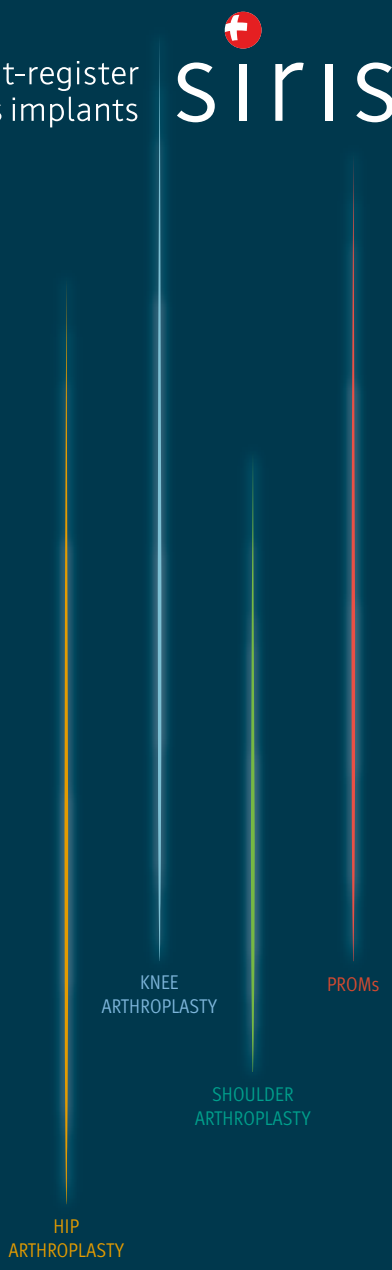
schweizerisches implantat-register
registre suisse des implants

SIRIS



Swiss National Joint Registry Report 2026

Annual Report of the SIRIS Registry Hip and Knee 2012 – 2025 and the SIRIS Registry Shoulder 2025

ANQ

swiss orthopaedics

UNIVERSITÄT BERN

SIRIS Report 2026

Annual Report of the Swiss National Joint Registry, Hip, Knee, Shoulder and PROMs

SIRIS – Foundation for Quality Assurance in Implant Surgery

swiss orthopaedics – Swiss Society of Orthopaedics and Traumatology

ANQ – National Association for the Development of Quality in Swiss Hospitals and Clinics

SwissRDL – Medical Registries and Data Linkage, Institute of Social and Preventive Medicine, University of Bern

Vorwort zum SIRIS-Jahresbericht 2026

Wer in der Schweiz an die orthopädische Endoprothetik denkt, stösst auf einen Glücksfall in Bezug auf die Dokumentation der Qualität – die SIRIS-Register. Dank einer hohen Erfassungsrate können sowohl bei den Implantaten als Medizinprodukte, als auch bei den Behandlungsprozessen in der ganzen Schweiz früh Anzeichen für Unzulänglichkeiten und Fehler erkannt werden.

Es wäre somit durchaus legitim, wenn sich die SIRIS-Stiftung auf die Weiterführung der bestehenden Datensammlungen beschränken würde. Doch tut sie das nicht. Ich gewinne den Eindruck, dass eine bedeutende Zukunftsorientierung und Neugestaltungsenergie vorhanden sind. Davon zeugen die Register für Wirbelsäulen- und für Schulterimplantate, die in den letzten Jahren aufgebaut wurden.

Für die Eidgenössische Qualitätskommission (EQK), die ich seit fast drei Jahren präsidiere, ist eine weitere Neuausrichtung von grosser Bedeutung: Die schrittweise Einführung von Patient Reported Outcome Measures (PROMs) in den Erhebungen bei den Spitälern und Kliniken. Die parallele Fokussierung auf die subjektive Ergebnisqualität nach einem Implantateinsatz ermöglicht eine patientenzentriertere Behandlung. Dazu ist aber auch die Kommunikation der Ergebnisse an die Betroffenen notwendig.

PROMs sind auch unabhängig davon von Bedeutung. Sie können Hinweise geben zu einer Frage, die das Schweizer Gesundheitssystem seit Jahren beschäftigt – die Unter- bzw. Überversorgung und damit die Frage der Indikationsqualität. Wenn die Patientinnen und Patienten konsistent von einer deutlichen Verbesserung der Lebensqualität nach einem entsprechenden Eingriff berichten würden, wären Fehlindikationen und Überversorgung kaum ein Thema. Ziel sollte also eine möglichst flächendeckende, repräsentative Erhebung von Schmerz, Funktion, Lebensqualität und Zufriedenheit vor und nach der Operation sein. Damit erkennt man auch «klinisch schlechte» Ergebnisse.

Die EQK ist vom Sinn der Projekte von SIRIS überzeugt und unterstützt sie schon länger, nicht nur ideell, sondern auch finanziell. Ich möchte allen, die sich für die Projekte engagieren, meinen herzlichen Dank aussprechen und gleichzeitig einen dringlichen Appell an alle Beteiligten richten, trotz hoher Arbeitslast die Projekte von SIRIS inklusive Erhebung von PROMs zu unterstützen, kooperativ weiterzuentwickeln und zu verfeinern. Denn Register sollen nicht tote Buchstaben und Zahlen sein, keine sozusagen statischen Statistiken. Sie sollen lebendige, bewegliche Geschichten erzählen, die man mit Spannung liest und über die man sich austauschen kann. Dies immer mit dem Ziel vor Augen, die bestmöglichen Outcomes zu garantieren, indem bei Auffälligkeiten wo nötig Anpassungen in den Behandlungsprozessen vorgenommen werden.

Michael Jordi
Präsident der Eidgenössischen Qualitätskommission (EQK)

Deutscher Originaltext

Foreword to the 2026 SIRIS Annual Report

In Switzerland, anyone interested in orthopaedic endoprosthetic replacement therapy will have the big luck to come across the related documentation of quality - the SIRIS Registry. Thanks to a high rate of data acquisition, it is possible to detect any evidence of shortcomings and errors with regard to the implants - the medical devices themselves - and the treatment procedures at an early stage throughout the whole of Switzerland.

With this in view, it would be perfectly legitimate of the SIRIS Foundation to simply restrict itself to the current processes of data collection. However, this is not its intention. In fact, I have the impression that a significant future orientation is underway coupled with an eagerness to access new fields. This is apparent in the form of the registries for spinal and shoulder implants that were established in recent years.

The Swiss Federal Quality Commission (EQK), which I have chaired for nearly three years now, considers one of the additional new projects to be of considerable importance - the gradual introduction of Patient Reported Outcome Measures (PROMs) questionnaires in hospitals and clinics. Concurrent focussing on the subjective nature of outcome quality following implant procedures will facilitate patient-centred care. But for this, it will also be necessary to communicate the results to those concerned.

Even irrespective of this, PROMs data will be of major relevance. It can provide insights into an aspect that has concerned the Swiss healthcare system for years - how far underprovision and overprovision of treatment occur and thus what the appropriateness of indication is. Assuming that patients were to consistently report a marked improvement in their quality of life following a corresponding procedure, the problems of diagnostic error and overprovision could be largely disregarded. The aim should be to acquire a comprehensive, representative compilation of data on pain, functioning, quality of life and satisfaction before and after surgery. This would also reveal any ‘clinically substandard’ outcomes.

The EQK is convinced of the value of the projects undertaken by SIRIS and has already provided it with support for a longer period - not simply as an advocate but also in the form of concrete funding. I should like to express my heartfelt gratitude to those committed to the projects and also make an urgent appeal to everyone involved to provide support to the SIRIS projects, including the collection of PROMs data, and to cooperate with regard to their development and improvement, despite a high workload. Such registries should not consist merely of bland facts and figures, lifeless statistics, as it were. They should bring stories to life-engaging, evolving narratives that capture attention and can be discussed with colleagues. And here the goal must always be to make sure of the best possible outcomes by introducing the necessary modifications to treatment procedures should any anomalies become apparent.

Michael Jordi
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All information in this report was composed with the utmost care. If any changes or modifications are made after publication, these will be published on our website www.siris-implant.ch, where you can also download the SIRIS Report 2026 and all previous reports.

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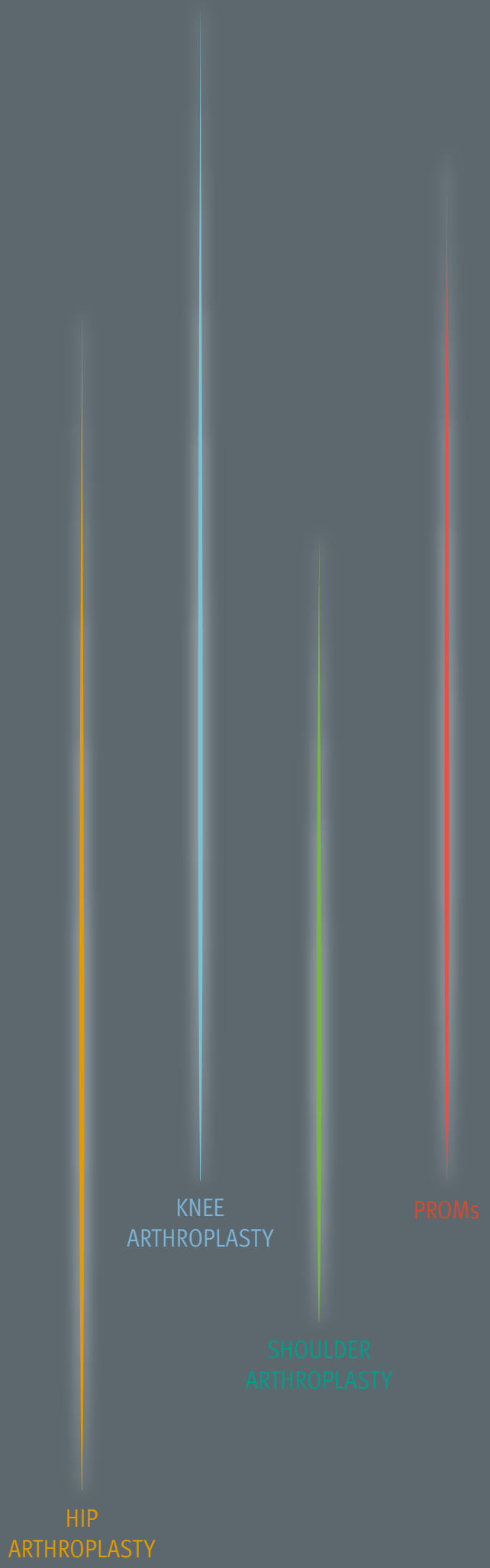


Introduction
Methods
Demography
Epidemiology

1. Introduction

1.1 Purpose of the registry

The Swiss National Implant Registry (SIRIS) was implemented in September 2012 to evaluate hip and knee joint replacements, introducing also shoulder joint replacements since January 2025. Registration in SIRIS is mandatory for all Swiss hospitals performing knee, hip and shoulder arthroplasties, as they are bound to the ANQ's national quality agreement.
Clearly defining the aim of the registry ensures that all contributors and participants pursue a common goal. This also influences the data architecture within the registry, since there will be different requirements for each stakeholder. The multi-partner association required to set up the registry meant that various points of view had to be considered to ensure success and support. Although partners naturally tends to focus preferentially on their particular interest, one fundamental interest is common to all, namely the long-term well-being of the patient after a prosthetic joint replacement. The following paragraphs will explain the various perspectives of key stakeholders that were considered during development of SIRIS.

The patient's perspective. Since patients expect joint replacement surgery to provide them with long-lasting, pain-free mobility, the surgical procedure should be followed by rapid recovery without complications and must be adapted to their level of activity. Ideally, after a prosthetic joint replacement and postoperative rehabilitation, patients should feel well and report excellent Patient Reported Outcome Measures (PROMs). From the patient's perspective, the registry data should be readily comprehensible, allowing patients to find information of interest despite the complexity of the topic and of the methodology behind the analysis. The growing importance of functional results beyond revision rates is reflected in the inclusion of PROMs in the annual report since 2022. Nationwide registration of PROMs within SIRIS is implemented and encouraged, however not mandatory. The data from the pilot project of the canton of Zurich already provided a basis for the development of reporting standards and delivered first insights into PROMs results. Patients who will read the report may find the information helpful to better understand their past or future surgery and thus be able to better discuss it with their surgeons.

The surgeon's perspective. For surgeons, a priority is to avoid surgical complications and shortcomings for their patients. In fact, the needs of patients and the goals of surgeons are fully aligned: obtaining functional, long-lasting, and pain-free joint replacement. By choosing a particular prosthesis, surgeons integrate the performance of the implant with their expertise. The implants must be well designed and impeccably manufactured to avoid problems such as early loosening or breakage. Hence, to add value from the surgeon's perspective, the registry should be able to identify problematic implants within a relatively short time frame and provide valuable early warning to surgeons when required. However, entering individual clinical data into a registry is not a welcome addition to an already intense daily schedule. Furthermore, although surgeons certainly appreciate benchmarking their results, the public availability of the information at the individual surgeon's level remains a controversial aspect. And revision is not the only endpoint anymore – PROMs are also adding a new perspective for surgeons: their patients' results are benchmarked against patients treated by other surgeons in Switzerland. Introducing shoulder joint replacement added a new group of SIRIS users – shoulder surgeons.

The industry's perspective. The industry's main activity is manufacturing and sales, driven by legitimate profit-orientation. Designing and providing first-rate, problem-free implants is the most rewarding strategy in this domain, as a series of failures may lead to allegations of negligence that could ultimately compromise the company. Hence, the aspect of economic viability coincides with the primary interest of

patients, namely successful prosthetic joint replacement in the long-term. Since progress and technical innovation are extremely important for an industry dedicated to providing safe, high-performance implants, the registry is regarded as an essential tool for post-market surveillance, validating evolutions and innovations in the real-life clinical setting. Because the industry generally accepts quality as the principal market-regulating factor, the registry is a welcome tool, motivating participation. To date, the publication of two-years revision rates for registered implants in the SIRIS reports was met with great interest from involved industries and surgeons. SIRIS is now able to provide medium-term follow-up results for more than 10 years, further improving the registry as a quality assessment tool. Introduction of shoulder implants and PROMs offers additional information to industry.

The hospital's perspective. It is in hospitals where surgeons and patients interact, with all parties sharing common interests. Hospitals aim to provide high-quality healthcare services at reasonable costs, while carefully monitoring patient numbers. However, hospitals are also interested in ensuring that patients remember the institution where they received successful treatment, encouraging them to return if necessary, including for other reasons than a prosthetic joint replacement. The registry is perceived as an instrument for quality control, not only for the implants used but also for the entire process, ranging from the preoperative consultation to the procedures in the operating theatre, as well as the postoperative follow-up. Personal recommendations from satisfied patients are the very best advertising for hospitals and related medical institutions. In today's competitive healthcare environment, hospitals are also very keen to uphold their reputation, and registry is an invaluable tool for this purpose. Additionally, since certain Swiss cantons require reaching a minimal volume of procedures to keep hospitals on contract lists, it appears that participating in the registry might be crucial for the survival of some institutions. This is a strong motivation for participation in registry, in an environment where hospital mergers and closures are frequently discussed. Performance benchmarks containing the two-year revision rates of institutions registered in SIRIS have been published online since 2020 (LINK to ANQ) and are updated with every new report.

The healthcare insurances' perspective. Insurers and third-party payers are concerned about healthcare costs, and thus aim to reduce hospitalization costs, to avoid re-admissions for complications, and obtain return to work of the patient as early as possible, if applicable. Insurers are very conscious of healthcare costs. Because the insurer's objective is to provide equal benefits to all its clients within the available budget, the registry is perceived as an instrument that can provide information regarding the performance of surgeons and institutions, functioning as a cost-quality assessment tool. While costs for primary arthroplasty are constricted within the DRG reimbursement system, revisions may cause significant additional and potentially avoidable costs, mostly outside of the primary flat rate. The focus of insurers is therefore increasingly directed to revision rates and re-revisions.

The government's perspective. The government organizes the healthcare system on behalf of all citizens. Therefore, the main challenge it faces is having to consider and bring together the needs and preferences of all players in the healthcare economy. One specific characteristic of the Swiss healthcare system is that cantons are independent and are the principal political and financial authorities for their healthcare systems. Furthermore, the healthcare system of the Principality of Liechtenstein (FL) interacts closely with the Swiss healthcare system and participates also in SIRIS. Although the federal government may not have any inherent financial interest in the healthcare system, the cantonal governments directly bear

a major share of hospital costs and are very active participants in all debates concerning hospital treatments, including their outcomes and costs. Governments also have an interest in assessing the overall situation concerning the quality of healthcare provision. While patients understandably tend to place their primary focus on receiving treatment *providing optimal and long-lasting results, the government certainly shares this aim but also has to ensure cost-effectiveness, as resources are limited. Nevertheless, political decision makers in Switzerland at all levels have arguably so far largely avoided that aspect, currently leaving the Swiss healthcare system somewhat adrift when it comes to actually allocating the limited resources in a rational and transparent manner. Despite this, governments require data on the overall surgical performance to assess requirements and subsequently plan the macroeconomic policies related to healthcare. Hence, government health agencies are commissioned to ensure that the institutions under their supervision provide high-quality healthcare to the population, whereby the agencies also have an interest in benchmarking hospitals and keeping insurance and third-party payer costs down to a reasonable minimum. Although the fragmentation of the dataset down to the cantonal level may sometimes preclude meaningful statistical analysis, the information can still be of interest to the Swiss cantonal and FL governments, as well as to the public.

1.2 Strong commitment

The annual report 2026 represents a collaborative data collection and analysis involving all the institutional partners of SIRIS. It includes data provided by 143 surgical units performing hip arthroplasty, 138 units performing knee arthroplasty and 131 units performing shoulder arthroplasty. Streamlining, improving, and optimising data collection is a continuous effort involving all partners. Crucially, this report also contains evidence that hospitals and surgeons are making progress beyond improving data collection. Decreasing and more homogenous early revision rates, as well as fewer outlier implants in the market, testify real improvements in treatment quality coinciding with SIRIS reporting.

Coverage is one important indicator of the commitment of all parties involved in SIRIS, and it correlates with reporting accuracy. However, it is difficult to assess coverage, because any benchmark registration system will have weaknesses. For SIRIS, only arthroplasties performed and submitted to the registry as closed records can be used in the analysis, as open cases may experience later modification. In 2024 (latest available year for estimating coverage), the coverage of SIRIS was estimated to be 96.2% for primary hip and 97.2% for primary knee replacements. This represents a reduction compared to previous estimates because of a re-evaluation of the reference figures and an actual decline in coverage compared to the preceding year. Nevertheless, this still demonstrates the strong commitment to the project by the surgeons and their teams, both in public and private hospitals, and also the high quality of the data collection, coaching, and organisation by the SIRIS team. Further details regarding the coverage are provided in Chapter 2 Methods, Part 2.3 Coverage.

SIRIS has thus achieved excellent coverage within a relatively short period since implementation in 2012 and continues to improve the content of the reports. The SIRIS Annual Report 2026 provides information on the state of hip and knee arthroplasty in Switzerland and the Principality of Liechtenstein, and presents, for the first time, data about shoulder arthroplasty. The report also provides important and verifiable information that we hope patients, healthcare providers, third-party payers, and healthcare regulators will find useful.

Factors	Variables
Patient related	Name
	Surname
	Date of birth
	Sex
	Height
	Weight
Surgery related	Main diagnosis
	Previous surgery
	Date and place of surgery
	Morbidity state
	Charnley class
	Intervention
	Approach
	Positioning
	Component fixation
	Cementing technique
Implant related	Type of implant
	Article number
	LOT number
	Company name
	Brand name

Table 1.1
Variables collected by the SIRIS registry

2. Methods

2.1 Maintenance and hosting of the registry

SIRIS (hip, knee and shoulder) is hosted and maintained by SwissRDL at the Institute for Social and Preventive Medicine (ISPM), University of Bern. A dedicated team comprising a statistician/methodologist, a data monitoring team, data management/IT specialists, as well as support staff, is responsible for management and maintenance of the data, technical support, analysis and reporting. The data monitoring team supervises data quality, provides user support and trains collaborators at the participating hospitals to ensure correct and efficient data entry into the registry. The overall project management support at SwissRDL is provided jointly by the data monitoring team and the statistician/methodologist, and both are members of the SIRIS Scientific Advisory Board that directs and oversees the registry and produces this annual report, among other things.

SIRIS data are collected via an online documentation platform (accessible at siris.memdoc.org) to record data on primary arthroplasties, reoperations (operations without addition or exchange of prosthetic components) and revisions. Furthermore, providers may also register post-operative follow-up data at their discretion. All individual implants used at the surgical procedures (including minor components) are registered alongside clinical data. The current versions of the CRF (v2021) can be downloaded from www.siris-implant.ch. While most participating hospital services use the standard online interface or dedicated applications (mostly on tablet devices) for data registration, some (mostly large) centres send data exports directly from their hospital information systems to SwissRDL via a web service client. Implant data are mostly entered into SIRIS by scanning the barcodes on the implant tags, which also is the recommended procedure due to its reliability. Manual data entry of implants is also possible with multiple-choice dropdown menus containing known implants. New implants are added to the implant library by SwissRDL at the request of SIRIS users or upon notification by a manufacturer.

Patients must provide written informed consent for data registration into SIRIS, which is ensured by participating surgeons and hospitals. The data of the SIRIS registry are stored on dedicated and protected servers at the University of Bern. Patient identification data (e.g. medical record number, name, date of birth) are stored on a specific, physically separate server for reasons of data protection and anonymisation. The patient's identification information is encrypted into a salted hash code to facilitate the linking of revisions performed at different healthcare facilities. This is needed to ensure continuity of implant follow-up and to calculate revision rates. Data protection complies with current standards and the methodology of separating the clinical data from the patient-identifying information was reviewed and approved by data protection delegates from the Swiss federal authority. Furthermore, patients have the right at any time to withdraw participation, check their data, or have their data deleted. Surgeons and hospitals may also use their specific SIRIS data, within certain restrictions, for internal quality assessment. The SIRIS Foundation, as the holder of the entire dataset, makes selected parts available in anonymised form upon request for independent academic research.

It is essential that only patients confirmed alive and residing in Switzerland are considered at risk for the analysis of revision rates. Patients who have died or left the country during the observation period are accounted for until date of death or departure from Switzerland. For this purpose, patient data from SIRIS were cross-checked with both the database of the Swiss Central Compensation Office (ZAS Geneva) and the Federal Statistical Office (FSO Neuchâtel). Until 2023, SIRIS could verify annually whether a patient had died or left Switzerland. Fewer than 5% of patients had an unknown status or were foreign-

ers operated in Switzerland without being registered residents. These patients were censored, unless later revised again in Switzerland, and were subsequently excluded from the analysis of (long-term) revision rates. However, the agreement with the FSO regarding data exchange ended in 2024 and the last update of mortality and migration data was received in April 2023. For the continued application of censoring events after April 2023, a simulation model based on 500+ patient typologies per joint was developed in order to project censoring events for a limited time horizon. The purpose of this simulation was not to predict death or emigration events, which would be unfeasible, but merely to apply known attrition rates from observed life table information to specific homogeneous cohorts of patients. Patients with unknown status after April 2023 were selected at random for simulated censoring events, replicating the original distributional properties of these events and taking into account known revision or other primary operations. In other words, these simulated events are just "standing in" for the real censoring events until they can be updated again, but the impact on estimated revision rates is comparable to real events if the assumed event proportions per group and year are reasonable estimates. It should be noted that not taking into account censoring events beyond a certain date is certainly introducing bias, especially in groups with high mortality, and therefore even an imperfect adjustment is preferable to no adjustment. Work is ongoing regarding a new procedure for linking these crucial data to SIRIS in 2027, including, for the first time shoulder arthroplasty.

2.2 Data quality and completeness

The data for this report were exported from the database in June 2026. The consistency and completeness of SIRIS data are checked in part through systematic software-generated validation tests, and additionally on a quarterly basis by the registry's statistician/methodologist, running automated analysis scripts for identification of likely data errors. The results of these checks are then fed back to the data monitoring team, which analyses root causes of confirmed problems and provides feedback to affected hospitals.

In addition to the ongoing data quality checking routines, several specific methodological decisions have been made to increase accuracy of reporting. For example, when the information provided on a CRF and the registered implants contradict each other (e.g. HHA is selected on the form, while THA components were registered), and it has not yet been possible to verify the case, then the implant registration information is given priority (in this example, the case is provisionally accounted for as a THA). This information is indicated in the relevant tables or figures if such decisions are likely to impact the overall results.

Two updates of the CRF have been implemented since the launch of SIRIS. The first version was used from 2012 to 2014, and an updated version was in use between 2015 and 2020. Some changes to the definition of existing variables (particularly for the type of arthroplasty of the knee) were introduced with this update, as well as some new variables, notably the body mass index (BMI) and the morbidity state according to the ASA classification.

Inconsistent use among providers of the answer option "unknown" (one institution even reporting unknown ASA status in almost all cases) indicates issues with data collection. Other common problems included impossible or inconsistent responses, which are more frequently observed in some sections

of the forms than in others, like revisions relating to acetabular components in HHA. This could be due to a systematic misunderstanding of the meaning of certain response categories (i.e. confusion between revision of the acetabular component and conversion to THA after HHA) or because of random data entry errors likely aggravated by design issues such as long drop-down lists. The latest CRF version 2021, for hip and knee, has successfully addressed some of these problems and has led to clear improvements in data quality.

SIRIS conducted organisational surveys in 2023 and 2024. Hospitals were surveyed on several issues including data entry mode, local responsibilities, coverage and availability of PROMs. A noteworthy finding of the surveys was that paper forms still play a major role in data collection. Two thirds of the hospital services participating in SIRIS still used them to collect registry data on paper first before registration in the online system. Only a minority of hospitals register cases directly and immediately online. This reflects in a relatively long delay in collection of SIRIS data. Only 26% of procedures were registered and completed within 24 hours and 65% within four weeks of operation. Nine percent of cases were registered with a delay of six months or longer.

Other noteworthy findings were that most hospitals do not yet use specific PROMs, and many of those doing it already use the ones that were included in the new SIRIS PROMs module that started in 2025.

The year 2025 also saw the introduction of the SIRIS shoulder module, the third joint covered in this report. The new CRFs were developed on the basis of many lessons drawn from the other joints. This, however, also led to calls for possible standardisation across all three joints. Therefore, SIRIS started a major round of CRF revision, with the aim of introducing modernised and harmonised versions in 2028.

2.3 Coverage

In order to be able to estimate the coverage of SIRIS, reliable reference data from other sources are needed. However, any benchmarking system has its specific weaknesses and disadvantages, resulting in a certain degree of incompleteness.

One option is to compare the annual number of cases reported in the registry with the numbers from quality indicators for Swiss acute care hospitals, as published by the Federal Office of Public Health (FOPH/BAG). This encompasses a complete annual survey of all hospital discharges in Switzerland, whereby each entry represents the hospital discharge and includes information about the patient's socio-demographic characteristics, diagnosis, and treatment. Codes I.1.8.F, I.1.9.F, and I.1.10.F can be used to identify primary hip prostheses of any kind and for any diagnosis, while codes I.1.15.F and I.1.16.F are used for total and partial knee prostheses. I.1.22.F contains both hip and knee procedures (primary and revision) that were removed from the other main groups because the patients had active tumour diagnoses. Starting in 2024, SwissRDL engaged in a joint project with the public health administration of the Canton of Zürich (GDZH), aiming to verify the quality of SIRIS data provided by hospitals in this canton. This led to the discovery of clear mismatches between reported coverage rates estimated either with the existing SIRIS methodology or with patient level hospital episode data available to the Canton. The two principal sources of disagreement could be identified. Previous assumptions about the counting of bilateral procedures in public data were wrong, a phenomenon heavily skewed towards a few hospitals, situated mainly in Zürich. The removal of the tumour cases from mainstream patient groups was not correctly identified. Attempts were made to improve the estimates by considering these two factors. Adjusting for bilateral procedures was relatively easy, but dividing up the tumour cases can only be done by

making assumptions. Therefore, a calibration based on Zürich hospital comparisons was undertaken in order to bring the different estimates in alignment by setting proportions of patients going to either hip, knee or revisions. Both corrections combined led to a considerable reduction in the estimated coverage rates. Total estimated coverage was re-estimated as 97.0% in 2023 (minus 1.4 percentage points). The reduction was stronger in hip cases (96.3%, down from 98.5%) than in knee cases (97.8%, down from 98.3%). It is plausible that the tumour diagnoses are strongly associated with age and hip patients are generally slightly older than knee patients, especially recipients of hemiarthroplasties who are typically above 80. Unfortunately, we cannot disaggregate the hip figures into an estimate for THA and HHA. It is not implausible to assume that coverage of elective THA is in the same range as that of TKA and that the lower overall hip estimate stems from even lower coverage of fractures, in particular HHA cases.

At the time of writing the 2026 annual report, only FOPH figures up to 31.12.2024 were available. These figures are published online, but only with a considerable time lag (detailed information provided at www.bag.admin.ch). As shown in **Table 2.1,** estimated primary coverage peaked at 97.2% in 2021, which represents a considerably lower re-evaluation compared to the previously reported estimate. The year 2024 saw actual declines in coverage in both joints, especially in knees, which should give reason for concern. Efforts will have to be made to sustain the current coverage levels. Having to rely on figures publicly available only with a considerable time lag is suboptimal for a registry, but efforts to secure timelier access to the actual raw figures reported by individual hospitals to FOPH/BAG have been rejected on legal grounds.

	2018	2019	2020	2021	2022	2023	2024
Primary hip prostheses							
BAG	23,597	24,102	23,843	25,428	27,059	28,392	29,525
SIRIS*	21,782	22,554	22,783	24,564	26,148	27,355	28,391
Primary coverage (%)	92.3	93.6	95.6	96.6	96.6	96.3	96.2
Primary knee prostheses							
BAG	18,507	19,420	19,074	20,488	23,286	24,755	26,242
SIRIS**	17,450	18,697	18,608	20,055	22,751	24,214	25,504
Primary coverage (%)	94.3	96.3	97.6	97.9	97.7	97.8	97.2
All primary hip and knee prostheses							
BAG	42,104	43,522	42,917	45,916	50,344	53,146	55,767
SIRIS	39,232	41,251	41,391	44,619	48,899	51,569	53,895
Primary coverage (%)	93.2	94.8	96.4	97.2	97.1	97.0	96.6

Table 2.1

Retrospective coverage analysis 2018–2024 based on National Office of Public Health figures (BAG)

BAG aggregate figures have been adjusted to reflect individual prostheses based on SIRIS estimates for bilateral procedures; l.1.21.F was divided between hip primary, knee primary and revision procedures based on assumptions derived from a calibration exercise involving SpiGes figures from Zürich. All SIRIS figures excluding Liechtenstein

* l.1.8.F/l.1.9.F/l.1.10.F (all first hip prostheses, all diagnoses)

** l.1.15.F/l.1.16.F (all first knee prostheses, all diagnoses)

SIRIS also accesses annual implant sales figures from the participating industry partners in Switzerland, specifically the number of femoral stems (indicator for hip arthroplasties) and tibia plateaus (indicator for knee arthroplasties) sold per year. In previous years, the two different ways of calculating coverage rates were mostly in agreement. However, starting in 2021 and observed increasingly in 2022/2023, we found that these figures were no longer in agreement with registry data or other sources, at least not on a calendar year basis and particularly for specific hospitals. Analysis strongly suggests that yearly sales and implant use figures in hospitals do not always agree. In other words, hospitals can report more procedures per year than implant sales in Switzerland suggest, resulting in coverage rates above 100% when using this method. We also became aware of the possibility that implants may be imported directly from foreign suppliers and are therefore not counted among official sales in Switzerland. However, it is reasonable to assume that such discrepancies tend to even out over time and across hospitals, or appear to be relatively small. For this type of analysis, we thus consider coverage rates between 90% and 110% as the target zone. Feedback from individual manufacturers to implant reports provided by SIRIS indicates that these high coverage rates are realistic. For instance, in specific implant reports, coverage rates tended to be as high as 100% for typical standard implants such as primary hip stems and as low as 80% for less common implants such as acetabular reinforcement cages.

Nevertheless, feedback on implant figures confirms the observed general upward trend in coverage until 2021. We also observed a clear progression of coverage at the hospital level since 2017, as all eligible units are currently submitting cases to SIRIS. In previous years, we had reasons to believe that the registry already had a higher, albeit not officially counted, coverage rate, as cases created in the online registration system need to be completed before possible inclusion in the analysis. For most procedures, at least one implant must be registered before a case may be recognised as completed by the system. A certain number of incomplete and unsubmitted cases are left in the system every year, mostly caused by missing implant entries. The improvements in coverage since 2017 are, to a certain extent, due to monitoring of and support to hospitals by SIRIS to solve submission problems. As a direct result of these efforts, the number of registered cases keeps increasing even after closure of each reporting period.

In recent years, however, at least part of the gap in data entries could be explained by increasing difficulties in obtaining informed consent from patients. This is a topic to observe in the future, as participation refusal poses a direct threat to the quality of any implant registry, as very high – ideally complete – coverage of all primary and revision procedures is needed for reliable analysis. The very principles of consent-based participation and general data protection rules denying the registry access to certain data without explicit consent are in conflict with the registry's mission of nationwide quality control.

In addition to the BAG figures reported in **Table 2.1., Figures 2.1 and 2.2** show the cantonal coverage rates for primary hip and knee procedures. In individual Cantons, SIRIS still probably achieved 2024 coverage rates above 99%, whilst in others they were below 90%. This picture is undoubtedly subject to annual variation as specific data submission problems in major hospitals have the potential to easily distort submission rates by several percentage points. It is also noteworthy that submission rates for hip and knee are not necessarily in agreement at the cantonal and therefore also not at the hospital level. This highlights the importance of ongoing monitoring in each participating hospital service.

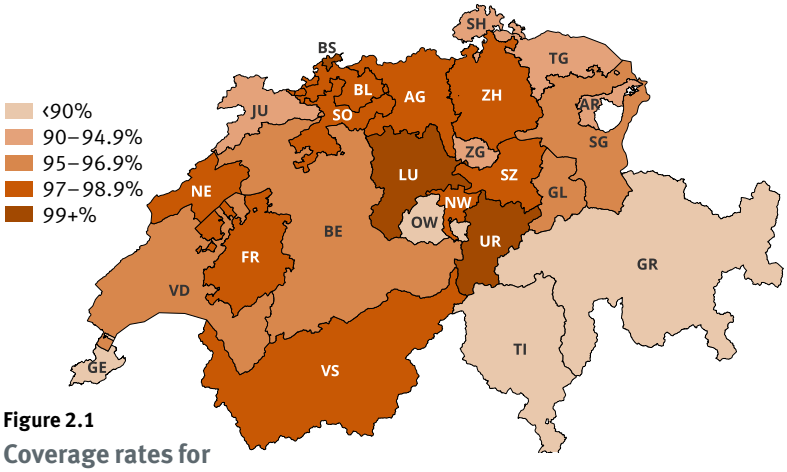


Figure 2.1
Coverage rates for primary hip procedures in the SIRIS registry 2024

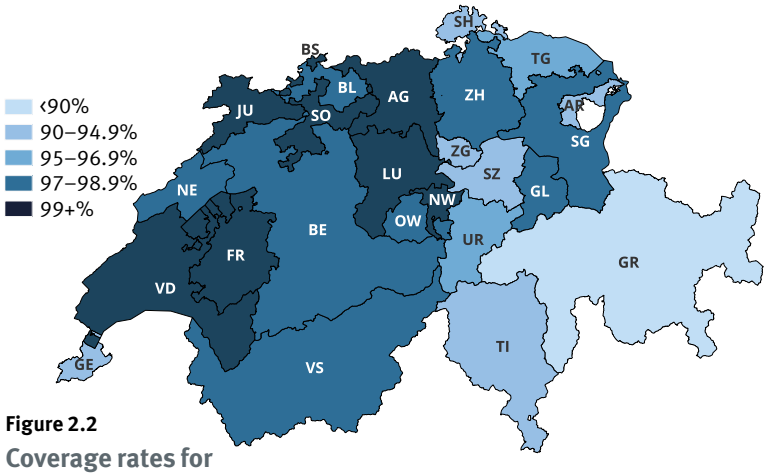


Figure 2.2
Coverage rates for primary knee procedures in the SIRIS registry 2024

2.4 Statistical precision, evaluation and outlier detection

The figures in this report are, whenever appropriate, accompanied by 95% confidence intervals. A confidence interval indicates the plausible range within which the true value should lie with the indicated probability, considering random variation of samples of limited size. For practical purposes, any position within the confidence interval should be seen as a plausible value and if confidence intervals overlap, they should be regarded as not statistically different. For an implant combination with large numbers, the confidence interval is usually narrow. As numbers get smaller, the statistical precision decreases, resulting in wider confidence intervals. All confidence intervals are unadjusted for the various forms of clustering that may also affect precision, especially when results depend on small numbers of surgeons, hospitals or implants. The latter aspect is a particular challenge for a medical registry in a small yet diverse country such as Switzerland and must be evaluated on a case-by-case basis during any outlier detection analysis.

In 2022, SIRIS started reporting a simple metric called the "case concentration score" (CCS) to address this issue. The CCS represents the share of a particular implant combination or system accounted for by the hospital service using it most often. This information is provided in the interest of transparency, as the performance of implants used in few places may not be an unbiased estimate of their true performance. Since the diversity of knee systems has also been increased to include more complicated designs, we also provide mean age figures for each system, if these designs were used for primary osteoarthritis. This is also done in the interest of transparency, as knee systems used in younger patients tend to have higher revision risks not necessarily related to the implant itself. Several methods are used for detection of outliers. For hospital services as well as for individual surgeons (the latter not being part of the scope of this report), we rely on risk-adjusted funnel plots of the 2-year revision rates and use the 99.8% limit as the relevant threshold. In other words, a provider is deemed an outlier if the 2-year revision rate is higher than the range of plausible observations in which 99.8% of observations would fall in case of random variation. The likelihood to observe a value outside of this range (both above and below the limits) solely due to chance would be 1 in 500. Therefore, the specific likelihood of exceeding such an upper boundary solely by chance would be only 1 in 1,000.

For implants, we use a much simpler method but report the results with several caveats and additional context. In this report, we continue with a distinction between the 2-year revision rate and the midterm evaluation, whereby the latter currently ends at 13 years of follow-up. All implant combinations or systems with at least 500 cases registered are evaluated. In the short-term (2-year) evaluation, we rate an implant as potential outlier if the observed 2-year revision rate is more than twice as high as for the average of the reference group ("outlier alert boundary"). The threshold for inclusion in this analysis was at least 50 cases reported in the current evaluation time frame (i.e. all primary operations between 1.1.2020 and 31.12.2023). We benchmark implants within a moving time window of 4 years to ensure that results represent current performance, not being affected by previous period effects. In this report, we refrained from ranking the implants by their 2-year revision rates and we excluded any potential outliers with confidence intervals overlapping with the 95% confidence interval of the reference group. In other words: the outlier status comes with varying degrees of statistical probability. An implant whose revision rate exceeds double the mean revision rate, while the confidence interval overlaps with the outlier boundary, is defined as a potential outlier. If the lower bound of the confidence interval exceeds twice the mean revision rate, it is considered a definitive outlier.

Furthermore, we identify three possible deviations from normal mid-term performance:

1. Implants with elevated revision risk, i.e. those whose revision rate is increased by a factor ranging from 1.5 to 1.99 relative to the reference group at any time point of at least 5 years follow-up;

2. Implants with long-term outlier status, i.e. those with a revision rate that is increased by at least a factor 2 relative to the reference group at any time point of at least 5 years follow-up; and

3. Implants with below average revision risk, i.e. those with a revision rate that is decreased by a factor of at least 0.66 relative to the reference group at the longest follow-up available. In other words, the revision rate of the implant cannot be more than 66% of the relevant reference group to be rated as having revision risk below average.

All these analyses are subject to further limitations linked to remaining numbers at risk over time and consecutive spread of confidence intervals, as specified in the relevant chapters. As implant group sizes vary markedly, readers must pay attention to the reported confidence intervals and any other contextual information – especially relating to small numbers of clinics involved – indicated on the outlier watch board in this report.

We thus benchmark implants directly against the relatively narrow field of comparable products in their normal variety of uses. There is no further risk adjustment, as similar products are already meant to be used for a particular range of comparable patients and diagnoses. However, detailed outlier reports are produced for manufacturers and affected hospital services. Additional analytical information such as risk-adjusted hazard ratios are provided in this context.

To help readers understand the grouping decisions of implant combinations or systems, an appendix to this report is provided online. The appendix lists all implants and provides additional information on the group composition (e.g. included stem or cup variants), and whether or not there is a likelihood of so-called camouflage effects, where unreported subgroups may influence the overall result.

2.5 Patient-reported outcome measures (PROMs)

SIRIS benefitted from two regional PROMs initiatives that were conducted using the registry's platform. Between 2017 and 2020, nine hospitals in the Cantons of BS, BL and SO collected PROMs for elective THA and TKA using the Core Outcome Measures Index (COMI). Patients were followed up after 6 months and 2 years postoperatively.

Another PROMs project in collaboration with SIRIS was initiated in 2019 by the Cantonal Health Authority of ZH in conjunction with Swiss Orthopaedics. All hospitals receiving public funding for elective hip and knee arthroplasty in the Canton of ZH had to collect the Swiss Orthopaedics minimal dataset (SO-MDS), consisting of the EQ-5D-5L quality of life questionnaire and a small selection of additional questions on joint-specific pain and satisfaction. Patients were followed up one year postoperatively. Several other hospitals in other cantons also contributed data.

In the previous years, we reported both PROMs pilot studies for hip and knee results separately. National evaluation of PROMs, with the Swiss Orthopaedics minimal dataset (SO-MDS) at its core, started in 2025 on a voluntary basis. In this report, we continue to report only on the SO-MDS results from all available hospitals and contrast hip and knee results.

The primary patient inclusion rate for PROMs of all participating hospitals from the Canton of ZH reached 73% in 2023 and the 1-year follow-up rate for primary cases from 2022 with valid SO-MDS was 79% for hip arthroplasty and 73% for knee arthroplasty. These rates were broadly maintained in 2024 and 2025.

The analysis focused on the so-called treatment effect (TE)[1,2]. This was expressed on one hand as pain reduction and on the other hand as general quality of life improvement. The calculations were performed on converted scales, with 0 defined as no symptoms and positive values designating levels of symptoms. TE was based on the following formula:

$$TE = \frac{\text{preoperative score - postoperative score}}{\text{preoperative score}}$$

In other words, this metric is the relative symptom reduction expressed on a numerical scale, whereby 1 equals complete symptom regression, 0 representing the complete absence of effect (e.g. same pain reported as before treatment), and a negative value represents an outcome worse than the pre-operative state (e.g. more pain than before treatment). The analysis excludes patients who did not report pre-operative symptoms (= 0). The scale can be presented as approximate percentage categories for comparison between settings or types of procedures. However, readers are advised that this purely numerical analysis may differ from other clinical evaluations of treatment success. We used TE for both the pain score and the EQ-5D summary scores.

[1] Huber J, Irlenbusch U, Kääb MJ, Reuther F, Kohut G, Judge A.
Treatment effects of reverse total shoulder arthroplasty – a simple method to measure outcomes at 6, 12, 24 and 60 months for each patient.
BMC Musculoskelet Disord. 2020 Jun 22;21(1):397. doi: 10.1186/s12891-020-03427-7. PMID: 32571282; PMCID: PMC7310507.

[2] Huber J, Dieppe P, Dreinhoefer K, Günther KP, Judge A.
The Influence of Arthritis in Other Major Joints and the Spine on the One-Year Outcome of Total Hip Replacement: A Prospective, Multicenter Cohort Study (EUROHIP) Measuring the Influence of Musculoskeletal Morbidity. J Bone Joint Surg Am. 2017 Sep 6;99(17):1428-1437. doi: 10.2106/JBJS.16.01040. PMID: 28872524; PMCID: PMC5685421.

3. Demography and Epidemiology

3.1 Introduction

Traditionally, the French speaking, Western part of Switzerland has maintained close cultural ties with France, just as the Canton Ticino has with northern Italy, or the German speaking part has with Germany and Austria. This has made Switzerland something of a melting pot of different concepts and approaches in orthopaedic surgery, particularly in hip and knee arthroplasty. It may also explain why SIRIS is able to report on nearly every existing brand and technology, even if only in relatively small numbers due to the country's small size. In the context of the Cantonal organisation of the healthcare system, it is a fortunate circumstance that SIRIS is established at the national level and, thanks to mandatory reporting, achieves a coverage rate of 96.6%.

Because of the fragmentation of the healthcare system due to Cantonal authority in this domain, the chapter Epidemiology will highlight results at the national level, as well as by Canton or region, and finally at the level of individual hospitals. The Principality of Liechtenstein is included in the analysis.

