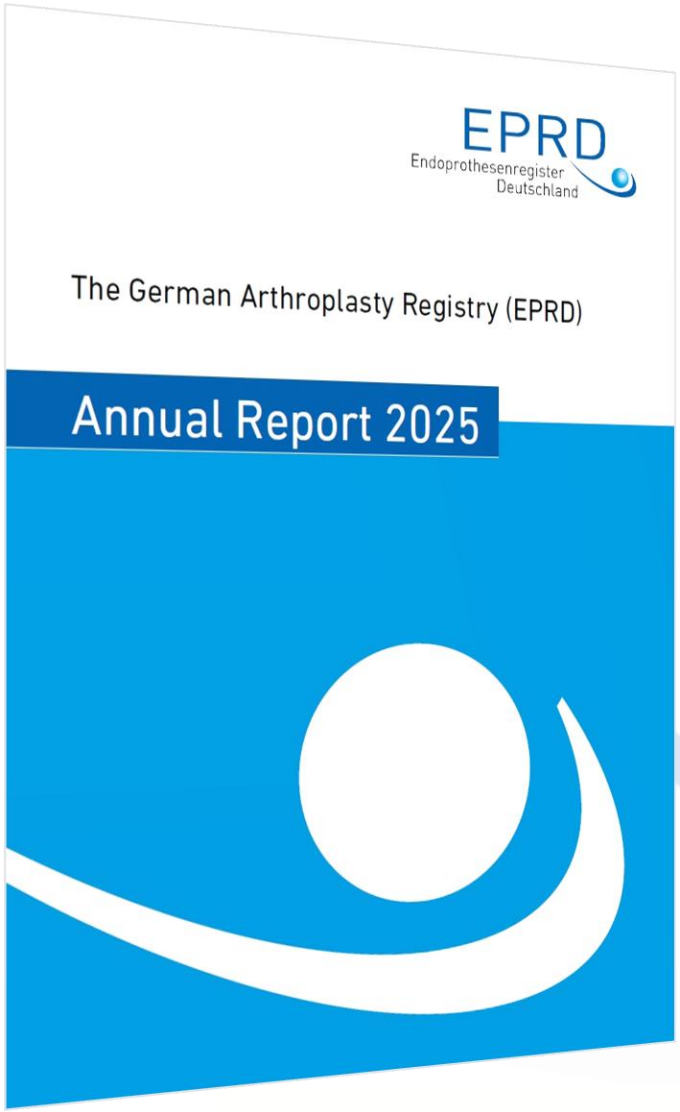


EPRD
Endoprothesenregister
Deutschland

EPRD Annual Report 2025

Authors:

Alexander Grimberg, Klaus-Peter Günther, Jörg Lützner,
Oliver Melsheimer, Michael Morlock, Arnd Steinbrück

powered by DGOOC
Deutsche Gesellschaft
für Orthopädie
und Orthopädische Chirurgie

Registry development

Registry development (I)

What is new in the 2025 report:

- Chapter „EPRD and the current German hospital reform – Which volumes for which hospitals?“
- Hip and knee arthroplasty developments in the EPRD described separately for primary arthroplasties and revisions, with additional sections on arthroplasty survival analysis by year of surgery.
- An update comparing international registry results initially presented three years ago.

Registry development (II)

EPRD
Endoprothesenregister Deutschland

- From the 1st of January 2025 it has become mandatory to submit all hip and knee arthroplasty data to the German Implant Registry (IRD). As an established and practical database, the EPRD remains a central component of healthcare research.

- The EPRD has developed a transfer interface that enables IRD datasets to be transferred to the EPRD data acquisition software.

- The EPRD and IRD have also harmonised the type of data that they collect.

- From 2025 onwards, the registration of patients for PROMs questionnaires will be extended to all hospitals and data on surgical approach (for hip arthroplasty) as well as computer navigation, robotics and PSI (for knee arthroplasty) will be recorded.

Registry development (III)

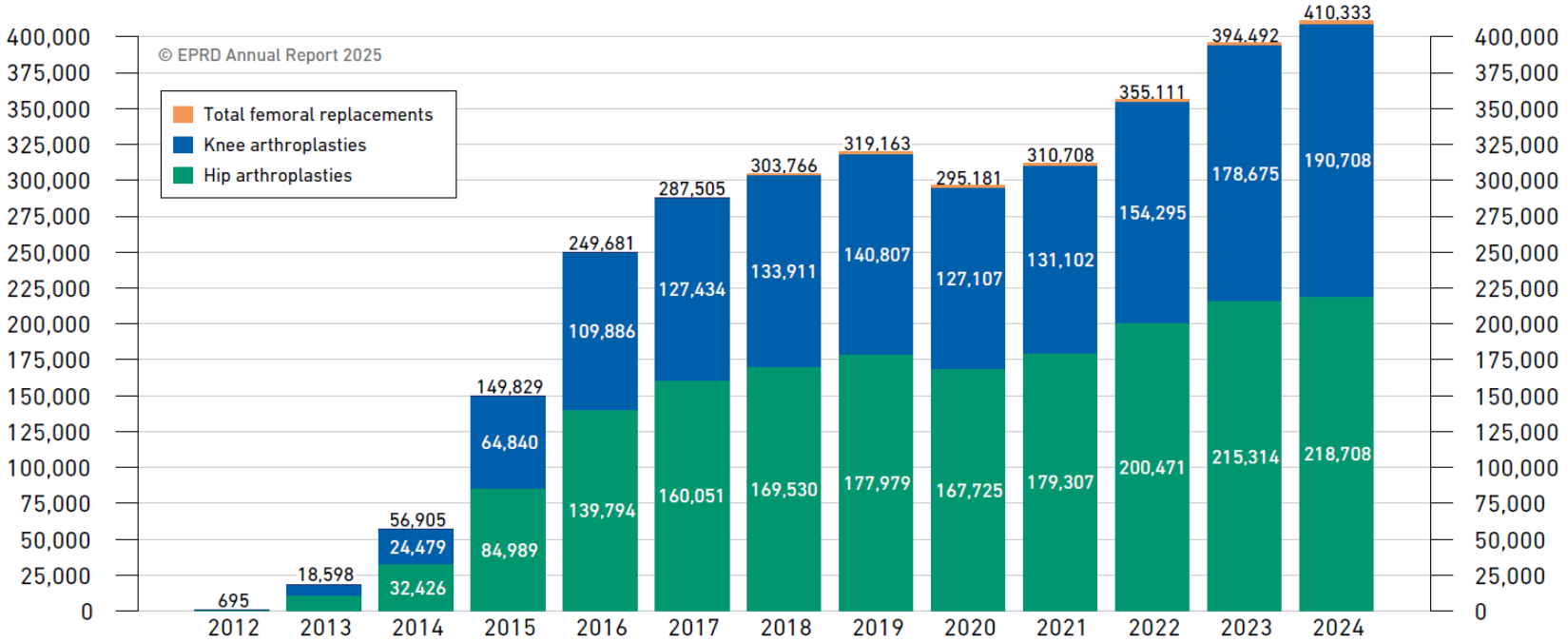


Figure 1: Annual procedure volume by operation date. The total number of documented procedures is shown in black above each respective column, with individual numbers for hip and knee arthroplasties shown in white.

- Up to the end of 2024 data on more than 3 million hip and knee arthroplasty procedures collected.
- 410.333 procedures added to the EPRD in 2024 → plus 4 % compared to 2023.

Registry development (IV)

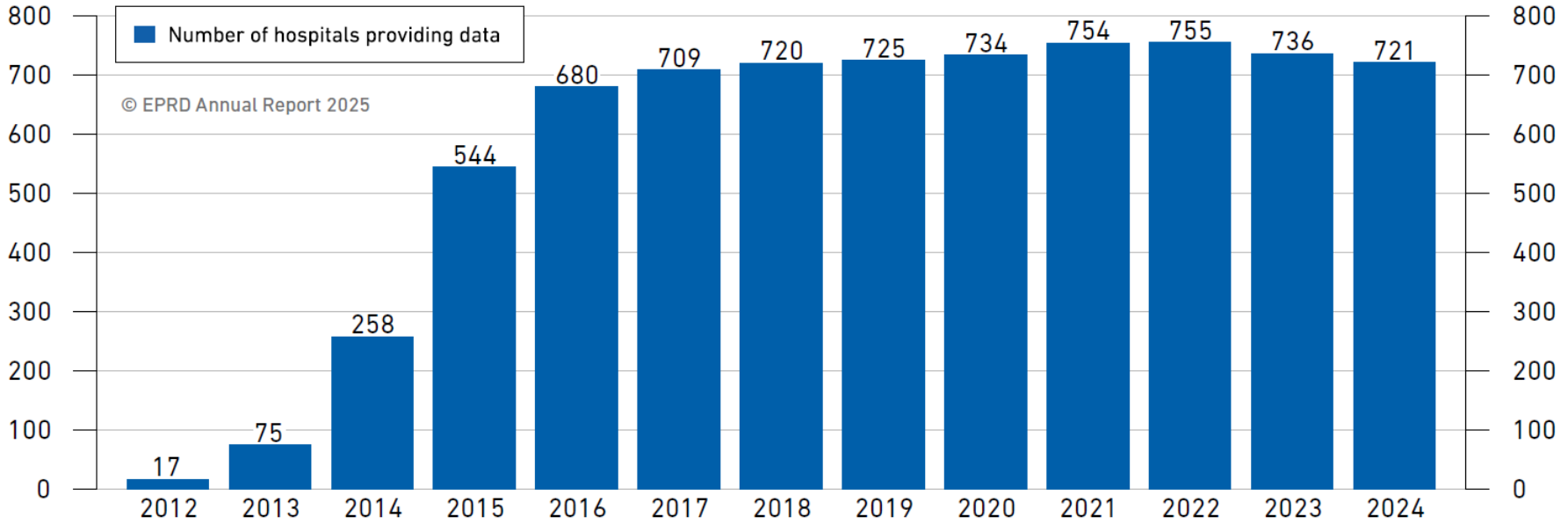


Figure 2: Number of hospitals submitting data each year. A hospital is considered a "data provider", if it submitted at least one surgical document to the EPRD during the calendar year.

- Commitment still high: but number of hospitals providing data has decreased again due to mergers and facility closures.

EPRD and the current German hospital reform

EPRD and the current German hospital reform (I)

EPRD Endoprothesenregister Deutschland

- EPRD data indicates that only considering case volume is not sufficient for measuring outcome quality.

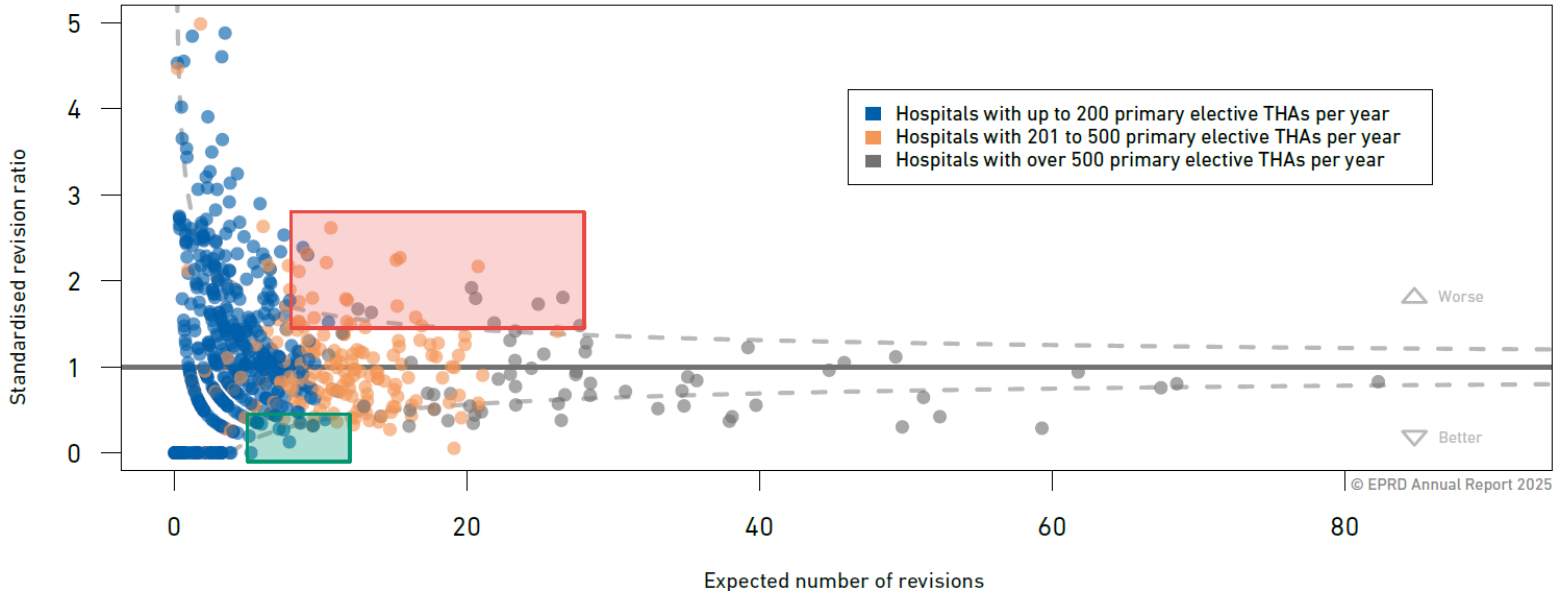


Figure 3: Funnel plot for primary elective THAs performed from April 2022 to September 2024 by the hospital's annual case volume of such primary procedures. The classifications in this report are based on the hospitals' quality reports for 2022 and the corresponding IQTIG quality indicators listed therein. Refer to page 15 for further details on funnel plots.

- Although arthroplasty generally follows the volume-outcome paradigm, there are individual low case volume hospitals that achieve very good outcomes and high volume hospitals with poorer outcomes

EPRD and the current German hospital reform (II)

- The EPRD has succeeded in establishing a nationwide system for the reliable documentation of arthroplasty treatment outcomes: Meaningful hospital planning should therefore not only be limited to the criterion of case volume, but also be expanded to include quality characteristics and individual hospital outcomes in the decision-making process.

- Important recommendation, see example of hospital reform in North Rhine-Westphalia:

  where a high-volume facility was excluded from continuing to perform arthroplasties despite obtaining above-average treatment quality outcomes by the QSR procedure as well as inconspicuous EPRD outcomes and where

  a neighbouring hospital with a below-average QSR rating and considerably higher revision rates, as determined by the EPRD, was granted approval to continue providing arthroplasty services.

The 2024 operating year

Primary hip arthroplasties (I)

EPRD Endoprothesenregister Deutschland

In brief:

- The use of highly cross-linked polyethylene insert components with antioxidants increased to 29.8 % in 2024.
- The proportion of shorter stems in total hip arthroplasty (THA) continued to increase and now stands at 23 %.
- Larger head sizes and shorter head-neck lengths are favoured.
- The proportion of cemented femoral fixation is increasing once again in 75-year-old or older patients.

Primary hip arthroplasties (II)

EPRD Endoprothesenregister Deutschland

- The use of highly cross-linked polyethylene insert components with antioxidants is increasing:

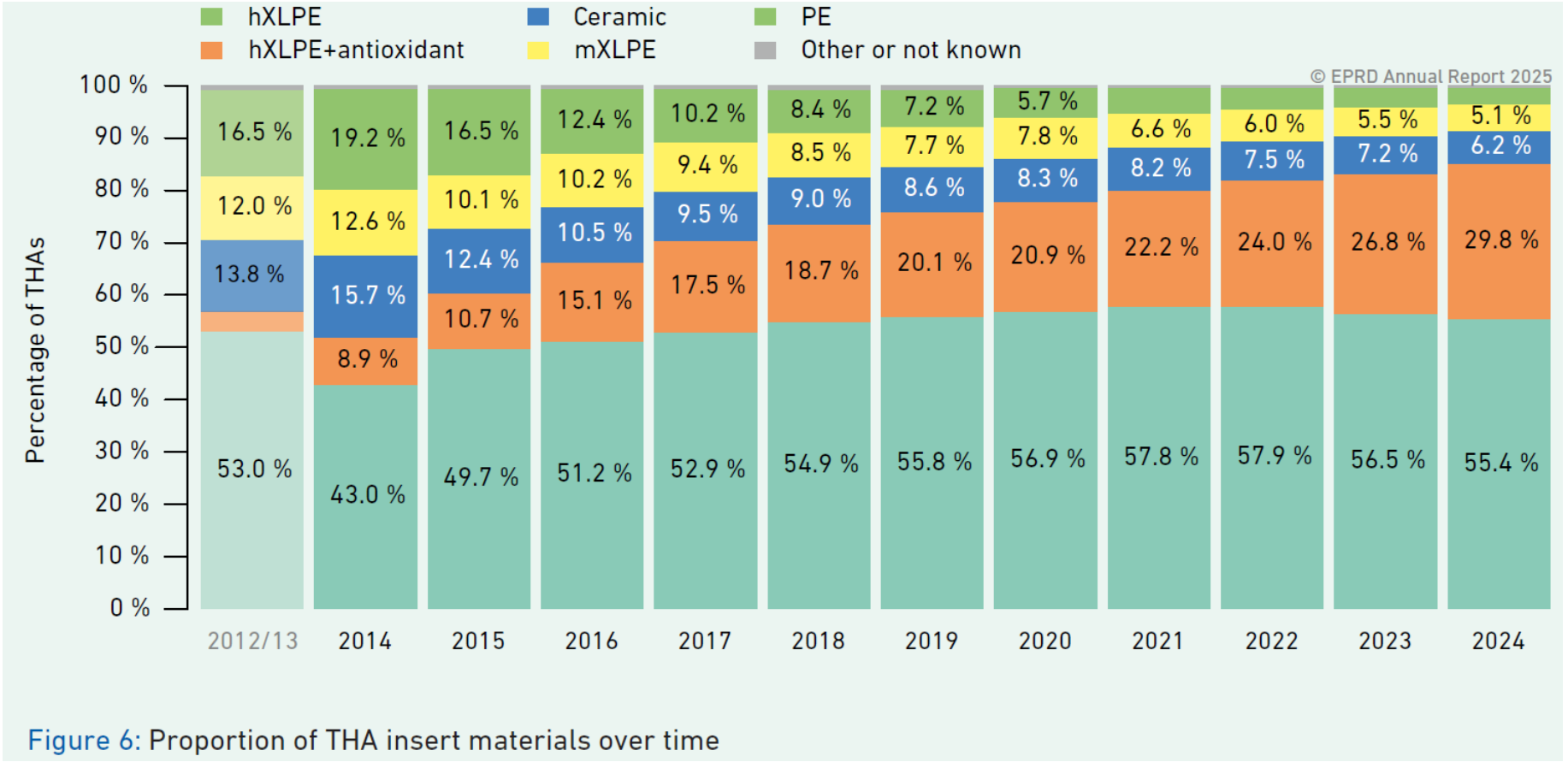


Figure 6: Proportion of THA insert materials over time

Primary hip arthroplasties (III)

