trend (proportion [%] per year) in modular humeral stem in primary shoulder hemiarthroplasties in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Yes	44.78	49.63	52.44	57.97	61.59	69.40	70.67	69.81	78.62	79.53	59.83
No	55.22	50.37	47.56	42.03	38.41	30.60	29.33	30.19	21.38	20.47	40.17
Total (n)	**335**	**270**	**246**	**207**	**164**	**134**	**150**	**159**	**145**	**127**	**1,937**

HA: shoulder hemiarthroplasty

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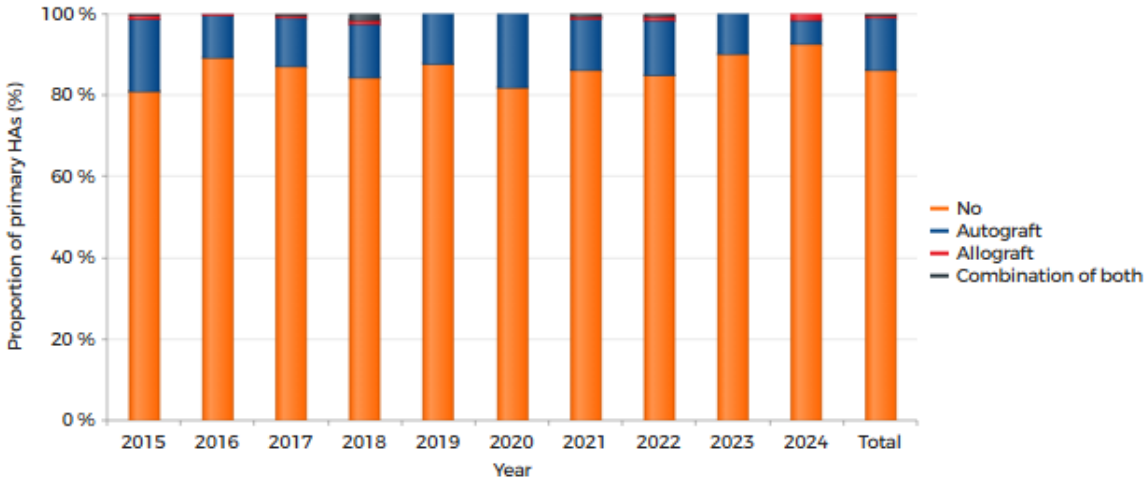
Bonegraft

FIGURE Trend (proportion [%] per year) in type of bonegraft in primary shoulder hemiarthroplasties in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
No	81.07	89.26	87.17	84.21	87.80	82.05	86.34	84.83	90.32	92.65	86.18
Autograft	17.75	10.40	11.84	13.36	12.20	17.95	12.42	13.48	9.68	5.88	12.86
Allograft	0.89	0.34	0.66	0.81	0	0	0.62	1.12	0	1.47	0.60
Combination of both	0.30	0	0.33	1.62	0	0	0.62	0.56	0	0	0.37
Total (n)	**338**	**298**	**304**	**247**	**205**	**156**	**161**	**178**	**155**	**136**	**2,178**

HA: shoulder hemiarthroplasty

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Most frequently registered humeral stem and humeral liner

TABLE The most frequently registered humeral stems and humeral heads in primary shoulder hemiarthroplasties in the Netherlands in 2020-2024

Year	2020	2021	2022	2023	2024
Humeral stem (n)	**140**	**157**	**163**	**150**	**133**
Name; Proportion (%)					
Aequalis Ascend Flex	27.14	23.57	22.70	30.67	29.32
SMR Stemless	5.00	3.82	5.52	12.00	16.54
SMR stem Cementless	5.71	5.73	4.91	2.00	9.77
Aequalis Fractuur hemi	14.29	10.19	5.52	4.67	5.26
Affinis Short	2.86	2.55	9.20	5.33	4.51
Simpliciti Shoulder System	3.57	3.82	3.07	1.33	4.51
Aequalis Flex Revive	2.86	3.18	3.68	11.33	3.76
Global Unite	3.57	6.37	7.98	4.00	3.76
Sidus Baseplate	4.29	7.01	7.36	4.67	3.01
Comprehensive Mini	3.57	0.64	3.68	4.67	2.26
Year	**2020**	**2021**	**2022**	**2023**	**2024**
Humeral head (n)	**143**	**150**	**151**	**141**	**127**
Name; Proportion (%)					
SMR head	10.49	12.00	11.92	14.18	30.71
Aequalis pyrocarbon humeral head	25.17	16.67	14.57	25.53	21.26
Aequalis Ascend Flex	5.59	10.67	14.57	17.02	14.96
Comprehensive	11.19	19.33	12.58	9.22	5.51
Simpliciti Shoulder System	3.50	4.00	3.31	1.42	5.51
Global Unite/ Global AP	4.20	6.67	8.61	4.96	3.94
Aequalis humerus kop	13.99	10.00	6.62	4.96	3.94
Affinis Short	2.80	2.67	7.95	5.67	3.94
Sidus Heads	4.20	7.33	7.95	4.96	3.15
Global AP	2.10	0.67	0.00	0.71	2.36

Most frequently registered bone cement

TABLE The most frequently registered types of bone cement used during primary shoulder hemiarthroplasties in the Netherlands in 2020-2024

Year	2020	2021	2022	2023	2024
Bone cement pre-packed in a vacuum mixing system (n)	**29**	**52**	**34**	**20**	**16**
Cement name; Proportion (%)					
Palacos R+G	27.59	46.15	20.59	60.00	68.75
Refobacin Bone Cement R	31.03	38.46	50.00	35.00	31.25
Year	**2020**	**2021**	**2022**	**2023**	**2024**
Separately packed bone cement components (n)	**28**	**12**	**28**	**13**	**11**
Cement name; Proportion (%)					
Refobacin Bone Cement R	7.14	0.00	10.71	38.46	36.36
Palacos R+G	67.86	83.33	42.86	38.46	27.27
Simplex ABC EC	7.14	0.00	25.00	0.00	18.18
Copal G+C	0.00	0.00	7.14	15.38	9.09
Copal G+V	0.00	0.00	0.00	0.00	9.09

Survival

Short term revision

By type of revision within 1 year

TABLE Cumulative 1-year revision percentage of primary shoulder hemiarthroplasties by type of revision in the Netherlands in 2019-2023 (n=882)

	Cumulative 1-year revision percentage - Kaplan Meier (95% CI)
Any type of revision	2.75 (1.67-3.84)
Major revision	0.80 (0.21-1.39)
Only humeral stem	0.00 (0.00-0.00)
Minor revision	1.95 (1.03-2.87)
DAIR	0.46 (0.01-0.90)
No DAIR	1.49 (0.69-2.30)

Any type of revision includes minor and major revisions as well as revision procedures that could not be classified as minor or major revision.
Major revision: Revision of at least the humeral stem.
Minor revision: Only humeralhead (including DAIR procedures).
CI: confidence interval.

In 2019-2023, 19 (2.2%) primary shoulder hemiarthroplasties were implanted in patients who died within one year after the primary procedure.

Time after primary hemi arthroplasty

TABLE Time after primary shoulder hemiarthroplasty until short-term revision in the Netherlands in 2016-2021 (n=1,085)

Time after primary hemi	Percentage revisions (%)
Day 0-29	0.46
Day 30-182	0.65
Day 183-364	1.66
Day 365-730 (second year)	2.76
Day 731-1095 (third year)	1.29

Reasons for revision

TABLE Reasons for revision within one year in patients that underwent a shoulder revision arthroplasty after a primary shoulder hemiarthroplasty in the Netherlands in 2019-2023 (n=48)

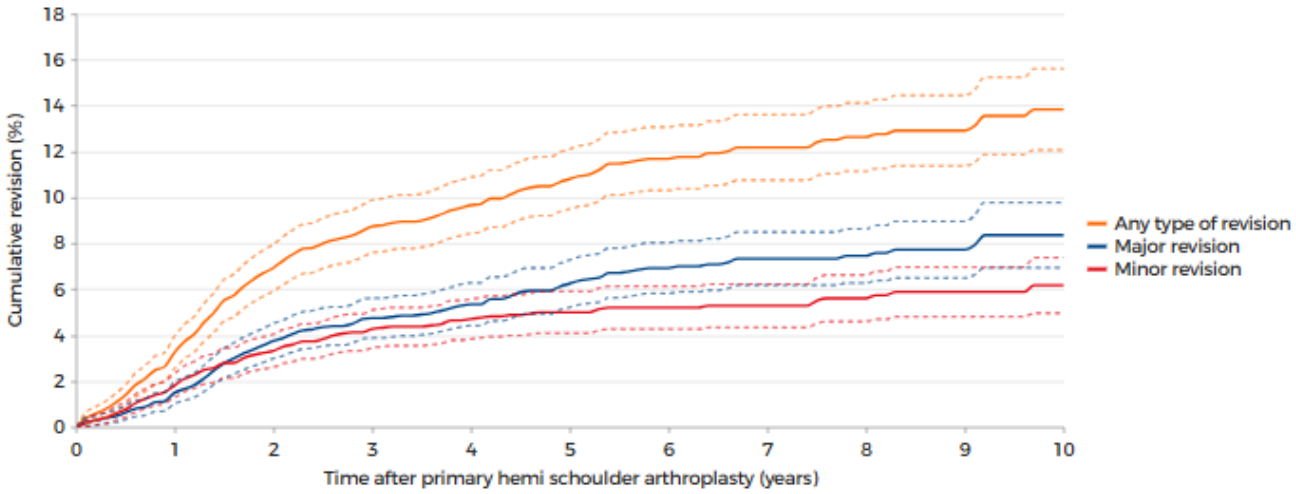
Reasons for revision	Proportion (%)
Cuff rupture	27.59
Infection	24.14
Malalignment	24.14
Cuff arthropathy	17.24
Instability	10.34
Loosening of humeral component	6.90
Progression of osteoarthritis	6.90
Loosening of glenoid component	3.45
Peri-prosthetic fracture	0.00
Other	17.24

Please note: One patient may have more than one reason of revision.

Long term revision

By type of revision

FIGURE Cumulative revision percentage (Kaplan-Meier; 95% CI) of primary shoulder hemiarthroplasties by type of revision in the Netherlands in 2014-2024 (n=2,592)



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	1yr	3yr	5yr	7yr	10yr
Any type of revision	2.63 (2.01-3.26)	8.54 (7.40-9.67)	10.67 (9.38-11.97)	12.18 (10.75-13.61)	13.84 (12.07-15.61)
Major revision	1.12 (0.70-1.53)	4.69 (3.83-5.56)	6.12 (5.10-7.13)	7.33 (6.18-8.49)	8.36 (6.94-9.78)
Minor revision	1.52 (1.04-2.00)	4.12 (3.31-4.92)	5.00 (4.09-5.90)	5.28 (4.33-6.22)	6.17 (4.96-7.38)

Please note: Dotted lines represent the upper and lower limits of the 95% confidence interval.
Any type of revision includes minor and major revisions as well as revision procedures that could not be classified as minor or major revision.
Major revision: Revision of at least the humeral stem.
Minor revision: Only humeralhead (including DAIR procedures).
CI: confidence interval.

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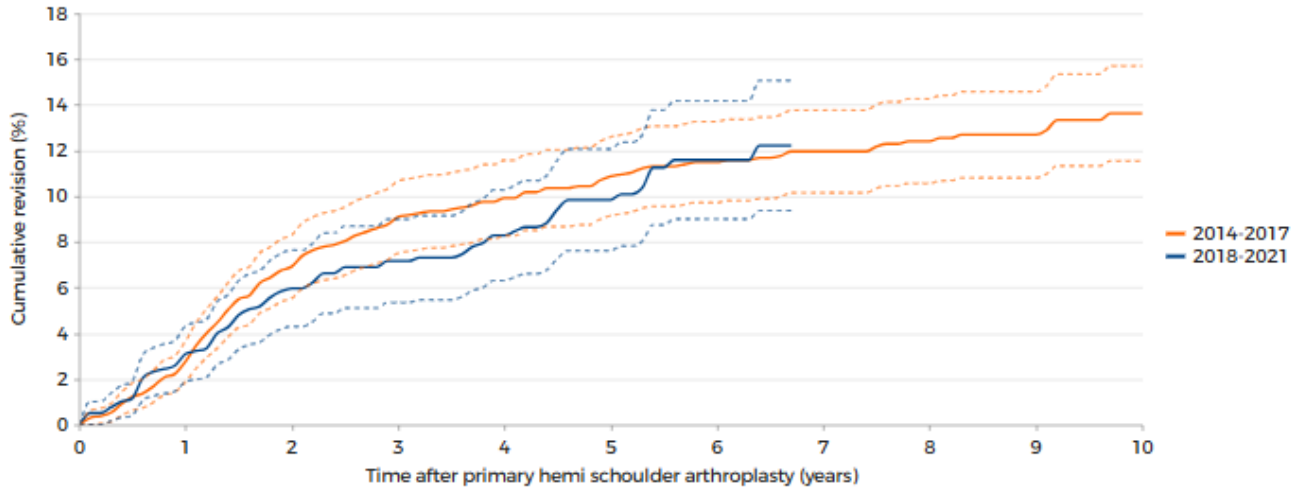
In 2007-2024, 439 (16.9%) primary shoulder hemiarthroplasties were implanted in patients who died within ten years after the primary diagnosis

By procedure year

FIGURE Cumulative revision percentage (Kaplan-Meier; 95% CI) of primary shoulder hemiarthroplasties by procedure year of primary arthroplasty in the Netherlands in 2014-2024 (n=2,106)



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	Number (n)	1yr	3yr	5yr	7yr	10yr
2014-2017	1,322	2.22 (1.42-3.02)	8.77 (7.21-10.32)	10.70 (8.99-12.40)	11.96 (10.15-13.77)	13.62 (11.54-15.70)
2018-2021	784	2.58 (1.46-3.69)	7.17 (5.34-9.00)	9.84 (7.62-12.07)	n.a.	n.a.

Please note: Dotted lines represent the upper and lower limits of the 95% confidence intervall; n.a. if <50 cases were at risk.
CI: confidence interval.

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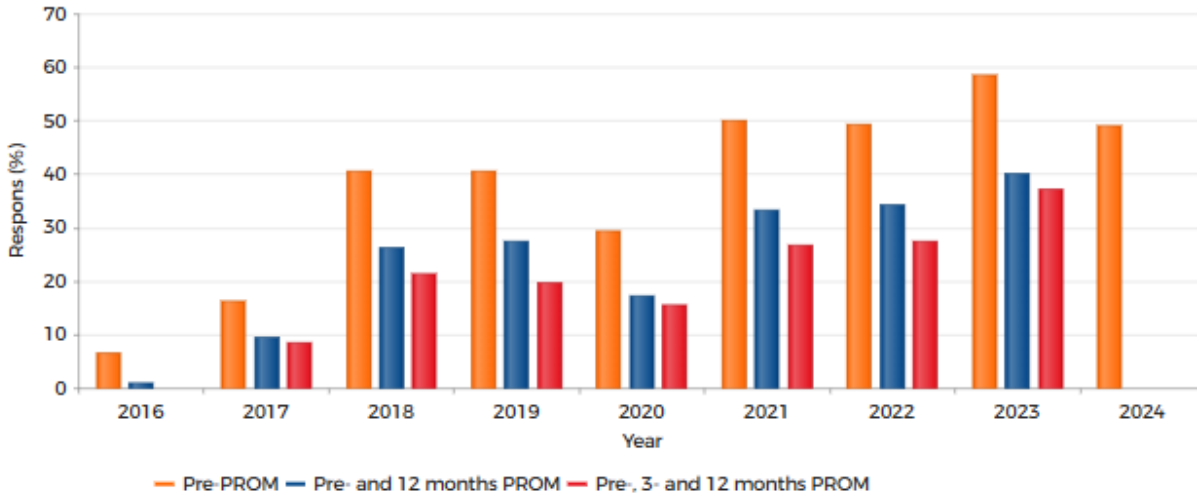
PROMs

Response

FIGURE Pre-operative, 3 months and 12 months postoperative response percentage of patients who underwent a primary shoulder hemiarthroplasty for osteoarthritis in the Netherlands in 2016-2024

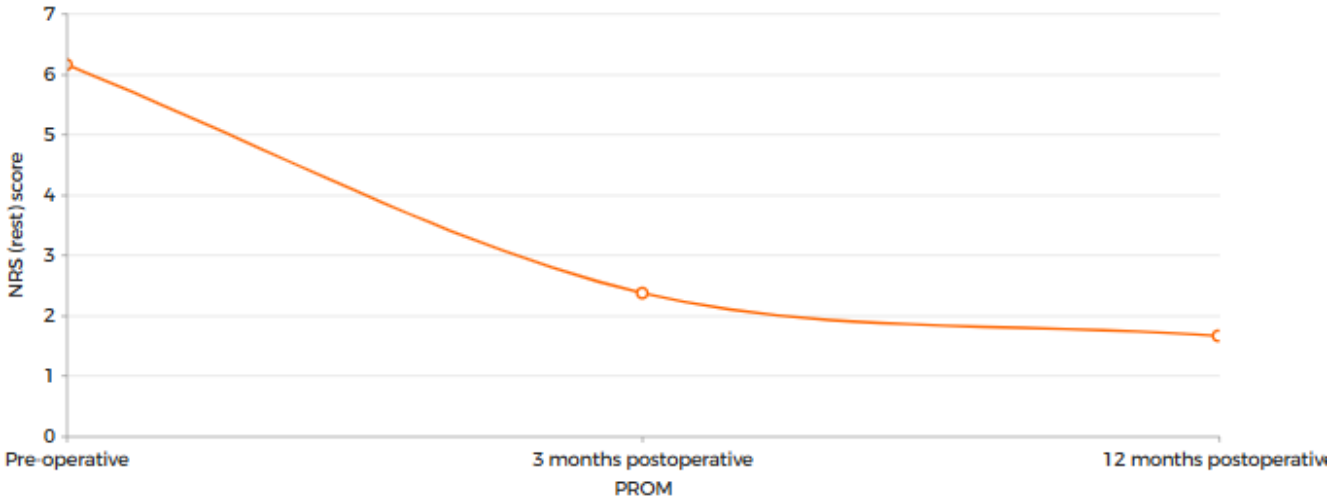


	2016	2017	2018	2019	2020	2021	2022	2023	2024
Pre-PROM	6.54	16.38	40.48	40.66	29.31	50.00	49.32	58.57	49.12
Pre- and 12 months PROM	0.93	9.48	26.19	27.47	17.24	33.33	34.25	40.00	n.a.
Pre-, 3- and 12 months PROM	0.00	8.62	21.43	19.78	15.52	26.67	27.40	37.14	n.a.
Shoulder hemiarthroplasty for osteoarthritis (n)	**107**	**116**	**84**	**91**	**58**	**60**	**73**	**70**	**57**

Please note: The 12 months postoperative PROMs response percentage is not (yet) available for 2024.
PROM: patient reported outcome measure.

NRS (rest)

FIGURE Mean (95% CI) pre-operative, 3 months and 12 months postoperative NRS (rest) scores of patients who underwent a primary shoulder hemiarthroplasty for osteoarthritis in the Netherlands in 2016-2023



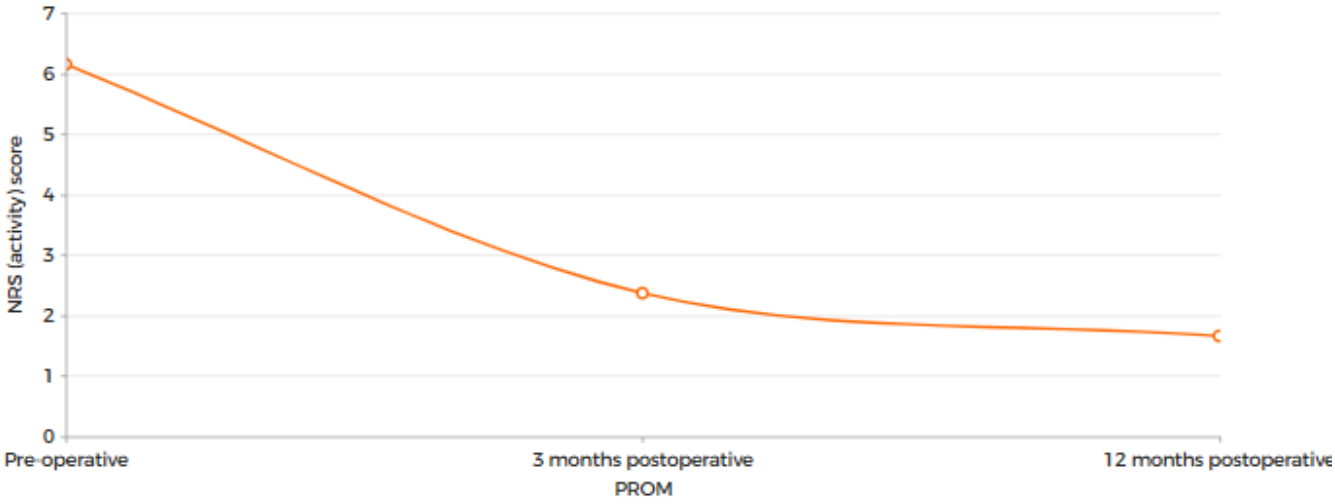
NRS (rest) score	Pre-operative	3 months postoperative	12 months postoperative
n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
117	6.15 (5.79-6.52)	2.37 (1.93-2.81)	1.66 (1.24-2.08)

CI: confidence interval

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 (95% CI) pre-operative, 3 months and 12 months postoperative NRS (activity) scores of patients who underwent a primary shoulder hemiarthroplasty for osteoarthritis in the Netherlands in 2019-2023



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NRS (activity) score	Pre-operative	3 months postoperative	12 months postoperative
n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
117	6.15 (5.79-6.52)	2.37 (1.93-2.81)	1.66 (1.24-2.08)

CI: confidence interval

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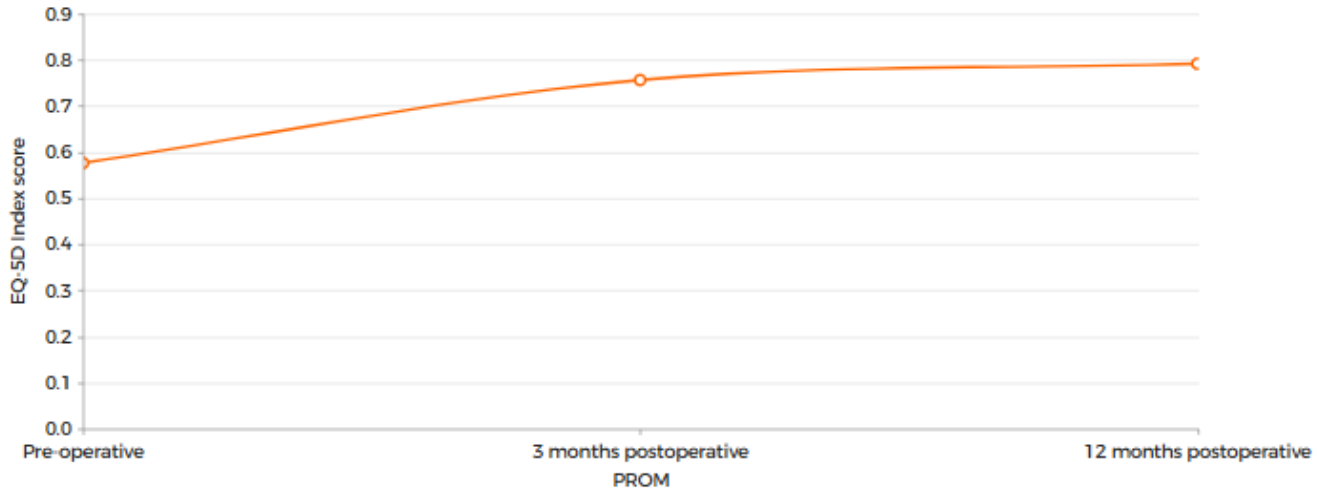
The NRS (activity) score measures pain during activity. The score has a range of 0.0 to 10.0, with 0.0 representing no pain and 10.0 representing the most possible pain.

EQ-5D index score

FIGURE Mean (95% CI) pre-operative, 3 months and 12 months postoperative EQ-5D Index scores of patients who underwent a primary shoulder hemiarthroplasty for osteoarthritis in the Netherlands in 2019-2023



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EQ-5D index score	Pre-operative	3 months postoperative	12 months postoperative
n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
117	0.58 (0.54-0.61)	0.76 (0.73-0.78)	0.79 (0.75-0.83)

CI: confidence interval

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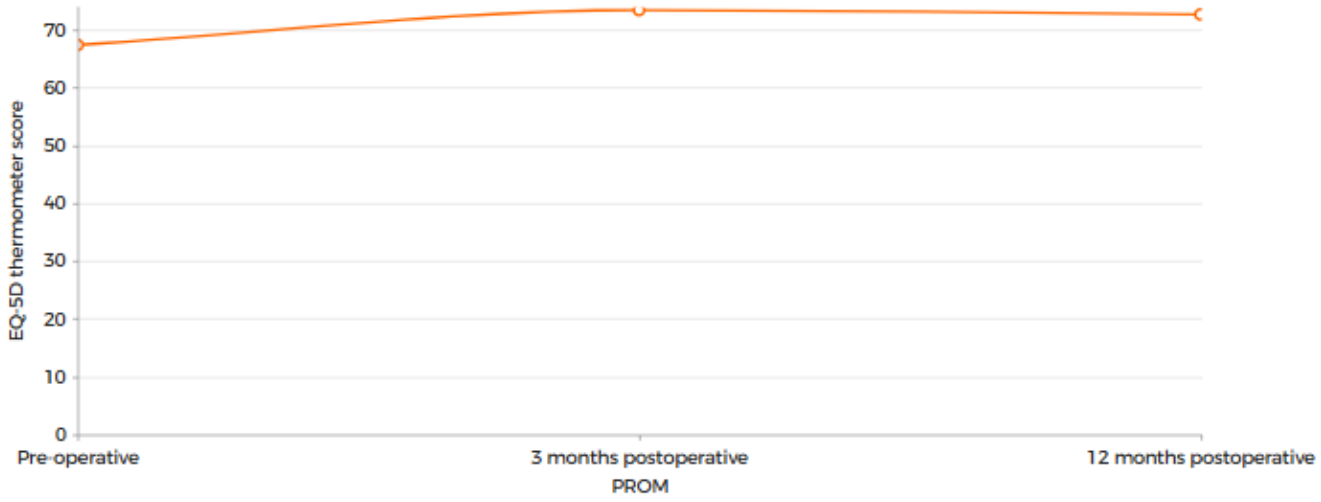
The EQ-5D index score measures quality of life. The score has a range of -0.329 to 1.0, with 1.0 representing the best possible quality of life.

EQ-5D thermometer

FIGURE Mean (95% CI) pre-operative, 3 months and 12 months postoperative EQ-5D thermometer scores of patients who underwent a primary shoulder hemiarthroplasty for osteoarthritis in the Netherlands in 2019-2023



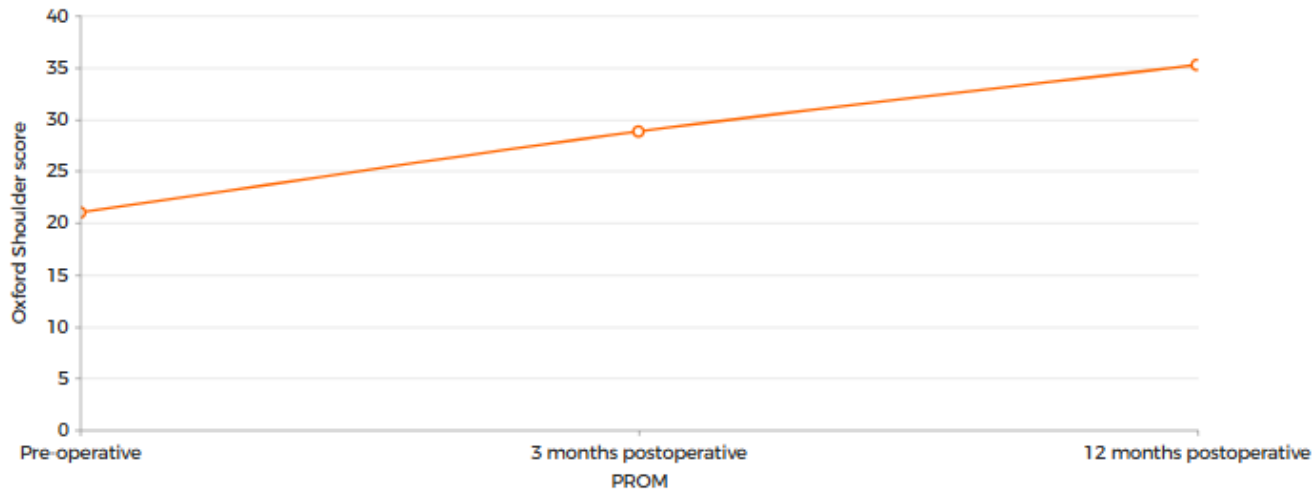
EQ-5D thermometer score	Pre-operative	3 months postoperative	12 months postoperative
n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
117	67.39 (63.90-70.88)	73.42 (69.51-77.34)	72.67 (68.03-77.31)

CI: confidence interval

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 (95% CI) pre-operative, 3 months and 12 months postoperative Oxford Shoulder scores of patients who underwent a primary shoulder hemiarthroplasty for osteoarthritis in the Netherlands in 2019-2023



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Oxford Shoulder score	Pre-operative	3 months postoperative	12 months postoperative
n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
117	20.98 (19.60-22.37)	28.80 (26.96-30.65)	35.23 (33.20-37.26)

CI: confidence interval

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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 0.0 representing no functional ability and 48.0 the most functional ability.