3.2 Hip arthroplasty

3.2.1 Nationwide data, Switzerland and Principality of Liechtenstein

Incidence of THA and HHA

Since introduction of SIRIS in 2012, a total of 278,679 primary THA and 30,795 primary HHA have been registered, along with 36,350 revision arthroplasties of the hip. Overall, 15,516 or 42.7% of the revisions could be linked to previously registered procedures, either primary or previous revision. The proportion of linked revisions increased from 13.0% in 2012 to 57.4% in 2025. However, 43.6% of the revisions remain unlinked, mainly because the index procedure was performed prior to implementation of SIRIS in 2012, or because the index arthroplasty was not reported **(Table 3.1).** The number and proportion of unlinked revisions remained stable over the last two years. On the long term, it is expected that the proportion of unlinked revisions will decline.

The incidence of THA has steadily increased over the years, from 228 per 100,000 inhabitants in 2013 to 297 per 100,000 inhabitants in 2025. This corresponds to an average annual increase of approximately 2.2%. Among the population at risk – the age group between 50 to 89 years – the incidence reached 704 per 100,000 inhabitants at risk in 2025 **(Figure 3.1).** For this group, the average yearly growth rate corresponded to approximately 1.6%.

A significant drop occurred in 2020 in the incidence per 100,000 population at risk. Before 2020, the average annual increase was approximately 0.6%. The growth rate peaked at 5.5% in 2021 and 2022, then declined progressively from 4.1% in 2023 to 2.2% in 2024 and 1.7% in 2025. Many of the surgeries performed in 2021 and 2022 appeared to be a rebound effect following the COVID-19 pandemic.

Year	Primary THA	Primary HHA	Primary others or type unclear	Primary total[1]	Annual growth rate THA	Annual growth rate HHA	Linked Rev./ Reop. of THA[2]	Linked Rev./Reop. of HHA[2]	Unlinked Rev./ Reop.[3]	Rev./ Reop. total[4]	% Linked Rev./ Reop.
2012*	6,705	637	1	7,343			113	6	793	912	13.0
2013	16,890	1,935	1	18,826			410	39	1,872	2,322	19.3
2014	17,179	2,030	1	19,210	1.7%	4.9%	572	60	1,899	2,533	25.0
2015	17,693	1,992	5	19,690	3.0%	-1.9%	728	65	1,810	2,604	30.5
2016	18,715	2,007	4	20,726	5.8%	0.8%	844	85	1,713	2,644	35.1
2017	18,890	2,099	9	20,998	0.9%	4.6%	866	78	1,680	2,629	35.9
2018	19,533	2,262	5	21,800	3.4%	7.8%	973	103	1,562	2,639	40.8
2019	20,205	2,359	8	22,572	3.4%	4.3%	1,112	106	1,522	2,745	44.4
2020	20,362	2,433	5	22,800	0.8%	3.1%	1,253	107	1,460	2,826	48.1
2021	22,160	2,422	8	24,590	8.8%	-0.5%	1,372	118	1,346	2,837	52.5
2022	23,512	2,651	1	26,164	6.1%	9.5%	1,367	142	1,315	2,829	53.3
2023	24,745	2,617	5	27,367	5.2%	-1.3%	1,510	128	1,365	3,003	54.5
2024	25,661	2,732	1	28,394	3.7%	4.4%	1,561	146	1,236	2,947	57.9
2025	26,429	2,619	3	29,051	3.0%	-4.1%	1,531	121	1,227	2,880	57.4
All	**278,679**	**30,795**	**57**	**309,531**			**14,212**	**1,304**	**20,800**	**36,350**	**42.7**

Table 3.1

Total and partial hip arthroplasty (THA and HHA), primary and revisions/reoperations

All documented operations

[1] Does not represent a full year of data, as data collection in most hospitals started only in October 2012

[2] i.e. primaries already registered in SIRIS

[3] can be of THA and HHA

[4] including linked revisions/reoperations of procedures that were classified as primary others or of unclear type

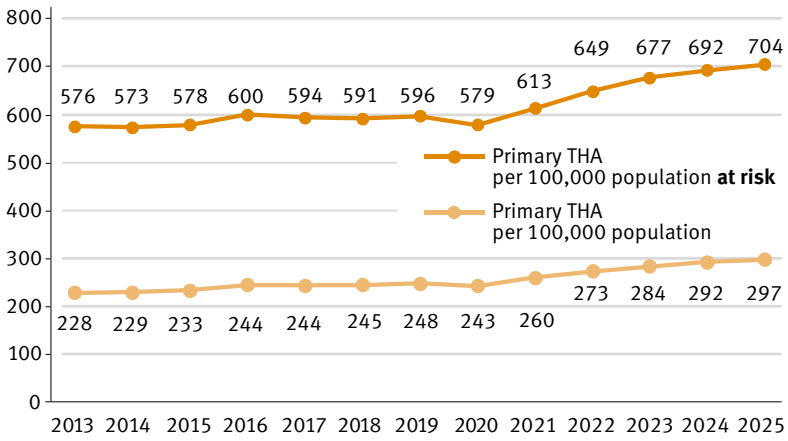


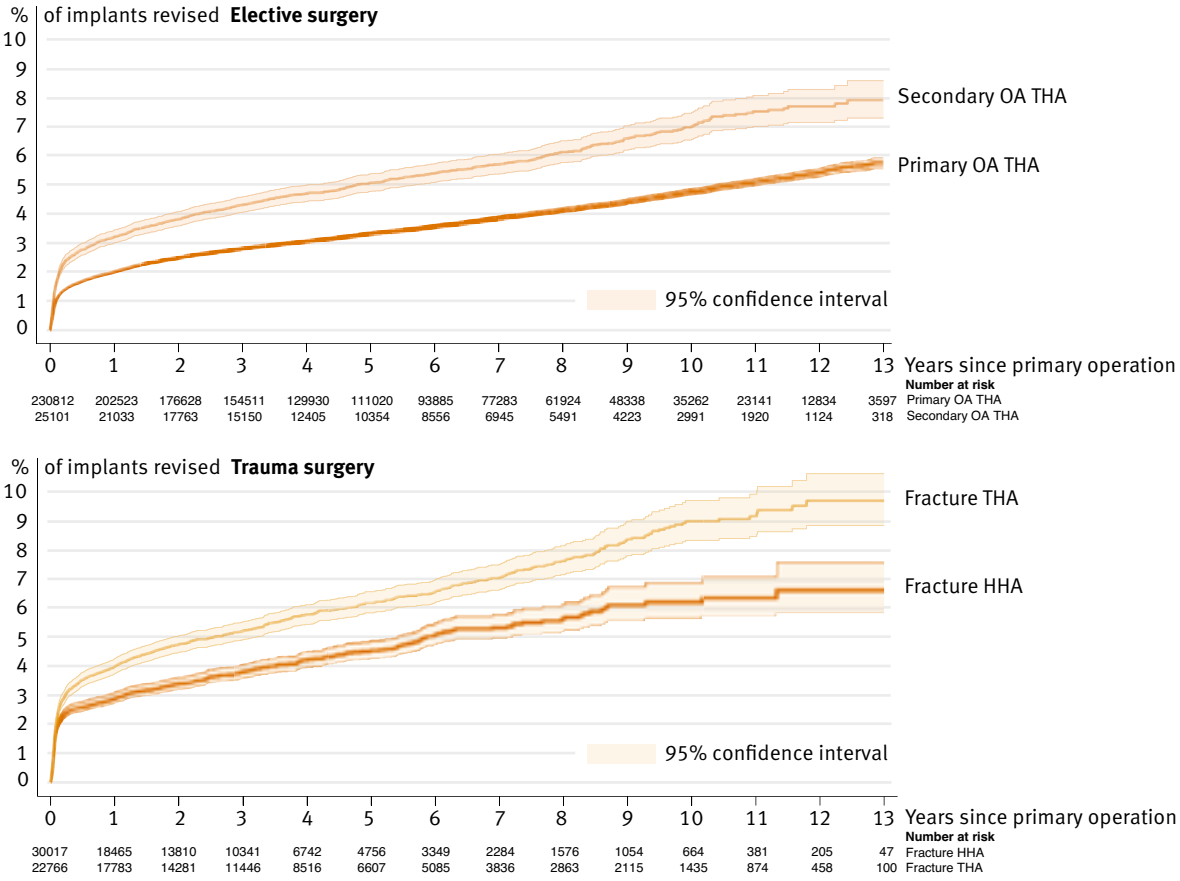
Figure 3.1

Incidence of primary total hip arthroplasties registered in SIRIS

Per 100,000 residents and per 100,000 residents at-risk*. Adjusted for estimated coverage. SIRIS figures excluding Liechtenstein.
Coverage rates 2013–2016 estimated at 91% ; 2017–2023 based on federal health office data; 2025 estimated at 97.4%.
*Age group 50–89 years accounts for 93% of all recipients of THA

Revision rates

Revision rates accumulate over time since the index arthroplasty. Analysing data from 2012 onwards, at 2 years, the average revision rate for primary THA was 2.5% (CI 2.4 – 2.5%) for primary OA, whereas it was 3.8% (CI 3.6 – 4.1%) for secondary OA and as high as 4.8% (CI 4.5 – 5.1%) for primary THA performed for fracture. The 2-year revision rate for HHA was 3.4% (CI 3.2 -3.7%). At 13 years, the revision rates were 5.7% (CI 5.5 – 5.9%), 7.7% (CI 7.1 – 8.3%), 9.7% (8.9 – 10.7%) and 7.9% (7.3 – 8.6%), respectively. Further details are provided in **Figure 3.2.**



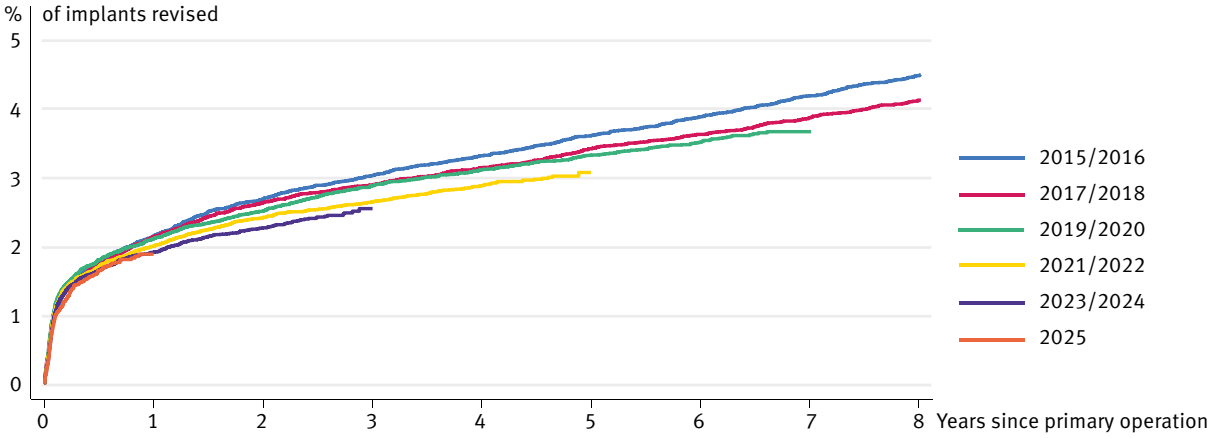
Failure rate	1 year	2 years	3 years	5 years	6 years	8 years	9 years	10 years	13 years
Prim OA THA	**2.0** (2.0-2.1)	**2.5** (2.4-2.5)	**2.8** (2.7-2.9)	**3.3** (3.2-3.4)	**3.6** (3.5-3.6)	**4.1** (4.0-4.2)	**4.4** (4.3-4.5)	**4.7** (4.6-4.9)	**5.7** (5.5-5.9)
Sec OA THA	**3.2** (3.0-3.5)	**3.8** (3.6-4.1)	**4.3** (4.0-4.6)	**5.1** (4.8-5.4)	**5.4** (5.1-5.7)	**6.1** (5.8-6.5)	**6.6** (6.2-7.0)	**7.0** (6.5-7.5)	**7.9** (7.3-8.6)
Fracture HHA	**2.9** (2.7-3.1)	**3.4** (3.2-3.7)	**3.8** (3.6-4.1)	**4.6** (4.3-4.9)	**5.1** (4.8-5.5)	**5.7** (5.2-6.2)	**6.2** (5.6-6.8)	**6.3** (5.7-6.9)	**6.7** (5.9-7.6)
Fracture THA	**4.0** (3.8-4.3)	**4.8** (4.5-5.1)	**5.2** (4.9-5.6)	**6.2** (5.9-6.6)	**6.6** (6.2-7.0)	**7.7** (7.2-8.2)	**8.4** (7.8-9.0)	**9.0** (8.4-9.8)	**9.7** (8.9-10.7)

Figure 3.2

Kaplan Meier estimate of cumulative postoperative revision risk after primary hip arthroplasty

Time since operation, 2012–2025, all services, all diagnoses

The comparison of different periods since 2015 shows a trend of decreasing revision rates over time, particularly since 2021/2022 **(Figure 3.3).** A statistically significant reduction was present for the one-year revision rate between the periods 2015/2016 and 2023/2024, and also for the three-year revision rates between 2015/2016 and 2021/2022. For 2015/2016 and 2023/2024, the two years revision rate dropped from 2.7% (CI 2.5-2.9) to 2.2% (CI 2.1-2.4). Such a decrease over time is one of the desired effects of a registry.



Failure rate	1 year	2 years	3 years	4 years	5 years	6 years	7 years	8 years
2015/2016	**2.1** (2.0-2.3)	**2.7** (2.5-2.9)	**3.0** (2.8-3.2)	**3.3** (3.1-3.5)	**3.6** (3.4-3.8)	**3.9** (3.6-4.1)	**4.2** (3.9-4.4)	**4.5** (4.2-4.7)
2017/2018	**2.1** (2.0-2.3)	**2.6** (2.4-2.8)	**2.9** (2.7-3.1)	**3.1** (2.9-3.3)	**3.4** (3.2-3.6)	**3.6** (3.4-3.8)	**3.8** (3.6-4.1)	**4.1** (3.9-4.3)
2019/2020	**2.1** (2.0-2.3)	**2.5** (2.3-2.7)	**2.9** (2.7-3.0)	**3.1** (2.9-3.3)	**3.3** (3.1-3.5)	**3.5** (3.3-3.7)		
2021/2022	**2.0** (1.8-2.1)	**2.4** (2.2-2.6)	**2.6** (2.5-2.8)	**2.9** (2.7-3.0)				
2023/2024	**1.9** (1.7-2.0)	**2.2** (2.1-2.4)						
2025	**1.9** (1.8-2.0)							

Figure 3.3

Kaplan Meier estimate of cumulative postoperative revision risk after THA by time period

Time since operation, 2015–2025, primary OA

3.2.2 Primary total hip arthroplasty

Since the introduction of SIRIS in 2012, a total of 278,679 primary THA have been registered. Over the last six years, 142,869 primary THA were registered, forming the base of the current analysis **(Table 3.2).** The registry discriminates between THA performed for primary OA (80.7%, the largest group), for secondary OA (9.7%, which includes post-traumatic OA, OA due to inflammatory diseases, avascular necrosis, and sequels of childhood diseases such as developmental dysplasia of the hip or Perthes' disease), and for fractures of the hip (9.6%). The proportion of primary OA continuously declined from 82.9% in 2020 to 79.6% in 2025, while the proportions of secondary OA and fracture cases increased proportionally.

		2020	2021	2022	2023	2024	2025	2020 – 2025
N		**20,362**	**22,160**	**23,512**	**24,745**	**25,661**	**26,429**	**142,869**
Diagnosis [%]	Primary OA	82.0	81.0	80.7	80.9	80.4	79.6	80.7
	Secondary OA	9.2	9.4	9.6	9.4	9.8	10.4	9.7
	Fracture	8.8	9.6	9.7	9.7	9.8	10.0	9.6
Women [%]		52.3	53.8	53.3	53.5	53.5	53.5	53.3
Mean age (SD)	All	69.0 (11.6)	69.2 (11.7)	69.5 (11.5)	69.4 (11.4)	69.4 (11.5)	69.5 (11.6)	69.3 (11.6)
	Women	70.6 (11.4)	70.8 (11.5)	71.0 (11.2)	70.8 (11.0)	70.9 (11.2)	71.0 (11.2)	70.9 (11.3)
	Men	67.1 (11.6)	67.4 (11.7)	67.7 (11.6)	67.7 (11.5)	67.8 (11.7)	67.8 (11.8)	67.6 (11.6)
Age group [%]	‹45	2.5	2.7	2.4	2.4	2.7	2.6	2.6
	45–54	8.9	8.6	7.8	7.4	7.5	7.5	7.9
	55–64	21.9	21.3	22.0	22.2	22.3	22.2	22.0
	65–74	31.5	30.9	30.6	31.4	30.4	30.3	30.8
	75–84	27.8	28.7	29.5	29.0	29.6	29.8	29.1
	85+	7.3	7.8	7.7	7.5	7.6	7.6	7.6
N unknown BMI (%)		2,410 (12)	1,883 (8)	1,312 (6)	1,281 (5)	947 (4)	942 (4)	8,775 (6)
N known BMI		17,952	20,277	22,200	23,464	24,714	25,487	134,094
Mean BMI (SD)		26.9 (5.1)	26.9 (5.2)	26.9 (5.2)	26.9 (5.2)	26.9 (5.2)	26.8 (5.0)	26.9 (5.1)
BMI [%]	‹18.5	2.3	2.2	2.2	2.2	2.1	2.2	2.2
	18.5–24.9	36.5	36.2	36.6	36.5	37.0	37.1	36.7
	25–29.9	38.1	37.4	36.7	37.4	37.4	37.9	37.5
	30–34.9	16.7	17.4	17.7	17.0	16.6	16.6	17.0
	35–39.9	4.8	5.0	5.2	5.1	5.0	4.6	4.9
	40+	1.7	1.8	1.6	1.8	1.8	1.5	1.7
N unknown ASA (%)		1,130 (6)	653 (3)	360 (2)	380 (2)	344 (1)	296 (1)	3,163 (2)
N known ASA		19,232	21,507	23,152	24,365	25,317	26,133	139,706
Morbidity	ASA 1	11.6	11.2	9.9	9.6	8.9	8.4	9.8
state [%]	ASA 2	58.9	57.7	58.9	59.3	58.8	58.3	58.7
	ASA 3	28.4	29.9	29.9	30.0	31.2	32.0	30.3
	ASA 4/5	1.1	1.2	1.3	1.2	1.1	1.3	1.2

Table 3.2

Primary total hip arthroplasty: Baseline patient characteristics by year

Sex and age

Both the age and the male/female ratio remained stable over the last 6 years for primary THA. Women represented 53.3% of the primary THA registered, and their mean age of 70.9 years was higher than the 67.6 years of men.

The distribution among the age groups showed minimal changes over the last 6 years. Overall, 67.5% of THA were performed in patients older than 65 years of age. Patients aged over 85 years represented 7.6%, while patients aged ‹55 years constituted 10.5% of the recipients. The proportion of THA performed on patients ‹45 years of age remained constant over the years, oscillating between 2.4 and 2.7%. This corresponds to 3,654 patients younger than 45 years. In contrast, the largest group were patients between 65 and 74 years of age, representing 31.2% or 44,056 patients **(Table 3.2).** For fractures, most patients were 85 years and older **(Figure 3.4).**

BMI and ASA score

BMI and ASA scores are recorded in SIRIS since 2015. Data collection has improved since introduction but seems to have reached a plateau. The share of unknown BMI decreased continuously from 16% in 2018 to 12% in 2020, thanks to the ongoing efforts of the support team supervising the clinics but stabilised at 4% since 2024.

The mean BMI was 26.8 kg/m² for all primary THA, whereby 37.5% were performed in overweight patients (BMI 25 – 29.9 kg/m²) and 23.6% in obese patients (BMI ›30 kg/m²) **(Table 3.2).** Patients with higher BMI were THA recipients at a younger age, an observation that could be made in both male and female patients **(Figure 3.5).** The distribution of BMI remained constant during the observation period between 01.01.2020 and 31.12.2025.

Most primary THA were performed on healthy individuals (ASA class 1 and 2), but 31.5% of the THA were performed on patients ASA class ≥3. The proportion of ASA class 3 patients increased from 28.4% in 2020 to 32.0% in 2025. During the same period, the proportion of ASA class 1 patients continued to decrease from 11.6% in 2020 to 8.4% in 2025.

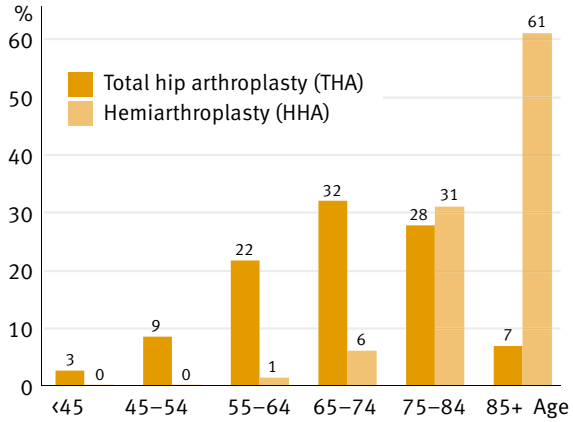


Figure 3.4

Age distribution at surgery of primary total hip arthroplasty and hemiarthroplasty

All documented operations

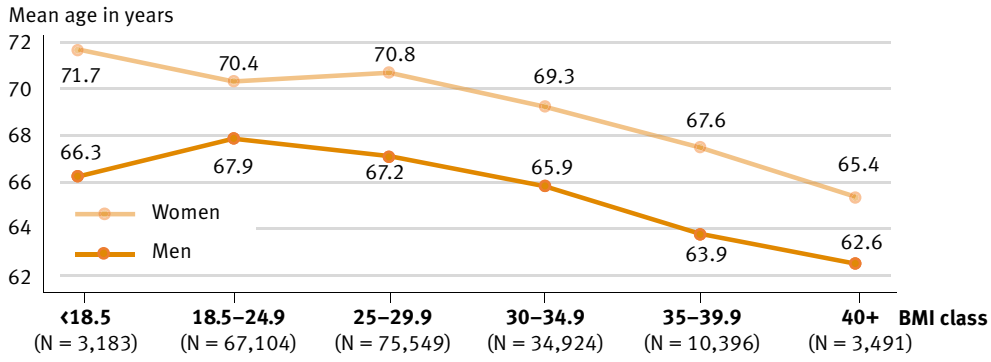


Figure 3.5

Primary total hip arthroplasty: Mean age at primary arthroplasty depending on BMI class

Primary and secondary osteoarthritis patients only. Please note that group sizes vary considerably. All documented operations.

		Primary OA	Secondary OA	Fracture
N (2020 – 2025)		**115,303**	**13,788**	**13,778**
Women [%]		51.8	57.3	62.3
Mean age	All	69.3 (10.8)	63.9 (15.3)	75.0 (10.9)
(SD)	Women	70.8 (10.4)	65.4 (15.1)	76.3 (10.2)
	Men	67.7 (10.9)	61.9 (15.3)	73.0 (11.7)
Age group	‹45	1.7	11.3	0.8
[%]	45–54	7.5	15.8	3.4
	55–64	23.0	22.8	13.2
	65–74	32.6	21.6	25.0
	75–84	29.1	20.9	38.1
	85+	6.1	7.7	19.5
Diagnosis	Osteoarthritis	99.9	0.0	0.0
[%]	Inflammatory arthritis	0.0	4	0
	Development. dysplasia	0.0	29	0
	Osteonecrosis	0.0	54.5	0.0
	Miscellaneous*	0.1	13.0	2.4
	Fracture	0.0	0.0	97.6
N unknown BMI (%)		6,720 (6)	631 (5)	1,424 (10)
N known BMI		108,583	13,157	12,354
Mean BMI (SD)		27.2 (5.1)	26.7 (5.5)	24.2 (4.5)
BMI [%]	‹18.5	1.6	2.7	7.4
	18.5–24.9	34.3	39	55.2
	25–29.9	38.9	34.1	28.4
	30–34.9	18.2	16.8	7.0
	35–39.9	5.3	4.9	1.5
	40+	1.8	2.2	0.5
N unknown ASA		2,617 (2)	221 (2)	325 (2)
N known ASA		112,686	13,567	13,453
Morbidity	ASA 1	10.1	11.4	5.6
state [%]	ASA 2	61.4	53.5	40.5
	ASA 3	27.8	33.4	48.9
	ASA 4/5	0.7	1.8	5.0

Table 3.3

Primary total hip arthroplasty: Baseline patient characteristics by main diagnostic group

* Miscellaneous diagnoses are free text entries that typically describe more complex situations.
Most of those must be classified as secondary arthroses, but there are also entries that describe fractures or directly fracture-related conditions such as pathological fractures or complications after osteosynthesis.

Underlying diagnosis

Patients treated for secondary OA were on average 5.4 years younger than those treated for primary OA. The share of patients younger than 45 years was 1.7% in the group treated for primary OA and 11.3% for those treated for secondary OA. The proportion of developmental dysplasia of the hip among all primary THA performed for secondary OA was 28,7%, while the majority of this subgroup (54.5%) were treated for avascular necrosis **(Table 3.3).**

Among the patients treated for fractures, there were considerably more women than men, representing close to two-thirds (62.3%). The average age of these women was 76.3 years, compared to 73.0 years for men. More than 82% of fractures occurred in patients over 65 years of age, and more than 57% in patients over 75 years. There also was a much higher proportion of patients in the fracture group belonging to ASA class ≥ 3 (48.9%).

3.2.3 Revision of primary THA

The current 4-year moving window from 01.01.2020 to 31.12.2023, providing a complete 2-year follow-op until 31.12.25, included 90,778 documented primary THA, of which 73,630 had been made for primary OA, 8,535 for secondary OA, and 8,613 for the treatment of fractures. A total of 2,486 of these THA had been revised within 2 years, resulting in an overall revision rate of 2.8% (CI 2.7 – 2.9%) **(Table 3.4).**

		Primary	Revised within 24 months			
			Revised		95% CI	
		N at risk*	N	%**	lower	upper
Overall (moving average)		90,778	2,486	2.8	2.7	2.9
Diagnosis	Primary OA	73,630	1,739	2.4	2.3	2.5
	Secondary OA	8,535	340	4.0	3.6	4.5
	Fracture	8,613	407	4.9	4.5	5.4
Sex	Women	38,047	929	2.5	2.3	2.6
	Men	35,583	810	2.3	2.1	2.5
Age group	‹55	6,994	179	2.6	2.2	3.0
	55–64	16,782	321	1.9	1.7	2.1
	65–74	24,186	550	2.3	2.1	2.5
	75–84	21,190	581	2.8	2.6	3.0
	85+	4,477	108	2.5	2.0	3.0
BMI group	‹18.5	1,069	26	2.5	1.7	3.6
	18.5–24.9	23,262	420	1.8	1.7	2.0
	25–29.9	26,448	544	2.1	1.9	2.3
	30–34.9	12,598	347	2.8	2.5	3.1
	35–39.9	3,709	182	4.9	4.3	5.7
	40+	1,219	76	6.3	5.1	7.8
	Unknown	5,325	144	2.7	2.3	3.2
Morbidity	ASA 1	7,734	134	1.7	1.5	2.1
state	ASA 2	44,029	943	2.1	2.0	2.3
	ASA 3	19,307	589	3.1	2.9	3.3
	ASA 4/5	468	16	3.6	2.2	5.8
	Unknown	2,092	57	2.7	2.1	3.5

Table 3.4

First revision of primary total hip arthroplasty within 24 months overall and according to baseline characteristics

4-year moving average covering implants between 01.01.2020 and 31.12.2023, with two years follow-up (31.12.2025)

* Number of patients with at least two years follow-up (i.e. primary prosthesis in moving average).

** Rates adjusted for effects of mortality and emigration.

Sex and age

There was a slight but not significant difference in the 2-year revision rate among men (2.3%, CI 2.1 – 2.5%), compared to women (2.5%, CI 2.3 to 2.6%). The overall revision rate for primary OA remained unchanged at 2.4% (CI 2.3 – 2.5) compared to the previous 4-year period. The lowest 2-year revision rate (1.9%, CI 1.7 – 2.1%) was observed in the age group 55–64 years old. The age groups ‹55 and 75– 84 years of age had the highest revision rate of 2.6% (CI 2.2 – 3.0%) and 2.8% (CI 2.6 – 3.0%), respectively.

BMI and ASA-score

BMI had a relevant impact on the 2-year revision rate. The highest revision rates were found in patients with a BMI ›35 kg/m². In these patients, it was almost three times higher than in normal weight patients.

The ASA score had a moderate influence on the revision rate. The highest revision rate of 3.6% (CI 2.2 – 5.8%) was found in ASA class 4/5 patients. ASA class 3 patients showed a revision rate of 3.1% (CI 2.9 – 3.3%). Compared to the previous period, the revision rate for ASA class 3 patients decreased, while it increased for ASA 4 patients. Healthy patients (ASA class 1 and 2) had the lowest revision rate (1.7%, CI 1.5 – 2.1% and 2.1%, CI 2.0 –2.3%, respectively).

Underlying diagnosis

The revision rate differed between the various underlying diagnoses. For primary OA, the 2-year revision rate was 2.4% (CI 2.3 – 2.5%), for secondary OA it was 4.0% (CI 3.6 – 4.5%) and showed the highest rate for fractures at 4.9% (CI 4.5 – 5.4%).

3.2.4 Re-revision after revision of total hip arthroplasty

Re-revisions are revisions occurring after the first revision of a THA. The first or index revision includes partial or complete revisions and sometimes re-implantations after Girdlestone, when the removal of the implant was not documented in the registry.

The re-revision rate was high and reached 11.7% (CI 11.0 – 12.5%) after the first year for revision after THA for primary OA and 14.8% (CI 12.9 – 17%) for secondary OA. After the first year, the curves flattened out and after the 7th year the re-revision rate barely increased. At thirteen years, the re-revision rate was 22.5% (CI 21.2-23.9%) for revision after THA for primary OA and 25.4% (CI 20.2-31.7%) at twelve years for revision after THA for secondary OA **(Figure 4.11).**

However, there is a number of patients undergoing additional revisions that may sum up to five or more revisions in selected cases. After five years 3.5% had been revised at least once. 0.46% had two revisions, 0.1% had three revisions, 0.02% had four revisions and 0.01% had five revisions or more. After 10 years overall 5.2% were revised. 4.2% had one re-revision, 0.72% two, 0.14% three, 0.06% four and 0.02% more than five revisions **(Figure 3.6).**

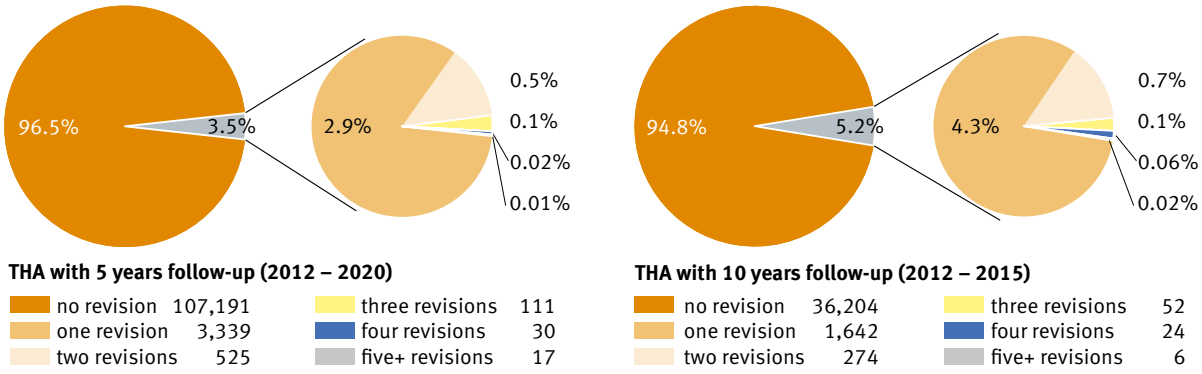


Figure 3.6

Risk of revision within 5 years and 10 years after primary THA (primary OA or secondary OA) in percent

Multi-stage operations are counted as one revision

3.2.5 Data by hospitals

The previously observed concentration towards larger units continued also in 2025. In 2025, 140 hospital units performed primary THA, with a yearly median load of 156 THA per unit. The number of units continued to decline from 153 in 2020 to 140 in 2025. Of note, these numbers also may reflect purely administrative measures, including consolidation of units within hospitals or hospital groups. Nevertheless, there is a shift towards larger units performing an increasing number of THA. In 2020, 33.7% of all THA were implanted in units performing ›300 cases/year. In 2025, this share increased to 46.1%. The same trend, although weaker, was observed in units performing 200-299 cases/year **(Tables 3.5 and 3.6).** Since 2013, the contribution to the total amount of THA of smaller services with ‹200 cases/year declined from 51% to 27%. At the same time, the proportion of THA in larger services increased from 49% to 73%. There is a clear trend for concentration in larger centres throughout the country **(Figure 3.7).** The same applies to HHA. The proportion of HHA performed in larger units (›200 THA/year) increased from 40% in 2013 to 61% in 2025. It is interesting to note that the concentration process accelerated around 2020, during and after the COVID-19 pandemic. The pandemic may have triggered an already previously existing trend.

		2020	2021	2022	2023	2024	2025
Primary total hip arthroplasty	N services	153	149	150	147	146	140
	M per service	94	117	122	132	143	156
Primary hemiarthroplasty of the hip	N services	125	105	110	105	101	98
	M per service	10	16	17	16	18	20
Revision arthroplasty (THA or HHA)	N services	134	140	142	131	131	130
	M per service	12	12	11	12	13	13

Table 3.5

Number of participating hospital services (N) and median procedures (M) per unit per year

Service volume		2020	2021	2022	2023	2024	2025
‹100	N procedures (%)	2,829 (14.0)	2,355 (10.9)	2431 (10.4)	2,439 (9.9)	1,996 (7.8)	2,186 (8.2)
	N services (%)	73 (47.7)	61 (40.9)	56 (37.3)	56 (38.1)	49 (33.6)	45 (32.1)
100–199	N procedures (%)	5,551 (27.5)	6,097 (27.9)	6,675 (28.6)	4,887 (19.9)	4,750 (18.7)	5,097 (19.3)
	N services (%)	43 (28.1)	46 (30.9)	50 (33.3)	37 (25.2)	38 (26.0)	38 (27.1)
200–299	N procedures (%)	4,995 (24.8)	5,185 (23.8)	5,751 (24.6)	7,473 (30.5)	8,170 (32.1)	6,982 (26.4)
	N services (%)	22 (14.4)	24 (16.1)	26 (17.3)	34 (23.1)	34 (23.3)	31 (22.1)
›300	N procedures (%)	6,800 (33.7)	8,178 (37.4)	8,509 (36.4)	9,717 (39.6)	10,559 (41.5)	12,182 (46.1)
	N services (%)	15 (9.8)	18 (12.1)	18 (12.0)	20 (13.6)	20 (13.7)	26 (18.6)

Table 3.6

Number of hospital services and number of primary total hip arthroplasties according to hospital volume

Note that service volume is defined as the sum of primary procedures per year

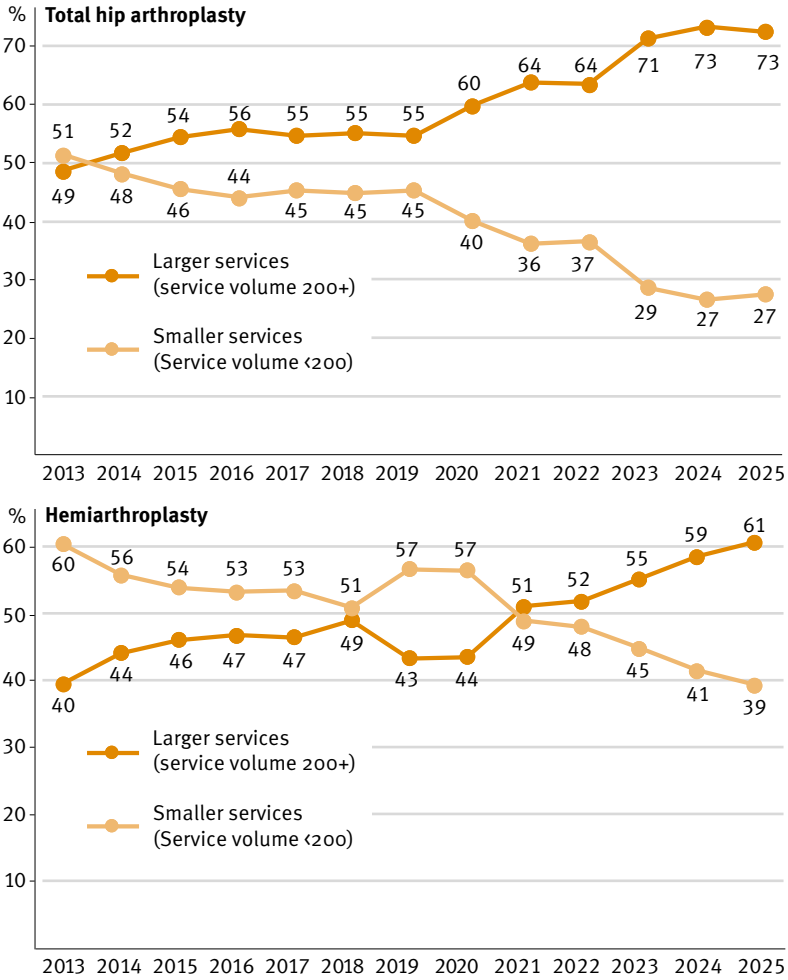


Figure 3.7

What share of selected procedures is performed in hospital services with different service volumes*?

* Note that service volume is defined as the sum of primary procedures per year

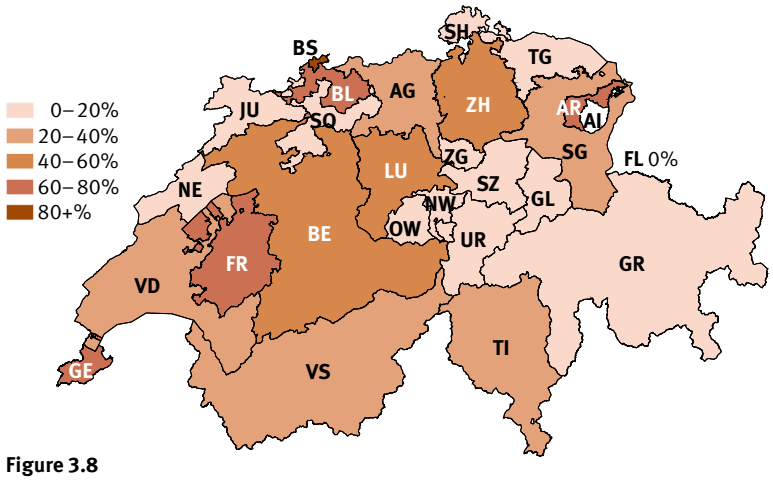


Figure 3.8

Share of total hip arthroplasties in service with 300+ procedures per year 2020 – 2025

Figure 3.8 shows how the share of THA procedures performed in high-volume units (more than 300 cases/year) varies by Canton. As shown above, the proportion of THA performed in services with a service volume of 300+ rose steadily from 33.7% to 46.1% between 2020 and 2025 **(Table 3.6).** The average over the six-year period is just under 40%.

However, there is regional variability. The highest share is found in Basel, with more than 80% of THA being implanted in high volume centers. In AR, BL, FR and GE 60–80% are performed in high volume centers. In the smaller, more rural Cantons, including GR, the share of larger centres was below 20%. Generally, these Cantons are all relatively small or scarcely populated and lack a major hospital.

Figure 3.9 illustrates the distribution of the workload among the 143 units participating in 2025, including three units performing only HHA. The largest unit performed 1,410 primary THA, while six units did <10 cases/year. Revision arthroplasty of the hip was performed in 130 units. In general, units with higher volumes of primary THA also performed higher numbers of revisions. However, 55 units did <10 revisions per year **(Figure 3.9).**

The distinction between larger and smaller services is based on the annual volume of THA. However, it does not necessarily indicate that surgery is performed by high volume surgeons in larger services. There are larger services with numerous attending physicians, each of them contributing various numbers of cases. Some of them may perform hundreds of primary THA, whereas others contribute only few procedures. On the other hand, it may well be that in smaller units, only one or a few surgeons are performing THA, at a comparable frequency as others in large services. Therefore, caution is advised before drawing conclusions about the effect of numbers and volume on the quality of THA.

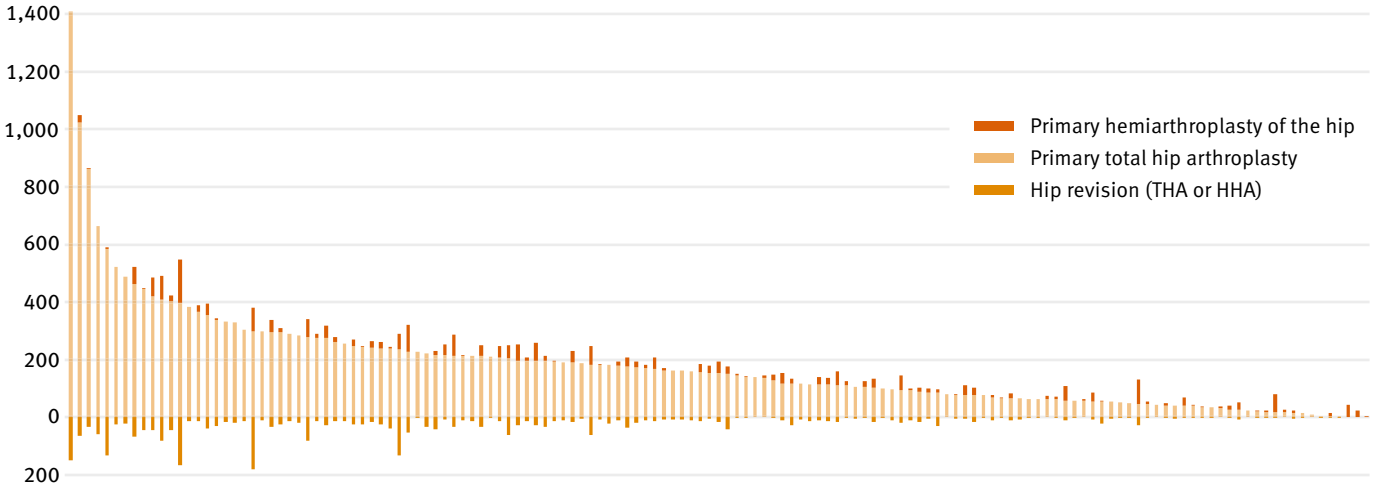


Figure 3.9
Cases per hospital service 2025: Total hip arthroplasty and hemiarthroplasty

In 2025, 13,937 THA were implanted in the 45 units performing ‹100 THA/year (8.2%), corresponding to 256 (2%) fewer cases than in 2024. Compared to 2024, an increase of 5,392 cases was observed in the 26 services performing more than 300 THA/year, corresponding to 56,770 primary THA. In these larger units, primary THA for secondary OA were performed more frequently, and the share of young patients was higher **(Table 3.7).** In contrast, the percentage of THA for fracture treatment was higher in units with less than 100 cases/year than in large units (13.6% vs 7.3%).

Hospital service volume*		‹100	100–199	200–299	300+
N (2020–2025)		**13,937**	**32,000**	**40,162**	**56,770**
Women [%]		53.1	53.7	52.9	53.5
Mean age (SD)	All	70.6 (11.1)	70.1 (11.2)	69.6 (11.3)	68.5 (12.0)
	Women	72.0 (10.9)	71.8 (10.8)	71.0 (11.0)	69.9 (11.7)
	Men	68.9 (11.1)	68.1 (11.3)	67.9 (11.4)	66.8 (12.1)
Age group [%]	‹45	1.6	1.8	2.2	3.4
	45–54	7.0	7.1	7.7	8.8
	55–64	20.1	21.3	21.8	23.0
	65–74	30.7	31.3	31.2	30.3
	75–84	31.3	30.2	29.5	27.8
	85+	9.3	8.4	7.5	6.7
Diagnosis [%]	Primary OA	78.4	80.4	82.3	80.3
	Secondary OA	8.0	7.9	7.8	12.4
	Fracture	13.6	11.7	9.9	7.3
N unknown BMI (%)		2,005 (14)	2,181 (7)	1,776 (4)	2,813 (5)
N known BMI		11,932	29,819	38,386	53,957
Mean BMI (SD)		26.7 (5.0)	26.9 (5.2)	27.0 (5.2)	26.8 (5.1)
BMI [%]	‹18.5	2.5	2.4	2.1	2.1
	18.5–24.9	37.5	36.0	35.7	37.6
	25–29.9	37.1	37.3	37.7	37.5
	30–34.9	17.1	17.5	17.3	16.5
	35–39.9	4.4	5.2	5.4	4.6
	40+	1.5	1.7	1.8	1.7
N unknown ASA (%)		252 (2)	722 (2)	682 (2)	1,507 (3)
N known ASA		13,685	31,278	39,480	55,263
Morbidity state [%]	ASA 1	10.0	8.5	9.3	10.9
	ASA 2	58.9	58.9	59.1	58.1
	ASA 3	29.7	31.3	30.4	29.9
	ASA 4/5	1.4	1.3	1.1	1.1

Table 3.7

Primary total hip arthroplasty: Baseline patient characteristics of primary total hip arthroplasty by hospital service volume

Calculations of hospital service volume based on primary hip surgeries in each included year (2020–2025).
* Note that service volume is defined as the sum of primary procedures per year

Two-year revision rates by hospitals

The national average revision rate at 2 years for THA for primary OA of 2.4% (CI 2.3 – 2.5%) served as reference for calculating the outlier status of individual hospitals, implants and surgeons. The results for all participating units are shown in funnel plots **(Figure 3.10).** Results were risk-adjusted for age, sex, BMI, ASA, and Charnley scores, as available, and restricted to THA performed solely for primary OA. Each dot represents a hospital/service. Confidence intervals were centered on the national average. Following convention, the 99.8% control limits were used to define the outlier status, whereas units between the 95% and 99.8% limits are defined as units with an elevated revision rate. In 2025, there was one unit, two less than in 2024, that was detected as outlier and 14 institutions with an elevated revision risk, the same number as in 2024.

