



Extensive English Summary of the LROI-Report 2012

# Insight into Quality of Orthopaedic Care in the Netherlands

Annual Report of the Dutch Arthroplasty Register  
(Landelijke Registratie Orthopedische Implantaten) 2012



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's Hertogenbosch

Netherlands Orthopaedic Association (NOV)  
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# Executive Summary LROI-Report 2012

## Introduction and Purpose

In 2007, the Dutch Arthroplasty Register (LROI) was initiated by the Netherlands Orthopaedic Association (Nederlandse Orthopaedische Vereniging, NOV) to register patient and implant characteristics of hip and knee prostheses in the Netherlands. The goal of the registration is to improve quality of orthopaedic care for patients and to detect less optimally performing orthopaedic implants (i.e. prostheses). The LROI contributes to the quality of orthopaedic care by continued monitoring of prostheses and feedback to orthopaedic surgeons via a web-based dashboard. This dashboard shows the orthopaedic surgeons the patient and prosthesis characteristics of all registered prostheses in their hospital. The results can be compared with averaged data from all other hospitals in the Netherlands, thereby providing a benchmark for each orthopaedic department (Figure 1).

Other national implant registries have shown that this continued feedback leads to a decrease in practice variation and improved results for the patients by earlier removal of inferior prostheses from the national market. The LROI provides a good overview of all hip and knee prostheses used in the Netherlands since 2007 and contains both patient characteristics as well as the

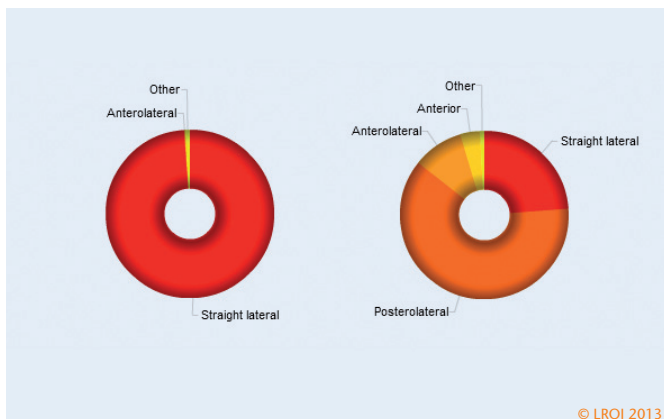


Figure 1 Example of the real-time online dashboard with mirror information (this example: approach of primary hip arthroplasty in hospital X compared with other Dutch hospitals).

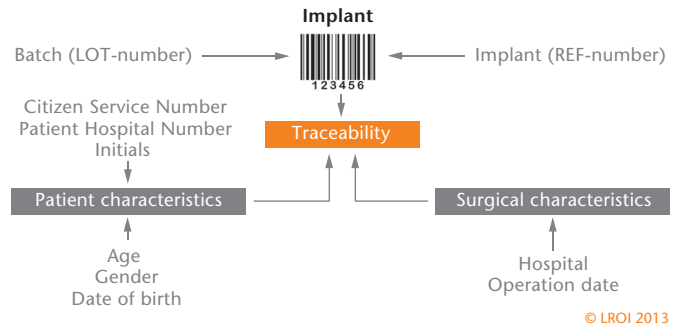


Figure 2 Traceability of joint implants in de LROI.

prosthesis' characteristics such as type and name. In case of a recall of a specific type of prosthesis, patients who had this prosthesis implanted can easily be traced. (Figure 2). Therefore, the LROI is an ideal portal for traceability of hip and knee prostheses in the Netherlands. The LROI has been a member of the International Society of Arthroplasty Registries (ISAR) for international collaboration since 2010.

## Developments in the LROI

In 2013, the LROI started an implant library for all registered hip and knee prostheses in the Netherlands. This implant library contains the name, type, and material of the prosthesis as well as coating, material of the liner, and the method of sterilisation of the polyethylene. These data were supplied by the manufacturers of the implants and checked by members of the Scientific Advisory Board of the LROI. Variables to describe the patient population, such as age, gender, and general health, were also registered in the LROI. In addition, patient case mix variables, such as body mass index (BMI), smoking behaviour, orthopaedic vitality (i.e. Charnley score), and postal code, were added to the database to better describe the patient population. Adjusting for these case mix variables improves comparability of care between hospitals. As of 2013, the LROI also offers the possibility to collect patient reported outcome measures (PROMs). PROMs are measured with (digital) questionnaires to measure the effect of a prosthesis operation on quality of life, pain, and level of

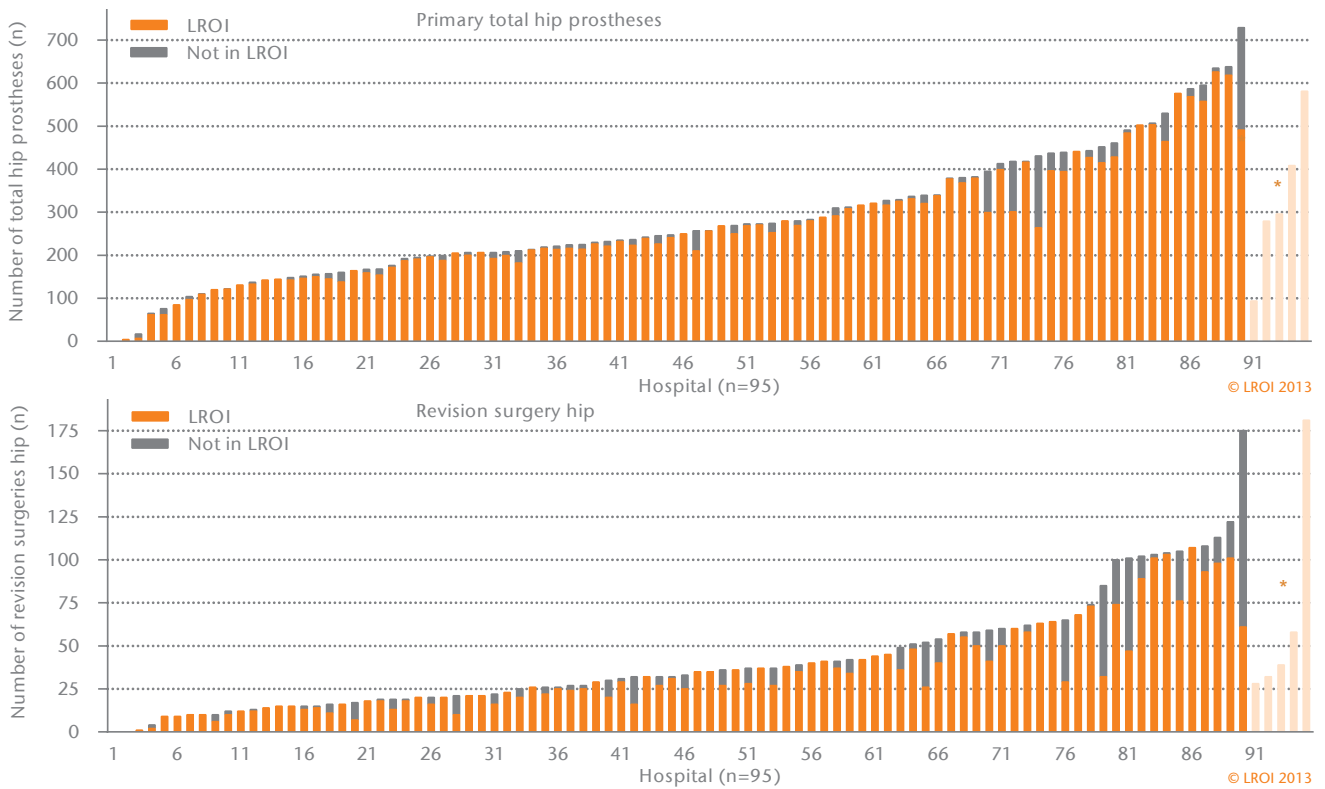


Figure 3 Completeness per hospital for primary total hip prostheses and revision surgeries hip in the Netherlands in 2012. \* No (correct) data available



Figure 4 Completeness per hospital for primary knee prostheses and revision surgeries knee in the Netherlands in 2012. \* No (correct) data available



Table 1 Completeness of the LROI in 2012 based on data of the hospital information system.