Shoulder revision artroplasty

Revision characteristics

Reasons for revision

TABLE Trend (proportion [%] per year) in reasons for revision in patients who underwent a shoulder revision arthroplasty in the Netherlands in 2015-2024

Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Shoulder revision arthroplasty (n)	272	274	346	334	353	309	329	345	472	492	3526
Reasons for revision; Proportion (%)											
Infection	16.54	22.26	21.39	24.85	28.05	28.80	32.22	30.72	28.18	36.38	27.65
Instability	15.44	23.36	26.30	22.16	22.66	23.95	19.76	20.58	21.19	21.14	21.70
Progression of osteoarthritis	24.63	16.79	16.76	14.97	12.18	10.36	11.25	11.01	8.69	7.11	12.68
Loosening of glenoid component	13.24	10.58	13.01	11.08	11.33	10.36	14.59	18.26	17.16	12.80	13.44
Cuff rupture	15.07	10.95	14.45	11.98	11.33	10.03	10.94	10.72	9.53	8.74	11.15
Cuff arthropathy	13.24	13.50	11.85	9.58	11.61	9.71	7.60	4.35	7.84	5.69	9.13
Other	12.87	8.39	8.38	5.99	6.23	9.39	5.78	9.86	9.75	9.35	8.59
Loosening of humeral component	7.72	10.95	4.62	7.19	5.38	8.74	7.90	8.70	8.90	9.15	7.94
Peri-prosthetic fracture	5.88	5.11	4.62	6.59	6.23	5.83	8.81	7.83	6.57	6.50	6.44
Revision after shoulder removal								4.93	5.93	9.15	
Other	11.76	12.04	9.25	12.57	11.90	17.48	12.77	11.88	13.77	9.15	12.14

Please note: Removal after shoulder revision was not registered before 2022.

One patient may have more than one reason for revision. As such, the total proportion is over 100%.

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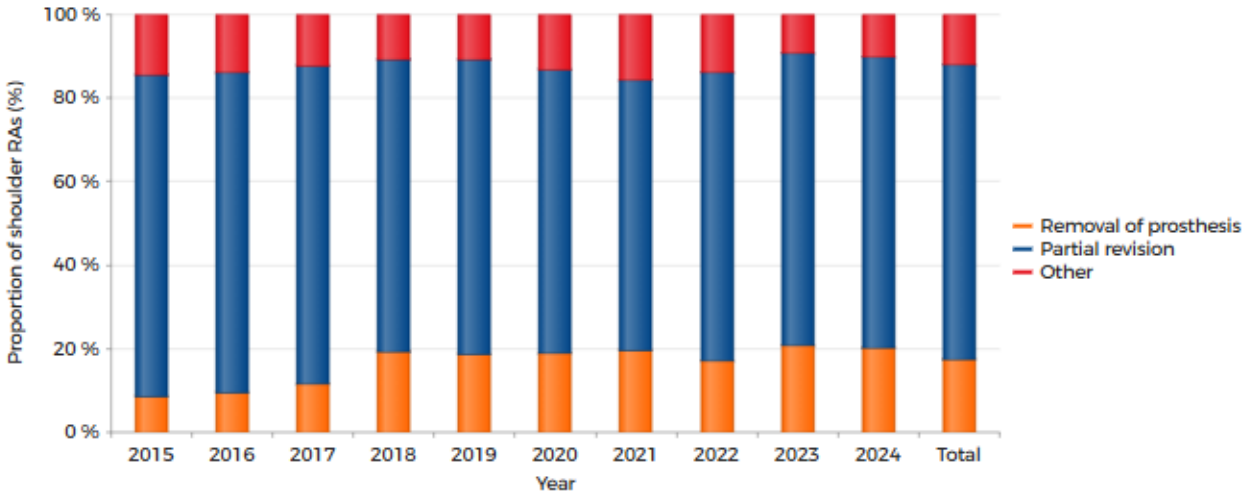
Type of revision

FIGURE Trend (proportion [%] per year) in type of revision in shoulder revision arthroplasties in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Removal of prosthesis	4.62	5.70	6.33	11.21	12.36	13.77	13.41	10.53	13.56	14.14	11.04
Partial revision	41.15	46.77	41.27	40.50	46.55	48.85	44.51	41.81	45.76	48.57	44.81
Other	7.69	8.37	6.63	6.23	7.18	9.51	10.67	8.48	5.93	6.97	7.63
Total (n)	**139**	**160**	**180**	**186**	**230**	**220**	**225**	**208**	**308**	**340**	**2,196**

RA: revision arthroplasty

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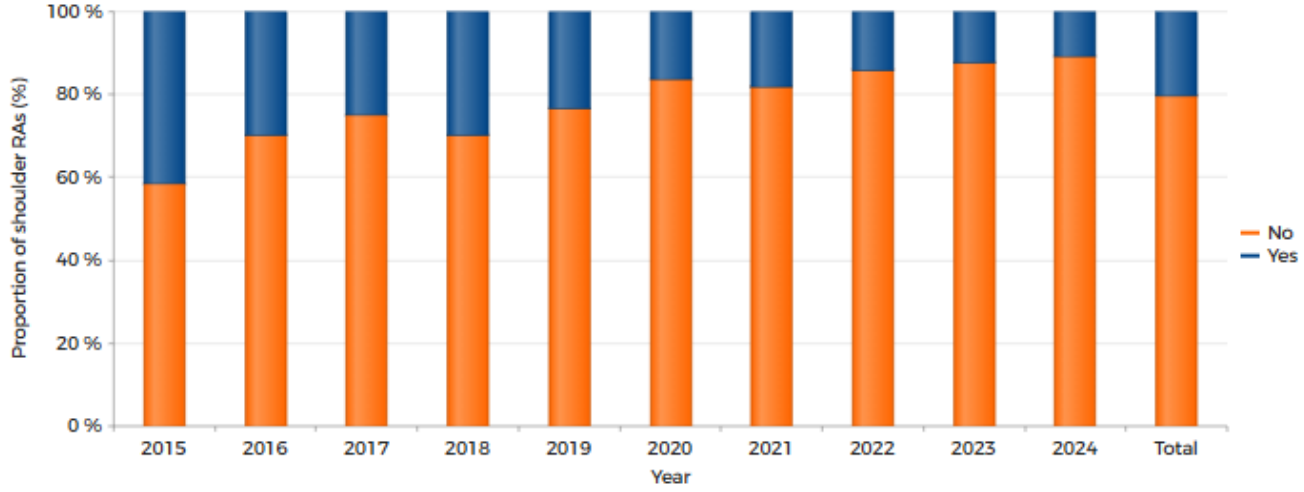
Conversion to TSA

FIGURE Trend (proportion [%] per year) in conversion of a shoulder hemiprosthesis to a total (anatomical or reverse) shoulder arthroplasty in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
No	58.68	70.24	75.23	70.13	76.67	83.89	82.05	86.01	87.87	89.24	79.61
Yes	41.32	29.76	24.77	29.87	23.33	16.11	17.95	13.99	12.13	10.76	20.39
Total (n)	**242**	**252**	**323**	**298**	**330**	**298**	**312**	**336**	**470**	**474**	**3,335**

RA: revision arthroplasty

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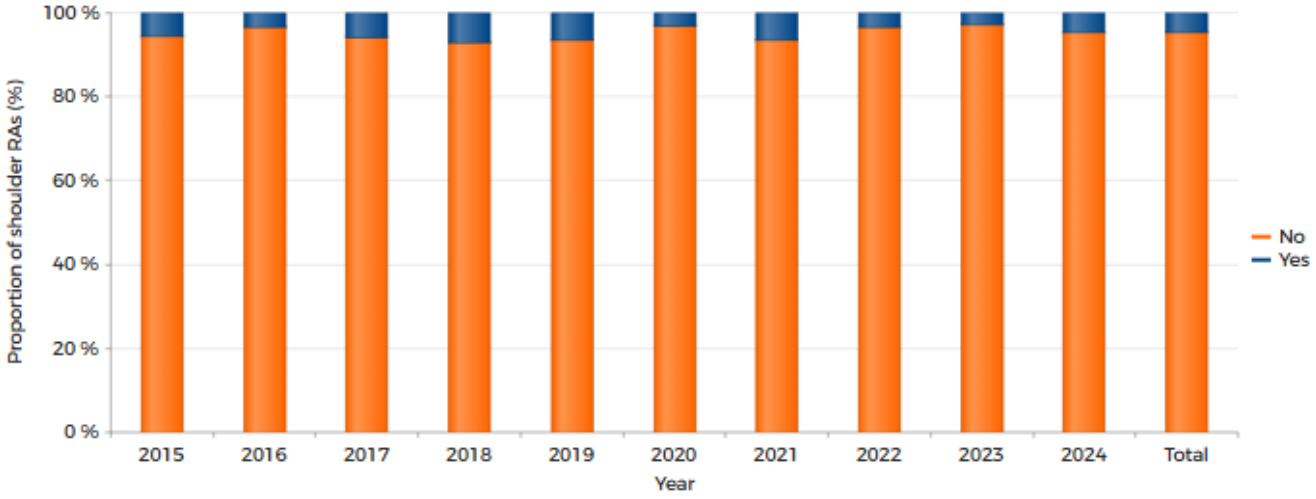
Conversion to hemi

FIGURE Trend (proportion [%] per year) in conversion of a total (anatomical or reverse) shoulder arthroplasty to a shoulder hemiprosthesis in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
No	94.44	96.76	94.29	92.81	93.58	96.94	93.55	96.71	97.22	95.35	95.26
Yes	5.56	3.24	5.71	7.19	6.42	3.06	6.45	3.29	2.78	4.65	4.74
Total (n)	**234**	**247**	**315**	**292**	**327**	**294**	**310**	**334**	**468**	**473**	**3,294**

RA: revision arthroplasty

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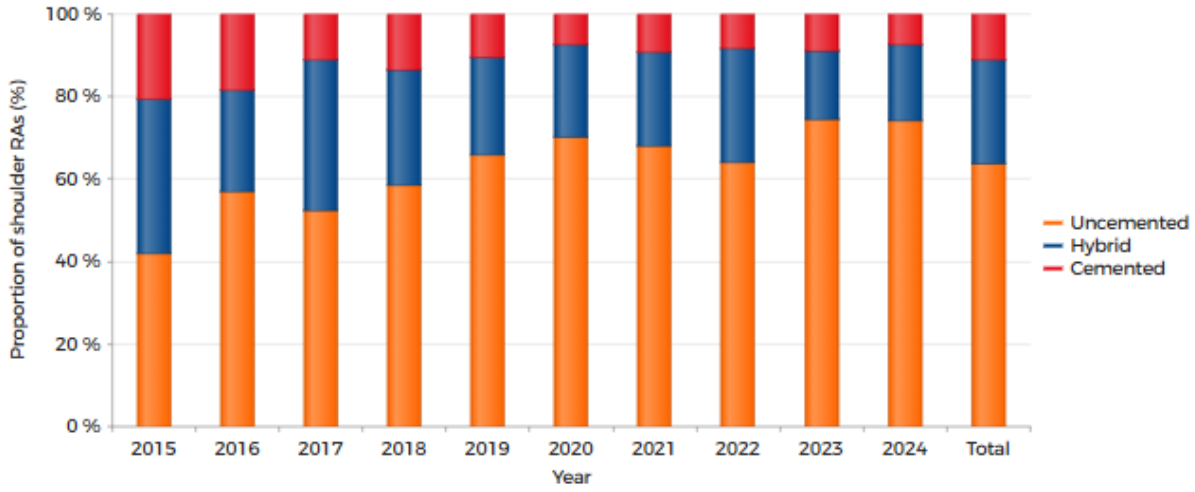
Fixation

FIGURE Trend (proportion [%] per year) in type of fixation in shoulder revision arthroplasties in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Uncemented	42	57.03	52.50	58.64	65.80	70.23	68.20	64.14	74.45	74.35	63.85
Hybrid	37.60	24.50	36.56	27.80	23.78	22.52	22.61	27.63	16.71	18.29	25.15
Cemented	20.40	18.47	10.94	13.56	10.42	7.25	9.19	8.22	8.85	7.36	11.01
Total (n)	**250**	**249**	**320**	**295**	**307**	**262**	**283**	**304**	**407**	**421**	**3,098**

RA: revision arthroplasty

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Most frequently registered components

TABLE The most frequently registered humeral stems, humeral heads, humeral liners, glenoid baseplates, glenospheres and metaphyses in shoulder revision arthroplasties in the Netherlands in 2020-2024

Year	2020	2021	2022	2023	2024
Humeral stem (n)	**105**	**128**	**145**	**182**	**177**
Name; Proportion (%)					
Delta X-tend	41.90	36.72	42.07	36.26	37.85
Aequalis Flex Revive	4.76	10.16	5.52	14.84	10.73
Aequalis Ascend Flex Cemented	0.00	3.91	8.97	8.24	9.60
Aequalis Ascend Flex	8.57	7.03	13.79	10.44	7.34
Comprehensive Mini	8.57	4.69	4.14	4.40	7.34
Global Unite	0.95	7.81	7.59	4.40	6.78
Univers Revers	2.86	1.56	1.38	3.30	3.95
Affinis Inverse	1.90	3.13	2.76	0.55	2.82
Aequalis Reversed Fractuur	6.67	1.56	3.45	2.20	2.82
SMR stem	0.00	0.00	1.38	0.00	2.26
Year	**2020**	**2021**	**2022**	**2023**	**2024**
Humeral head (n)	**26**	**33**	**31**	**35**	**35**
Name; Proportion (%)					
Global AP	15.38	18.18	19.35	25.71	37.14
SMR head	3.85	12.12	3.23	0.00	11.43
Aequalis Ascend Flex	26.92	27.27	41.94	22.86	11.43
Comprehensive	3.85	0.00	6.45	8.57	8.57
Aequalis humerus kop	15.38	6.06	0.00	5.71	8.57
Global Icon	0.00	0.00	0.00	2.86	5.71
Global Unite/ Global AP	7.69	6.06	6.45	5.71	5.71
Affinis Fracture	7.69	3.03	3.23	2.86	2.86
SMR CTA head	0.00	3.03	6.45	8.57	2.86
Affinis Short	3.85	0.00	0.00	5.71	2.86
Year	**2020**	**2021**	**2022**	**2023**	**2024**
Humeral liner (n)	**189**	**198**	**226**	**287**	**317**
Name; Proportion (%)					
Delta X-tend	37.57	51.52	53.54	43.90	46.06
Aequalis Ascend Flex	12.70	16.67	19.91	24.39	21.45
Comprehensive	11.11	9.09	8.41	7.67	11.36
Univers Revers	1.59	2.02	0.88	2.79	4.73
SMR reversed liner	5.82	2.53	0.88	5.57	4.10
Affinis Inverse	2.65	1.52	1.77	1.05	3.47
Equinoxe	6.35	3.03	3.54	3.48	2.84
Aequalis Reversed II	5.82	5.05	4.42	2.09	2.21
Aequalis Reversed Fractuur	5.82	3.03	3.10	3.83	1.89
Anatomical Inverse Humeral Poly Inlays	5.82	3.03	2.21	1.74	1.26

Year	2020	2021	2022	2023	2024
Glenosphere (n)	**141**	**165**	**180**	**262**	**287**
Name; Proportion (%)					
Delta X-tend	26.95	38.79	43.89	37.40	41.11
Perform Reversed	6.38	10.30	12.78	17.94	13.94
Aequalis Reversed II	17.02	13.33	18.89	15.27	12.89
Comprehensive	11.35	9.70	7.22	9.16	12.89
SMR reversed head	11.35	3.64	2.78	6.11	5.92
Univers Revers	2.13	3.64	2.22	3.82	4.18
TM Reverse Glenoid Heads	7.80	5.45	1.11	2.29	2.44
Affinis Inverse Vitamys	2.13	0.61	1.11	0.38	2.44
Equinoxe	6.38	2.42	2.22	2.67	1.39
Affinis Inverse	3.55	3.64	1.11	1.15	1.05
Year	**2020**	**2021**	**2022**	**2023**	**2024**
Metaphysis (n)	**99**	**115**	**127**	**163**	**190**
Name; Proportion (%)					
Aequalis Ascend Flex	16.16	27.83	31.50	37.42	37.89
Delta X-tend	17.17	25.22	27.56	23.93	22.11
Comprehensive	19.19	17.39	15.75	14.72	20.00
Univers Revers	2.02	1.74	1.57	4.91	5.26
SMR reversed body	9.09	5.22	2.36	7.98	3.16
SMR reversed body extender	1.01	0.00	0.00	1.84	3.16
Equinoxe	12.12	5.22	3.15	3.68	2.63
Anatomical inverse Humeral Cups	10.10	5.22	3.94	3.07	2.11
Global Unite	0.00	0.87	1.57	0.00	1.05
Global Unite Fracture	1.01	0.87	3.15	0.00	1.05
Year	**2020**	**2021**	**2022**	**2023**	**2024**
Glenoid baseplate (n)	**93**	**117**	**128**	**162**	**168**
Name; Proportion (%)					
Delta X-tend	43.01	45.30	50.78	40.74	41.67
Perform Reversed	3.23	9.40	9.38	19.75	17.26
Comprehensive	15.05	11.97	8.59	12.96	16.67
Aequalis Reversed II	15.05	13.68	17.97	14.81	9.52
Univers Revers	0.00	0.00	1.56	2.47	4.17
SMR uncemented glenoid	5.38	5.13	1.56	1.85	2.98
Equinoxe	2.15	1.71	2.34	2.47	1.79
SMR Axioma baseplate	0.00	0.00	0.00	1.23	1.79
Affinis Inverse	6.45	4.27	3.13	0.62	1.19
Universal Glenoid	3.23	2.56	0.78	1.23	1.19

Most frequently registered bone cement

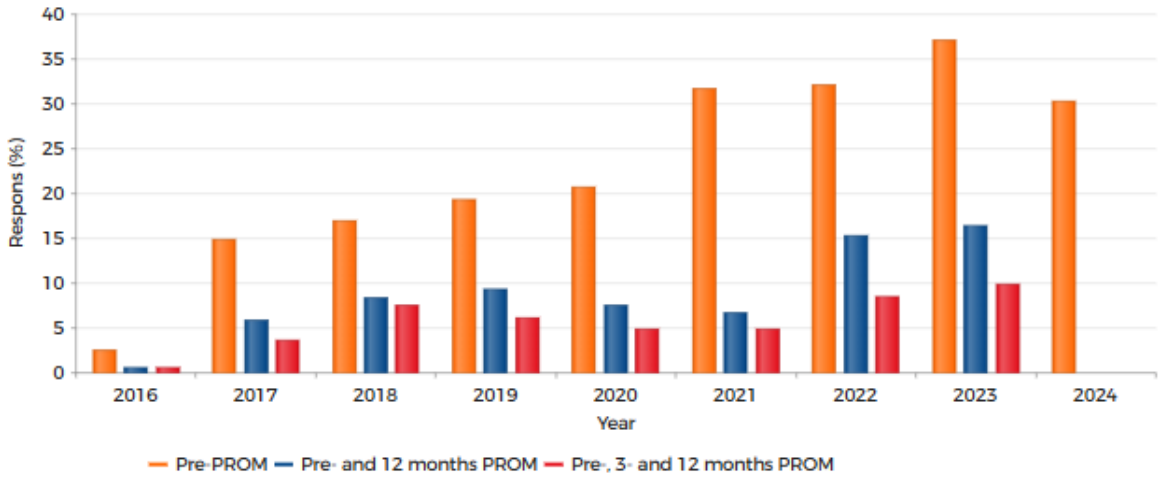
TABLE The most frequently registered types of bone cement by type of mixing system used during shoulder revision arthroplasties in the Netherlands in 2020-2024

Year	2020	2021	2022	2023	2024
Bone cement used (n)	**60**	**76**	**91**	**86**	**85**
Cement name; Proportion (%)					
Copal G+C	38.33	43.42	39.56	44.19	38.82
Palacos R+G	28.33	32.89	27.47	31.40	34.12
Refobacin Bone Cement R	11.67	15.79	14.29	15.12	11.76
Copal G+V	0.00	2.63	3.30	4.65	10.59
Refobacin Revision	10.00	3.95	4.40	2.33	2.35
Biomet Bone Cement R	0.00	0.00	0.00	0.00	1.18
Palacos MV+G	0.00	0.00	3.30	1.16	1.18

PROMs

Response

FIGURE Pre-operative, 3 months and 12 months postoperative response percentage of patients who underwent a shoulder revision in the Netherlands in 2016-2024

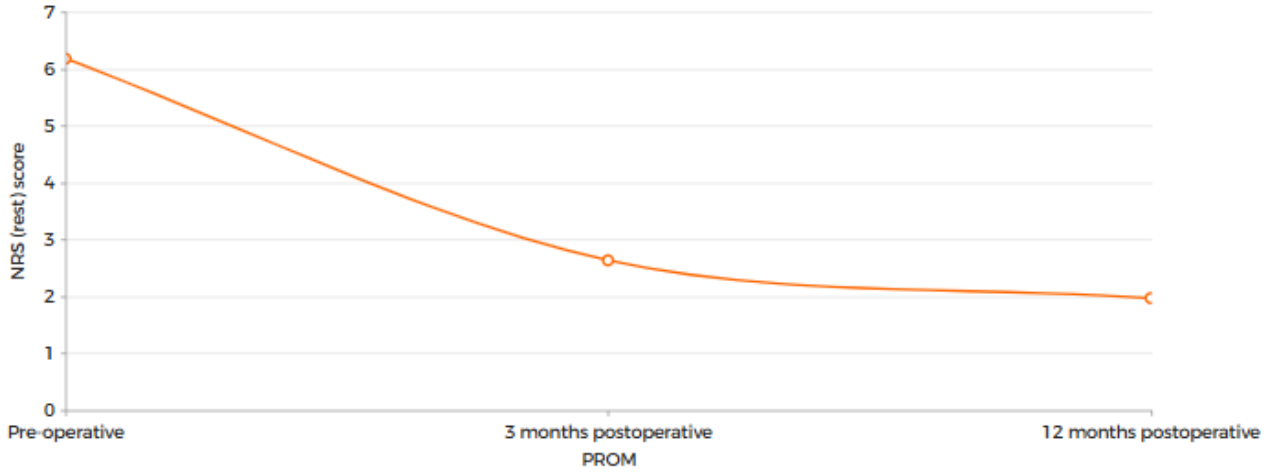


	2016	2017	2018	2019	2020	2021	2022	2023	2024
Pre-PROM	2.55	14.80	17.00	19.29	20.75	31.73	32.03	37.06	30.33
Pre- and 12 months PROM	0.51	5.78	8.30	9.29	7.55	6.64	15.30	16.35	n.a.
Pre-, 3- and 12 months PROM	0.51	3.61	7.51	6.07	4.91	4.80	8.54	9.81	n.a.
Shoulder revision (n)	**196**	**277**	**253**	**280**	**265**	**271**	**281**	**367**	**399**

Please note: The 12 months postoperative PROMs response percentage is not (yet) available for 2024.
PROM: patient reported outcome measure.

NRS (rest)

FIGURE Mean (95% CI) pre-operative, 3 months and 12 months postoperative NRS (rest) scores of patients who underwent a shoulder revision in the Netherlands in 2016-2023



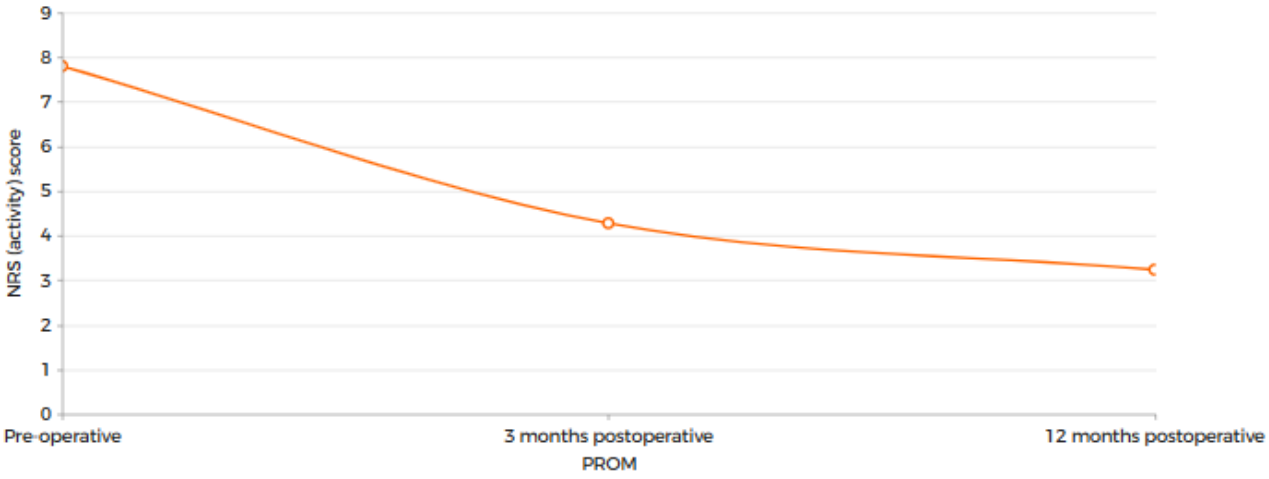
NRS (rest) score	Pre-operative	3 months postoperative	12 months postoperative
n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
133	6.18 (5.73-6.62)	2.63 (2.20-3.06)	1.97 (1.58-2.35)

CI: confidence interval

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 (95% CI) pre-operative, 3 months and 12 months postoperative NRS (activity) scores of patients who underwent a shoulder revision in the Netherlands in 2019-2023



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NRS (activity) score	Pre-operative	3 months postoperative	12 months postoperative
n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
133	7.80 (7.44-8.17)	4.28 (3.81-4.75)	3.24 (2.77-3.70)

CI: confidence interval

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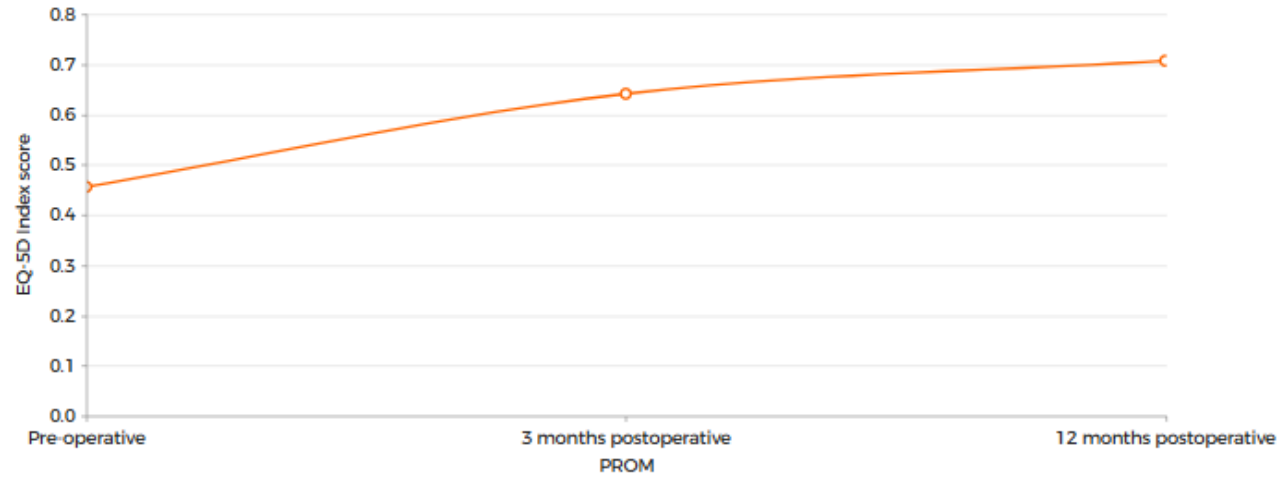
The NRS (activity) score measures pain during activity. The score has a range of 0.0 to 10.0, with 0.0 representing no pain and 10.0 representing the most possible pain.

EQ-5D index score

FIGURE Mean (95% CI) pre-operative, 3 months and 12 months postoperative EQ-5D Index scores of patients who underwent a shoulder revision in the Netherlands in 2019-2023



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EQ-5D index score	Pre-operative	3 months postoperative	12 months postoperative
n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
133	0.46 (0.41-0.50)	0.64 (0.60-0.68)	0.71 (0.67-0.75)

CI: confidence interval

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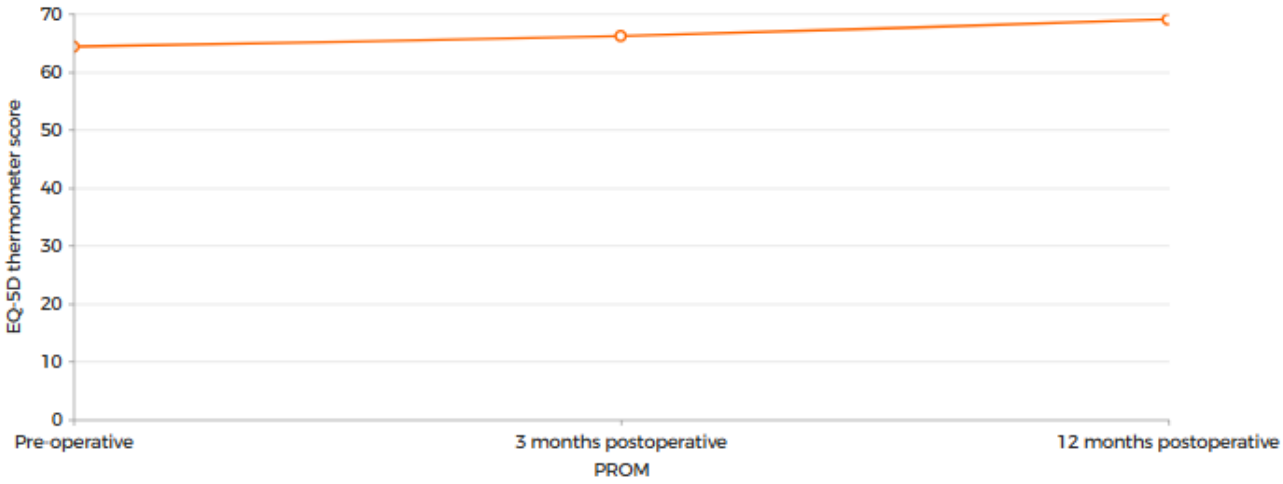
The EQ-5D index score measures quality of life. The score has a range of -0.329 to 1.0, with 1.0 representing the best possible quality of life.