3.2.6 Arthroplasty for fractures of the hip

Fractures of the hip may involve not only the proximal femur but may also affect the acetabulum. These fractures may be treated conservatively, by internal fixation, by hip hemiarthroplasty (HHA) or THA, depending on dislocation and fracture type. The choice of treatment option depends on the underlying pathology, functional requirements of the patient, availability within the department, as well as the experience of the treating surgeon. The patients' age, the activity level and comorbidities influence functional requirements and thus the choice of treatment option. Only arthroplasties are recorded within SIRIS. Internal fixation is not recorded. While HHA is the preferred option for frail, low-demand patients, THA is more commonly performed in healthier and more active patients. The number of surgical treatments with internal fixation is unknown. Therefore, changes in growth rates may also reflect a change in treatment strategies between prosthetic joint replacement and joint reconstruction with internal fixation.

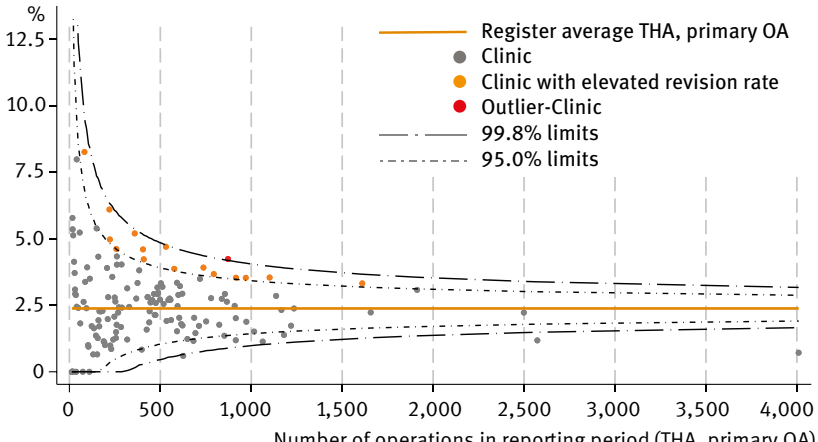


Figure 3.10

2-year revision rate of primary total hip arthroplasty by service*

THA results restricted to patients with primary osteoarthritis (prim OA). Results are risk-adjusted for age, sex and BMI, ASA, Charnley Score if available

*Number of operations in the reporting period 01/2020–12/2023 (4-year moving average, follow-up to 12/2025)

Interpretation of funnel plots

- The coloured line denotes the Swiss average 2-year revision rate
- Clinics that lie between the 95% limits (grey dots) have revision rates that are within the statistically expected range of observations given their operation volume
- Clinics below the 95/99.8% limits are performing better than the average
- Clinics above the 95% limit and below the 99.8% limit (orange dots) have elevated 2-year revision rates. This could be due to random variation, but we recommend that possible reasons are investigated, in particular if the position should be stable over time or worsen.
- Clinics above the 99.8% limit (red dots) have 2-year revision rates that deviate markedly from the national average (unlikely to be due to random variation alone).

Between 2020 and 2025, the registry recorded a total of 28,919 primary hip arthroplasties (both THA and HHA) performed for fracture, with an average annual increase of 4.4% per year. Between 2024 and 2025 the numbers remained almost identical. The previously observed increase of hip fracture treatment with THA continued in 2025 **(Table 3.8)**. In 2025, for the first time more than 50% of fractures treated with arthroplasty were recipients of THA. There is a clear trend over the years towards treatment with THA, proportions increasing from 43.1% in 2020 to 50.9% in 2025.

		2020	2021	2022	2023	2024	2025	2020–2025
N		**4,154**	**4,502**	**4,886**	**4,964**	**5,204**	**5,209**	**28,919**
Treatment with THA* [%]		43.1	47.3	46.8	48.4	48.3	50.9	47.6
Treatment with HHA** [%]		56.9	52.7	53.2	51.6	51.7	49.1	52.4
Women [%]		67.0	67.0	66.8	65.7	65.4	64.1	65.9
Mean age (SD)	All	81.1 (10.7)	81.0 (10.7)	80.8 (10.7)	80.6 (10.7)	80.6 (10.7)	80.6 (10.9)	80.8 (10.7)
	Women	82.3 (10.0)	81.8 (10.3)	82.0 (10.0)	81.6 (10.1)	81.8 (9.7)	81.8 (10.0)	81.9 (10.0)
	Men	78.7 (11.7)	79.3 (11.3)	78.5 (11.7)	78.6 (11.6)	78.2 (12.1)	78.4 (11.9)	78.6 (11.7)
Age group [%]	‹45	0.2	0.3	0.3	0.4	0.6	0.5	0.4
	45–54	1.9	1.6	1.9	1.9	1.5	1.8	1.8
	55–64	6.9	6.8	7.0	6.8	6.8	6.8	6.9
	65–74	14.7	14.8	13.9	14.9	14.5	14.5	14.5
	75–84	32.0	32.8	34.1	34.6	35.7	35.1	34.2
	85+	44.2	43.6	42.9	41.4	40.9	41.3	42.3
N unknown BMI (%)		747 (18)	675 (15)	601 (12)	557 (11)	431 (8)	369 (7)	3,380 (12)
N known BMI		3,407	3,827	4,285	4,407	4,773	4,840	25,539
Mean BMI (SD)		23.6 (4.4)	23.8 (4.3)	23.6 (4.2)	23.8 (4.6)	23.7 (4.3)	23.7 (4.2)	23.7 (4.3)
BMI [%]	‹18.5	10.0	8.7	9.5	9.1	9.4	9.1	9.3
	18.5–24.9	56.6	56.9	56.6	57.3	57.5	57.4	57.1
	25–29.9	26.0	26.5	26.7	25.7	25.8	26.2	26.1
	30–34.9	5.7	6.5	6.2	5.9	5.8	6.0	6.0
	35–39.9	1.4	1.1	0.9	1.4	1.2	1.1	1.2
	40+	0.3	0.3	0.2	0.7	0.3	0.3	0.3
N unknown ASA (%)		213 (5)	159 (4)	120 (2)	135 (3)	100 (2)	65 (1)	792 (3)
N known ASA		3,941	4,343	4,766	4,829	5,104	5,144	28,127
Morbidity state	ASA 1	3.7	3.1	3.4	2.6	2.7	2.7	3.0
[%]	ASA 2	28.8	27.8	27.3	28.6	28.6	28.4	28.2
	ASA 3	59.9	60.4	60.4	60.2	60.9	60.9	60.5
	ASA 4/5	7.6	8.7	8.9	8.7	7.8	8.0	8.3

Table 3.8

Fracture of the hip: Baseline patient characteristics by year

*THA= Total Hip Arthroplasty.
**HHA= Hemiarthroplasty

Figure 3.11 and 3.12 show the high variability of the treatment of hip fractures with THA or HHA for the different Cantons. In some Cantons, particularly OW, GL and TG, fractures of the hip are treated almost exclusively with THA. In the French and Italian speaking Cantons however, the use of HHA is the favoured treatment.

Sex and age

Women represented most of the patients treated with arthroplasty for fractures, comprising 65.9% of the cases. The proportion is declining slowly from 67% in 2020 to 65.9% in 2025. Patients aged >65 years represent 91% of the cases, and the age group >85 years accounted for 42.3% of the hip arthroplasties (Table 3.8). On the other hand, only 2.2% of the patients were younger than 55 years, whereas 6.9% were aged between 55 and 64 years.

Patients treated with HHA were on average 11 years older than those treated with THA (Table 3.9). As discussed above, younger patients were more likely to receive a THA. Although in 2025 more than 50% of patients were treated with THA, there were more treatments with HHA (52.4%) during the time period from 2020 to 2025. A total of 625 patients <55 years of age had hip arthroplasty for hip fractures and 93% of these (N = 580) were treated with THA. Nevertheless, 45 of the patients <55 years of age were still treated with HHA. On the other end of the age spectrum, of the 12,230 patients older than 85 years, 78% received HHA and only 22% THA (Table 3.9).

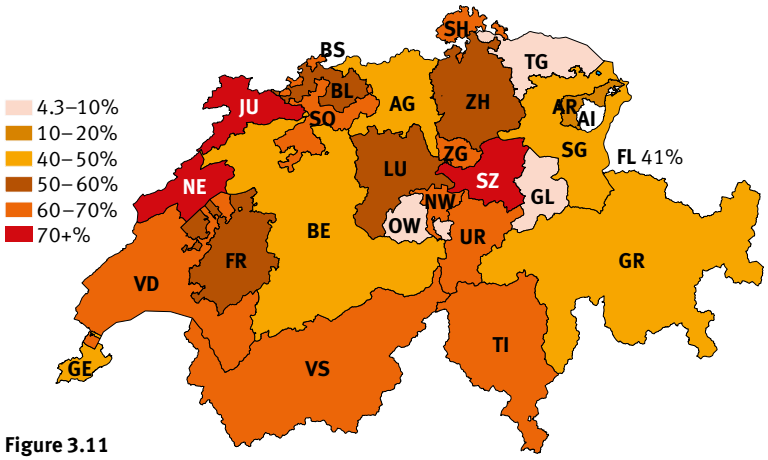


Figure 3.11
Share of fractures treated with hemiarthroplasty 2020 – 2025

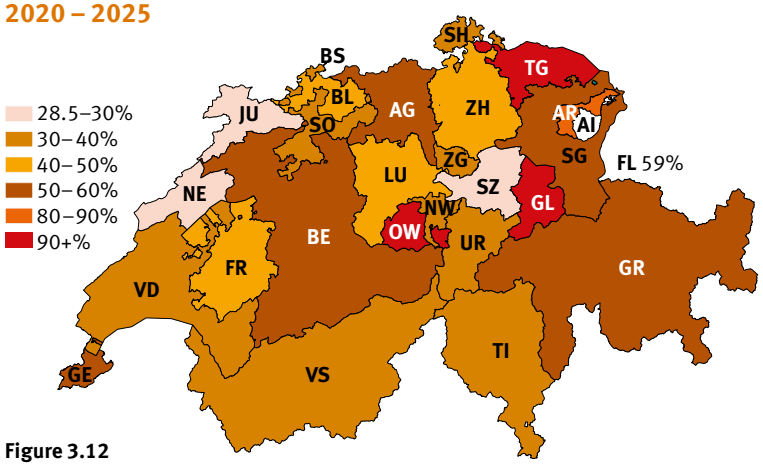


Figure 3.12
Share of fractures treated with total hip arthroplasty 2020 – 2025

		THA	HHA
N (2020 – 2025)		**13,778**	**15,141**
Women [%]		62.3	69.3
Mean age (SD)	All	75.0 (10.9)	86.0 (7.4)
	Women	76.3 (10.2)	86.5 (7.0)
	Men	73.0 (11.7)	84.9 (8.0)
Age group [%]	<45	0.8	0.1
	45–54	3.4	0.2
	55–64	13.2	1.0
	65–74	25.0	5.0
	75–84	38.1	30.6
	85+	19.5	63.1
N unknown BMI (%)		1,424 (10)	1,956 (13)
N known BMI		12,354	13,185
Mean BMI (SD)		24.2 (4.5)	23.3 (4.2)
BMI [%]	<18.5	7.4	11.0
	18.5–24.9	55.2	59
	25–29.9	28.4	24.0
	30–34.9	7.0	5.1
	35–39.9	1.5	0.8
	40+	0.5	0.2
N unknown ASA		325 (2)	467 (3)
N known ASA		13,453	14,674
Morbidity state [%]	ASA 1	5.6	0.6
	ASA 2	40.5	17.0
	ASA 3	48.9	71.1
	ASA 4/5	5.0	11.3

Table 3.9
Fracture of the hip: Baseline patient characteristics by type of treatment

BMI and ASA score

Most patients treated for fractures of the hip had a normal BMI. This was the case for 83% for both THA and HHA. THA patients were slightly more frequently obese (9.0% versus 6.1%), and more HHA patients had a BMI ‹18.5 kg/m², reflecting more prevalent malnutrition and sarcopenia in this subgroup **(Table 3.10).** The ASA score had an influence on the treatment modality. An ASA score ›2 was prevalent in 82.4% of patients treated with HHA but only in 53.9% of those treated with THA. This indicates that frailer patients were treated preferably with HHA.

3.2.7 Revision of primary HHA

The 2-year revision rate after THA for fracture of the hip was 4.9% (CI 4.5 – 5.4%) and higher than in HHA patients, where 3.8% (CI 3.4 – 4.2%) had been revised **(Table 3.10).** The 2-year revision rate of THA for the treatment of fractures was more than twice that of THA for primary OA (4.9% [CI 4.5–5.4%] vs 2.4% [CI 2.3–2.5%]).

Sex and Age

In both THA and HHA, men tended to have a higher revision rate. In the THA group, a slightly more elevated revision rate of 6.7% (CI 5.4 – 8.3%) was observed in the age group 55-64 years old. The highest revision

		Total hip arthroplasty					Hemi hip arthroplasty				
		At risk*	Revised		95% CI		At risk*	Revised		95% CI	
		N	N	%**	lower	upper	N	N	%**	lower	upper
Overall (moving average)		8,613	407	4.9	4.5	5.4	9,893	331	3.8	3.4	4.2
Sex	Women	5,403	223	4.3	3.7	4.8	6,925	217	3.5	3.1	4.0
	Men	3,210	184	6.0	5.2	6.9	2,968	114	4.5	3.8	5.4
Age group	‹55	360	19	5.4	3.4	8.3	31	2	6.9	1.8	24.9
	55–64	1,168	77	6.7	5.4	8.3	108	8	7.6	3.9	14.7
	65–74	2,187	96	4.5	3.7	5.5	509	32	7.0	5.0	9.7
	75–84	3,179	149	4.8	4.1	5.7	3,014	118	4.4	3.7	5.2
	85+	1,718	66	4.1	3.3	5.2	6,231	171	3.1	2.7	3.6
BMI group	‹18.5	573	27	5.0	3.5	7.2	903	29	3.8	2.7	5.5
	18.5–24.9	4,157	170	4.2	3.6	4.9	4,904	125	2.9	2.4	3.4
	25–29.9	2,121	116	5.6	4.7	6.7	2,057	94	5.1	4.2	6.2
	30–34.9	529	35	6.8	4.9	9.4	436	26	6.5	4.4	9.4
	35–39.9	112	14	12.6	7.7	20.4	76	9	12.9	6.9	23.3
	40+	43	3	7.0	2.3	20.1	18	0	0.0		
	Unknown	1,078	42	4.2	3.1	5.7	1,499	48	3.8	2.8	5.0
Morbidity state	ASA 1	505	15	3.0	1.8	4.9	60	3	5.3	1.7	15.7
	ASA 2	3,371	129	3.9	3.3	4.6	1,655	53	3.4	2.6	4.4
	ASA 3	4,040	230	6.0	5.3	6.8	6,730	231	3.9	3.5	4.5
	ASA 4/5	436	24	6.2	4.2	9.2	1,083	32	3.5	2.5	5.0
	Unknown	261	9	3.6	1.9	6.8	365	12	3.7	2.1	6.3

Table 3.10

Fracture of the hip: First revisions within 24 months overall and according to baseline characteristics

4-year moving average covering implants between 01.01.2020 and 31.12.2023, with two years follow-up (31.12.2025)

* Number of patients with at least two years follow-up (i.e. primary prosthesis in moving average).

** Rates adjusted for effects of mortality and emigration.

rate was observed in the age group 55-64 (7.6%, CI 3.9 – 14.7%) among recipients of HHA, but the age groups below and above showed much higher revision rates than in the corresponding THA group. However, numbers are relatively small, reflected in wide confidence intervals.

BMI and ASA score

An elevated BMI was a risk factor for revision in both the THA and the HHA groups. There was, however, no significant difference between the two groups. Statistical precision was limited by relatively small numbers. The highest revision risk was found in the BMI group 35–39.9 kg/m², reaching 12.6% (CI 7.7-20.4%) and 12.9% (CI 6.9–23.3%) in THA and HHA, respectively.

Higher ASA scores tended to be associated with more frequent revisions mainly in the THA group.

3.2.8 Data analysis by hospital for fractures of the hip

17% of all patients with a fracture were treated in a hospital with a volume of ‹100 primary cases/year **(Table 3.11).** The other hospital categories (100–199, 200–299, and ›300) each treated approximately 27% of the fracture patients. Age distribution was comparable among the four categories (‹100 cases/year, 100–199, 200–299, and ›300), with a mean age varying between 80.3 and 81.5 years. Hospitals with smaller caseloads (‹100 and 100-199 cases/year) treated more octogenarians. It is interesting to note that the percentage of patients treated by HHA in the low-volume institutions was significantly higher (61.4% vs 47.3%) than in the larger units **(Table 3.11).** This indicates a different treatment approach in small units (‹100 cases/year), that is not explained by BMI or ASA score, as these parameters are comparable in all four hospital categories. One explanation may be that surgeons not trained in THA participate in the treatment of hip fractures in these smaller institutions, performing HHA only.

The proportion of hip arthroplasties performed in large and small units has changed significantly since 2013. Since then, the proportion of patients treated in smaller facilities has decreased from 60% to 39%, whereas the proportion of patients treated in larger facilities has risen from 40% to 61%. This trend was interrupted during 2019 and 2020. The reasons are not clear for 2019. In 2020 it may be a side effect of the COVID-19 pandemic, smaller hospitals having been less affected by governmental restrictions than larger providers of elective surgery.

Overall, there is a clear trend to treat fractures of the hip in high volume institutions **(Figure 3.7)**. The contribution of low volume centres is declining.

Hospital service volume*		<100	100–199	200–299	300+
N (2020–2025)		**4,916**	**8,063**	**8,054**	**7,886**
Treatment with THA [%]**		38.6	46.3	49.5	52.7
Treatment with HHA [%]***		61.4	53.7	50.5	47.3
Women [%]		67.0	67.7	65.9	63.6
Mean age (SD)	All	81.5 (10.0)	81.0 (10.6)	80.5 (10.7)	80.3 (11.4)
	Women	82.3 (9.5)	82.1 (9.9)	81.6 (10.0)	81.7 (10.4)
	Men	79.9 (10.8)	78.8 (11.7)	78.3 (11.5)	77.9 (12.5)
Age group [%]	<45	0.2	0.3	0.3	0.7
	45–54	1.3	1.5	1.8	2.3
	55–64	5.6	6.9	6.9	7.5
	65–74	14.2	14.3	15.4	14.1
	75–84	34.5	33.9	34.5	33.8
	85+	44.2	43.1	41.0	41.6
N unknown BMI (%)		1,108 (23)	945 (12)	691 (9)	636 (8)
N known BMI		3,808	7,118	7,363	7,250
Mean BMI (SD)		23.7 (4.2)	23.7 (4.4)	23.7 (4.3)	23.7 (4.4)
BMI [%]	<18.5	8.5	9.9	9.2	9.1
	18.5–24.9	58.0	56.6	56.9	57.3
	25–29.9	26.7	25.9	26.3	25.9
	30–34.9	5.7	5.9	5.9	6.3
	35–39.9	0.9	1.3	1.2	1.1
	40+	0.2	0.4	0.4	0.4
N unknown ASA (%)		151 (3)	231 (3)	203 (3)	207 (3)
N known ASA		4,765	7,832	7,851	7,679
Morbidity state [%]	ASA 1	3.5	2.7	3.1	2.9
	ASA 2	28.1	28.6	29.2	27.0
	ASA 3	59.2	60.4	59.5	62.4
	ASA 4/5	9.2	8.4	8.2	7.7

Table 3.11

Fracture of the hip: Baseline patient characteristics by hospital service volume

Calculations of hospital service volume based on primary hip surgeries in each included year (2020–2025).
* Note that service volume is defined as the sum of primary procedures per year

Reporting of revision rates of HHA by hospitals

The national average 2-year revision rate for HHA of 3.8% (CI 3.4 – 4.2%) served as reference for calculating the outlier status of individual hospitals, implants and surgeons. The results of the participating units are shown in the funnel plot **(Figure 3.13).** Compared to last year's moving window, which had identified two outliers, no outliers were observed anymore. However, units with an increased revision risk rose from one to six units.

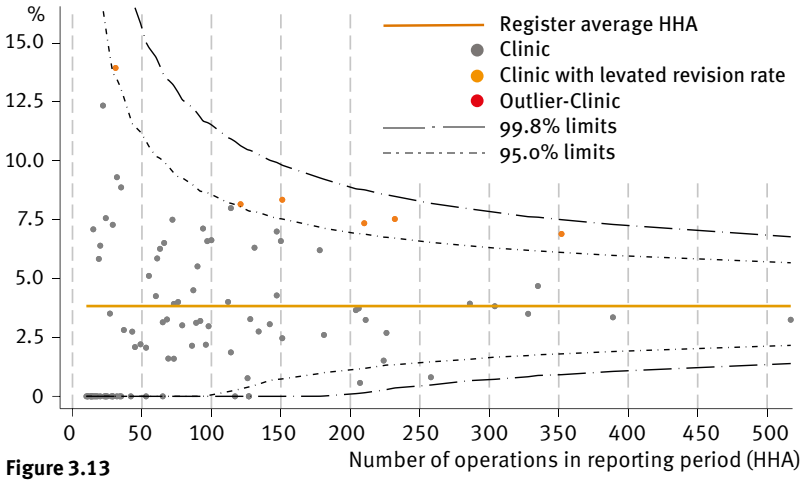


Figure 3.13

2-year revision rate of primary hemiarthroplasty by service*

Results are risk-adjusted for age, sex and BMI, ASA, Charnley Score if available

*Number of operations in the reporting period 01/2020–12/2023 (4-year moving average, follow-up to 12/2025)

Interpretation of funnel plots

- The coloured line denotes the Swiss average 2-year revision rate
- Clinics that lie between the 95% limits (grey dots) have revision rates that are within the statistically expected range of observations given their operation volume
- Clinics below the 95/99.8% limits are performing better than the average
- Clinics above the 95% limit and below the 99.8% limit (orange dots) have elevated 2-year revision rates. This could be due to random variation, but we recommend that possible reasons are investigated, in particular if the position should be stable over time or worsen.
- Clinics above the 99.8% limit (red dots) have 2-year revision rates that deviate markedly from the national average (unlikely to be due to random variation alone).

3.3 Knee arthroplasty

3.3.1 Nationwide data, including the Principality of Liechtenstein

Incidence of TKA and PKA

Since 2012, 260,240 primary knee arthroplasties were registered in SIRIS, of which 220,196 were TKA and 39,914 were PKA **(Tables 3.12 and 3.13).** The incidence of knee arthroplasties (including both TKA and PKA) has steadily increased over the past years, growing from 201 per 100,000 inhabitants in 2013 to 300 per 100'000 inhabitants in 2025. Considering only the population most at risk (the age group between 50 to 89 years, accounting for 97% of the recipients of TKA and PKA), the incidence of both TKA and PKA was 740 per 100,000 in 2025 **(Figure 3.14).** This represents one of the highest incidences for TKA in Europe as well as worldwide.

During the first decade of the registry, which had been introduced in 2012, the increase in the incidence could mainly be explained by improvements of coverage, as the number of participating services and the data completeness both increased over time. The high growth rate of 13.4% observed in 2022 was mostly explainable by a considerable rebound effect after the restrictions on elective surgery during the COVID-19 pandemic **(Table 3.12).** While the growth rate decreased from 6.2% in 2023 to 5.3% in 2024 and 4.9% in 2025 **(Table 3.12)**, an unbroken and steeper increase since 2020 resulted in an increase in the incidence of both TKA and PKA by 43.7% since 2020 **(Figure 3.15 and Table 3.12).** Although indirect signs of widening of the indication for knee arthroplasty, such as increasing numbers in particularly young or old patients, could still not be detected in the SIRIS dataset **(Table 3.13),** the mean growth rate is clearly above the growth rate of 6.3% of the popu-

Year	Primary TKA	Primary PKA	Primary others or type unclear	Primary Total	Share of PKA	Annual growth rate primary	Linked Rev./ Reop. of TKA	Linked Rev./ Reop. of PKA	Unlinked Rev./Reop. can be of TKA or PKA	Rev./ Reop. Total[2]	Share of linked Rev./ Reop.
2012[1]	4,650	938	8	5,596			19	2	510	531	4.0%
2013	12,648	2,402	17	15,067	15.9%		184	51	1,251	1,491	15.8%
2014	13,048	2,339	14	15,401	15.2%	2.2%	399	114	1,117	1,630	31.5%
2015	13,481	2,389	5	15,875	15.0%	3.1%	598	127	1,069	1,795	40.4%
2016	14,603	2,457	9	17,069	14.4%	7.5%	842	195	1,134	2,174	47.7%
2017	14,475	2,616	14	17,105	15.3%	0.2%	954	265	1,084	2,307	52.8%
2018	14,723	2,724	12	17,459	15.6%	2.1%	1,047	293	1,084	2,426	55.2%
2019	15,615	3,087	5	18,707	16.5%	7.1%	1,219	304	1,058	2,584	58.9%
2020	15,469	3,150	6	18,625	16.9%	-0.4%	1,334	403	1,065	2,802	62.0%
2021	16,851	3,213	5	20,069	16.0%	7.8%	1,418	412	1,035	2,868	63.8%
2022	19,321	3,435	6	22,762	15.1%	13.4%	1,595	465	926	2,991	68.9%
2023	20,757	3,457	13	24,227	14.3%	6.4%	1,727	490	1,021	3,242	68.4%
2024	21,752	3,756	7	25,515	14.7%	5.3%	1,807	537	981	3,330	70.4%
2025	22,803	3,951	9	26,763	14.8%	4.9%	1,813	582	1,022	3,422	70.0%
All	**220,196**	**39,914**	**130**	**260,240**	**15.3%**		**14,956**	**4,240**	**14,357**	**33,593**	**57.1%**

Table 3.12

Total and partial knee arthroplasty (TKA, PKA), primary and revisions/reoperations

All documented operations

[1] Does not represent a full year of data, as data collection in most hospitals started only in October 2012

[2] including linked revisions/reoperations of procedures that were classified as "primary others" or of unclear type

lation at risk for TKA and PKA over the same period. While the effect of the extensive ban of arthroscopy in elderly patients for meniscal pathology or the economic impact of lower reimbursement for arthroscopy in the ambulatory setting remain unclear, there is no doubt that TKA and PKA are unbowed successful with high request by patients and enthusiastic proposal by surgeons and hospitals.

3.3.2 Primary total knee arthroplasty

In 2025, the total number of primary TKA registered in SIRIS reached 220,196 cases **(Table 3.12).** Between 2020 and 2025, 116,953 primary TKA were performed **(Table 3.13).**

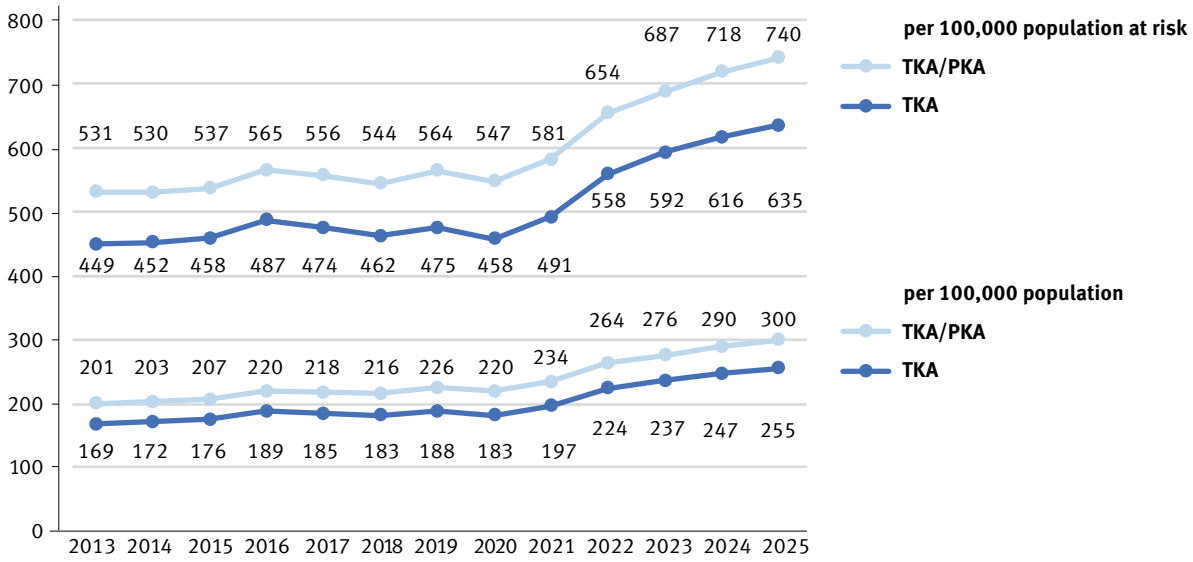


Figure 3.14

Incidence of all primary knee arthroplasties registered in SIRIS

Per 100,000 residents and per 100,000 residents at-risk (Age group 50–89 years accounts for 97% of all recipients of TKA/PKA) Adjusted for estimated coverage. SIRIS figures excluding Liechtenstein. Coverage rates 2013–2016 estimated at 92%; 2017–2024 based on federal health office data; 2025 estimated at 97.7%.

		2020	2021	2022	2023	2024	2025	2020–2025
N		**15,469**	**16,851**	**19,321**	**20,757**	**21,752**	**22,803**	**116,953**
Diagnosis [%]	Primary OA*	88.6	87.0	86.9	87.3	87.4	86.9	87.3
	Secondary OA	11.4	13.0	13.1	12.7	12.6	13.1	12.7
	Inflammatory origin	0.9	1.0	1.0	1.1	1.0	1.0	1.0
	Fracture	2.2	2.4	2.3	2.3	2.1	2.1	2.2
	Lesion of ligament	5.7	5.9	5.9	5.7	6.1	6.3	5.9
	Infection	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	Osteonecrosis	1.4	1.9	1.9	1.8	1.5	1.7	1.7
	Other**	1.2	1.7	1.8	1.7	1.8	1.9	1.7
Women [%]		58.5	59.9	59.1	58.7	58.5	58.0	58.7
Mean age (SD)	All	69.5 (9.4)	69.6 (9.5)	69.8 (9.5)	69.9 (9.3)	69.9 (9.4)	69.9 (9.4)	69.8 (9.4)
	Women	70.1 (9.6)	70.1 (9.6)	70.4 (9.6)	70.3 (9.4)	70.3 (9.5)	70.4 (9.5)	70.3 (9.5)
	Men	68.7 (9.2)	68.8 (9.3)	69.0 (9.2)	69.4 (9.2)	69.2 (9.3)	69.2 (9.2)	69.1 (9.2)
Age group [%]	<45	0.5	0.5	0.5	0.4	0.4	0.4	0.5
	45–54	5.7	5.7	5.4	4.7	5.0	4.7	5.2
	55–64	24.6	24.6	24.4	24.6	25.0	25.2	24.8
	65–74	36.0	35.3	35.2	35.3	34.6	35.1	35.2
	75–84	28.9	29.6	29.8	30.6	30.6	29.8	29.9
	85+	4.2	4.4	4.6	4.3	4.5	4.7	4.5
N unknown BMI (%)		1,924 (12)	1,538 (9)	1,327 (7)	1,171 (6)	862 (4)	886 (4)	7,708 (7)
N known BMI		13,545	15,313	17,994	19,586	20,890	21,917	109,245
Mean BMI (SD)		29.2 (5.5)	29.2 (5.6)	29.2 (5.5)	29.2 (5.6)	29.3 (5.6)	29.1 (5.5)	29.2 (5.6)
BMI [%]	<18.5	0.6	0.6	0.5	0.5	0.4	0.5	0.5
	18.5–24.9	22.2	22.1	22.3	22.1	22.2	22.6	22.2
	25–29.9	38.2	38.0	37.8	38.2	37.5	38.2	38.0
	30–34.9	24.8	25.0	25.0	24.8	25.4	24.5	24.9
	35–39.9	10.2	9.8	10.4	10.3	10.1	10.2	10.2
	40+	4.1	4.5	4.1	4.2	4.3	4.0	4.2
N unknown ASA (%)		1,016 (7)	579 (3)	431 (2)	433 (2)	721 (3)	1,172 (5)	4,352 (4)
N known ASA		14,453	16,272	18,890	20,324	21,031	21,631	112,601
Morbidity state	ASA 1	7.9	6.9	6.9	6.3	6.1	5.5	6.5
[%]	ASA 2	62.1	61.8	63.0	63.5	62.1	61.1	62.3
	ASA 3	29.6	30.8	29.6	29.8	31.4	33.0	30.8
	ASA 4/5	0.4	0.4	0.6	0.4	0.5	0.4	0.5

Table 3.13

Primary total knee arthroplasty: Baseline patient characteristics by year

* As of SIRIS version 2021, this category includes the category "secondary arthritis after meniscus surgery". This category accounts for more than 6% of current entries, but shows large variability between hospitals.

** A small number of cases with "secondary OA caused by patellar instability" were added to this category.

Sex and age

The share of women (58.7%) and the mean age of the patients (69.8 years) remained constant between 2020 and 2025. The proportion of younger patients (0.5% ‹45 years of age and 5.2% aged 45 to 54 years) and of patients older than 85 years (4.5%) did not change significantly in recent years **(Table 3.13 and Figure 3.15).** On average, women were older than men when TKA was performed in all BMI classes and higher BMI was associated with lower age at primary TKA **(Figure 3.16).**

Patients with secondary OA were significantly younger (mean age 65.4 years) than those with primary OA (mean age 70.4 years) when receiving TKA, women still being older than men on average. In addition, the share of men was higher in secondary OA (51.7%) than for women (48.3%) **(Table 3.13).** Patients older than 65 years of age were less frequently classified as secondary OA.

Younger age was the main reason for differences in revision rates after TKA between primary and secondary OA. When comparing corresponding age groups, revision rates did not differ between primary and secondary OA (see Chapters 5.3 and 5.4).

BMI and ASA-score

The share of unknown BMI continuously decreased from 12% in 2020 to 4% in 2025. It seems that almost all participating institutions have realised the importance of BMI for risk adjustment, as missing values lead to overestimation of revision rates. BMI data allow for a risk adjustment most often favourable to the provider. Between 2020 and 2025, the BMI remained constant at mean 29.2 kg/m². The distribution among the BMI subgroups did not change relevantly during this period **(Table 3.13).**

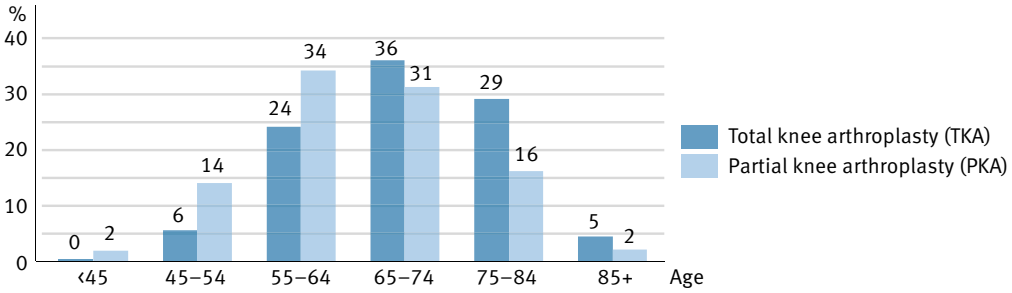


Figure 3.15

Age distribution at surgery of primary total and partial knee arthroplasty

All documented operations

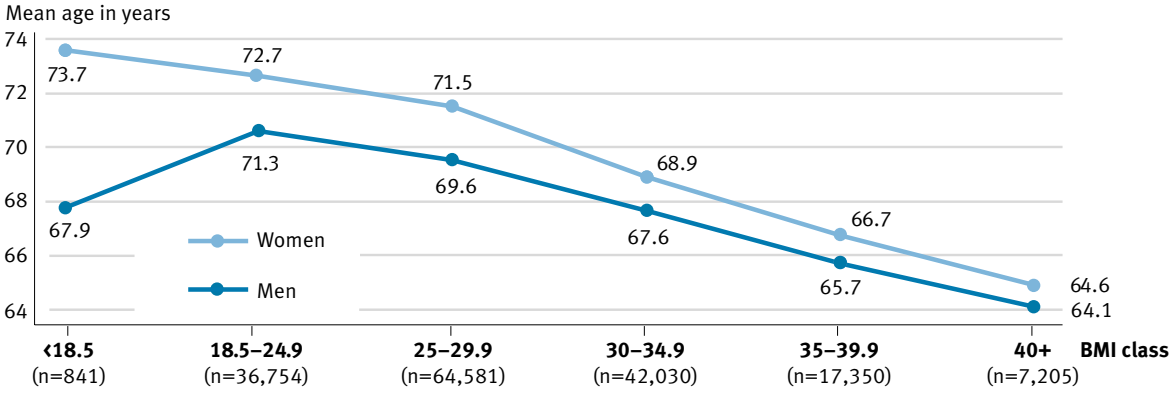


Figure 3.16

Primary total knee arthroplasty: Mean age at primary arthroplasty depending on BMI class

All documented operations. Please note that group sizes vary considerably.

In all BMI subgroups, women were older than men at primary TKA, although the difference decreased with age and when the BMI exceeded 30 kg/m² **(Figure 3.16).** The difference in younger patients was mainly due to men's higher share of post-traumatic OA. Younger patients tended to be more frequently obese. The mean age at surgery was approximately 70 years for patients with a BMI under 30 kg/m², whereas patients with a BMI of more than 40 kg/m² had surgery performed between 5 and 6 years earlier **(Figure 3.16).** In posttraumatic (secondary) OA, the mean BMI was significantly lower overall and in all BMI subgroups **(Table 3.14).**

As with the BMI, the share of unknown ASA-score decreased continuously from 7% in 2020 to 3% in 2024. The increase of the share of unknown ASA score in 2025, rising to 5% or from 721 to 1,172 cases in absolute numbers, can be explained by one larger hospital not delivering ASA scores during 2024 and 2025, accounting altogether for more than in 1,000 cases. There is still reasonable hope that the missing data will be transferred soon. ASA score is another important factor for risk adjustments. The distribution of the ASA score also remained constant over the past 6 years. BMI and ASA-score did not differ between the groups of primary and secondary OA.

		Primary OA*	Secondary OA
N (2020–2025)		**102,106**	**14,847**
Women [%]		60.3	48.3
Mean age (SD)	All	70.4 (9.1)	65.4 (10.4)
	Women	70.7 (9.3)	66.7 (11.0)
	Men	70.0 (8.9)	64.3 (9.7)
Age group [%]	‹45	0.3	1.9
	45–54	4.2	11.5
	55–64	23.1	35.9
	65–74	36.1	29.4
	75–84	31.6	18.2
	85+	4.7	3.0
N unknown BMI (%)		6,838 (7)	870 (6)
N known BMI		95,268	13,977
Mean BMI (SD)		29.4 (5.6)	28.2 (5.1)
BMI [%]	‹18.5	0.5	0.9
	18.5–24.9	21.6	27
	25–29.9	37.7	40.2
	30–34.9	25.2	22.8
	35–39.9	10.6	6.9
	40+	4.5	2.4
N unknown ASA (%)		3,806 (4)	546 (4)
N known ASA		98,300	14,301
ASA state [%]	ASA 1	5.9	10.4
	ASA 2	62.2	62.9
	ASA 3	31.5	26.2
	ASA 4/5	0.4	0.6

Table 3.14

Primary total knee arthroplasty: Baseline patient characteristics by main diagnostic group

* Including "arthritis after meniscus surgery"

Underlying diagnosis

The most frequent indication for TKA was classified as primary OA, representing 87.3% of the cases during the period from 2020 to 2025 **(Table 3.13).** This figure indicates a probable issue of underreporting of secondary causes of OA. As additional causes for secondary OA (such as ligament lesions or infection) were introduced on the CRF 2015, and as the awareness of risk factors for knee OA has steadily increased during the last decade, a higher proportion of secondary OA would be expected.

Secondary OA had a share of 12.7% between 2020 and 2025, not varying significantly over time. Ligament lesions formed the most frequent subgroup, followed by sequels of fractures and osteonecrosis, representing 5.9%, 2.2% and 1.7% of all TKA, respectively. All other conditions were rare, the proportion of inflammatory disease as reason for TKA was 1.0%, while the category "other" represented 1.7%.

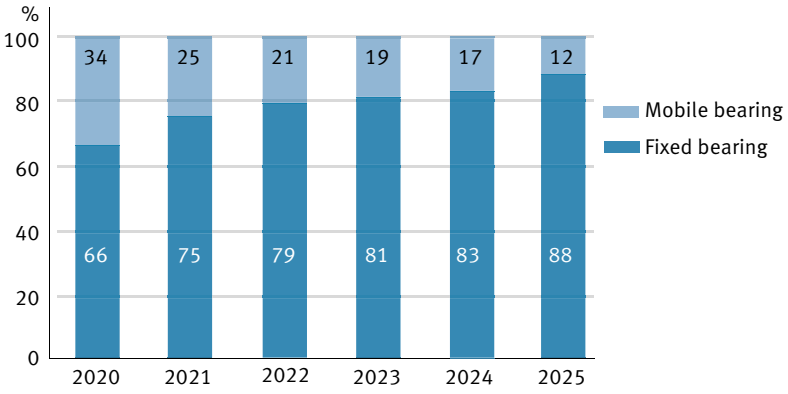
Please refer to the discussion above for more details regarding the influences of sex, age, BMI and ASA. Of note, there were considerable differences in distribution of diagnosis among high-volume hospitals (please refer to 3.3.5).

Insert type

Nationwide, the proportion of mobile bearings decreased rapidly over the past six years, from 34.0% in 2020 to 12.3% in 2025 **(Figure 3.17).**

Patella resurfacing

The patella was not resurfaced in 60.6% of the primary TKA performed between 2020 and 2025 **(Figure 3.18).** However, resurfacing rate increased continuously nationwide over the last years, from 32.0% in 2020 to 46.3% in 2025. The observed general trend towards more frequent primary patella resurfacing over the past years may well be explained by an intent to prevent early revision and improve two-year revision rates, independent of functional outcomes. The same effect could be observed in Australia over the past 15 years.

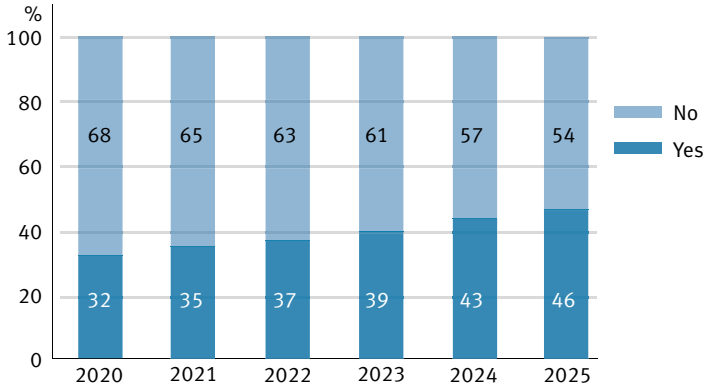


	2020	2021	2022	2023	2024	2025	2020–2025
N	13,526	16,366	18,931	20,339	21,320	22,357	112,839
Mobile bearing	34.0	25.0	20.9	18.9	16.5	12.3	20.2
Fixed bearing	66.0	75.0	79.1	81.1	83.5	87.7	79.8

Figure 3.17

Primary total knee arthroplasty: Type of insert

Percentage by year, all diagnoses



	2020	2021	2022	2023	2024	2025	2020–2025
N	15,467	16,849	19,320	20,757	21,752	22,802	116,947
No	68.2	65.1	63.2	60.6	56.6	53.6	60.6
Yes	31.8	34.9	36.7	39.4	43.3	46.3	39.4

Figure 3.18

Primary total knee arthroplasty: Patellar component

Percentage by year, all diagnoses

3.3.3 Primary partial knee arthroplasty

A total of 39,914 primary PKA were registered since inception of SIRIS in 2012 **(Table 3.12).** In 2025, 22,803 TKA and 3,951 PKA were registered, resulting in a share of PKA of 14.8%. The proportion of PKA among all knee arthroplasties was 15.3% over the past 14 years as well as over the last 6 years. It showed a peak at 16.9% in 2020 and tended to decrease from 2022 onwards. This is clearly less than in Denmark, where medial PKA rates were 35.5% in 2025 and approximately additional 3% for lateral and patellofemoral PKA. It is important to note that the proportion of PKA varies greatly across Switzerland, changing considerably depending on Cantons, regions, hospitals or individual surgeons. Whereas in some units PKA remained rare, other centres performed PKA in more than 40% of their primary knee arthroplasty cases.