EPRD Endoprothesenregister Deutschland

- The proportion of shorter stems in THAs reaches new documented high:

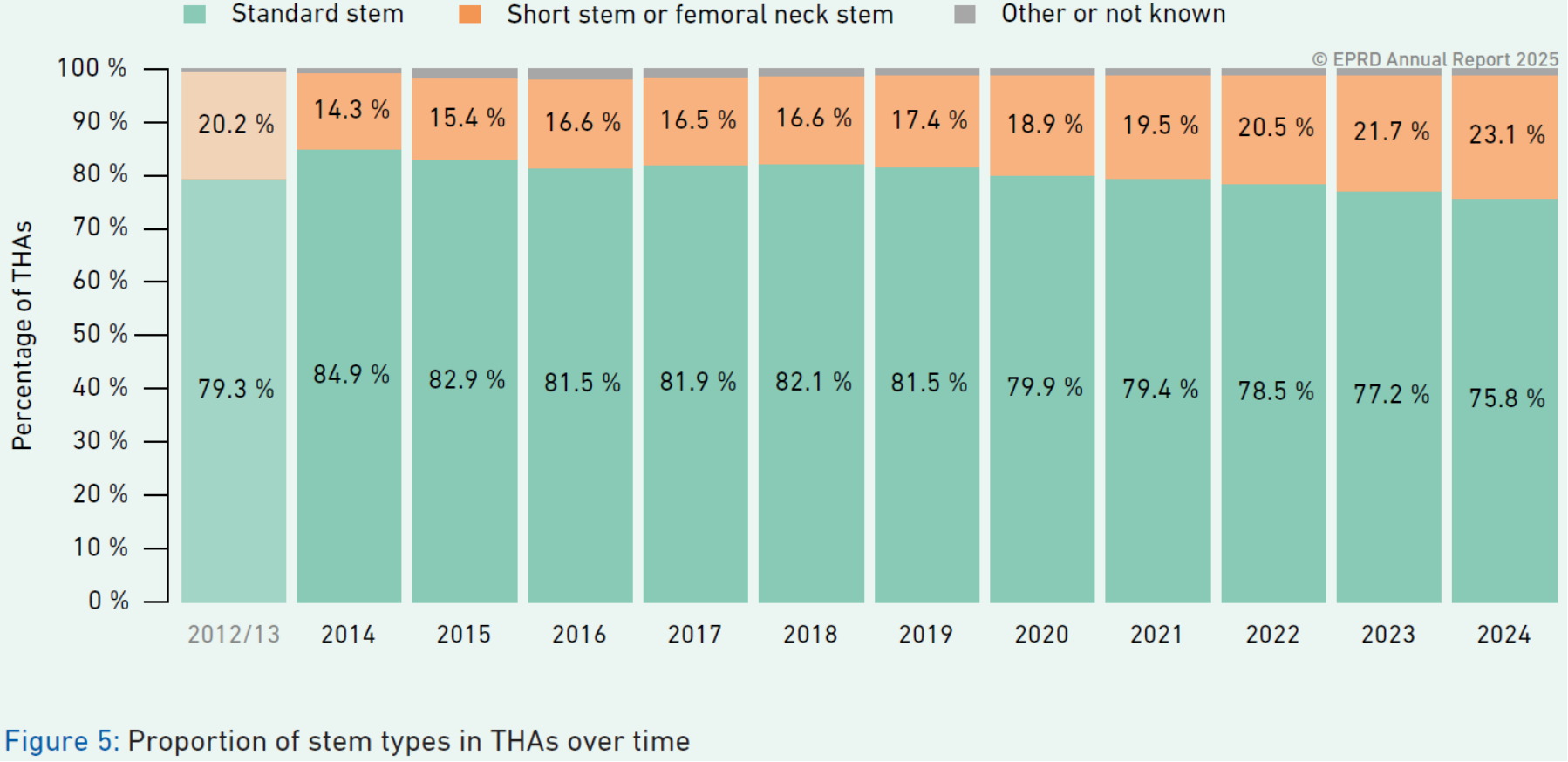


Figure 5: Proportion of stem types in THAs over time

Primary hip arthroplasties (IV)

EPRD Endoprothesenregister Deutschland

- Larger head sizes and shorter head-neck lengths (see Fig. 8, p. 42 in the report) are favoured:

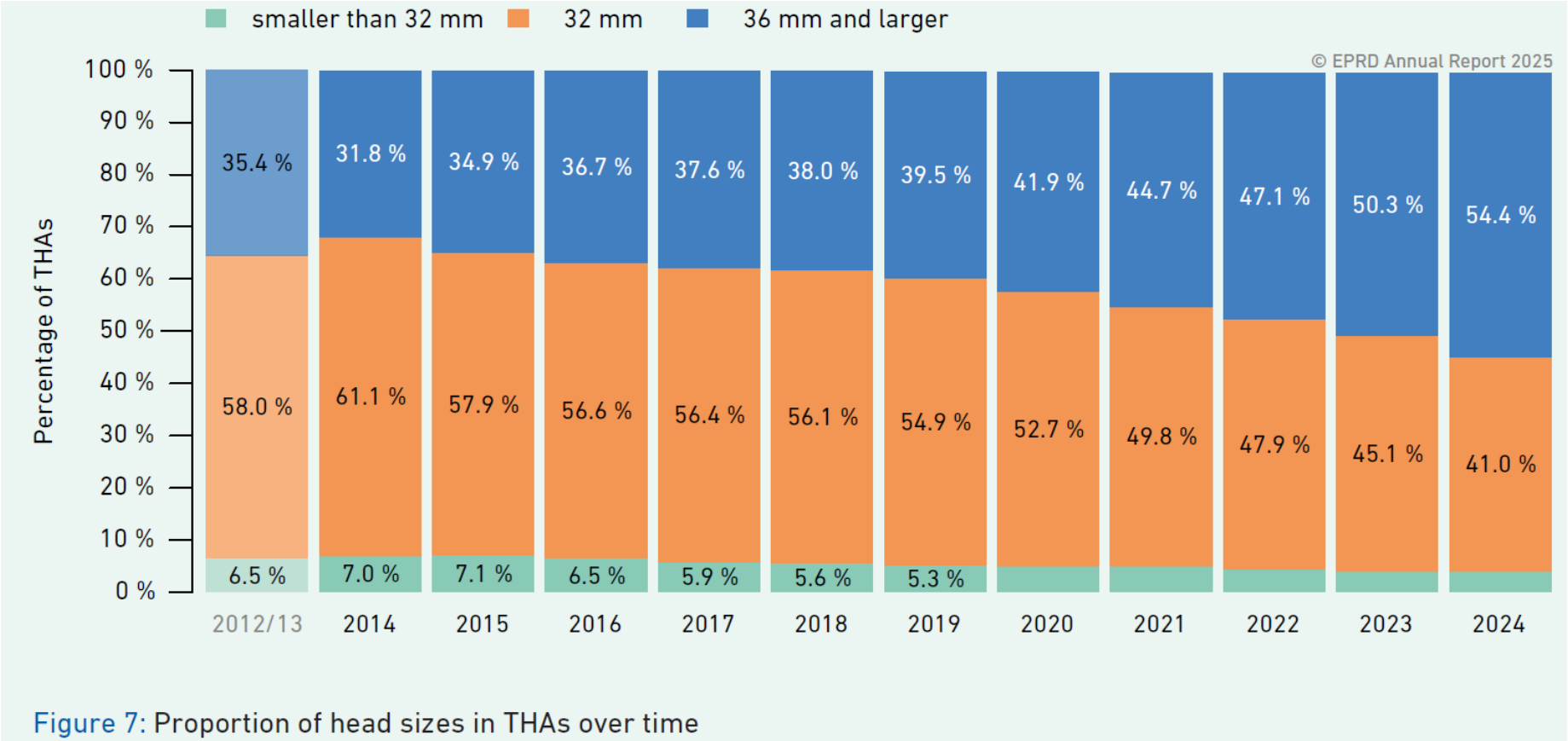


Figure 7: Proportion of head sizes in THAs over time

Primary hip arthroplasties (V)

EPRD Endoprothesenregister Deutschland

- The proportion of cemented femoral fixation is increasing once again in 75-year-old or older patients:

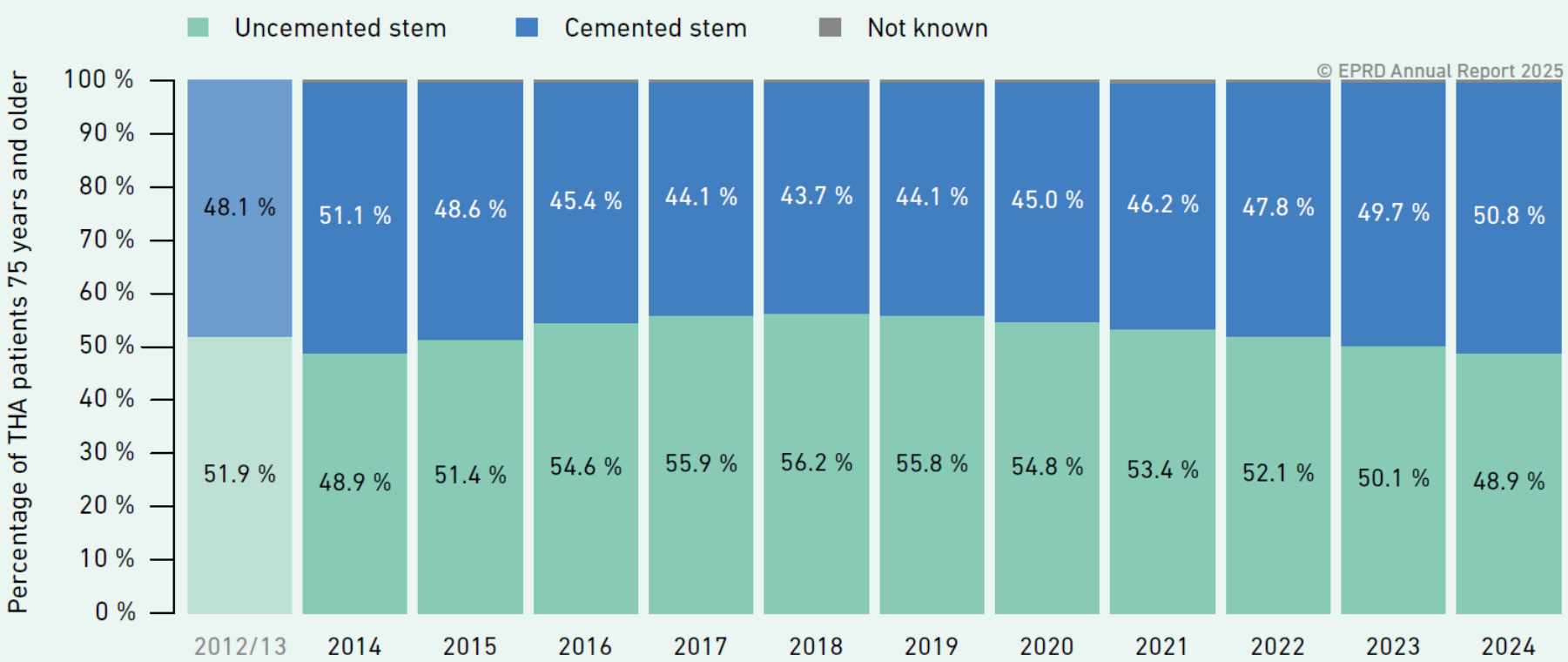


Figure 9: Proportion of types of femoral fixation in THA patients 75 years and older over time

Hip arthroplasty revisions (I)

EPRD Endoprothesenregister Deutschland

In brief:

- The most common indications for hip revisions were loosening (21.0 %), infection (18.5 %), periprosthetic fracture (15.5 %) and dislocation (14.3 %). The loosening percentage has been decreasing for the past few years.
- New stems and/or cups were implanted in 71.2 % of one-stage revisions and reimplantation procedures.
- When a new cup was implanted a dual mobility cup was increasingly favoured instead of a monobloc cup.

Hip arthroplasty revisions (II)

EPRD Endoprothesenregister Deutschland

- In 2024, loosening was the most common indication for hip revisions, with proportions decreasing over the past few years:

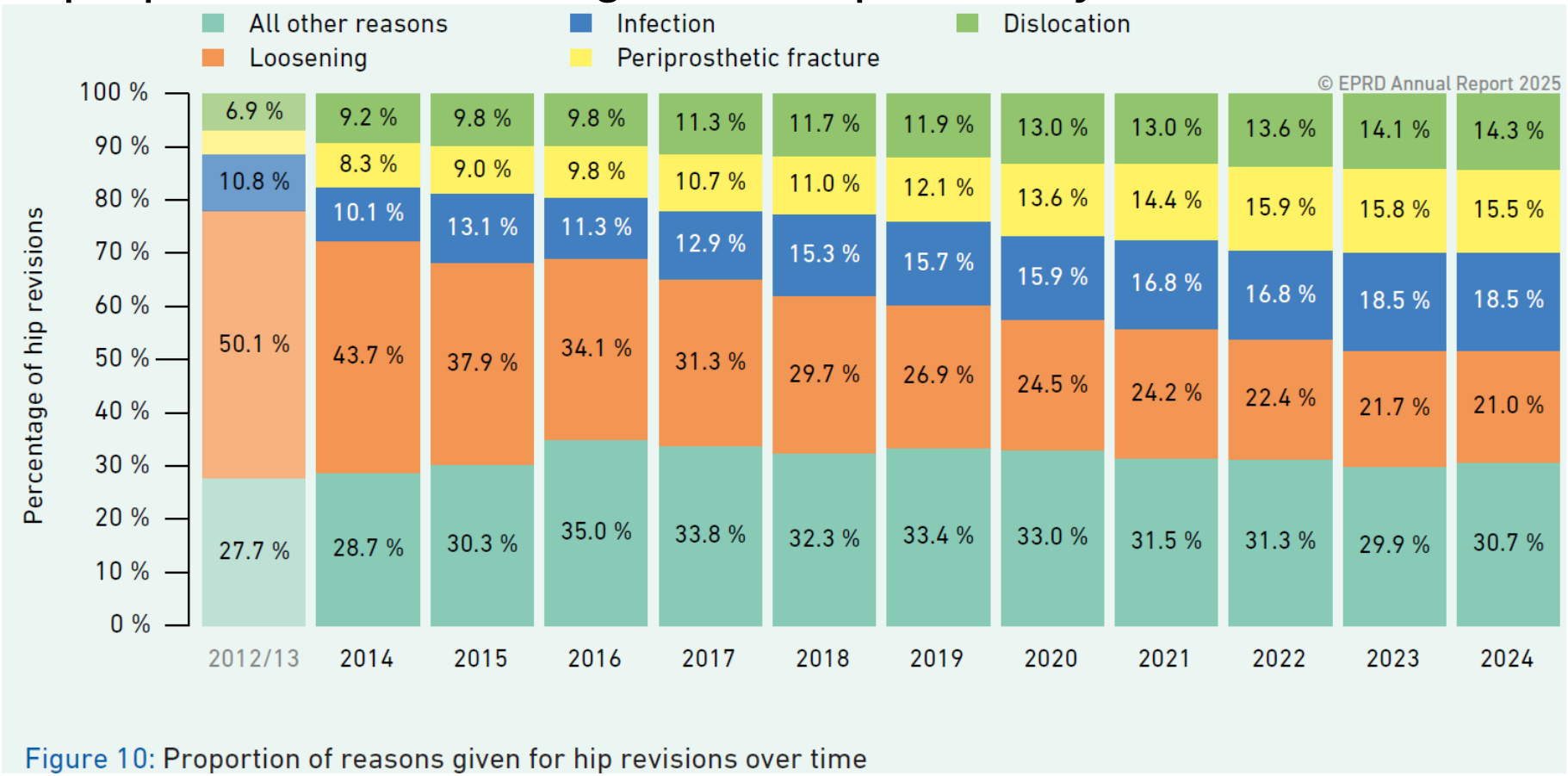


Figure 10: Proportion of reasons given for hip revisions over time

Primary knee arthroplasties (I)

EPRD Endoprothesenregister Deutschland

In brief:

- The use of mobile-bearing systems continues to decrease: in 2024, these systems were implanted in 7.1 % of total knee arthroplasties (TKAs) and 50 % of unicondylar arthroplasties.
- The use of cruciate retaining systems also keeps decreasing with 42.4 % registered in 2024.