EQ-5D thermometer

FIGURE Mean (95% CI) pre-operative, 3 months and 12 months postoperative EQ-5D thermometer scores of patients who underwent a shoulder revision in the Netherlands in 2019-2023



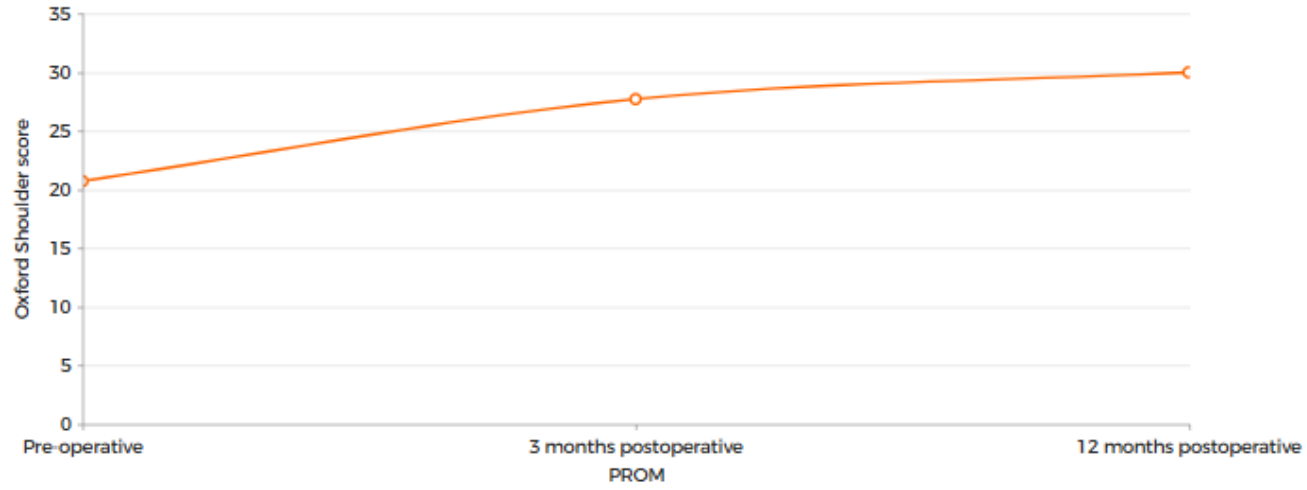
EQ-5D thermometer score	Pre-operative	3 months postoperative	12 months postoperative
n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
133	64.30 (60.79-67.81)	66.14 (62.55-69.72)	69.00 (65.17-72.83)

CI: confidence interval

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 (95% CI) pre-operative, 3 months and 12 months postoperative Oxford Shoulder scores of patients who underwent a shoulder revision in the Netherlands in 2019-2023



Oxford Shoulder Score	Pre-operative	3 months postoperative	12 months postoperative
n	Mean (95% CI)	Mean (95% CI)	Mean (95% CI)
133	20.71 (18.90-22.53)	27.70 (25.79-29.61)	29.98 (27.96-32.01)

CI: confidence interval

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 0.0 representing no functional ability and 48.0 the most functional ability.

Elbow arthroplasty

Numbers

Registered procedures

TABLE Number of registered elbow arthroplasties per year of surgery (2014-2024) in the LROI in April 2025

Year of surgery	Total elbow arthroplasty	Distal hemihumeral arthroplasty	Radial head arthroplasty	Radiocapitellar arthroplasty	Other	Unknown/ missing	Revision arthroplasty	Total
2014	72	5	23	4	0	4	38	**146**
2015	78	4	41	1	0	1	67	**192**
2016	67	2	46	12	2	8	57	**194**
2017	67	1	41	13	0	23	61	**206**
2018	73	5	54	2	2	3	58	**197**
2019	79	2	57	0	0	2	63	**203**
2020	78	3	55	0	2	1	52	**191**
2021	74	7	75	0	0	0	45	**201**
2022	74	2	63	1	0	0	87	**227**
2023	85	9	69	0	2	0	58	**223**
2024	69	4	75	0	2	2	82	**234**
Total (n)	**816**	**44**	**599**	**33**	**10**	**44**	**668**	**2,214**

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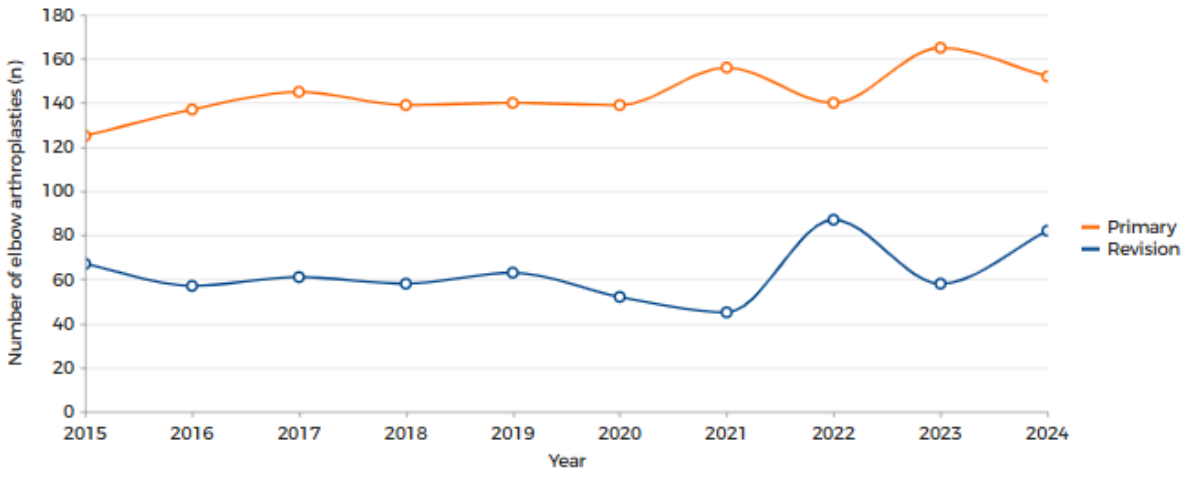
Type of procedures

FIGURE Number of primary elbow arthroplasties and elbow revision arthroplasties registered in the LROI in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Primary	125	137	145	139	140	139	156	140	165	152	**1,438**
Revision	67	57	61	58	63	52	45	87	58	82	**630**
Total (n)	**192**	**194**	**206**	**197**	**203**	**191**	**201**	**227**	**223**	**234**	**2,068**

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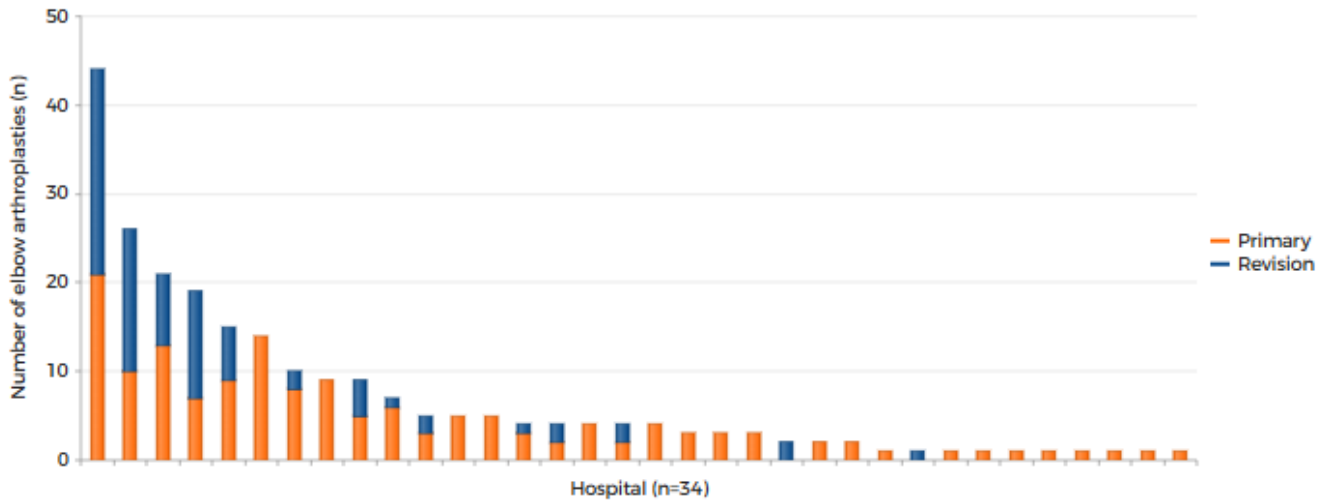
Type of procedure per hospital

FIGURE Number of primary elbow arthroplasties and elbow revision arthroplasties per hospital in the Netherlands in 2024 (n=234)



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Primary elbow arthroplasty

Patient characteristics

By prosthesis

TABLE Patient characteristics of all patients with a registered primary elbow arthroplasty by type of elbow arthroplasty in the Netherlands in 2024

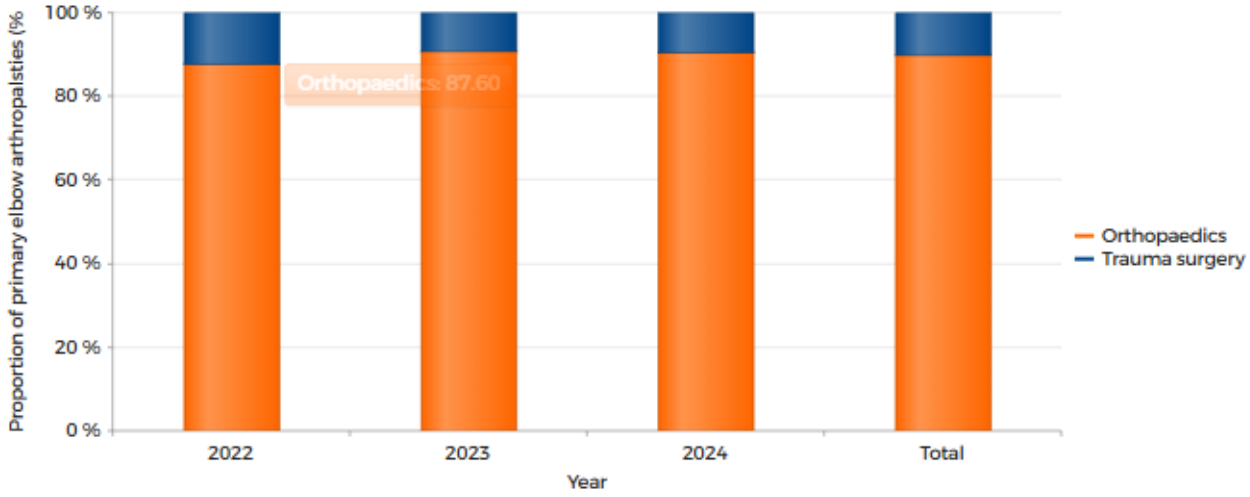
	Total arthroplasty	Radial head arthroplasty	Total
N(%)	**73 (49.4)**	**75 (50.6)**	**152**
Mean age (years) (SD)	67.5 (11.9)	59.7 (13.0)	63.3 (13.7)
Age (years) (%)			
<50	10	19	15
50-59	10	29	19
60-69	30	31	30
70-79	37	17	27
>80	14	4	9
Gender (%)			
Men	25	35	30
Women	75	65	70
ASA score (%)			
ASA I	8	19	15
ASA II	63	67	64
ASA III-IV	29	15	21
Type of hospital (%)			
General	82	89	84
UMC	18	11	16
Private	0	0	0
Diagnosis (%)			
Fracture	27	76	51
Late posttraumatic	22	17	21
Osteoarthritis	21	3	11
Rheumatoid arthritis	19	0	9
Inflammatory arthritis	0	0	0
Osteonecrosis	0	0	0
Hemophilic arthropathy	0	0	0
Tumour	1	0	0
Other	10	4	7
Mean BMI (kg/m2) (SD)	27.5 (5.6)	28.6 (6.8)	28 (6.2)
Body Mass Index (kg/m2) (%)			
Underweight (<=18.5)	1	1	1
Normal weight (>18.5-25)	32	31	31
Overweight (>25-30)	47	36	42
Obesity (>30-40)	15	23	19
Morbid obesity (>40)	5	8	7
Smoking (%)			
No	82	87	87
Yes	15	11	13

Total arthroplasty includes distal hemihumeral prostheses (n=4).
Two primary elbow arthroplasty were registered as other.
General: general hospital; UMC: university medical centre; Private: private hospital; SD: standard deviation.

Procedure characteristics

Specialism

FIGURE Trend (proportion [%] per year) in specialism for performing a primary elbow arthroplasty in the Netherlands in 2022-2024

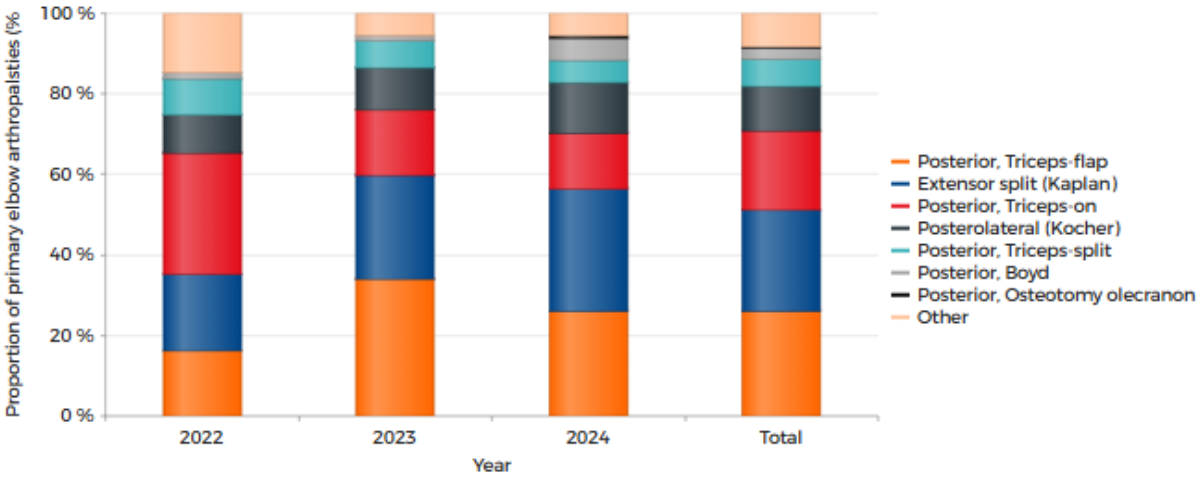


	2022	2023	2024	Total
Orthopaedics	87.60	90.91	90.44	89.81
Trauma surgery	12.40	9.09	9.56	10.19
Total (n)	**121**	**165**	**136**	**422**

Please note: Specialism was not registered before 2022.

Surgical approach

FIGURE Trend (proportion [%] per year) in surgical approach for performing a primary elbow arthroplasty in the Netherlands in 2022-2024

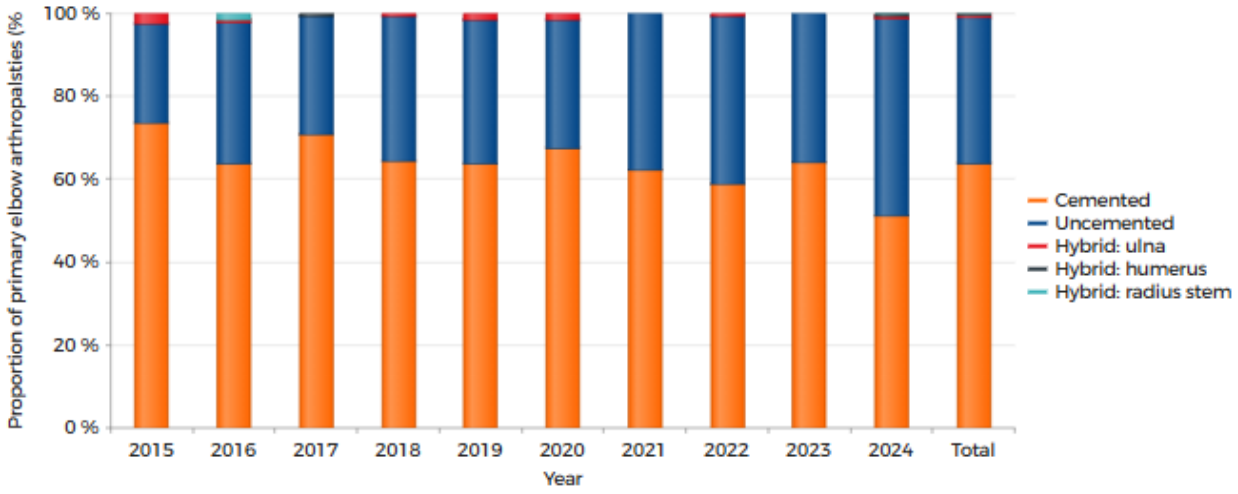


	2022	2023	2024	Total
Posterior, Triceps-flap	16.18	34.15	26.21	26.07
Extensor split (Kaplan)	19.12	25.61	30.34	25.17
Posterior, Triceps-on	30.15	16.46	13.79	19.78
Posterolateral (Kocher)	9.56	10.37	12.41	10.79
Posterior, Triceps-split	8.82	6.71	5.52	6.97
Posterior, Boyd	1.47	1.22	5.52	2.70
Posterior, Osteotomy olecranon	0	0	0.69	0.22
Other	14.71	5.49	5.52	8.31
Total (n)	**136**	**164**	**145**	**445**

Please note: The registration form was changed in 2022. Therefore, trends are shown for the period 2022-2024 only.

Fixation

FIGURE Trend (proportion [%] per year) in type of fixation in primary elbow arthroplasties in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Cemented	73.77	63.91	70.92	64.44	63.77	67.39	62.34	58.82	64.02	51.35	63.88
Uncemented	23.77	33.83	28.37	34.81	34.78	31.16	37.66	40.44	35.98	47.30	35.06
Hybrid: ulna	2.46	0.75	0	0.74	1.45	1.45	0	0.74	0	0.68	0.78
Hybrid: humerus	0	0	0.71	0	0	0	0	0	0	0.68	0.14
Hybrid: radius stem	0	1.50	0	0	0	0	0	0	0	0	0.14
Total (n)	**122**	**133**	**141**	**135**	**138**	**138**	**154**	**136**	**164**	**148**	**1,409**

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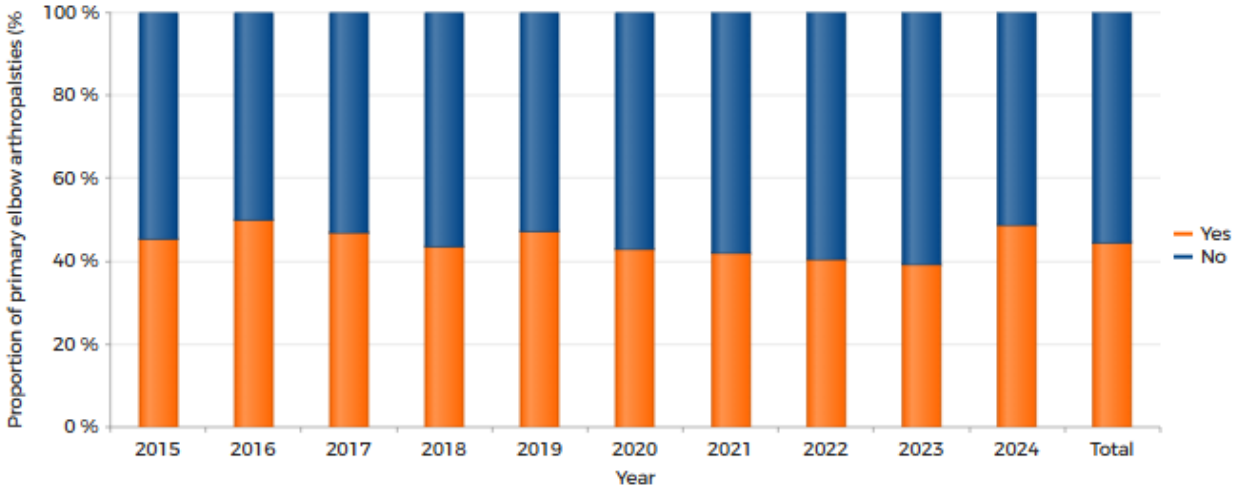
Implantation of radial head

FIGURE Trend (proportion [%] per year) in implantation of radial head component in primary elbow arthroplasties in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Yes	45.38	50	46.88	43.59	47.33	42.86	42	40.60	39.13	48.65	44.41
No	54.62	50	53.13	56.41	52.67	57.14	58	59.40	60.87	51.35	55.59
Total (n)	**119**	**118**	**96**	**117**	**131**	**133**	**150**	**133**	**161**	**148**	**1,306**

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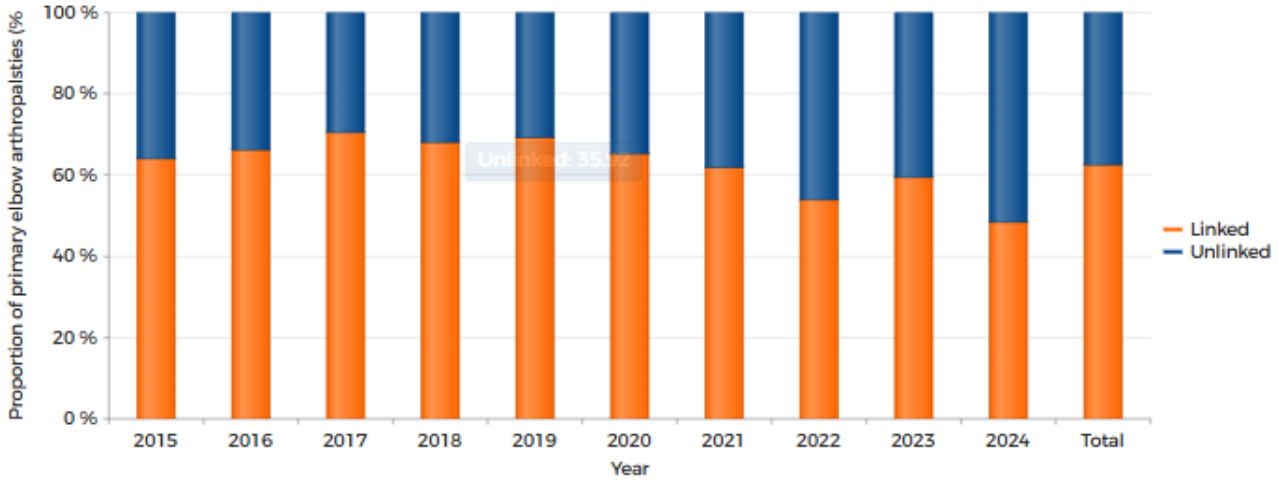
Linked prosthesis

FIGURE Trend (proportion [%] per year) of linked versus unlinked prostheses in primary elbow arthroplasties in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Linked	64.08	66.13	70.43	68.07	69.42	65.25	61.90	54.05	59.57	48.51	62.53
Unlinked	35.92	33.87	29.57	31.93	30.58	34.75	38.10	45.95	40.43	51.49	37.47
Total (n)	**103**	**124**	**115**	**119**	**121**	**118**	**147**	**111**	**141**	**134**	**1,233**

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Most frequently registered - total elbow

TABLE The most frequently registered total elbow arthroplasties in primary elbow arthroplasties in the Netherlands in 2020-2024

Year	2020	2021	2022	2023	2024
Total elbow arthroplasty (n)	**58**	**70**	**67**	**84**	**66**
Name; Proportion (%)					
Latitude EV	51.72	60.00	46.27	63.10	53.03
Latitude	15.52	12.86	11.94	10.71	28.79
Coonrad/Morrey	20.69	17.14	23.88	21.43	13.64
Discovery	8.62	2.86	5.97	3.57	3.03
Mutars	0.00	0.00	1.49	0.00	1.52

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Most frequently registered - radial head

TABLE The most frequently registered radial head arthroplasties in primary elbow arthroplasties in the Netherlands in 2020-2024

Year	2020	2021	2022	2023	2024
Radial head arthroplasty (n)	**45**	**62**	**51**	**60**	**65**
Name; Proportion (%)					
RHS	80.00	62.90	39.22	41.67	55.38
Anatomic Radial Head	4.44	6.45	33.33	26.67	26.15
Evolve Radial Head	2.22	1.61	3.92	6.67	9.23
Explor	8.89	17.74	9.80	13.33	6.15
Radial Head Replacement System	0.00	3.23	1.96	8.33	3.08

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Most frequently registered - types of bone cement

TABLE The registered types of bone cement used during primary elbow arthroplasties in the Netherlands in 2020-2024

Year	2020	2021	2022	2023	2024
Bone cement used (n)	**83**	**84**	**79**	**92**	**76**
Cement name; Proportion (%)					
Palacos R+G	24.39	29.27	36.71	43.48	47.30
Copal G+C	0.00	0.00	17.72	25.00	25.68
Palacos LV+G	6.10	13.41	11.39	11.96	10.81
Simplex ABC Tobra	4.88	24.39	10.13	5.43	8.11
Refobacin Bone Cement R	13.41	19.51	7.59	7.61	6.76
Simplex ABC EC	30.49	8.54	10.13	4.35	1.35

Survival

Short term revision

By type of revision within 1 year

TABLE Revision procedures within 1 year after primary elbow arthroplasty by year in the Netherlands in 2014-2023

Procedure year	Number of primary elbow arthroplasties	Number of revisions	Percentage revisions
2014	107	6	5.6%
2015	125	2	1.6%
2016	135	3	2.2%
2017	145	5	3.4%
2018	138	7	5.1%
2019	140	4	2.9%
2020	139	1	0.7%
2021	154	9	5.8%
2022	137	8	5.8%
2023	165	10	6.1%

Conversion to total elbow arthroplasty

TABLE Conversions from primary non-total elbow arthroplasty to total elbow arthroplasty within 1 year in the period 2014-2023 (n=642)

Number of revision procedures	27
Number of conversions	6
Percentage conversions	22.2 %

Time after primary elbow arthroplasty

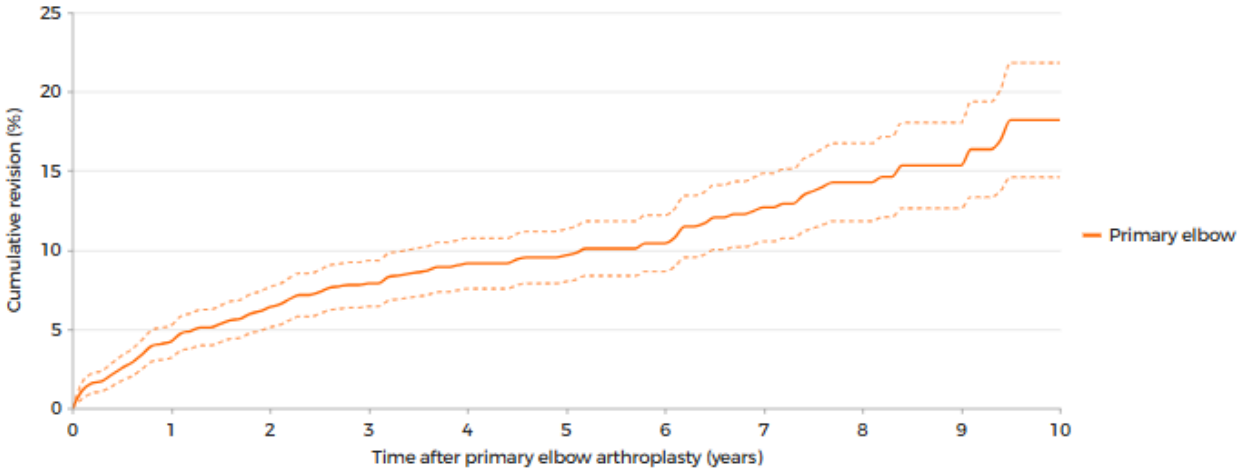
TABLE Time after primary elbow arthroplasty until short-term revision in the Netherlands in 2014-2021 (n=1,083)

Time after primary elbow	Percentage revisions (%)
Day 0-29	0.74
Day 30-182	1.39
Day 183-364	1.29
Day 365-730 (second year)	2.31
Day 731-1095 (third year)	1.57

Long term revision

Overall

FIGURE Cumulative revision percentage (Kaplan-Meier; 95% CI) of primary elbow arthroplasties in the Netherlands in 2014-2024 (n=1,534)



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	1yr	3yr	5yr	7yr	10yr
Primary elbow	4.07 (3.06-5.07)	7.79 (6.35-9.22)	9.52 (7.88-11.17)	12.47 (10.36-14.58)	18.21 (14.60-21.81)

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

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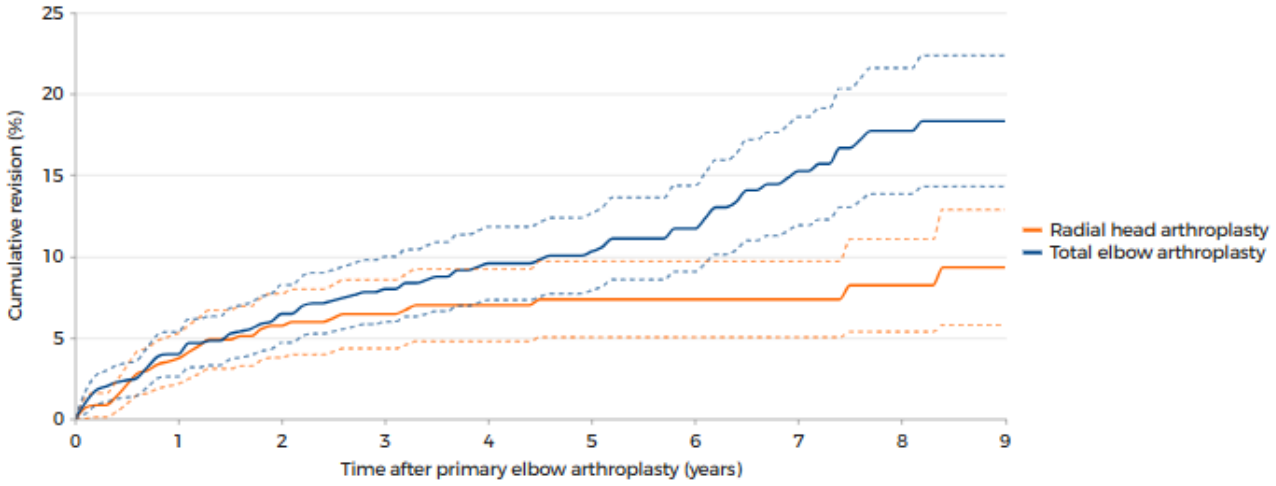
In 2014-2024, 158 (10.3%) primary elbow arthroplasties were implanted in patients who died within ten years after the primary procedure.