	Hip registration		Knee registration	
	Primary total hip prosthesis	Revision hip	Primary knee prosthesis	Revision knee
Number of hospitals <sup>1</sup>	95	95	100	100
Completeness of participating hospitals	94%	83%	94%	86%

<sup>1</sup> Number of hospitals that implanted hip and/or knee prostheses in 2012.  
Not all hospitals implanted hip prostheses.

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functioning. PROMs are measured preoperatively, three months postoperatively, and one year postoperatively. The registration of joint prostheses of the ankle, shoulder, elbow, and wrist starts in January 2014. Furthermore, the project examining the validity and completeness of the LROI will be expanded in 2014.

### Completeness

A complete registration is essential for the reliability of the results. The completeness of the LROI data was validated in two ways. Firstly, the number of primary and revision surgeries of hip and knee prostheses in the LROI was compared with data from the hospital information system of each hospital. Secondly, the number of implant registry entries in the LROI was compared with data from Vektis. Vektis is an organisation of the health insurance companies, managing a database containing all expense claims of hip and knee prosthesis surgeries in the Netherlands. Since 2009, 98% of all hospitals performing hip and knee prosthesis surgeries have registered their procedures in the LROI database; in 2012, all hospitals registered in the LROI. A comparison of data from the LROI with the hospital information system showed a completeness of 94% for both primary total hip prostheses (THP) and primary knee prostheses. For hip revision surgeries the completeness of participating hospitals was 83%, for knee revision surgeries this was 86% (Table 1).

A completeness of over 90% of all implanted primary THP was reached in 88% of participating hospitals in 2012; for revision hip surgery, data were for over 90% complete in 57% of the hospitals (Figure 3). A completeness over 90% of implanted primary knee prostheses was reached in 82% of participating hospitals in 2012; for revision knee this was the case in 64% of the hospitals (Figure 4).

A comparison of the LROI-data for 2011 with data from Vektis showed a completeness of data entry of 96% for primary THPs and 92% for primary knee prostheses. For revision surgery, the completeness for hip and knee prosthesis was 91% and 89% respectively. The difference in completeness of the LROI is most likely caused by the difference of the definition of ‘treatment’ date in the two databases: in the Vektis database hip and knee surgeries are registered at the starting date of the treatment plan, whereas in the LROI the date of surgery is registered. The latter results in a small difference in number of operations.

### Primary Total Hip Prosthesis

In 2007-2012, 114,110 primary THPs were registered in the LROI (Figure 5). In 2012, 23,815 primary THPs were registered in 95 hospitals with a median number of 234 (range 4-623) per hospital (Figure 6).

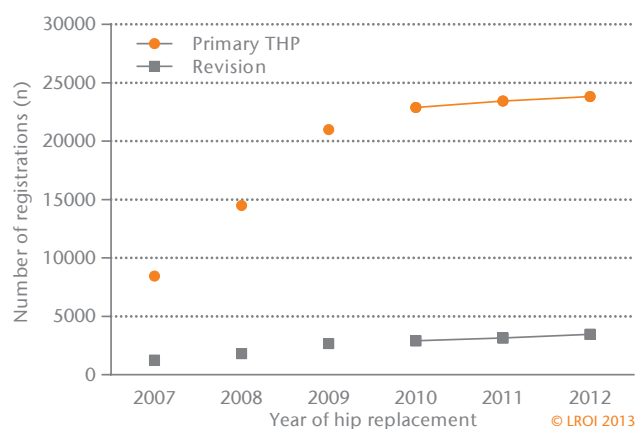


Figure 5 Number of total hip prostheses (THPs) (n=114,110) and revision surgeries hip (n=15,283) in 2007-2012 registered in the LROI. NB. The period 2007-2009 was the starting phase of the LROI and therefore the registration is incomplete for these years.

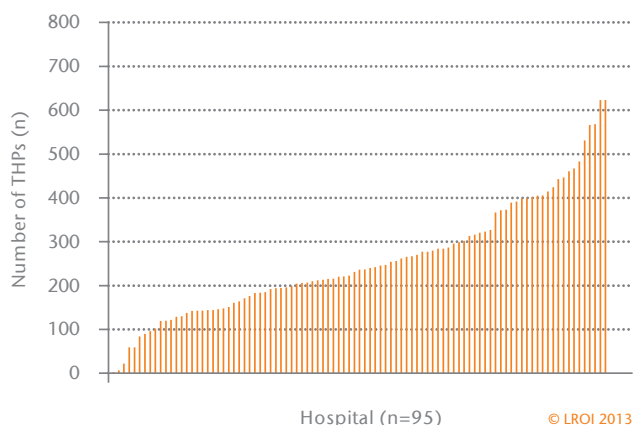


Figure 6 Number of primary total hip prostheses (THPs) per hospital in 2012 in the Netherlands (n=23,815).

Table 2 Patient characteristics of all patients with a THP in 2010-2012 per indication in the LROI.

	Osteoarthritis	Dysplasia	Rheumatoid arthritis	Fracture	Osteonecrosis	Post-Perthes	Tumour	Late posttraumatic	Total
N	53.757 (87%)	1.294 (2%)	567 (1%)	2.100 (4%)	1.835 (3%)	178 (0%)	135 (0%)	1.754 (3%)	62.114 (100%)
Gender									
Male	32	30	26	31	46	68	40	41	33
Female	68	70	74	69	54	32	60	59	67
Age (years)									
<60	14	53	34	13	41	77	39	25	17
60-74	52	35	45	51	38	19	43	42	50
≥75	34	12	21	36	21	4	18	33	33
ASA-score									
I	24	44	7	16	21	57	5	20	24
II	65	49	70	58	57	40	45	57	63
III-IV	11	7	23	26	23	3	50	23	13
Type of hospital									
General	94	87	85	94	87	85	68	90	93
UMC	3	10	15	6	12	15	32	10	4
Private	3	3	0	0	1	0	0	0	3

In 2010-2012 there were 494 (0.08%) patients with a primary THP with a diagnosis not described in this table.  
 General: general hospital; UMC: university medical centre; Private: private hospital

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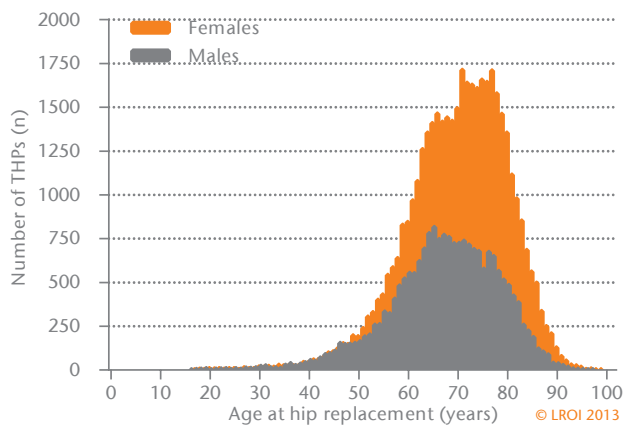


Figure 7 Age distribution of patients with a (first) primary THP according to gender in the Netherlands in 2010-2012 (n=62,277).