Hospital service volume*		**‹100**	**100–199**	**200–299**	**300+**
N (2020–2025)		**2,105**	**4,167**	**4,629**	**10,061**
Women [%]		48.3	45.5	46.6	46.0
Mean age (SD)	All	64.2 (10.2)	64.5 (10.1)	65.4 (10.1)	65.0 (10.1)
	Women	64.0 (10.9)	64.0 (10.6)	64.9 (10.5)	64.7 (10.5)
	Men	64.4 (9.4)	64.8 (9.7)	65.9 (9.7)	65.3 (9.7)
Age group [%]	‹45	1.8	1.8	1.8	1.8
	45–54	15.6	14.8	12.1	13.5
	55–64	35.3	35.9	34.1	34.4
	65–74	30.8	28.9	31.8	31.5
	75–84	14.0	16.7	17.8	16.7
	85+	2.4	1.9	2.4	2.2
Diagnosis [%]	Primary OA	90.5	88.8	90.6	88.4
	Secondary OA	9.5	11.2	9.4	11.6
N unknown BMI (%)		288 (14)	273 (7)	112 (2)	830 (8)
N known BMI		1,817	3,894	4,517	9,231
Mean BMI (SD)		28.4 (4.8)	28.8 (5.0)	28.3 (4.8)	28.0 (4.7)
BMI [%]	‹18.5	0.5	0.3	0.4	0.5
	18.5–24.9	23.2	22.2	24.4	26.7
	25–29.9	43.4	41.2	42.9	42.1
	30–34.9	24.1	25.8	23.8	22.9
	35–39.9	7.3	8.2	6.6	6.2
	40+	1.5	2.2	1.9	1.5
N unknown ASA (%)		92 (4)	84 (2)	126 (3)	509 (5)
N known ASA		2,013	4,083	4,503	9,552
ASA state [%]	ASA 1	14.5	14.1	10.2	11.8
	ASA 2	66.9	64.8	69.6	66.9
	ASA 3	18.1	20.7	19.8	21.1
	ASA 4/5	0.4	0.3	0.4	0.2

Table 3.15

Baseline patient characteristics of primary partial knee arthroplasty by hospital service volume

* Note that service volume is defined as the sum of primary procedures per year

Hospitals with >100 knee arthroplasties of any type per year performed 94.7% of the PKA between 2020 and 2025 **(Table 3.15).**

Figure 3.19 demonstrates the highly variable share of PKA as proportion of all primary knee arthroplasties performed between 2020 and 2025, spreading from less than 5% for example in the Cantons NE, GL and OW to numbers clearly above the nationwide mean of 15.3% in BE, LU or TI, with rates reaching more than 30% in Nidwalden, just in direct neighbourhood of OW.

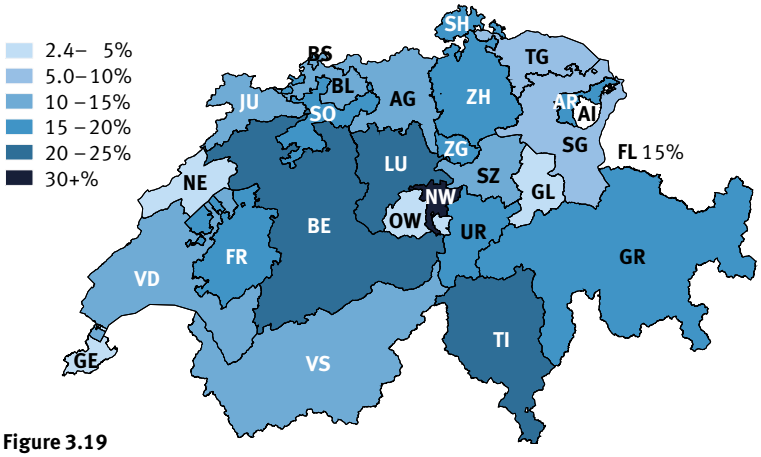


Figure 3.19
Share of partial knee arthroplasty 2020 – 2025

Sex and age

Age at surgery was lower for PKA than for TKA, with the age peak at 55 – 64 years for the former, compared to 65 – 74 years for the latter **(Table 3.16).** In 15.8% of the PKA, the patients were younger than 54 years of age, whereas the age group 75 – 84 years accounted for 16.6% and patients older than 85 years for only 2.2% **(Table 3.16).** Elderly patients are of special interest as surgical and general health risks can be reduced remarkably by PKA compared to TKA.

BMI and ASA-score

The BMI was not recorded in 7% of the cases between 2020 and 2025. The mean BMI of PKA patients was 28.3 kg/m², slightly lower than in TKA (29.2 kg/m²). The ASA-scores were not reported in 4% of the cases registered between 2020 and 2025. Over the whole period, patients with an ASA-score of 3 and 4 represented 19.8%. This was less than in TKA, where ASA-score 3 and 4 represented 20.7% of the cases. The distribution of BMI or ASA score did not vary relevantly over the past six years **(Table 3.16).**

Recipients of PKA were not only healthier but also significantly younger than the TKA cohort (64.9 versus 69.8 years of age) **(Table 3.13 and 3.16).**

Participants are encouraged to provide information about risk factors such as BMI and ASA-score, as it allows risk adjustments for revision rates, which are mostly favourable to the providers.

Underlying diagnosis

Between 2020 and 2025, 89.2% of the OA were classified as primary, the remaining 10.8% being secondary. The latter were composed by 5.2% of osteonecrosis, 2.1% ligament lesion and 2.3% classified as “other reason”. Fractures were rare indications (0.8%). In 0.3% of PKA, the indication provided was inflammatory arthritis **(Table 3.15).** The distribution of the underlying diagnosis did not vary relevantly over the past six years **(Table 3.15).**

		2020	2021	2022	2023	2024	2025	2020-2025
N		**3,150**	**3,213**	**3,435**	**3,457**	**3,756**	**3,951**	**20,962**
Diagnosis [%]	Primary OA*	91.2	89.0	88.7	89.2	88.7	88.4	89.2
	Secondary OA	8.8	11.0	11.3	10.8	11.3	11.6	10.8
	Inflammatory origin	0.2	0.2	0.3	0.3	0.3	0.4	0.3
	Fracture	0.8	0.7	0.9	0.9	0.9	0.8	0.8
	Lesion of ligament	2.1	2.4	2.1	2.0	2.1	2.2	2.1
	Infection	0.0	0.0	0.1	0.0	0.1	0.1	0.0
	Osteonecrosis	4.5	5.5	5.2	5.2	5.6	5.2	5.2
	Other**	1.2	2.1	2.7	2.3	2.4	3.0	2.3
Women [%]		47.8	46.6	44.9	46.5	45.0	46.9	46.3
Mean age (SD)	All	64.6 (10.2)	64.5 (10.0)	65.0 (10.0)	65.0 (10.0)	65.0 (10.1)	65.2 (10.3)	64.9 (10.1)
	Women	64.2 (11.0)	64.3 (10.1)	64.7 (10.4)	64.8 (10.6)	64.4 (10.6)	64.7 (10.8)	64.5 (10.6)
	Men	64.9 (9.5)	64.7 (10.0)	65.3 (9.6)	65.2 (9.5)	65.4 (9.7)	65.7 (9.8)	65.2 (9.7)
Age group [%]	‹45	2.3	1.9	1.5	1.7	1.6	1.9	1.8
	45–54	14.4	14.6	13.4	13.5	13.7	12.7	13.7
	55–64	34.1	34.6	35.2	34.8	34.9	34.6	34.7
	65–74	31.0	31.7	30.9	31.0	30.7	30.6	31.0
	75–84	16.0	15.3	16.8	16.8	16.9	17.7	16.6
	85+	2.2	2.0	2.2	2.2	2.2	2.5	2.2
N unknown BMI (%)		347 (11)	302 (9)	257 (7)	209 (6)	168 (4)	220 (6)	1,503 (7)
N known BMI		2,803	2,911	3,178	3,248	3,588	3,731	19,459
Mean BMI (SD)		28.5 (4.9)	28.4 (5.0)	28.2 (4.7)	28.3 (4.9)	28.3 (4.6)	28.2 (4.8)	28.3 (4.8)
BMI [%]	‹18.5	0.5	0.3	0.2	0.3	0.5	0.8	0.5
	18.5–24.9	24.7	25.8	26.1	25.0	24.0	24.3	24.9
	25–29.9	40.9	39.8	42.5	42.5	42.5	44.2	42.2
	30–34.9	24.8	24.2	23.2	23.6	25.1	22.2	23.8
	35–39.9	7.3	8.0	6.5	6.4	6.3	6.6	6.8
	40+	1.7	1.9	1.4	2.2	1.5	1.8	1.8
N unknown ASA (%)		152 (5)	58 (2)	79 (2)	82 (2)	149 (4)	291 (7)	811 (4)
N known ASA		2,998	3,155	3,356	3,375	3,607	3,660	20,151
Morbidity	ASA 1	14.6	14.9	12.3	11.1	10.7	10.2	12.2
state [%]	ASA 2	68.4	65.9	66.6	67.6	68.0	66.1	67.1
	ASA 3	16.8	18.9	20.8	21.1	20.9	23.3	20.4
	ASA 4/5	0.2	0.3	0.3	0.2	0.4	0.3	0.3

Table 3.16

Primary partial knee arthroplasty: Baseline patient characteristics by year

* As of SIRIS version 2021, this category includes secondary arthritis after meniscus surgery. This category accounts for more than 6% of current entries, but shows large variability between hospitals.

** A small number of newly added cases with secondary OA caused by patellar instability were added to this category.

3.3.4 Revision of primary TKA

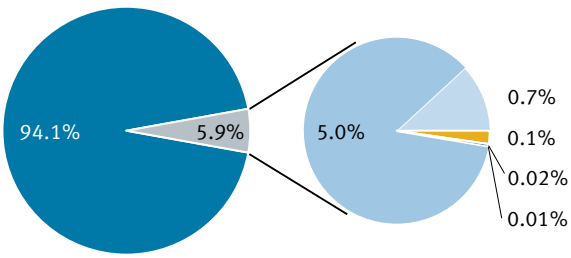
During the current 4-year moving window from 01.01.2020 to 31.12.2023, providing a complete 2-year follow-up until 31.12.2025, a total of 72,398 TKA had been performed. Of those, 2,387 had been revised, resulting in a 2-year revision rate of 3.3% (CI 3.2–3.5%) **(Table 3.17).** The risk of revision within 5 years after primary TKA was 5.9%. Ten years after primary TKA, the global revision rate increased to 8.3% **(Figure 3.20).**

When considering revisions after five years of follow-up, 84.9% were first revisions and 12.2% were revised twice. Third and fourth revisions were rare. For revisions after 10 years of follow-up, 80.7% were revised once, 15.4% twice and 2.9% three times. Fourth and fifth revisions remained rare **(Figure 3.20).**

Sex and age

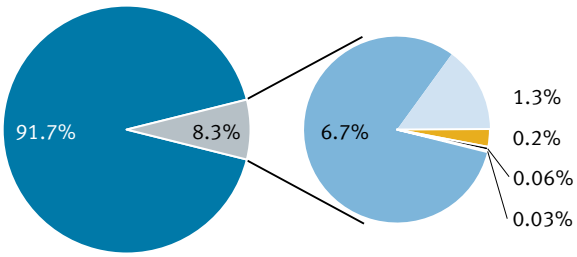
Younger patients were more at risk of early revision, with a two-year revision rate of 5.5% (CI 4.7–6.3%) for the age group ‹55 years of age, and of 3.8% (CI 3.5–4.1%) for the age group 55 – 64 years old. On the other hand, older patients (›75 years) were revised significantly less often than all the other age groups. One reason for this difference could be explained by the higher functional demands of younger patients. Additionally, one could assume that unsatisfactory results after primary TKA were better accepted by older patients due to other compromising medical reasons and possibly higher tolerance for inferior results.

For the first time, men (3.5%, CI 3.5–3.7%) were revised statistically significantly more often within 24 months than women (3.0%, CI 2.9–3.2%) **(Table 3.17).**



TKA with 5 years follow-up (2012 – 2020)

no revision	86,160	three revisions	121
one revision	4,590	four revisions	21
two revisions	661	five+ revisions	11



TKA with 10 years follow-up (2012 – 2015)

no revision	27,656	three revisions	72
one revision	2,025	four revisions	17
two revisions	386	five+ revisions	8

Figure 3.20

Risk of revision within 5 years and 10 years after primary TKA in percent

Multi-stage operations are counted as one revision

		Primary	Revised within 24 months			
			Revised		95% CI	
		N at risk*	N	%**	lower	upper
Overall (moving average)		72,398	2,387	3.3	3.2	3.5
Diagnosis	Primary OA	63,286	2,003	3.2	3.1	3.3
	Secondary OA	9,112	384	4.3	3.9	4.7
Overall Primary OA		63,286	2,003	3.2	3.1	3.3
Sex	Women	38,393	1,151	3.0	2.9	3.2
	Men	24,893	852	3.5	3.3	3.7
Age	‹55	2,929	159	5.5	4.7	6.3
group [%]	55–64	14,562	553	3.8	3.5	4.1
	65–74	22,974	730	3.2	3.0	3.4
	75–84	19,905	496	2.5	2.3	2.8
	85+	2,914	65	2.3	1.8	2.9
BMI group	‹18.5	282	10	3.6	2.0	6.6
	18.5–24.9	1,441	364	3.0	2.7	3.3
	25–29.9	21,913	657	3.0	2.8	3.3
	30–34.9	14,603	457	3.2	2.9	3.5
	35–39.9	6,186	237	3.9	3.4	4.4
	40+	2,596	89	3.5	2.8	4.2
	BMI unknown	5,265	189	3.6	3.2	4.2
Morbidity	ASA 1	3,846	112	2.9	2.4	3.5
state	ASA 2	38,300	1,202	3.2	3.0	3.3
	ASA 3	18,664	610	3.3	3.1	3.6
	ASA 4/5	272	13	5.0	2.9	8.4
	ASA unknown	2,204	66	3.0	2.4	3.9

Table 3.17

First revision of primary total knee arthroplasty within 24 months overall and according to baseline characteristics

4-year moving average covering implants between 01.01.2020 and 31.12.2023, with two years follow-up (31.12.2025)

* Number of patients with at least two years follow-up (i.e. primary prosthesis in moving average).

** Rates adjusted for effects of mortality and emigration.

BMI and ASA-score

The BMI was moderately associated with short-term revision rates. Normal weight patients had the lowest early revision rate. With BMI ›30 kg/m², the 2-year revision rate increased to 3.2% (CI 2.9–3.5%), while it reached 3.9% (CI 3.4–4.4%) at BMI ›35 kg/m². The latter value represents a statistically significant difference from the normal weight reference group. Small numbers may have influenced the apparently increased revision rate in low BMI patients, as only 282 TKA patients had a BMI ‹18.5 kg/m² and accounted for only 10 early revisions. One single revision more or less could therefore dramatically influence the outcome. Small group size is also reflected by a wide confidence interval (CI 2.0–6.6%).

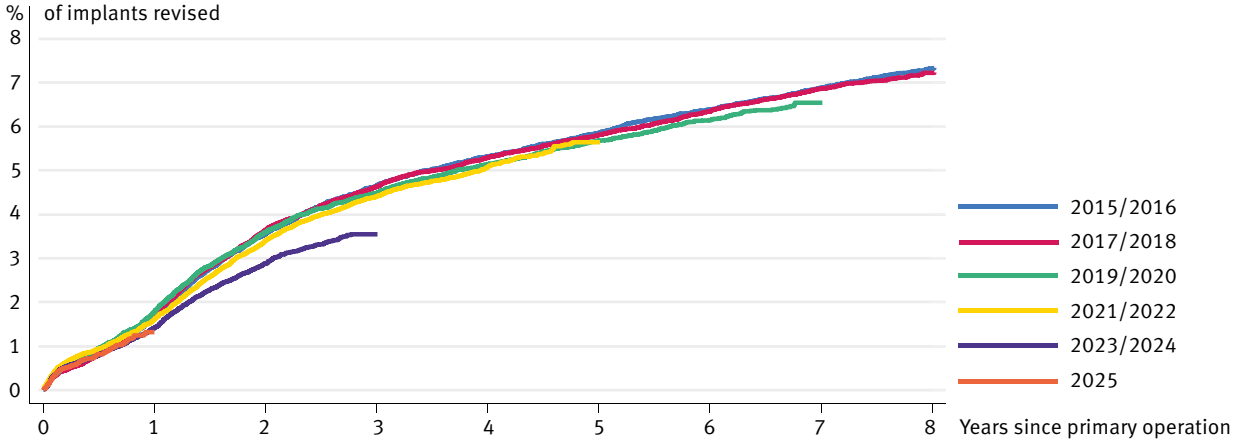
Patients with ASA-score 4 or 5 tended to be revised more often, the difference however remaining statistically not significant, again due to a wide confidence interval because of small sample size **(Table 3.17).**

Underlying diagnosis

Whereas the 2-year revision rate was 3.2% (CI 3.1–3.3%) in primary OA, this increased significantly to 4.3% (CI 3.9–4.7%) in secondary OA. This is however mainly an effect of the age difference at the index arthroplasty, which was 70.4 years on average between 2020 and 2025 for primary OA, compared to 65.4 years for secondary OA **(Table 3.14).** Please refer also to chapter 3.3.2.

TKA revision rates over time

Comparing the revision rates of TKA over different time periods using Kaplan-Meier estimates, a trend towards continuous improvement may be observed since 2021/2022 **(Figure 3.21).** TKA revision rates for the period 2023/2024 had logically a follow-up limited to three years only but were significantly reduced compared to all previous periods. Such improvements over time would be one of the main goals of an implant registry.



Failure rate	1 year	2 years	3 years	4 years	5 years	6 years	7 years	8 years
2015/2016	**1.6** (1.5-1.8)	**3.6** (3.3-3.8)	**4.7** (4.4-4.9)	**5.3** (5.0-5.6)	**5.8** (5.6-6.1)	**6.4** (6.1-6.7)	**6.9** (6.6-7.2)	**7.3** (7.0-7.6)
2017/2018	**1.7** (1.6-1.9)	**3.6** (3.4-3.9)	**4.6** (4.4-4.9)	**5.3** (5.0-5.5)	**5.8** (5.5-6.1)	**6.3** (6.1-6.6)	**6.8** (6.5-7.1)	**7.2** (6.9-7.5)
2019/2020	**1.8** (1.6-2.0)	**3.6** (3.4-3.8)	**4.5** (4.2-4.7)	**5.1** (4.9-5.4)	**5.7** (5.4-5.9)	**6.1** (5.9-6.4)		
2021/2022	**1.6** (1.5-1.7)	**3.4** (3.2-3.6)	**4.4** (4.2-4.6)	**5.1** (4.8-5.3)				
2023/2024	**1.4** (1.3-1.5)	**2.9** (2.7-3.0)						
2025	**1.3** (1.2-1.4)							

Figure 3.21

Kaplan Meier estimate of cumulative postoperative revision risk after TKA by time period

Time since operation, 2012–2025, all services, all diagnoses

3.3.5 Revision of primary PKA

Compared to previous years up to 2021, the revision rate of PKA has increased, as it did for TKA. The reason for this is likely the improved linkage rate, leading to the detection of formerly unrecognised revisions.

Of the 39,914 PKA documented since 2012, 13,255 had been performed between 01.01.2020 and 31.12.2023 and were at risk for revision in the 4-year moving window used to calculate the current 2-year revision rate. Of the implants in this cohort, 625 were revised, accounting for a 2-year revision rate of 4.7% (CI 4.4–5.1%) **(Table 5.9).** The risk of revision 5 years after primary PKA was 8.6%, compared to 5.9% within 5 years after primary TKA (see 3.3.4).

At 5 years after primary PKA, 84.5% of the cases had been revised once, 12.7% twice, and 2% were third revisions **(Figure 3.22).**

There was a significant difference in survival of TKA compared to PKA, being significant from the first postoperative year onwards, as depicted in a cumulative Kaplan-Meier estimate **(Figure 3.23).** At 13 years, the revision rate for TKA was 9.0% (8.7–9.3%), whereas it was 17.0% (16.1–17.9%) for PKA. As progression of OA was the second most reason for revision at two years after PKA **(Table 5.10)** with continuously steep increasing progression over time **(Figure 5.27)** one could question if parts of the higher revision rate of PKA was due to poor indication or poor surgical technique e.g. by provoking contralateral OA in case of overstuffing and overcorrecting alignment.

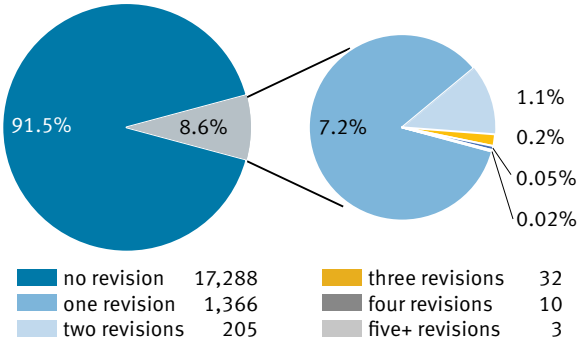
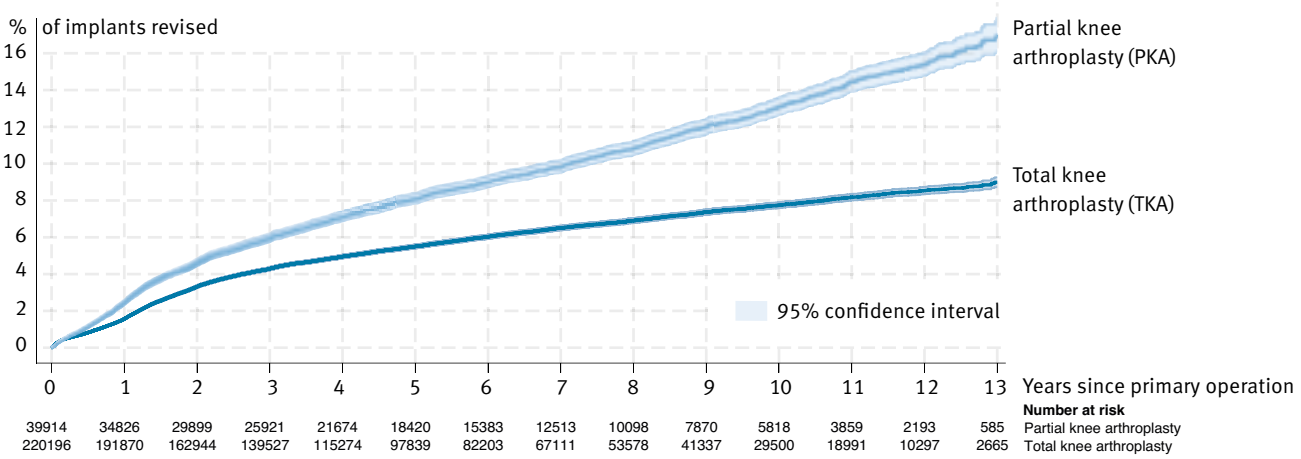


Figure 3.22

Risk of revision within 5 years after primary PKA in percent

2012 – 2020. Multi-stage operations are counted as one revision.



Failure rate	1 year	2 years	3 years	5 years	6 years	8 years	9 years	10 years	13 years
TKA	**1.6** (1.5-1.6)	**3.3** (3.3-3.4)	**4.3** (4.2-4.4)	**5.5** (5.4-5.6)	**6.0** (5.9-6.2)	**6.9** (6.8-7.0)	**7.4** (7.2-7.5)	**7.7** (7.6-7.9)	**9.0** (8.7-9.3)
PKA	**2.5** (2.3-2.6)	**4.6** (4.4-4.9)	**6.0** (5.7-6.2)	**8.1** (7.8-8.4)	**9.0** (8.7-9.4)	**10.9** (10.5-11.3)	**12.0** (11.6-12.5)	**13.1** (12.6-13.6)	**17.0** (16.1-17.9)

Figure 3.23

Kaplan Meier estimate of cumulative postoperative revision risk after primary knee arthroplasty

Time since operation, 2012–2025, all services, all diagnoses.

Sex and age

Younger patients had a significantly higher revision risk, with two-year revision rates of 6.4% (CI 5.4–7.7%) in the age group under 55 years of age, compared to 3.3% (CI 2.6–4.2%) in the age group 75 – 84 years. As in TKA, younger patients were more prone to early revision, reflecting the higher functional demands in this group and perhaps more acceptance of inferior results by older patients due to lower activity levels or because of reluctance of any additional surgery.

The 2-year revision rates for women were 5.1% (CI 4.5–5.7%), whereas for men it was 4.1% (CI 3.7–4.7%), a difference not statistically significant **(Table 5.9).** Nevertheless, it is noteworthy that men tended to be revised less often than women, in contrast to TKA (see 3.3.4). This could possibly be attributed to worse bone quality in elderly women. This could lead to an increased risk for periprosthetic fractures mainly at the tibial side especially when combined with small size and slightly deeper resection.

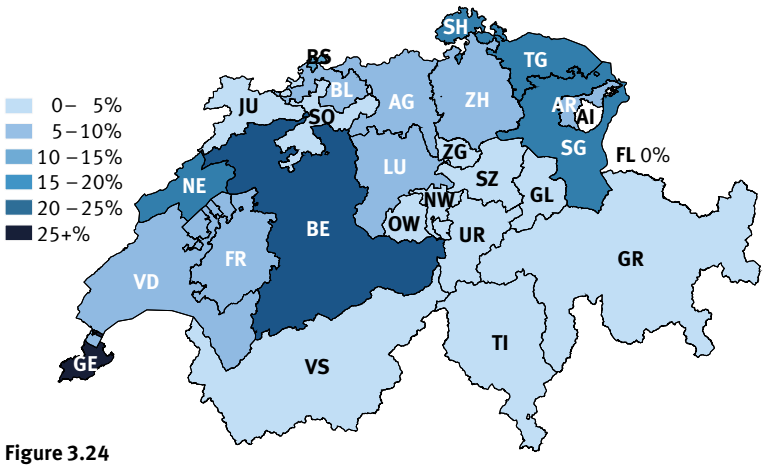


Figure 3.24
Share of robotic-assisted total knee arthroplasty 2021 – 2025

3.3.6 Regional data

In this section regional heterogeneity is presented concerning different selected topics in TKA and PKA or revision of TKA and PKA in Switzerland. Implant selection greatly depends on surgeons' preferences, is influenced by cultural, educational, traditional and systemic differences concerning concepts in knee arthroplasty, and is a topic discussed worldwide. As discussed in the Introduction, Switzerland is an orthopaedic melting pot, explaining the richness of solutions available for evaluation in SIRIS. As differences may not change on a yearly cycle, we would like to focus on some topics every year.

To get informed about regional differences in growth rate of TKA and PKA, types of knee systems or inserts used, or prevalences of patella resurfacing, please consult the annual report 2025. Please refer to the annual report 2021 regarding more details about patella resurfacing. Particularly, it could be demonstrated that whether the patella is resurfaced primarily or not is more dependent on the surgeon's personal preference than on the knee system type or the geographic region.

Share of robotic-assisted TKA

The share of technical support in TKA has increased in Switzerland from 28.5% in 2020 to 45.5% in 2025 for all technologies. Robotic assistance progressed from 3.1% in 2020 to 19.4% in 2025 and this increased proportion over this period of time. Several robotic systems were introduced by different manufacturers into the market over the past 5 years. Most of them are closed systems linked to implants. The technology can be categorized mainly into image-free and image-based assistance.

Figure 3.24 demonstrates that robotics was not introduced uniformly in Switzerland. The Cantons GE and BE were the hot spots between 2021 to 2025, followed by NE, SH, TH and SG.

3.3.7 Data by hospitals

In 2025, 138 hospital services registered TKA, 123 provided PKA, and 135 revision arthroplasty of the knee **(Tables 3.18 and 3.19).** SIRIS has achieved a 100% participation rate of the hospital services since 2018 for primary TKA and PKA, as well as revision arthroplasty for relevant institutions. As SIRIS is highly dependent on data quality, such a deed merits congratulations of the providers.

Number of procedures per year

The median annual number of primary TKA per hospital increased from 67 in 2015 to 120 in 2025, a clear increase in volume per unit. **Tables 3.18 and 3.19** highlight the distribution of case numbers within service size categories (yearly numbers of procedures ‹100, 100 – 199, 200 – 300, ›300). In absolute numbers, primary TKA performed in units with a yearly volume ‹100 decreased from 2,721 in 2020 to 2,288 in 2025, corresponding to a market share decrease from 17.7% to 10.0%. A similar effect took place in services with a volume of 100–199 TKA per year. The reduction in absolute numbers also resulted in a decreasing market share of 30.5% in 2020 to 17.0% in 2025. On the other hand, services with annual volumes 200–299 and ›300 TKA profited of an increasing number of procedures and their market share. For TKA units in the category 200–299 cases/year, numbers increased from 3,240 cases (21.0%) in 2020 to 5,352 cases (23.5%), whereas this was even more pronounced for TKA units ›300 cases/year, with numbers increasing from 4,754 cases (30.8%) in 2020 to 11,279 (49.5%) in 2025. **Figure 3.25** highlights that the likelihood of being treated in a large centre varied considerably at the Cantonal level, depending on the geographical location of large centres and their neighbourhood of other centres. The share of patients treated in a large centre exceeded 80% in three Cantons, whilst it was zero – e.g. in some typical mountain Cantons – or below 20% in others.

		2020	2021	2022	2023	2024	2025
Primary arthroplasty of the knee (TKA)	N services	146	145	145	144	142	138
	M per service	77	86	106	111	119	120
Primary partial arthroplasty of the knee	N services	128	127	127	126	122	123
	M per service	12	13	14	14.5	17.5	17
Revision arthroplasty of the knee (TKA or partial)	N services	130	134	135	135	134	135
	M per service	13	12	13	16	13.5	14

Table 3.18

Number of participating hospital services (N) and median procedures (M) per unit per year

		2020	2021	2022	2023	2024	2025
‹100	N procedures (%)	2,721 (17.7)	2,551 (15.4)	2,699 (14.1)	2,904 (14.2)	2,299 (10.7)	2,288 (10.0)
	N services (%)	78 (53.4)	72 (49.3)	65 (44.6)	66 (45.8)	57 (40.1)	53 (38.4)
100–199	N procedures (%)	4,698 (30.5)	4,778 (28.9)	5,551 (28.9)	5,235 (25.5)	4,285 (19.9)	3,884 (17.0)
	N services (%)	39 (26.7)	40 (27.4)	42 (28.9)	38 (26.3)	34 (23.9)	31 (22.5)
200–299	N procedures (%)	3,240 (21.0)	4,041 (24.4)	3,452 (18.0)	3,590 (17.5)	5,475 (25.4)	5,352 (23.5)
	N services (%)	16 (10.9)	19 (13.0)	18 (12.4)	17 (11.8)	27 (19.0)	26 (18.8)
›300	N procedures (%)	4,754 (30.8)	5,185 (31.3)	7,493 (39.0)	8,766 (42.8)	9,509 (44.1)	11,279 (49.5)
	N services (%)	13 (8.9)	14 (9.6)	20 (13.8)	23 (16.0)	24 (16.9)	28 (20.3)

Table 3.19

Number of hospital services and number of primary total knee arthroplasties according to hospital volume*

* Note that service volume is defined as the sum of primary procedures per year

In addition, the number of units performing less than 100 and 100-199 TKA per year decreased from 78 and 39 units respectively in 2020 to 53 and 31 respectively in 2025. During the same period, units performing 200-299 and ›300 TKA per year increased from 16 and 13 respectively in 2020 to 26 and 28 respectively in 2025 **(Table 3.18 and 3.19).** Of course, not all of the units getting larger with time did just increase the number of operations. Some may have integrated more established surgeons, and some may have increased their expertise forming joint ventures or fusing with other services.

On the other hand, a large service does not necessarily indicate that surgery is performed by high volume surgeons. There are services with multiple attending physicians, each of them contributing various numbers of cases. Some of them may perform hundreds of arthroplasties, whereas others contribute only few. In contrast, it may well be that in smaller units only one or a few surgeons are performing arthroplasty – at a comparable frequency as others in large services. Therefore, conclusions about the effect of annual volume on the quality of surgery must be considered with caution.

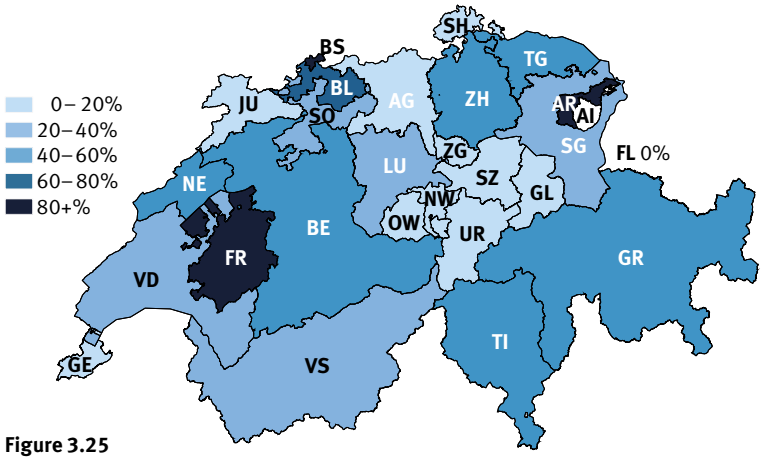


Figure 3.25

Share of total knee arthroplasties in services with 300+ procedures per year, 2020 – 2025

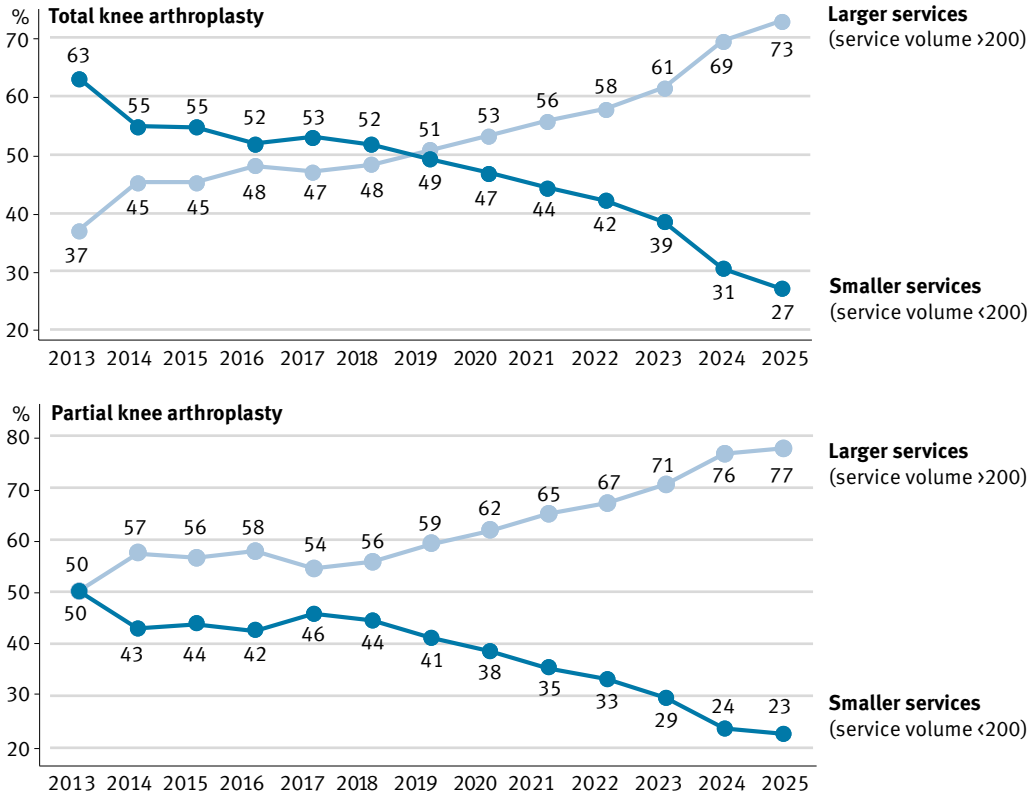


Figure 3.26

What share of selected procedures is performed in hospital services with different service volumes*?

* Note that service volume is defined as the sum of primary procedures per year

Simplifying the classification into centres with less than 200 and more than 200 interventions per year confirms a continuous and even accelerating concentration process over time towards larger centres for TKA. This trend is even more pronounced and occurred earlier for PKA **(Figure 3.26).**

High-volume services tended to perform more PKA and revision arthroplasties than smaller units, while some centres seemed to focus on PKA and/or revision, perhaps reflecting a sort of sub-specialisation **(Figure 3.27).** Hospitals with more than 100 knee arthroplasties of all types per year performed 87.1% of the primary TKA between 2020 and 2025 **(Table 3.20).**

Demography and type of OA

Sex, mean age, age groups, BMI, and distribution of ASA class did not differ among volume categories by hospital (‹100, 100 – 199, 200 – 299, 300+ primary TKA per year) **(Table 3.20).**

Hospital service volume*		‹100	100–199	200–299	300+
N (2020–2025)		**15,087**	**28,573**	**25,123**	**48,170**
Women [%]		58.3	58.8	59.5	58.5
Mean age (SD)	All	70.2 (9.6)	70.1 (9.4)	69.9 (9.5)	69.4 (9.4)
	Women	70.6 (9.6)	70.7 (9.5)	70.3 (9.6)	69.9 (9.5)
	Men	69.5 (9.5)	69.3 (9.2)	69.4 (9.3)	68.7 (9.1)
Age group [%]	‹45	0.5	0.4	0.5	0.5
	45–54	5.4	4.7	5.0	5.5
	55–64	23.2	24.3	24.4	25.7
	65–74	34.6	35.1	35.1	35.5
	75–84	31.2	30.6	30.4	28.9
	85+	5.0	4.9	4.7	3.9
Diagnosis [%]	Primary OA	88.1	88.4	88.6	85.8
	Secondary OA	11.9	11.6	11.4	14.2
N unknown BMI (%)		1,849 (12)	1,440 (5)	932 (4)	3,487 (7)
N known BMI		13,238	27,133	24,191	44,683
Mean BMI (SD)		29.2 (5.6)	29.5 (5.7)	29.3 (5.6)	29.0 (5.4)
BMI [%]	‹18.5	0.6	0.5	0.5	0.5
	18.5–24.9	22.6	20.9	21.6	23.3
	25–29.9	37.8	37.4	37.6	38.7
	30–34.9	24.3	25.8	25.4	24.3
	35–39.9	10.7	10.8	10.4	9.5
	40+	4.1	4.7	4.5	3.8
N unknown ASA (%)		397 (3)	608 (2)	600 (2)	2,747 (6)
N known ASA		14,690	27,965	24,523	45,423
ASA state [%]	ASA 1	6.4	6.0	5.6	7.3
	ASA 2	61.8	62.2	61.9	62.6
	ASA 3	31.1	31.2	31.9	29.8
	ASA 4/5	0.7	0.5	0.5	0.3

Table 3.20

Baseline patient characteristics of primary total knee arthroplasty by hospital service volume

* Note that service volume is defined as the sum of primary procedures per year

The most frequent indication for TKA had been classified as primary OA, representing 87.3% of the cases over the period 2020 to 2025 **(Table 3.13).** Reporting of OA class (primary or secondary) varied remarkably in the 42 hospitals with more than 200 procedures per year. Primary OA was registered as the diagnosis leading to the operation between 44% (hospital 1) and up to 94% of the cases (hospital 42), indicating varying practice in coding of diagnosis **(Figure 3.28).** In units with a high share of secondary OA, a meniscectomy was indicated most frequently (up to 30% in hospital 2) as a previous operation, although this diagnosis does not significantly influence demography nor outcome after knee arthroplasty and is thus included among primary OA cases for calculations of revision rates. The higher share of secondary OA in some hospitals can partially be explained by the introduction of more reporting options with the 2015 version of the CFR. Rates of secondary OA due to other causes also greatly varied among the high-volume centres, similarly to proportions of post meniscectomy OA.

A technical bias towards primary OA is possible in reporting, as this diagnosis is on the top in the selection menu and thus possibly decreases the probability of selecting other alternatives, even if more appropriate. Real discrepancies in patient demographics among the 36 high-volume hospitals do not explain

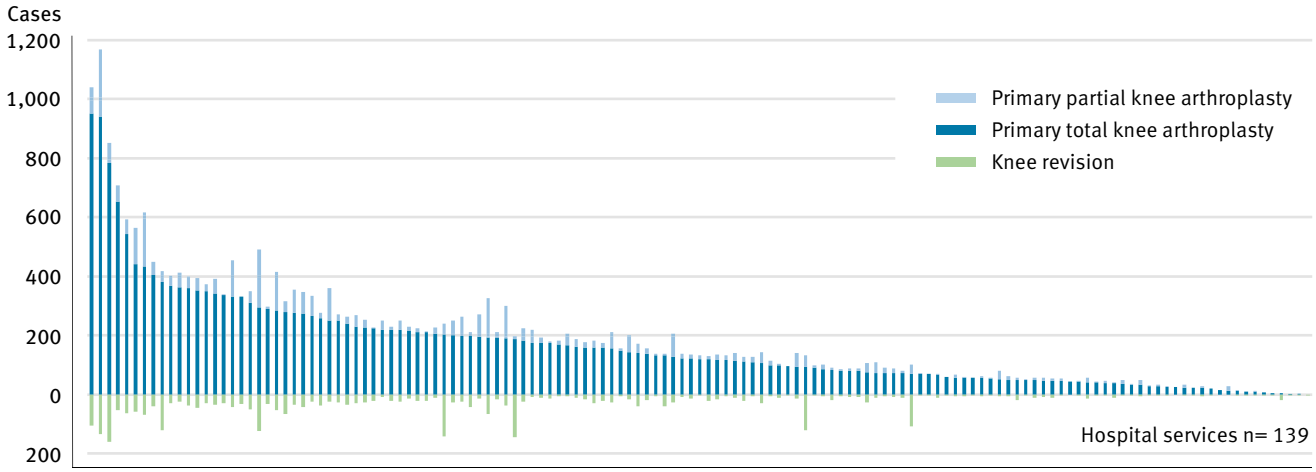


Figure 3.27

Cases per hospital service 2025: Total and partial knee arthroplasty

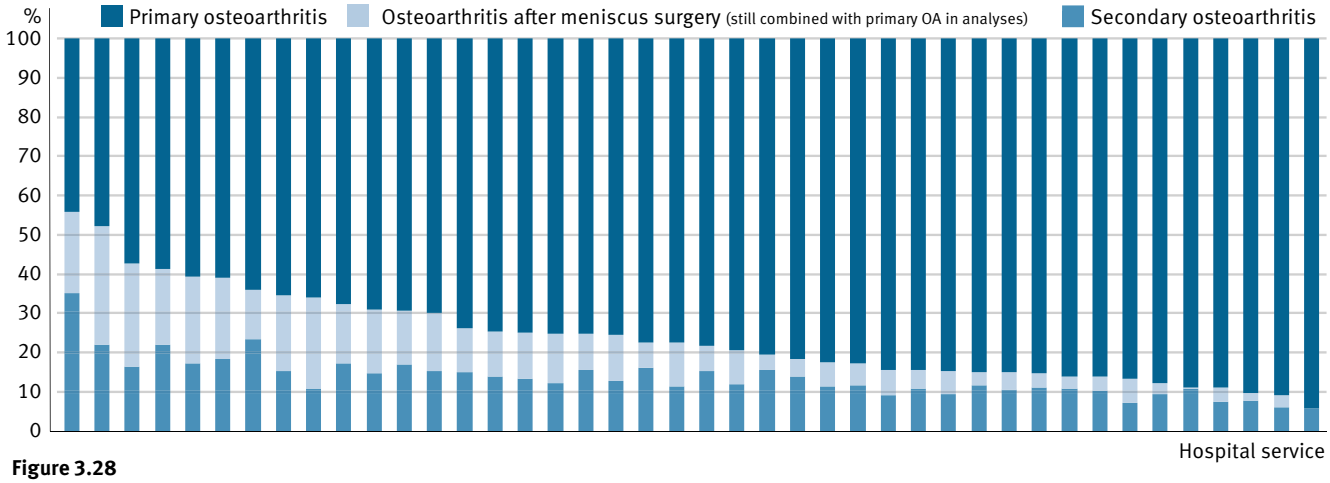


Figure 3.28

Distributions of different diagnoses in 42 hospitals >200 cases (2025)

these considerable differences, as all other parameters were comparable. Increasing rates of secondary OA risk can influence revision rates, a benchmark established solely on arthroplasty performed for primary OA, where OA after meniscectomy is included. Providers are encouraged to improve coding as proper identification of secondary OA is necessary for correct benchmarking, just as comorbidities like BMI or ASA-scores.