By type of elbow arthroplasty

FIGURE Cumulative revision percentage (Kaplan-Meier; 95% CI) of primary elbow arthroplasties by type of elbow arthroplasty in the Netherlands in 2014-2024 (n=1,405)



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	1yr	3yr	5yr	7yr	9yr
Total elbow arthroplasty	3.97 (2.60-5.34)	7.80 (5.82-9.78)	10.04 (7.70-12.37)	14.84 (11.59-18.09)	18.32 (14.30-22.35)
Radial head arthroplasty	3.53 (2.01-5.04)	6.44 (4.33-8.55)	7.36 (5.02-9.69)	7.36 (5.02-9.69)	9.32 (5.77-12.88)

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

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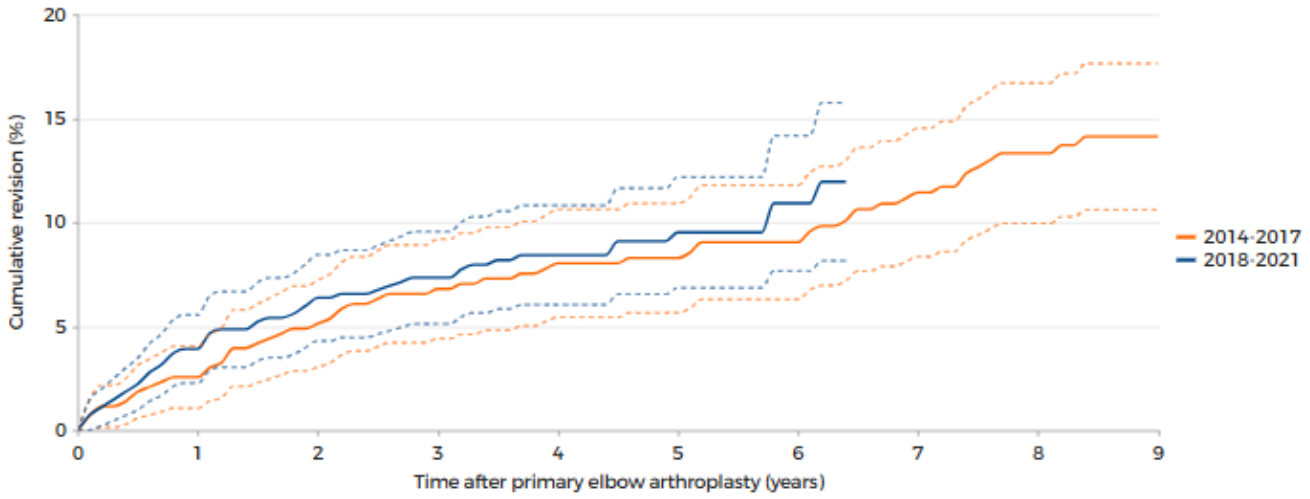
By procedure year

FIGURE Cumulative revision percentage (Kaplan-Meier; 95% CI) of primary elbow arthroplasties fo by procedure year of primary arthroplasty in the Netherlands in 2014-2024



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	Number (n)	1yr	3yr	5yr	7yr	9yr
2014-2017	434	2.55 (1.06-4.04)	6.56 (4.21-8.91)	8.28 (5.65-10.91)	11.17 (8.12-14.22)	14.12 (10.61-17.64)
2018-2021	542	3.91 (2.27-5.55)	7.34 (5.12-9.56)	9.10 (6.55-11.64)	n.a.	n.a.

Please note: Dotted lines represent the upper and lower limits of the 95% confidence intervall; n.a. if <50 cases were at risk.
CI: confidence interval.

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Elbow revision arthroplasty

In this section you will find all the information on elbow revision arthroplasty:

Revision characteristics

Reasons for revision

TABLE Trend (proportion [%] per year) in reasons for revision in patients who underwent an elbow revision arthroplasty in the Netherlands in 2016-2024

Year	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Elbow revision arthroplasty (n)	**57**	**61**	**58**	**63**	**52**	**45**	**87**	**58**	**82**	**563**
Reasons for revision; Proportion (%)										
Polyethylene wear	28.07	27.87	27.59	22.22	15.38	15.56	18.39	15.52	14.63	20.43
Infection	14.04	3.28	15.52	15.87	23.08	17.78	24.14	24.14	25.61	18.65
Metallosis	22.81	22.95	22.41	23.81	13.46	22.22	12.64	18.97	10.98	18.29
Instability or dislocation	21.05	40.98	15.52	20.63	5.77	22.22	11.49	18.97	9.76	17.94
Loosening of ulnar component	15.79	18.03	17.24	17.46	23.08	13.33	18.39	15.52	19.51	17.76
Loosening of humeral component	15.79	14.75	15.52	12.70	30.77	20.00	12.64	18.97	19.51	17.41
Mechanical complication or loosening of radial component	21.05	18.03	20.69	15.87	15.38	13.33	9.20	15.52	10.98	15.10
Peri-prosthetic fracture	3.51	18.03	18.97	19.05	17.31	17.78	9.20	12.07	10.98	13.68
Malposition or malalignment							9.20	10.34	6.10	
Revision after elbow removal							2.30	1.72	0.00	
Other	12.28	24.59	10.34	14.29	13.46	15.56	16.09	8.62	17.07	14.92

Please note: Malalignment and Removal after elbow revision have been registered since 2022.
One patient may have more than one reason for revision. As such, the total proportion is over 100%.

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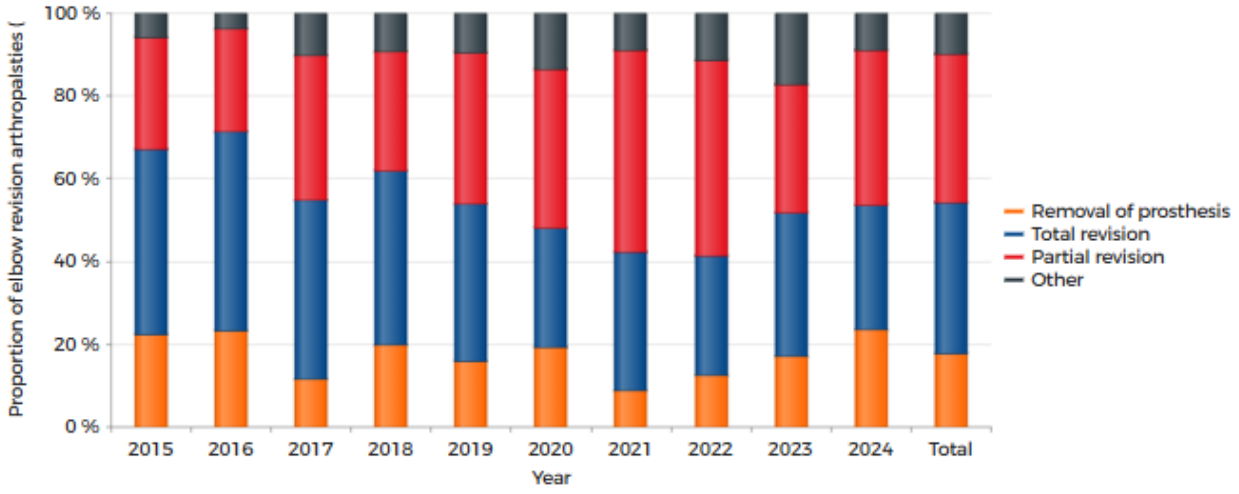
Type of revision

FIGURE Trend (proportion [%] per year) in type of revision in elbow revision arthroplasties in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Removal of prosthesis	22.39	23.21	11.67	20	15.87	19.23	8.89	12.64	17.24	23.75	17.66
Total revision	44.78	48.21	43.33	41.82	38.10	28.85	33.33	28.74	34.48	30	36.76
Partial revision	26.87	25	35	29.09	36.51	38.46	48.89	47.13	31.03	37.50	35.79
Other	5.97	3.57	10	9.09	9.52	13.46	8.89	11.49	17.24	8.75	9.79
Total (n)	**67**	**56**	**60**	**55**	**63**	**52**	**45**	**87**	**58**	**80**	**623**

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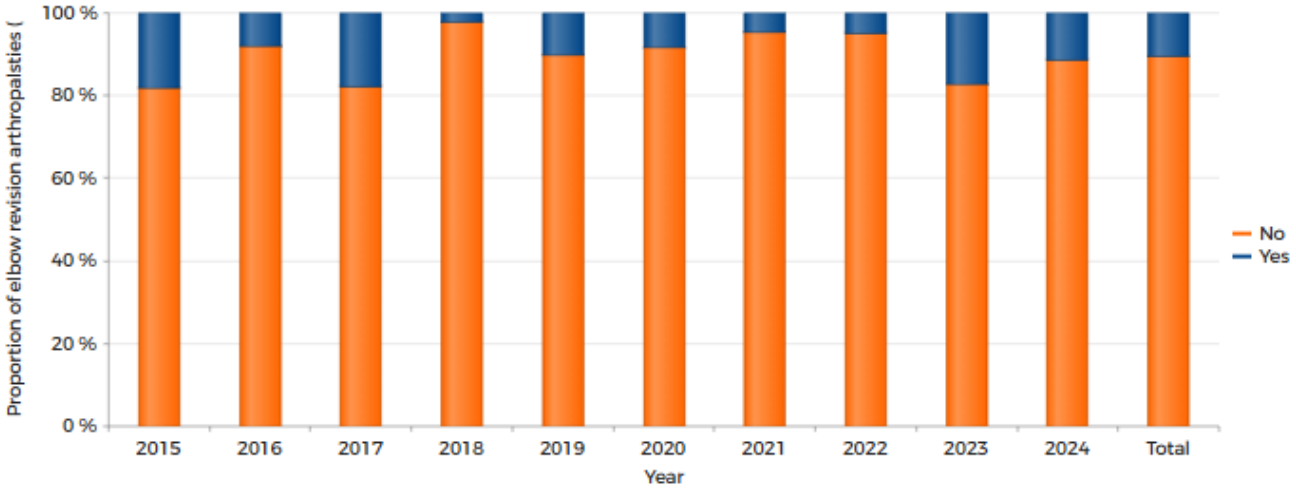
Conversion to total elbow arthroplasty

FIGURE Trend (proportion [%] per year) in conversion of a radial head arthroplasty to a total elbow arthroplasy in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
No	81.82	92	82.14	97.96	90	91.84	95.35	95.18	82.76	88.61	89.69
Yes	18.18	8	17.86	2.04	10	8.16	4.65	4.82	17.24	11.39	10.31
Total (n)	**55**	**50**	**56**	**49**	**60**	**49**	**43**	**83**	**58**	**79**	**582**

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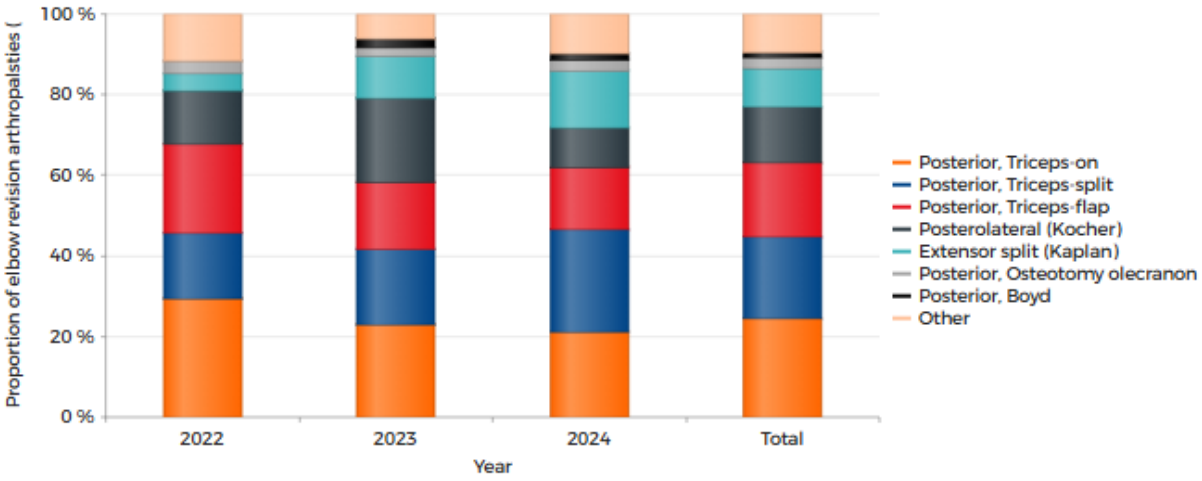
Surgical approach

FIGURE Trend (proportion [%] per year) in surgical approach for performing a elbow revision arthroplasty in the Netherlands in 2022-2024

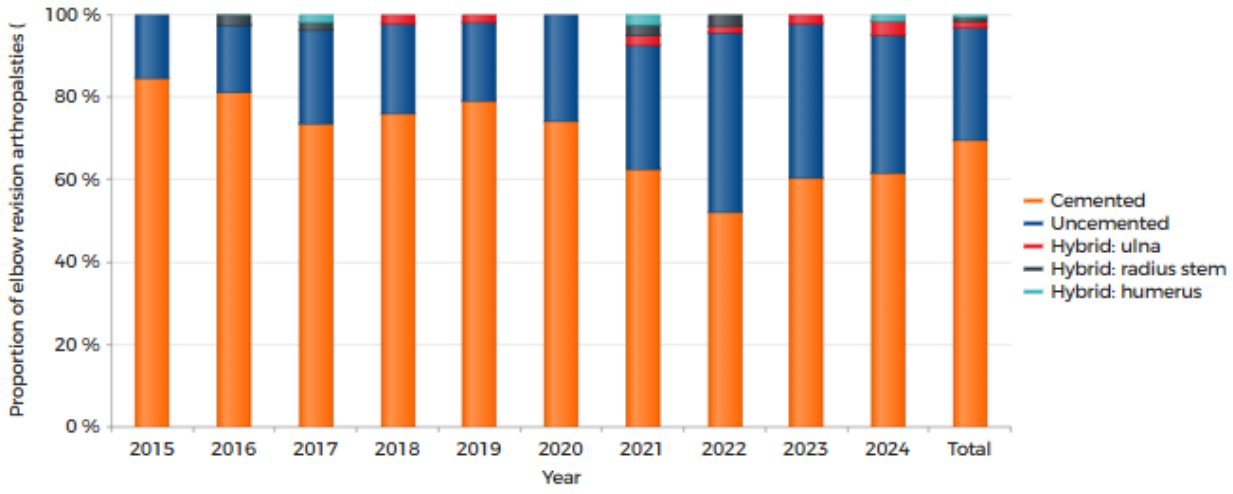


	2022	2023	2024	Total
Posterior, Triceps-on	29.41	22.92	21.13	24.60
Posterior, Triceps-split	16.18	18.75	25.35	20.32
Posterior, Triceps-flap	22.06	16.67	15.49	18.18
Posterolateral (Kocher)	13.24	20.83	9.86	13.90
Extensor split (Kaplan)	4.41	10.42	14.08	9.63
Posterior, Osteotomy olecranon	2.94	2.08	2.82	2.67
Posterior, Boyd	0	2.08	1.41	1.07
Other	11.76	6.25	9.86	9.63
Total (n)	**68**	**48**	**71**	**187**

Please note: The registration form was changed in 2022. Therefore, trends are shown for the period 2022-2024 only.

Fixation

FIGURE Trend (proportion [%] per year) in type of fixation in elbow revision arthroplasties in the Netherlands in 2015-2024



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Cemented	84.62	81.40	73.58	76.09	79.25	74.36	62.50	52.11	60.42	61.67	69.70
Uncemented	15.38	16.28	22.64	21.74	18.87	25.64	30	43.66	37.50	33.33	27.33
Hybrid: ulna	0	0	0	2.17	1.89	0	2.50	1.41	2.08	3.33	1.39
Hybrid: radius stem	0	2.33	1.89	0	0	0	2.50	2.82	0	0	0.99
Hybrid: humerus	0	0	1.89	0	0	0	2.50	0	0	1.67	0.59
Total (n)	**52**	**43**	**53**	**46**	**53**	**39**	**40**	**71**	**48**	**60**	**505**

Most frequently registered – components

TABLE The most frequently registered humerus and ulna components in elbow revision arthroplasties in the Netherlands in 2020-2024

Year	2020	2021	2022	2023	2024
Humerus (n)	**15**	**15**	**24**	**19**	**19**
Humerus name; Proportion (%)					
Latitude EV	53.33	40.00	33.33	26.32	52.17
Latitude	6.67	0.00	4.17	21.05	17.39
Coonrad/Morrey	26.67	26.67	25.00	36.84	13.04
Discovery	13.33	0.00	0.00	0.00	8.70
Nes	0.00	20.00	25.00	10.53	4.35
Mutars	0.00	13.33	4.17	5.26	4.35
Year	**2020**	**2021**	**2022**	**2023**	**2024**
Ulna (n)	**18**	**13**	**30**	**21**	**27**
Ulna name; Proportion (%)					
Latitude EV	66.67	46.15	70.00	66.67	70.37
Coonrad/Morrey	22.22	38.46	16.67	28.57	7.41
Discovery	5.56	0.00	0.00	0.00	7.41
Mutars	0.00	15.38	3.33	0.00	7.41
Latitude	5.56	0.00	0.00	0.00	3.70
Nes	0.00	0.00	10.00	4.76	3.70

Most frequently registered - type of bone cement

TABLE The registered types of bone cement used during elbow revision arthroplasties in the Netherlands in 2020-2024

Year	2020	2021	2022	2023	2024
Bone cement used (n)	**23**	**23**	**25**	**25**	**35**
Cement name; Proportion (%)					
Copal G+C	4.35	0.00	32.00	40.00	48.57
Palacos R+G	30.43	21.74	12.00	24.00	22.86
Palacos LV+G	0.00	4.35	4.00	4.00	11.43
Simplex ABC TOBRA	21.74	30.43	12.00	16.00	8.57
Refobacin Bone Cement R	13.04	17.39	20.00	8.00	2.86
Copal G+V	0.00	0.00	8.00	4.00	2.86
Palamed G	0.00	0.00	0.00	0.00	2.86

Wrist arthroplasty

Numbers

Registered procedures

TABLE Number of registered wrist arthroplasties per year of surgery (2017-2024) in the LROI in April 2025

Year of surgery	Total wrist arthroplasty	Ulnar head arthroplasty	DRU arthroplasty	Hemi arthroplasty	Other	Unknown/ missing	Revision arthroplasty	Total
2017	35	13	10	1	14	5	17	**95**
2018	37	7	18	2	6	4	20	**94**
2019	43	7	30	5	20	4	32	**141**
2020	34	9	16	12	10	5	47	**133**
2021	27	4	16	16	8	5	26	**102**
2022	24	7	17	21	6	6	30	**111**
2023	36	2	28	16	13	7	28	**130**
2024	50	2	12	12	38	2	13	**129**
Total (n)	**286**	**51**	**147**	**85**	**115**	**38**	**213**	**935**

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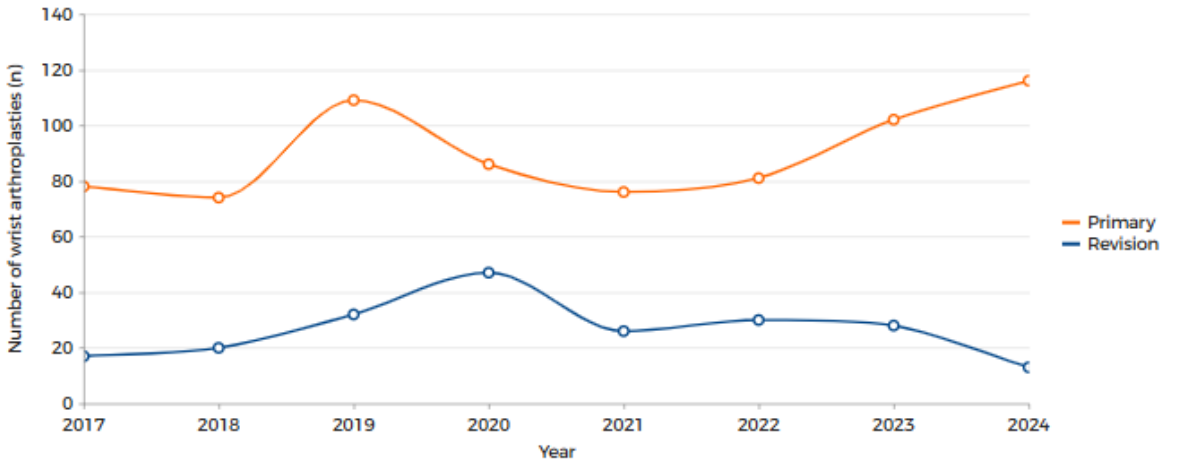
Type of procedures

FIGURE Number of primary wrist arthroplasties and wrist revision arthroplasties registered in the LROI in the Netherlands in 2016-2024



	2017	2018	2019	2020	2021	2022	2023	2024	Total
Primary	78	74	109	86	76	81	102	116	**722**
Revision	17	20	32	47	26	30	28	13	**213**
Total (n)	**95**	**94**	**141**	**133**	**102**	**111**	**130**	**129**	**935**

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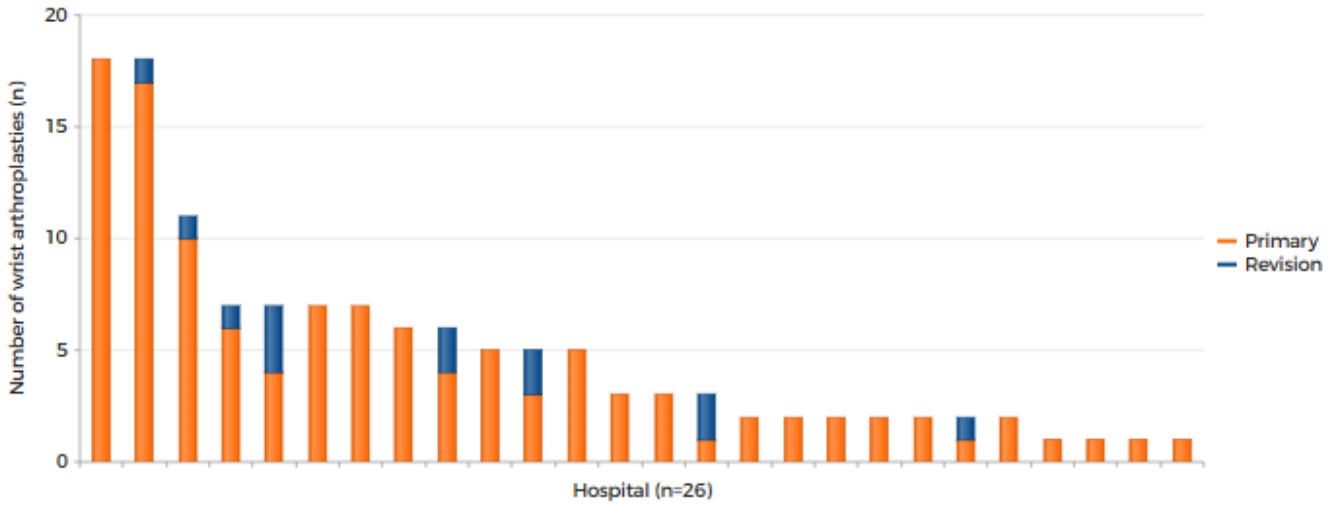
Type of procedure per hospital

FIGURE Number of primary wrist arthroplasties and wrist revision arthroplasties per hospital in the Netherlands in 2024 (n=129)



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Primary wrist arthroplasty

Patient characteristics

Demographics

By specialism

TABLE Patient characteristics of all patients with a registered primary wrist arthroplasty in the Netherlands in 2024

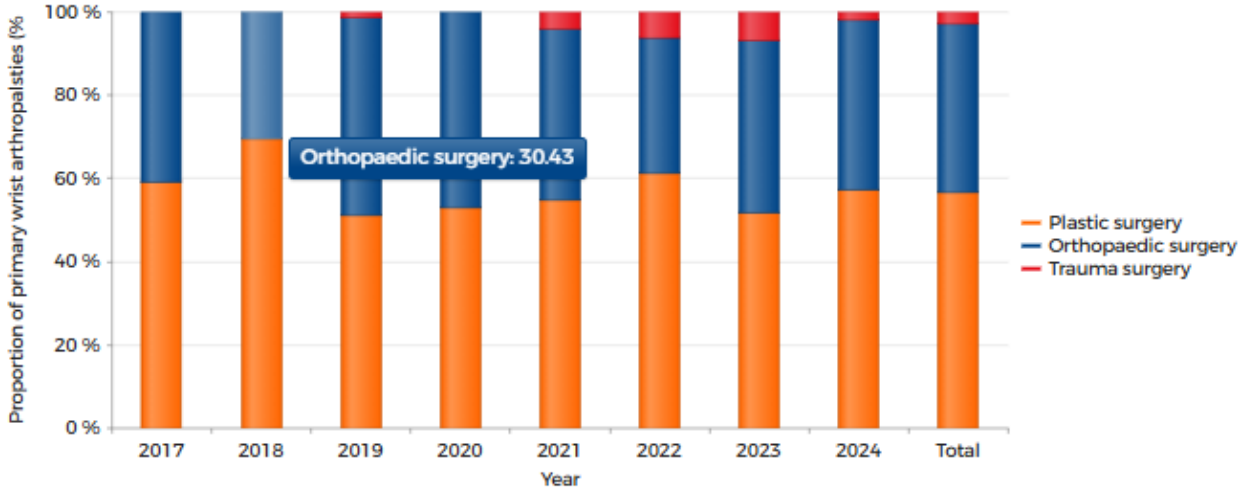
	Plastic surgery	Orthopaedic surgery	Total
N(%)	**66 (57.4)**	**47 (40.8)**	**116**
Mean age (years) (SD)	62.2 (9.4)	65.2 (11.2)	63.3 (10.9)
Age (years) (%)			
<50	5	9	7
50-59	36	17	28
60-69	38	36	36
70-79	20	23	22
>80	2	15	7
Gender (%)			
Men	35	38	36
Women	65	62	64
ASA score (%)			
ASA I	24	9	18
ASA II	62	64	63
ASA III-IV	14	28	19
Type of hospital (%)			
General	77	96	84
UMC	5	4	4
Private	18	0	11
Diagnosis (%)			
Osteoarthritis	74	53	66
Post-traumatic	6	23	13
Rheumatoid arthritis	3	19	10
Osteonecrosis	2	0	1
Inflammatory arthritis	0	2	1
Other	14	2	10
Mean BMI (kg/m2) (SD)	27.7 (5.2)	26.8 (4.9)	27.3 (5)
Body Mass Index (kg/m2) (%)			
Underweight (<=18.5)	0	4	2
Normal weight (>18.5-25)	30	36	35
Overweight (>25-30)	27	34	34
Obesity (>30-40)	24	26	26
Morbid obesity (>40)	5	0	3
Smoking (%)			
No	91	87	91
Yes	5	13	9

Total primary wrist arthroplasties includes two procedures performed by trauma surgeons and one procedure with missing specialism.
General: general hospital; UMC: university medical centre; Private: private hospital; SD: standard deviation.