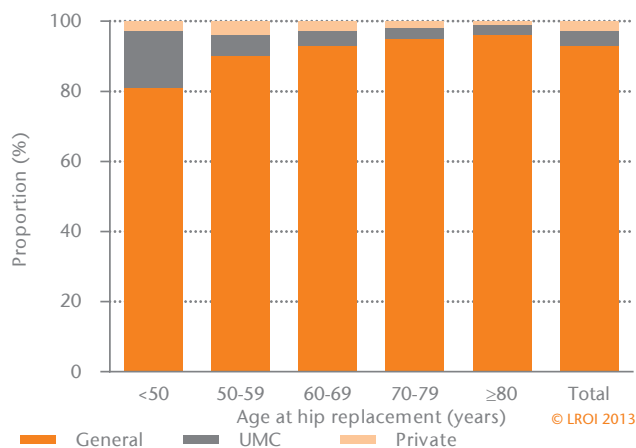


Figure 8 Type of hospital according to age at (first) primary THP in the Netherlands in 2010-2012 (n=60,855).

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

Approximately two-thirds of the patients who received a THP in 2010-2012 were female and the mean age was 69.5 (standard deviation (SD) 10.6) years (Figure 7). Over 60% of the patients who received a THP had an ASA-score of II and 87% had a THP for the indication osteoarthritis. Over 90% of patients were treated in a general hospital. Patients treated in a university medical centre (UMC) were generally younger (16% aged <50 years) (Figure 8) and had a higher ASA-score (21% with ASA-score III-IV), while patients treated in a private hospital had a lower ASA-score (Figure 9). Five percent of the patients who had a THP in 2010-2012 had a previous operation on the affected hip, mainly osteosynthesis.

Table 2 describes the patient characteristics of all patients with a THP in the period 2010-2012 per indication. Patients with a THP due to a childhood disease, i.e. dysplasia or Perthes disease, were the youngest patient groups with respectively 53% and 77% of patients below the age of 60.

The most commonly used surgical approach for a primary THP was posterolateral (62%), followed by direct lateral (24%) (Figure 10). More than half of the primary THPs (63%) were performed uncemented, 29% were performed cemented, and 8% were (reversed) hybrid performed in 2010-2012. Among younger patients, THPs were performed more often

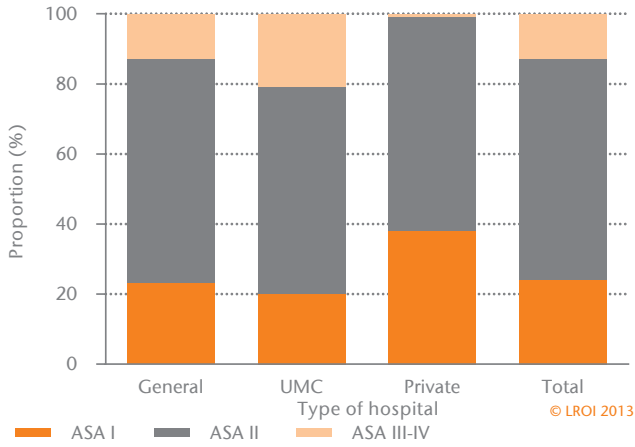


Figure 9 ASA-score for patients with a (first) primary THP according to type of hospital in the Netherlands in 2010-2012 (n=60,080).  
General: general hospital; UMC: university medical centre; Private: private hospital

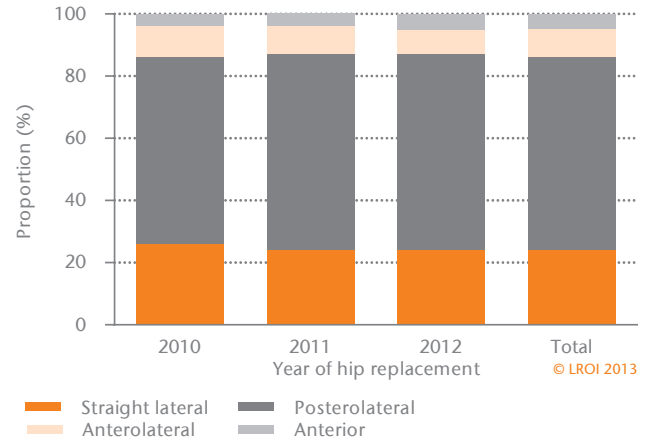


Figure 10 Trend in surgical approach for primary THPs in the Netherlands in 2010-2012 (n=69,726).

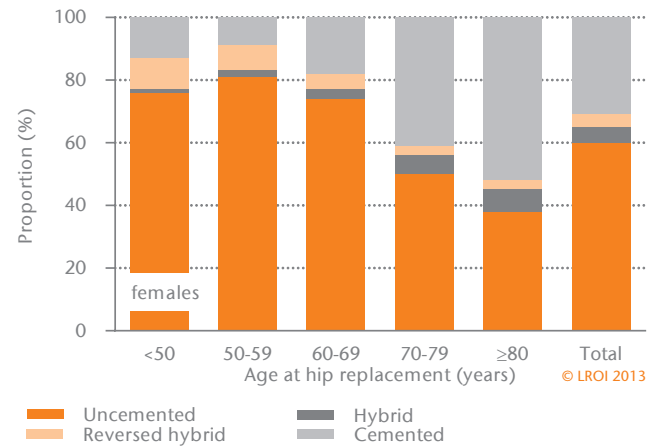
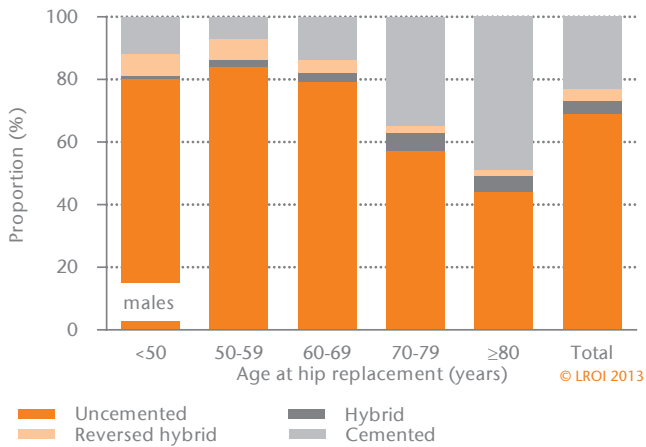


Figure 11 Type of fixation for primary THPs per age group for males (n=22,622) and females (n=46,949) in the Netherlands in 2010-2012.