Primary knee arthroplasties (II)

EPRD Endoprothesenregister Deutschland

- The use of mobile-bearing systems continues to decrease: in 2024, these systems were implanted in 7.1 % of TKAs:

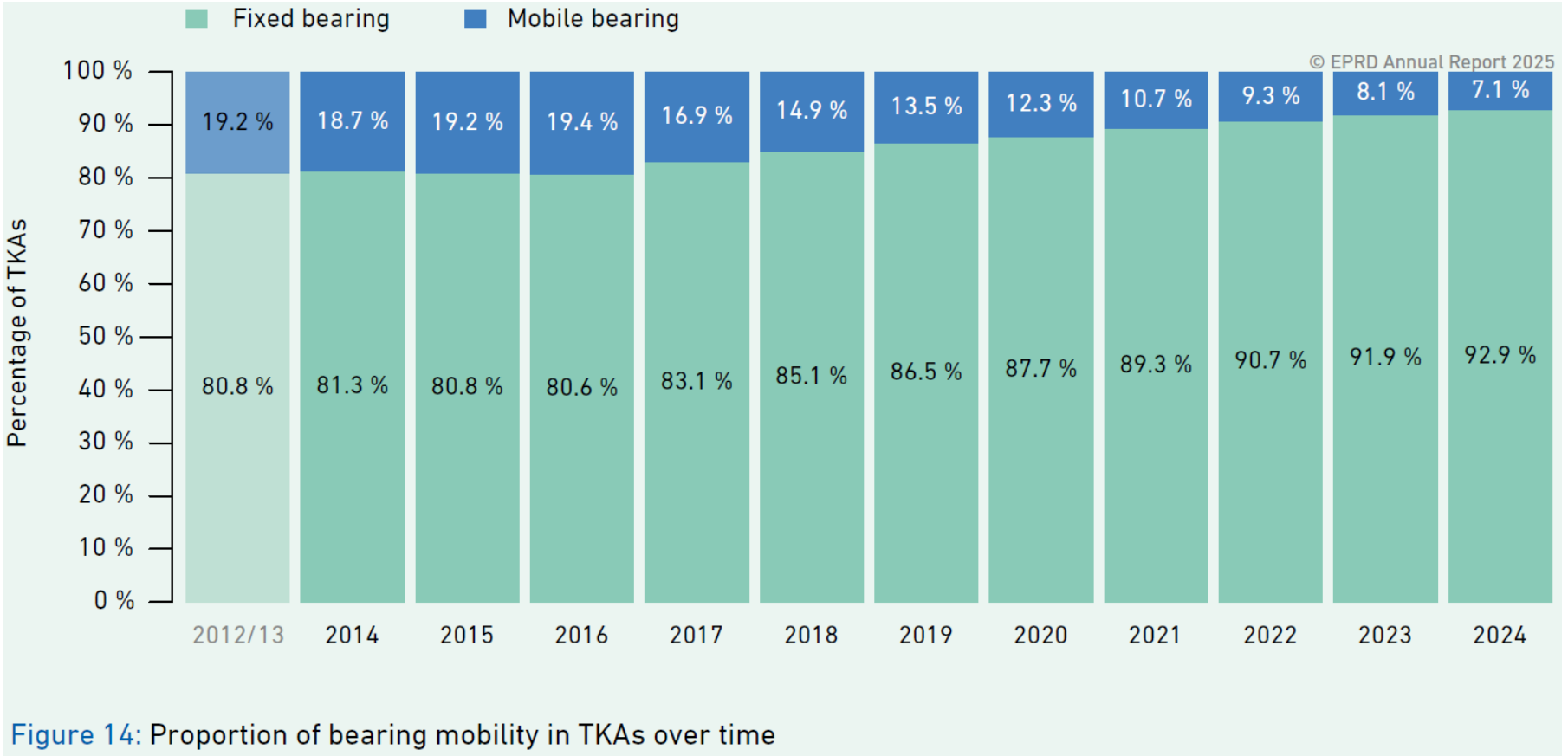


Figure 14: Proportion of bearing mobility in TKAs over time

Primary knee arthroplasties (III)

EPRD Endoprothesenregister Deutschland

- The use of cruciate retaining systems also keeps decreasing, but they continue to be used most frequently in standard TKA knee systems:

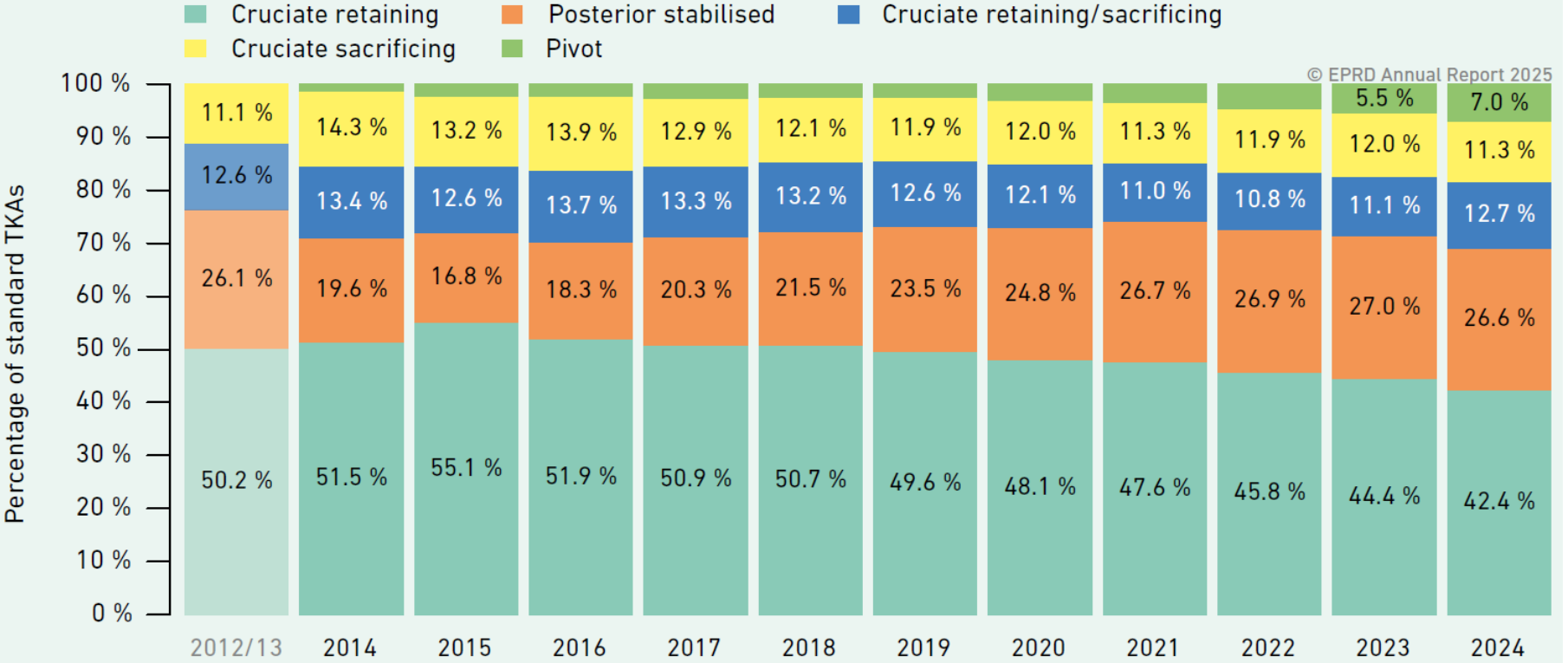


Figure 16: Proportion of standard TKA knee systems over time

Knee arthroplasty revisions (I)

EPRD Endoprothesenregister Deutschland

In brief:

- The main reasons for knee revisions are loosening (21.8 %) and infection (15.2 %).
- Almost half of revisions involve the exchange of all implant components.
- Knee revisions often switch to a more constrained posterior stabilised, varus-valgus stabilised or a hinged system.
- The prevailing trend in septic revisions is to leave bone-anchored components *in situ*.

Knee arthroplasty revisions (II)

EPRD Endoprothesenregister Deutschland

- In contrast to hip arthroplasty revisions the proportion of implant-preserving revisions (DAIR) for knee infections continued to increase in 2024:

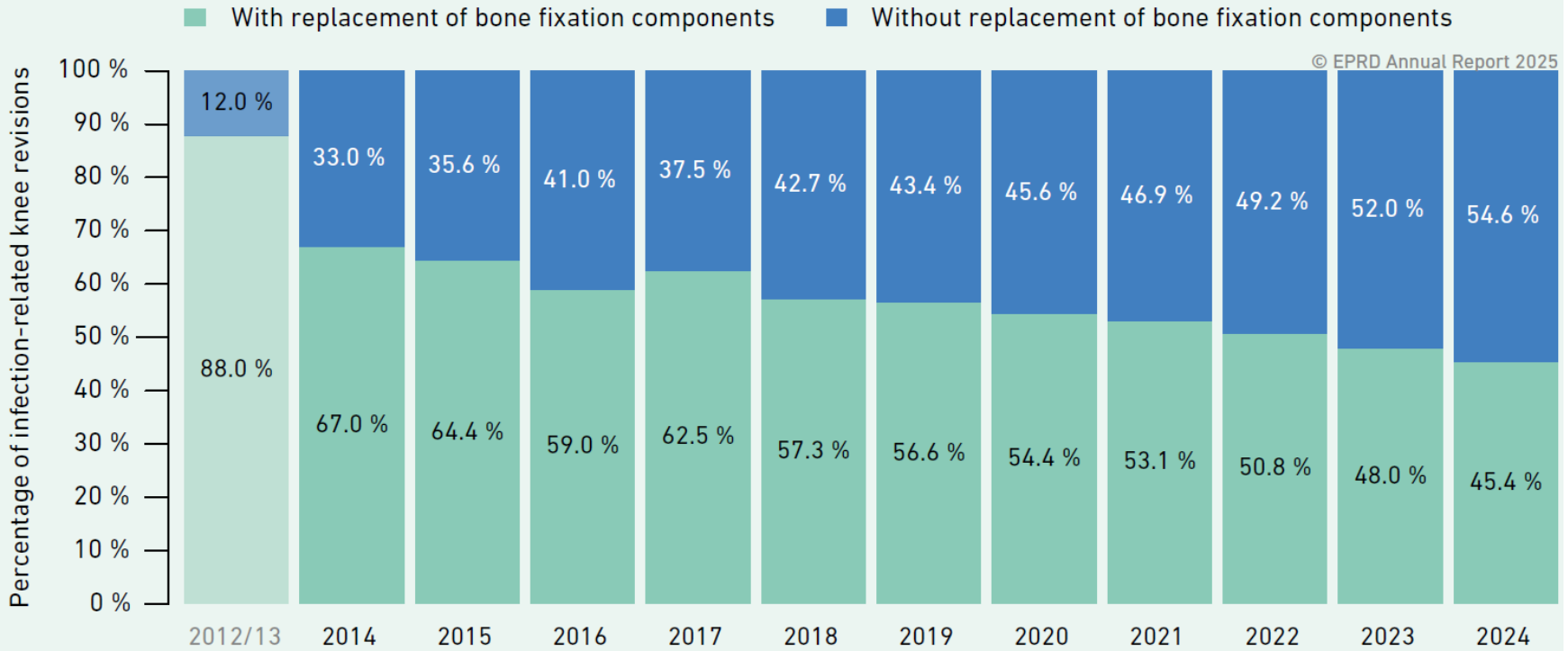


Figure 18: Trends of bone fixation component replacements in infection-related knee revisions over time. Here, two-stage revisions are regarded as a single procedure.

Mismatch detection for more patient safety (I)

EPRD Endoprothesenregister Deutschland

- In 2024 the EPRD identified 572 (25 fewer than in 2023) potential mismatch cases in otherwise plausibly documented primary arthroplasties.
- These included 46 THAs where the documented sizes of the head component and the insert or acetabular component (Monobloc) differed. The selected head was too large for the insert or cup in 12 cases and too small in 34 cases:

		Inner diameter of insert/acetabular component		
		28 mm	32 mm	36 mm
Head size	22 mm	2		
	28 mm		8	
	32 mm	2		24
	36 mm		10	

Table 43: Number of mismatches due to deviations between head size and inner diameter of insert or cup in 2024

Mismatch detection for more patient safety (II)

- Aim: Prevent mismatch cases by informing hospitals at an early stage about potential problems with component selection.
- The EPRD's own product database serves to check datasets for mismatches.
  - The EPRD has only started checking the size compatibility of knee arthroplasties in 2024 as the required information was previously not included in the product database.
- The EPRD notifies hospitals of any potential mismatch cases in its monthly case queries.

Hip and knee arthroplasty survival

Study population follow-up (I)

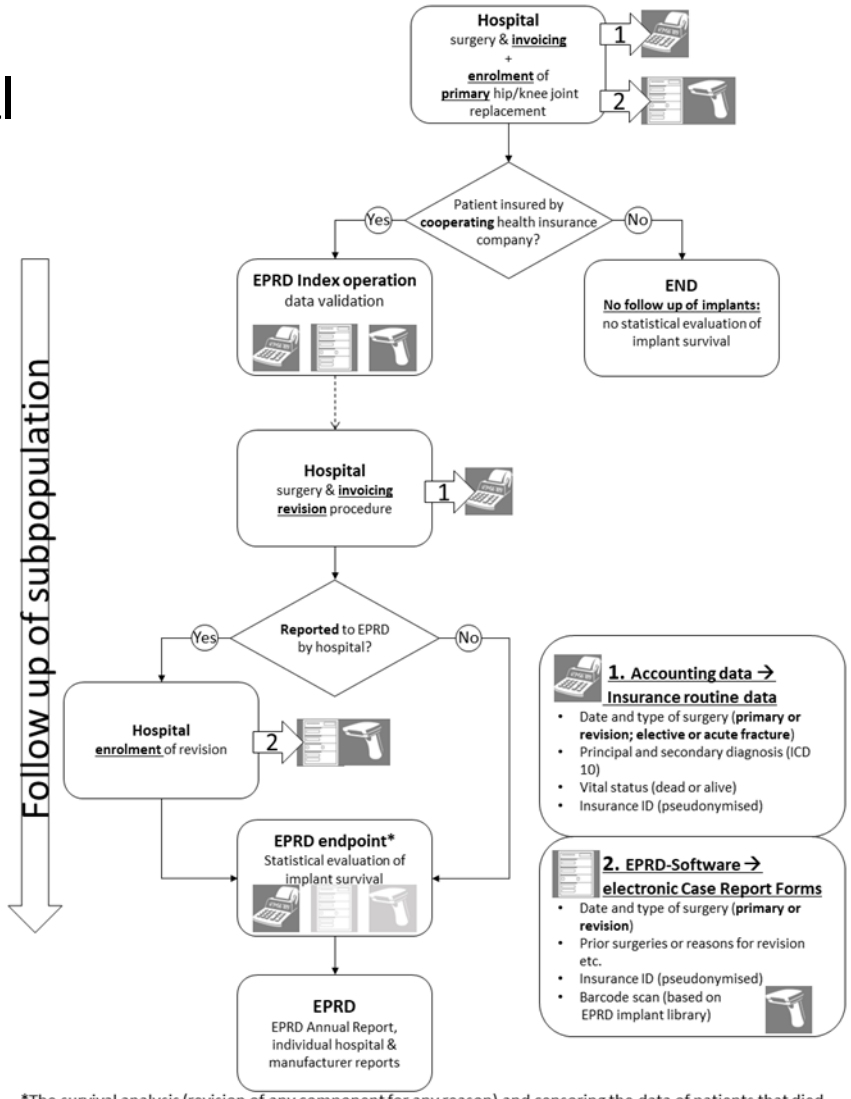
EPRD
Endoprothesenregister Deutschland

<u>Arthroplasty survival calculations:</u>

Only data from patients insured with one of the regional health insurance providers (AOK) or one of the other statutory health insurance providers (Ersatzkassen) and with available billing data are included in the arthroplasty survival calculations.

Even though this means that only a part of the total number of datasets compiled in the EPRD is available for the arthroplasty survival analysis, an almost complete coverage of reoperations is guaranteed for this population.

This **„Completeness of Revision“** is an **essential quality feature** of the EPRD.



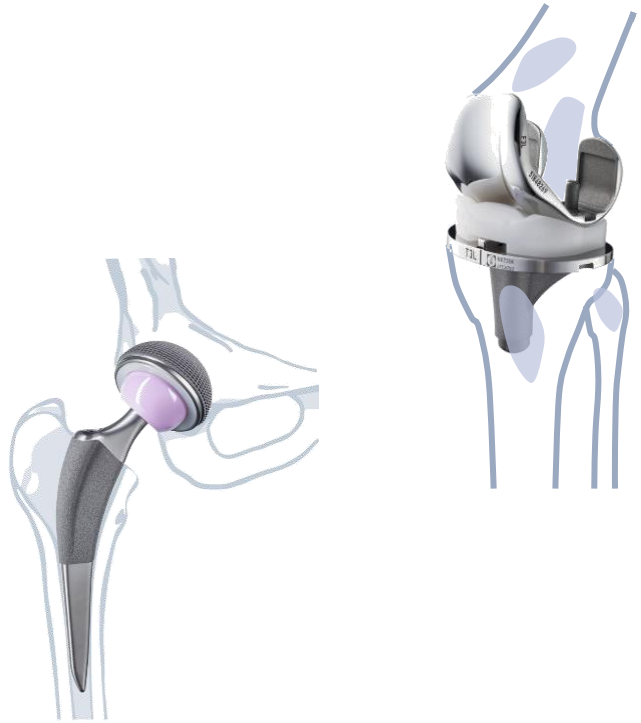
*The survival analysis (revision of any component for any reason) and censoring the data of patients that died or suffered an amputation of the involved limb only requires (1) Accounting data -> insurance routine data.

Study population follow-up (II)

EPRD
Endoprothesenregister Deutschland

Arthroplasty survival analysis:

- Based on 1,370,000 primary arthroplasties and 146,000 revisions followed up.
- In addition to cumulative revision rates (CRRs), cumulative re-revision rates (CReRRs) are also examined.