Procedure characteristics

Specialism

FIGURE Trend (proportion [%] per year) in specialism for performing a primary wrist arthroplasty in the Netherlands in 2017-2024

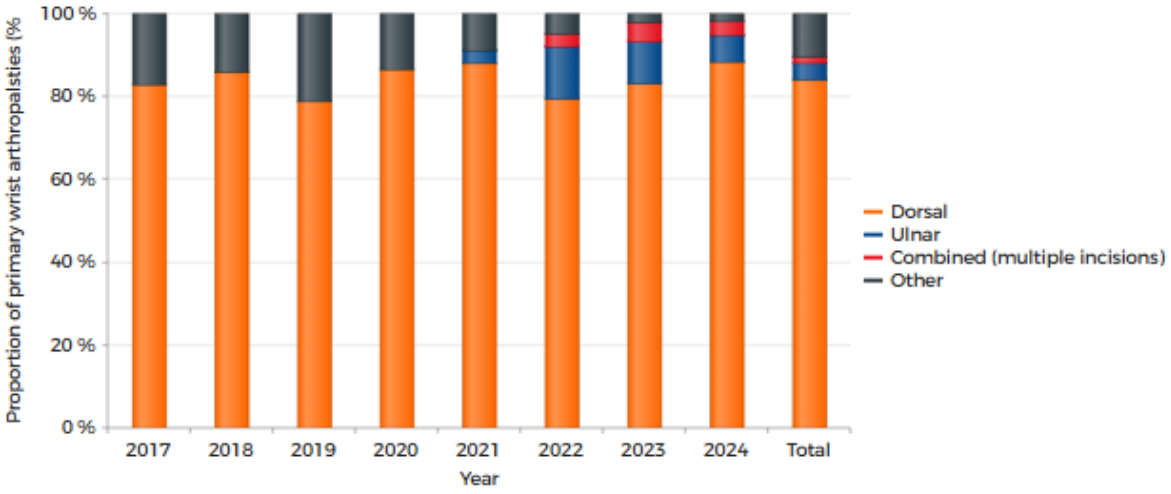


	2017	2018	2019	2020	2021	2022	2023	2024	Total
Plastic surgery	59.21	69.57	51.11	52.94	54.79	61.25	51.96	57.39	56.81
Orthopaedic surgery	40.79	30.43	47.78	47.06	41.10	32.50	41.18	40.87	40.58
Trauma surgery	0	0	1.11	0	4.11	6.25	6.86	1.74	2.61
Total (n)	**76**	**69**	**90**	**85**	**73**	**80**	**102**	**115**	**690**

Please note: the specialism of trauma surgery has been registered since 2022

Surgical approach

FIGURE Trend (proportion [%] per year) in surgical approach for performing a primary wrist arthroplasty in the Netherlands in 2017-2024

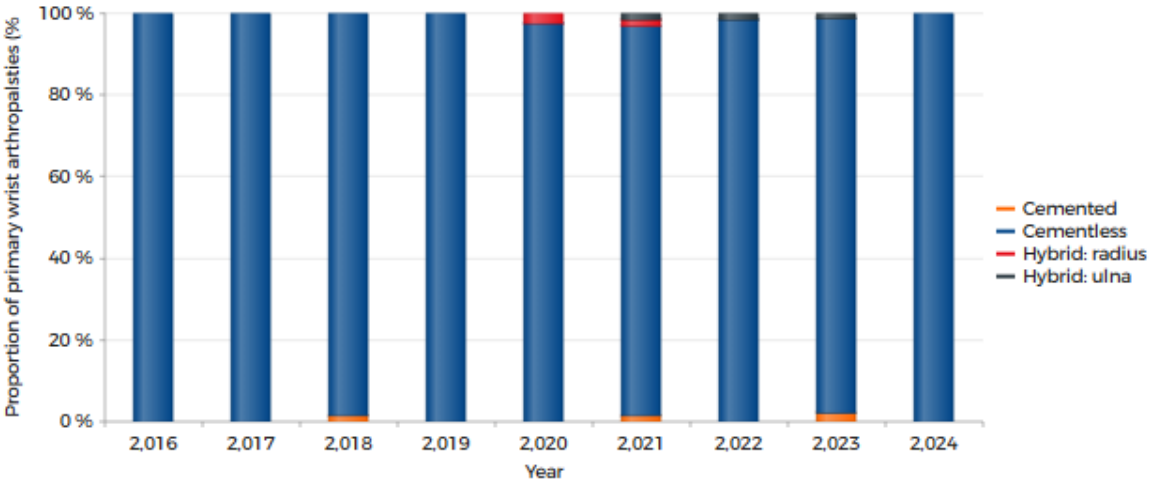


	2017	2018	2019	2020	2021	2022	2023	2024	Total
Dorsal	82.86	85.92	78.85	86.42	88.06	79.37	83.15	88.50	84.19
Ulnar	0	0	0	0	2.99	12.70	10.11	6.19	3.95
Combined (multiple incisions)	0	0	0	0	0	3.17	4.49	3.54	1.52
Other	17.14	14.08	21.15	13.58	8.96	4.76	2.25	1.77	10.33
Total (n)	**70**	**71**	**104**	**81**	**67**	**63**	**89**	**113**	**658**

Please note: the combined and ulnar surgical approaches have been registered since 2022

Fixation

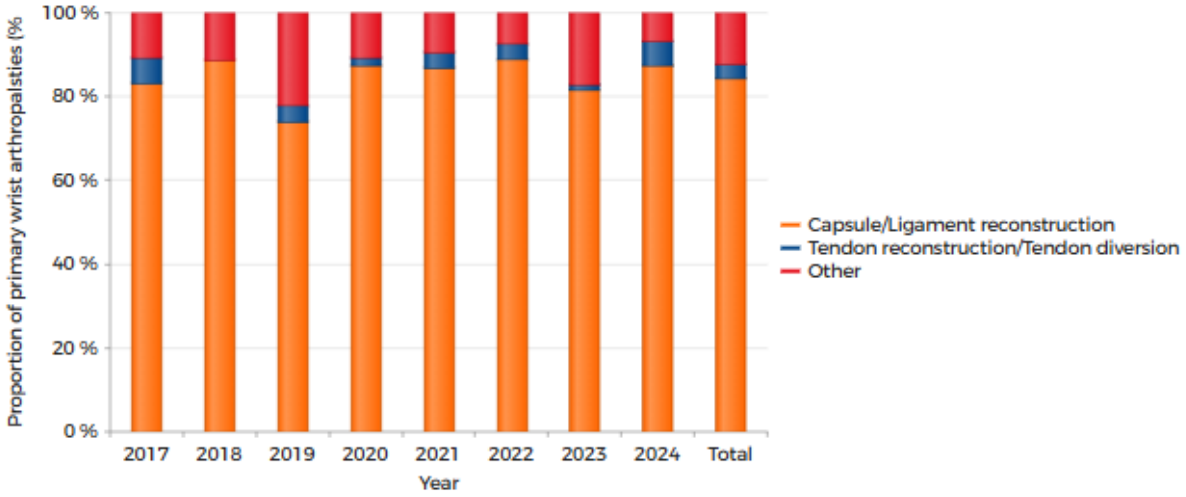
FIGURE Trend (proportion [%] per year) in type of fixation in primary wrist arthroplasties in the Netherlands in 2017-2024



	2016	2017	2018	2019	2020	2021	2022	2023	2024
Cemented	0	0	1.41	0	0	1.54	0	2.17	0
Cementless	100	100	98.59	100	97.40	95.38	98.48	96.74	100
Hybrid: radius	0	0	0	0	2.60	1.54	0	0	0
Hybrid: ulna	0	0	0	0	0	1.54	1.52	1.09	0
Total (n)	**16**	**71**	**71**	**103**	**77**	**65**	**66**	**92**	**113**

Soft tissue stabilisation

FIGURE Trend (proportion [%] per year) in type of stabilisation in primary wrist arthroplasties in the Netherlands in 2017-2024



	2017	2018	2019	2020	2021	2022	2023	2024	Total
Capsule/Ligament reconstruction	82.98	88.71	74.07	87.50	86.79	88.89	81.58	87.50	84.33
Tendon reconstruction/Tendon diversion	6.38	0	3.70	1.79	3.77	3.70	1.32	5.68	3.29
Other	10.64	11.29	22.22	10.71	9.43	7.41	17.11	6.82	12.38
Total (n)	**47**	**62**	**81**	**56**	**53**	**54**	**76**	**88**	**517**

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Most frequently registered components

TABLE The most frequently registered carpal and radial stem components in primary wrist arthroplasties in the Netherlands in 2020-2024

Year	2020	2021	2022	2023	2024
Carpal (n)	**30**	**23**	**35**	**48**	**50**
Carpal name; Proportion (%)					
RCPI	20.00	26.09	57.14	50.00	48.00
Remotion	10.00	4.35	8.57	33.33	30.00
Motec	3.33	4.35	8.57	6.25	22.00
Year	**2020**	**2021**	**2022**	**2023**	**2024**
Radial stem (n)	**34**	**30**	**22**	**37**	**0.00**
Radial stem name; Proportion (%)					
Motec	0.00	3.33	13.64	5.41	50.00
Remotion	8.82	6.67	13.64	37.84	30.43
Distal radioulnar joint	23.53	30.00	36.36	48.65	19.57

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Survival

Short term revision

Revision rates within 1 year

TABLE Revision procedures within 1 year after primary wrist arthroplasty by year in the Netherlands in 2017-2023

Procedure year	Number of primary wrist arthroplasties	Number of revisions	Percentage revisions
2017	78	3	3.8%
2018	74	3	4.1%
2019	109	3	2.8%
2020	86	3	3.5%
2021	76	0	0.0%
2022	81	1	1.2%
2023	102	3	2.9%

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Time after primary wrist

TABLE Time after primary wrist arthroplasty until short-term revision in the Netherlands in 2017-2021 (n=423)

Time after primary wrist	Percentage revisions (%)
Day 1-29	0.00
Day 30-182	0.71
Day 183-364	2.13
Day 365-730 (second year)	1.89
Day 731-1095 (third year)	1.89

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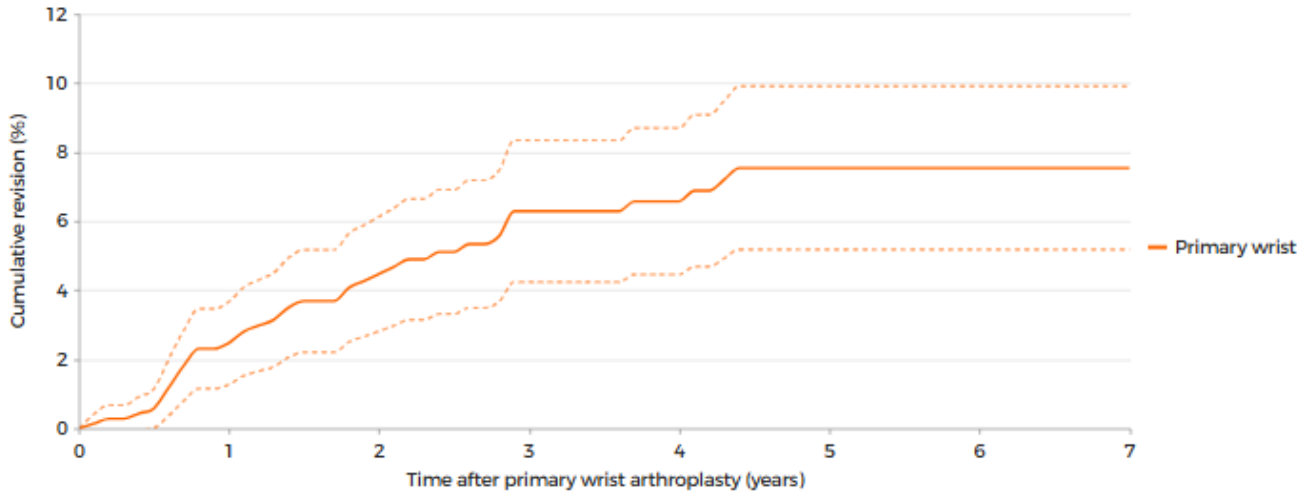
Long term revision

Overall

FIGURE Cumulative revision percentage (Kaplan-Meier; 95% CI) of primary wrist arthroplasties in the Netherlands in 2017-2024 (n=772)



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	1yr	3yr	5yr	7yr
Primary wrist	2.31 (1.15-3.46)	6.29 (4.24-8.34)	7.54 (5.18-9.91)	7.54 (5.18-9.91)

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

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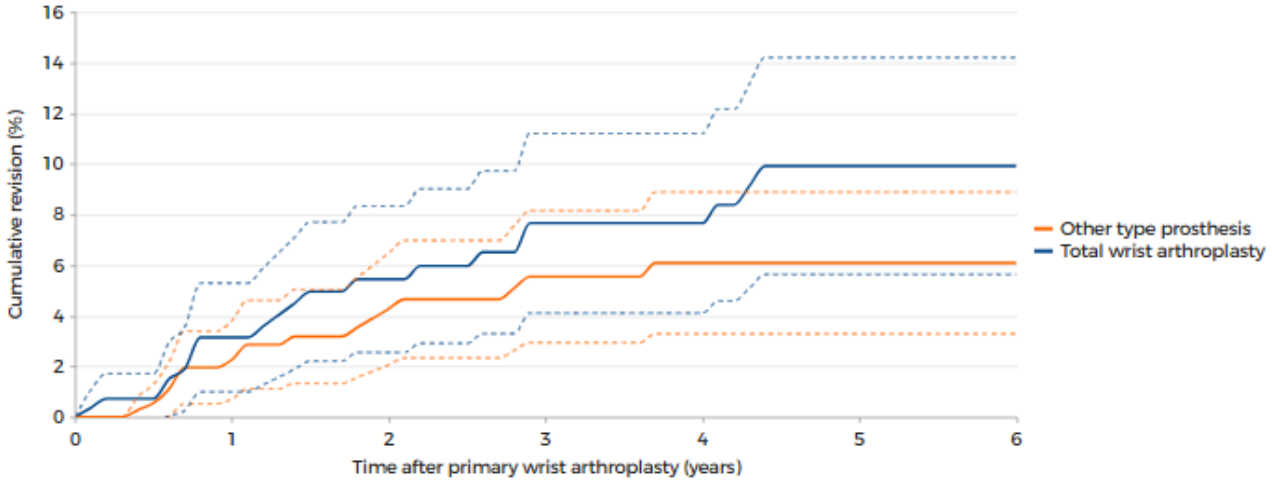
In 2017-2024, 28 (3.9%) primary wrist arthroplasties were implanted in patients who died within seven years after the primary procedure.

By type of wrist arthroplasty

FIGURE Cumulative revision percentage (Kaplan-Meier; 95% CI) of primary wrist arthroplasties by type of wrist arthroplasty in the Netherlands in 2017-2024



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	Number (n)	1yr	3yr	5yr	6yr
Total wrist arthroplasty	284	3.14 (0.99-5.29)	7.65 (4.11-11.20)	9.92 (5.63-14.20)	9.92 (5.63-14.20)
Other type prosthesis	400	1.95 (0.52-3.39)	5.54 (2.94-8.15)	6.09 (3.29-8.88)	6.09 (3.29-8.88)

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

CI: confidence interval.

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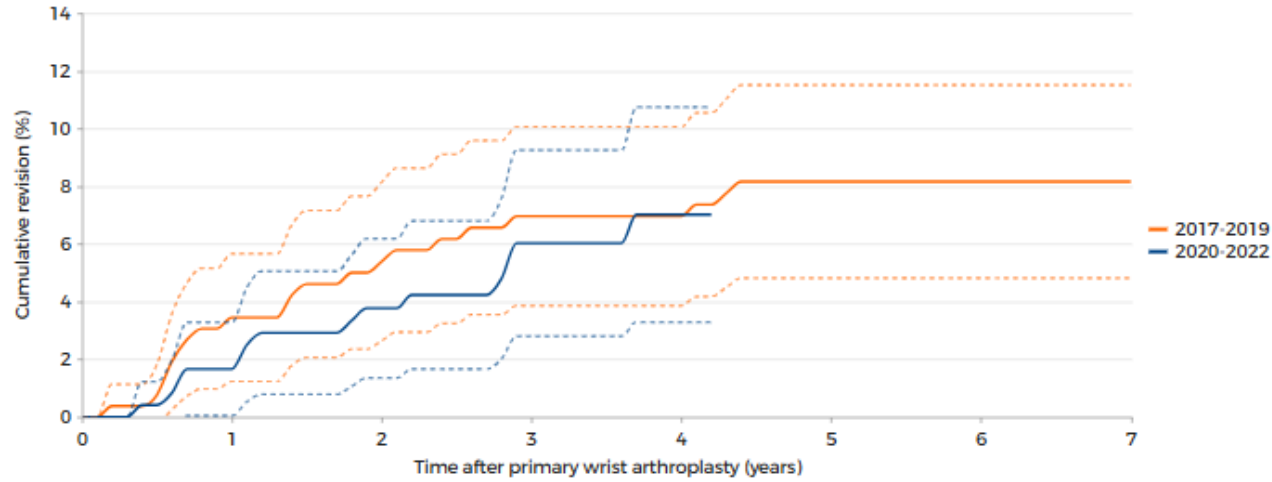
By procedure year

FIGURE Cumulative revision percentage (Kaplan-Meier; 95% CI) of primary wrist arthroplasties by procedure year of primary arthroplasty in the Netherlands in 2017-2024



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	Number (n)	1yr	3yr	5yr	7yr
2017-2019	261	3.07 (0.97-5.16)	6.96 (3.86-10.06)	8.16 (4.81-11.51)	8.16 (4.81-11.51)
2020-2022	243	1.66 (0.05-3.28)	6.02 (2.80-9.25)	n.a.	n.a.

Please note: Dotted lines represent the upper and lower limits of the 95% confidence interval; n.a. if <50 cases were at risk.

CI: confidence interval.

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Wrist revision arthroplasty

In this section you will find all the information on revision wrist arthroplasty

Revision characteristics

Reasons for revision

TABLE Reasons for revision in patients who underwent a wrist revision arthroplasty in the Netherlands in 2017-2024

Year	2017	2018	2019	2020	2021	2022	2023	2024	Total
Wrist revision arthroplasty (n)	**17**	**20**	**32**	**47**	**26**	**30**	**28**	**13**	**213**
Reasons for revision; Proportion (%)									
Loosening of carpal component	11.76	25.00	25.00	19.15	34.62	43.33	28.57	46.15	28.17
Bone resorption of carpal component						30.00	32.14	38.46	
Instability	17.65	25.00	21.88	21.28	23.08	20.00	21.43	46.15	23.00
Dislocation	17.65	15.00	9.38	14.89	23.08	16.67	7.14	23.08	15.02
Loosening of radial component	5.88	5.00	15.63	17.02	23.08	10.00	10.71	0.00	12.68
Bone resorption of radial component						10.00	17.86	30.77	
Infection	0.00	5.00	12.50	6.38	3.85	13.33	17.86	0.00	8.45
Revision after wrist removal						6.67	10.71	7.69	
Implant fracture	17.65	0.00	3.13	6.38	7.69	3.33	10.71	7.69	6.57
Peri-prosthetic fracture	5.88	0.00	0.00	0.00	11.54	3.33	3.57	15.38	3.76
Loosening of ulnar component	0.00	0.00	0.00	2.13	3.85	6.67	3.57	7.69	2.82
Bone resorption of ulnar component							14.29		
Other	29.41	25.00	31.25	27.66	26.92	16.67	7.14	15.38	23.00

Please note: One patient may have more than one reason for revision. As such, the total proportion is over 100%.

Please note: Bone resorption of carpal component, bone resorption of radial component, revision after wrist removal and bone resorption of ulnar component were not registered before 2022.

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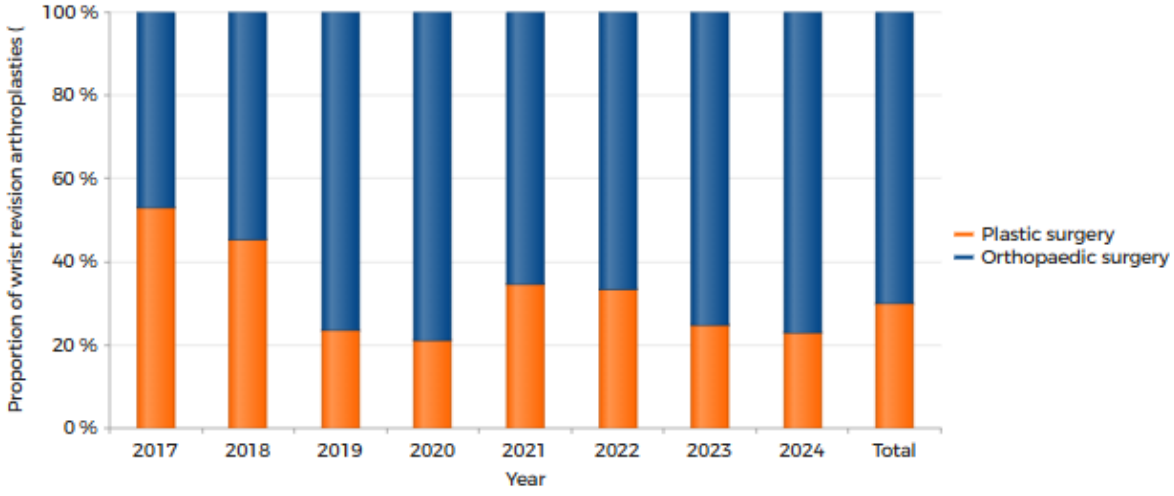
Specialism

FIGURE Trend (proportion [%] per year) in specialism for performing a wrist revision arthroplasty in the Netherlands in 2017-2024



	2017	2018	2019	2020	2021	2022	2023	2024	Total
Plastic surgery	52.94	45.45	23.53	21.28	34.62	33.33	25	23.08	30.16
Orthopaedic surgery	47.06	54.55	76.47	78.72	65.38	66.67	75	76.92	69.84
Total (n)	**17**	**11**	**17**	**47**	**26**	**30**	**28**	**13**	**189**

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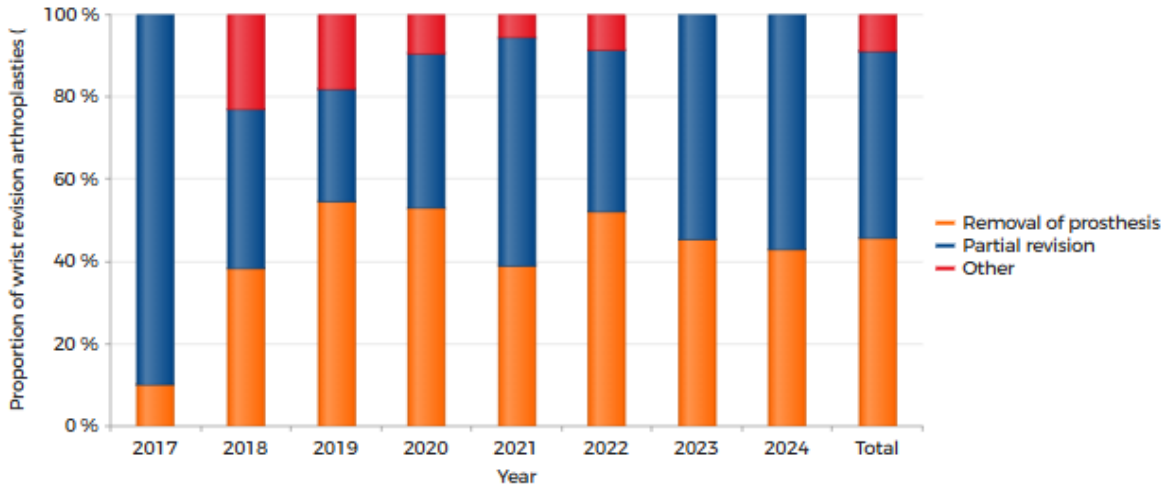
Type of revision

FIGURE Trend (proportion [%] per year) in type of revision in wrist revision arthroplasties in the Netherlands in 2017-2024



	2017	2018	2019	2020	2021	2022	2023	2024	Total
Removal of prosthesis	6.25	26.32	37.50	36.17	26.92	41.38	37.04	23.08	32.06
Partial revision	56.25	26.32	18.75	25.53	38.46	31.03	44.44	30.77	32.06
Other	0	15.79	12.50	6.38	3.85	6.90	0	0	6.22
Total (n)	**10**	**13**	**22**	**32**	**18**	**23**	**22**	**7**	**147**

Most frequently registered components

TABLE The most frequently registered carpal and radial stem components in wrist revision arthroplasties in the Netherlands in 2020-2024

Year	2020	2021	2022	2023	2024
Carpal (n)	**13**	**11**	**7**	**9**	**4**
Carpal name; Number (n)					
Remotion	0	1	1	3	2
Motec	0	2	1	2	2
Freedom	10	6	3	3	0
Universal2	3	2	2	1	0
Year	**2020**	**2021**	**2022**	**2023**	**2024**
Radial stem (n)	**10**	**7**	**3**	**3**	**1**
Radial stem name; Number (n)					
Remotion	0	0	0	1	1
Distal radioulnar joint	3	3	1	1	0
Motec	0	1	1	1	0

Finger arthroplasty

In this section you will find all the information on finger arthroplasty:

Numbers

Registered procedures

TABLE Number of registered finger arthroplasties per year of surgery (2017-2024) in the LROI in April 2025

Year of surgery	Total finger arthroplasty	Revision arthroplasty	Total
2017	186	14	**200**
2018	193	25	**218**
2019	263	24	**287**
2020	250	25	**275**
2021	234	16	**250**
2022	308	35	**343**
2023	406	48	**454**
2024	339	24	**363**
Total (n)	**2,179**	**211**	**2,390**

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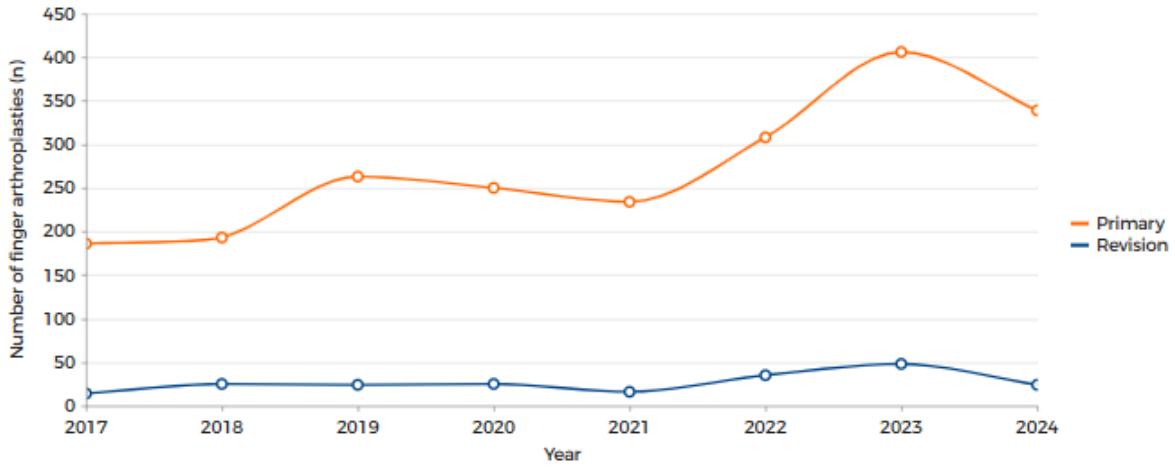
Type of procedures

FIGURE Number of primary finger arthroplasties and finger revision arthroplasties registered in the LROI in the Netherlands in 2017-2024



	2017	2018	2019	2020	2021	2022	2023	2024	Total
Primary	186	193	263	250	234	308	406	339	**2,179**
Revision	14	25	24	25	16	35	48	24	**211**
Total (n)	**200**	**218**	**287**	**275**	**250**	**343**	**454**	**363**	**2,390**

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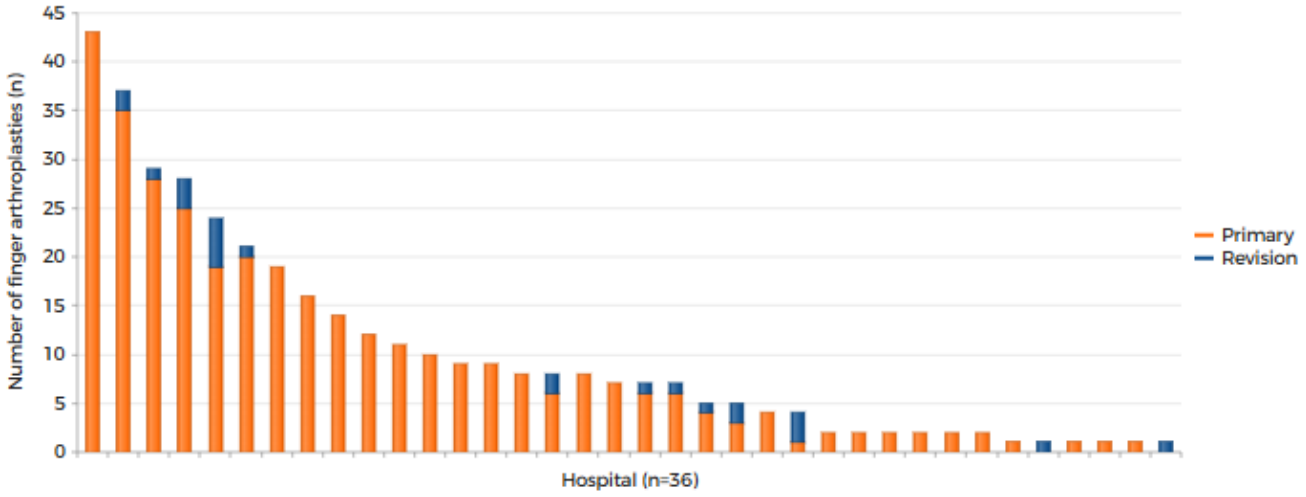
Type of procedure per hospital

FIGURE Number of primary finger arthroplasties and finger revision arthroplasties per hospital in the Netherlands in 2024 (n=363)



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Type of primary finger prosthesis

TABLE Type of primary finger prosthesis in primary finger arthroplasties in the Netherlands in 2024 (n=339)

Finger joint	Thumb (n)	Index (n)	Middle (n)	Ring (n)	Small (n)	Total (n)
CMC	45	n.a.	n.a.	n.a.	n.a.	45
MCP	2	32	27	7	8	76
PIP	n.a.	43	76	61	31	211
DIP	2	3	0	1	1	7
Total (n)	**49**	**78**	**103**	**69**	**40**	**339**

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Primary finger arthroplasty

In this section you will find all the information on primary finger arthroplasty:

Patient characteristics

Demographics

Patient characteristics by specialism

TABLE Patient characteristics of all patients with a registered primary finger arthroplasty in the Netherlands in 2024

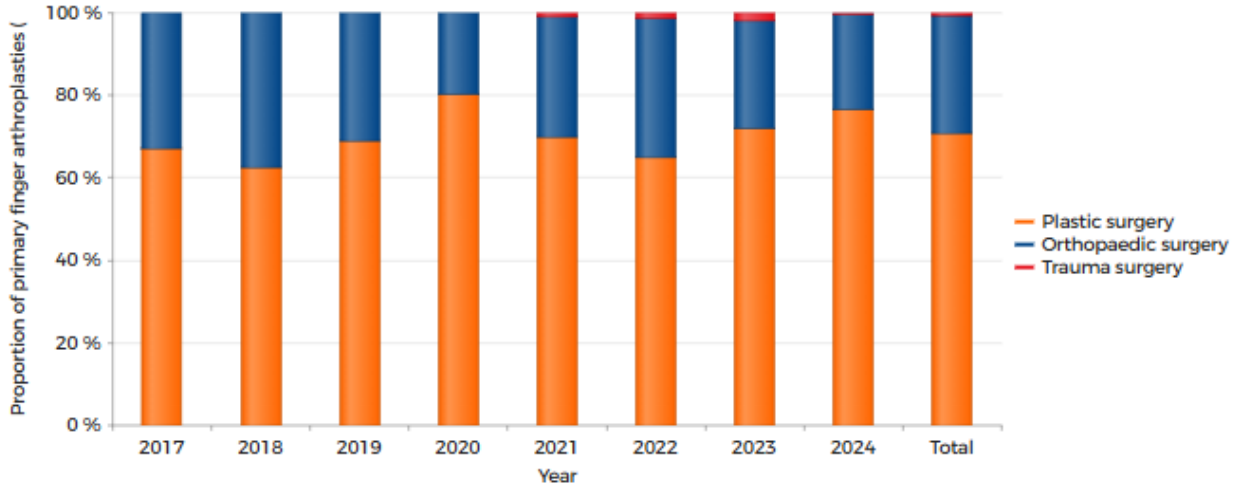
	Plastic surgery	Orthopaedic surgery	Total
N(%)	**256 (76.6)**	**77 (23)**	**339**
Mean age (years) (SD)	65.1 (10.5)	65.8 (7.8)	65.4 (9.9)
Age (years) (%)			
<50	6	0	4
50-59	23	19	22
60-69	32	45	36
70-79	35	31	34
>80	4	4	4
Gender (%)			
Men	27	19	26
Women	73	81	74
ASA score (%)			
ASA I	18	10	16
ASA II	70	64	70
ASA III-IV	9	26	14
Type of hospital (%)			
General	24	78	37
UMC	6	6	6
Private	70	16	57
Diagnosis (%)			
Osteoarthritis	86	83	86
Post-traumatic	2	1	2
Rheumatoid arthritis	10	12	10
Osteonecrosis	0	0	0
Inflammatory arthritis	0	1	0
Other	1	1	1
Mean BMI (kg/m2) (SD)	26.5 (6.0)	26.6 (4.0)	26.5 (5.3)
Body Mass Index (kg/m2) (%)			
Underweight (<=18.5)	0	0	0
Normal weight (>18.5-25)	20	42	45
Overweight (>25-30)	13	38	34
Obesity (>30-40)	9	16	18
Morbid obesity (>40)	1	1	2
Smoking (%)			
No	88	91	94
Yes	5	9	6

Total primary finger arthroplasties includes one procedure performed by trauma surgeons and five procedures with missing specialism.
General: general hospital; UMC: university medical centre; Private: private hospital; SD: standard deviation.