Two-year revision rates for TKA and PKA

Funnel plots **(Figures 3.29 – 3.31)** illustrate risk-adjusted early revision rates for primary OA, considering age, sex, BMI, ASA, and Charnley scores for risk adjustment, as available, for TKA including and excluding isolated secondary patella resurfacing, and PKA. Each dot represents a hospital service. The spread of outcomes in Switzerland was relatively homogeneous, although there were exceptions, and there appears to be more variation with knee than with hip procedures. More clinics with elevated revision rates (orange dots) and outliers (red dots) could be identified for both TKA and PKA than for THA.

When isolated secondary patella resurfacing in primary TKA is excluded, the spread of results becomes less pronounced, with numbers of outliers decreasing from 3 to 1, unfortunately leaving one mid-volume hospital **(Figures 3.29 – 3.31) .** However, any addition of an implant, such as a secondary patella resurfacing or an additional PKA, is by definition a revision in arthroplasty. If a secondary patella resurfacing has to be performed within two years of the primary TKA, it cannot be considered as a good result. Considering Kaplan-Meier estimation of cumulative revision risk, a lower revision risk after primary TKA can be assumed in the cohort 2023/2024 in the short term compared to the previous years. This was statistically significant at two years whereas the numbers are not yet completed for three years of follow-up **(Figure 3.21).**

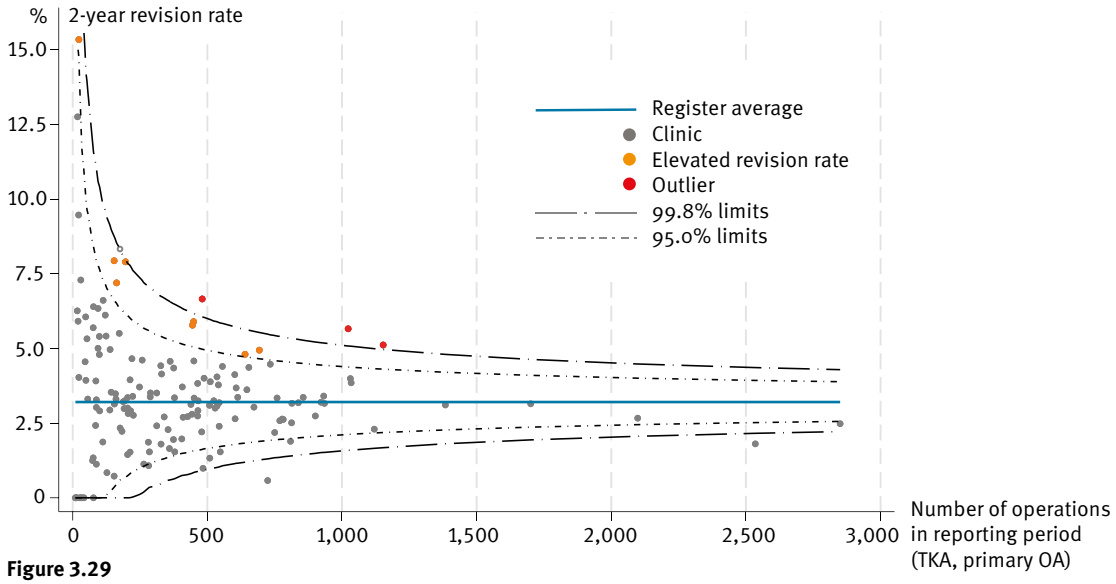


Figure 3.29

2-year revision rate of primary total knee arthroplasty by service*

TKA results restricted to patients with primary osteoarthritis (prim OA). Results are risk-adjusted for age, sex and BMI, ASA, Charnley Score if available

*Number of operations in the reporting period 01/2020–12/2023 (4-year moving average, follow-up to 12/2025)

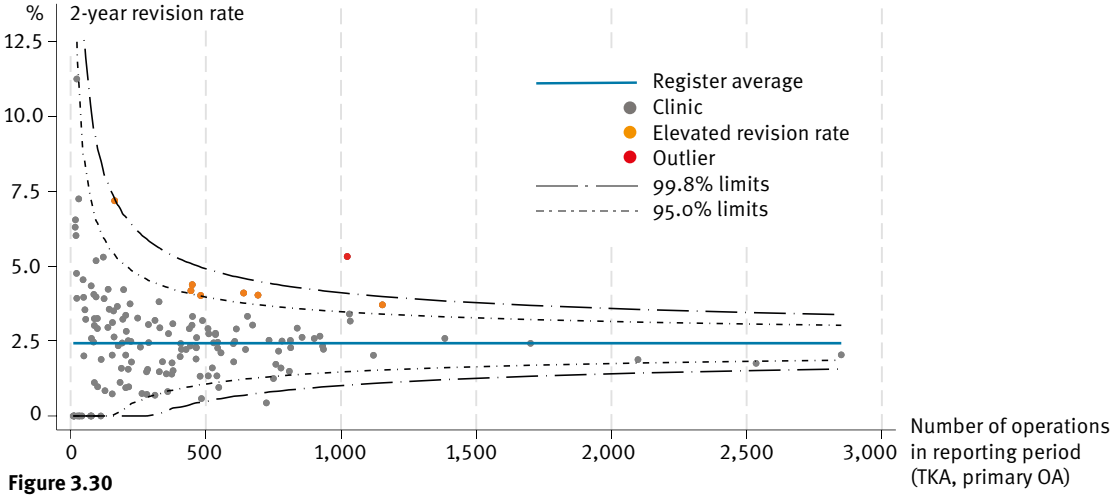


Figure 3.30

2-year revision rate of primary total knee arthroplasty by service*, without isolated secondary patella resurfacing

TKA results restricted to patients with primary osteoarthritis (prim OA). Results are risk-adjusted for age, sex and BMI, ASA, Charnley Score if available

*Number of operations in the reporting period 01/2020–12/2023 (4-year moving average, follow-up to 12/2025)

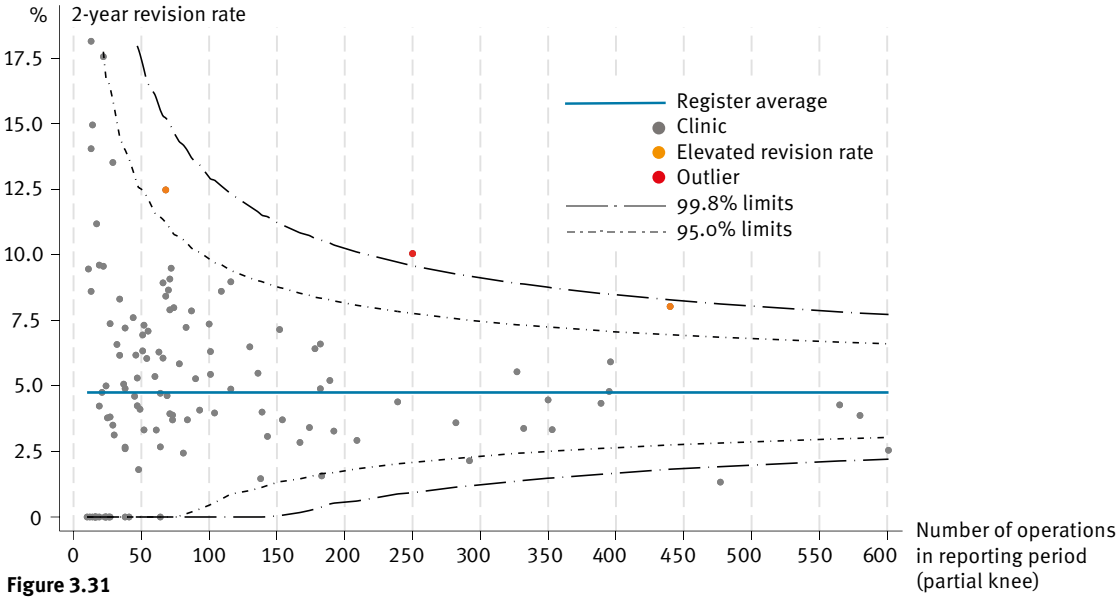


Figure 3.31

2-year revision rate of partial knee arthroplasty by service*

PKA results restricted to patients with primary osteoarthritis (prim OA). Results are risk-adjusted for age, sex and BMI, ASA, Charnley Score if available

*Number of operations in the reporting period 01/2020–12/2023 (4-year moving average, follow-up to 12/2025)

Interpretation of funnel plots

- The coloured line denotes the Swiss average 2-year revision rate
- Clinics that lie between the 95% limits (grey dots) have revision rates that are within the statistically expected range of observations given their operation volume
- Clinics below the 95/99.8% limits are performing better than the average
- Clinics above the 95% limit and below the 99.8% limit (orange dots) have elevated 2-year revision rates. This could be due to random variation, but we recommend that possible reasons are investigated, in particular if the position should be stable over time or worsen.
- Clinics above the 99.8% limit (red dots) have 2-year revision rates that deviate markedly from the national average (unlikely to be due to random variation alone).

3.4 Shoulder arthroplasty

The SIRIS Shoulder registry was introduced on 1 January 2025, extending the national arthroplasty registry to shoulder replacement surgery. Registration was initially voluntary and became mandatory on 1 July 2025. The first year of registration therefore provides an initial nationwide overview of primary shoulder arthroplasty and revision or reoperation procedures in Switzerland and the Principality of Liechtenstein.

3.4.1 Nationwide data, including the Principality of Liechtenstein

During the first year of the SIRIS Shoulder registry, a total of 4,511 primary shoulder arthroplasties were registered. Reverse total shoulder arthroplasty (rTSA) was by far the most frequently performed procedure, accounting for 4,046 cases (89.7%). Anatomical total shoulder arthroplasty (aTSA) was performed in 397 cases (8.8%), while 68 patients (1.5%) received a hemiarthroplasty (HSA).

The marked predominance of rTSA demonstrates its central role in contemporary shoulder arthroplasty practice in Switzerland. Almost nine out of ten primary shoulder arthroplasties registered during the first year were reverse replacements, whereas anatomical total shoulder arthroplasty and hemiarthroplasty together accounted for only approximately one in ten procedures.

Registry coverage

In 2025, 131 hospital services reported primary total shoulder arthroplasties to SIRIS, with a median of 25 procedures per service. Hemiarthroplasty was performed in 42 services. More detailed analyses of procedure volumes and differences between hospital services are presented in Section 3.4.5.

Revision and reoperation procedures

During the same period, 427 revision or reoperation procedures were registered in 82 hospital services. Of these, 94 (22.0%) could be linked to a primary shoulder arthroplasty already recorded in SIRIS, whereas 333 (78.0%) were unlinked. The high proportion of unlinked procedures is expected during the initial phase of a newly established registry, as most index arthroplasties leading to revision in 2025 had been performed before the introduction of SIRIS Shoulder.

With increasing duration of registration, the proportion of revisions that can be linked to their corresponding index arthroplasty is expected to increase progressively, allowing more robust calculation of revision rates and implant survival in the future **(Table 3.21).**

Year	Primary aTSA	Primary rTSA	Primary HSA1	Primary total	Share of rTSA	Linked Rev./Reop. of aTSA2	Linked Rev./Reop. of rTSA2	Linked Rev./Reop. total	Unlinked Rev./Reop. of aTSA	Unlinked Rev./Reop. of rTSA	Rev./Reop. on total3	Share of Linked Rev./Reop.
2025	397	4,046	68	4,511	89.7%	4	89	94	62	194	427	22.0%

Table 3.21

Total and partial shoulder arthroplasty (aTSA, rTSA, HSA), primary and revisions/reoperations

All documented operations

[1] Hemi Shoulder Arthroplasty
[2] i.e. primaries already registered in SIRIS
[3] can be of aTSA, rTSA or HSA

3.4.2 Primary shoulder arthroplasty

Sex and age

In 2025, demographic characteristics differed considerably according to the type of primary shoulder arthroplasty performed. Women represented 62.2% of patients undergoing rTSA, compared with 49.1% for aTSA and 39.7% for HSA.

Patients undergoing rTSA were substantially older, with a mean age of 74.5 years, compared with 63.5 years for aTSA and 60.3 years for HSA. Women were older than men for all three types of arthroplasty. Mean age was 76.0 years for women and 72.0 years for men undergoing rTSA, 65.9 and 61.2 years for aTSA, and 62.5 and 58.8 years for HSA, respectively.

The differences were also apparent across age groups. More than half (55.1%) of rTSA were performed in patients aged 75 years or older, including 10.4% in patients aged 85 years or older. In contrast, aTSA was most frequently performed between 55 and 74 years of age, with 42.3% of patients aged 55–64 years and 30.5% aged 65–74 years. HSA was performed in a distinctly younger and more heterogeneous population: 41.2% of patients were younger than 55 years, compared with 14.4% for aTSA and only 1.8% for rTSA **(Figure 3.32).**

These demographic differences reflect, at least in part, the different underlying indications for the three types of shoulder arthroplasty, which are discussed below.

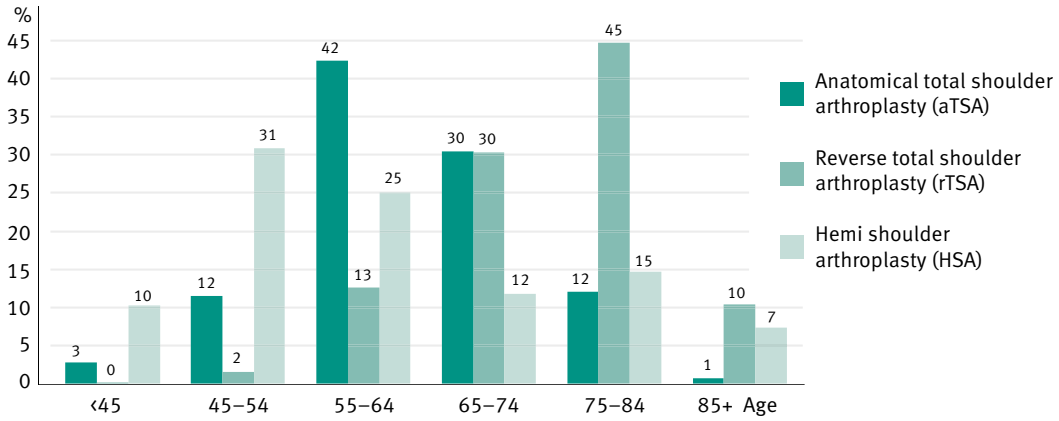


Figure 3.32

Age distribution at surgery for primary anatomical total shoulder arthroplasty (aTSA), reverse total shoulder arthroplasty (rTSA) and hemiarthroplasty (HSA) in 2025.

All documented operations

BMI and ASA score

BMI was available for more than 96% of patients in all three arthroplasty groups. The proportion of missing BMI data was 3.3% for aTSA, 3.4% for rTSA and 4.4% for HSA. Mean BMI was 29.0 kg/m² for aTSA, 27.9 kg/m² for rTSA and 26.9 kg/m² for HSA.

Overweight and obesity were common in all three groups. A BMI of 25 kg/m² or higher was recorded in 66.7% of aTSA, 65.5% of rTSA and 56.9% of HSA patients. Severe obesity was uncommon, with a BMI of 40 kg/m² or higher in 1.8%, 2.3% and 3.1% of aTSA, rTSA and HSA patients, respectively.

For rTSA, increasing BMI was associated with a progressively younger age at surgery. Mean age decreased from 75.6 years in patients with normal weight (BMI 18.5–24.9 kg/m²) to 73.0 years in those with a BMI of 30–34.9 kg/m² and 68.8 years in patients with a BMI ≥40 kg/m². Thus, patients with severe obesity underwent rTSA approximately seven years earlier than patients with normal weight **(Figure 3.33).**

ASA score was available for more than 98% of patients. Patients undergoing rTSA had a higher comorbidity burden than those undergoing aTSA. ASA class 3 or higher was recorded in 45.9% of rTSA patients, compared with 22.1% of aTSA and 32.4% of HSA patients. Conversely, 77.9% of aTSA patients were classified as ASA 1 or 2, compared with 54.1% for rTSA and 67.6% for HSA.

Underlying diagnosis

The underlying diagnosis differed markedly between the three types of primary shoulder arthroplasty. Primary osteoarthritis was by far the most frequent indication for aTSA, accounting for 82.4% of cases, followed by secondary osteoarthritis (12.6%) and osteonecrosis (3.3%). Acute fracture (0.8%), dislocation or instability (0.5%) and other diagnoses (0.5%) were uncommon indications for aTSA.

The indications for rTSA were considerably more diverse. Cuff tear arthropathy (CTA) was the most frequent diagnosis, accounting for 36.7% of cases, followed by primary osteoarthritis (23.1%) and acute fracture within 21 days (18.5%). Massive cuff tear without arthritis represented another important indication, accounting for 11.5% of rTSA. Secondary

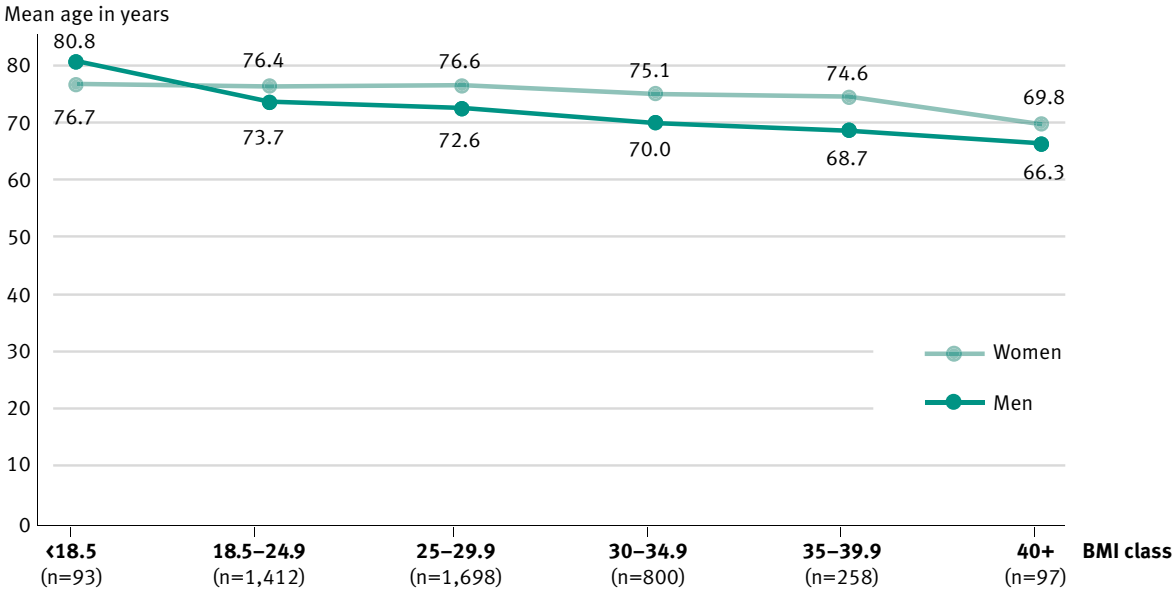


Figure 3.33

Mean age at primary reverse total shoulder arthroplasty according to BMI class and sex in 2025.

All documented operations. Please note that group sizes vary considerably.

osteoarthritis accounted for 4.1%, chronic fracture for 2.1%, dislocation or instability for 1.7%, and osteonecrosis for 1.4%. Rheumatoid arthritis (0.2%), tumour (0.1%) and other main diagnoses (0.7%) were rare.

HSA accounted for only a small proportion of primary shoulder arthroplasties and was used for a particularly heterogeneous spectrum of diagnoses. Primary osteoarthritis was the most frequently recorded indication (35.3%), followed by secondary osteoarthritis and osteonecrosis (14.7% each), acute fracture (13.2%) and CTA (11.8%). Tumour accounted for 4.4%, chronic fracture for 2.9%, and dislocation or instability and massive cuff tear without arthritis for 1.5% each.

The considerable differences in the distribution of underlying diagnoses help explain the distinct age, sex and comorbidity profiles observed between rTSA, aTSA and HSA. Detailed baseline characteristics are summarised in **Table 3.22.**

3.4.3 Revision shoulder arthroplasty

During the first year of SIRIS Shoulder, 427 revision or reoperation procedures were registered. Of these, 94 (22.0%) could be linked to a primary shoulder arthroplasty registered in SIRIS, whereas 333 (78.0%) were unlinked. The predominance of unlinked procedures is expected during the initial phase of the registry, as most shoulder arthroplasties undergoing revision in 2025 had been implanted before the introduction of SIRIS Shoulder.

Among the 94 linked procedures, 89 followed rTSA and four followed aTSA; one procedure was not assigned to either category in the available summary data. Given the recent introduction of the registry and the consequently limited number of linked procedures, meaningful calculation of revision rates and detailed subgroup analyses are not yet possible. These analyses will become increasingly relevant as follow-up and linkage rates increase.

Sex and age

The sex distribution of revision or reoperation cases did not match the distribution in primary cases. 55% of patients were male. This includes 42.4% of revised aTSA cases, 50% of HSA cases, and 56.2% of rTSA cases. The mean age at revision or reoperation was 71.2 years (SD 10.5), but reflecting the age distribution of primary cases this was 66.1 years for HSA, 68.1 years for aTSA and 72.9 years for rTSA patients. The typical age bracket for HSA revision was 55–64 (33.3% of patients were in that bracket), for aTSA revision it was 65–74 (36.4%), and for rTSA revision it was 75–84 (38.1%).

BMI and ASA score

Completion of BMI and ASA data in revision or reoperation procedures was comparable to primary cases with 2.6% missing BMI and also 2.6% missing ASA values. The BMI distribution was very similar in primary and revision cases. The biggest group (BMI 25–29.9) accounted for 36.4% overall, or 38.5% in the largest (rTSA) group. ASA values were slightly higher on average in revision or reoperation cases. 52.6% had an ASA value of 3 (severe comorbidities). This reflected mainly a certain shift from 2 to 3 as the typical ASA category reported, with practically nothing changing at the lower and upper end of the scale.

		aTSA	rTSA	HSA
N		**397**	**4,046**	**68**
Diagnosis [%]	Primary osteoarthritis	82.4	23.1	35.3
	Cuff tear arthropathy (CTA)	0.0	36.7	11.8
	Acute fracture (within 21 days)	0.8	18.5	13.2
	Chronic fracture	0.0	2.1	2.9
	Secondary osteoarthritis	12.6	4.1	14.7
	Dislocation / instability	0.5	1.7	1.5
	Osteonecrosis / avascular necrosis	3.3	1.4	14.7
	Rheumatoid arthritis	0.0	0.2	0.0
	Tumour	0.0	0.1	4.4
	Massive cuff tear without arthritis	0.0	11.5	1.5
	Other main diagnosis	0.5	0.7	0.0
Women [%]		49.1	62.2	39.7
Mean age (SD)	All	63.5 (9.3)	74.5 (8.8)	60.3 (14.3)
	Women	65.9 (9.4)	76.0 (8.2)	62.5 (14.8)
	Men	61.2 (8.6)	72.0 (9.3)	58.8 (13.9)
Age group [%]	‹45	2.8	0.2	10.3
	45–54	11.6	1.6	30.9
	55–64	42.3	12.7	25.0
	65–74	30.5	30.4	11.8
	75–84	12.1	44.7	14.7
	85+	0.8	10.4	7.4
N unknown BMI (%)		13 (3.3)	137 (3.4)	3 (4.4)
N known BMI		384	3,909	65
Mean BMI (SD)		29.0 (11.0)	27.9 (5.1)	26.9 (4.5)
BMI [%]	‹18.5	2.3	2.1	1.5
	18.5–24.9	31.0	32.4	41.5
	25–29.9	40.6	38.9	32.3
	30–34.9	18.0	18.4	15.4
	35–39.9	6.3	5.9	6.2
	40+	1.8	2.3	3.1
N unknown ASA (%)		4 (1.1)	70 (1.7)	0
N known ASA		393	3,976	68
Morbidity state	ASA 1	8.1	3.3	11.8
[%]	ASA 2	69.7	50.8	55.9
	ASA 3	21.4	44.5	30.9
	ASA 4/5	0.8	1.4	1.5

Table 3.22

Primary shoulder arthroplasty: Baseline patient characteristics by year

3.4.4 Regional data

Regional variation in shoulder arthroplasty practice was already apparent during the first year of SIRIS Shoulder. The number of primary shoulder arthroplasties differed considerably between cantons, reflecting differences in population size, hospital structures and referral patterns. As SIRIS records procedures according to the treating hospital rather than necessarily the canton of residence of the patient, these data should not be interpreted as population-based cantonal incidence rates.

Type of shoulder arthroplasty

Despite rTSA accounting for almost 90% of primary shoulder arthroplasties nationwide, its relative use was far from homogeneous across Switzerland. Among cantons with at least 20 registered primary shoulder arthroplasties, the proportion of rTSA ranged across all categories from 75–80% to 95–100% **(Figure 3.35).**

Particularly high proportions of rTSA were observed in several cantons, including Vaud, Solothurn, Basel-Landschaft, Thurgau and Schwyz, where rTSA accounted for 95–100% of primary shoulder arthroplasties. Proportions of 90–95% were observed in several other cantons, including Neuchâtel, Aargau, Lucerne and Ticino. In contrast, Fribourg was among the cantons with the lowest proportion of rTSA and consequently a comparatively high use of aTSA.

The geographic distribution therefore suggests substantial variation in the choice between reverse and anatomical shoulder arthroplasty across Switzerland despite the strong nationwide predominance of rTSA. These differences may reflect variation in patient populations and underlying indications, but also differences in referral patterns and local surgical practice. Interpretation should remain cautious during this initial reporting period, particularly because registration was voluntary during the first six months of 2025. Continued mandatory registration will allow regional practice patterns and their evolution over time to be assessed more reliably in future reports. **(Figure 3.34).**

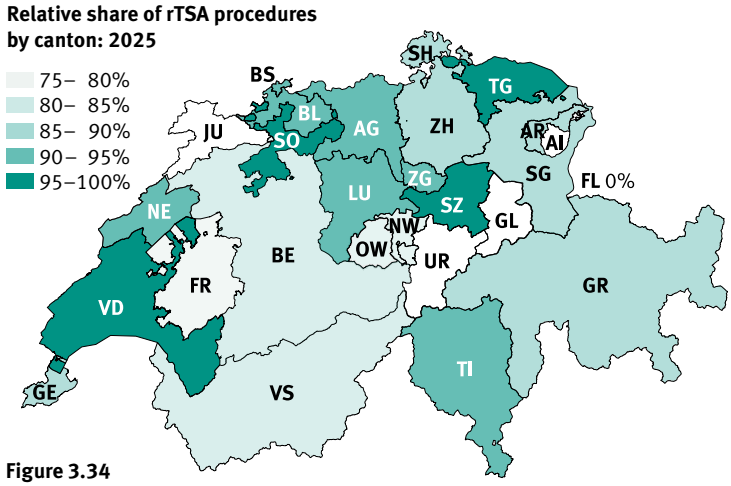


Figure 3.34

Relative share of rTSA procedures by canton: 2025

Excluding Cantons with less than 20 primary shoulder arthroplasties

3.4.5 Data by hospitals

In 2025, 131 hospital services registered primary total shoulder arthroplasties in SIRIS. The median annual number of primary procedures was 25 per service. Hemiarthroplasty was performed in 42 services, while revision or reoperation procedures were reported by 82 services. **(Table 3.23).**

Number of procedures per year

Shoulder arthroplasty activity was distributed across a large number of predominantly low-volume hospital services. Of the 131 services performing primary total shoulder arthroplasty, 99 (75.6%) performed fewer than 50 procedures during 2025. These services accounted for 41.3% of all primary total shoulder arthroplasties. In contrast, a considerably smaller number of higher-volume services accounted for a disproportionate share of the national caseload. **(Table 3.24 and Figure 3.35).**

The distribution illustrates that shoulder arthroplasty in Switzerland remains widely dispersed across hospital services, although a substantial proportion of procedures is concentrated in a relatively small number of higher-volume centres. As 2025 represents the first year of SIRIS Shoulder and registration was voluntary during the first six months, longitudinal trends in centralisation cannot yet be assessed.

Procedure		2025
Primary total arthroplasty of the shoulder	N services	131
	M per service	25
Primary hemi arthroplasty of the shoulder	N services	42
	M per service	1
Revision arthroplasty of the shoulder	N services	82
	M per service	2

Table 3.23

Number of participating hospital services and median procedures per service in 2025.

Service volume*		2025
‹50	N procedures (%)	1,835 (41.3)
	N services (%)	99 (75.6)
50–99	N procedures (%)	1,490 (33.5)
	N services (%)	24 (18.3)
100–149	N procedures (%)	596 (13.4)
	N services (%)	5 (3.8)
›150	N procedures (%)	522 (11.8)
	N services (%)	3 (3.3)

Table 3.24

Number of hospital services and primary total shoulder arthroplasties according to hospital volume in 2025.

*Service volume is defined as the sum of primary procedures per year. Percentages are reproduced from the supplied registry source table.

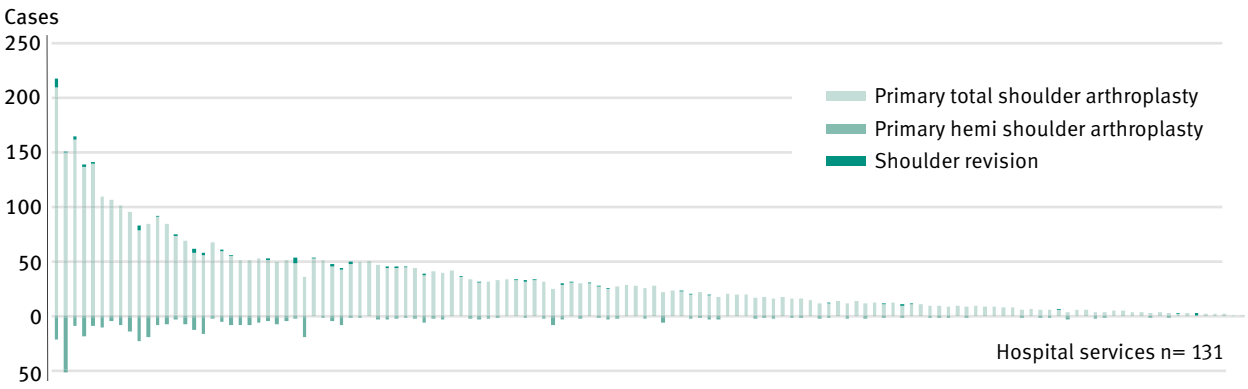


Figure 3.35

Distribution of primary total shoulder arthroplasty, primary hemiarthroplasty and shoulder revision/reoperation procedures across hospital services in 2025.

Demography and type of arthroplasty

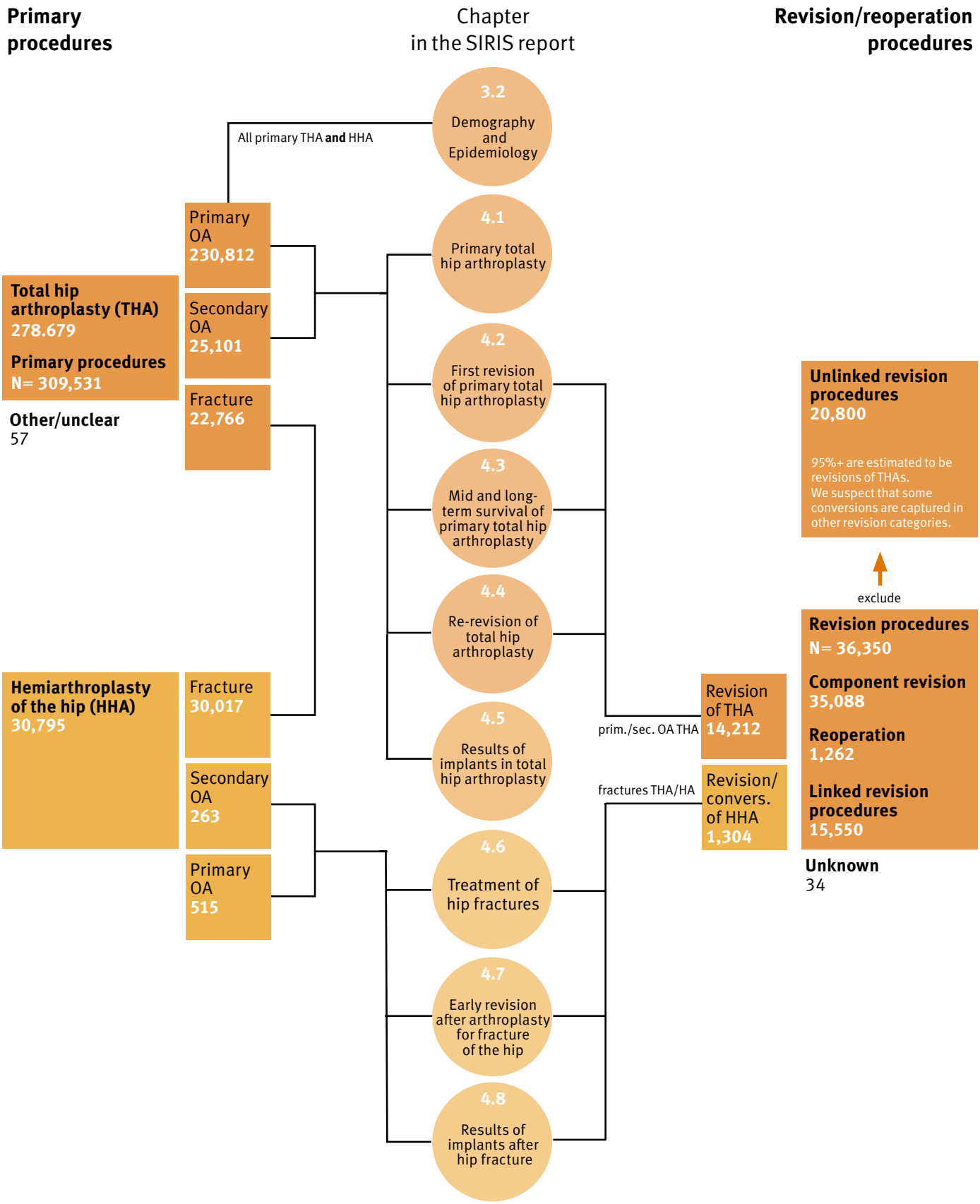
The relative use of rTSA and aTSA varied between hospital services and across volume categories. Given the marked nationwide predominance of rTSA, reverse arthroplasty represented the majority of procedures across all hospital-volume groups.

Continued mandatory registration will allow future reports to determine whether hospital volume is associated with systematic differences in patient demographics, underlying indications and the selection of reverse versus anatomical shoulder arthroplasty.

Hip arthroplasty

4. Hip arthroplasty

Overview of data structure



Overview of types of analyses for determining revision rates

Types of analysis / Report section	**Kaplan-Meier estimates** 2012 – 2025	**2-year revision rates** (implants 2020 – 2023 with completed 2-year follow-up)	**Funnel plots of 2-year hospital revision rates** (implants 2020 – 2023 with completed 2-year follow-up)
	Adjusted for censoring events	**Adjusted for censoring events**	**Risk-adjusted and adjusted for censoring events**
Hip overview	All total hip arthroplasties (THA) All hip hemi arthroplasties (HHA)		THA after primary osteoarthritis (primary OA). **ANQ online reporting, above 99.8%= outlier status** All hip hemi arthroplasties (HHA)
First revision of primary THA	THA for various subgroups	THA for various subgroups	
First revision of THA/HHA after fracture of the hip	HHA with bipolar versus unipolar heads THA after fracture of the hip	HHA for various subgroups THA for various subgroups	
Hip implants (minimal number in group)	Uncemented stem-cup combinations, THA after primary OA (500+) Hybrid fixation stem-cup combinations, THA after primary OA (500+) Uncemented stem-cup combinations, THA after **secondary** OA (500+) **Long-term evaluation 5–13 years: elevated revision rate or outlier**	Uncemented stem-cup combinations, THA after primary OA (50+) Hybrid fixation stem-cup combinations, THA after primary OA (50+) Uncemented stem-cup combinations, THA after **secondary** OA (50+) Uncemented stem-cup combinations, THA after fracture OA (50+) Hybrid fixation stem-cup combinations, THA after fracture (50+) Cemented stem-head combinations, HHA after fracture (50+) **2-year evaluation (two times group average= outlier status)**	

4.1 Primary total hip arthroplasty

Until 31.12.2025, the total number of primary THA registered in SIRIS reached 278,679 cases **(Table 3.1).** The current 4-year moving window includes 90,779 THA performed between 01.01.2020 and 31.12.2023, providing a complete 2-year follow-up **(Table 3.2).** The share of women (53.3%) and the mean age of the patients (69.3 years) remained constant throughout the current period of observation from 2020 to 2025. Please consult also Chapter 3.2.2 Demography and Epidemiology for further details regarding incidence and demographic characteristics.

Main diagnostic groups

The register categories primary THA into three groups **(Table 4.1),** depending on the diagnosis leading to the operation: THA for primary OA, for secondary OA and for the treatment of fractures, as the revisions rates differ significantly between these groups. The latter group, behaving quite differently from the other two, is considered more in detail in **Chapter 4.6** Fractures of the hip.

Primary THA for primary OA accounted for 80.7% of all primary THA. The share of secondary OA was 9.7% and for fractures it was 9.6%.

Type of hip prosthesis

In over 99% of the cases, conventional THA had been performed in all three main diagnostic groups. Resurfacing of the hip has largely been abandoned in Switzerland, only 19 cases were registered during the past 6 years **(Table 4.1).** The use of dual mobility cups (DMC) has increased over the last 10 years, particularly in the fracture group, where more than one-third of the THA performed in 2025 were made using a DMC. The use of DMC also increased in primary and secondary OA, albeit at a lower level **(Figure 4.1).**

Fixation of the stem differed significantly among the main diagnostic groups but did not change significantly since 2020 **(Table 4.2).** Uncemented stems were used in more than 80% of primary OA. Its use declined slightly from 88.1% in 2020 to 86.3% in 2025. Correspondingly, the use of hybrid fixation increased from 10.4% to 12.6%. In secondary OA the use of uncemented stems remained stable between 81.2% and 82.1%. However, there was a shift from all cemented to hybrid fixation over time in this subgroup. In the treatment of fractures, uncemented fixation declined from 52.1% in 2020 to 45.8% in 2025, with a significant drop occurring in 2022. Cages and reinforcement rings were used noticeably more frequently in the secondary OA and the fracture groups than in primary OA. This is most probably due to more complex deformities or fractures of the acetabulum needing advanced reconstruction techniques.

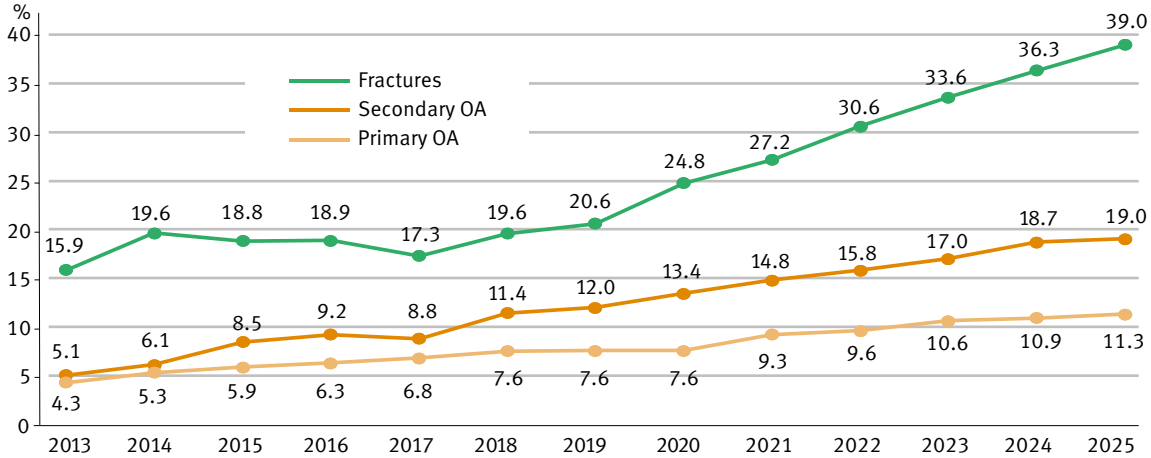


Figure 4.1

Share of dual-mobility cups over time by main pathology (%)

Main diagnostic group		Primary OA		Secondary OA		Fracture	
N (2020–2025)		**N**	**%**	**N**	**%**	**N**	**%**
Previous surgery	None	112,040	97.2	11,732	85.1	12,338	89.5
	Internal fixation femur			806	5.8	1099	8.0
	Osteotomy femur			515	3.7	75	0.5
	Internal fixation acetabulum			92	0.7	138	1.0
	Osteotomy pelvis			328	2.4	7	0.1
	Arthrodesis			6	0.1	3	0.0
	Open impingement surgery (v2021)			97	0.7	5	0.0
	Arthroscopic impingement surgery (v2021)			106	0.8	3	0.0
	Other previous surgery (any previous surgery for primary OA)			405	2.9	158	1.1
Intervention	Total hip replacement (as entered on SIRIS form)	115,177	99.9	13,743	99.7	13,704	99.5
	Hip resurfacing	18	0.0	1	0.0	0	0.0
	Other* (other categories and free text entries recognised as THAs)	105	0.1	44	0.3	74	0.5
Approach	Anterior	65,426	56.7	7,255	52.6	8,202	59.5
	Anterolateral	32,437	28.1	3,817	27.7	3,011	21.9
	Posterior	14,553	12.6	1,863	13.5	1,692	12.3
	Lateral	2,640	2.3	607	4.4	675	4.9
	Other approach	247	0.2	246	1.8	197	1.4
Fixation	All uncemented	100,696	87.3	11,244	81.5	6,811	49.4
	Hybrid (acetabulum uncemented, femur cemented)	13,257	11.5	1,860	13.5	5,926	43.0
	All cemented	786	0.7	314	2.3	630	4.6
	Reverse hybrid (acetabulum cemented, femur uncemented)	366	0.3	173	1.3	194	1.4
	Reinforcement ring, femur uncemented	83	0.1	78	0.6	56	0.4
	Reinforcement ring, femur cemented	115	0.1	119	0.9	161	1.2
N (2021–2025)		**N**	**%**	**N**	**%**	**N**	**%**
Technology	Conventional	62,116	63.4	7,031	59.5	6,708	56.3
	Computer assisted cup	1,712	1.7	104	0.9	39	0.3
	Computer assisted stem	1,991	2.0	115	1.0	23	0.2
	Robotic assisted (image guided, CT based)	924	0.9	135	1.1	16	0.1
	Patient specific cutting blocks	1,102	1.1	57	0.5	6	0.1
	Intraoperative fluoroscopy/radiography	33,232	33.9	4,547	38.5	5,168	43.3
Add. intervention	None	95,010	96.4	10,494	88.0	105,940	86.5
	Acetabular roof reconstruction	1,161	1.2	316	2.7	1,451	1.2
	Central osseous reconstruction	749	0.8	256	2.1	2,361	1.9
	Proximal femur osteotomy	12	0.0	37	0.3	399	0.3
	ORIF/CRIF acetabulum	44	0.0	31	0.3	2,,271	1.9
	Cerclage femur	725	0.7	317	2.7	6442	5.3
	ORIF/CRIF femur	59	0.1	53	0.4	1,603	1.3
	Augments	19	0.0	18	0.2	113	0.1
	Other	1,041	1.1	634	5.3	5,815	4.7

Table 4.1

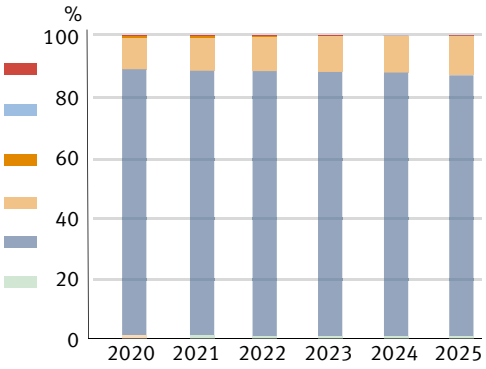
Primary total hip arthroplasty: Surgery characteristics by main diagnostic group

Multiple responses possible (percentages do not sum to 100)

* in case of inconsistencies between form entry and implant registration, we use the implant in determining the relevant category (e.g. entered "bipolar prosthesis" but registered stem and dual mobility cup. Such cases are routinely counted as THAs, but still retained in the "other" category chosen by the user.