Hip and knee arthroplasty survival

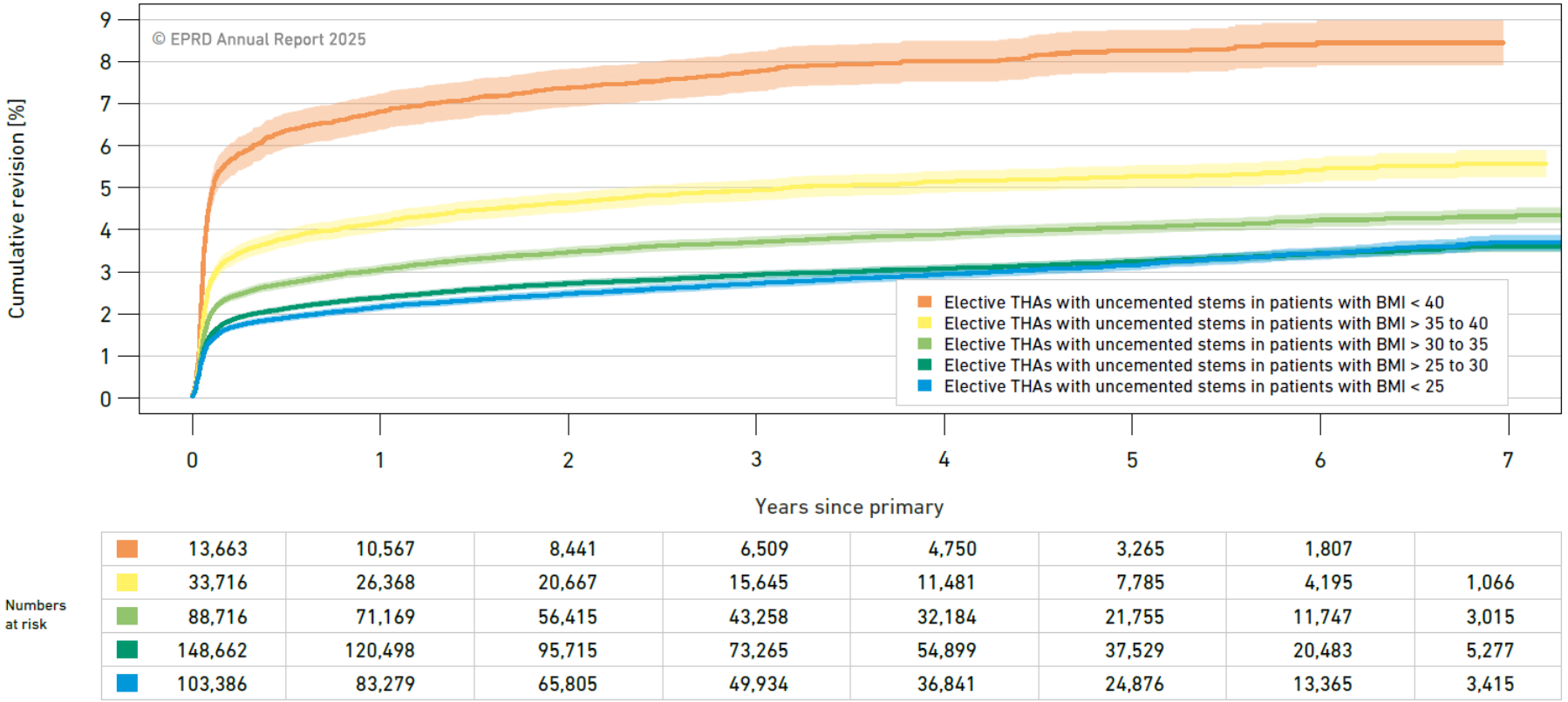
Important: Arthroplasty survival is not only dependent on the implant used!

- Patient-specific parameters such as age, sex, body mass index (BMI) and comorbidities have a significant impact on the cumulative revision rate.
- Higher patient volumes per hospital tend to reduce the risk of revision arthroplasty.
  - But, in individual cases, hospitals with high case volumes and poorer outcomes, as well as hospitals with lower case volumes and very good outcomes are also observed.

Non-implant-related factors: Patient (I)

EPRD Endoprothesenregister Deutschland

- Patient BMI substantially impacts outcomes for specific types of arthroplasties:



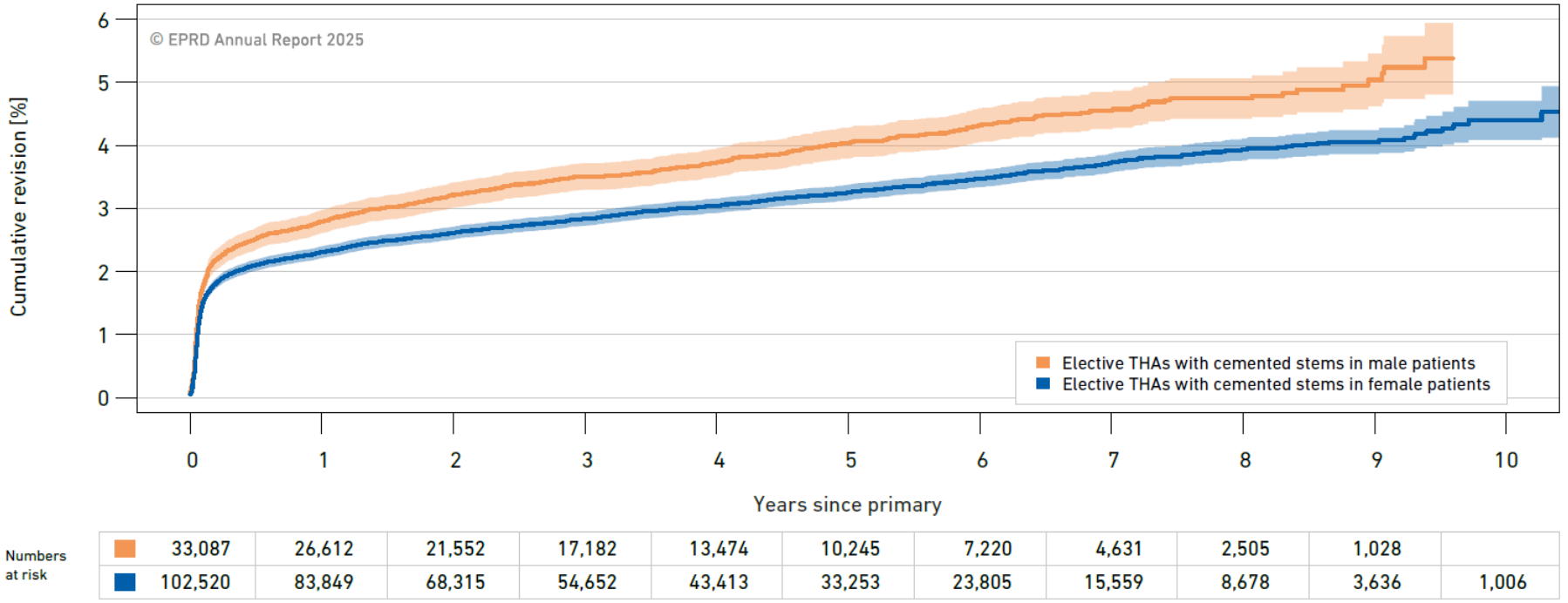
Numbers at risk								
	13,663	10,567	8,441	6,509	4,750	3,265	1,807	
	33,716	26,368	20,667	15,645	11,481	7,785	4,195	1,066
	88,716	71,169	56,415	43,258	32,184	21,755	11,747	3,015
	148,662	120,498	95,715	73,265	54,899	37,529	20,483	5,277
	103,386	83,279	65,805	49,934	36,841	24,876	13,365	3,415

Figure 24: Cumulative revision rates for elective total hip arthroplasties with uncemented stems by patient body mass index *(p < 0.0001)*

Non-implant-related factors: Patient (II)

EPRD Endoprothesenregister Deutschland

- Irrespective of the type of primary hip arthroplasty performed, men are at higher risk of revision surgery. The rationale is that men have a higher overall risk of infection.



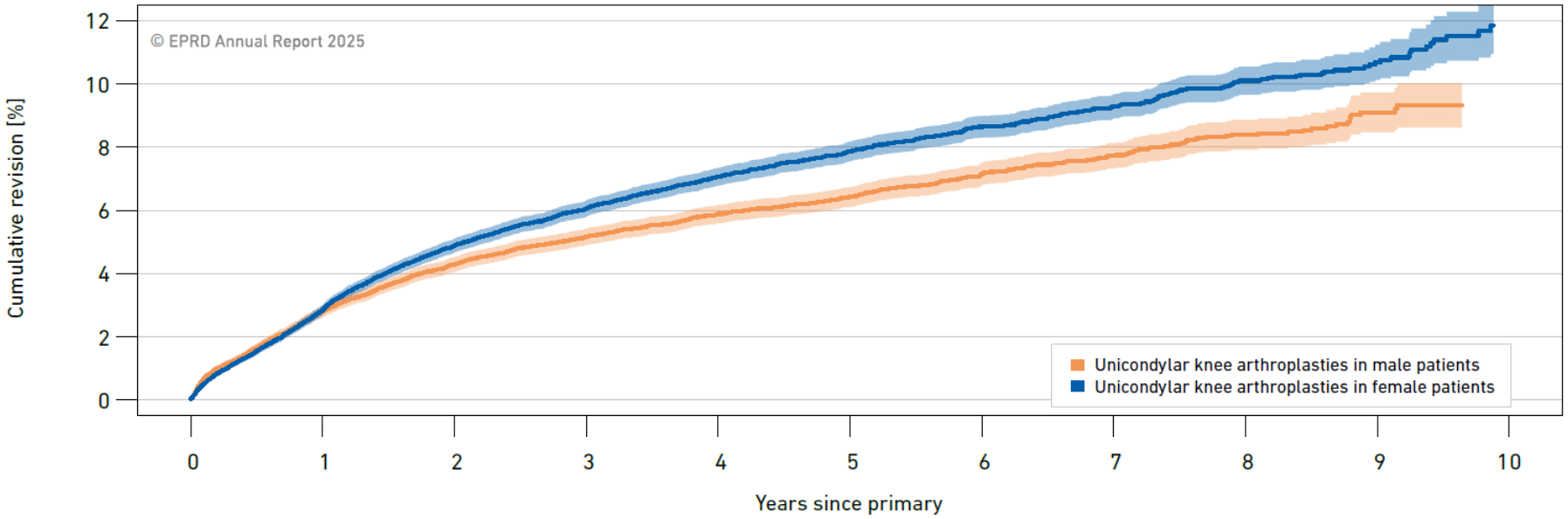
Numbers at risk											
	33,087	26,612	21,552	17,182	13,474	10,245	7,220	4,631	2,505	1,028	
	102,520	83,849	68,315	54,652	43,413	33,253	23,805	15,559	8,678	3,636	1,006

Figure 23: Cumulative revision rates for elective total hip arthroplasties with cemented stems by patient sex *($p < 0.0001$)*

Non-implant-related factors: Patient (III)

EPRD Endoprothesenregister Deutschland

- For most types of arthroplasties, men have significantly higher revision rates than women. Unicondylar arthroplasty is a notable exception:



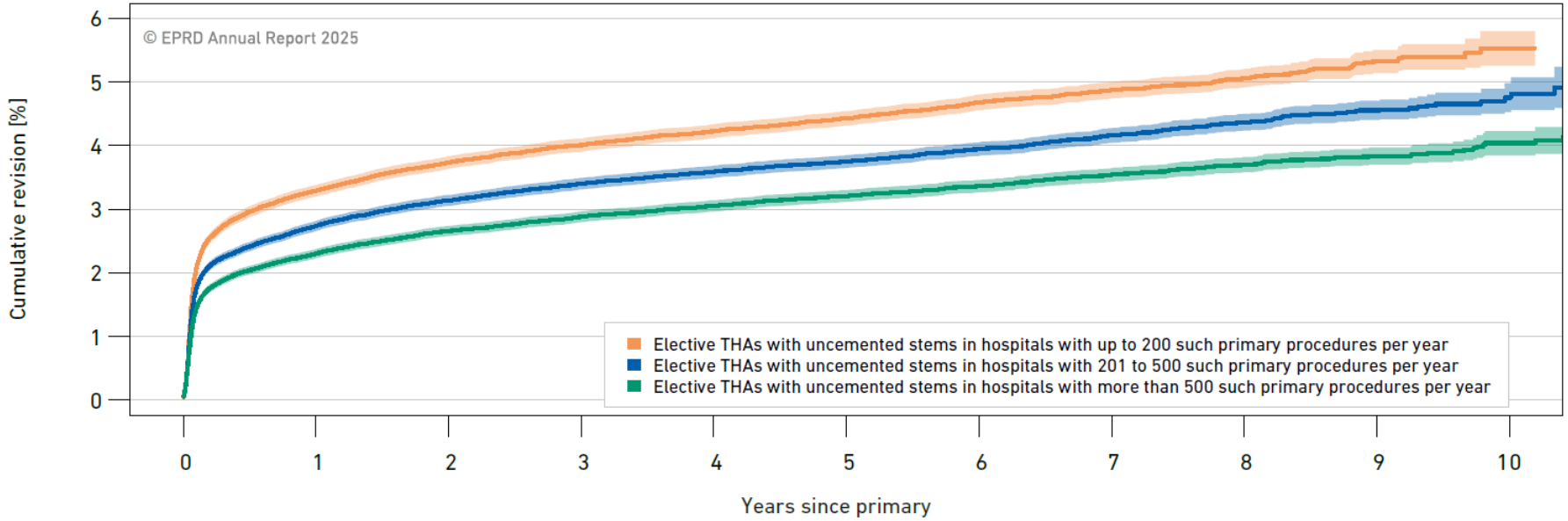
Numbers at risk										
	35,207	28,278	22,708	17,973	14,150	10,612	7,394	4,633	2,441	924
	43,058	34,870	28,322	22,934	18,375	14,134	10,115	6,430	3,470	1,268

Figure 37: Cumulative revision rates for unicondylar knee arthroplasty by patient sex *($p < 0.0001$)*

Non-implant-related factors: Hospital (I)

EPRD Endoprothesenregister Deutschland

- Cumulative revision rates of elective THAs with uncemented stems by the hospital's annual volume of primary hip arthroplasties:



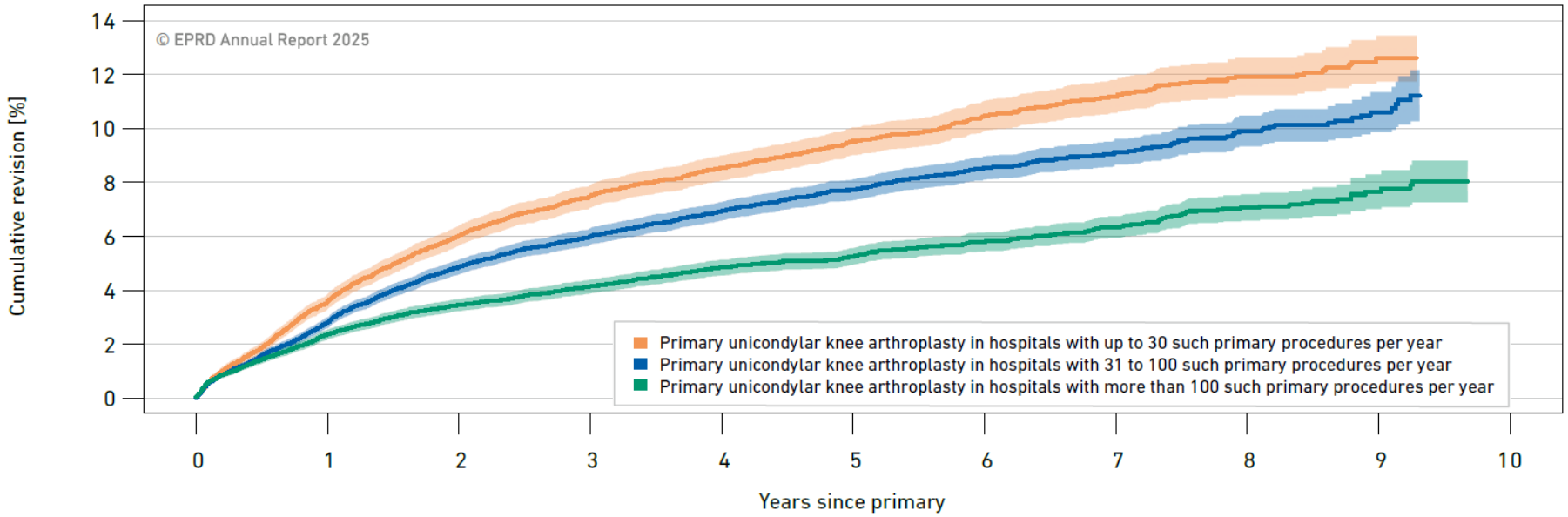
Numbers at risk											
Elective THAs with uncemented stems in hospitals with up to 200 such primary procedures per year	152,267	125,575	103,998	84,816	69,121	54,041	38,978	25,422	13,561	4,714	745
Elective THAs with uncemented stems in hospitals with 201 to 500 such primary procedures per year	168,003	139,388	115,103	92,522	74,458	58,156	42,467	28,108	15,876	6,599	1,571
Elective THAs with uncemented stems in hospitals with more than 500 such primary procedures per year	166,602	139,449	116,193	95,835	77,607	60,466	43,430	28,923	16,734	7,084	2,817

Figure 25: Cumulative revision rates for elective total hip arthroplasties by the hospital's annual volume of primary elective total hip arthroplasties *($p < 0.0001$)*

Non-implant-related factors: Hospital (II)

EPRD Endoprothesenregister Deutschland

- Cumulative revision rates for unicondylar knee arthroplasties by the hospital's annual volume of primary unicondylar knee arthroplasties:



Numbers at risk										
19,246	15,240	12,321	10,167	8,278	6,385	4,611	2,974	1,566	660	
29,257	23,427	18,711	14,653	11,518	8,587	5,925	3,669	1,922	695	
28,761	23,526	19,082	15,225	11,953	9,142	6,496	4,140	2,297	801	

Figure 40: Cumulative revision rates for unicondylar knee arthroplasty by the hospital's annual volume of primary unicondylar knee arthroplasties[7] *($p < 0.0001$)*

7: The classifications in this report are based on the hospitals' quality reports for 2022 and the corresponding IQTIG quality indicators listed therein.