Procedure characteristics

Specialism

FIGURE Trend (proportion [%] per year) in specialism for performing a primary finger arthroplasty in the Netherlands in 2017-2024



	2017	2018	2019	2020	2021	2022	2023	2024	Total
Plastic surgery	67.04	62.63	68.90	80.40	69.87	64.90	72.14	76.65	70.89
Orthopaedic surgery	32.96	37.37	31.10	19.60	29.26	33.77	26.12	23.05	28.46
Trauma surgery	0	0	0	0	0.87	1.32	1.74	0.30	0.65
Total (n)	**179**	**190**	**254**	**250**	**229**	**302**	**402**	**334**	**2,140**

Please note: the specialism of trauma surgery has been registered since 2022

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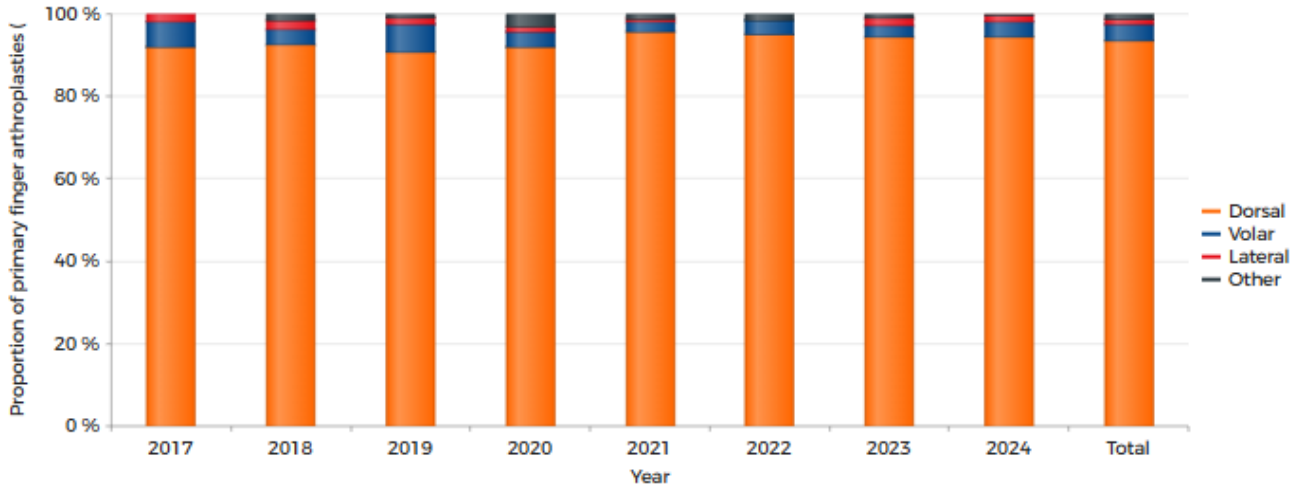
Surgical approach

FIGURE Trend (proportion [%] per year) in surgical approach for performing a primary finger arthroplasty in the Netherlands in 2017-2024



	2017	2018	2019	2020	2021	2022	2023	2024	Total
Dorsal	92.05	92.67	90.83	91.95	95.63	95.06	94.44	94.61	93.59
Volar	6.25	3.66	6.67	3.81	2.62	3.42	2.92	3.59	3.98
Lateral	1.70	2.09	1.67	1.27	0.44	0	1.75	1.50	1.29
Other	0	1.57	0.83	2.97	1.31	1.52	0.88	0.30	1.14
Total (n)	**176**	**191**	**240**	**236**	**229**	**263**	**342**	**334**	**2,011**

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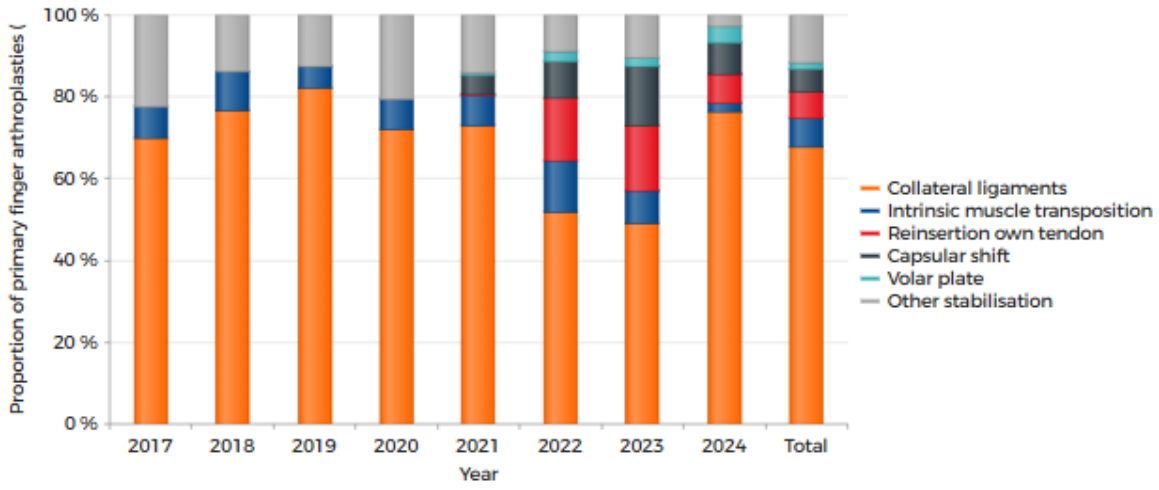
Soft tissue stabilisation

FIGURE Trend (proportion [%] per year) in type of stabilisation in primary finger arthroplasty in the Netherlands in 2017-2024



	2017	2018	2019	2020	2021	2022	2023	2024	Total
Collateral ligaments	70	76.61	82.16	72.19	72.88	51.72	49.22	76.49	67.92
Intrinsic muscle transposition	7.50	9.68	5.41	7.28	7.34	12.81	7.81	1.99	7.05
Reinsertion own tendon	0	0	0	0	0.56	15.27	16.02	6.95	6.19
Capsular shift	0	0	0	0	4.52	8.87	14.45	7.95	5.73
Volar plate	0	0	0	0	0.56	2.46	1.95	3.97	1.52
Other stabilisation	22.50	13.71	12.43	20.53	14.12	8.87	10.55	2.65	11.59
Total (n)	**120**	**124**	**185**	**151**	**177**	**203**	**256**	**302**	**1,518**

Please note: Capsular shift, reinsertion own tendon and volar plate have been resgistered since 2022

Most frequently registered components

TABLE The most frequently registered proximal components in primary finger arthroplasties in the Netherlands in 2020-2024

Year	2020	2021	2022	2023	2024
Proximal component (n)	**168**	**176**	**245**	**331**	**289**
Proximal name; Proportion (%)					
Silicone PIP	52.38	60.80	39.18	32.02	28.37
Swanson	5.95	7.95	11.43	14.80	24.57
KeriFlex PIP	0.00	0.00	1.63	17.22	17.30
KeriMedical Touch	0.00	0.00	1.22	4.53	7.27
MCP Implant	14.29	7.39	20.41	15.11	5.88
KeriFlex MCP	0.00	0.00	2.86	8.16	5.54
Cap Flex PIP prothese	0.60	2.27	1.63	3.02	5.19
Maia	0.00	0.00	1.22	0.00	3.11
Pyrocardan	1.19	1.14	1.22	1.51	2.08
PIP Implant	4.17	3.41	0.00	0.00	0.35

Survival

Short term revision

Revision rates within 1 year

TABLE Revision procedures within 1 year after primary finger arthroplasty by year in the Netherlands in 2017-2023

Procedure year	Number of primary finger arthroplasties	Number of revisions	Percentage revisions
2017	186	2	1.1%
2018	193	3	1.6%
2019	262	0	0.0%
2020	249	3	1.2%
2021	234	2	0.9%
2022	306	6	2.0%
2023	404	11	2.7%

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Time after primary finger arthroplasty

TABLE Time after primary finger arthroplasty until short-term revision in the Netherlands in 2017-2021 (n=1,124)

Time after primary finger	Percentage revisions (%)
Day 0-29	0.09
Day 30-182	0.44
Day 183-364	0.36
Day 365-730 (second year)	0.98
Day 731-1095 (third year)	0.44

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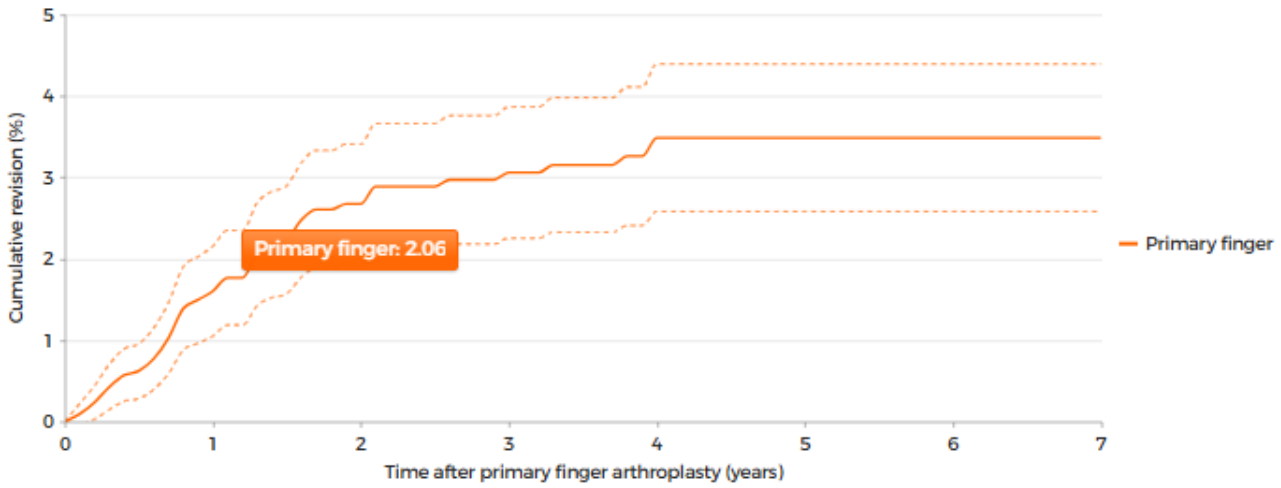
Long term revision

Overall

FIGURE Cumulative revision percentage (Kaplan-Meier; 95% CI) of primary finger arthroplasties in the Netherlands in 2017-2024 (n=2,173)



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	1yr	3yr	5yr	7yr
Primary finger	1.50 (0.96-2.03)	2.97 (2.18-3.76)	3.49 (2.58-4.39)	3.49 (2.58-4.39)

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

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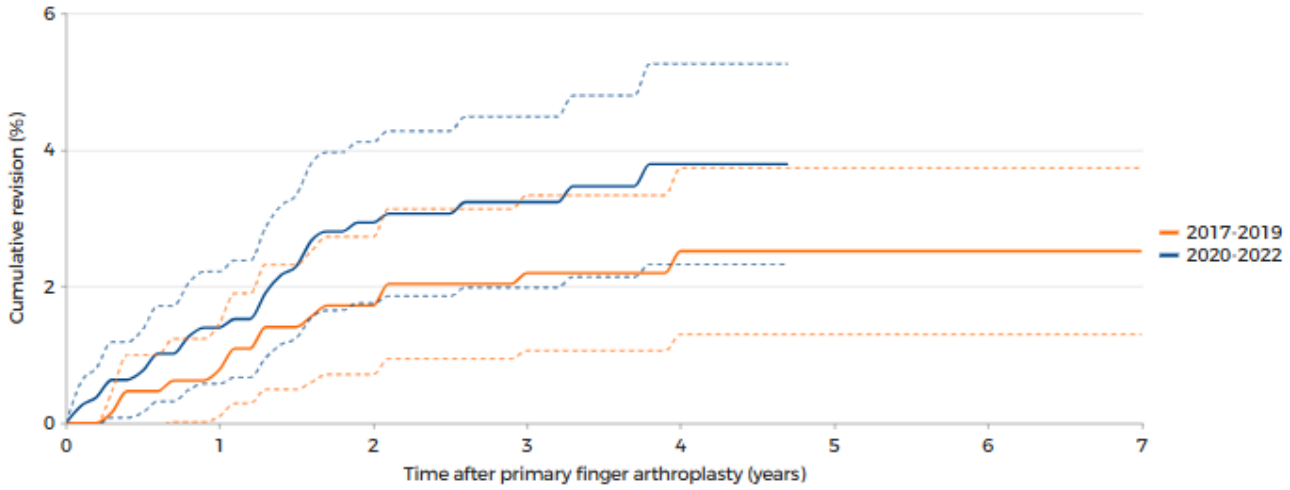
In 2017-2024, 80 (3.7%) primary finger arthroplasties were implanted in patients who died within seven years after the primary procedure.

By procedure year

FIGURE Cumulative revision percentage (Kaplan-Meier; 95% CI) of primary finger arthroplasties by procedure year of primary arthroplasty in the Netherlands in 2017-2024



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	Number (n)	1yr	3yr	5yr	7yr
2017-2019	641	0.62 (0.01-1.23)	2.04 (0.94-3.13)	2.52 (1.30-3.73)	2.52 (1.30-3.73)
2020-2022	789	1.40 (0.58-2.22)	3.23 (1.98-4.48)	n.a.	n.a.

Please note: Dotted lines represent the upper and lower limits of the 95% confidence intervall; n.a. if <50 cases were at risk.
CI: confidence interval.

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Finger revision arthroplasty

In this section you will find all the information on revision finger arthroplasty:

Revision characteristics

Reasons for revision

TABLE Reasons for revision in patients who underwent a finger revision arthroplasty in the Netherlands in 2017-2024

Year	2017	2018	2019	2020	2021	2022	2023	2024	Total
Finger revision arthroplasty (n)	14	25	24	25	16	35	48	24	211
Reasons for revision; Proportion (%)									
Implant fracture	0.00	36.00	37.50	28.00	56.25	42.86	43.75	8.33	34.12
Instability or dislocation	0.00	36.00	29.17	20.00	37.50	31.43	10.42	12.50	21.80
Luxation	28.57	20.00	25.00	8.00	31.25	28.57	0.00	4.17	15.64
Malposition or malalignment						20.00	18.75	45.83	
Bone resorption of proximal component	14.29	4.00	20.83	0.00	12.50	14.29	0.00	12.50	8.53
Bone resorption of distal component	0.00	4.00	20.83	4.00	6.25	14.29	0.00	4.17	6.64
Infection	14.29	0.00	25.00	4.00	0.00	2.86	4.17	12.50	
Loosening of proximal component	28.57	0.00	20.83	4.00	0.00	2.86	2.08	8.33	7.11
Loosening of distal component	0.00	0.00	0.00	4.00	0.00	0.00	0.00	0.00	6.64
Revision after finger removal						2.86	2.08	0.00	
Periprosthetic fracture	7.14	0.00	0.00	0.00	0.00				
Other	57.14	20.00	33.33	24.00	43.75	8.57	25.00	25.00	26.07

Please note: One patient may have more than one reason for revision. As such, the total proportion is over 100%.
Please note: Malposition or malalignment and revision after finger removal have been registered since 2022. Periprosthetic fractures have not been registered since 2022.

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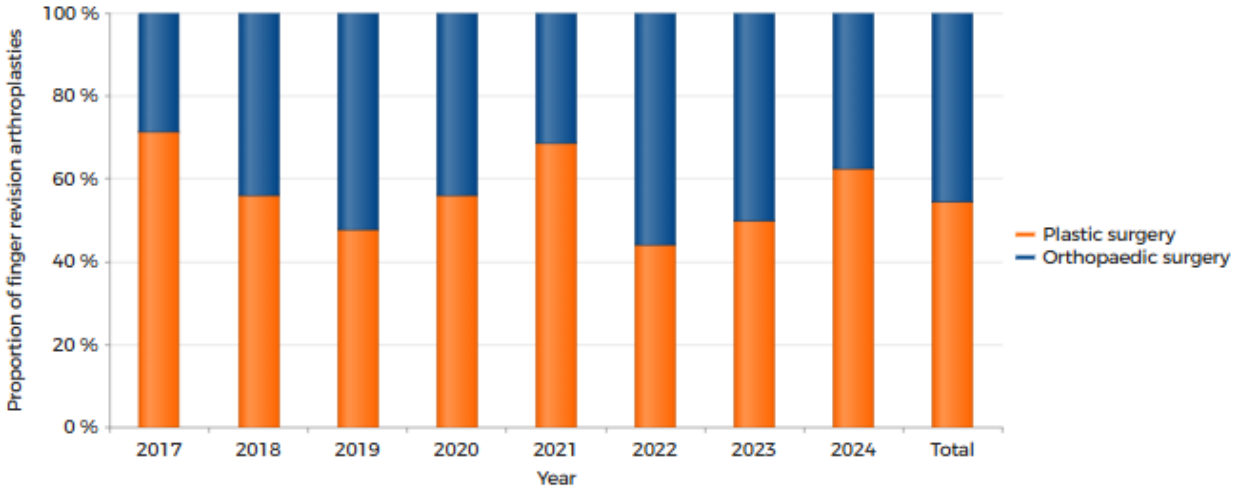
Specialism

FIGURE Trend (proportion [%] per year) in specialism for performing a finger revision arthroplasty in the Netherlands in 2017-2024



	2017	2018	2019	2020	2021	2022	2023	2024	Total
Plastic surgery	71.43	56	47.83	56	68.75	44.12	50	62.50	54.55
Orthopaedic surgery	28.57	44	52.17	44	31.25	55.88	50	37.50	45.45
Total (n)	**14**	**25**	**23**	**25**	**16**	**34**	**48**	**24**	**209**

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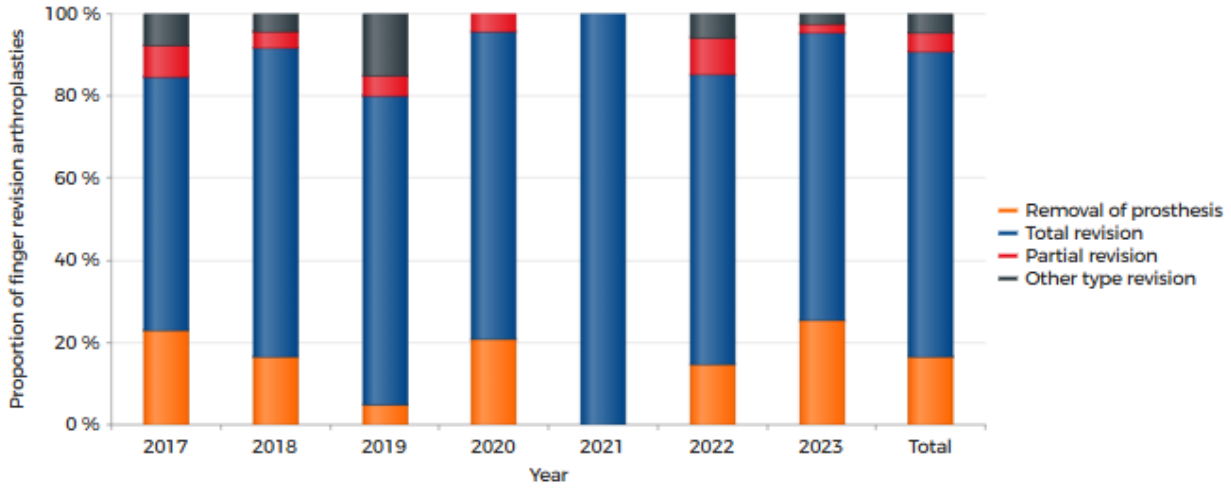
Type of revision

FIGURE Type of revision arthroplasty of finger revision arthroplasties in the Netherlands in 2017-2024



	2017	2018	2019	2020	2021	2022	2023	Total
Removal of prosthesis	23.08	16.67	5	20.83	0	14.71	25.58	16.67
Total revision	61.54	75	75	75	100	70.59	69.77	74.14
Partial revision	7.69	4.17	5	4.17	0	8.82	2.33	4.60
Other type revision	7.69	4.17	15	0	0	5.88	2.33	4.60
Total (n)	**13**	**24**	**20**	**24**	**16**	**34**	**43**	**174**

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Most frequently registered components

TABLE The most frequently registered proximal components in finger revision arthroplasties in the Netherlands in 2020-2024

Year	2020	2021	2022	2023	2024
Proximal component (n)	**15**	**15**	**27**	**35**	**16**
Proximal name; Proportion (%)					
Swanson	13.33	0.00	3.70	5.71	50.00
Silicone PIP	20.00	46.67	40.74	42.86	25.00
KeriFlex PIP	0.00	0.00	0.00	17.14	12.50
KeriFlex MCP	0.00	0.00	0.00	14.29	6.25
KeriMedical Touch	0.00	0.00	0.00	0.00	6.25

Clubfoot

In this section you will find all the information on clubfoot treatments:

Numbers

Registered treatments

TABLE Number of registered clubfoot treatments per year (2022-2024) in the LROI in April 2025

Year of treatment	Initial assessment	Termination of cast treatment	Relapse	Follow up at 1 year
2022	144	118	4	25
2023	152	136	15	82
2024	131	99	8	67
Total (n)	**427**	**353**	**27**	**174**

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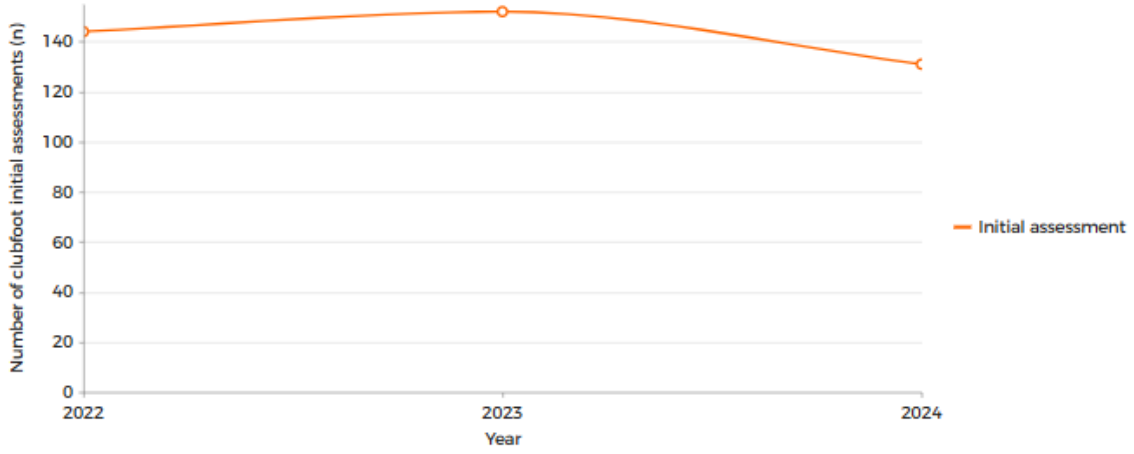
Initial assessments per year

FIGURE Number of patients with initial assessment clubfoot registered in the LROI in the Netherlands in 2022-2024



	2022	2023	2024
Initial assessment	144	152	131
Total (n)	**144**	**152**	**131**

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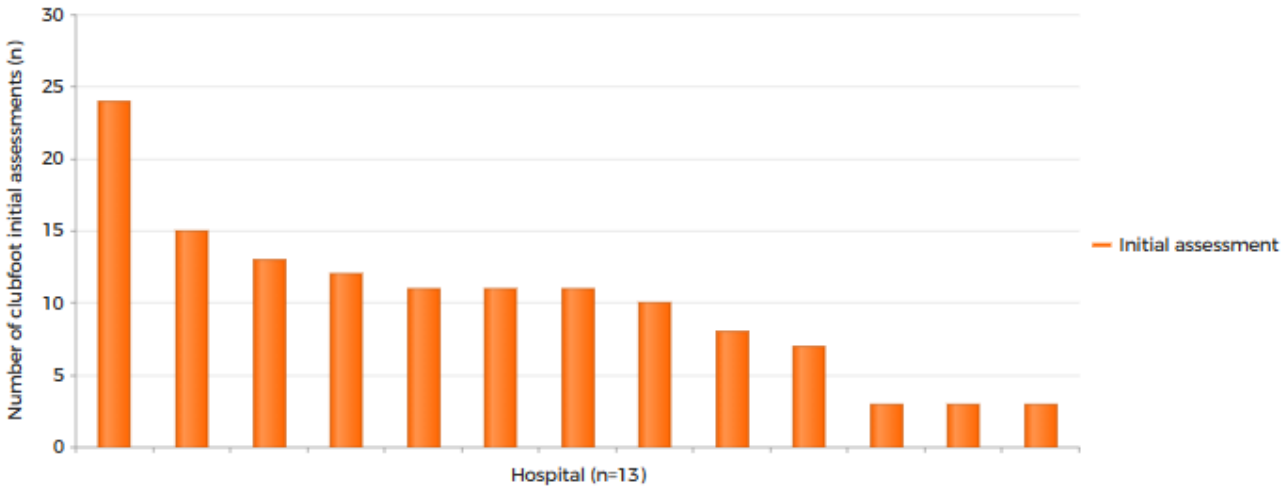
Initial assessments per hospital

FIGURE Number of patients with initial assessment clubfoot per hospital in the Netherlands in 2024 (n=131)



Initial assessment

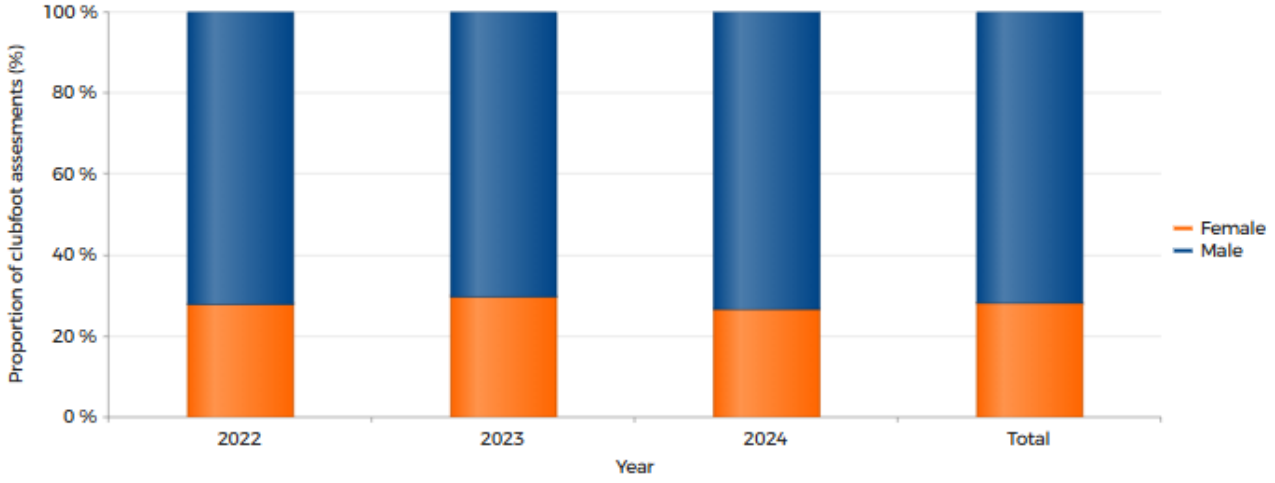
Demographics

TABLE Patient and treatment characteristics of patients with a registered initial assessment clubfoot by treatment year in the Netherlands in 2022-2024

	2022	2023	2024	Total
n	**144**	**152**	**131**	**427**
Gender (%)				
Male	72	70	73	72
Female	28	30	27	28
Age (days)				
Mean (SD)	11 (14)	12 (13)	17 (24)	12 (13)
Median (IQR)	7 (5-11)	9 (6-13)	10 (6-17)	9 (5-13)
Treatment started within 1 week (%)	58	36	32	42
Treatment started within 2 weeks (%)	83	82	73	79
Bilateral (%)	48	43	45	45

Gender

FIGURE Trend (proportion [%] per year) in gender of patients with a registered initial assesment clubfoot in the Netherlands in 2022-2024



	2022	2023	2024	Total
Female	27.78	29.61	26.72	28.10
Male	72.22	70.39	73.28	71.90
Total (n)	**144**	**152**	**131**	**427**

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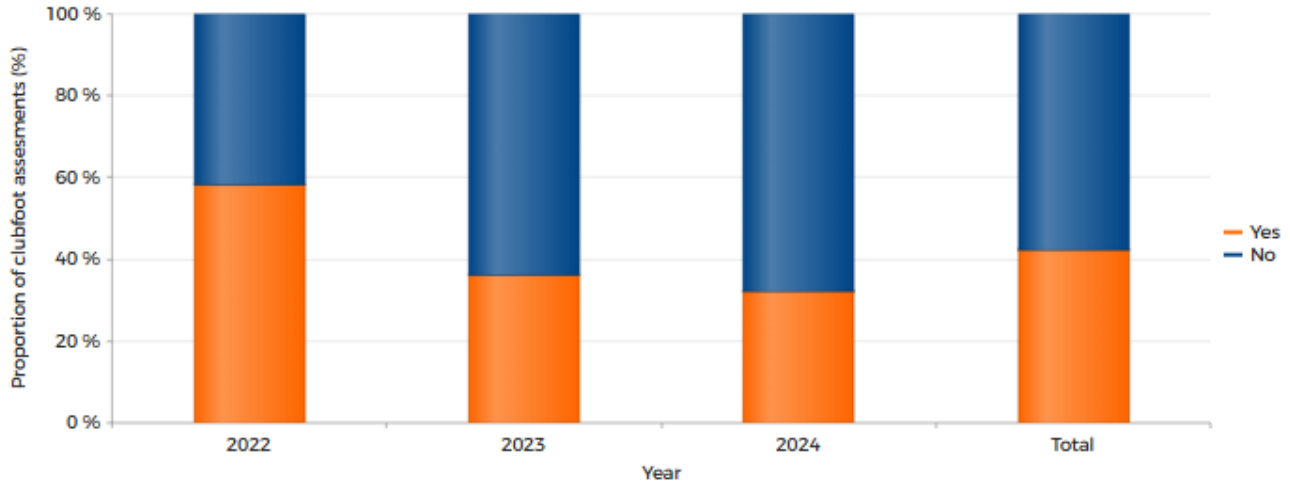
Treatment within 1 week