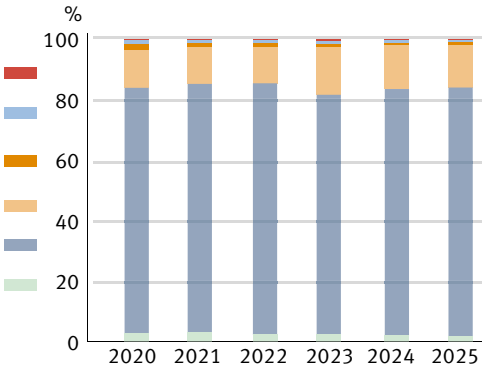
Primary osteoarthritis

2020	2021	2022	2023	2024	2025	
0.1	0.1	0.1	0.1	0.0	0.1	Reinforcement ring femur uncem.
0.2	0.2	0.1	0.1	0.0	0.0	Reinforcement ring femur cemented
0.4	0.5	0.3	0.2	0.3	0.2	Reverse hybrid
10.4	10.8	11.2	11.6	11.9	12.8	Hybrid
88.1	87.6	87.6	87.4	87.2	86.3	All uncemented
0.9	0.9	0.7	0.6	0.6	0.6	All cemented
16,705	**17,947**	**18,965**	**20,014**	**20,637**	**21,035**	**N**



Secondary osteoarthritis

2020	2021	2022	2023	2024	2025	
0.4	0.5	0.6	0.8	0.6	0.5	Reinforcement ring femur uncem.
1.2	0.8	0.8	0.9	0.8	0.7	Reinforcement ring femur cemented
2.1	1.6	1.3	1.2	0.9	0.7	Reverse hybrid
12.3	12.0	12.0	15.6	14.3	14.2	Hybrid
81.2	81.9	83.1	79.3	81.5	82.1	All uncemented
2.7	3.1	2.2	2.2	2.0	1.7	All cemented
1,866	**2,084**	**2,258**	**2,326**	**2,511**	**2,743**	**N**



Fracture

2020	2021	2022	2023	2024	2025	
0.4	0.4	0.5	0.5	0.3	0.3	Reinforcement ring femur uncem.
1.2	1.2	1.0	1.6	0.9	1.1	Reinforcement ring femur cemented
1.9	1.8	1.4	1.2	1.2	1.1	Reverse hybrid
39.3	39.9	39.8	43.6	45.6	47.8	Hybrid
52.1	51.3	52.3	48.8	47.7	45.8	All uncemented
5.0	5.4	4.9	4.3	4.2	3.8	All cemented
1,791	**2,129**	**2,289**	**2,405**	**2,513**	**2,651**	**N**

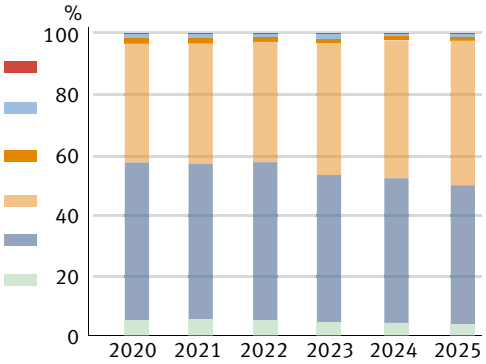


Table 4.2

Primary total hip arthroplasty: Component fixation methods by diagnostic group by year

Surgical approach

Currently, the anterior approach was used most often for primary OA, followed by the anterolateral approach. Approaches first started to be recorded in 2015. Since then, the use of the anterior approach has gradually increased, reaching 58.9% in 2025. The anterolateral approach was quite popular in 2020, being used in 30.6% of the primary THA, but its use declined to 27.4% in 2025. The lateral approach is used less and less frequently. The share of the posterior approach remains relatively stable; it was used in 12.3% of the cases in 2025 **(Table 4.3).**

Bearing

The bearing is one of the most important determinants of wear resistance and consequently long-term implant survival. Improvement of bearing materials has led to a decrease in development of osteolysis and loosening, with decreasing necessity for revision. Ceramic-on-highly crosslinked polyethylene (CoXLPE) and ceramic-on-ceramic (CoC) were most frequently used in younger patients. Currently, the most frequently used bearing in Switzerland was CoXLPE and its use continued to increase. In 2025, this combination was chosen in 71.4% of all primary THA for primary OA **(Table 4.4 and Figure 4.2).** So-called antioxidant-added XLPE (AOXLPE) was used in 12% of all polyethylene bearings in 2013, with a share rising to 37% in 2025 **(Figure 4.3).**

Surgical approach	2020	2021	2022	2023	2024	2025	2020–2025
Anterior	52.8	55.9	56.9	56.4	58.6	58.9	56.7
Anterolateral	30.6	27.6	27.8	28.4	27.5	27.4	28.1
Lateral	3.7	3.0	2.5	1.9	1.6	1.3	2.3
Posterior	12.6	13.3	12.6	13.1	12.0	12.3	12.6
Other approach	0.3	0.2	0.2	0.2	0.2	0.2	0.2
Total [N]	**16,705**	**17,947**	**18,965**	**20,014**	**20,637**	**21,035**	**115,303**

Table 4.3
Surgical approach in total hip arthroplasty for primary osteoarthritis by year (in %)

Bearing surface	2020	2021	2022	2023	2024	2025	2020–2025
Metal on conventional polyethylene (MoCPE)	1.5	2.1	1.3	1.6	1.4	1.4	1.5
Ceramic on conventional polyethylene (CoCPE)	4.0	4.6	4.7	5.6	5.4	5.3	5.0
Metal on cross-linked polyethylene (MoXLPE)	9.6	9.0	7.7	6.7	6.9	6.5	7.7
Ceramic on cross-linked polyethylene (CoXLPE)	62.5	63.7	66.7	67.7	69.4	71.4	67.1
Ceramic on ceramic (CoC)	15.0	14.0	12.8	12.0	10.4	9.9	12.2
Ceramicised metal on conventional polyethylene (CMoCPE)	0.3	0.3	0.3	0.2	0.3	0.1	0.2
Ceramicised metal on cross-linked polyethylene (CMoXLPE)	7.1	6.2	6.4	6.2	6.2	5.4	6.2
N (bearing surface known)	**16,448**	**17,695**	**18,726**	**19,645**	**20,256**	**20,439**	**113,209**
N (bearing surface unknown)	**257**	**252**	**239**	**369**	**381**	**596**	**2,094**

Table 4.4
Primary total hip arthroplasty: bearing surface* in primary osteoarthritis by year (in %)
* Femoral heads and acetabular inserts/monobloc cups

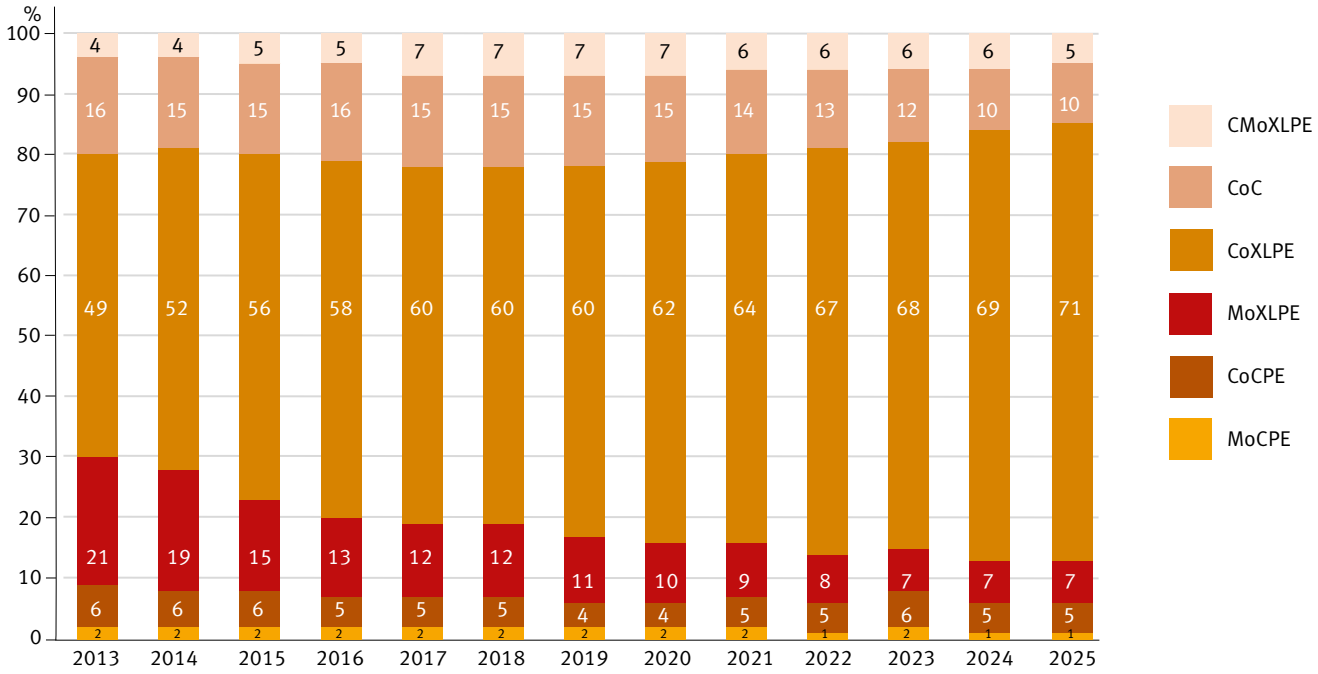


Figure 4.2

Relative shares of bearing surfaces in total hip arthroplasty over time

Primary OA

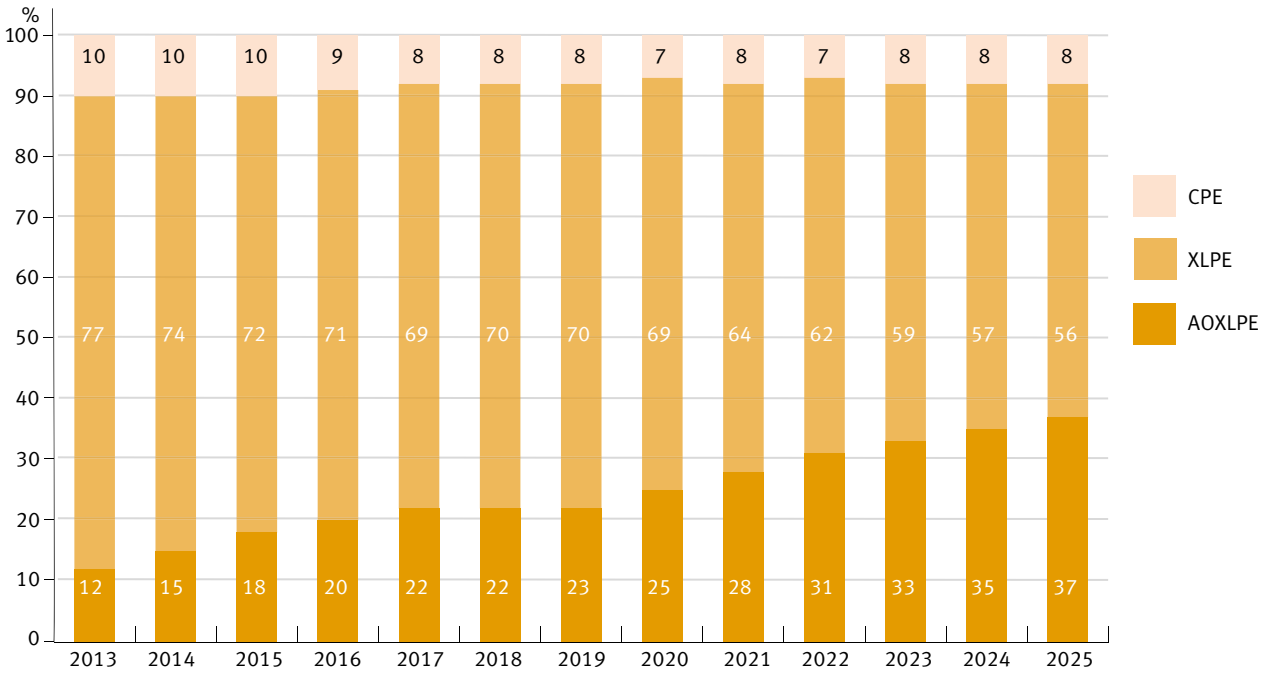


Figure 4.3

Primary total hip arthroplasty: antioxidant-added XLPE in primary osteoarthritis by year (in %)

The second most frequently used bearing was CoC, accounting overall for 12.2% of all THA for primary OA. However, its use slowly declined over the years and was used in only 9.9% in 2025. It was used most often in patients ‹45 years of age, where it was chosen in 23%. Ceramised metal (CM) was used in 6.4% of the cases, mostly in combination with XLPE. XLPE is the most often used acetabular bearing in all age groups. However, it is more often combined with metal heads in patients above 75, while in the younger patients CoXLPE or CoC are prevalent. Metal-on-conventional polyethylene (MoCPE) continued to have a very low share, essentially unchanged around 1.5% over the years. It is predominantly used in patients older than 85 years of age. CPE is used more frequently in combination with a ceramic head (CoCPE 5%). But as the MoCPE combination it is used more often in the older age categories. The age-related use of the various bearings is shown in **Table 4.5 and Figure 4.4.**

Bearing surface	‹45	45–54	55–64	65–74	75–84	85+	All
Metal on conventional polyethylene (MoCPE)	0.2	0.2	0.3	0.8	2.6	7.2	1.5
Ceramic on conventional polyethylene (CoCPE)	1.3	1.6	2.3	4.4	7.6	10.7	5.0
Metal on cross-linked polyethylene (MoXLPE)	2.6	3.9	4.6	6.7	10.5	16.8	7.7
Ceramic on cross-linked polyethylene (CoXLPE)	66.5	67.5	70.7	69.1	64.7	53.9	67.1
Ceramic on ceramic (CoC)	23.0	19.6	14.9	12.2	8.8	6.8	12.2
Ceramicised metal on conventional polyethylene (CMoCPE)	0.00	0.04	0.08	0.11	0.46	0.75	0.24
Ceramicised metal on cross-linked polyethylene (CMoXLPE)	6.46	7.12	7.03	6.65	5.33	3.92	6.22
N (bearing surface known)	1,951	8,513	26,010	37,000	32,841	6,892	113,207
N (bearing surface unknown)**	43	129	456	631	656	179	2,094

Table 4.5

Primary total hip arthroplasty: bearing surface* in primary osteoarthritis by age (in %)**

* Femoral heads and acetabular inserts/monobloc cups

** please note that age is missing in one case

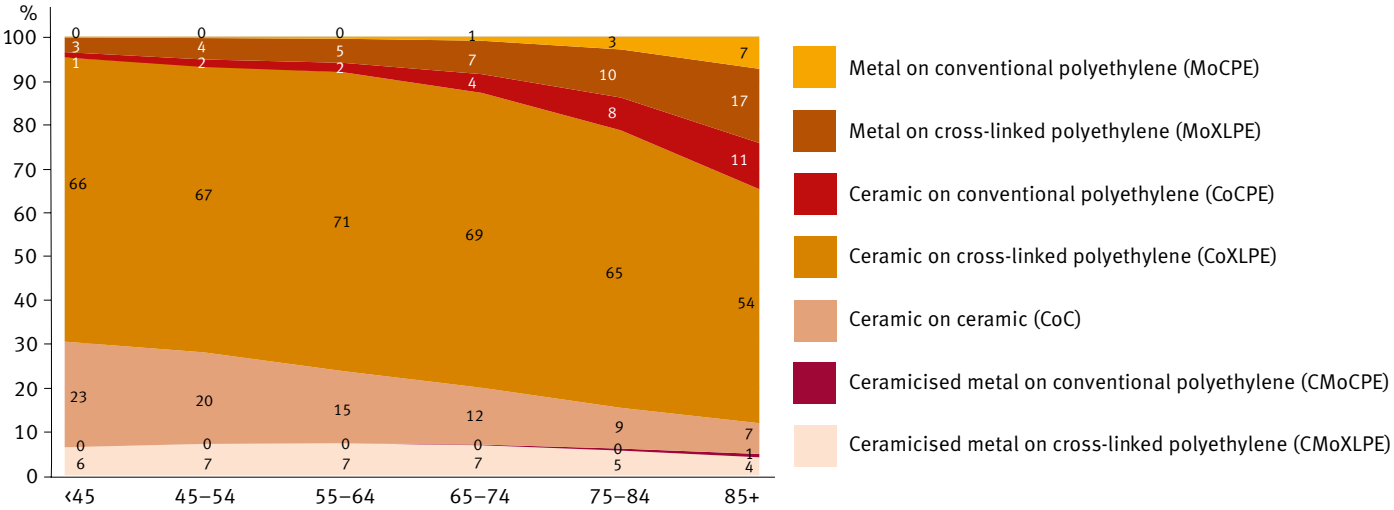


Figure 4.4

Primary total hip arthroplasty: bearing surface in primary osteoarthritis by age (in %)

Primary OA, 2019 – 2025

Fixation

Uncemented fixation was standard for primary THA performed for primary OA, accounting for 87.3% of all cases and more than 95% of patients under the age of 65. Patients older than 85 years still received cementless implants in 59.1% of the cases **(Table 4.6).** Hybrid fixation is the second most common fixation technique with a nationwide average of 11.5%. However, in the age group 85+ it is used in one out of three cases (36.6%).

Fixation method	<45	45–54	55–64	65–74	75–84	85+	All
All cemented	0.3	0.2	0.1	0.4	1.0	3.0	0.7
All uncemented	98.1	97.6	96.4	91.2	78.4	59.1	87.3
Hybrid acetabulum uncemented, femur cemented	1.1	1.8	3.1	8.0	19.9	36.6	11.5
Reverse hybrid acetabulum cemented, femur uncemented	0.4	0.2	0.2	0.2	0.4	0.9	0.3
Reinforcement ring, femur cemented	0.00	0.06	0.06	0.05	0.14	0.35	0.10
Reinforcement ring, femur uncemented	0.2	0.2	0.1	0.1	0.0	0.1	0.1
N	**1,994**	**8,642**	**26,466**	**37,631**	**33,497**	**7,071**	**115,301**

Table 4.6

Primary total hip arthroplasty: fixation methods in primary osteoarthritis by age* (in %)

* please note that age is missing in one case

Fixation method	Women	Men	All
All cemented	1.0	0.4	0.7
All uncemented	82.4	92.6	87.3
Hybrid acetabulum uncemented, femur cemented	15.9	6.7	11.5
Reverse hybrid acetabulum cemented, femur uncemented	0.4	0.2	0.3
Reinforcement ring, femur cemented	0.14	0.06	0.10
Reinforcement ring, femur uncemented	0.1	0.1	0.1
N	**59,716**	**55,587**	**115,303**

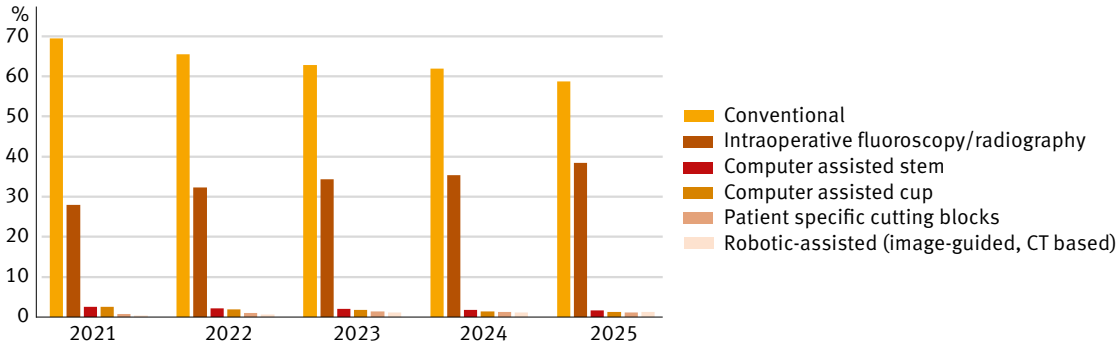
Table 4.7

Primary total hip arthroplasty: fixation methods in primary osteoarthritis by sex (in %)

Technology

Navigation, robotics or patient specific instruments (PSI) were not widely used in THA in Switzerland, contrary to practice in knee arthroplasty. Such aids were used in 6.1% of all cases only. On the other hand, intraoperative fluoroscopy was reported to be used in about one third of all cases (33.9%). The use of fluoroscopy increased over the last years **(Figure 4.5).**

The use of fluoroscopy is highly variable in Switzerland. It was used in almost all cases in canton GL. In AR, BL, LU, SH, TG and VS it was used in about 60-80% of the cases. In the cantons FR, SG, ZG and ZH fluoroscopy or radiography was used in 40–60%. In BS, GE, NE and SO it is used in 20–40%. In the remaining cantons fluoroscopy was rarely used or not at all **(Figure 4.6).**



Technology [%]	2021	2022	2023	2024	2025	2021–2025
Conventional	69.4	65.5	62.8	61.9	58.7	63.4
Intraoperative fluoroscopy/radiography	28.0	32.3	34.3	35.4	38.4	33.9
Computer assisted stem	2.6	2.2	2.1	1.8	1.6	2.0
Computer assisted cup	2.6	2.0	1.7	1.4	1.2	1.7
Patient specific cutting blocks	0.8	1.0	1.4	1.3	1.2	1.1
Robotic-assisted (image guided, CT based)	0.4	0.6	1.1	1.2	1.3	0.9
N	**17,308**	**18,965**	**20,014**	**20,637**	**21,035**	**97,959**

Figure 4.5

Primary total hip arthroplasty: technologies used in primary OA

Multiple responses possible (percentages do not sum to 100)

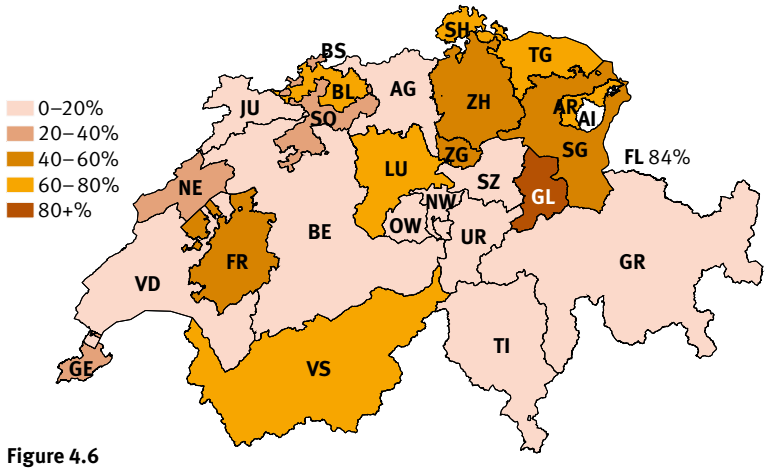


Figure 4.6

Share of intraoperative fluoroscopy/radiography used in total hip arthroplasty by cantons 2021 – 2025

4.2 First revision within 2 years of primary total hip arthroplasty

First revisions are revisions that are linked to a primary THA registered in SIRIS, occurring for the first time, as opposed to re-revisions, which are revisions after previous revisions. The 2-year revision rates were calculated for a moving 4-year window, which includes the last 4 years with a full 2-year follow-up. For this report, this corresponds to primary THA implanted between 01.01.2020 and 31.12.2023.

For primary OA, the nationwide 2-year revision rate was 2.4% (CI 2.3–2.5%), whereas for secondary OA it was 4.0% (CI 3.6–4.5%) and for fractures 4.9 % (CI 4.5–5.4%), each significantly different from the others.

The lowest 2-year revision rate (1.9%) was observed in the age group 55–64 years old. The revision rate for primary OA remained unchanged compared to the previous 4-year moving window.

4.2.1 Reasons for early first revision of primary total hip arthroplasty for primary OA

A total of 1,739 revisions of primary THA performed for primary OA were registered during the current 4-year moving window. This is 1.8% more than during the observation window used in the last annual report. However, the number of primary THA has increased by 4.3% from 70,465 to 73,630. The most frequent cause of early first revision of primary THA for primary OA was infection (32.8%), followed by periprosthetic fracture (19.6%), dislocation (18.1%), and femoral loosening (14.7%) **(Table 4.8).** However, data acquirement does not allow to distinguish between early loosening of an initially stable stem or a failed osteointegration of a poorly implanted stem. There was an increase in the share of revisions attributed to infections from 30.9% in the previous report to 32.8%. Approximately one sixth of all revisions (15.5%) were undertaken for malposition of either the acetabular or the femoral component.

For Kernel density estimation – an evaluation of the frequency of an event as a revision THA at a given time – please refer to the annual report 2025.

4.2.2 Type of revision surgery

The spectrum reached from sole exchange of the head or of the insert to complete exchange of all components (the latter accounting for 14.9% of all revisions) **(Table 4.9).** The most frequently performed operation was the exchange of the femoral component only (24.7%). An exchange of the head and of the insert was performed in 17.8%.

Reason	revised	%
Infection	571	32.8
Periprosthetic fracture	340	19.6
Dislocation	315	18.1
Loosening femoral	256	14.7
Position/orientation of cup	154	8.9
Loosening acetabular	138	7.9
Position/orientation of stem	116	6.7
Wear	24	1.4
Implant failure	22	1.3
Spacer	14	0.8
Osteolysis FE	8	0.5
Squeaking	8	0.5
Osteolysis AC	5	0.3
Trochanter pathology	4	0.2
Impingement	2	0.1
Other	208	12.0
N revisions	**1,739**	

Table 4.8

Reason for early first revision of primary total hip arthroplasty (primary OA)

4-year moving average covering implants between 01.01.2020 and 31.12.2023, with two years follow-up (31.12.2025). Early first revisions are those occurring within 2 years of the primary arthroplasty.
Multiple responses possible (percentages do not sum to 100).

Type	revised	%
Exchange femoral component	429	24.7
Exchange head and insert	310	17.8
Exchange acetabular and femoral components	259	14.9
Exchange acetabular component and head	225	12.9
Exchange head	220	12.7
Exchange acetabular component	86	4.9
Exchange femoral component and insert	67	3.9
Component reimplantation (after spacer or Girdlestone)	39	2.2
Component removal, spacer implantation	33	1.9
Exchange insert	20	1.2
Exchange femoral component, insert and osteosynthesis	17	1.0
Girdlestone	6	0.3
Other intervention	28	1.6
N revisions	**1,739**	

Table 4.9

Type of early first revision of total hip arthroplasty (primary OA)

4-year moving average covering implants between 01.01.2020 and 31.12.2023, with two years follow-up (31.12.2025).
Early first revisions are those occurring within 2 years of the primary arthroplasty

4.2.3 Early revision rate by stem fixation, bearing and approach

Table 4.10 gives an overview of the revision rates depending on implant fixation, bearing and surgical approach, whereby the overall 2-year revision rate was 2.4% (11,739 of 73,630 primary THA performed for primary OA). The parameters that were associated with above average revision rates included all-cemented and hybrid fixation. MoXLPE bearings had the highest revision rate, followed by combinations with CPE and CoC bearings. However, confidence intervals remained wide and overlapping. Differences were therefore not statistically significant.
The use of a posterior approach was associated with a significantly higher early revision rate of 3.2% (CI 2.8%–3.5%).

			Revised		95% CI	
		N at risk*	N	%**	lower	upper
	Overall (moving average)	73,630	1,739	2.4	2.3	2.5
Fixation	Cemented	553	14	2.6	1.5	4.3
	Uncemented	64,537	1,497	2.3	2.2	2.5
	Hybrid	8385	219	2.6	2.3	3.0
Articulation	Metal on conventional polyethylene (MoCPE)	1,186	34	2.9	2.1	4.0
	Ceramic on conventional polyethylene (CoCPE)	3,459	95	2.8	2.3	3.4
	Metal on cross-linked polyethylene (MoXLPE)	5,935	179	3.0	2.6	3.5
	Ceramic on cross-linked polyethylene (CoXLPE)	47,346	1,054	2.2	2.1	2.4
	Ceramic on ceramic (CoC)	9,715	262	2.7	2.4	3.1
	Ceramicised metal on conventional polyethylene (CMoCPE)	191	5	2.7	1.1	6.3
	Ceramicised metal on cross-linked polyethylene (CMoXLPE)	4,681	75	1.6	1.3	2.0
Approach	Anterior	40,940	928	2.3	2.1	2.4
	Anterolateral	21,002	461	2.2	2.0	2.4
	Lateral	2,020	50	2.5	1.9	3.3
	Posterior	9,502	299	3.2	2.8	3.5
	Other approach	166	1	0.6	0.1	4.2

Table 4.10

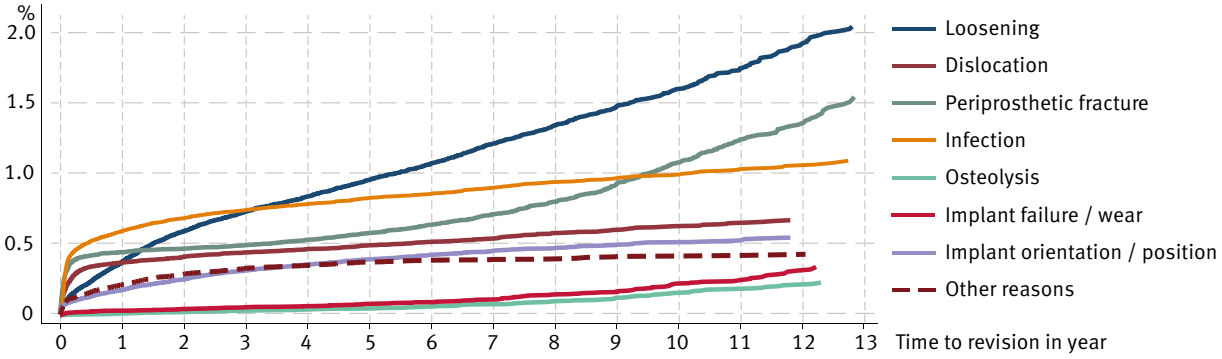
First revision of primary total hip arthroplasty within 24 months according to stem fixation, articulation and approach

4-year moving average covering implants between 01.01.2020 and 31.12.2023, with two years follow-up (31.12.2025).
* Number of patients with at least two years follow-up (i.e. primary prosthesis in moving average).
** Rates adjusted for effects of mortality and emigration.

4.3 Mid and long-term survival of primary total hip arthroplasty

The cumulative incidence rates show the long-term behaviour of implants, illustrating the proportion of implants having experienced at least one revision. Figure 4.7 presents the cumulative incidence rates up to 13 years postoperatively for all THA performed for primary OA, overall and separately for cemented and uncemented femoral components. Cumulative revision rates for infection, dislocation and osteolysis did not differ between cemented and uncemented stems, whereas periprosthetic fractures occurred more frequently with uncemented stems, both in the short term and up to the maximum follow-up available of 13 years postoperatively. Loosening and periprosthetic fractures were the dominant reasons for revisions over the whole observation period. The curve for loosening shows a near-linear increase. The curve for periprosthetic fractures rises faster in the first three months for uncemented stems but flattens out until the fifth year for uncemented and the seventh year for cemented stems. Thereafter, the curves start to rise until they become the second most frequent cause for revision after nine years for uncemented stems. The curve for periprosthetic fractures for cemented stems shows a flatter, more linear rise.

Primary osteoarthritis (OA) total hip arthroplasty



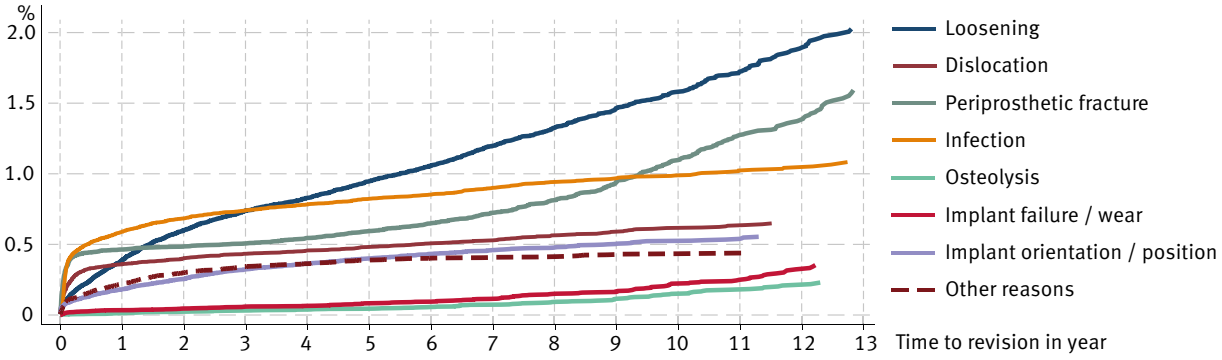
Diagnoses	1 year	2 years	3 years	5 years	9 years	10 years	13 years
Loosening	**0.4** (0.4-0.4)	**0.6** (0.6-0.6)	**0.7** (0.7-0.8)	**1.0** (0.9-1.0)	**1.5** (1.4-1.6)	**1.6** (1.5-1.7)	**2.1** (1.9-2.2)
Dislocation	**0.4** (0.4-0.4)	**0.4** (0.4-0.4)	**0.4** (0.4-0.5)	**0.5** (0.5-0.5)	**0.6** (0.6-0.6)	**0.6** (0.6-0.7)	**0.7** (0.6-0.7)
Periprosthetic fracture	**0.5** (0.4-0.5)	**0.5** (0.4-0.5)	**0.5** (0.5-0.5)	**0.6** (0.6-0.6)	**0.9** (0.9-1.0)	**1.1** (1.0-1.2)	**1.6** (1.4-1.7)
Infection	**0.6** (0.6-0.6)	**0.7** (0.7-0.7)	**0.7** (0.7-0.8)	**0.8** (0.8-0.9)	**1.0** (0.9-1.0)	**1.0** (1.0-1.1)	**1.1** (1.0-1.2)
Osteolysis	**0.0** (0.0-0.0)	**0.0** (0.0-0.0)	**0.0** (0.0-0.0)	**0.0** (0.0-0.1)	**0.1** (0.1-0.1)	**0.2** (0.1-0.2)	**0.2** (0.2-0.3)
Implant failure / wear	**0.0** (0.0-0.0)	**0.0** (0.0-0.1)	**0.1** (0.0-0.1)	**0.1** (0.1-0.1)	**0.2** (0.1-0.2)	**0.2** (0.2-0.3)	**0.3** (0.3-0.4)
Implant orientation / position	**0.2** (0.2-0.2)	**0.3** (0.2-0.3)	**0.3** (0.3-0.3)	**0.4** (0.4-0.4)	**0.5** (0.5-0.5)	**0.5** (0.5-0.6)	**0.6** (0.5-0.6)
Other reasons	**0.2** (0.2-0.2)	**0.3** (0.3-0.3)	**0.3** (0.3-0.4)	**0.4** (0.4-0.4)	**0.4** (0.4-0.5)	**0.4** (0.4-0.5)	**0.4** (0.4-0.5)

Figure 4.7 Part one

Cumulative incidence rates for different revision diagnoses (primary OA THA)

Time since operation, 2012–2025, % of implants revised

Primary osteoarthritis (OA) total hip arthroplasty – uncemented femur



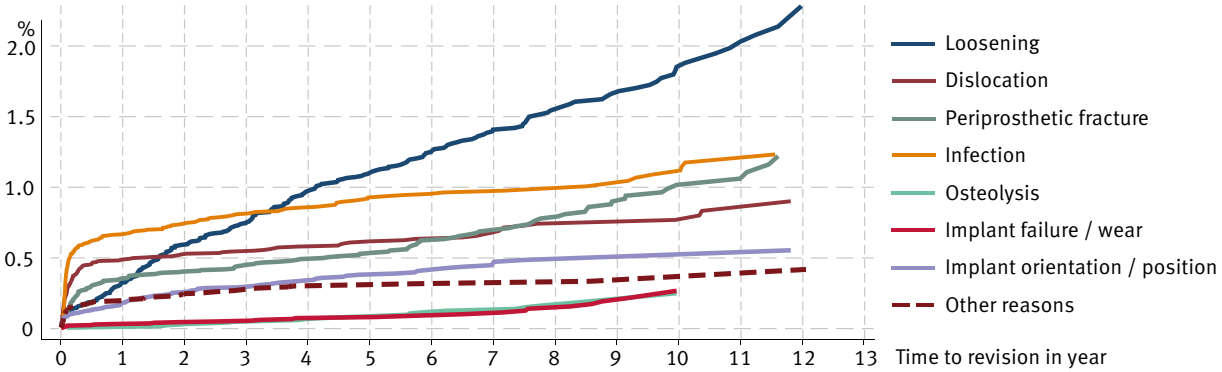
	1 year	2 years	3 years	5 years	9 years	10 years	13 years
Loosening	**0.4** (0.4-0.4)	**0.6** (0.6-0.6)	**0.7** (0.7-0.8)	**0.9** (0.9-1.0)	**1.5** (1.4-1.5)	**1.6** (1.5-1.7)	**2.0** (1.9-2.2)
Dislocation	**0.4** (0.3-0.4)	**0.4** (0.4-0.4)	**0.4** (0.4-0.5)	**0.5** (0.5-0.5)	**0.6** (0.5-0.6)	**0.6** (0.6-0.7)	**0.6** (0.6-0.7)
Periprosthetic fracture	**0.5** (0.4-0.5)	**0.5** (0.5-0.5)	**0.5** (0.5-0.5)	**0.6** (0.6-0.6)	**0.9** (0.9-1.0)	**1.1** (1.0-1.2)	**1.6** (1.5-1.7)
Infection	**0.6** (0.6-0.6)	**0.7** (0.6-0.7)	**0.7** (0.7-0.8)	**0.8** (0.8-0.9)	**1.0** (0.9-1.0)	**1.0** (0.9-1.0)	**1.1** (1.0-1.2)
Osteolysis	**0.0** (0.0-0.0)	**0.0** (0.0-0.0)	**0.0** (0.0-0.0)	**0.0** (0.0-0.1)	**0.1** (0.1-0.1)	**0.1** (0.1-0.2)	**0.2** (0.2-0.3)
Implant failure / wear	**0.0** (0.0-0.0)	**0.0** (0.0-0.1)	**0.1** (0.0-0.1)	**0.1** (0.1-0.1)	**0.2** (0.1-0.2)	**0.2** (0.2-0.3)	**0.4** (0.3-0.4)
Implant orientation / position	**0.2** (0.2-0.2)	**0.3** (0.2-0.3)	**0.3** (0.3-0.4)	**0.4** (0.4-0.4)	**0.5** (0.5-0.5)	**0.5** (0.5-0.6)	**0.6** (0.5-0.6)
Other reasons	**0.2** (0.2-0.2)	**0.3** (0.3-0.3)	**0.3** (0.3-0.4)	**0.4** (0.4-0.4)	**0.4** (0.4-0.5)	**0.4** (0.4-0.5)	**0.4** (0.4-0.5)

Figure 4.7 Part two

Cumulative incidence rates for different revision diagnoses (primary OA THA)

Time since operation, 2012–2025, % of implants revised

Primary osteoarthritis (OA) total hip arthroplasty – cemented femur



	1 year	2 years	3 years	5 years	9 years	10 years	13 years
Loosening	**0.3** (0.3-0.4)	**0.6** (0.5-0.7)	**0.7** (0.6-0.9)	**1.1** (1.0-1.2)	**1.7** (1.5-1.9)	**1.9** (1.6-2.1)	**2.3** (1.9-2.7)
Dislocation	**0.5** (0.4-0.6)	**0.5** (0.4-0.6)	**0.5** (0.5-0.6)	**0.6** (0.5-0.7)	**0.7** (0.6-0.9)	**0.8** (0.6-0.9)	**0.9** (0.7-1.1)
Periprosthetic fracture	**0.4** (0.3-0.4)	**0.4** (0.3-0.5)	**0.5** (0.4-0.5)	**0.5** (0.4-0.6)	**0.9** (0.7-1.1)	**1.0** (0.8-1.2)	**1.2** (1.0-1.5)
Infection	**0.7** (0.6-0.8)	**0.7** (0.6-0.9)	**0.8** (0.7-0.9)	**0.9** (0.8-1.1)	**1.0** (0.9-1.2)	**1.1** (0.9-1.3)	**1.2** (1.0-1.5)
Osteolysis	**0.0** (0.0-0.0)	**0.0** (0.0-0.1)	**0.0** (0.0-0.1)	**0.1** (0.0-0.1)	**0.2** (0.1-0.3)	**0.3** (0.2-0.4)	**0.3** (0.2-0.4)
Implant failure / wear	**0.0** (0.0-0.1)	**0.0** (0.0-0.1)	**0.1** (0.0-0.1)	**0.1** (0.0-0.1)	**0.2** (0.1-0.3)	**0.3** (0.2-0.4)	**0.3** (0.2-0.4)
Implant orientation / position	**0.2** (0.1-0.2)	**0.3** (0.2-0.3)	**0.3** (0.2-0.4)	**0.4** (0.3-0.5)	**0.5** (0.4-0.6)	**0.5** (0.4-0.6)	**0.6** (0.4-0.8)
Other reasons	**0.2** (0.1-0.3)	**0.2** (0.2-0.3)	**0.3** (0.2-0.4)	**0.3** (0.2-0.4)	**0.3** (0.3-0.4)	**0.3** (0.3-0.4)	**0.4** (0.3-0.6)

Figure 4.7 Part three

Cumulative incidence rates for different revision diagnoses (primary OA THA)

Time since operation, 2012–2025, % of implants revised

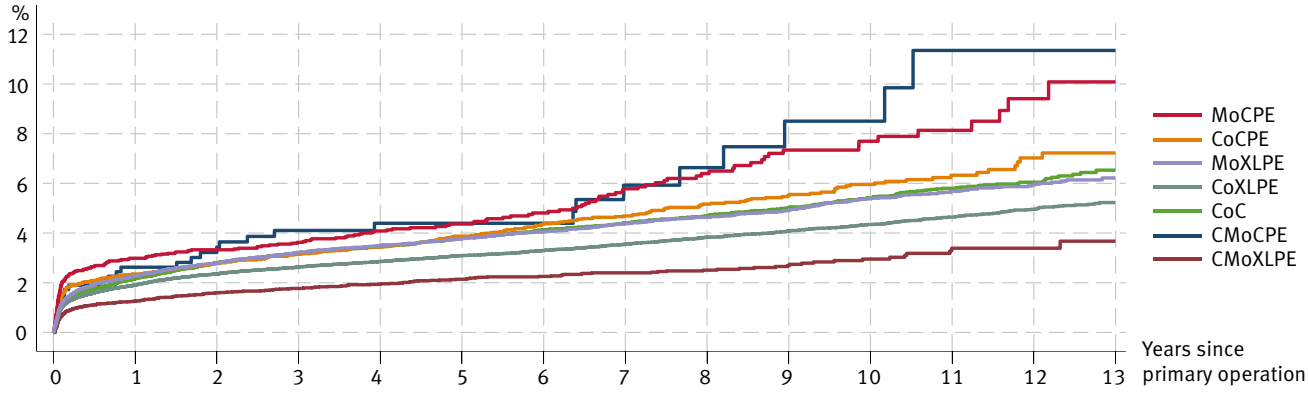
4.3.1 First revision by bearing types and head size

For an extensive analysis of bearing sizes and types refer to the annual report 2025.

Head size and bearing type influence wear, which can lead in the long- term to osteolysis and loosening. Head size has an impact on stability, with larger heads being more stable, reducing the risk of dislocation, compared to smaller diameters. However, large heads bear the risk of increased wear, an issue particularly relevant with CPE.

At 13 years, the estimated cumulative revision rate for CMoXLPE had the lowest revision rate of 3.7% (CI 3.0–4.5%) and CoXLPE had a revision rate of 5.2% (CI 5.0–5.5%). In contrast, the highest cumulative revision rate was observed for CMoCPE with 11.4% (CI 7.0–18.0%), followed by MoCPE with 10.1% (CI 7.9 –12.8) **(Figure 4.8).** However, this observation has to be taken with care, considering small numbers with consecutively wide confidence intervals.

Heads with a diameter ≥40 mm had an excessively high revision rate of 12.0% (CI 8.9–16.1) at 13 years **(Figure 4.9),** despite being used mostly in CoC bearings. Bearings with diameter 32 or 36 mm had similar 13-year revision rates of 5.4% (CI 5.1–5.7%) and 5.4% (CI 4.9–5.6%), respectively. The 28 mm heads were associated with a significantly higher revision rate at 13 years of 7.2% (CI 6.4–8.0%).