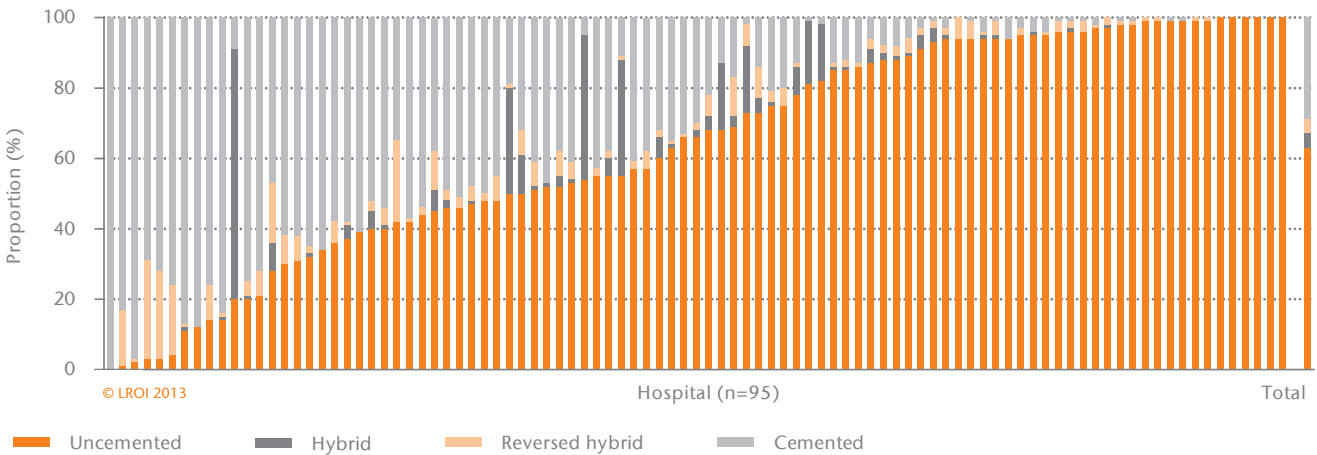


Figure 12 Type of fixation for primary THPs per hospital in the Netherlands in 2010-2012 (n=69,906).

Table 3 The ten most frequently registered acetabular, femoral, and femoral head components of primary THPs in the Netherlands in 2010-2012.

Acetabular component (n=67,330)		Femoral component (n=68,965)		Femoral head component (n=67,877)	
Name	Proportion (%)	Name	Proportion (%)	Name	Proportion (%)
Allofit	12	Alloclassic SL	11	Biolog <sup>®</sup> Delta (Zimmer)	19
Pinnacle	7	Lubinus SP II	11	V40 Heads (Stryker)	13
Exceed ABT	6	Taperloc	8	Delta (Biomet)	12
IP Cup	6	Corail	8	CoCr Modular Heads (Biomet)	9
Mallory Head	6	CLS Spotorno	7	Articulaze (Johnson)	7
Trident	6	Exeter	5	Ceramic Head (Link)	6
SHP	3	Mallory Head Stems	5	Bionit Head (Mathys)	5
Reflection All Poly	3	SL Plus	5	Oxinium Head (Smith & Nephew)	5
Alloclassic	3	Original ME Muller	5	CoCr Head (Link)	4
RM Pressfit Cup	3	Spectron EF	5	Biolog Delta (Smith & Nephew)	4

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uncemented, compared to elderly patients (Figure 11). In some hospitals, all THPs were performed cemented, while in other hospitals THPs were all performed uncemented (Figure 12). The proportion of femoral heads with a small diameter (22-28 mm) decreased from 46% in 2010 to 32% in 2012, while the proportion of femoral heads with a diameter of 32 mm and 36 mm increased (Figure 13). The ten most frequently registered acetabular, femoral, and femoral head components of primary

THPs in 2010-2012 in the Netherlands are shown (Table 3) as well as the five most frequently registered types of bone cement used for primary THPs (Table 4).

### Resurfacing Hip Prosthesis

In the period 2010-2012, a total of 834 resurfacing hip prostheses were registered for 712 patients. The number of registered resurfacing hip prostheses per year decreased from 600 in 2010 to 11 in 2012 (Figure 14), following the advice of the Netherlands Orthopaedic Association (NOV) on metal-on-metal prostheses. The mean age of these patients was 53.6 (SD 58.0) years, which is 16 years younger than the mean age of patients who received a conventional THP. Furthermore, 77% of the patients who received a resurfacing hip prosthesis were male, compared to 33% in the group who received a THP. The general health (ASA-score) of patients with a resurfacing prosthesis was better than that of patients who received a THP. The BHR was the most frequently registered resurfacing hip prosthesis in 2010-2012 in the Netherlands (Table 5).

Table 4 The five most frequently registered types of bone cement for primary THPs in the Netherlands in 2010-2012.

Name	Proportion (%)
Palacos R + G	69
Refobacin Bone Cement R	13
Simplex P	8
Palacos MV + G / Palamed G	4
Refobacin Plus Bone Cement	4

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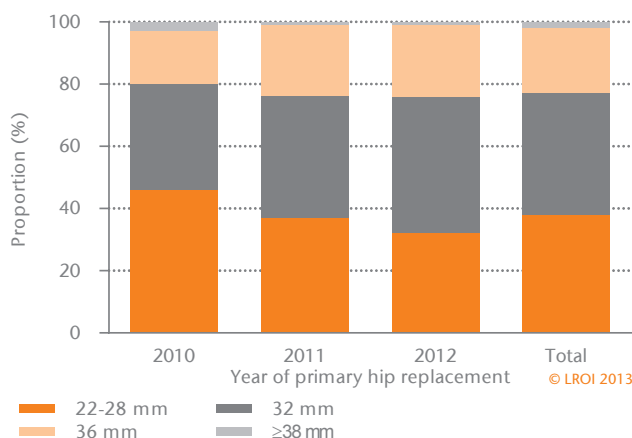


Figure 13 Diameter head of primary THPs over time in the Netherlands in 2010-2012 (n=69,796).

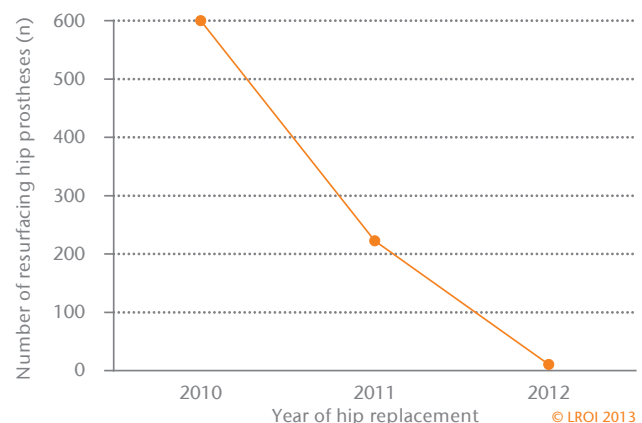


Figure 14 Number of resurfacing hip prostheses in the Netherlands in 2010-2012 (n=834).

Table 5 Names and numbers of resurfacing hip prostheses implanted in 2010-2012 in the Netherlands registered in the LROI (n=834).

Name	2010 Number (n) N=600	2011 Number (n) N=223	2012 Number (n) N=11	Totaal Number (n) N=834
BHR	205	104	7	316
Adept	113	48	2	163
Conserve Plus	90	36	1	127
Durom	79	23	1	103
Recap	53	5	0	58
Cormet	29	7	0	36
Mitch	24	0	0	24
ASR	7	0	0	7

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### Hip Revision

In the period 2007-2012, 15,283 hip revision surgeries were registered in the LROI. In 2012, 68% of these hip revision surgeries were partial revisions and 28% were total revisions (Figure 15). The femoral head was replaced in 91% of the partial revisions, the acetabular component was replaced in 61% of the partial revisions, and in 54% of the partial revision surgeries the insert was replaced (Table 6). In 2012, there were 3,469 hip revision surgeries registered in 93 hospitals with a median number of 29 (range 2-181) per hospital (Figure 16). The most frequent indication for hip revision surgery was loosening of the

Table 6 Revised component at partial revision of hip prostheses in the Netherlands in 2010-2012.