FIGURE Trend (proportion [%] per year) of patients with a registered initial assesment clubfoot who began treatment within one week in the Netherlands in 2022-2024



	2022	2023	2024	Total
Yes	58.33	36.18	32.06	42.39
No	41.67	63.82	67.94	57.61
Total (n)	**144**	**152**	**131**	**427**

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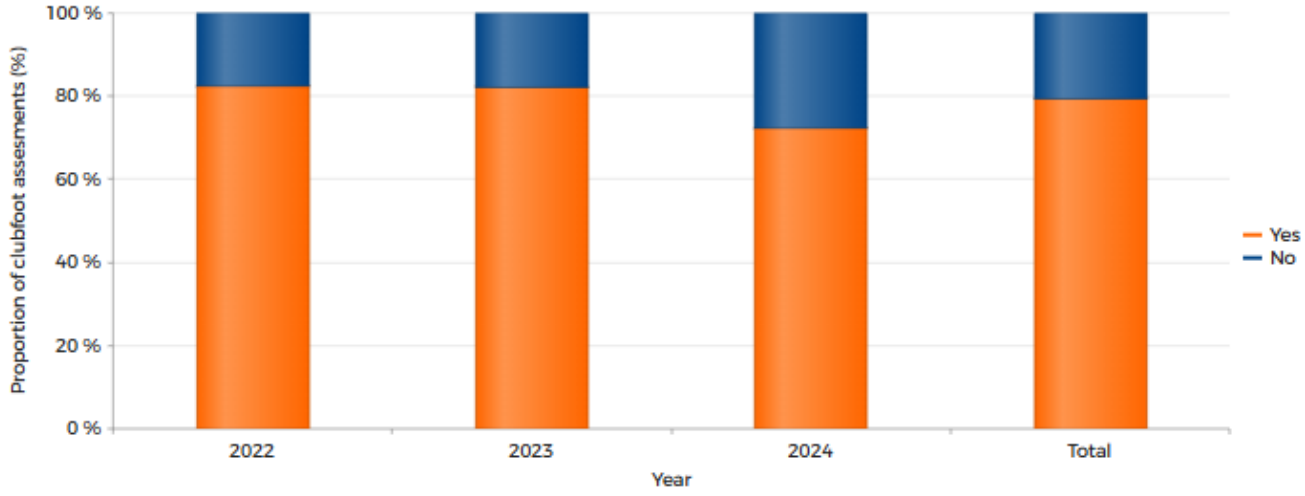
Treatment within 2 weeks

FIGURE Trend (proportion [%] per year) of patients with a registered initial assesment clubfoot who began treatment within two weeks in the Netherlands in 2022-2024



	2022	2023	2024	Total
Yes	82.64	82.24	72.52	79.39
No	17.36	17.76	27.48	20.61
Total (n)	**144**	**152**	**131**	**427**

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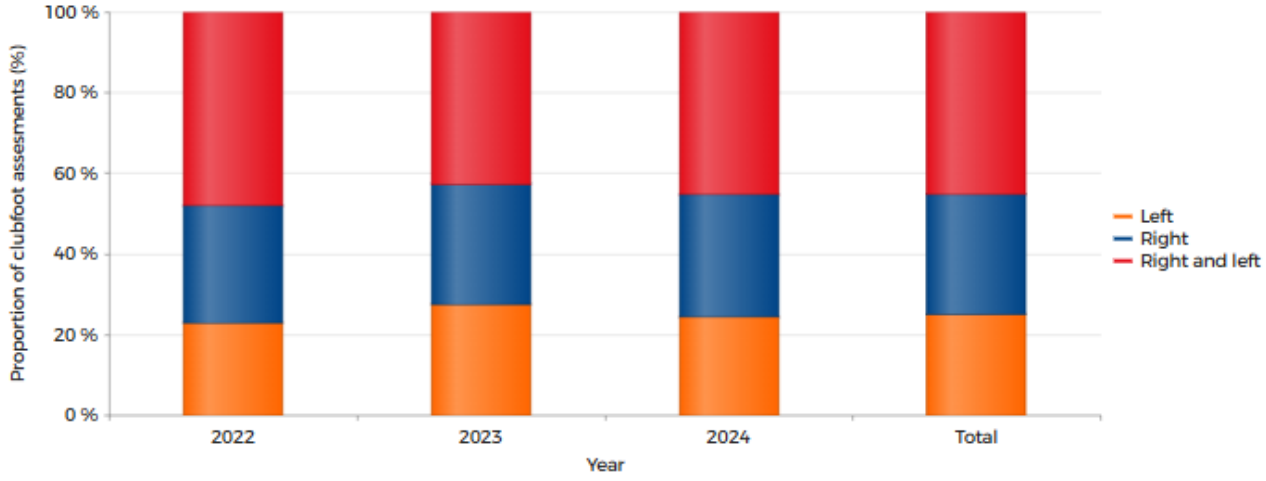
Affected side

FIGURE Trend (proportion [%] per year) in affected side of patients with a registered initial assesment clubfoot in the Netherlands in 2022-2024



	2022	2023	2024	Total
Left	22.92	27.63	24.43	25.06
Right	29.17	29.61	30.53	29.74
Right and left	47.92	42.76	45.04	45.20
Total (n)	**144**	**152**	**131**	**427**

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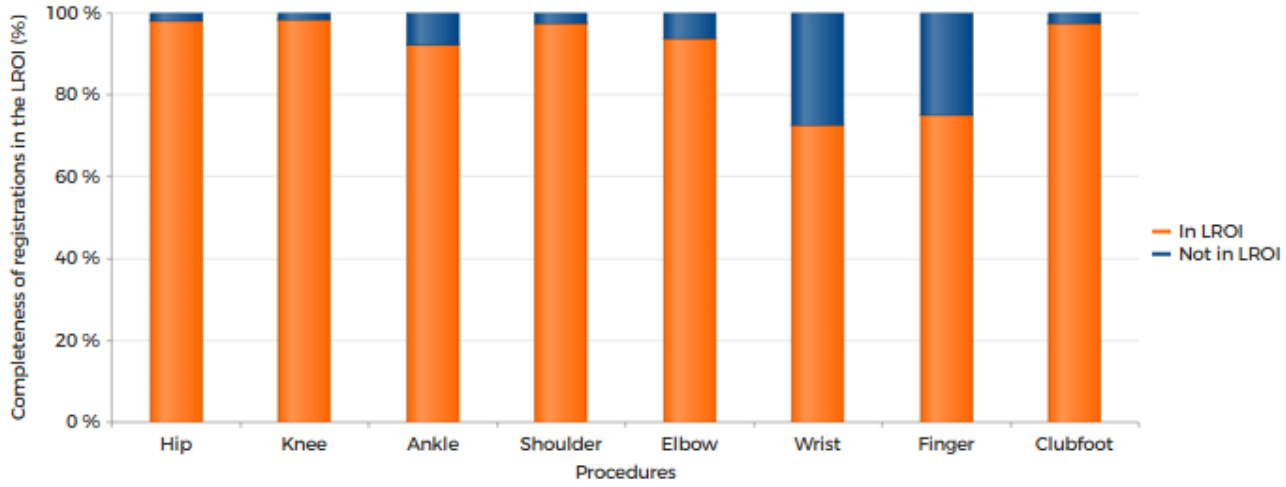
Data quality

Completeness

Overall completeness per procedure

FIGURE Completeness (proportion [%] per procedure) of the registration of procedures in the LROI in 2024



	Hip	Knee	Ankle	Shoulder	Elbow	Wrist	Finger	Clubfoot
In LROI	98.20	98.60	92.40	97.50	94	72.70	75.30	97.40
Not in LROI	1.80	1.40	7.60	2.50	6	27.30	24.70	2.60
Total (n)	**40,008**	**36,237**	**224**	**4,102**	**232**	**110**	**219**	**154**

Please note: Hip registrations include primary total hip arthroplasties, primary hip hemiarthroplasties and hip revision arthroplasties.
Please note: Completeness refers to the number of registered arthroplasties (orthopaedic, trauma and plastic surgery) in the LROI as of July 2025, compared to the total number of arhtroplasties performed in 2024 based on the hospital information system (HIS). This pertains only to hospitals that submitted data for comparison.
Please note: Fifteen orthopaedic departments (with 13,047 procedures in the LROI), seven trauma surgery departments (1,184 procedures in the LROI), and nine plastic surgery departments (63 procedures in the LROI) did not provide hospital information system (HIS) data for comparison. These procedures are therefore not included in determining the national completeness of the LROI.
Please note: Three clubfoot treatment departments (with 41 initial assessments in the LROI) did not provide HIS data for comparison. These clubfoot in

Completeness per year

TABLE Completeness (proportion [%] per procedure) of the registration of procedures in the LROI in 2013-2024

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Hip arthroplasties												
Primary total hip arthroplasties	97	96	98	99	99	99	99	99	99	99	98	98
Primary hip hemiarthroplasties	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	92	89	96
Primary hip hemiarthroplasties (orthopaedic surgeon)	71	84	88	95	96	96	94	97	96	n/a	n/a	n/a
Primary hip hemiarthroplasties (trauma surgeon)	n/a	n/a	n/a	50	64	65	63	68	74	n/a	n/a	n/a
Hip revision arthroplasties	88	93	97	97	98	97	97	98	98	97	99	100
Knee arthroplasties												
Primary knee arthroplasties	95	96	98	99	100	99	99	99	97	99	98	99
Knee revision arthroplasties	90	93	98	98	98	97	97	98	97	98	98	99
Ankle arthroplasties												
Primary ankle arthroplasties	n/a	80	91	92	100	98	98	95	95	96	95	95
Ankle revision arthroplasties	n/a	55	67	94	87	83	55	95	96	95	95	83
Shoulder arthroplasties												
Primary shoulder arthroplasties	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	97	96	97
Primary shoulder arthroplasties (orthopaedic surgeon)	n/a	78	94	94	98	91	96	96	97	n/a	n/a	n/a
Primary shoulder arthroplasties (trauma surgeon)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	32	25	n/a	n/a	n/a
Shoulder revision arthroplasties	n/a	74	90	92	90	78	91	93	79	95	94	100
Elbow arthroplasties												
Primary elbow arthroplasties	n/a	70	85	88	91	89	85	92	89	85	88	97
Elbow revision arthroplasties	n/a	55	86	93	87	85	83	91	78	87	90	89
Wrist arthroplasties												
Primary wrist arthroplasties	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	59	85	76
Primary wrist arthroplasties (orthopaedic surgeon)	n/a	n/a	n/a	n/a	71	29	55	70	73	n/a	n/a	n/a
Primary wrist arthroplasties (plastic surgeon)	n/a	n/a	n/a	n/a	64	62	50	56	75	n/a	n/a	n/a
Wrist revision arthroplasties	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	85	79	60
Wrist revision arthroplasties (orthopaedic surgeon)	n/a	n/a	n/a	n/a	18	83	77	100	93	n/a	n/a	n/a
Wrist revision arthroplasties (plastic surgeon)	n/a	n/a	n/a	n/a	25	50	50	86	75	n/a	n/a	n/a
Finger arthroplasties												
Primary finger arthroplasties	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	60	77	73
Primary finger arthroplasties (orthopaedic surgeon)	n/a	n/a	n/a	n/a	53	63	66	65	81	n/a	n/a	n/a
Primary finger arthroplasties (plastic surgeon)	n/a	n/a	n/a	n/a	67	68	60	82	84	n/a	n/a	n/a
Finger revision arthroplasties	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	100	100	100
Finger revision arthroplasties (orthopaedic surgeon)	n/a	n/a	n/a	n/a	17	100	90	41	83	n/a	n/a	n/a
Finger revision arthroplasties (plastic surgeon)	n/a	n/a	n/a	n/a	24	40	57	67	100	n/a	n/a	n/a
Clubfoot												
Initial assessment	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	67	66	95

Please note: Completeness refers to the number of registered arthroplasties (orthopaedic, trauma and plastic surgery) in the LROI as of July 2025, compared to the total number of arhtroplasties performed in 2024 based on the hospital information system (HIS). This pertains only to hospitals that submitted data for comparison.

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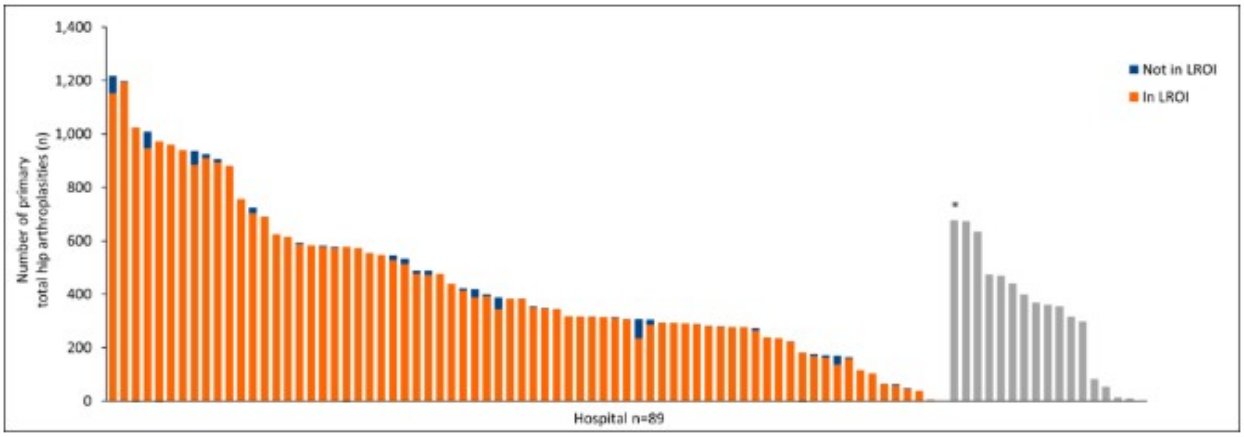
Please note: Three clubfoot treatment departments (with 41 initial assessments in the LROI) did not provide HIS data for comparision. These clubfoot initial assessments are therefore not included in determining the national completeness of the LROI.

The completeness of number of registered procedures in the LROI is determined every year in July-August. Improving data completeness and data quality by registering missing data is an ongoing process.

Completeness primary THA per hospital account

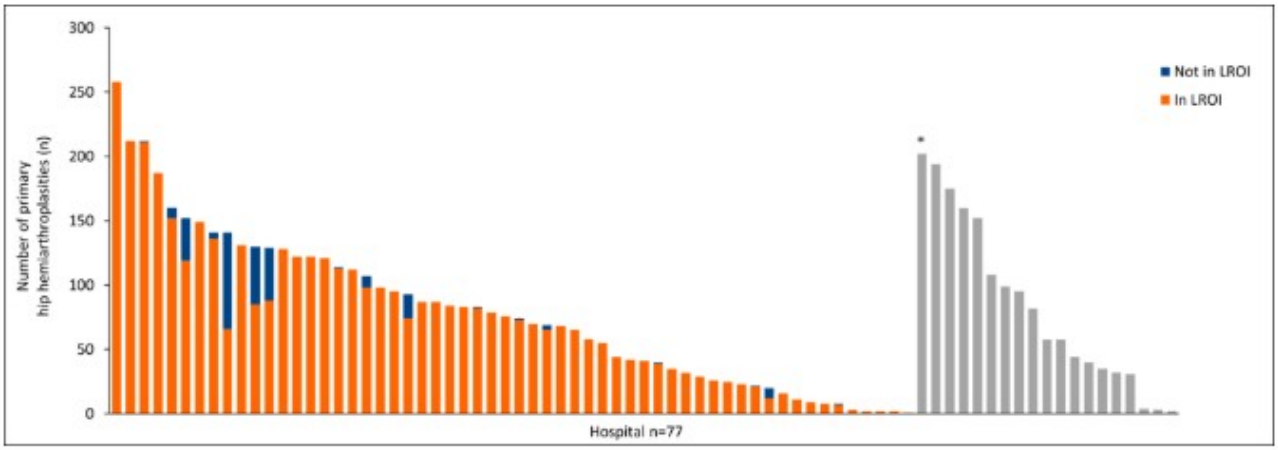
Number of procedures performed (based on the hospital information system) and the number of registered procedures in the LROI per hospital account for primary total hip arthroplasties in 2024



* No data provided for comparison by the hospital account

Completeness primary hip hemiarthroplasty per hospital account

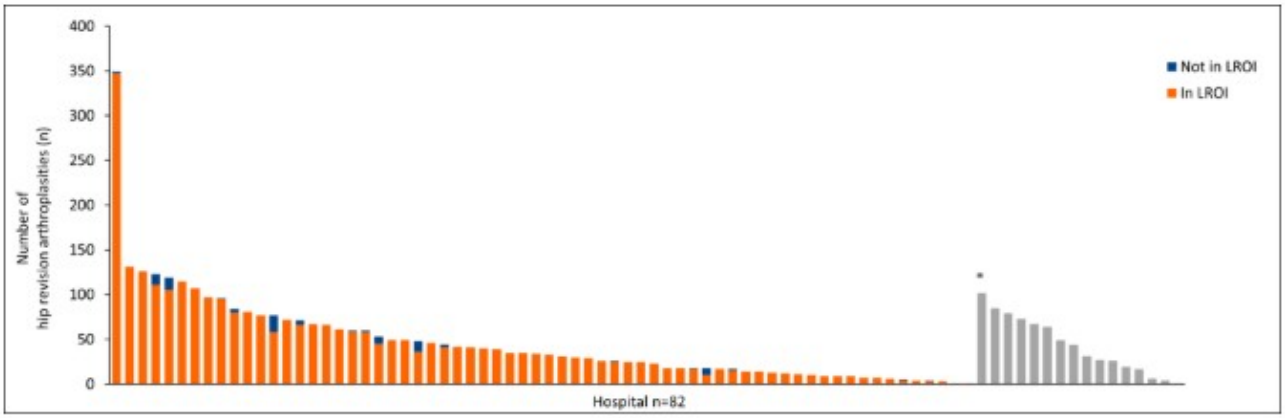
Number of procedures performed (based on the hospital information system) and the number of registered procedures in the LROI per hospital account for primary hip hemiarthroplasties in 2024



* No data provided for comparison by the hospital account

Completeness hip revision per hospital account

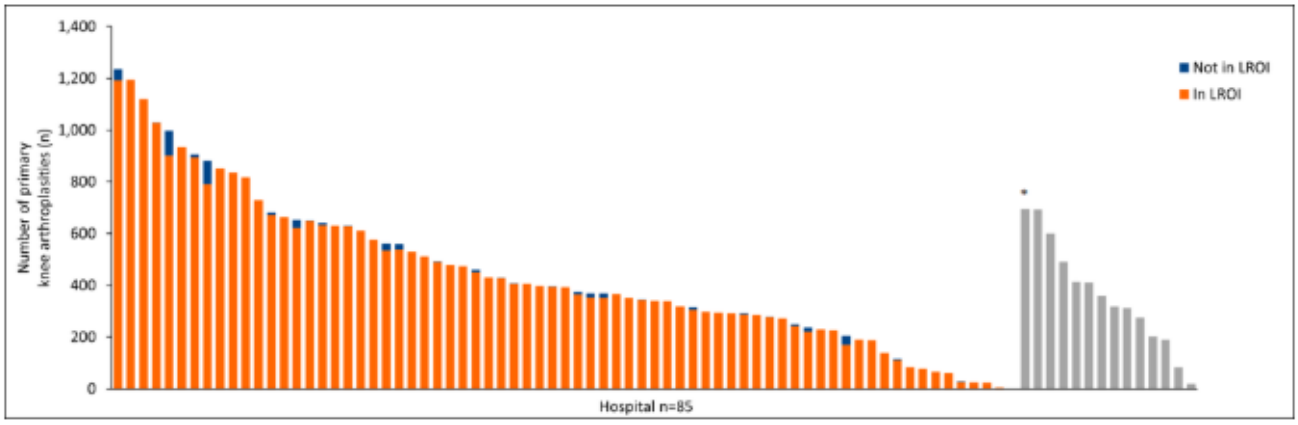
Number of procedures performed (based on the hospital information system) and the number of registered procedures in the LROI per hospital account for hip revision arthroplasties in 2024



* No data provided for comparison by the hospital account

Completeness primary knee per hospital account

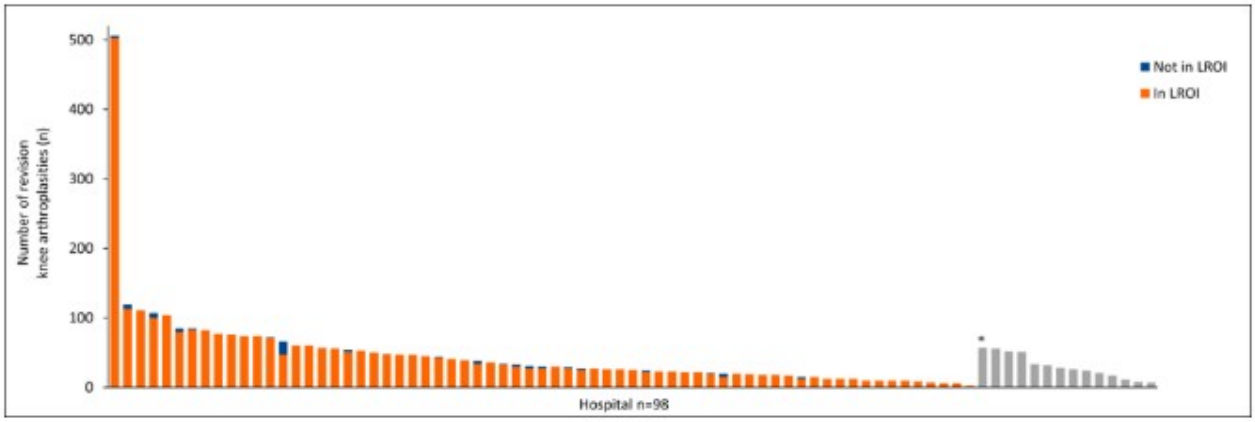
Number of procedures performed (based on the hospital information system) and the number of registered procedures in the LROI per hospital account for primary knee arthroplasties in 2024



* No data provided for comparison by the hospital account

Completeness knee revision per hospital account

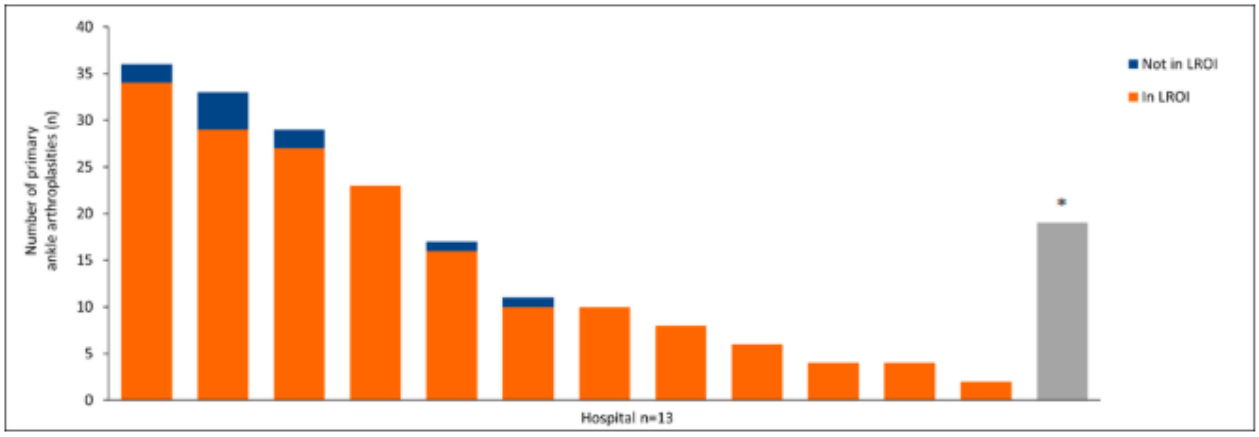
Number of procedures performed (based on the hospital information system) and the number of registered procedures in the LROI per hospital account for knee revision arthroplasties in 2024



* No data provided for comparison by the hospital account

Completeness primary ankle per hospital account

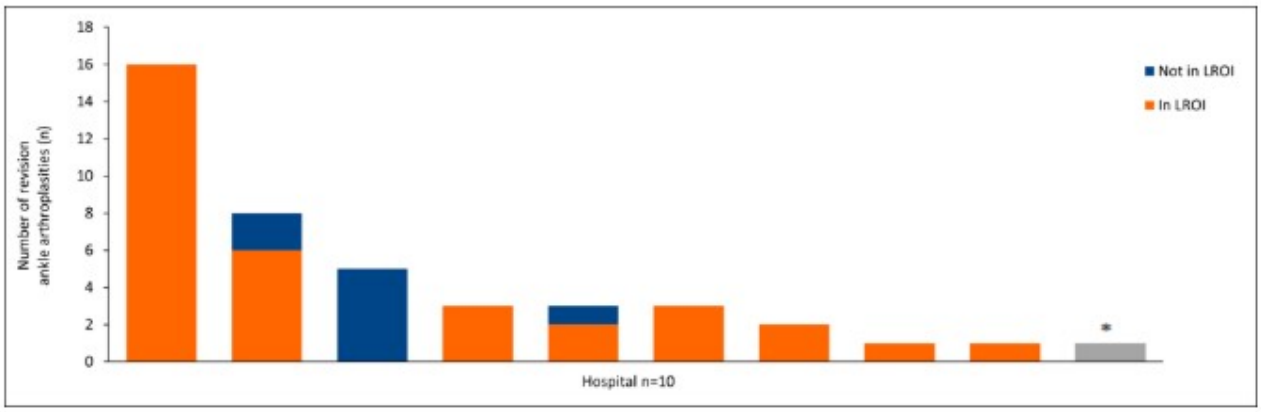
Number of procedures performed (based on the hospital information system) and the number of registered procedures in the LROI per hospital account for primary ankle arthroplasties in 2024



* No data provided for comparison by the hospital account

Completeness ankle revision per hospital account

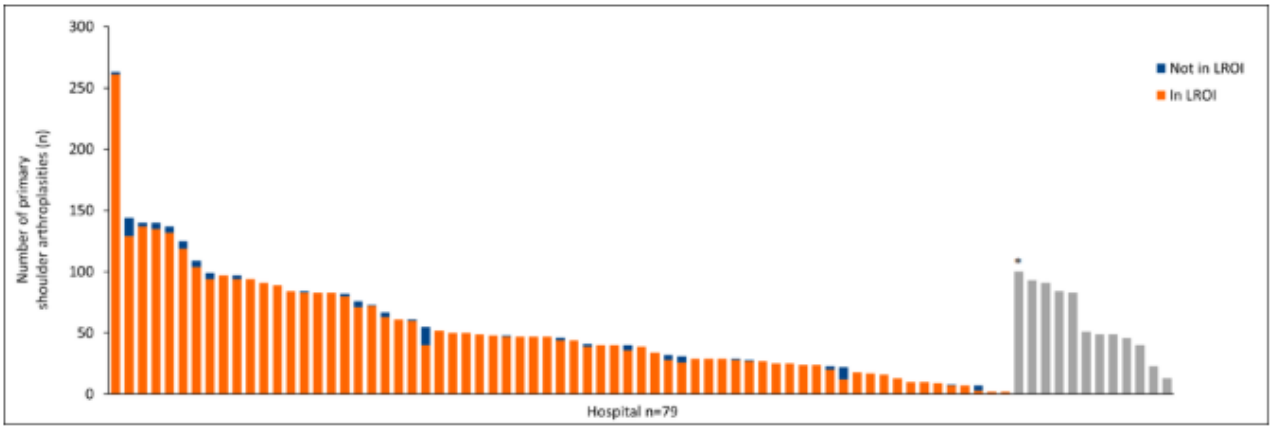
Number of procedures performed (based on the hospital information system) and the number of registered procedures in the LROI per hospital account for ankle revision arthroplasties in 2024



* No data provided for comparison by the hospital account

Completeness primary shoulder per hospital account

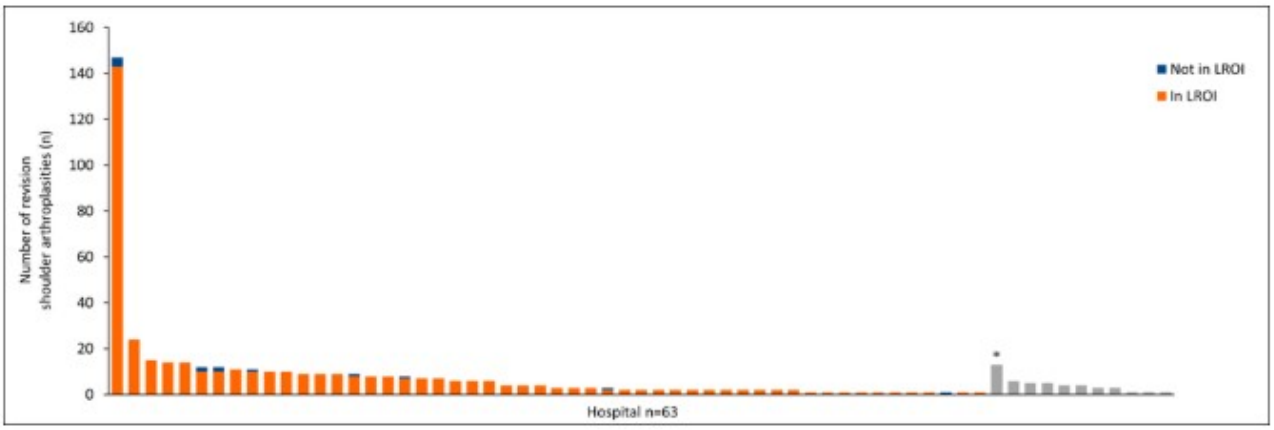
Number of procedures performed (based on the hospital information system) and the number of registered procedures in the LROI per hospital account for primary shoulder arthroplasties in 2024