Cumulative revision rates hip arthroplasty (I)

EPRD Endoprothesenregister Deutschland

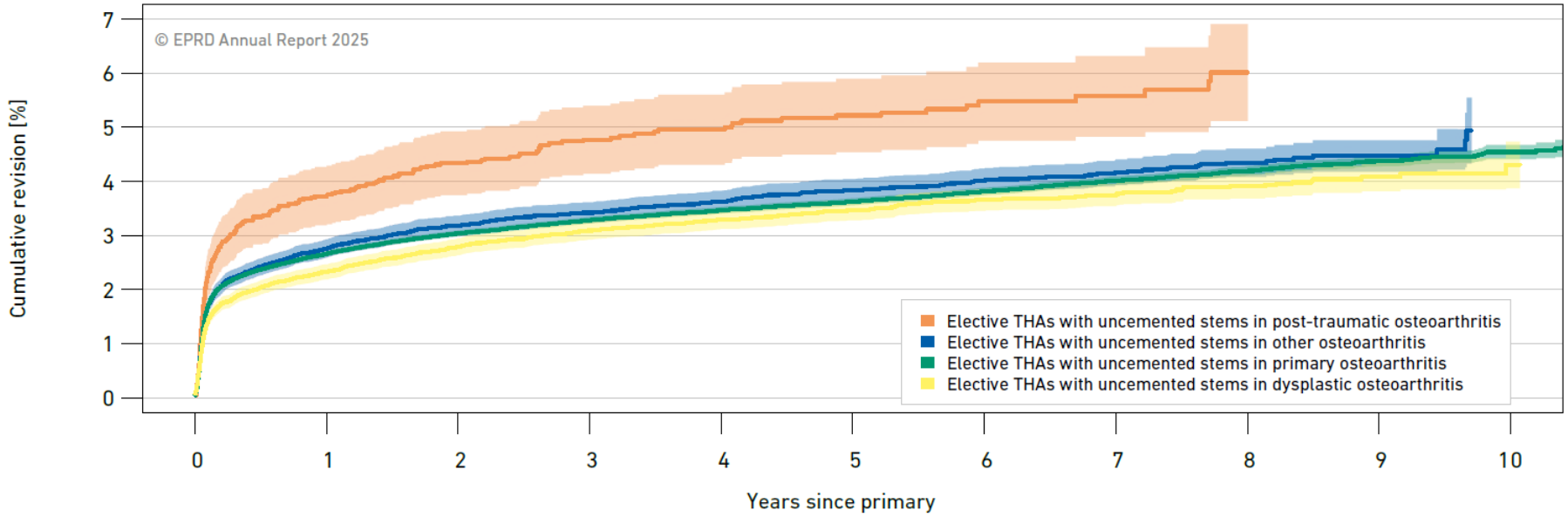
In brief:

- Non-elective procedures and procedures indicated for post-traumatic osteoarthritis have higher cumulative revision rates.
- Arthroplasties with cemented femoral components have lower cumulative revision rates due to better outcomes in older patients.
- Larger heads and shorter head-neck lengths have lower revision rates during the early post-operative phase.

Cumulative revision rates hip arthroplasty (II)

EPRD Endoprothesenregister Deutschland

- Post-traumatic osteoarthritis is associated with a higher revision risk:



Numbers at risk

4,882	4,067	3,393	2,794	2,290	1,822	1,285	847	502		
37,061	31,499	26,556	22,449	18,603	14,547	10,721	7,058	3,825	1,329	
390,542	324,853	269,930	219,802	178,133	139,318	100,836	66,583	37,469	15,130	4,133
46,729	39,120	32,379	26,624	21,755	17,135	12,551	8,487	4,754	1,919	557

Figure 21: Cumulative revision rates for elective total hip arthroplasties with uncemented stems by primary diagnosis *($p < 0.0001$)*

Cumulative revision rates hip arthroplasty (III)

EPRD Endoprothesenregister Deutschland

- Arthroplasties with cemented femoral components have lower cumulative revision rates due to better outcomes in older patients:

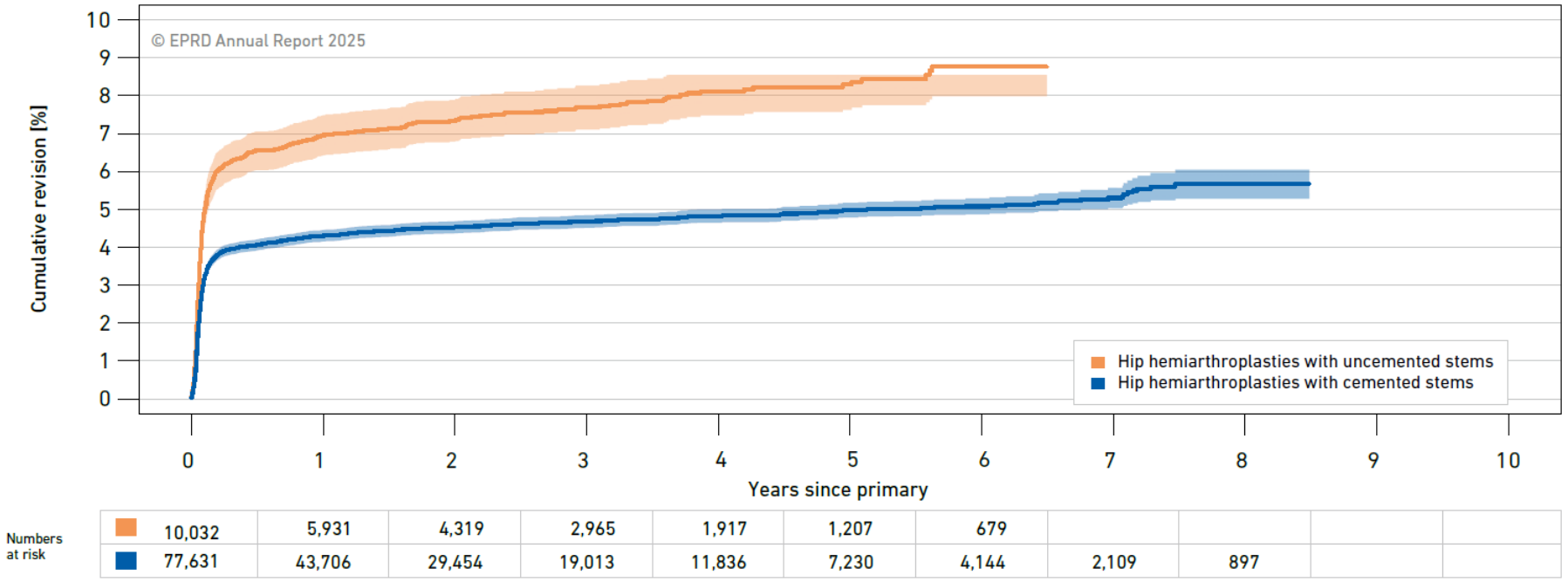
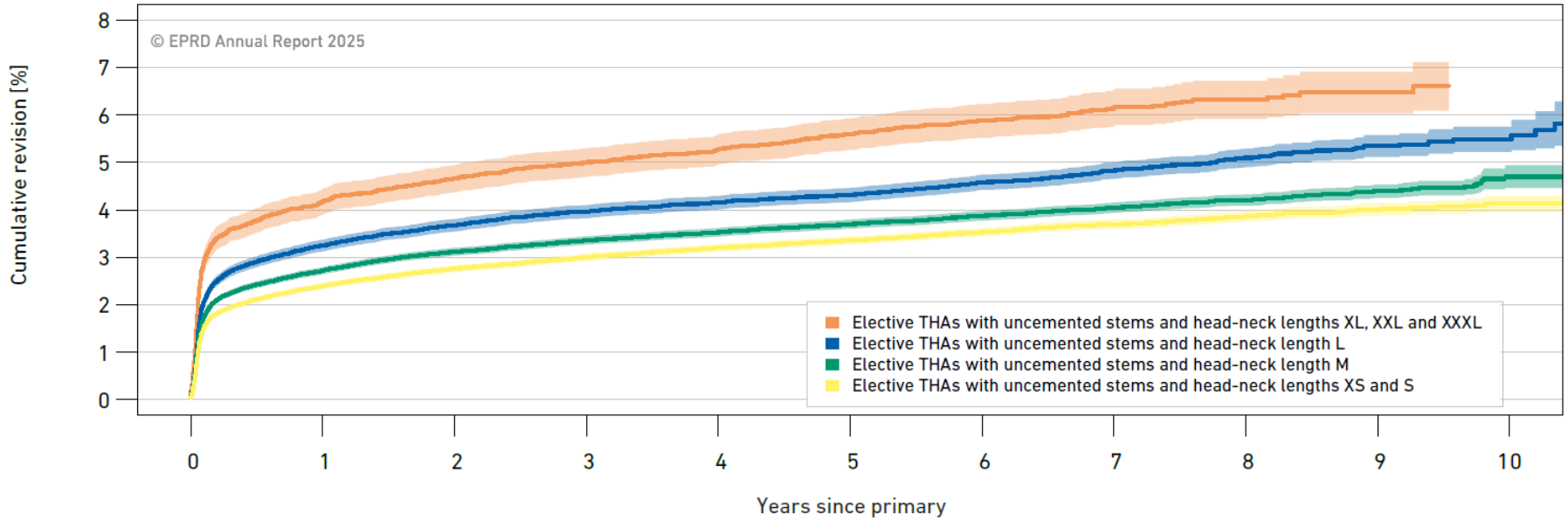


Figure 26: Cumulative revision rates for uncemented and cemented hip hemiarthroplasties *(p < 0.0001)*

Cumulative revision rates hip arthroplasty (IV)

EPRD Endoprothesenregister Deutschland

- Shorter head-neck lengths have lower revision rates during the early post-operative phase:



Numbers at risk											
	21,714	18,194	15,312	12,606	10,302	8,039	5,947	3,962	2,296	903	
	82,212	69,104	58,390	48,410	39,837	31,784	23,773	16,232	9,539	4,022	1,079
	179,850	150,225	125,380	102,988	83,849	65,686	47,695	31,686	17,989	7,225	2,022
	208,507	172,416	141,947	114,816	92,457	71,762	51,276	33,248	17,906	6,962	1,924

Figure 28: Cumulative revision rates for elective total hip arthroplasties with uncemented stems by head-neck lengths *($p < 0.0001$)*

Cumulative revision rates hip arthroplasty (V)

EPRD Endoprothesenregister Deutschland

- Trends: To date, longitudinal EPRD records show no evidence of an improvement in hip arthroplasty outcomes:

Elective THAs with uncemented stems		Cumulative revision rates after ...						
Year of the operation	Number	1 year	2 years	3 years	4 years	5 years	6 years	7 years
2012/13	3,006	2.6 [2.0; 3.2] (2,898)	3.3 [2.7; 4.0] (2,675)	3.5 [2.8; 4.2] (2,534)	3.8 [3.1; 4.5] (2,440)	4.0 [3.3; 4.7] (2,382)	4.1 [3.4; 4.9] (2,325)	4.3 [3.6; 5.1] (2,266)
2014	7,356	2.3 [2.0; 2.6] (7,027)	3.0 [2.6; 3.4] (6,793)	3.3 [2.9; 3.7] (6,646)	3.5 [3.1; 3.9] (6,501)	3.7 [3.2; 4.1] (6,344)	3.8 [3.4; 4.3] (6,157)	4.0 [3.5; 4.4] (5,985)
2015	22,347	2.4 [2.2; 2.6] (21,432)	2.8 [2.6; 3.0] (20,796)	3.1 [2.9; 3.3] (20,303)	3.3 [3.1; 3.6] (19,857)	3.5 [3.3; 3.8] (19,387)	3.7 [3.5; 4.0] (18,797)	3.9 [3.6; 4.1] (18,200)
2016	38,170	2.7 [2.5; 2.8] (36,338)	3.2 [3.0; 3.3] (35,494)	3.4 [3.3; 3.6] (34,766)	3.6 [3.4; 3.8] (34,021)	3.8 [3.6; 4.0] (33,173)	3.9 [3.7; 4.1] (32,242)	4.1 [3.9; 4.3] (31,210)
2017	44,941	2.8 [2.6; 2.9] (43,080)	3.1 [3.0; 3.3] (42,253)	3.4 [3.2; 3.6] (41,432)	3.6 [3.4; 3.8] (40,481)	3.7 [3.6; 3.9] (39,456)	3.9 [3.8; 4.1] (38,329)	4.2 [4.0; 4.4] (27,871)
2018	48,876	2.6 [2.5; 2.8] (46,982)	3.1 [2.9; 3.2] (46,077)	3.3 [3.1; 3.4] (45,140)	3.5 [3.3; 3.6] (44,127)	3.6 [3.5; 3.8] (42,995)	3.9 [3.7; 4.0] (31,499)	
2019	52,040	2.8 [2.6; 2.9] (50,049)	3.2 [3.0; 3.3] (49,007)	3.4 [3.3; 3.6] (48,073)	3.6 [3.4; 3.8] (46,976)	3.8 [3.6; 4.0] (34,536)		
2020	48,924	2.9 [2.8; 3.1] (46,914)	3.3 [3.1; 3.4] (46,083)	3.6 [3.4; 3.7] (45,188)	3.7 [3.6; 3.9] (33,389)			
2021	52,922	2.8 [2.7; 3.0] (50,751)	3.2 [3.0; 3.3] (49,885)	3.4 [3.3; 3.6] (36,390)				
2022	61,205	2.8 [2.7; 2.9] (58,738)	3.2 [3.0; 3.3] (44,027)					
2023	66,767	2.8 [2.6; 2.9] (48,275)						

Table 55: Cumulative revision rates for elective total hip arthroplasties with uncemented stems by operating year *(p = 0.4)*

Cumulative revision rates knee arthroplasty (I)

EPRD Endoprothesenregister Deutschland

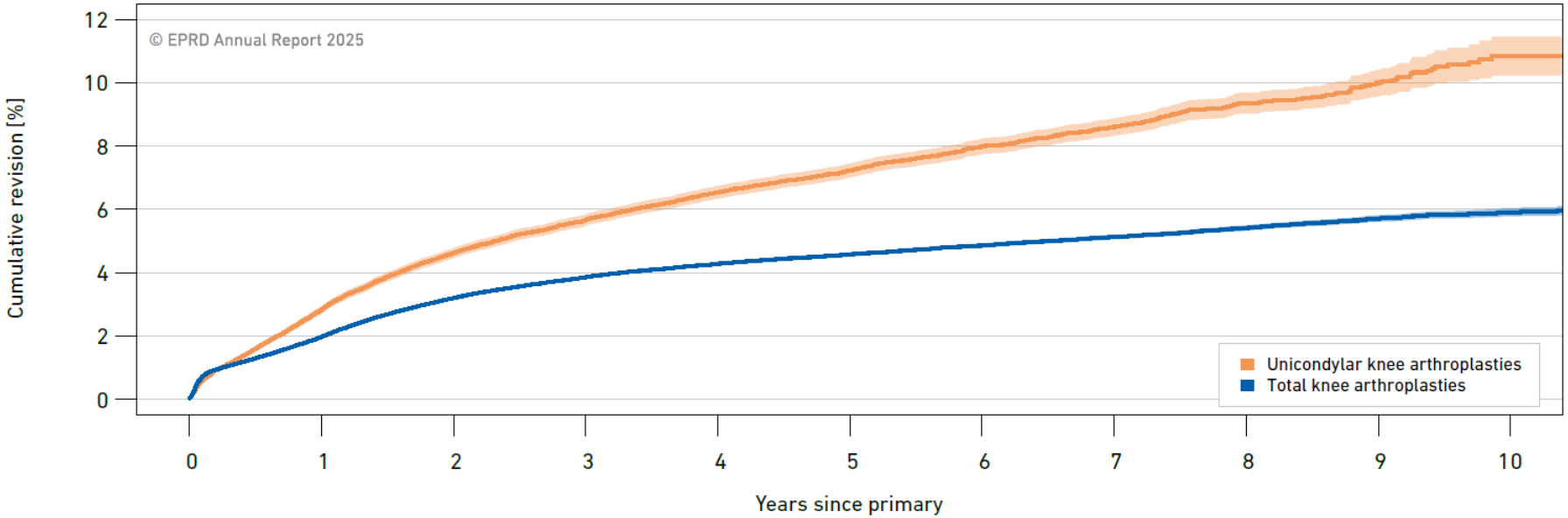
In brief:

- Cumulative revision rates for unicondylar arthroplasties are considerably higher than for TKAs (7.2 % versus 4.6 %, respectively, 5 years post-arthroplasty).
- The risk of revision surgery is also considerably higher for post-traumatic osteoarthritis than for other types of osteoarthritis.
- To date, cruciate retaining and cruciate sacrificing systems yield the lowest cumulative revision rates.
- In the early post-operative years, standard TKAs with fixed bearings tend to have lower cumulative revision rates.