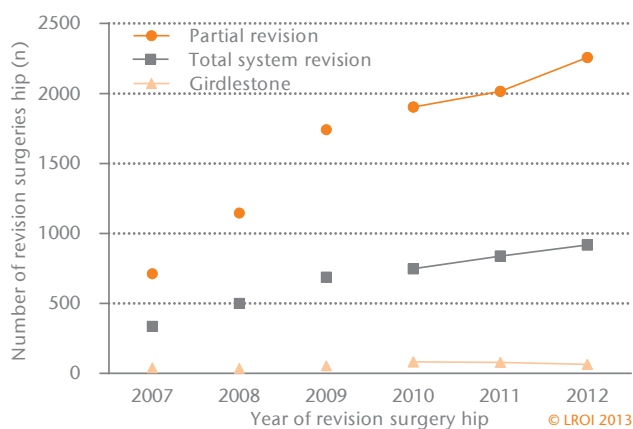
Revised component	Proportion (%) <sup>1</sup>
Acetabulum	61
Inlay	54
Femoral head	91
Femur	28

<sup>1</sup> More than one component can be replaced at revision surgery, therefore the total proportion is over 100%. © LROI 2013

Table 7 Reasons for revision or reoperation in patients who underwent revision surgery in the Netherlands in 2010 -2012.

	Proportion (%) <sup>1</sup>
Loosening acetabular component	39
Loosening femoral component	29
Liner wear	24
Dislocation	23
Periprosthetic fracture	11
Infection	9
Girdlestone situation	6
Peri-articular ossification	5

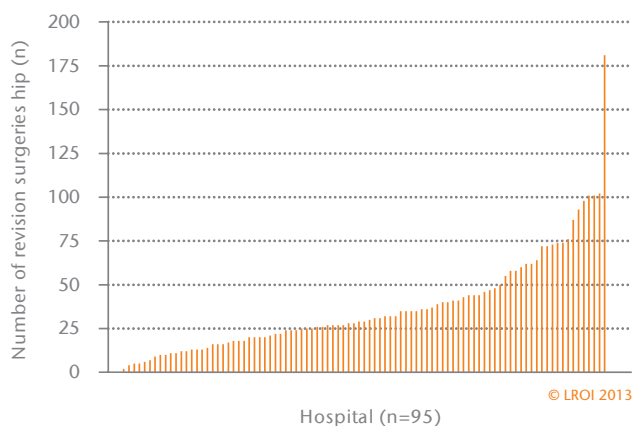
<sup>1</sup> More than one reason for revision can be registered per revision or reoperation, therefore the total proportion is over 100%. © LROI 2013



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Figure 15 Number of revision surgeries hip according to type of revision in 2007-2012 registered in the LROI (n=15,283).

NB. The period 2007-2009 was the starting phase of the LROI and therefore the registration is incomplete for these years.



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Figure 16 Number of hip revision surgeries hip per hospital in the Netherlands in 2012 (n=3,469).

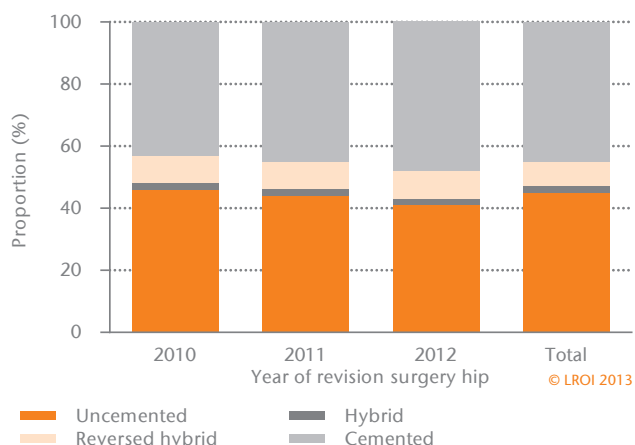


Figure 17 Type of fixation for revision hip prosthesis in the Netherlands in 2010-2012 (n=13,716).

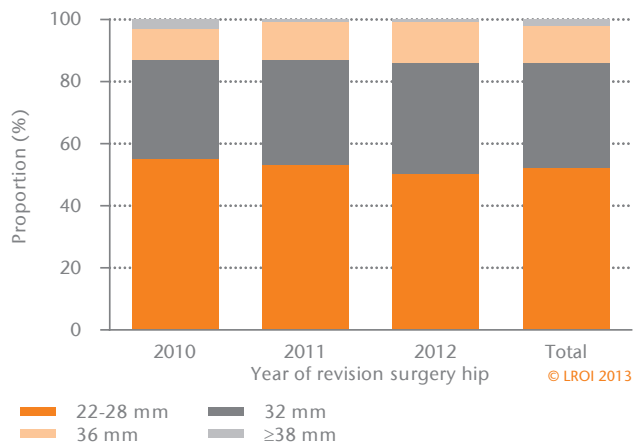


Figure 18 Diameter head of revision hip prostheses in the Netherlands in 2010-2012 (n=7,543).

Table 8 The ten most frequently registered acetabular, femoral, and femoral head components of revision hip prostheses in the Netherlands in 2010-2012.<sup>1</sup>

Acetabular component (n=5,708)		Femoral component (n=3,931)		Femoral head component (n=7,543)	
Name	Proportion (%)	Name	Proportion (%)	Name	Proportion (%)
Avantage	22	Exeter	13	V40 Heads (Stryker)	14
Reflection All Poly	6	Restoration Modular	10	CoCr Modular Heads (Biomet)	14
Allofit	4	Lubinus SPII	9	CoCr Head (Link)	8
Exeter Rimfit	4	Mallory Head Stems	6	BioloX® Delta (Zimmer)	7
Müller Low Profile	4	Spectron EF	5	CoCr Head (Smith & Nephew)	6
IP Cup	4	Corail	4	Metasul Head (Zimmer)	6
FAL Cup	3	MP Reconstruction Prosthesis	4	Omnifit (Stryker)	5
Pinnacle	3	Stanmore	4	Oxinium Head (Smith & Nephew)	5
Mallory Head	3	Revitan	3	Delta (Biomet)	5
CCB Cup	3	Alloclassic SL	3	Articulaze (Johnson)	4

<sup>1</sup>In the majority of cases not all components of a hip prosthesis were replaced, therefore the number of registered components differ.

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Table 9 The five most frequently registered types of bone cement for revision hip prostheses in the Netherlands in 2010-2012.

Name	Proportion (%)
Palacos R + G	44
Copal Revision	16
Simplex P	15
Refobacin Revision	8
Biomet Bone Cement R	6

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acetabular component (39%) or femoral component (29%). Both wear of the liner and dislocation were coded as reason for revision in over 20% of the revision surgeries (Table 7). In the period 2010-2012, 45% of the revised prostheses were performed uncemented and 45% were performed cemented. The diameter of the femoral head was 22-28 mm in half of the revision prostheses. The ten most frequently registered acetabular, femoral, and femoral head components of revision

hip prostheses in the Netherlands in 2010-2012 are shown (Table 8) as well as the five most frequently registered types of bone cement used for revision hip prostheses (Table 9).

### Primary Knee Prosthesis

In the period 2007-2012, 104,865 primary knee prostheses were registered in the LROI. The number of registered total knee prostheses (TKPs) increased from 17,839 in 2010 to 20,068 in 2012, while the number of registered unicondylar knee prostheses decreased from 1,696 to 1,488 in the same period (Figure 19). In the majority of primary knee prosthesis surgeries in 2010-2012 a TKP was implanted (91%). In 2012, 22,496 primary knee prostheses were registered in 100 hospitals with a median number of 208 (range 10-678) (Figure 20).

Over 90% of all patients with a primary knee prosthesis were treated in a general hospital. The proportion of unicondylar knee prostheses performed in a private hospital increased from 15% in 2010 to 18% in 2012. For TKPs, the proportion of surgeries performed in private hospitals also increased (Figure 21).