* No data provided for comparison by the hospital account

Completeness shoulder revision per hospital account

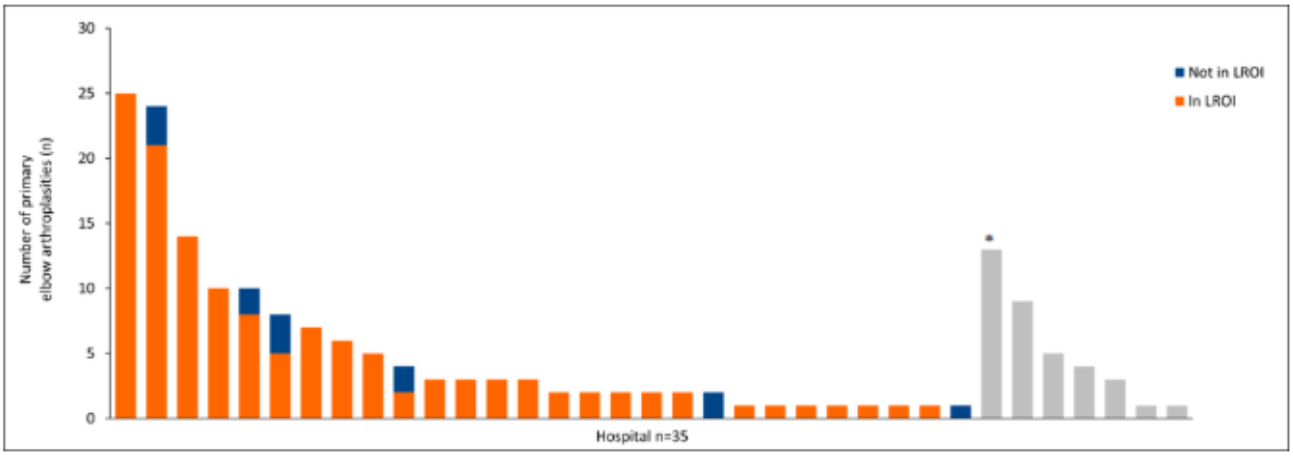
Number of procedures performed (based on the hospital information system) and the number of registered procedures in the LROI per hospital account for shoulder revision arthroplasties in 2024



* No data provided for comparison by the hospital account

Completeness primary elbow per hospital account

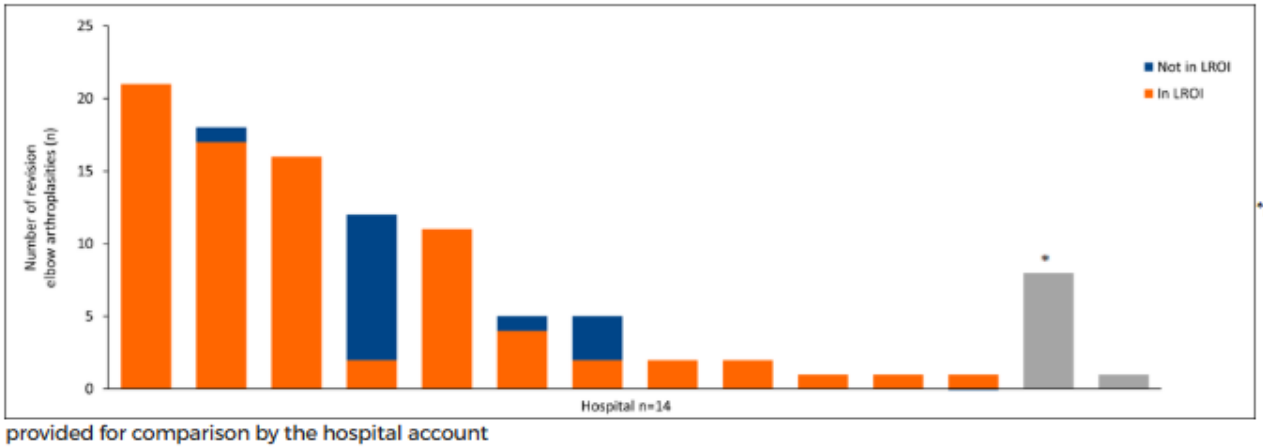
Number of procedures performed (based on the hospital information system) and the number of registered procedures in the LROI per hospital account for primary elbow arthroplasties in 2024



* No data provided for comparison by the hospital account

Completeness elbow revision per hospital account

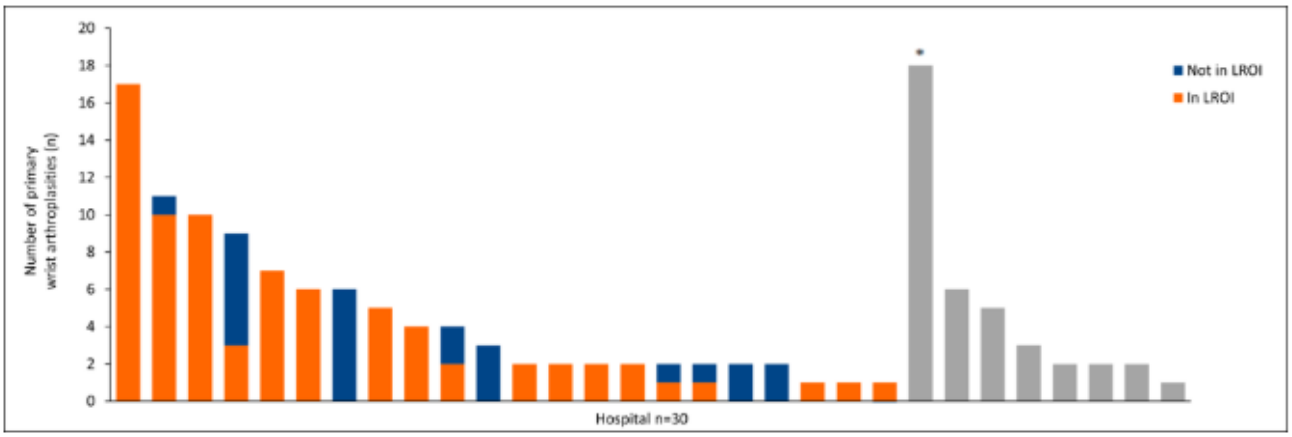
Number of procedures performed (based on the hospital information system) and the number of registered procedures in the LROI per hospital account for elbow revision arthroplasties in 2024



*No data provided for comparison by the hospital account

Completeness primary wrist per hospital account

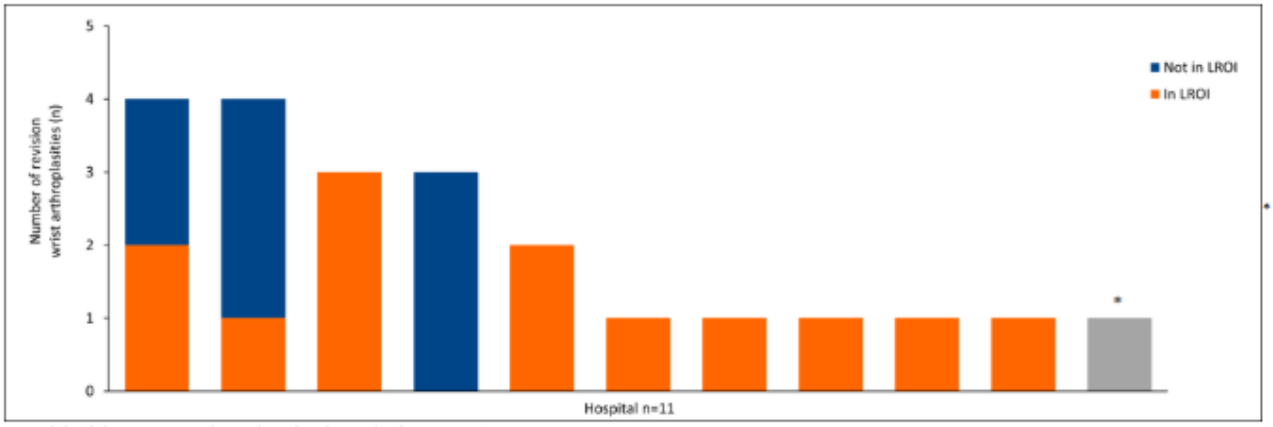
Number of procedures performed (based on the hospital information system) and the number of registered procedures in the LROI per hospital account for primary wrist arthroplasties in 2024



* No data provided for comparison by the hospital account

Completeness wrist revision per hospital account

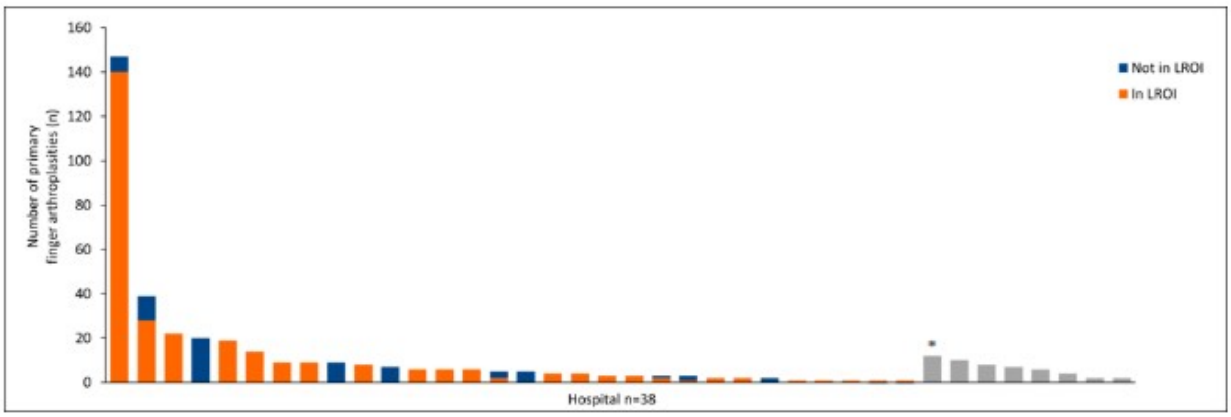
Number of procedures performed (based on the hospital information system) and the number of registered procedures in the LROI per hospital account for wrist revision arthroplasties in 2024



* No data provided for comparison by the hospital account

Completeness primary finger per hospital account

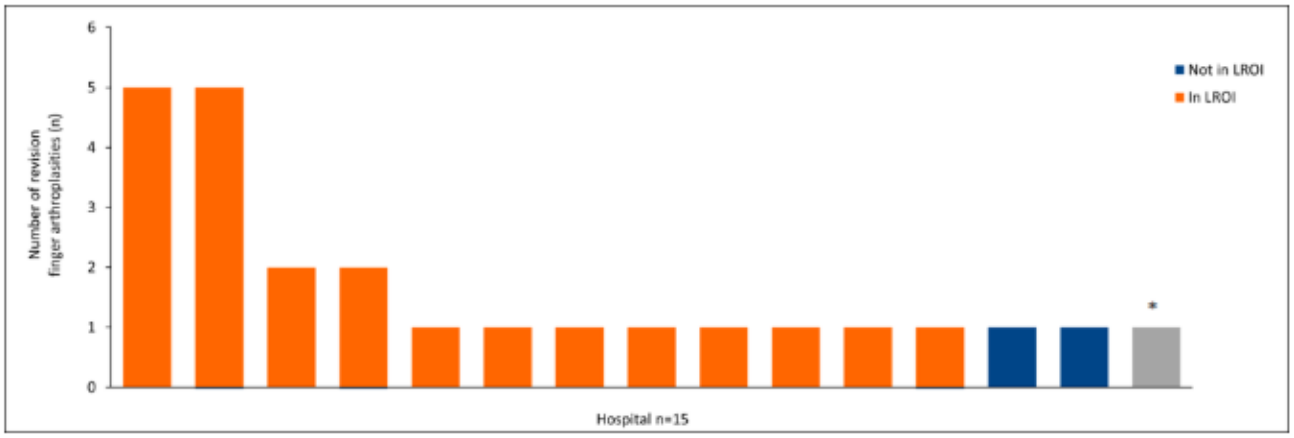
Number of procedures performed (based on the hospital information system) and the number of registered procedures in the LROI per hospital account for primary finger arthroplasties in 2024



* No data provided for comparison by the hospital account

Completeness finger revision per hospital account

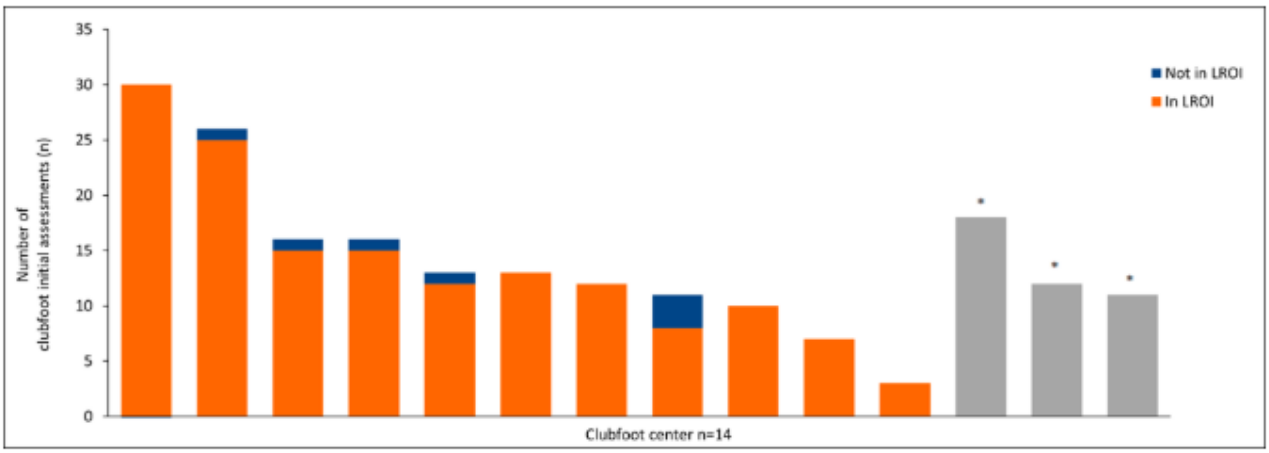
Number of procedures performed (based on the hospital information system) and the number of registered procedures in the LROI per hospital account for finger revision arthroplasties in 2024



* No data provided for comparison by the hospital account

Completeness clubfoot initial assessment per hospital account

Number of treatments performed (based on the hospital information system) and the number of registered treatments in the LROI per hospital account for clubfoot initial assessments in 2024

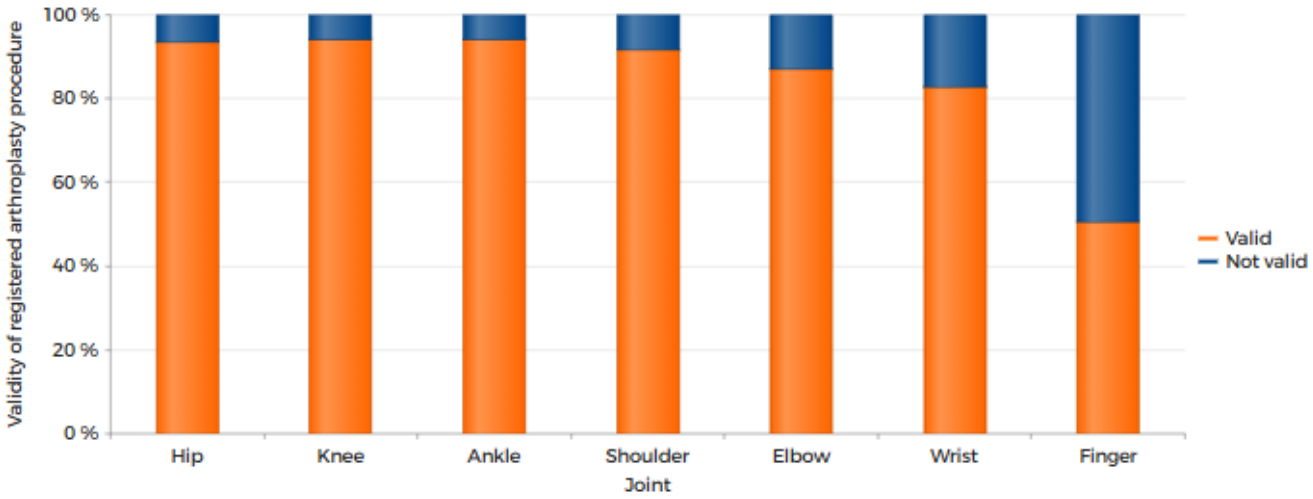


* No data provided for comparison by the hospital

Validity

Overall validity

FIGURE Validity (proportion [%] per procedure) of the registration of procedures in the LROI in 2024



	Hip	Knee	Ankle	Shoulder	Elbow	Wrist	Finger
Valid	93.46	94.20	94.27	91.86	87.18	82.95	50.69
Not valid	6.54	5.80	5.73	8.14	12.82	17.05	49.31
Total (n)	**46,949**	**41,165**	**227**	**4,793**	**234**	**129**	**363**

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 2024

	Hip	Knee	Ankle	Shoulder	Elbow	Wrist	Finger
Number of arthroplasties (n)	**46,949**	**41,165**	**227**	**4,793**	**234**	**129**	**363**
Number of primary arthroplasties (n)	43,167	37,687	192	4,301	152	116	339
Number of revision arthroplasties (n)	3,782	3,478	35	492	82	13	24
General characteristics	**%**	**%**	**%**	**%**	**%**	**%**	**%**
Gender	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Encrypted citizen service number	99.8	99.9	99.1	99.9	98.7	97.7	99.7
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	100.0	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	99.9	100.0	100.0	100.0	98.7	98.5	93.9
BMI	96.7	98.3	99.1	98.1	97.9	91.5	56.5
Smoking	98.1	98.7	97.4	99.2	97.0	97.7	93.1
ASA score	99.7	99.6	100.0	99.9	98.3	99.2	95.6
Fixation	99.8	99.9	99.1	99.8	97.9	97.7	95.0
Primary arthroplasty characteristics	**%**	**%**	**%**	**%**	**%**	**%**	**%**
Diagnosis	99.2	99.6	100.0	99.0	98.7	99.1	97.9
Charnley/Walch score	98.4	99.5	100.0	98.4	n.a.	n.a.	n.a.
Prosthesis	100.0	100.0	100.0	100.0	98.7	98.3	100.0
Surgical approach	99.5	97.5	99.5	95.7	96.7	97.4	98.5
Revision arthroplasty characteristics	**%**	**%**	**%**	**%**	**%**	**%**	**%**
Type of revision	99.4	99.6	100.0	99.2	97.7	100.0	91.7
Charnley score	100.0	100.0	n.a.	n.a.	n.a.	n.a.	n.a.
Reason for revision	98.7	98.8	97.1	98.6	92.7	100.0	91.7

Please note: Validity by variable as determined in April 2025.
HIS: hospital information system; BMI: body mass index

Participating hospitals

General hospitals

1/2

TABLE Overview of general hospitals registering joint arthroplasties and clubfood treatments in the LROI 2007-2024

Participating hospitals	Hip	Knee	Ankle	Shoulder	Elbow	Wrist	Finger	Clubfoot
Admiraal de Ruyter Ziekenhuis	x	x	x	x	x			
Albert Schweitzer Ziekenhuis	x	x		x		x	x	
Amphia	x	x		x	x	x	x	x
Antonius Ziekenhuis	x	x	x	x				
BovenIJ Ziekenhuis	x	x		x				
Bravis Ziekenhuis	x	x	x	x	x	x	x	
Canisius Wilhelmina Ziekenhuis	x	x		x		x	x	
Centraal Militair Hospitaal	x	x						
Deventer Ziekenhuis	x	x		x	x	x	x	
Diakonessenhuis	x	x	x	x	x	x	x	
ETZ	x	x	x	x	x	x	x	
Elkerliek Ziekenhuis	x	x	x	x	x		x	
Franciscus Gasthuis & Vlietland	x	x		x	x	x	x	
Groene Hart Ziekenhuis	x	x		x		x	x	
Haaglanden Medisch Centrum	x	x	x	x	x	x	x	
HagaZiekenhuis, locatie Den Haag	x	x	x	x	x	x	x	
HagaZiekenhuis, locatie Zoetermeer	x	x		x			x	
Havenziekenhuis*	x	x		x				
Het Flevoziekenhuis	x	x	x	x	x		x	
IJsselland Ziekenhuis	x	x		x	x			
Ikazia Ziekenhuis	x	x		x	x	x		
Interconfess. St. Gez. Rivierenland	x	x		x			x	
Jeroen Bosch Ziekenhuis	x	x		x	x	x	x	
MC Jan van Goyen	x	x						
MC Slotervaart*	x	x	x	x	x			
MC Zuiderzee*	x	x		x				
Maasstadziekenhuis	x	x	x	x	x	x	x	
Maxima Medisch Centrum	x	x		x	x	x	x	x
Meander Medisch Centrum	x	x	x	x		x	x	
Medisch Centrum Leeuwarden	x	x		x	x	x	x	
Medisch Spectrum Twente	x	x		x	x			x
Noordwest Ziekenhuisgroep	x	x	x	x	x	x	x	
OCON	x	x		x	x	x	x	x
OLVG	x	x	x	x	x			x
Ommelander Ziekenhuis Groningen	x	x		x	x	x	x	
Prinses Maxima Centrum	x	x		x				
Reinier Haga Groep	x	x	x	x	x	x	x	
Reinier de Graaf Groep*	x	x	x	x	x		x	
Reinier de Graaf Gasthuis, kinderorthopedie								x
Rivas Beatrixziekenhuis	x	x		x				
Rode Kruis Ziekenhuis	x	x		x	x		x	
SJG Weert	x	x		x	x			
Saxenburgh groep	x	x		x				

TABLE Overview of general hospitals registering joint arthroplasties and clubfood treatments in the LROI 2007-2024

Participating hospitals	Hip	Knee	Ankle	Shoulder	Elbow	Wrist	Finger	Clubfoot
Sint Antonius Ziekenhuis	x	x		x	x	x	x	
Sint Maartenskliniek, Woerden*	x	x	x	x	x			
Sint Maartenskliniek, concern	x	x	x	x	x	x	x	x
Spaarne Gasthuis	x	x	x	x		x	x	
Spijkenisse Medisch Centrum	x	x		x				
St. Algem. Christ. Martini Zkh	x	x	x	x	x	x	x	
Stichting Alrijne Zkh	x	x	x	x		x	x	
Stichting Catharina Ziekenhuis	x	x		x	x			
Stichting Chr. Alg. Zkh noordwest-veluwe	x	x		x			x	
Stichting Dijklander Zkh	x	x	x	x	x			
Stichting GelreZiekenhuizen	x	x	x	x	x	x	x	
Stichting Isala Klinieken	x	x	x	x	x	x	x	x
Stichting Laurentius Zkh	x	x	x	x	x	x	x	
Stichting Slingeland Zkh	x	x		x				
Stichting St. Anna Zorggroep	x	x	x	x	x			
Stichting het van Weel-Bethesda Zkh	x	x		x				
Streekziekenhuis Koningin Beatrix	x	x		x	x			
Tergooi MC	x	x		x	x	x	x	
Treant Zorggroep	x	x		x	x	x	x	
VieCuri Medisch Centrum	x	x		x	x		x	
Wilhelmina Ziekenhuis Assen	x	x		x	x		x	
Zaans Medisch Centrum	x	x	x	x	x		x	
Ziekenhuis Amstelland	x	x	x	x	x			
Ziekenhuis Bernhoven	x	x		x	x			
Ziekenhuis Gelderse Vallei	x	x		x				
Ziekenhuis Nij Smellinghe	x	x		x		x	x	
Ziekenhuis Rijnstate	x	x	x	x	x	x	x	
Ziekenhuis Tjongerschans	x	x		x				
ZiekenhuisGroep Twente	x							
ZorgSaam Ziekenhuis	x	x	x	x	x	x	x	
Zuyderland Medisch Centrum	x	x		x	x	x	x	

Please note: Since 2007, the LROI has been collecting data on hip and knee procedures, on ankle, shoulder and elbow procedures since 2014, on wrist and finger procedures since 2016, and on clubfoot treatments since 2022.

* These hospitals no longer perform joint replacement procedures.

University Medical Centers (UMC)

TABLE Overview of university medical centers registering joint arthroplasties and clubfood treatments in the LROI 2007-2024

Participating hospitals	Hip	Knee	Ankle	Shoulder	Elbow	Wrist	Finger	Clubfoot
Amsterdam UMC	x	x	x	x	x			x
Erasmus MC	x	x		x	x	x	x	x
Leids Universitair Medisch Centrum	x	x	x	x	x	x	x	x
Maastricht UMC+	x	x	x	x	x	x	x	x
Radboudumc	x	x		x	x	x	x	x
UMC Groningen	x	x	x	x	x	x	x	x
UMC Utrecht	x	x		x		x	x	x

Please note: Since 2007, the LROI has been collecting data on hip and knee procedures, on ankle, shoulder and elbow procedures since 2014, on wrist and finger procedures since 2016, and on clubfoot treatments since 2022.

Private hospitals

TABLE Overview of private hospitals registering joint arthroplasties and clubfood treatments in the LROI 2007-2024

Participating hospitals	Hip	Knee	Ankle	Shoulder	Elbow	Wrist	Finger	Clubfoot
AVE Orthopedische Klinieken*	x	x	x	x				
Acibadem International Medical Center	x	x	x	x				
Bergman Clinics, Loc. Amsterdam						x	x	
Bergman Clinics, Loc. Arnhem	x	x		x				
Bergman Clinics, Loc. Breda	x	x	x	x				
Bergman Clinics, Loc. Delft*	x	x		x				
Bergman Clinics, Loc. Naarden	x	x	x	x		x	x	
Bergman Clinics, Loc. Rijswijk	x	x	x	x				
Bergman Clinics, Loc. Rotterdam	x	x		x				
Berne Kliniek						x	x	
CortoClinics	x	x						
DC Klinieken, Lairesse*	x	x		x				
De Schouderdokter				x				
Dr. Kuypers Kliniek							x	
Eisenhower Kliniek	x	x		x			x	
FlexClinics	x	x						
Kliniek ViaSana	x	x		x				
Medische Kliniek Velsen	x	x		x	x			
OrthoDirect	x	x		x				
Orthoparc	x	x						
Orthopedie kliniek Amsterdam*		x						
Park Medisch Centrum	x	x						
Stichting Annadal Kliniek	x	x						
Stichting The Knee Clinic*		x						
Voor de hand							x	
Xpert Clinic, Loc. Amsterdam	x	x	x	x	x	x	x	
Xpert Clinic, Loc. Annatommie mc Amstelveen	x	x	x	x				
Xpert Clinic, Loc. Annatommie mc Utrecht	x	x	x	x			x	
Xpert Clinic, Loc. Eindhoven	x	x		x		x	x	
Xpert Clinic, Loc. Enschede						x	x	
Xpert Clinic, Loc. Rotterdam	x					x	x	
Xpert Clinic, Loc. Rozendaal	x	x						
Xpert Clinic, Loc. Velp							x	

Please note: Since 2007, the LROI has been collecting data on hip and knee procedures, on ankle, shoulder and elbow procedures since 2014, on wrist and finger procedures since 2016, and on clubfoot treatments since 2022.

* These hospitals no longer perform joint replacement procedures.

Methodology

Definitions and abbreviations

An overview of definitions and abbreviations used in this LROI annual report

Definitions

An overview of definitions used in this LROI annual report

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
Anchor question
The anchor question (daily functioning) measures change in daily functioning after joint replacement. The anchor question (pain) measures change in pain degree after joint replacement. The score has a range of 1.0 to 7.0, with 1.0 representing very deteriorated and 7.0 representing very improved
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. The NRS (satisfaction) score measures patients' satisfaction with the outcome of joint replacement. The score has a range of 0.0 to 10.0, with 0.0 representing very unsatisfied and 10.0 representing very satisfied
ODEP rating
Orthopaedic Data Evaluation Panel. ODEP provides ratings for hip femoral stems, hip acetabular cups and total knee replacement implants. An ODEP rating consists of a number and a letter (A or B), and a star (optional). The number represents the number of years for which the product's performance had been evidenced. The letter represents the strength of evidence presented by the manufacturer (A represents strong evidence and B represents acceptable evidence). A Star (*) represents very strong evidence above A and B. Detailed information can be found at www.odep.org.uk
Olecranon
The most proximal part of the ulna
One-stage revision
A single revision procedure to change (insertion, replacement and/or removal) one or more components of the prosthesis (excluding patella addition)
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 0.0 to 48.0, with 0.0 representing no functional ability and 48.0 representing the most functional ability
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 no functional ability and 48.0 representing the most functional ability.
Oxford Shoulder score
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 0.0 representing no functional ability and 48.0 representing the most functional ability.
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)
Recommendation score
The recommendation score measures to what extend the patient would recommend joint replacement to a friend or relative. The score has a range of 1.0 to 5.0, with 1.0 representing totally disagree and 5.0 representing totally agree
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
Vektis
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. www.vektis.nl
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

AA Ankle arthroplasty
AO Antioxidant
ASA American Society of Anaesthesiologists
BMI Body Mass Index
BSN Citizen Service Number
CI Confidence Interval
CMC Carpometacarpal [finger joint]
D(IP) Distal interphalangeal [finger joint]
DRU Distal Radioulnar [prosthesis]
EA Elbow arthroplasty
HIS Hospital Information System
HA Hip arthroplasty
IQR Interquartile range
KA Knee arthroplasty
LROI Dutch Arthroplasty Register
MCP Metacarpophalangeal [finger joint]
NOV Netherlands Orthopaedic Association
NRS Numeric Rating Scale
ODEP Orthopaedic Data Evaluation Panel
ORIF Open Reduction Internal Fixation
PE Polyethylene
PIP Proximal interphalangeal [finger joint]
PKA Patellofemoral Knee Arthroplasty
PROM Patient Reported Outcome Measure
RA Revision arthroplasty
RHA Resurfacing hip arthroplasty
SA Shoulder arthroplasty
SD Standard Deviation
TEA Total Elbow Arthroplasty
THA Total Hip Arthroplasty
TKA Total Knee Arthroplasty
TSA Total Shoulder Arthroplasty
UKA Unicondylar Knee Arthroplasty
UMC University Medical Centre
Zo Oxidized Zirconium