Cumulative revision rates knee arthroplasty (II)

EPRD Endoprothesenregister Deutschland

- Cumulative revision rates for unicondylar arthroplasties are considerably higher than for TKAs:



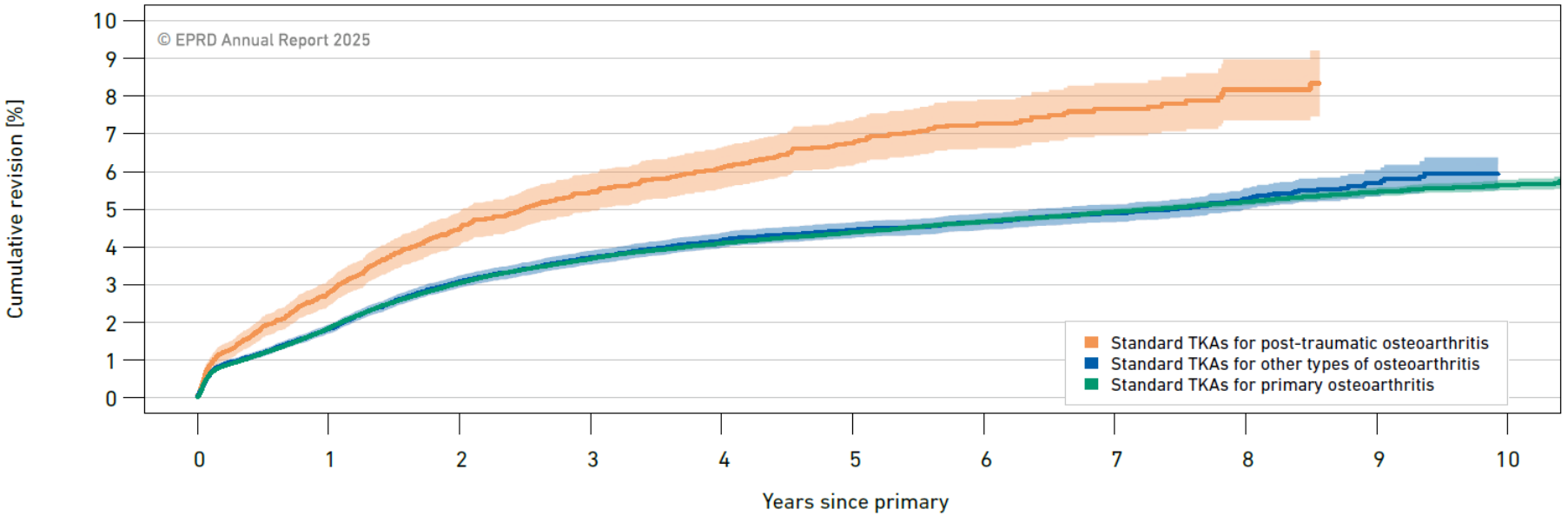
Numbers at risk										
78,265	63,148	51,030	40,907	32,525	24,746	17,509	11,063	5,911	2,192	723
533,045	440,205	358,003	290,136	235,637	184,009	133,025	86,777	47,997	19,308	5,084

Figure 33: Cumulative revision rates for total and unicondylar knee arthroplasties *(p < 0.0001)*

Cumulative revision rates knee arthroplasty (III)

EPRD Endoprothesenregister Deutschland

- The highest cumulative revision rates for osteoarthritis-related procedures are observed for post-traumatic osteoarthritis:



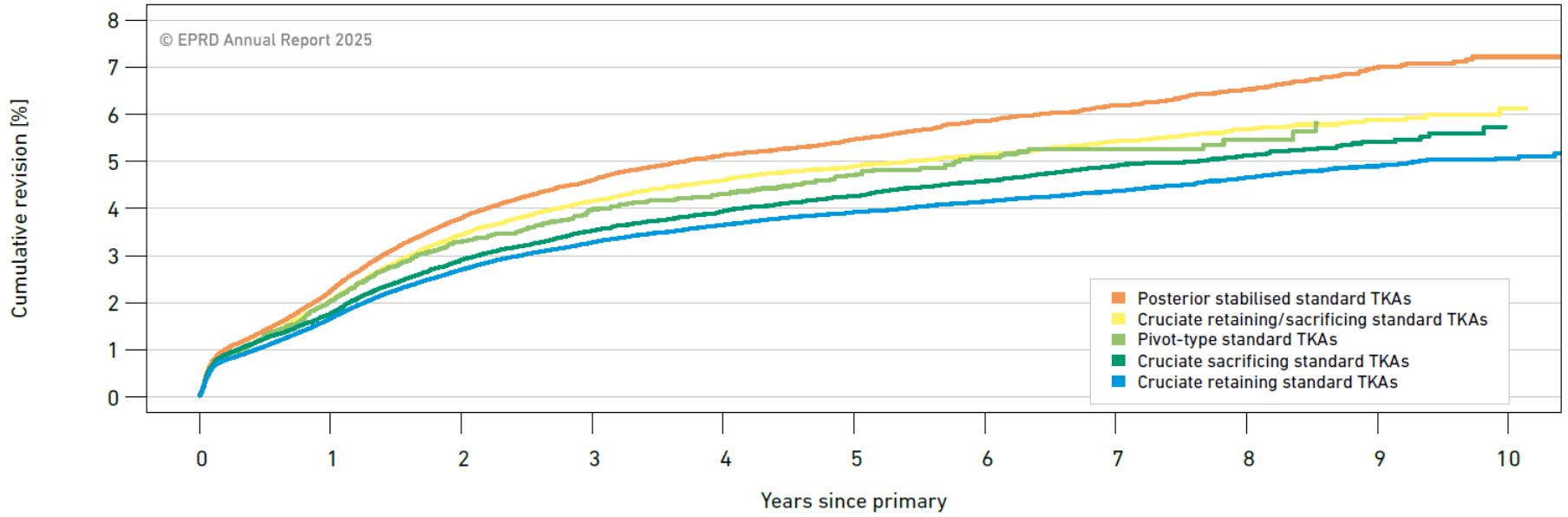
Numbers at risk											
Standard TKAs for post-traumatic osteoarthritis	9,927	8,095	6,530	5,231	4,139	3,246	2,328	1,522	802		
Standard TKAs for other types of osteoarthritis	50,199	42,514	35,175	29,559	24,572	19,192	13,842	9,261	5,096	1,889	
Standard TKAs for primary osteoarthritis	446,140	368,077	298,938	241,446	195,825	153,077	110,875	72,176	40,066	16,295	4,363

Figure 35: Cumulative revision rates for standard total knee arthroplasties by primary diagnosis (based on the documented ICD-10 codes) *(p < 0.0001)*

Cumulative revision rates knee arthroplasty (IV)

EPRD Endoprothesenregister Deutschland

➢ Cruciate retaining systems require fewer revisions than other knee systems:



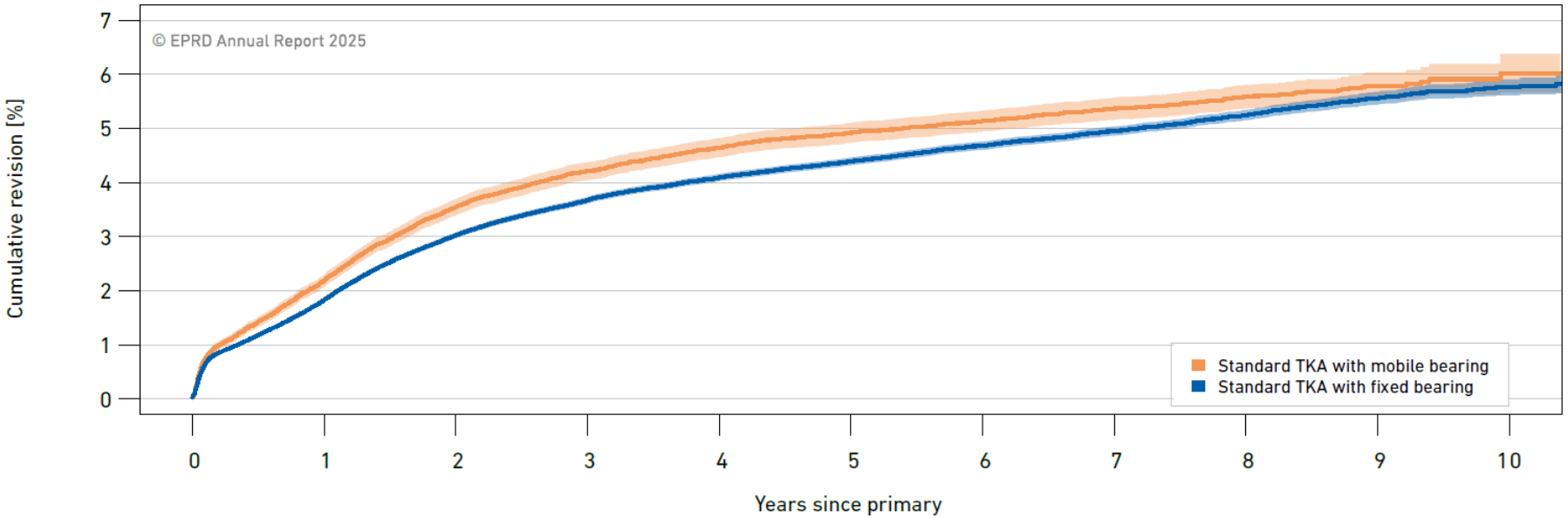
Numbers at risk											
Posterior stabilised standard TKAs	123,277	99,656	78,733	61,898	48,573	36,785	25,658	16,209	8,822	3,769	1,292
Cruciate retaining/sacrificing standard TKAs	59,509	49,189	40,960	33,999	28,361	22,610	16,580	10,911	6,050	2,343	585
Pivot-type standard TKAs	18,204	12,864	9,000	6,319	4,697	3,386	2,330	1,470	738		
Cruciate sacrificing standard TKAs	62,735	52,448	42,734	34,957	28,745	22,582	16,678	11,049	6,094	2,247	
Cruciate retaining standard TKAs	245,738	207,237	171,495	140,990	115,774	91,428	66,757	43,945	24,622	10,024	2,536

Figure 41: Cumulative revision rates for standard total knee arthroplasty by knee system *(p < 0.0001)*. Confidence intervals have been omitted for clarity.

Cumulative revision rates knee arthroplasty (V)

EPRD Endoprothesenregister Deutschland

- In the early post-operative years, TKAs with fixed bearings have significantly lower revision rates than systems with mobile bearings:



Numbers at risk										
64,835	57,244	49,981	43,104	36,891	30,312	23,089	15,839	9,004	3,300	704
444,628	364,150	292,941	235,059	189,259	146,479	104,914	67,745	37,322	15,334	4,215

Figure 42: Cumulative revision rates for standard total knee arthroplasty by bearing mobility *(p < 0.0001)*

Cumulative revision rates knee arthroplasty (VI)

EPRD Endoprothesenregister Deutschland

- Trends: The EPRD confirms an improvement in standard TKA outcomes over time:

Standard TKAs		Cumulative revision rates after ...						
Year of the operation	Number	1 year	2 years	3 years	4 years	5 years	6 years	7 years
2012/13	3,059	2.0 [1.5; 2.5] (2,976)	3.9 [3.2; 4.6] (2,728)	4.7 [4.0; 5.5] (2,538)	5.1 [4.3; 5.9] (2,421)	5.3 [4.5; 6.1] (2,338)	5.4 [4.6; 6.3] (2,264)	5.7 [4.9; 6.6] (2,181)
2014	7,542	1.9 [1.6; 2.2] (7,227)	3.3 [2.9; 3.7] (6,866)	4.1 [3.6; 4.5] (6,658)	4.5 [4.0; 5.0] (6,486)	4.9 [4.4; 5.4] (6,281)	5.3 [4.7; 5.8] (6,078)	5.6 [5.0; 6.1] (5,798)
2015	23,260	2.2 [2.0; 2.3] (22,314)	3.5 [3.3; 3.8] (21,441)	4.3 [4.0; 4.5] (20,813)	4.6 [4.3; 4.9] (20,234)	4.9 [4.6; 5.2] (19,642)	5.1 [4.8; 5.4] (18,929)	5.4 [5.1; 5.7] (18,154)
2016	38,109	2.0 [1.8; 2.1] (36,608)	3.3 [3.1; 3.5] (35,408)	3.9 [3.7; 4.1] (34,512)	4.4 [4.2; 4.6] (33,589)	4.6 [4.4; 4.9] (32,488)	4.9 [4.7; 5.1] (31,350)	5.1 [4.9; 5.4] (30,050)
2017	45,879	2.0 [1.8; 2.1] (44,442)	3.2 [3.1; 3.4] (43,178)	3.8 [3.6; 4.0] (42,115)	4.2 [4.0; 4.3] (40,984)	4.5 [4.3; 4.6] (39,708)	4.7 [4.5; 4.9] (38,269)	5.0 [4.8; 5.2] (27,401)
2018	49,292	1.8 [1.7; 1.9] (47,835)	2.9 [2.7; 3.0] (46,581)	3.5 [3.3; 3.7] (45,329)	3.9 [3.8; 4.1] (44,018)	4.2 [4.0; 4.4] (42,593)	4.5 [4.3; 4.7] (31,113)	
2019	51,692	1.8 [1.7; 1.9] (50,261)	2.9 [2.8; 3.1] (48,872)	3.5 [3.4; 3.7] (47,652)	4.0 [3.8; 4.1] (46,320)	4.3 [4.1; 4.4] (33,741)		
2020	47,988	2.0 [1.9; 2.1] (46,459)	3.1 [3.0; 3.3] (45,265)	3.8 [3.7; 4.0] (44,126)	4.3 [4.1; 4.5] (32,098)			
2021	51,232	1.8 [1.7; 1.9] (49,760)	3.1 [2.9; 3.2] (48,401)	3.8 [3.6; 3.9] (34,420)				
2022	61,989	1.8 [1.7; 2.0] (60,237)	3.0 [2.9; 3.1] (44,182)					
2023	73,064	1.8 [1.7; 1.9] (53,275)						

Table 62: Outcomes for standard total knee arthroplasty by operating year *(p = 0.0003)*

Cumulative revision rates for specific implant systems and component pairs (I)

EPRD Endoprothesenregister Deutschland

- The EPRD annual report continues to present outcomes for specific implant systems (brands) and combinations in detail.

Elective THAs							Cumulative revision rates after ...									
Femoral stem	Acetabular cup	Number	Hosp.	Age	m/f	yrs implanted	1 year	2 years	3 years	4 years	5 years	6 years	7 years	8 years	9 years	10 years
Hybrid fixation		108,536	753	79 (74 - 82)	25/75	2012-2024	2.3 [2.2; 2.4] (87,773)	2.6 [2.5; 2.7] (70,589)	2.8 [2.7; 2.9] (55,740)	3.0 [2.9; 3.1] (43,714)	3.3 [3.1; 3.4] (33,074)	3.5 [3.4; 3.6] (23,300)	3.7 [3.6; 3.9] (14,937)	4.0 [3.8; 4.1] (8,055)	4.1 [3.9; 4.3] (3,277)	4.5 [4.2; 4.8] (838)
A2 Kurzschaft (ARTIQO)	ANA.NOVA Alpha (ARTIQO)	468	24	80 (74.5 - 83)	20/80	2020-2024	2.9 [1.3; 4.6] (266)	*3.4 [1.5; 5.2] (137)*								
ABG II (Stryker)	Trident (Stryker)	444	9	79 (76 - 82)	22/78	2014-2022	2.5 [1.0; 3.9] (427)	2.9 [1.4; 4.5] (417)	2.9 [1.4; 4.5] (399)	2.9 [1.4; 4.5] (373)	3.2 [1.5; 4.9] (304)	3.2 [1.5; 4.9] (214)	*3.2 [1.5; 4.9] (83)*			
Actinia (Implantcast)	EcoFit cpTi (Implantcast)	351	10	80 (76 - 83)	25/75	2016-2024	2.3 [0.7; 3.9] (329)	2.9 [1.1; 4.7] (302)	3.2 [1.3; 5.1] (290)	3.6 [1.6; 5.5] (268)	3.6 [1.6; 5.5] (216)	*3.6 [1.6; 5.5] (126)*				
Avenir (Zimmer Biomet)	Allofit (Zimmer Biomet)	6,410	169	80 (75 - 83)	22/78	2014-2024	2.2 [1.8; 2.6] (4,630)	2.4 [2.0; 2.8] (3,327)	2.6 [2.2; 3.0] (2,208)	2.7 [2.2; 3.1] (1,420)	2.9 [2.4; 3.4] (844)	2.9 [2.4; 3.4] (515)	2.9 [2.4; 3.4] (314)	*2.9 [2.4; 3.4] (149)*	*2.9 [2.4; 3.4] (58)*	
Avenir (Zimmer Biomet)	Allofit IT (Zimmer Biomet)	616	18	78 (74.5 - 82)	21/79	2014-2024	3.0 [1.6; 4.3] (522)	3.4 [1.9; 4.9] (387)	3.7 [2.1; 5.3] (280)	4.5 [2.6; 6.3] (167)	*4.5 [2.6; 6.3] (91)*					
BHR (Smith & Nephew)	BHR (Smith & Nephew)	441	24	55 (51 - 59)	99/1	2014-2024	1.4 [0.3; 2.5] (401)	1.9 [0.6; 3.2] (355)	2.2 [0.8; 3.6] (311)	2.5 [1.0; 4.1] (262)	2.9 [1.2; 4.6] (218)	2.9 [1.2; 4.6] (163)	*4.4 [1.7; 6.9] (106)*	*4.4 [1.7; 6.9] (59)*		
BICONTACT (Aesculap)	PLASMACUP (Aesculap)	405	22	78 (75 - 82)	30/70	2013-2024	2.2 [0.8; 3.7] (360)	2.5 [1.0; 4.0] (310)	2.5 [1.0; 4.0] (284)	2.9 [1.2; 4.5] (253)	2.9 [1.2; 4.5] (227)	2.9 [1.2; 4.5] (193)	*2.9 [1.2; 4.5] (149)*	*2.9 [1.2; 4.5] (97)*		
BICONTACT (Aesculap)	PLASMAFIT (Aesculap)	2,237	91	79 (75 - 83)	22/78	2013-2024	2.0 [1.4; 2.6] (1,908)	2.3 [1.6; 2.9] (1,615)	2.7 [2.0; 3.4] (1,350)	2.9 [2.1; 3.6] (1,116)	3.2 [2.4; 4.0] (902)	3.4 [2.5; 4.3] (670)	3.6 [2.7; 4.5] (471)	3.6 [2.7; 4.5] (276)	*4.3 [2.6; 6.0] (126)*	
C-STEM AMT (Johnson & Johnson)	PINNACLE Press Fit (Johnson & Johnson)	740	11	80 (76 - 84)	17/83	2014-2024	1.8 [0.8; 2.8] (600)	2.0 [1.0; 3.1] (483)	2.2 [1.1; 3.3] (373)	2.9 [1.4; 4.3] (289)	3.2 [1.6; 4.8] (235)	4.1 [2.1; 6.1] (186)	*4.6 [2.4; 6.9] (118)*	*4.6 [2.4; 6.9] (65)*		
CCA (Mathys)	Allofit (Zimmer Biomet)	434	5	76 (73 - 80)	32/68	2013-2023	2.3 [0.9; 3.7] (411)	3.3 [1.6; 5.0] (391)	3.8 [1.9; 5.6] (369)	4.3 [2.3; 6.3] (350)	4.6 [2.6; 6.6] (331)	5.2 [3.0; 7.4] (308)	5.8 [3.5; 8.2] (283)	6.9 [4.3; 9.5] (239)	7.3 [4.6; 9.9] (160)	*7.3 [4.6; 9.9] (106)*
CCA (Mathys)	RM Classic (Mathys)	482	6	78 (74 - 82)	33/67	2014-2024	2.8 [1.3; 4.4] (390)	3.7 [1.9; 5.4] (313)	3.7 [1.9; 5.4] (239)	4.2 [2.1; 6.2] (184)	4.7 [2.4; 6.9] (169)	*5.3 [2.7; 7.7] (141)*	*6.0 [3.1; 8.8] (108)*	*6.0 [3.1; 8.8] (57)*		

Table 53: Implant outcomes for stem/cup combinations in elective total hip arthroplasty. For each type of fixation, the combinations are listed alphabetically by the stem component.