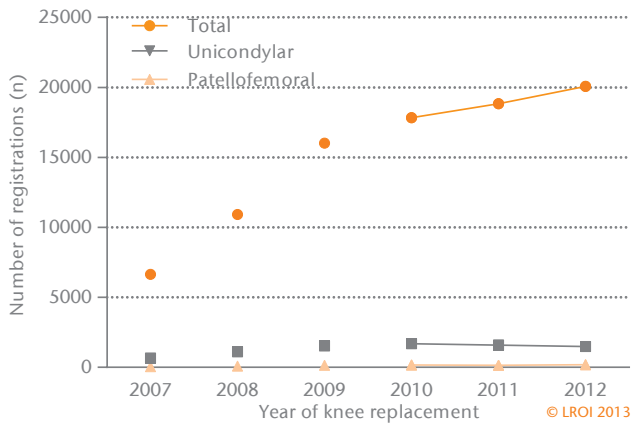


Figure 19 Number of primary knee prostheses according to type of prostheses in 2007-2012 registered in de LROI.  
NB. The period 2007-2009 was the starting phase of the LROI and therefore the registration is incomplete for these years.

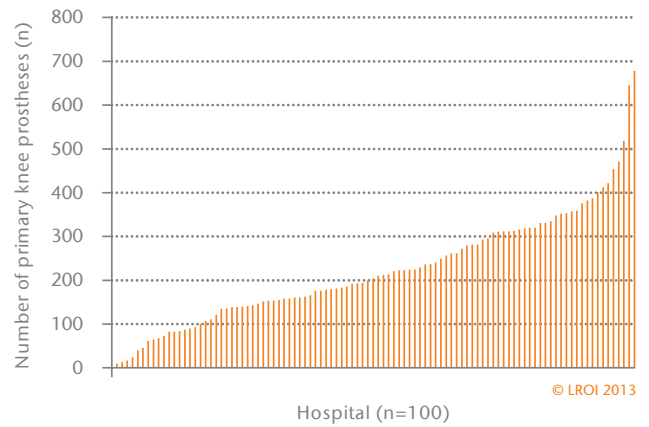
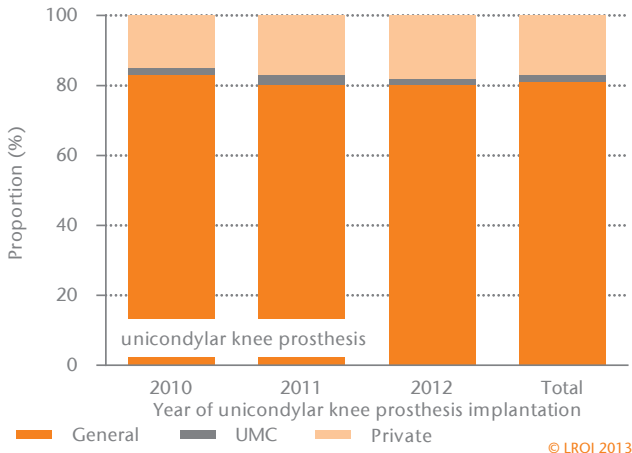


Figure 20 Number of primary knee prostheses per hospital in 2012 in the Netherlands (n=22,496).



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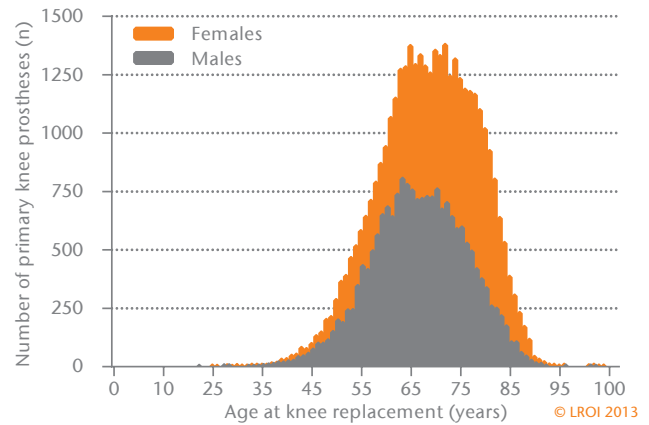


Figure 22 Age distribution of patients with a (first) primary knee prosthesis according to gender in 2010-2012 in the Netherlands (n=55,804).

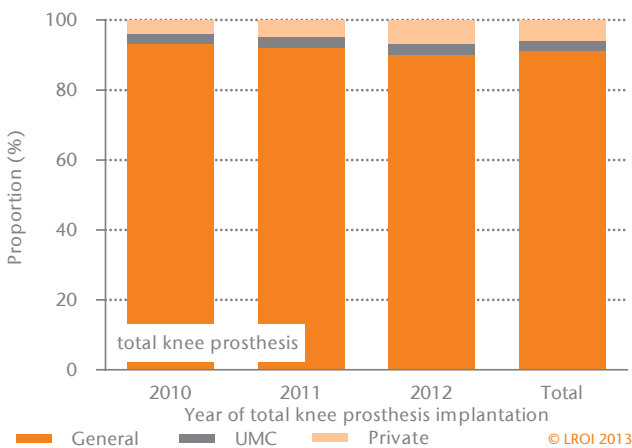


Figure 21 Number of unicondylar knee prostheses (n=4,741) and total knee prostheses (n=55,567) per type of hospital in the Netherlands in 2010-2012. General: general hospital; UMC: university medical centre; Private: private hospital

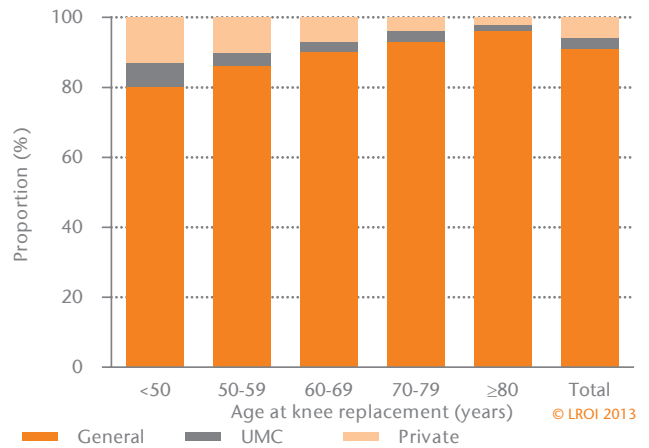


Figure 23 Type of hospital according to age at (first) primary knee prosthesis in the Netherlands in 2010-2012 (n=54,766). General: general hospital; UMC: university medical centre; Private: private hospital

Approximately two-thirds of the patients who received a primary knee prosthesis in 2010-2012 were female and the mean age was 68.3 (standard deviation (SD) 9.7) years (Figure 22). Almost 70% of the patients who received a primary knee prosthesis had an ASA-score of II and 97% had received a primary knee prosthesis after the indication osteoarthritis.

Patients treated in a general hospital were older on average (68.7 year (SD: 9.7)) than patients treated in a UMC (65.9 (SD: 10.9)) or a private hospital (63.8 (SD: 9.3)) (Figure 23). Patients treated in a UMC had a higher ASA-score (21% with ASA-score

of III-IV), while patients treated in a private hospital had a lower ASA-score (Figure 24). Thirty-three percent of the patients who had received a primary knee prosthesis in the period 2010-2012 had had a previous operation on the affected knee, a meniscectomy in the majority of cases. Table 10 describes the patient characteristics of all patients with a primary knee prosthesis in the period 2010-2012 per indication.

The age and type of hospital is strongly correlated with the diagnosis of a primary knee arthroplasty. The proportion of

Table 10 Patient characteristics of all patients with a primary knee prosthesis (unicondylar, total, patellofemoral) in 2010-2012 per indication in the LROI.