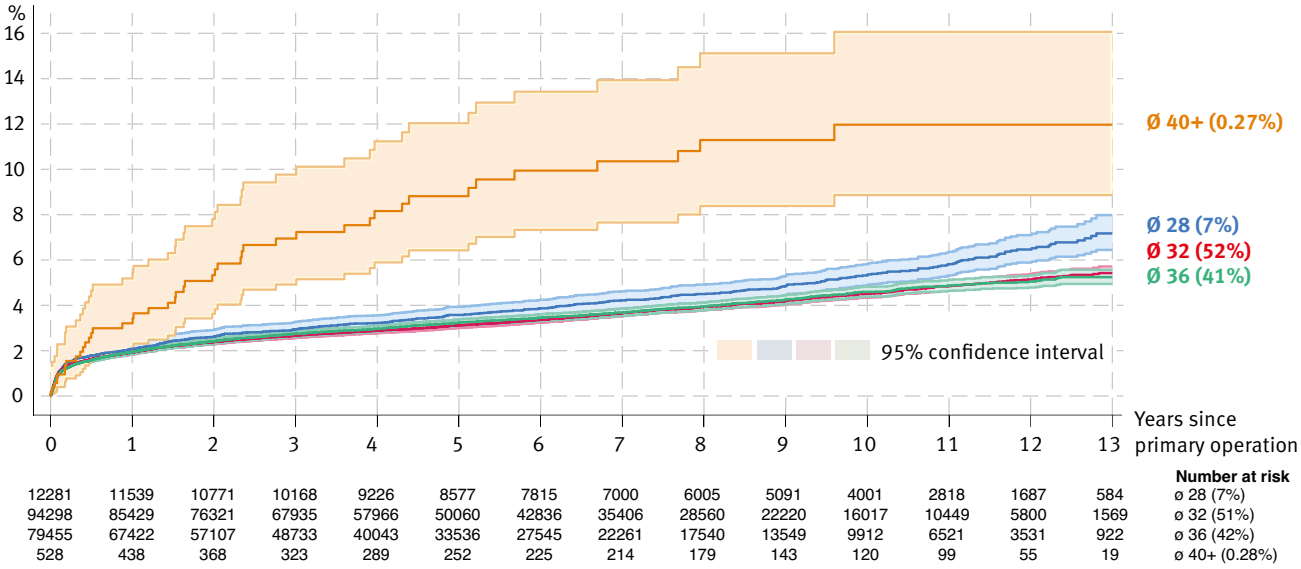


Bearing surf.	1 year	2 years	3 years	5 years	6 years	8 years	9 years	10 years	13 years
MoCPE	**3.0** (2.5-3.6)	**3.3** (2.8-3.9)	**3.6** (3.1-4.3)	**4.4** (3.7-5.1)	**4.8** (4.1-5.6)	**6.4** (5.5-7.5)	**7.3** (6.2-8.6)	**7.7** (6.5-9.1)	**10.1** (7.9-12.8)
CoCPE	**2.4** (2.1-2.6)	**2.8** (2.5-3.1)	**3.1** (2.8-3.5)	**3.9** (3.5-4.3)	**4.4** (3.9-4.8)	**5.2** (4.7-5.7)	**5.5** (5.0-6.1)	**6.0** (5.4-6.6)	**7.2** (6.3-8.3)
MoXLPE	**2.3** (2.1-2.5)	**2.8** (2.6-3.0)	**3.2** (3.0-3.4)	**3.8** (3.5-4.0)	**4.1** (3.8-4.3)	**4.6** (4.4-4.9)	**4.9** (4.6-5.2)	**5.4** (5.0-5.7)	**6.2** (5.8-6.7)
CoXLPE	**1.9** (1.8-2.0)	**2.4** (2.3-2.4)	**2.6** (2.5-2.7)	**3.1** (3.0-3.2)	**3.3** (3.2-3.4)	**3.8** (3.7-4.0)	**4.1** (3.9-4.2)	**4.3** (4.2-4.5)	**5.2** (5.0-5.5)
CoC	**2.2** (2.0-2.3)	**2.8** (2.6-3.0)	**3.2** (3.0-3.4)	**3.8** (3.6-4.0)	**4.1** (3.9-4.4)	**4.7** (4.4-5.0)	**5.0** (4.7-5.3)	**5.4** (5.1-5.8)	**6.5** (6.0-7.1)
CMoCPE	**2.6** (1.6-4.3)	**3.4** (2.2-5.3)	**4.1** (2.7-6.2)	**4.4** (2.9-6.6)	**4.4** (2.9-6.6)	**6.6** (4.3-10.1)	**8.5** (5.4-13.2)	**8.5** (5.4-13.2)	**11.4** (7.0-18.0)
CMoXLPE	**1.3** (1.1-1.5)	**1.6** (1.4-1.8)	**1.8** (1.6-2.0)	**2.1** (1.9-2.4)	**2.3** (2.0-2.6)	**2.5** (2.2-2.8)	**2.7** (2.4-3.1)	**3.0** (2.6-3.4)	**3.7** (3.0-4.6)

Figure 4.8

Estimated failure rates of primary total hip arthroplasty for different bearing surfaces

Time since operation, 2012–2025, % of implants revised



Head size	1 year	2 years	3 years	5 years	6 years	8 years	9 years	10 years	13 years
28 (7%)	**2.1** (1.8-2.3)	**2.6** (2.3-2.9)	**2.9** (2.7-3.3)	**3.6** (3.3-3.9)	**3.9** (3.5-4.2)	**4.5** (4.1-4.9)	**4.8** (4.4-5.3)	**5.3** (4.9-5.8)	**7.2** (6.4-8.0)
32 (51%)	**1.9** (1.8-2.0)	**2.4** (2.3-2.5)	**2.7** (2.6-2.8)	**3.1** (3.0-3.2)	**3.4** (3.2-3.5)	**3.9** (3.8-4.1)	**4.2** (4.0-4.4)	**4.5** (4.3-4.7)	**5.4** (5.1-5.7)
36 (42%)	**1.9** (1.9-2.0)	**2.4** (2.3-2.5)	**2.7** (2.6-2.9)	**3.2** (3.1-3.4)	**3.5** (3.3-3.6)	**3.9** (3.8-4.1)	**4.3** (4.1-4.4)	**4.6** (4.4-4.8)	**5.2** (4.9-5.6)
40+ (0.28%)	**3.2** (2.0-5.2)	**5.3** (3.6-7.8)	**6.9** (4.9-9.8)	**8.8** (6.4-12.0)	**9.9** (7.3-13.4)	**11.3** (8.4-15.1)	**11.3** (8.4-15.1)	**12.0** (8.9-16.1)	**12.0** (8.9-16.1)

Figure 4.9

Estimated failure rates of primary total hip arthroplasty for different types of head sizes (standard cups: all uncemented fixation)

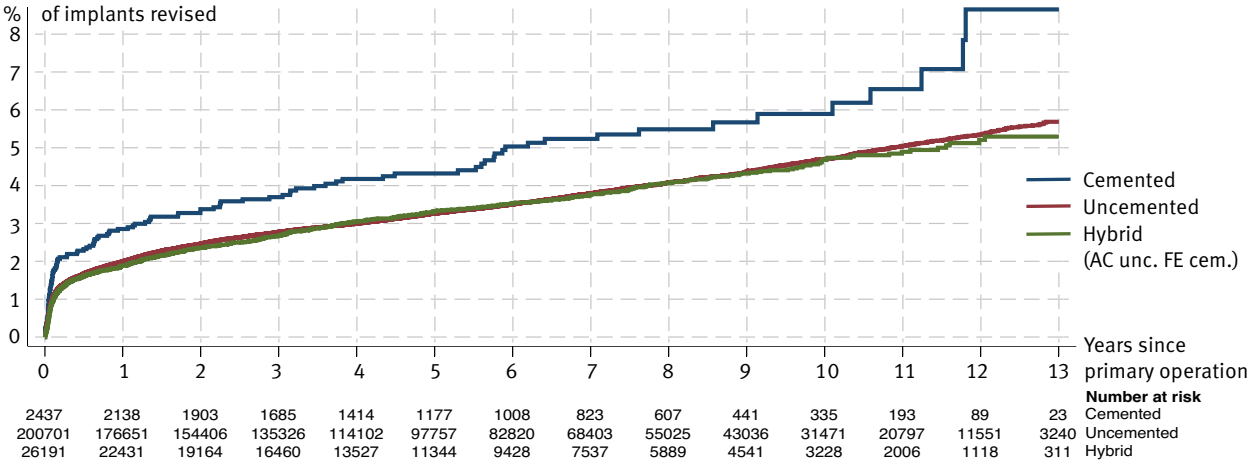
Time since operation, 2012–2025, diagnosis primary OA

4.3.2 First revision by fixation

Component fixation also affected medium- to long-term revision rates **(Figure 4.10).** Hybrid fixation showed slightly better revision rates at 13 years with 5.3% (CI 4.8–5.9%) than uncemented fixation with 5.7% (CI 5.5–5.9%) or all cemented with 8.7% (CI 6.2–11.9%). Although the revision rates for hybrid fixation tended to run below the revision rates for uncemented fixation for most of the observation time, confidence intervals remained largely overlapping, indicating no statistical significance. The revision rate of cemented fixation rose significantly in the last 3 years of the follow-up available. However, statistical relevance is limited by small numbers with wide confidence intervals.

4.3.3 First revision by BMI

The 2-year revision rate for patients with BMI ›40 kg/m² was 6.4% (CI 5.6–7.4%), more than three times higher than in patients with normal weight. Most revisions occurred within the first 2 to 3 months and the most frequent reason for revision was infection, accounting for up to one-third of all revisions in this population **(see annual report 2025).**



Fixation	1 year	2 years	3 years	5 years	6 years	8 years	9 years	10 years	13 years
Cemented	**2.9** (2.3-3.6)	**3.4** (2.7-4.2)	**3.7** (3.0-4.6)	**4.3** (3.5-5.3)	**5.0** (4.1-6.1)	**5.5** (4.5-6.7)	**5.7** (4.6-6.9)	**5.9** (4.8-7.2)	**8.7** (6.2-11.9)
Uncemented	**2.0** (1.9-2.1)	**2.5** (2.4-2.5)	**2.8** (2.7-2.9)	**3.3** (3.2-3.4)	**3.5** (3.4-3.6)	**4.1** (4.0-4.2)	**4.4** (4.3-4.5)	**4.7** (4.6-4.8)	**5.7** (5.5-5.9)
Hybrid*	**1.9** (1.7-2.1)	**2.4** (2.2-2.6)	**2.7** (2.5-2.9)	**3.3** (3.1-3.6)	**3.5** (3.3-3.8)	**4.1** (3.8-4.4)	**4.3** (4.0-4.7)	**4.7** (4.3-5.1)	**5.3** (4.8-5.9)

Figure 4.10

Estimated failure rates of primary total hip arthroplasty for different fixation methods

Time since operation, 2012–2025, diagnosis primary OA. * acetabulum uncemented, femur cemented.

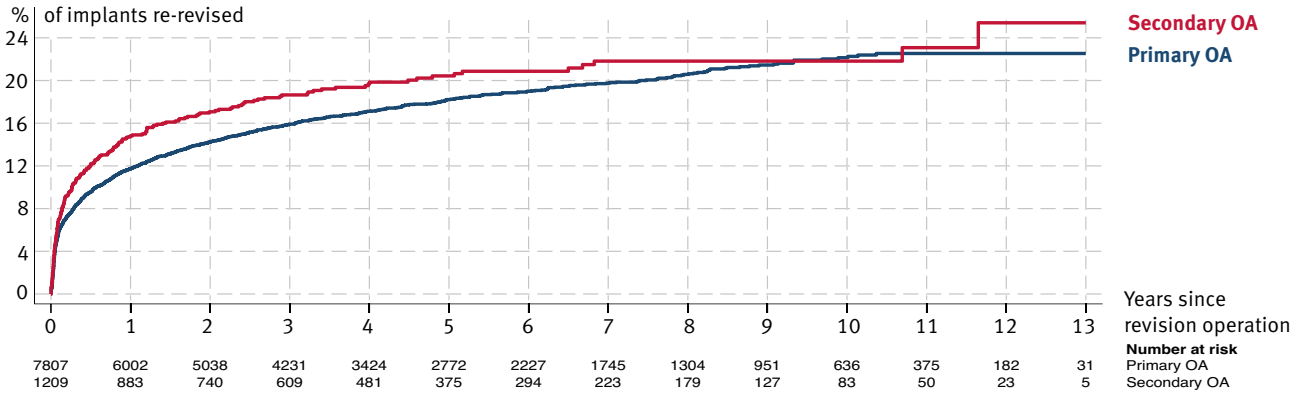
4.4 Re-revision of total hip arthroplasty

Re-revisions are revisions occurring after the first revision. The first or index revision includes partial or complete revisions and sometimes re-implantations after Girdlestone, when the removal of the implant was not documented in the register.

The re-revision rate is high and reached 11.7% (CI 11.0–12.5%) for primary OA after the first year and 14.8% (CI 12.9–17.0%) for secondary OA. That means that every 7th to 8th revision was revised again within the first year. The re-revision rate after two years accounted for 11.7% (CI 11.0–12.5%). After 13 years the re-revision rate rose to 22.5% (CI 21.2–23.9%). At 13 years, the revision rate was 22.5% (CI 21.2–23.9%) for primary and 25.4% (CI 20.2–31.7%) for secondary OA **(Figure 4.11).**

4.4.1 Reasons for re-revision THA

Over the first five years, infection is the predominant diagnosis leading to a re-revision, followed by loosening and dislocation. From the 6th year onwards, loosening is the main reason for re-revision. The cumulative incidence rate for loosening reaches 9.6% (CI 8.9–11.3) after 12 years **(Figure 4.12).**

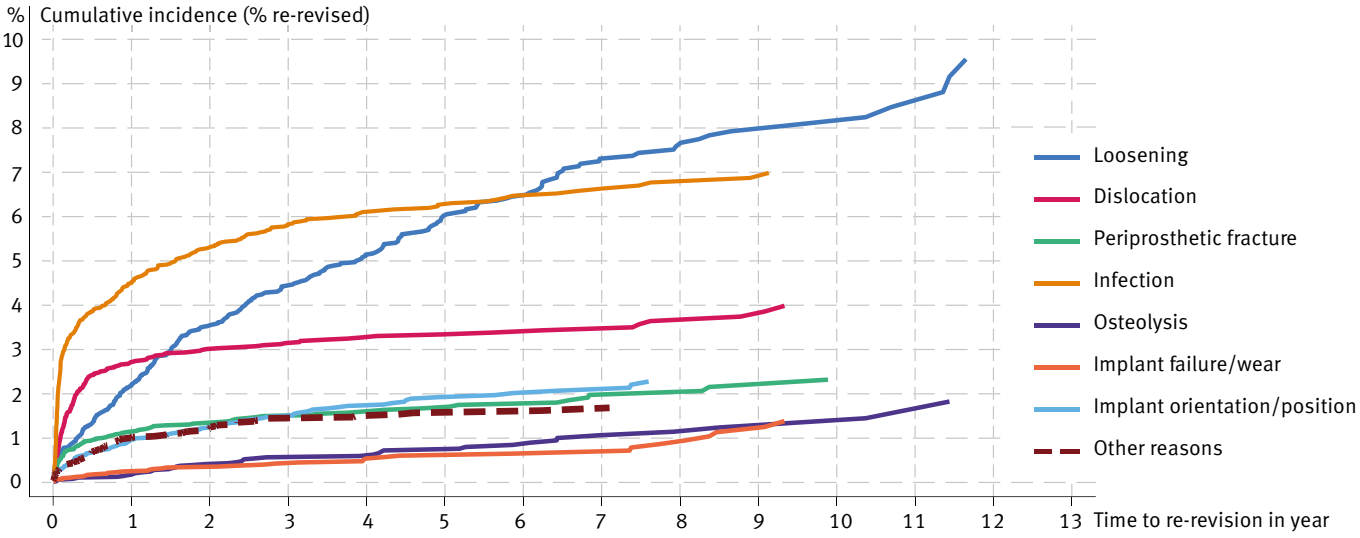


OA	1 year	2 years	3 years	5 years	6 years	8 years	10 years	12 years
Primary OA	**11.7** (11.0-12.5)	**14.3** (13.5-15.1)	**15.9** (15.1-16.8)	**18.2** (17.3-19.2)	**19.0** (18.0-20.0)	**20.6** (19.5-21.7)	**22.1** (20.9-23.5)	**22.5** (21.2-23.9)
Sec. OA	**14.8** (12.9-17.0)	**17.1** (15.0-19.4)	**18.7** (16.5-21.1)	**20.4** (18.1-23.1)	**20.9** (18.4-23.6)	**21.8** (19.2-24.7)	**21.8** (19.2-24.7)	**25.4** (20.2-31.7)

Figure 4.11

Estimated failure rates after revision of total hip arthroplasty: primary and secondary OA

Time since revision, 2012–2025. Start point of analysis: first registered component revision in SIRIS that meets the inclusion criteria. End point of analysis: next registered component revision.

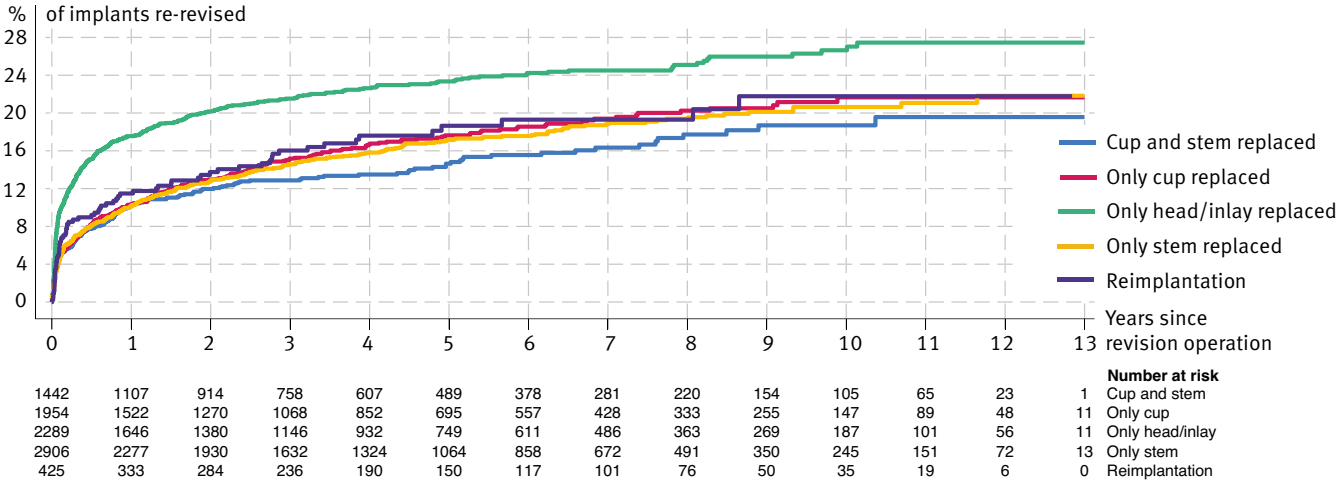


Diagnoses	1 year	2 years	3 years	5 years	9 years	10 years	12 years
Loosening	**2.2** (1.9-2.6)	**3.5** (3.1-4.0)	**4.4** (3.9-5.0)	**6.0** (5.4-6.7)	**7.9** (7.1-8.9)	**8.0** (7.2-9.1)	**9.6** (8.0-11.3)
Dislocation	**2.7** (2.4-3.1)	**3.0** (2.6-3.4)	**3.1** (2.8-3.6)	**3.3** (2.9-3.8)	**3.7** (3.2-4.3)	**4.0** (3.4-4.7)	**4.0** (3.4-4.7)
Periprosthetic fracture	**1.1** (0.9-1.4)	**1.3** (1.1-1.7)	**1.5** (1.2-1.8)	**1.7** (1.4-2.0)	**2.2** (1.7-2.7)	**2.3** (1.8-3.0)	**2.3** (1.8-3.0)
Infection	**4.5** (4.0-5.0)	**5.3** (4.8-5.9)	**5.8** (5.3-6.4)	**6.3** (5.7-6.9)	**6.9** (6.2-7.6)	**7.0** (6.3-7.8)	**7.0** (6.3-7.8)
Osteolysis	**0.2** (0.1-0.3)	**0.4** (0.3-0.6)	**0.6** (0.4-0.8)	**0.7** (0.5-1.0)	**1.2** (0.9-1.7)	**1.2** (0.9-1.7)	**1.8** (1.1-3.1)
Implant failure / wear	**0.2** (0.2-0.4)	**0.3** (0.2-0.5)	**0.4** (0.3-0.6)	**0.6** (0.4-0.9)	**1.1** (0.8-1.7)	**1.4** (0.9-2.1)	**1.4** (0.9-2.1)
Implant orientation / position	**1.0** (0.8-1.2)	**1.2** (1.0-1.5)	**1.5** (1.2-1.8)	**1.9** (1.6-2.3)	**2.3** (1.9-2.8)	**2.3** (1.9-2.8)	**2.3** (1.9-2.8)
Other reasons	**1.0** (0.8-1.3)	**1.2** (1.0-1.5)	**1.4** (1.2-1.8)	**1.6** (1.3-1.9)	**1.7** (1.4-2.1)	**1.7** (1.4-2.1)	**1.7** (1.4-2.1)

Figure 4.12

Cumulative incidence rates for different re-revision diagnoses after main component changes

Time since operation, 2012–2025, % of implants re-revised



Typ of procedure	1 year	2 years	3 years	5 years	9 years	10 years	12 years
Cup and stem repl.	**9.9** (8.5-11.5)	**11.5** (10.0-13.3)	**12.7** (11.1-14.5)	**14.3** (12.5-16.3)	**18.6** (16.0-21.6)	**18.6** (16.0-21.6)	**19.5** (16.5-22.9)
Only cup replaced	**10.3** (9.1-11.6)	**12.9** (11.6-14.5)	**15.0** (13.5-16.7)	**17.3** (15.6-19.1)	**20.2** (18.1-22.4)	**21.2** (18.9-23.9)	**22.2** (19.3-25.6)
Only stem replaced	**10.6** (9.6-11.7)	**13.2** (12.1-14.5)	**14.9** (13.7-16.3)	**17.4** (16.0-19.0)	**20.4** (18.7-22.3)	**20.9** (19.1-22.9)	**22.1** (19.7-24.8)
Only head/insert repl.	**17.2** (15.8-18.7)	**19.9** (18.3-21.5)	**21.2** (19.7-22.9)	**22.9** (21.2-24.7)	**25.6** (23.6-27.7)	**26.2** (24.0-28.5)	**27.0** (24.6-29.5)
Reimplantation	**10.7** (8.2-13.9)	**13.0** (10.2-16.5)	**15.1** (12.0-18.9)	**17.5** (14.0-21.6)	**20.3** (15.9-25.7)	**20.3** (15.9-25.7)	

Figure 4.13

Estimated failure rates after revision of total hip arthroplasty (primary and secondary OA): types of procedures

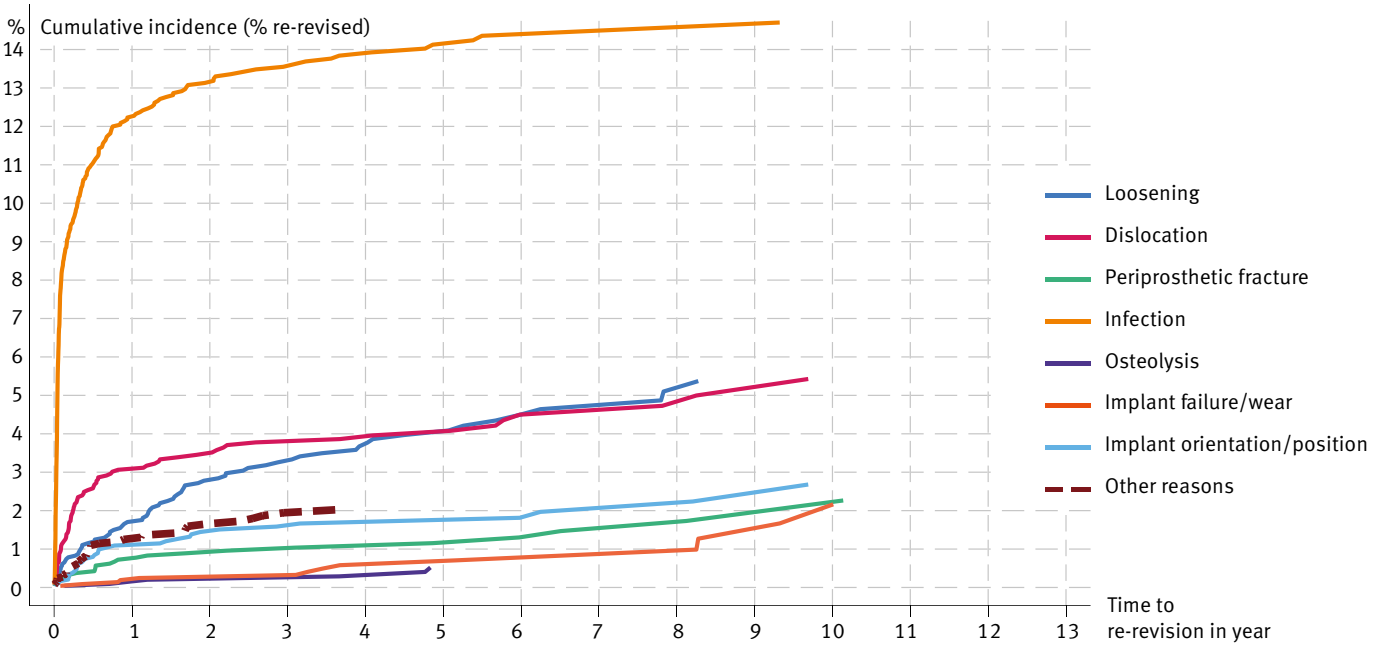
Time since revision, 2012–2025. Start point of analysis: first registered component revision in SIRIS that meets the inclusion criteria.
End point of analysis: next registered component revision.

4.4.2 Influence of type of previous THA revision

The lowest revision rate was seen after complete revision, i.e. revision of both the stem and the cup. Revision of only the cup or the stem and re-implantation had similar revision rates around 13% at two years and 22% at eleven years (for precise numbers consult **Figure 4.13).** However, head and insert exchange had a significantly higher revision rate at two years (19.9%, CI 18.3–21.5%). At 13 years, the revision rate increased to 27.0% (CI 24.6–29.5%).

4.4.3 Re-revision by revision diagnosis

The main reason for re-revision after isolated head and insert exchange was infection, with a re-revision rate of 13.1% (CI 11.9–14.5%) at one year **(Figure 4.14).** Head and insert exchange mainly is performed in prosthetic joint infections as DAIR procedure (Debridement, Antibiotics and Implant Retention). These findings indicate that this concept was not successful in every 10th DAIR procedure. The outcome of this type of revision is more linked to the reason for revision than to the type of surgery.



Diagnoses	1 year	2 years	3 years	5 years	9 years	10 years	12 years
Loosening	**1.7** (1.2-2.3)	**2.8** (2.1-3.6)	**3.3** (2.5-4.2)	**4.0** (3.1-5.0)	**5.4** (4.2-6.9)	**5.4** (4.2-6.9)	**5.4** (4.2-6.9)
Dislocation	**3.1** (2.4-3.9)	**3.5** (2.8-4.3)	**3.8** (3.0-4.7)	**4.0** (3.2-4.9)	**5.0** (3.9-6.4)	**5.4** (4.1-7.1)	**5.4** (4.1-7.1)
Periprosthetic fracture	**0.7** (0.4-1.2)	**0.9** (0.6-1.4)	**1.0** (0.6-1.5)	**1.2** (0.7-1.8)	**1.7** (1.1-2.8)	**1.7** (1.1-2.8)	**2.3** (1.3-4.1)
Infection	**12.2** (11.0-13.6)	**13.1** (11.9-14.5)	**13.6** (12.2-15.0)	**14.1** (12.8-15.6)	**14.4** (13.0-15.9)	**14.7** (13.2-16.4)	**14.7** (13.2-16.4)
Osteolysis	**0.1** (0.0-0.5)	**0.2** (0.1-0.5)	**0.2** (0.1-0.5)	**0.5** (0.2-1.2)	**0.5** (0.2-1.2)	**0.5** (0.2-1.2)	**0.5** (0.2-1.2)
Implant failure/wear	**0.2** (0.1-0.5)	**0.2** (0.1-0.6)	**0.2** (0.1-0.6)	**0.6** (0.3-1.1)	**1.3** (0.6-2.6)	**1.7** (0.8-3.4)	**2.2** (1.1-4.4)
Implant orientation/position	**1.1** (0.7-1.6)	**1.4** (1.0-2.1)	**1.6** (1.1-2.2)	**1.7** (1.2-2.3)	**2.2** (1.5-3.3)	**2.7** (1.7-4.2)	**2.7** (1.7-4.2)
Other reasons	**1.2** (0.9-1.8)	**1.7** (1.2-2.3)	**1.9** (1.4-2.7)	**2.0** (1.5-2.8)	**2.0** (1.5-2.8)	**2.0** (1.5-2.8)	**2.0** (1.5-2.8)

Figure 4.14

Cumulative incidence rates for different re-revision diagnoses after head/insert changes

Time since operation, 2012–2025, % of implants re-revised

4.5 Results of implants in total hip arthroplasty

A key feature of an arthroplasty registry is to analyse the performance of implants regarding revision rates over time. While short-term results largely reflect a surgeon's or an institution's performance, long-term results depend more on the design and quality of the implants. THA comprises at least three components: the stem, the cup, and the head. Considering common modularity of the cup, including dual mobility systems, it is sensible to focus on combinations in current use and to compare those with each other as it could be that a cup works well with one stem but poorly with another – and vice versa. THA performed for primary and for secondary OA are considered separately. The internationally recognised benchmark considers only primary OA. The reader is reminded to consider statistical precision of the results. A single revision weighs much more in a small group than in a large group. Hence, there is always a trade-off between statistical precision and the necessity to identify possible low-volume outliers. Methodological details are provided in **Chapter 2 Methods.**

A so-called case concentration score (CCS) was introduced since the annual report 2022. It indicates the percentage of arthroplasties performed by the main user hospital service. A higher value signifies an increased likelihood of bias due to local effects induced by a single provider unit. Hence, a share of ›50% would suggest that reported results are likely dominated by data from one hospital service while a score of 100% indicates that the implant is used in one hospital only.

4.5.1 Two-year revision rates

The 2-year revision rate is an important time point for gathering initial results about the early performance of an implant, especially since most early complications occur within the first 3 months after surgery. The average revision rate is calculated for the moving 4-year window period from 01.01.2020 to 31.12.2023. Due to the moving 4-year window for the analysis of the 2-year revision rates, some results may differ from those from previous reports.

Uncemented combinations for primary OA

A total of 63,808 uncemented THA had been performed during the current moving 4-year window for primary OA. Compared to previous years, the average 2-year revision rate improved from 2.5% (CI 2.4–2.6%) in 2024 to 2.4% (CI 2.3–2.5%) in 2025 and remained at the same level for the current 4-year window. **Table 4.11** shows the 2-year revision rates of all uncemented implant combinations used more than 50 times for primary OA, representing 96.6% of all combinations. Four stem/cup combinations were identified as potential outliers and two implant combination as 'highly likely' outliers. These were further analysed following the protocol described in Chapter 2 Methods and presented in the outlier watchlist at the end of this report. Compared to the previous report, three combinations lost their status as potential outlier(Avenir/Trident II, Nanos/R3, Symbol/Symbol DMHA/DS evol.). SPS evolution/April Poly fell below the threshold of 50 cases for analysis and hence does not show up anymore. On the contrary, the combination Express/Primero reached the critical number of ›50 cases and presents itself with a revision rate that exceeded the alert boundary.

Avenir/G7 hemispherical is an interesting implant combination. It had been identified in the previous report as a combination with an increased revision rate. Because of the wide confidence interval, it did not fulfil the criteria as a potential outlier. Although the 2-year revision rate decreased from 5.2% (CI 1.7

–15.3%) to 5.0% (CI 2.5–9.8%), it became an overt outlier in 2025. Because of an increase in the number of cases at risk from 60 in the previous observation period to 161 in the current 4-year window, the confidence interval narrowed, leading to an outlier status. The improvement of the nationwide average 2-year revision rate from 2.4% to 2.3% also contributed by decreasing of the baseline. A detailed assessment of the outliers is presented in the outlier watch list page 202.

Table 4.11 and Figure 4.15 shows the alphabetical list of stem/cup combinations with respect to the group average and the outlier boundary. The latter was defined by convention as twice the value of the average of 2.3%. Any revision rate with the lower end of the confidence interval above the outlier boundary (displayed as a red dot for the mean value) signifies an outlier status.

Hybrid combinations for primary OA

A total of 8,135 hybrid primary THA had been performed for primary OA within the moving 4-year window period from 01.01.2020 to 31.12.2023. The average 2-year revision rate was 2.5% (CI 2.2–2.9%) **(Figure 4.16).** There was one outlier (Amistem-C/Mpact) regarding short-term revision rate and one combination (SPII Lubinus/Mobilelink) with an increased revision rate detected in the current period of observation.

Uncemented combinations for secondary OA

A total of 6,843 uncemented primary THA had been performed for secondary OA within the current moving 4-year window period. The average 2-year revision rate was 3.6% (CI 3.2–4.0%) **(Figure 4.17).** None of the implant combinations were considered to be outliers. There was one implant combination (Avenir/Fitmore) with an elevated revision rate.

Stem component	Cup component	CSS*	at risk N**	N	Revised % (95% CI)***
Accolade II	Trident II	36	107	4	3.7 (1.4-9.7)
Actis	Pinnacle	32	1,357	25	1.8 (1.3-2.7)
Amistem-H prox coating	Versafitcup trio/ccl.	95	77	1	1.3 (0.2-9.1)
Amistem-P	Mpact	47	456	12	2.6 (1.5-4.6)
Amistem-P	Versafitcup DM	25	129	3	2.3 (0.8-7.1)
Amistem-P	Versafitcup trio/ccl.	15	4,774	141	3.0 (2.5-3.5)
Ana.Nova alpha proxy	Ana.Nova alpha	95	127	2	1.6 (0.4-6.1)
Avenir	Allofit	13	2,901	72	2.5 (2.0-3.1)
Avenir	Avantage	35	113	2	1.8 (0.4-6.9)
Avenir	Fitmore	30	628	23	3.7 (2.5-5.5)
Avenir	G7 DM hemispherical	78	146	2	1.4 (0.3-5.4)
Avenir	G7 hemispherical	50	161	8	5.0 (2.5-9.8)
Avenir complete	Allofit	51	227	6	2.7 (1.2-5.9)
Avenir complete	G7 DM hemispherical	81	97	2	2.1 (0.5-8.2)
Avenir complete	G7 hemispherical	36	212	4	1.9 (0.7-5.0)
CLS Spotorno	Allofit	39	175	11	6.3 (3.5-11.1)
CLS Spotorno	Fitmore	40	395	7	1.8 (0.9-3.7)
Corail	Fitmore	97	159	1	0.6 (0.1-4.4)
Corail	Novae TH/Bi-Mentum	35	63	2	3.2 (0.8-12.1)
Corail	Pinnacle	18	4,147	108	2.6 (2.2-3.2)
Corail collared	Bimobile	64	73	5	7.0 (3.0-16.1)
Corail collared	Fitmore	90	174	3	1.7 (0.6-5.3)
Corail collared	Gyros	55	137	6	4.4 (2.0-9.5)
Corail collared	Novae TH/Bi-Mentum	27	1,314	24	1.8 (1.2-2.7)
Corail collared	Pinnacle	19	8,273	143	1.7 (1.5-2.0)
Corail collared	RM pressfit vitamys	66	145	0	0.0 (.-)
Corehip	Plasmafit	86	187	1	0.5 (0.1-3.8)
Exacta	Jump system/JS traser	86	166	4	2.4 (0.9-6.3)
Exacta S	Jump system/JS traser	54	260	6	2.3 (1.0-5.1)
Exception	Allofit	35	54	1	1.9 (0.3-12.4)
Exception	Avantage	76	203	11	5.4 (3.0-9.6)
Expersus	Primaro	91	58	3	5.2 (1.7-15.2)
Fitmore	Allofit	75	2,709	44	1.6 (1.2-2.2)
Fitmore	Fitmore	38	2,369	49	2.1 (1.6-2.7)
Fitmore	G7 hemispherical	58	96	3	3.1 (1.0-9.4)
Fitmore	RM pressfit vitamys	95	538	6	1.1 (0.5-2.5)
H-Max S	Delta TT	26	118	1	0.8 (0.1-5.9)
H-Max S	Symbol DMHA/DS evol.	95	95	4	4.3 (1.6-11.0)
Harmony evolution	April ceramic	84	62	1	1.6 (0.2-10.9)
Individual/custom hip	April ceramic	32	631	13	2.1 (1.2-3.5)
Individual/custom hip	Pinnacle	53	115	3	2.6 (0.9-8.0)

* Share of implants accounted for by main user hospital service. A higher share signifies an increased likelihood of biased figures due to local effects. A share of 50%+ would suggest that reported results are likely determined by one hospital service.

** Number of patients with at least two years follow-up (i.e. primary prosthesis in moving average).

*** Rates adjusted for effects of mortality and emigration.

Table 4.11 – Part one

2-year evaluation: Revision rates of uncemented primary total hip arthroplasty combinations within 24 months (primary OA)

4-year moving average covering implants between 01.01.2020 and 31.12.2023, with two years follow-up (31.12.2025)

Stem component	Cup component	CSS*	at risk N**	N	Revised % (95% CI)***
LCU	Mobilelink	80	226	9	4.1 (2.1-7.6)
Metafix	Trinity	80	250	8	3.2 (1.6-6.3)
Minimax	Versafitcup trio/ccl.	41	149	3	2.0 (0.7-6.1)
Nanos	R3	50	74	2	2.7 (0.7-10.4)
Optimys	Anexys	20	211	5	2.4 (1.0-5.6)
Optimys	RM pressfit	24	284	13	4.6 (2.7-7.8)
Optimys	RM pressfit vitamys	7	11,094	234	2.1 (1.9-2.4)
Optimys	Symbol DMHA/DS evol.	73	226	2	0.9 (0.2-3.5)
Optimys	Trident II	61	306	5	1.6 (0.7-3.9)
Polarstem	EP-fit	95	284	12	4.2 (2.4-7.3)
Polarstem	Novae TH/Bi-Mentum	100	51	3	5.9 (1.9-17.1)
Polarstem	Polarcup	59	808	18	2.2 (1.4-3.5)
Polarstem	R3	56	3,529	47	1.3 (1.0-1.8)
Quadra-H	Allofit	100	50	2	4.0 (1.0-15.1)
Quadra-H	Mpact	31	272	7	2.6 (1.2-5.3)
Quadra-H	Versafitcup DM	65	132	4	3.0 (1.2-7.9)
Quadra-H	Versafitcup trio/ccl.	19	1,435	48	3.4 (2.5-4.4)
Quadra-P	Mpact	66	548	12	2.2 (1.3-3.8)
Quadra-P	Mpact 3D metal monocer	98	59	1	1.7 (0.2-11.4)
Quadra-P	Versafitcup DM	43	182	7	3.9 (1.9-8.0)
Quadra-P	Versafitcup trio/ccl.	23	2,762	43	1.6 (1.2-2.1)
SBG	R3	40	462	9	2.0 (1.0-3.7)
SBG	Xentrax	100	58	0	0.0 (.-.)
SL-plus	HI	100	67	2	3.0 (0.8-11.4)
SL-plus MIA	EP-fit	51	204	2	1.0 (0.2-3.9)
SL-plus MIA	HI	34	166	5	3.1 (1.3-7.2)
SL-plus MIA	R3	74	368	9	2.5 (1.3-4.7)
SMS	Versafitcup trio/ccl.	69	234	5	2.2 (0.9-5.1)
SPS evolution	April ceramic	48	484	31	6.5 (4.6-9.1)
SPS evolution	Liberty	47	76	3	3.9 (1.3-11.7)
Stelia-Stem	BSC pressfit	100	100	2	2.0 (0.5-7.8)
Symbol	Symbol DMHA/DS evol.	76	254	11	4.4 (2.4-7.7)
Twinsys	Anexys	60	145	2	1.4 (0.4-5.5)
Twinsys	RM pressfit	60	70	8	11.5 (5.9-21.6)
Twinsys	RM pressfit vitamys	23	1,694	48	2.8 (2.2-3.8)
Twinsys	Symbol DMHA/DS evol.	53	72	2	2.8 (0.7-10.7)
other combinations			2,194	87	4.0 (3.3-4.9)
CH average for group					**2.3 (2.2-2.5)**

* Share of implants accounted for by main user hospital service. A higher share signifies an increased likelihood of biased figures due to local effects. A share of 50%+ would suggest that reported results are likely determined by one hospital service.