Cumulative revision rates for specific implant systems and component pairs (II)

EPRD Endoprothesenregister Deutschland

- Knee arthroplasties are further subdivided into those with and without primary patellar resurfacing.

Knee arthroplasties								Cumulative revision rates after ...									
Femoral component	Tibial component	Patellar resurfacing	Number	Hosp.	Age	m/f	yrs implanted	1 year	2 years	3 years	4 years	5 years	6 years	7 years	8 years	9 years	10 years
Standard TKAs, cruciate retaining, fixed bearing, hybrid			10,337	145	69 (62 - 76)	42/58	2012-2024	1.7 [1.4; 1.9] (9,387)	2.5 [2.2; 2.8] (8,300)	3.0 [2.7; 3.4] (7,277)	3.3 [2.9; 3.6] (6,307)	3.6 [3.2; 4.0] (5,299)	3.9 [3.5; 4.3] (4,273)	4.2 [3.7; 4.6] (3,065)	4.7 [4.1; 5.2] (1,875)	5.2 [4.6; 5.9] (791)	5.6 [4.8; 6.4] (177)
balanSys BICONDYLAR (Mathys)	balanSys BICONDYLAR fix (Mathys)	No	456	7	71 (63 - 77)	46/54	2016-2024	0.4 [0.0; 1.1] (408)	0.7 [0.0; 1.6] (331)	1.0 [0.0; 2.1] (260)	1.5 [0.1; 2.9] (187)	*1.5* *[0.1; 2.9]* *(128)*	*1.5* *[0.1; 2.9]* *(86)*				
COLUMBUS (Aesculap)	COLUMBUS (Aesculap)	No	828	7	69 (62 - 76)	37/63	2014-2024	3.3 [2.1; 4.5] (755)	3.8 [2.5; 5.2] (695)	4.3 [2.9; 5.7] (655)	4.6 [3.1; 6.0] (620)	4.6 [3.1; 6.0] (524)	5.0 [3.4; 6.5] (389)	5.6 [3.8; 7.3] (255)	*5.6* *[3.8; 7.3]* *(123)*		
EFK (OHST Medizintechnik)	EFK (OHST Medizintechnik)	No	1,342	15	70 (63 - 76)	42/58	2014-2024	1.4 [0.7; 2.0] (1,293)	2.2 [1.4; 3.0] (1,214)	2.5 [1.6; 3.3] (1,116)	2.7 [1.8; 3.6] (1,023)	3.1 [2.2; 4.1] (921)	3.9 [2.8; 5.0] (817)	4.5 [3.3; 5.7] (713)	5.2 [3.9; 6.6] (533)	6.2 [4.5; 7.8] (245)	
GENESIS II COCR (Smith & Nephew)	Genesis II (Smith & Nephew)	No	471	6	68 (61 - 75)	44/56	2012-2024	1.1 [0.1; 2.1] (441)	1.6 [0.4; 2.7] (425)	2.3 [0.9; 3.7] (392)	2.3 [0.9; 3.7] (349)	2.6 [1.1; 4.1] (301)	2.6 [1.1; 4.1] (267)	3.0 [1.3; 4.7] (213)	3.0 [1.3; 4.7] (155)	*3.0* *[1.3; 4.7]* *(100)*	
LEGION COCR (Smith & Nephew)	Genesis II (Smith & Nephew)	No	808	11	69 (61 - 76)	54/46	2017-2024	2.6 [1.5; 3.7] (663)	4.0 [2.5; 5.5] (504)	4.8 [3.1; 6.4] (366)	5.1 [3.3; 6.8] (235)	*5.6* *[3.6; 7.6]* *(131)*	*6.4* *[3.8; 9.0]* *(74)*				
NexGen (Zimmer Biomet)	NexGen (Zimmer Biomet)	No	595	9	69 (62 - 75)	51/49	2014-2024	0.8 [0.1; 1.6] (566)	1.2 [0.3; 2.1] (507)	1.2 [0.3; 2.1] (478)	1.2 [0.3; 2.1] (459)	1.4 [0.4; 2.4] (410)	1.7 [0.6; 2.8] (369)	1.7 [0.6; 2.8] (318)	2.1 [0.7; 3.5] (186)	*2.1* *[0.7; 3.5]* *(70)*	
NexGen Flex (Zimmer Biomet)	NexGen (Zimmer Biomet)	No	747	33	69 (62 - 76)	51/49	2014-2024	1.4 [0.5; 2.2] (685)	2.5 [1.3; 3.6] (553)	2.6 [1.4; 3.8] (507)	2.6 [1.4; 3.8] (465)	3.1 [1.7; 4.4] (426)	3.6 [2.1; 5.1] (348)	3.6 [2.1; 5.1] (221)	*3.6* *[2.1; 5.1]* *(119)*	*4.8* *[2.0; 7.4]* *(70)*	
SIGMA (Johnson & Johnson)	SIGMA (Johnson & Johnson)	No	948	22	68 (61 - 76)	41/59	2014-2024	1.2 [0.5; 1.9] (919)	1.7 [0.9; 2.5] (869)	2.3 [1.3; 3.3] (776)	2.5 [1.4; 3.5] (668)	3.1 [1.9; 4.3] (558)	3.5 [2.2; 4.8] (427)	3.5 [2.2; 4.8] (290)	3.5 [2.2; 4.8] (165)	*3.5* *[2.2; 4.8]* *(62)*	
TC-PLUS (Smith & Nephew)	TC-PLUS (Smith & Nephew)	No	653	12	70 (63 - 76)	41/59	2014-2024	2.2 [1.0; 3.3] (612)	2.8 [1.5; 4.1] (525)	2.8 [1.5; 4.1] (445)	3.1 [1.7; 4.4] (362)	3.1 [1.7; 4.4] (279)	3.1 [1.7; 4.4] (225)	*3.1* *[1.7; 4.4]* *(110)*			
Triathlon (Stryker)	Triathlon (Stryker)	No	677	20	70 (63 - 75)	40/60	2014-2024	1.0 [0.2; 1.8] (542)	1.8 [0.7; 2.8] (421)	2.0 [0.8; 3.2] (341)	2.4 [1.0; 3.7] (288)	2.4 [1.0; 3.7] (243)	2.4 [1.0; 3.7] (182)	*2.4* *[1.0; 3.7]* *(136)*	*2.4* *[1.0; 3.7]* *(61)*		
Vanguard (Zimmer Biomet)	Vanguard Cruciate (Zimmer Biomet)	No	1,330	18	68 (61 - 75)	44/56	2015-2024	2.2 [1.4; 3.0] (1,135)	4.0 [2.9; 5.1] (1,011)	5.1 [3.8; 6.3] (792)	6.2 [4.7; 7.6] (610)	6.7 [5.1; 8.2] (464)	6.7 [5.1; 8.2] (335)	6.7 [5.1; 8.2] (208)	*7.2* *[5.3; 9.1]* *(110)*		

Table 60: Implant outcomes for femoro-tibial combinations in primary knee arthroplasties with or without patellar resurfacing at primary TKA. Within the groups comprising the type of arthroplasty and fixation, the knee system, and the degree of constraint, the combinations are listed alphabetically by the femoral component.

Cumulative revision rates for specific implant systems and component pairs (III)

EPRD Endoprothesenregister Deutschland

- Note that hospital-related and patient-related factors may sometimes overlap with implant effects.
  - Additional information on the patient population operated (median age and proportion of male and female patients) is therefore provided.
  - We also indicate when primary arthroplasties with the corresponding components became available.
- Important: If the procedure involves revision or explantation, this is considered to be the endpoint of the analysis – regardless of whether implant components were actually left *in situ* during the surgery or replaced.

Cumulative re-revision rates (I)

In brief:

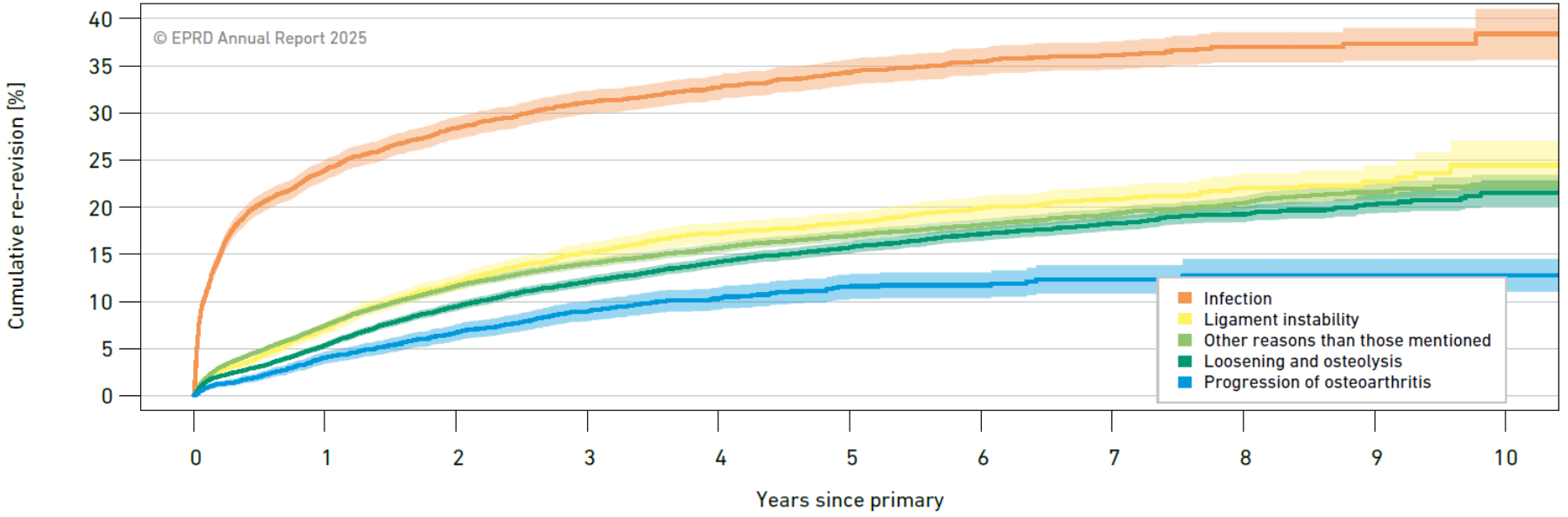
- The 2-year hip arthroplasty cumulative re-revision rate for one-stage septic revisions is 29.9 % (28.4 % for knee arthroplasty).

- The cumulative re-revision rate increases from one subsequent revision to the next. Outcome differences between aseptic and septic revisions become smaller with each subsequent procedure.

Cumulative re-revision rates (II)

EPRD Endoprothesenregister Deutschland

- Cumulative re-revision rates by indication over time: septic revisions due to a periprosthetic infection carry the highest risk:



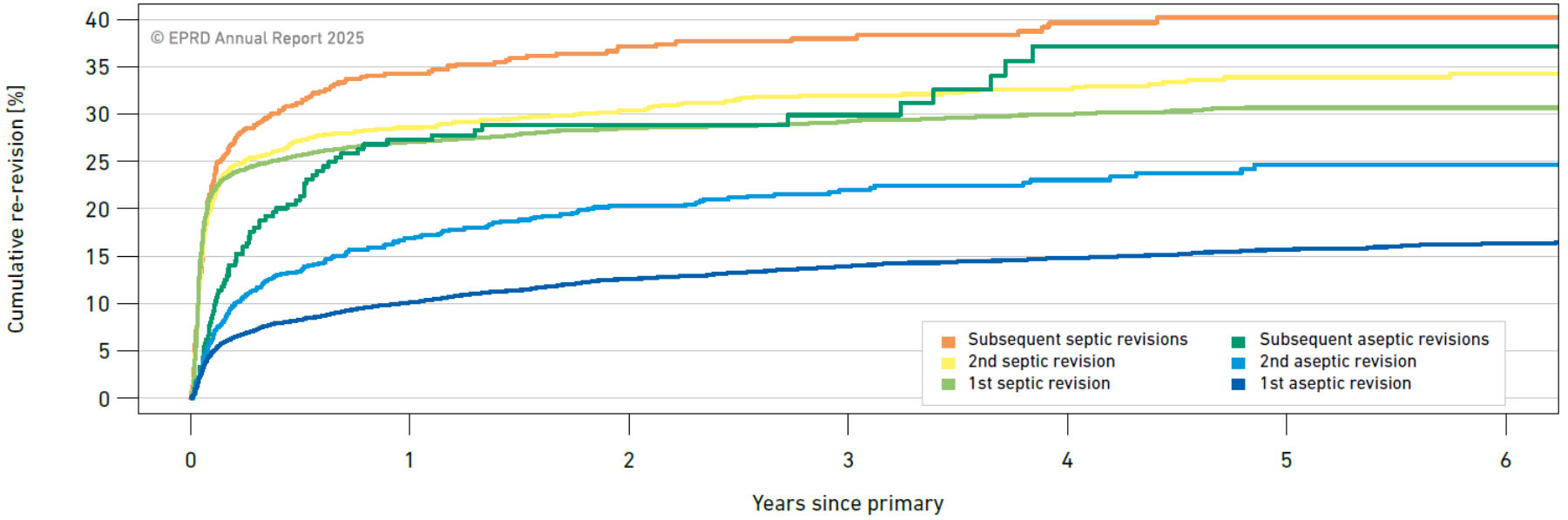
Numbers at risk											
Infection	6,603	3,978	3,044	2,335	1,792	1,313	902	565	322	157	42
Ligament instability	6,344	5,020	3,965	3,143	2,422	1,861	1,323	837	456	196	48
Other reasons than those mentioned	25,597	20,206	16,345	13,378	10,727	8,360	6,115	4,050	2,299	959	271
Loosening and osteolysis	17,729	14,518	11,784	9,563	7,661	5,896	4,301	2,854	1,623	719	221
Progression of osteoarthritis	4,073	3,121	2,321	1,737	1,266	879	503	268	138	61	13

Figure 45: Knee arthroplasty cumulative re-revision rates by indication over time. Only one-stage revisions are considered *($p < 0.0001$)*

Cumulative re-revision rates (III)

EPRD
Endoprothesenregister Deutschland

- Cumulative re-revision rates increase from one subsequent revision to the next:



Numbers at risk							
	653	327	252	183	131	85	53
	1,588	845	623	472	354	239	146
	6,069	3,313	2,485	1,837	1,309	891	534
	280	147	101	61	37	31	13
	1,087	676	508	359	236	161	96
	10,840	7,534	5,677	4,274	3,067	2,160	1,378

Figure 31: Hip arthroplasty cumulative re-revision rates after first, second and subsequent revisions *($p < 0.0001$)*. Confidence intervals have been omitted for clarity.

Patient mortality

Patient mortality (I)

- Important: In the following patient mortality tables, the arthroplasty surgery and the death of the respective patient are not necessarily related.

  - Reason: The EPRD receives annual updates directly from participating federal health insurance provider associations about whether a patient is still alive or deceased and the month of death. The cause of death is not included in this information.

Patient mortality (II)

In brief:

- In the EPRD, mortality rates after elective primary arthroplasties are often lower than the general population figure from the German Federal Statistical Office (DESTATIS).

- Mortality rates after non-elective hip arthroplasties and after septic revisions are, however, considerably higher.

Patient mortality (III)

- 1-year arthroplasty mortality rates for male patients by age category and type of arthroplasty:

Male patients		1-year mortality expressed as a percent of the age group …							
Type of procedure		≤ 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	≥ 85
Primary arthroplasties	Elective THAs with uncemented stems	0.46 [0.38; 0.53] (27,174)	0.60 [0.51; 0.69] (23,947)	0.72 [0.63; 0.81] (29,656)	1.04 [0.93; 1.15] (28,437)	1.18 [1.06; 1.30] (26,152)	2.16 [1.98; 2.35] (21,924)	3.75 [3.42; 4.08] (11,361)	6.19 [5.36; 7.01] (2,801)
	Elective THAs with cemented stems	3.21 [1.85; 4.55] (592)	6.20 [4.32; 8.04] (562)	5.58 [4.07; 7.08] (767)	5.42 [4.28; 6.55] (1,332)	4.04 [3.43; 4.65] (3,565)	3.76 [3.37; 4.16] (7,938)	4.62 [4.21; 5.03] (8,771)	7.54 [6.77; 8.30] (3,763)
	Non-elective THAs	6.20 [4.21; 8.14] (510)	7.97 [6.01; 9.89] (644)	10.67 [8.96; 12.33] (1,052)	10.08 [8.65; 11.46] (1,380)	11.63 [10.14; 13.10] (1,445)	15.06 [13.52; 16.58] (1,656)	20.37 [18.58; 22.12] (1,449)	35.93 [33.52; 38.24] (924)
	Hemiarthroplasties	23.16 [16.48; 29.30] (120)	25.28 [19.67; 30.50] (168)	29.11 [25.12; 32.90] (334)	31.29 [28.23; 34.23] (577)	33.01 [30.82; 35.12] (1,111)	33.47 [31.91; 35.00] (2,168)	37.73 [36.54; 38.90] (3,604)	48.29 [47.31; 49.25] (4,734)
	Standard TKAs	0.34 [0.23; 0.45] (10,738)	0.45 [0.36; 0.55] (16,759)	0.52 [0.43; 0.60] (25,385)	0.84 [0.73; 0.95] (23,641)	1.16 [1.04; 1.28] (26,254)	1.70 [1.55; 1.85] (26,240)	2.98 [2.73; 3.23] (15,627)	4.71 [4.08; 5.33] (3,760)
	Constrained TKAs	1.56 [0.41; 2.71] (397)	1.56 [0.48; 2.64] (466)	1.95 [0.89; 2.99] (605)	2.79 [1.61; 3.97] (650)	2.92 [1.76; 4.06] (729)	4.30 [3.02; 5.56] (874)	6.52 [4.80; 8.20] (705)	9.92 [6.69; 13.04] (271)
	Unicondylar knee arthroplasties	0.28 [0.12; 0.43] (4,106)	0.31 [0.17; 0.45] (5,646)	0.31 [0.18; 0.44] (6,321)	0.65 [0.42; 0.88] (4,313)	0.82 [0.55; 1.10] (3,755)	0.93 [0.61; 1.25] (3,142)	1.83 [1.19; 2.47] (1,490)	3.44 [1.58; 5.27] (324)
	Patellofemoral knee arthroplasties	0.00 [0.00; 0.00] (120)	0.00 [0.00; 0.00] (65)	0.00 [0.00; 0.00] (34)	0.00 [0.00; 0.00] (25)	10.00 [0.00; 26.80] (9)	0.00 [0.00; 0.00] (14)	0.00 [0.00; 0.00] (3)	0.00 [0.00; 0.00] (7)
Corresponding DESTATIS figures		< 0.51	0.57 – 0.87	0.97 – 1.46	1.60 – 2.23	2.42 – 3.37	3.67 – 5.28	5.83 – 9.24	>10.48
Revisions	Hip revisions, aseptic, with exchange of bone-anchored components	0.66 [0.20; 1.11] (1,148)	1.39 [0.69; 2.08] (1,002)	2.18 [1.43; 2.92] (1,327)	4.48 [3.49; 5.46] (1,500)	5.85 [4.85; 6.83] (1,853)	7.51 [6.55; 8.47] (2,520)	12.56 [11.33; 13.77] (2,284)	27.64 [25.60; 29.62] (1,220)
	Hip revisions, aseptic, without exchange of bone-anchored components	2.00 [0.40; 3.58] (285)	0.64 [0.00; 1.53] (279)	1.86 [0.48; 3.21] (346)	2.28 [0.87; 3.68] (387)	4.38 [2.72; 6.01] (519)	5.57 [3.87; 7.23] (639)	9.63 [7.20; 12.00] (474)	26.23 [20.69; 31.38] (165)
	Hip revisions, septic, with exchange of bone-anchored components	1.64 [0.57; 2.70] (527)	2.18 [0.90; 3.45] (449)	2.26 [1.08; 3.42] (585)	4.48 [2.95; 5.99] (642)	3.81 [2.44; 5.16] (678)	7.17 [5.49; 8.83] (811)	13.43 [11.04; 15.76] (644)	33.55 [28.35; 38.38] (207)
	Hip revisions, septic, without exchange of bone-anchored components	3.91 [1.21; 6.53] (177)	5.52 [2.42; 8.51] (184)	5.74 [3.12; 8.29] (260)	9.40 [6.28; 12.40] (289)	8.88 [5.98; 11.69] (315)	15.00 [11.67; 18.21] (364)	25.33 [21.28; 29.16] (315)	42.47 [36.14; 48.16] (132)
	Knee revisions, aseptic, with exchange of bone-anchored components	0.41 [0.01; 0.81] (942)	0.62 [0.19; 1.06] (1,171)	0.81 [0.38; 1.23] (1,568)	1.48 [0.89; 2.06] (1,484)	1.44 [0.88; 2.00] (1,591)	2.48 [1.75; 3.21] (1,582)	4.77 [3.54; 5.98] (1,029)	15.42 [11.76; 18.92] (296)
	Knee revisions, aseptic, without exchange of bone-anchored components	0.20 [0.00; 0.60] (489)	1.04 [0.27; 1.80] (619)	0.59 [0.07; 1.10] (788)	1.95 [0.96; 2.92] (688)	1.94 [0.99; 2.87] (739)	2.92 [1.81; 4.03] (796)	3.14 [1.61; 4.64] (445)	5.76 [2.02; 9.35] (117)
	Knee revisions, septic, with exchange of bone-anchored components	2.21 [0.58; 3.82] (296)	2.58 [0.99; 4.15] (350)	2.43 [1.06; 3.78] (454)	2.19 [0.95; 3.41] (497)	6.15 [4.18; 8.08] (524)	6.02 [4.19; 7.81] (602)	9.29 [6.54; 11.97] (369)	14.59 [8.75; 20.05] (121)
	Knee revisions, septic, without exchange of bone-anchored components	2.73 [0.05; 5.33] (133)	2.66 [0.33; 4.94] (165)	2.91 [1.01; 4.77] (264)	5.10 [2.63; 7.50] (265)	8.76 [5.76; 11.67] (293)	8.97 [6.20; 11.66] (348)	23.04 [18.39; 27.42] (226)	29.88 [21.97; 36.99] (83)

Table 64: 1-year arthroplasty mortality rates for male patients by age category and type of arthroplasty

Patient mortality (IV)

- 1-year arthroplasty mortality rates for female patients by age category and type of arthroplasty:

Female patients		1-year mortality expressed as a percent of the age group ...							
Type of procedure		≤ 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	≥ 85
Primary arthroplasties	Elective THAs with uncemented stems	0.26 [0.21; 0.32] (27,973)	0.27 [0.21; 0.32] (28,071)	0.39 [0.33; 0.44] (39,615)	0.45 [0.39; 0.51] (45,859)	0.69 [0.61; 0.76] (44,907)	1.08 [0.98; 1.18] (39,382)	2.05 [1.87; 2.24] (21,263)	4.40 [3.89; 4.91] (5,376)
	Elective THAs with cemented stems	6.33 [4.07; 8.53] (393)	6.02 [4.32; 7.70] (661)	3.43 [2.61; 4.25] (1,664)	2.38 [1.96; 2.81] (4,388)	1.59 [1.38; 1.80] (12,484)	1.85 [1.69; 2.01] (25,508)	2.46 [2.29; 2.63] (28,235)	5.24 [4.87; 5.60] (12,317)
	Non-elective THAs	4.81 [2.99; 6.61] (475)	5.14 [3.81; 6.46] (930)	5.71 [4.70; 6.72] (1,724)	5.41 [4.64; 6.18] (2,870)	5.88 [5.17; 6.58] (3,705)	7.09 [6.43; 7.75] (5,046)	11.94 [11.07; 12.81] (4,326)	25.20 [23.93; 26.45] (3,126)
	Hemiarthroplasties	25.48 [18.32; 32.01] (109)	26.37 [20.54; 31.78] (160)	26.11 [22.30; 29.74] (358)	23.08 [20.51; 25.58] (738)	21.75 [20.16; 23.32] (1,835)	20.31 [19.38; 21.24] (5,307)	21.45 [20.82; 22.08] (11,590)	33.27 [32.74; 33.79] (18,591)
	Standard TKAs	0.15 [0.10; 0.21] (19,161)	0.20 [0.15; 0.25] (27,265)	0.32 [0.26; 0.37] (39,324)	0.39 [0.33; 0.44] (45,286)	0.52 [0.47; 0.58] (51,875)	0.88 [0.80; 0.95] (54,845)	1.36 [1.25; 1.48] (34,701)	2.54 [2.23; 2.86] (8,463)
	Constrained TKAs	1.32 [0.50; 2.14] (708)	0.98 [0.37; 1.59] (892)	0.97 [0.48; 1.46] (1,354)	1.68 [1.12; 2.23] (1,862)	2.30 [1.73; 2.86] (2,455)	2.55 [2.02; 3.07] (3,114)	4.38 [3.70; 5.05] (3,181)	9.65 [8.21; 11.07] (1,324)
	Unicondylar knee arthroplasties	0.08 [0.01; 0.15] (5,973)	0.14 [0.05; 0.23] (6,037)	0.17 [0.08; 0.27] (6,583)	0.23 [0.11; 0.34] (5,606)	0.32 [0.17; 0.47] (5,177)	0.76 [0.50; 1.02] (4,057)	0.90 [0.50; 1.29] (2,043)	1.51 [0.47; 2.55] (441)
	Patellofemoral knee arthroplasties	0.00 [0.00; 0.00] (381)	0.00 [0.00; 0.00] (146)	0.79 [0.00; 2.31] (125)	0.00 [0.00; 0.00] (34)	0.00 [0.00; 0.00] (28)	3.33 [0.00; 9.55] (29)	6.67 [0.00; 18.47] (14)	0.00 [0.00; 0.00] (3)
Corresponding DESTATIS figures		< 0.28	0.31 - 0.46	0.51 – 0.78	0.86 – 1.22	1.33 – 1.98	2.20 – 3.36	3.76 – 6.40	>7.42
Revisions	Hip revisions, aseptic, with exchange of bone-anchored components	0.81 [0.35; 1.27] (1,375)	1.20 [0.63; 1.76] (1,296)	1.82 [1.24; 2.39] (1,913)	2.66 [2.06; 3.25] (2,511)	3.40 [2.81; 3.99] (3,260)	4.82 [4.26; 5.38] (4,996)	8.26 [7.58; 8.93] (5,477)	22.31 [21.23; 23.38] (4,017)
	Hip revisions, aseptic, without exchange of bone-anchored components	1.18 [0.15; 2.20] (406)	1.61 [0.32; 2.88] (340)	2.21 [0.91; 3.49] (451)	2.62 [1.38; 3.85] (571)	2.23 [1.28; 3.17] (857)	3.01 [2.08; 3.92] (1,215)	7.88 [6.38; 9.36] (1,074)	20.51 [17.61; 23.30] (555)
	Hip revisions, septic, with exchange of bone-anchored components	0.79 [0.00; 1.67] (355)	3.30 [1.36; 5.20] (304)	2.56 [1.22; 3.87] (483)	3.49 [2.11; 4.85] (601)	6.07 [4.52; 7.60] (815)	9.05 [7.44; 10.63] (1,061)	14.75 [12.66; 16.79] (894)	26.95 [23.69; 30.07] (467)
	Hip revisions, septic, without exchange of bone-anchored components	2.22 [0.04; 4.36] (157)	6.43 [2.99; 9.76] (170)	5.80 [2.99; 8.53] (236)	6.28 [3.81; 8.69] (317)	9.42 [6.87; 11.91] (406)	13.78 [11.24; 16.25] (560)	22.22 [19.27; 25.06] (556)	41.07 [37.30; 44.61] (369)
	Knee revisions, aseptic, with exchange of bone-anchored components	0.26 [0.03; 0.49] (1,823)	0.30 [0.08; 0.53] (2,148)	0.35 [0.13; 0.57] (2,659)	0.69 [0.39; 0.98] (2,820)	1.53 [1.12; 1.92] (3,289)	2.03 [1.59; 2.47] (3,641)	4.81 [4.03; 5.58] (2,556)	16.06 [14.19; 17.88] (1,138)
	Knee revisions, aseptic, without exchange of bone-anchored components	0.64 [0.13; 1.15] (868)	0.28 [0.00; 0.59] (1,004)	0.31 [0.01; 0.61] (1,219)	0.49 [0.13; 0.85] (1,302)	0.95 [0.47; 1.42] (1,472)	1.58 [1.00; 2.16] (1,621)	3.31 [2.24; 4.37] (967)	7.92 [4.88; 10.86] (286)
	Knee revisions, septic, with exchange of bone-anchored components	2.11 [0.42; 3.76] (272)	1.42 [0.18; 2.66] (320)	0.21 [0.00; 0.62] (476)	1.83 [0.75; 2.90] (553)	2.55 [1.38; 3.70] (626)	5.27 [3.67; 6.85] (677)	7.94 [5.78; 10.05] (531)	15.69 [11.14; 20.00] (204)
	Knee revisions, septic, without exchange of bone-anchored components	3.85 [0.78; 6.83] (141)	3.73 [0.74; 6.62] (135)	2.93 [0.91; 4.91] (213)	5.00 [2.50; 7.44] (261)	6.40 [3.77; 8.96] (272)	9.57 [6.87; 12.19] (384)	12.95 [9.88; 15.92] (372)	22.98 [16.61; 28.88] (123)

Table 65: 1-year arthroplasty mortality rates for female patients by age category and type of arthroplasty

Results in international comparison

Results in international comparison (I)

In brief:

- The EPRD is the third-largest arthroplasty registry for hip and knee arthroplasties in the world.
- International arthroplasty registries differ in their recording methodology and structure.
- The obligation to register arthroplasty procedures and surgeon-specific data varies depending on the registry and the national legal framework.

Results in international comparison (II)

EPRD Endoprothesenregister Deutschland

- The proportion of fully cemented THAs continues to decrease across registries, whereas the use of hybrid fixation is increasing – except in Australia:

	AOANJRR[19]	EPRD	NJR	LROI	SAR	SIRIS	AJRR
Uncemented	65	79	37	69	34	87	95
Reverse-hybrid	-	< 1	2	3	6	< 1	
Cemented	2	2	17	18	51	1	5
Hybrid	33	18	42	10	10	12	

Table 68: Proportion (%) of primary total hip arthroplasty bone fixations reported in selected international registries. The shaded cells also include fracture prostheses.

19 Estimated values, from graphs in the annual report. Data for 2023 applies to "Metropolitan Centres".

Results in international comparison (III)

EPRD Endoprothesenregister Deutschland

- Ceramic heads are the most widely used, except in Sweden. The 36 mm head size is the most common in the EPRD and the AJRR. It is also increasingly used internationally:

	AOANJRR[21]	EPRD	LROI	SAR[22]	AJRR[23]
< 28 mm	15	<1	10	<1	4
28 mm		4		5	
32 mm	25	41	63	83	15
36 mm	60	55	26	12	64
> 36 mm		<1	<1	0	10

Table 69: Proportion (%) of primary total hip arthroplasty head sizes in selected international registries. The shaded cells also include fracture prostheses.

21 Estimated values, from graphs in the annual report. Data for 2023 applies to "Metropolitan Centres".
22 Estimated values, from graphs in the annual report.
23 The proportion of dual mobility (DM) systems in the AJRR are reported separately and amounts to approximately 8 %.

Results in international comparison (IV)

EPRD Endoprothesenregister Deutschland

- Unicondylar knee arthroplasty is particularly well established in Europe:

	AOANJRR	EPRD	NJR	LROI	SAR	SIRIS	AJRR
Total knee arthroplasty	92	85	85	78	88	86	96
Unicondylar knee arthroplasty	7	14	14	22	12	13	4
Patellofemoral knee arthroplasty	1	<1	1	<1	<1	1[25]	<1

Table 71: Proportion (%) of the basic types of knee arthroplasties reported in selected international registries

25 For the 2023 reference year, SIRIS classifies patellofemoral and unicondylar arthroplasties as partial knee arthroplasties (in total: 14 %). The proportion of patellofemoral procedures can be approximated to 1 %, based on long-term data.

Results in international comparison (V)

EPRD
Endoprothesenregister Deutschland

- Fully cemented TKAs are still the international standard (representing 60 % to 97 % of all arthroplasties). Uncemented and hybrid arthroplasties are respectively increasing in the US and Australia:

	AOANJRR[29]	EPRD	NJR[34]	LROI	SAR	AJRR
Cemented	60	97	97	93	92	76
Uncemented	22	2	3	4	7	22
Hybrid	18	2	<1	3	1	2

Table 74: Proportion (%) of primary total knee arthroplasty bone fixations in selected international registries

29 Estimated values, from graphs in the annual report. Data for 2023 applies to "Metropolitan Centres".

34 The proportions of the total number of knee arthroplasties provided in the annual report were converted to the proportion of total knee arthroplasties.

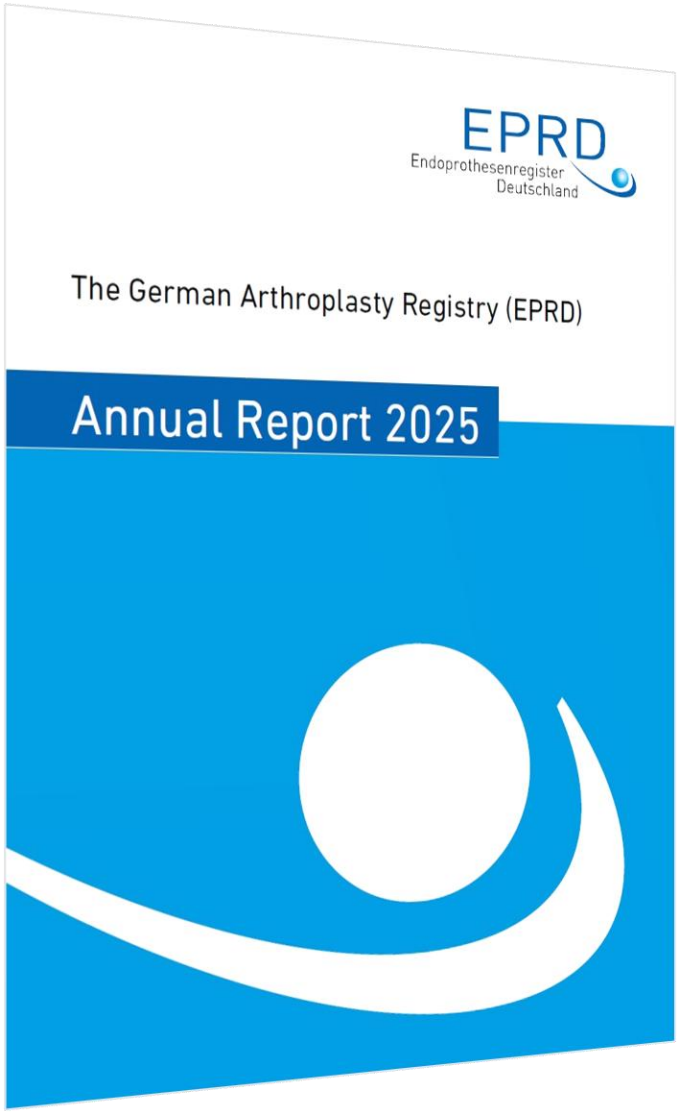
Results in international comparison (VI)

- In Europe, the share of TKAs without primary patellar resurfacing ranges from 61 % to 97 %. In Australia and the US, respectively 81 % and 87 % of primary TKAs include patellar resurfacing:

	AOANJRR[35]	EPRD	LROI	SAR	SIRIS	AJRR
Without patellar resurfacing	19	89	80	97	61	13
With patellar resurfacing	81	11	20	3	39	87

Table 76: Proportion (%) of patellar resurfacing during primary total knee arthroplasty in selected international registries

35 Estimated values, from graphs in the annual report. Data for 2023 applies to "Metropolitan Centres" (which provided data on 87 % of arthroplasties from 2014 to 2023 according to AOANJRR).



EPRD
Endoprothesenregister
Deutschland

If you have any questions, please contact us at:

EPRD Deutsche Endoprothesenregister gGmbH
Straße des 17. Juni 106-108
10623 Berlin
Phone: +49 - (0)30 - 340 60 36 40
Fax.: +49 - (0)30 - 340 60 36 41
Email: info@eprd.de
Web: https://www.eprd.de/en