	Osteoarthritis	Post-traumatic	Rheumatoid arthritis	Osteonecrosis	Total
N	53,016 (96%)	858 (2%)	818 (2%)	255 (0%)	55,274 (100%)
Gender					
Male	34	37	23	33	34
Female	66	63	77	67	66
Age (years)					
<60	20	35	31	22	20
60-74	53	45	47	38	53
≥75	27	20	22	40	27
ASA-score					
I	22	26	5	17	22
II	67	62	70	62	67
III-IV	11	12	25	21	11
Type of hospital					
General	91	86	85	91	91
UMC	3	10	13	7	3
Private	6	4	2	2	6

In the period 2010-2012 there were 327 (1.7%) patients with a primary knee prosthesis with a diagnosis not described in this table.  
General: general hospital; UMC: university medical centre; Private: private hospital

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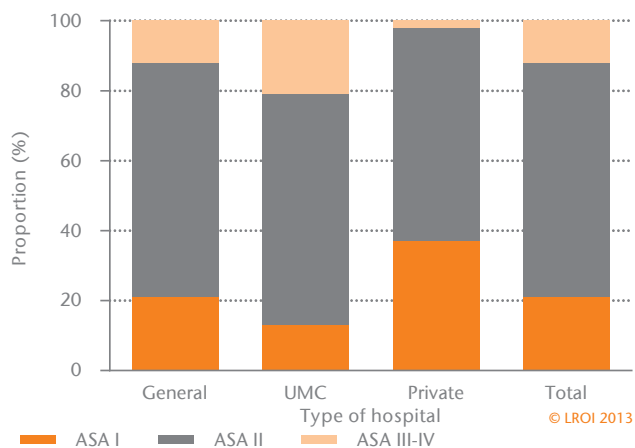


Figure 24 ASA-score of patients with a (first) primary knee prosthesis according to type of hospital in the Netherlands in 2010-2012 (n=53,048).  
General: general hospital; UMC: university medical centre; Private: private hospital

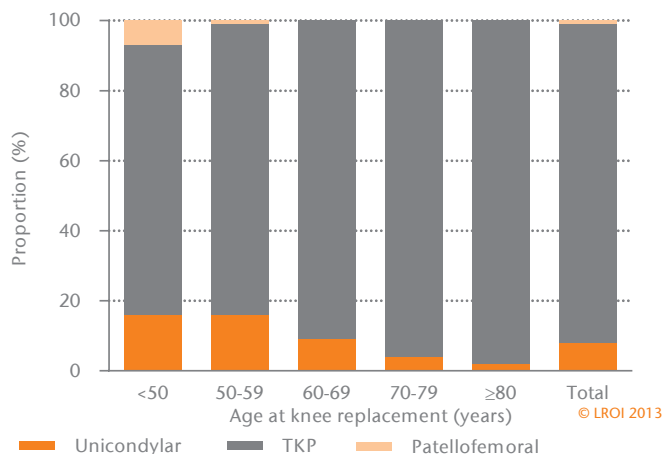


Figure 25 Type of knee prosthesis according to age of the patient at (first) primary knee replacement in the Netherlands in 2010-2012 (n=63,087).  
TKP: total knee prosthesis



unicondylar knee prosthesis was strongly associated with the age of the patient (in 16% of patients <50 years to 2% in patients ≥80 years). The patellofemoral knee prosthesis was almost exclusively used in patients <50 years (Figure 25). The most frequently used surgical approach for a primary knee prosthesis was medial parapatellar (94%). The majority of hospitals performed over 90% of their primary knee prosthesis cemented (Figure 26). However, there were four hospitals that performed less than 10% of their primary knee prostheses cemented (Figure 27). In 18% of the primary knee prostheses a patella was used, with a slight increase over time in the period 2010-2012 (Figure 28). The ten most frequently registered primary knee prostheses in the period 2010-2012 in the Netherlands are shown (Table 11) as well as the five most frequently registered types of bone cement used for primary knee prostheses (Table 12).

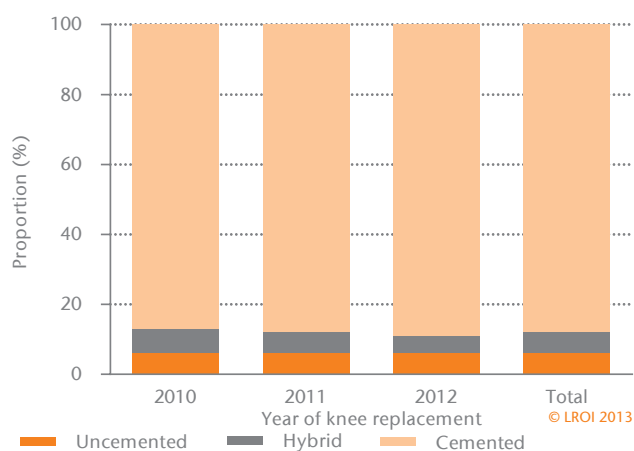


Figure 26 Type of fixation for primary knee prosthesis in the Netherlands in 2010-2012 (n=63,626).

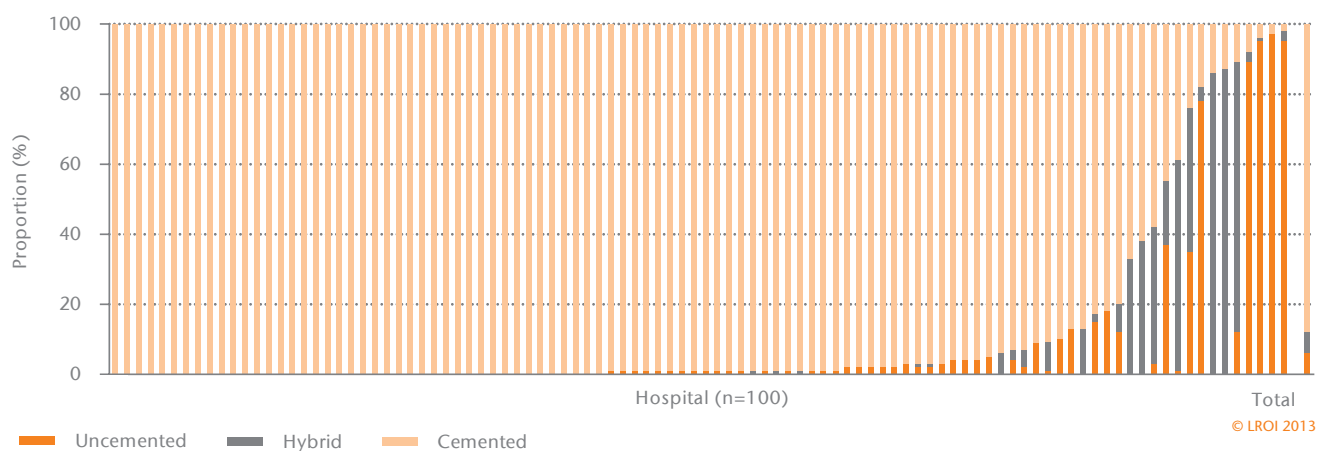


Figure 27 Type of fixation for primary knee prosthesis per hospital in the Netherlands in 2010-2012 (n=63,626).

Table 11 The ten most frequently registered primary knee prostheses and patella components implanted in the Netherlands in 2010-2012.

Primary knee prostheses (n=65,002)		Patella component (n=11,264) <sup>1</sup>	
Name	Proportion (%)	Name	Proportion (%)
Genesis II	19	PFC/Sigma	22
NexGen	17	Genesis II	20
Vanguard Complete Knee	15	NexGen	20
LCS	13	Vanguard	19
PFC/Sigma	10	AGC	11
AGV V2	3	Patella PE Ersatz	3
Scorpio	3	Optetrak	1
Optetrak	3	Scorpio	1
ACS	2	LCS	1
Profix	2	Advance	0

<sup>1</sup> In 17% of the implanted knee prostheses a patella component was used in the Netherlands in 2010-2012.

Table 12 The five most frequently registered types of bone cement used for primary knee prostheses in the Netherlands in 2010-2012.

Name	Proportion (%)
Palacos R + G	62
Refobacin Plus Bone Cement	9
Simplex P	9
Biomet Bone Cement R	7
Palacos MV + G / Palamed G	5

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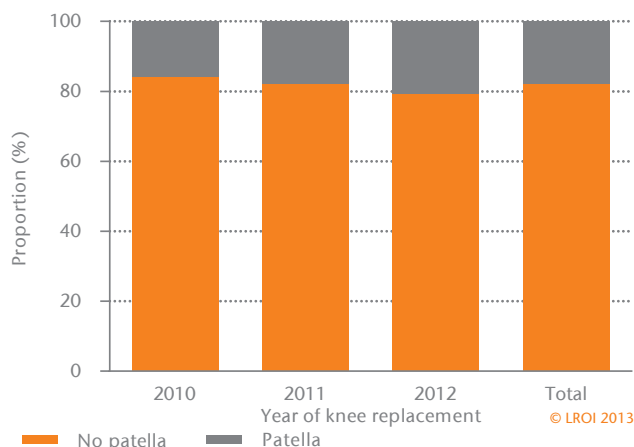


Figure 28 Patella component used during primary knee prosthesis surgery in the Netherlands in 2010-2012 (n=60,032).

### Knee Revision

In the period 2007-2012, 8,044 knee revision surgeries were registered in the LROI database. In 42% of these knee revision surgeries a partial revision was performed and a total revision

Table 13 Revised component at partial revision surgeries knee in the Netherlands in 2010-2012.

Revised component	Proportion (%) <sup>1</sup>
Insert	70
Patella	35
Tibia	29
Femur	15

<sup>1</sup> More than one component can be replaced at revision surgery, therefore the total proportion is over 100%. © LROI 2013

Table 14 Reason for revision or reoperation in patients who underwent revision surgery knee in 2010 -2012.

	Proportion <sup>1</sup> (%)
Loosening tibial component	30
Instability	26
Patella pain	25
Malalignment	19
Loosening femoral component	15
Wear of inlay	13
Infection	13
Progression of osteoarthritis	13
Revision after knee removal	10
Patella dislocation	4
Loosening of patella component	4
Periprosthetic fracture	2

<sup>1</sup> More than one reason for revision can be registered per revision or reoperation, therefore the total proportion is over 100%. © LROI 2013

was performed in 50% of these knee revisions (Figure 29). The insert was replaced in 70% of partial revisions, while the other components were replaced less often (Table 13). In 2012, 1,917 knee revision surgeries were registered in 96 hospitals with a median number of 15 surgeries (range 1-204) (Figure 30). The most frequent indications for knee revision surgery were loosening of the tibial component (30%), instability (26%), and patellar pain (25%) (Table 14). In the period 2010-2012, 87% of revision prostheses were performed cemented and 10% were performed uncemented. The ten most frequently registered femoral, tibial, inlay, and patella components for revision knee prostheses in the period 2010-2012 in the Netherlands are shown (Table 15 and 16) as well as the six most frequently registered types of bone cement (each with a proportion of over 5%) used for revision knee prostheses (Table 17).

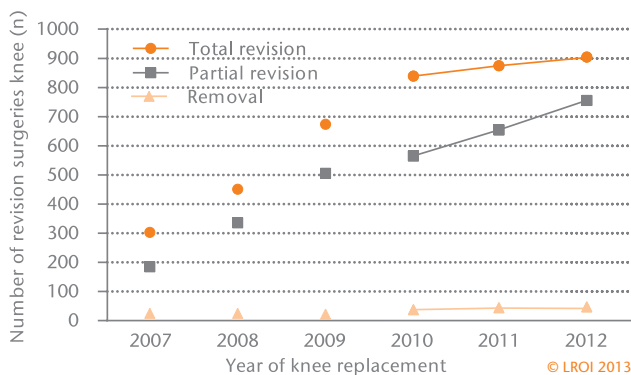


Figure 29 Number of revision surgeries knee according to type of revision in the Netherlands in 2007-2012 registered in the LROI (n=7,253). NB. The period 2007-2009 was the starting phase of the LROI and therefore the registration is incomplete for these years.

Table 15 The ten most frequently registered femoral and tibial components of revision knee prostheses in the Netherlands in 2010-2012.<sup>1</sup>

<b>Femoral component (n=2,833)</b>		<b>Tibial component (n=2,936)</b>	
Name	Proportion (%)	Name	Proportion (%)
Legion	16	Legion	17
NexGen	16	NexGen	16
Genesis II	14	Vanguard Complete Knee	16
LCS	10	Genesis II	12
Vanguard Complete Knee	9	S-Rom	10
PFC/Sigma	8	LCS	4
Vanguard SSK	6	RT Plus	4
RT Plus	3	Optetrak	3
Optetrak	3	ACS	3
Triathlon	2	Scorpio	3

<sup>1</sup> In the majority not all components of a knee prosthesis were replaced, therefore the number of registered components differ.

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Table 16 The ten most frequently registered inlay and patella components of revision knee prostheses in the Netherlands in 2010-2012.<sup>1</sup>

<b>Inlay (n=3,619)</b>		<b>Patella component (n=1,673)</b>	
Name	Proportion (%)	Name	Proportion (%)
Genesis II	29	Genesis II	33
NexGen	16	Vanguard	15
LCS	12	PFC / Sigma	14
Vanguard Complete Knee	9	NexGen	12
PFC / Sigma	5	AGC	6
Vanguard SSK	4	Optetrak	3
RT Plus	3	LCS	3
ACS	3	Triathlon	2
Optetrak	3	BCS	2
Scorpio	3	Scorpio	2

<sup>1</sup> In the majority not all components of a knee prosthesis were replaced, therefore the number of registered components differ.

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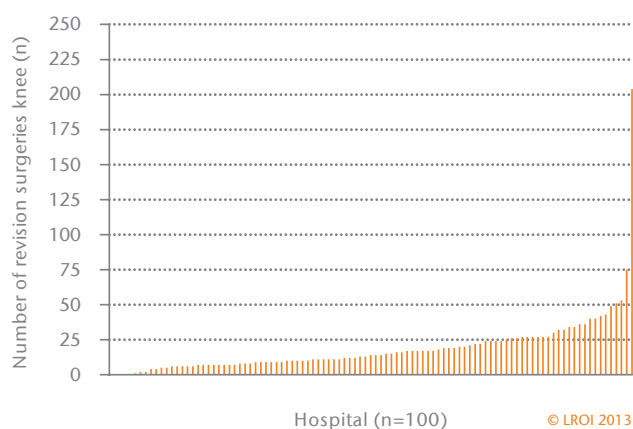


Figure 30 Number of revision surgeries knee per hospital in 2012 in the Netherlands (n=1,917).

Table 17 The six most frequently registered types of bone cement used for revision knee prostheses in the Netherlands in 2010-2012.

Name	Proportion (%)
Palacos R + G	45
Copal Revision	16
Refobacin Plus Bone Cement	9
Simplex P	8
Refobacin Bone Cement R	8
Refobacin Revision	6

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