** Number of patients with at least two years follow-up (i.e. primary prosthesis in moving average).

*** Rates adjusted for effects of mortality and emigration.

Table 4.11 – Part two

2-year evaluation: Revision rates of uncemented primary total hip arthroplasty combinations within 24 months (primary OA)

4-year moving average covering implants between 01.01.2020 and 31.12.2023, with two years follow-up (31.12.2025)

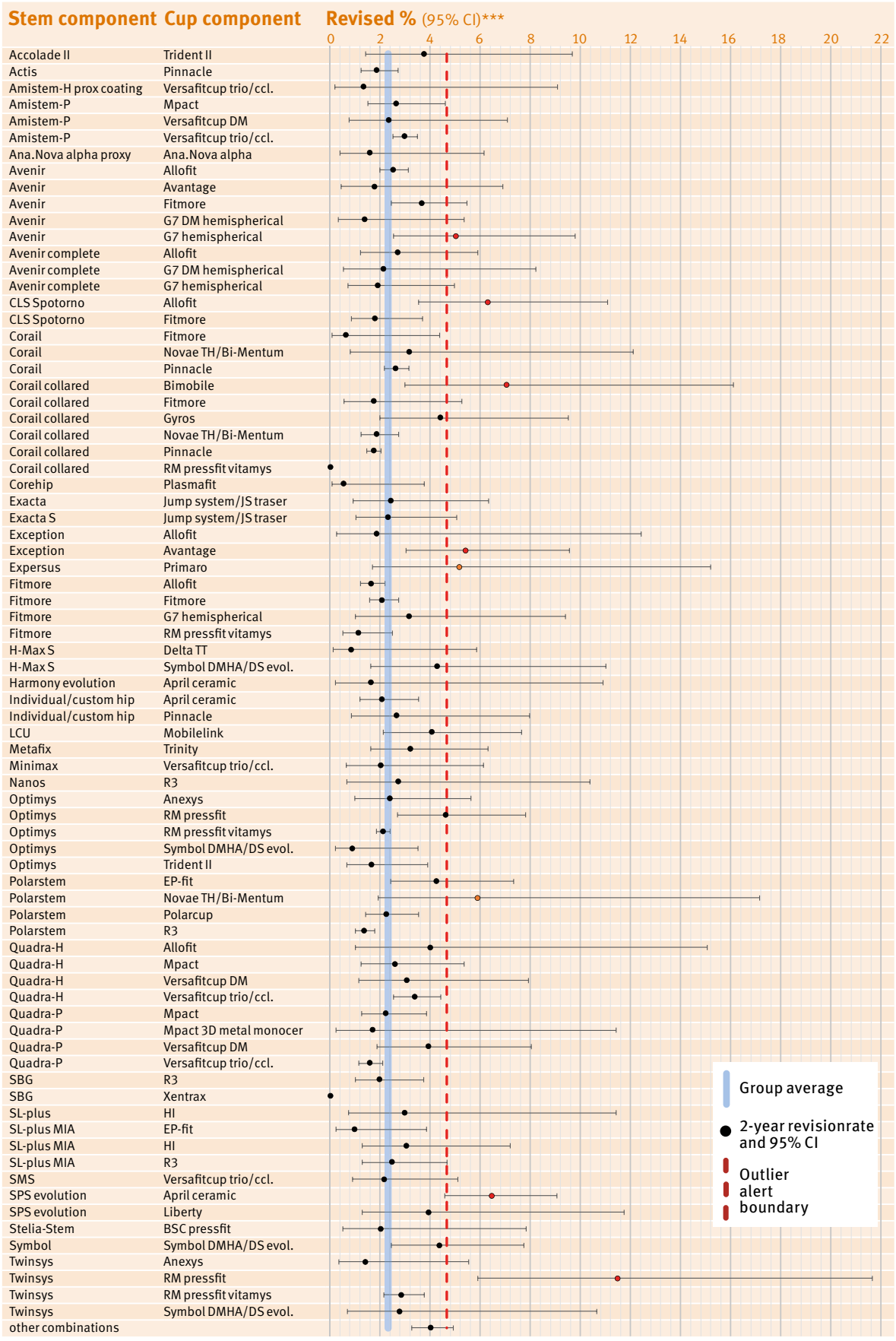


Figure 4.15

2-year evaluation: Revision rates of uncemented primary total hip arthroplasty combinations within 24 months (primary OA)

Stem component	Cup component	CSS*	at risk N**	Revised N
Amistem-C	Mpact	34	88	6
Amistem-C	Versafitcup DM	29	122	4
Amistem-C	Versafitcup trio/ccl.	17	696	23
Avenir (cem)	Allofit	25	387	10
Avenir (cem)	Fitmore	64	373	11
CCA	RM pressfit vitamys	43	58	2
Centris	RM pressfit vitamys	53	119	2
Corail (cem)	Novae TH/Bi-Mentum	36	225	2
Corail (cem)	Pinnacle	22	743	14
Exeter V40	Symbol DMHA/DS evol.	100	103	1
Harmony (cem)	Liberty	72	53	0
MS-30	Allofit	69	571	12
MS-30	Fitmore	45	139	5
MS-30	Versafitcup trio/ccl.	100	81	0
Original Mueller	Allofit	67	57	2
Original Mueller	Fitmore	92	60	1
Polarstem (cem)	Polarcup	44	73	3
Quadra-C	Versafitcup trio/ccl.	36	250	8
Quadra-P (cem)	Versafitcup DM	33	60	1
Quadra-P (cem)	Versafitcup trio/ccl.	26	218	5
SPII Lubinus	Mobilelink	30	60	4
Twinsys (cem)	MobiliT	100	62	1
Twinsys (cem)	RM pressfit	20	76	0
Twinsys (cem)	RM pressfit vitamys	26	1,214	18
Twinsys (cem)	Symbol DMHA/DS evol.	38	84	1
Weber	Allofit	37	129	6
Weber	Fitmore	35	453	10
other combinations	-		1,581	50

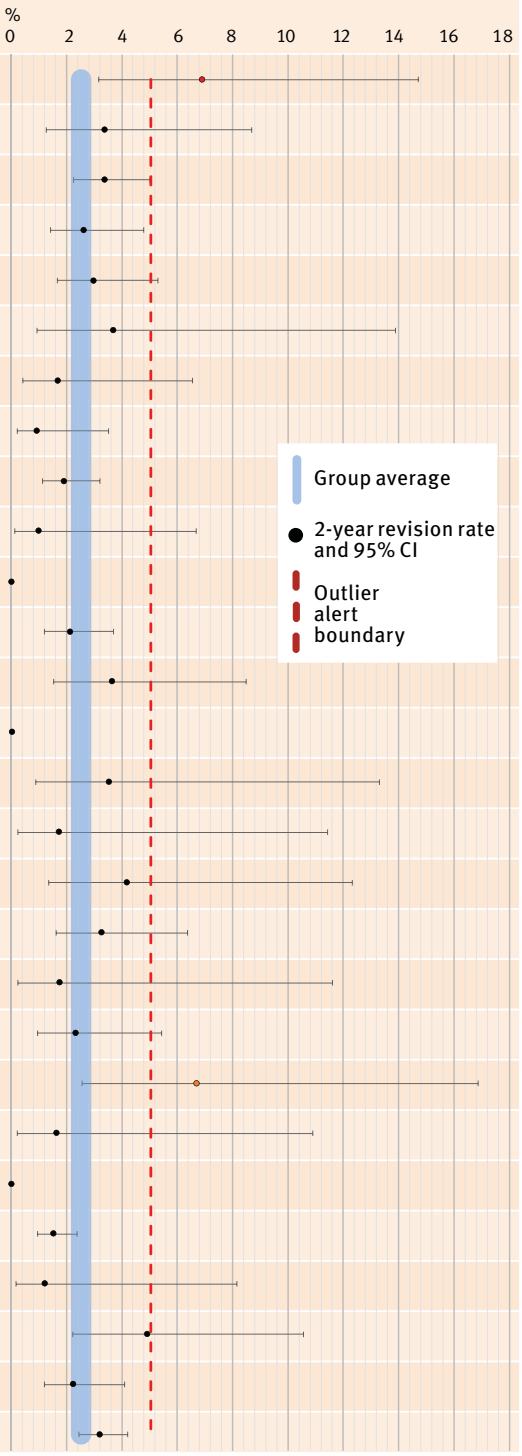


Figure 4.16

2-year evaluation: Revision rates of hybrid primary total hip arthroplasty combinations within 24 months (primary OA)

4-year moving average covering implants between 01.01.2020 and 31.12.2023, with two years follow-up (31.12.2025)

* Share of implants accounted for by main user hospital service. A higher share signifies an increased likelihood of biased figures due to local effects. A share of 50%+ would suggest that reported results are likely determined by one hospital service.

** Number of patients with at least two years follow-up (i.e. primary prosthesis in moving average).

*** Rates adjusted for effects of mortality and emigration.

Stem component	Cup component	CSS*	at risk N**	Revised N	Revised % (95% CI)***
Actis	Pinnacle	37	193	7	3.6 (1.8-7.5)
Amistem-P	Versafitcup trio/ccl.	15	404	19	4.7 (3.0-7.3)
Avenir	Allofit	21	286	11	3.9 (2.2-6.9)
Avenir	Fitmore	68	65	5	7.7 (3.3-17.5)
Avenir complete	G7 hemispherical	68	63	3	4.8 (1.6-14.2)
Corail	Pinnacle	13	293	7	2.4 (1.2-5.0)
Corail collared	Novae TH/Bi-Mentum	34	154	10	6.5 (3.6-11.8)
Corail collared	Pinnacle	30	823	23	2.8 (1.9-4.2)
Fitmore	Allofit	93	645	10	1.6 (0.8-2.9)
Fitmore	Fitmore	36	189	8	4.2 (2.1-8.3)
Fitmore	RM pressfit vitamys	100	95	1	1.1 (0.1-7.2)
Individual/custom hip	April ceramic	20	106	2	1.9 (0.5-7.3)
Optimys	RM pressfit vitamys	18	958	29	3.0 (2.1-4.4)
Polarstem	Polarcup	79	142	3	2.1 (0.7-6.5)
Polarstem	R3	74	368	14	3.8 (2.3-6.4)
Quadra-H	Versafitcup trio/ccl.	31	109	6	5.6 (2.5-12.0)
Quadra-P	Versafitcup trio/ccl.	61	300	7	2.3 (1.1-4.9)
SBG	R3	47	57	3	5.3 (1.7-15.4)
Twinsys	RM pressfit vitamys	13	149	9	6.1 (3.2-11.4)
other combinations	-		1444	66	4.6 (3.6-5.8)
CH average for group					**3.6 (3.2-4.0)**

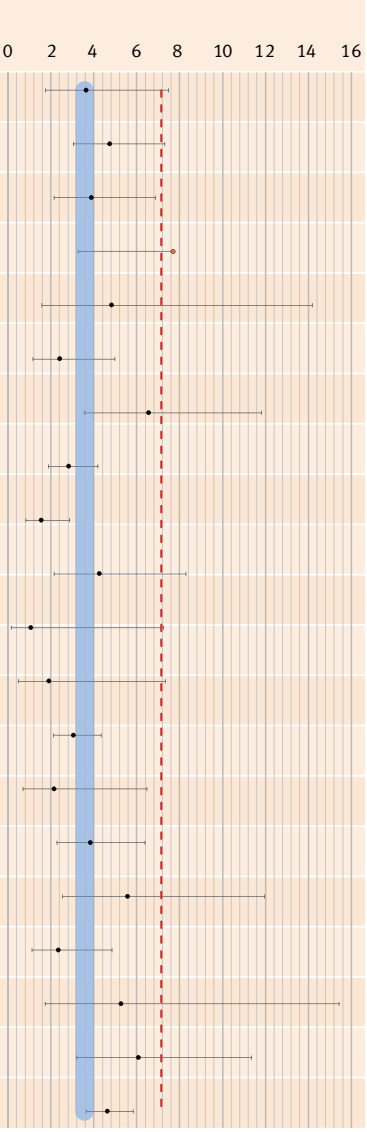


Figure 4.17

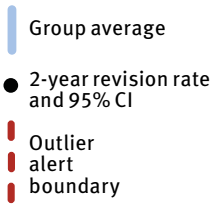
2-year evaluation: Revision rates of uncemented primary total hip arthroplasty combinations within 24 months (secondary OA)

4-year moving average covering implants between 01.01.2020 and 31.12.2023, with two years follow-up (31.12.2025).

* Share of implants accounted for by main user hospital service. A higher share signifies an increased likelihood of biased figures due to local effects. A share of 50%+ would suggest that reported results are likely determined by one hospital service.

** Number of patients with at least two years follow-up (i.e. primary prosthesis in moving average).

*** Rates adjusted for effects of mortality and emigration.



Important information on the use of the implant performance tables below

- Estimated revision rate exceeds the alert boundary, but we do not identify this implant combination as an outlier because the 95% confidence interval overlaps the confidence zone of the reference group.
- Identified as potential outliers. Please note the statistical confidence intervals. The outlier status comes with varying degrees of statistical probability. We consider the potential outlier status „highly likely“ when both the estimated revision rate and the complete confidence interval exceed the outlier alert boundary.

Please be aware that relatively rare implant combinations are frequently used in only a small number or indeed only in one hospital in Switzerland. Observed revision rates may be determined by local factors and performance may differ significantly between locations. Manufacturers of detected outlier implants and the hospitals where they were used (and revisions occurred) have been informed by SIRIS.

4.5.2 Thirteen-year revision rates

The register provides an overview of the 13-year performance of implant combinations. In Tables the revision rates are shown for 1, 3, 5, 10 and 13 years of follow-up.

Uncemented combinations for primary OA

Table 4.12 shows in alphabetic order the stem/cup combinations used in 75% of the uncemented THA performed for primary OA and their evolution between 2020 and 2025.

At 13 years, the average revision rate for all uncemented stem/cup combinations was 5.7% (CI 5.5 –5.9%). **Table 4.13** shows the revision rates since 2012 for THA conducted for primary OA, whereby only uncemented stem/cup combinations with N › 500 are presented. The rare combinations are discussed in detail in the next section. The lowest revision rate at 13 years was documented for the combination Optimys/RM pressfit vitamys with 2.8% (CI 2.6–3.1%) and Polarstem/R3 with 2.8% (CI 2.3–3.4%). The highest revision rate was found in the combination SL-plus MIA/HI with 10.5% (CI 8.0–13.7%).

Stem component	Cup component	2020	2021	2022	2023	2024	2025	2020 – 2025
Actis	Pinnacle	185	223	406	543	607	911	**2,875**
Amistem-P	Versafitcup trio/ccl.	1,182	1,229	1,213	1,150	1,035	820	**6,629**
Avenir	Allofit	1,039	714	617	531	541	527	**3,969**
Corail	Pinnacle	1,216	1,136	938	857	643	305	**5,095**
Corail collared	Novae TH/Bi-Mentum	97	343	357	517	521	536	**2,371**
Corail collared	Pinnacle	1,609	2,008	2,292	2,364	2,437	2,381	**13,091**
Fitmore	Allofit	561	617	681	850	1,097	1,291	**5,097**
Fitmore	Fitmore	624	596	608	541	230	30	**2,629**
Optimys	RM pressfit vitamys	2,108	2,492	3,045	3,449	3,799	4,195	**19,088**
Polarstem	R3	766	818	936	1,009	1,241	1,146	**5,916**
Quadra-P	Versafitcup trio/ccl.	244	570	869	1,079	1,187	1,200	**5,149**
Twinsys	RM pressfit vitamys	397	416	423	458	490	452	**2,636**
other combinations	-	4,531	4,394	4,096	3,929	3,959	4,102	**25,011**
Total		**14,559**	**15,556**	**16,481**	**17,277**	**17,787**	**17,896**	**99,556**

Table 4.12
Top 75% of primary total hip arthroplasty uncemented combinations (primary OA) 2020 – 2025

Stem component	Cup component	Total N	CCS*	1 year (95% CI)	3 years (95% CI)	5 years (95% CI)	10 years (95% CI)	13 years (95% CI)
Actis	Pinnacle	3,022	25	**1.5** (1.1-2.0)	**2.2** (1.6-2.9)	**2.2** (1.6-2.9)		
Alloclassic	Fitmore	729	66	**2.2** (1.4-3.6)	**4.1** (2.9-5.9)	**5.0** (3.7-6.9)	**6.2** (4.7-8.3)	**6.2** (4.7-8.3)
Amistem-H	Versafitcup trio/ccl.	7,344	15	**2.0** (1.7-2.3)	**3.2** (2.8-3.6)	**4.3** (3.9-4.8)	**7.3** (6.7-7.9)	**9.5** (8.6-10.5)
Amistem-H collared	Versafitcup trio/ccl.	556	100	**0.9** (0.4-2.2)	**1.8** (1.0-3.4)	**1.8** (1.0-3.4)	**3.2** (1.9-5.4)	
Amistem-H prox coating	Versafitcup trio/ccl.	3,247	12	**2.2** (1.7-2.7)	**3.0** (2.4-3.6)	**3.4** (2.8-4.1)		
Amistem-P	Mpact	971	43	**3.1** (2.1-4.4)	**3.8** (2.7-5.5)	**4.8** (3.2-7.2)		
Amistem-P	Versafitcup trio/ccl.	7,013	13	**2.4** (2.1-2.8)	**3.2** (2.8-3.7)	**3.7** (3.2-4.3)		
Avenir	Alloclassic	591	68	**1.9** (1.0-3.3)	**2.4** (1.4-4.0)	**2.8** (1.7-4.5)	**3.9** (2.6-6.0)	**6.5** (3.3-12.9)
Avenir	Allofit	11,896	10	**2.1** (1.8-2.3)	**2.7** (2.4-3.0)	**3.1** (2.8-3.4)	**4.0** (3.6-4.4)	**4.6** (4.0-5.3)
Avenir	Fitmore	2,765	16	**3.2** (2.6-3.9)	**3.9** (3.3-4.7)	**4.2** (3.5-5.0)	**4.7** (3.9-5.6)	**5.0** (4.1-6.1)
Avenir complete	Allofit	500	39	**1.1** (0.5-2.7)	**1.8** (0.9-3.9)	**1.8** (0.9-3.9)		
Avenir complete	G7 hemispherical	523	32	**2.1** (1.1-3.8)	**2.1** (1.1-3.8)			
CLS Spotorno	Allofit	1,645	30	**2.8** (2.1-3.7)	**4.0** (3.2-5.1)	**4.5** (3.6-5.6)	**5.9** (4.7-7.3)	**6.1** (4.9-7.6)
CLS Spotorno	Fitmore	1,918	26	**1.7** (1.2-2.4)	**2.2** (1.6-3.0)	**2.9** (2.2-3.8)	**3.7** (2.9-4.8)	**4.1** (3.1-5.4)
Corail	Pinnacle	13,802	13	**2.1** (1.9-2.4)	**3.0** (2.8-3.4)	**3.6** (3.3-3.9)	**5.3** (4.8-5.7)	**6.4** (5.7-7.2)
Corail collared	Gyros	968	65	**2.1** (1.3-3.2)	**2.7** (1.9-4.0)	**2.8** (1.9-4.1)	**4.6** (3.2-6.7)	
Corail collared	Novae TH/Bi-Mentum	2,461	24	**1.9** (1.4-2.5)	**2.7** (2.0-3.5)	**2.7** (2.0-3.5)		
Corail collared	Pinnacle	19,280	19	**1.4** (1.2-1.5)	**2.0** (1.8-2.2)	**2.3** (2.0-2.5)	**3.0** (2.7-3.5)	**3.0** (2.7-3.5)
Corehip	Plasmafit	520	79	**0.8** (0.3-2.2)	**0.8** (0.3-2.2)	**1.3** (0.5-3.1)		
Exception	Avantage	1,134	78	**3.4** (2.5-4.6)	**4.5** (3.5-5.9)	**5.4** (4.2-7.0)	**7.7** (6.2-9.6)	**9.6** (7.2-12.7)
Fitmore	Allofit	10,040	65	**1.7** (1.5-2.0)	**2.6** (2.3-3.0)	**2.9** (2.6-3.3)	**3.7** (3.2-4.1)	**4.1** (3.5-4.7)
Fitmore	Fitmore	6,240	26	**1.9** (1.5-2.2)	**2.6** (2.3-3.1)	**3.0** (2.6-3.5)	**4.0** (3.4-4.6)	**4.6** (3.8-5.5)
Fitmore	RM pressfit vitamys	1,779	84	**1.2** (0.8-1.8)	**2.0** (1.4-2.8)	**2.1** (1.5-3.0)	**2.4** (1.7-3.4)	
H-Max S	Delta TT	546	22	**1.7** (0.9-3.1)	**2.1** (1.1-3.7)	**2.5** (1.5-4.3)	**5.9** (3.7-9.2)	
Individual/custom hip	April ceramic	1,589	26	**1.7** (1.2-2.5)	**2.7** (2.0-3.7)	**3.2** (2.4-4.3)	**3.6** (2.6-4.9)	**4.1** (2.9-5.9)
Optimys	Anexys	653	22	**2.1** (1.2-3.5)	**2.4** (1.5-4.0)	**2.4** (1.5-4.0)		
Optimys	RM pressfit	861	18	**2.6** (1.7-3.9)	**2.9** (1.9-4.3)	**3.3** (2.2-4.8)	**4.2** (2.8-6.3)	
Optimys	RM pressfit vitamys	28,816	8	**1.8** (1.7-2.0)	**2.3** (2.1-2.4)	**2.5** (2.3-2.7)	**2.8** (2.6-3.1)	**2.8** (2.6-3.1)
Optimys	Trident II	643	52	**2.3** (1.4-3.8)	**2.5** (1.5-4.1)	**2.5** (1.5-4.1)		
Polarstem	EP-fit	823	53	**3.8** (2.7-5.3)	**4.5** (3.3-6.2)	**4.9** (3.6-6.6)	**6.2** (4.5-8.5)	**6.2** (4.5-8.5)
Polarstem	Polarcup	2,743	74	**2.2** (1.7-2.8)	**2.4** (1.9-3.0)	**2.5** (2.0-3.2)	**3.0** (2.4-3.8)	**4.7** (2.7-8.2)
Polarstem	R3	10,402	62	**1.2** (1.0-1.4)	**1.7** (1.4-1.9)	**1.9** (1.7-2.2)	**2.5** (2.1-3.0)	**2.8** (2.3-3.4)
Quadra-H	Mpact	544	42	**2.2** (1.3-3.9)	**2.8** (1.7-4.6)	**3.0** (1.8-4.8)		
Quadra-H	Versafitcup trio/ccl.	7,222	19	**2.0** (1.7-2.3)	**3.1** (2.7-3.5)	**3.9** (3.4-4.4)	**7.1** (6.4-7.9)	**8.5** (7.4-9.7)
Quadra-P	Mpact	1,088	49	**2.2** (1.5-3.3)	**2.7** (1.9-4.0)	**3.4** (2.1-5.5)		
Quadra-P	Versafitcup trio/ccl.	5,182	20	**1.6** (1.3-2.0)	**2.1** (1.7-2.5)	**2.3** (1.9-2.9)		
SBG	R3	1,669	42	**1.3** (0.9-2.0)	**1.9** (1.3-2.7)	**2.4** (1.7-3.2)	**3.8** (2.7-5.4)	
SL-plus MIA	EP-fit	1,254	30	**2.0** (1.4-2.9)	**2.2** (1.6-3.2)	**2.6** (1.9-3.7)	**3.3** (2.3-4.6)	**3.3** (2.3-4.6)
SL-plus MIA	HI	885	43	**2.2** (1.4-3.4)	**4.2** (3.0-5.8)	**5.6** (4.2-7.4)	**9.4** (7.3-12.1)	**10.5** (8.0-13.7)
SL-plus MIA	R3	2,038	64	**1.0** (0.7-1.6)	**1.3** (0.9-2.0)	**1.5** (1.0-2.1)	**2.0** (1.4-2.9)	**2.9** (1.8-4.6)
SPS evolution	April ceramic	1,769	40	**5.0** (4.1-6.1)	**6.4** (5.3-7.6)	**6.7** (5.6-8.0)	**7.7** (6.4-9.2)	**8.0** (6.6-9.6)
Tri-Lock	Pinnacle	768	65	**1.3** (0.7-2.4)	**2.8** (1.8-4.3)	**3.2** (2.2-4.8)	**3.6** (2.4-5.2)	**3.6** (2.4-5.2)
Twinsys	RM pressfit vitamys	5,484	13	**2.3** (1.9-2.7)	**3.0** (2.5-3.5)	**3.4** (2.9-3.9)	**4.9** (4.2-5.8)	**7.1** (5.5-9.0)
other combinations	-	23,865		**2.7** (2.5-2.9)	**3.9** (3.6-4.2)	**4.7** (4.4-5.0)	**6.6** (6.2-7.1)	**7.9** (7.3-8.5)
CH average for group				**2.0 (1.9-2.1)**	**2.8 (2.7-2.8)**	**3.3 (3.2-3.3)**	**4.7 (4.6-4.8)**	**5.7 (5.5-5.9)**

Table 4.13

Long term evaluation: Failure rates of primary total hip arthroplasty uncemented combinations (primary OA)

Time since operation, 2012–2025. Please note that if reported stem-cup combinations involve multiple sub-variants, it is possible that the long-term performance of these sub-variants may be significantly different from their combined performance.

* Share of implants accounted for by main user hospital service. A higher share signifies an increased likelihood of biased figures due to local effects. A share of 50%+ would suggest that reported results are likely determined by one hospital service.

Five implant combinations with an elevated revision rate were detected. The corresponding KM estimates are shown in **Figure 4.18.** Exception/Avantage and Polarstem/EP fit already appeared in 2023 as implant combinations with elevated revision rates. The combination Alloclassic/Fitmore reached the status of elevated revision rate already in 2024. Amistem-H was only implanted until 2019 and is no longer in active use. It has been replaced by new evolutions of the stem. A similar situation is observed for the combination Quadra-H/Versafitcup Trio/ccl., the use of this stem being discontinued in 2023. Both combinations still show up in the long-term evaluation.

There were two implant combinations with outlier level revision rates over the 13-year observation period. SL plus MIA/HI (10.5%, CI 8.0–13.7%) and SPS Evolution/April ceramic, which already had an outlier status at 2 years. After a steep early rise of the cumulative revision rate, the curve flattened out over the subsequent years. However, the outlier boundary was still exceeded at 5 years of follow-up. The revision rate of this combination amounts to 8.0% (CI 6.6 –9.6%) at 13 years. Currently, the curve lies within the boundary of an elevated revision risk **(Figure 4.19).**

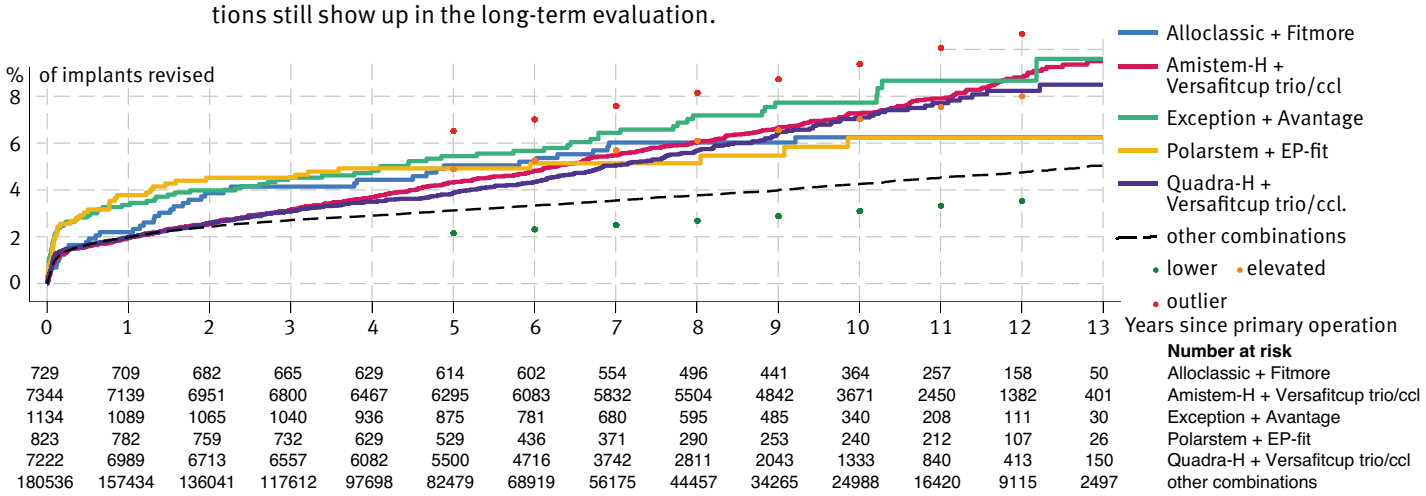


Figure 4.18

Implant combinations with elevated long-term revision rates (primary OA, uncemented THA)

An elevated revision rate was defined as a deviation of at least 50% above the group average at any time between year 5 and year 12 (and lower bounds of the 95% confidence interval exceeding the upper bound of the group average; and at least 50 cases at risk at 5 years). The dots indicate upper and lower limits.

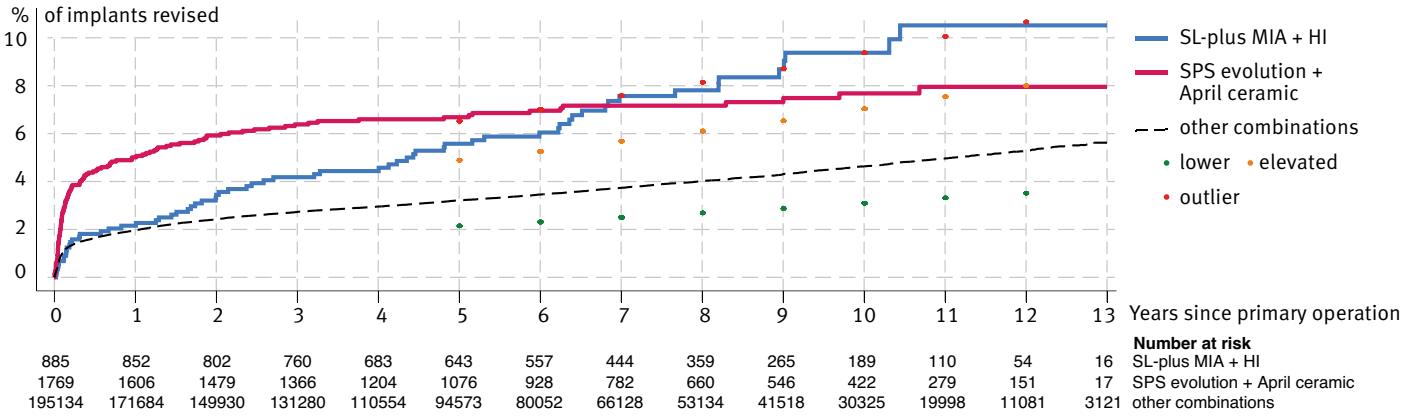


Figure 4.19

Implant combinations with long-term evaluation outlier status (primary OA, uncemented THA)

Outlier status was defined as a revision rate of twice the group average at any time between year 5 and year 12 (and lower bounds of the 95% confidence interval exceeding the upper bound of the group average; and at least 50 cases at risk at 5 years). The dots indicate upper and lower limits.

There were five uncemented implant combinations with a below-average revision rate to be reported in 2026 **(Figure 4.20).** The curves of these well-performing implant combinations had an almost horizontal continuation after the initial rise over the first 3 postoperative months. The combination Optimys/RM pressfit vitamys, Polarstem/R3 and SL-plus MIA/R3 belonged already 2023 to the best-performing implant combinations. Corail collared/Pinnacle and Fitmore/RM pressfit vitamys were identified already in 2025 as implants with a below average revision rate. The KM estimates of the cumulative revision risks for all other uncemented implant combinations are shown in **Figures 4.21.** These curves run between the upper and lower limits corresponding to the elevated revision risk at 150%, respectively the below-average revision risk at 66% from the groups' average.

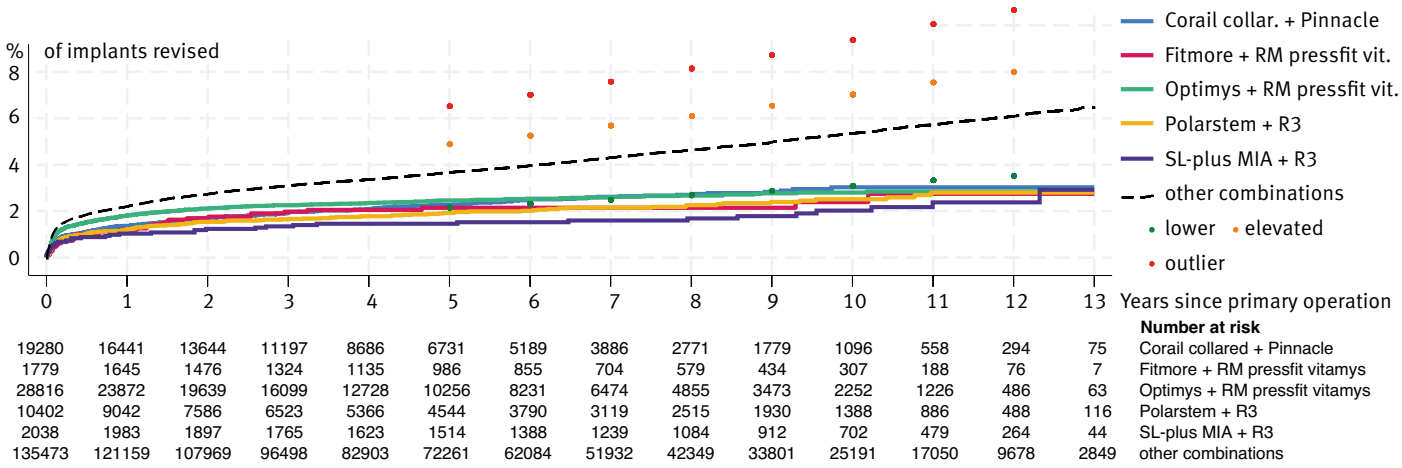


Figure 4.20

Implant combinations with below-average long-term revision rates (primary OA, uncemented THA)

Below-average was defined as a 9-year/10-year revision rate of up to 66% of the group average (and upper bounds of the 95% confidence interval staying below the lower bound of the group average; and at least 25 cases at risk at 9 years/10 years). The dots indicate upper and lower limits.

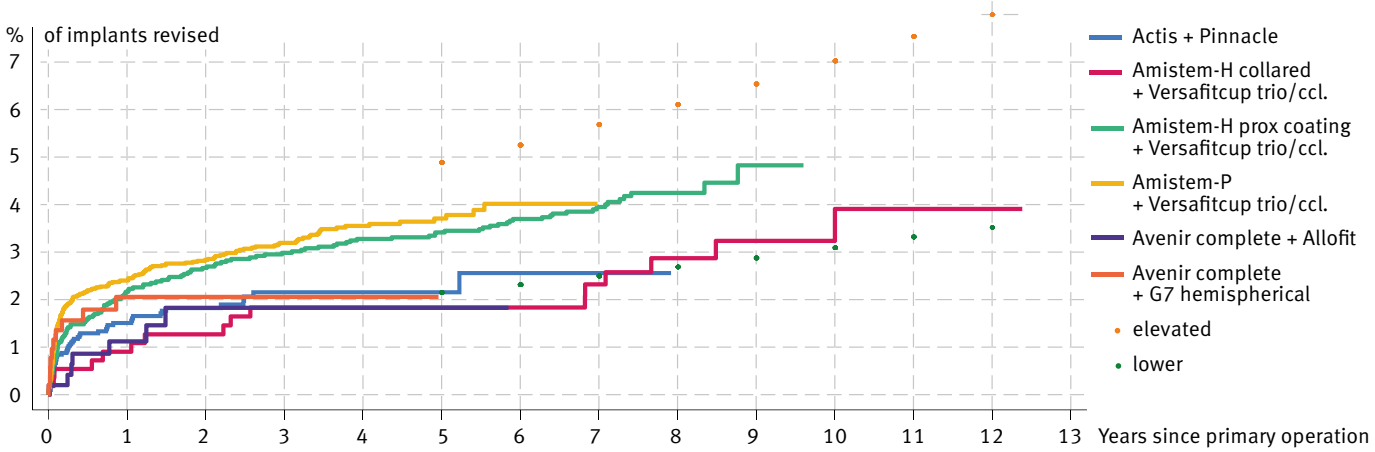
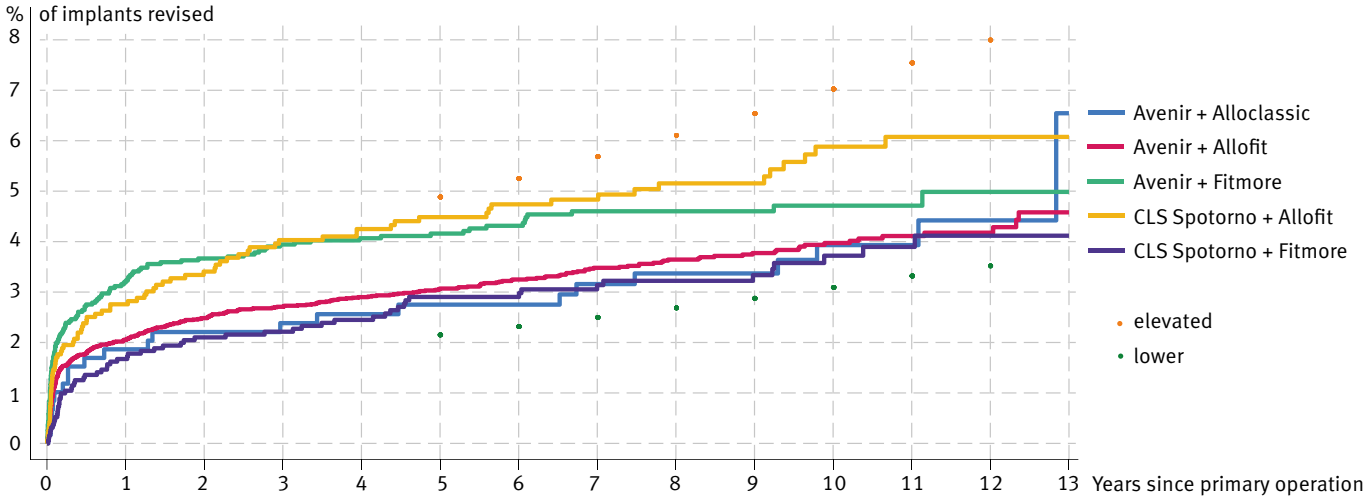
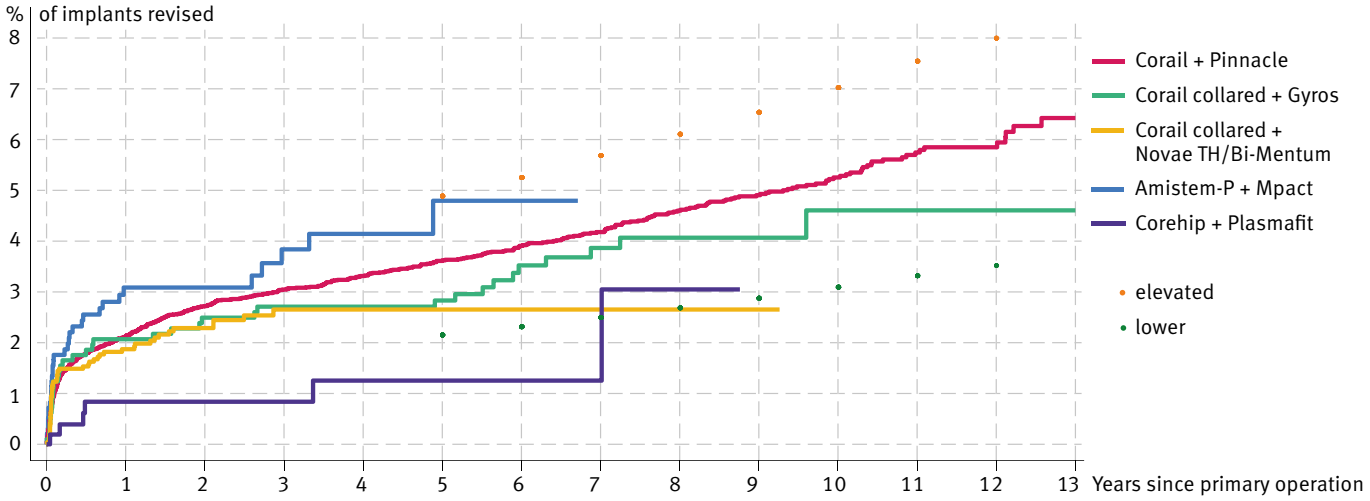


Figure 4.21 – Part one

All remaining implant combinations with average revision risks (primary OA, uncemented THA)

Also showing upper and lower limits (corresponding to elevated and below-average version risk at 150% and 66% of the group average respectively).





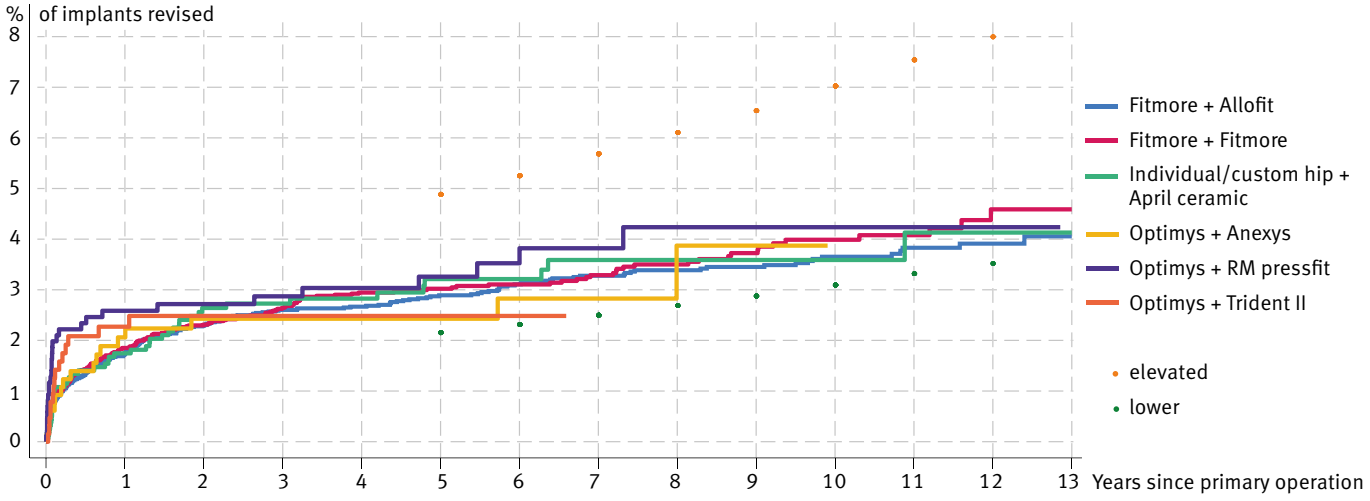
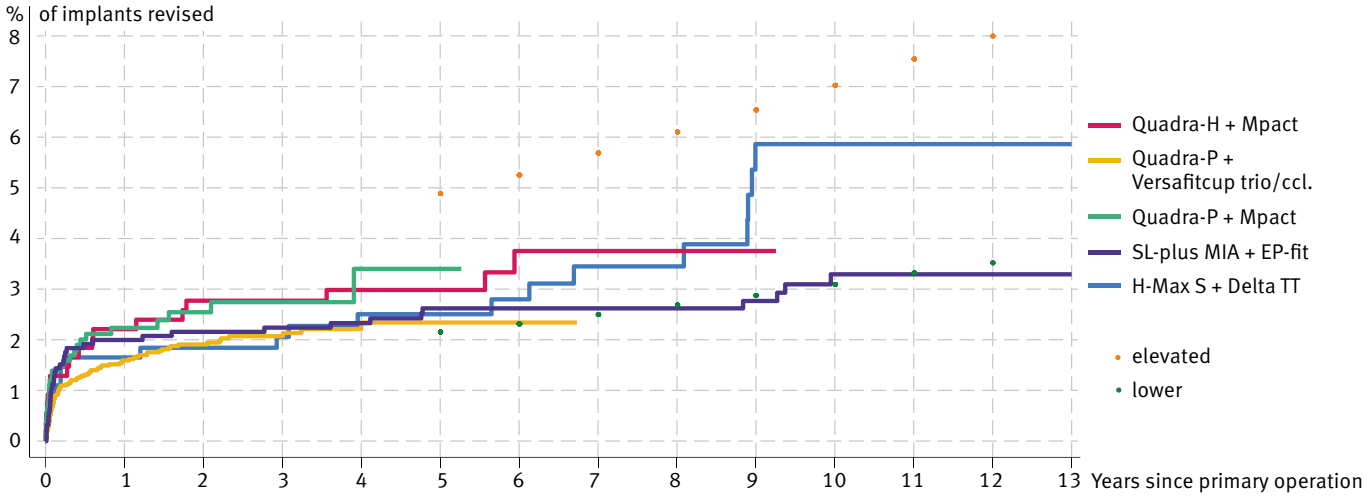


Figure 4.21 – Part two

All remaining implant combinations with average revision risks (primary OA, uncemented THA)

Also showing upper and lower limits (corresponding to elevated and below-average version risk at 150% and 66% of the group average respectively).



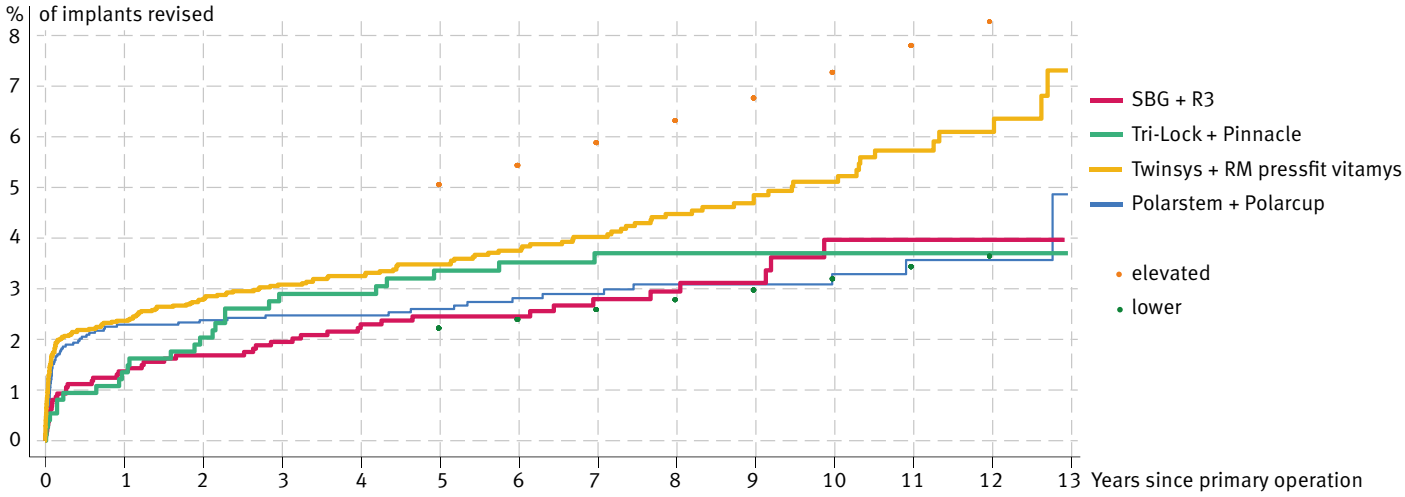


Figure 4.21 – Part three

All remaining implant combinations with average revision risks (primary OA, uncemented THA)

Also showing upper and lower limits (corresponding to elevated and below-average version risk at 150% and 66% of the group average respectively).

Uncemented combinations with different bearings

Most cup systems are modular, allowing the use of different bearings. For the most commonly used 75% implant combinations, the revision rates were calculated depending on the bearing surface. The results, sorted by implant combination, are shown in **Table 4.14.**

Stem component	Cup component	Total N	Bearing surface	1 year (95% CI)	3 years (95% CI)	5 years (95% CI)	10 years (95% CI)	13 years (95% CI)
Actis	Pinnacle	783	CoC	1.6 (0.9-2.8)	1.9 (1.1-3.3)	1.9 (1.1-3.3)		
Actis	Pinnacle	2,202	CoXLPE	1.5 (1.1-2.2)	2.3 (1.6-3.2)	2.3 (1.6-3.2)		
Alloclassic	Fitmore	681	CoXLPE	1.9 (1.1-3.3)	3.8 (2.6-5.6)	4.8 (3.4-6.7)	6.1 (4.5-8.2)	6.1 (4.5-8.2)
Amistem-H	Versafitcup trio/ccl.	2,420	CoC	1.6 (1.1-2.2)	2.8 (2.2-3.5)	3.7 (3.0-4.5)	5.7 (4.8-6.7)	6.6 (5.5-8.0)
Amistem-H	Versafitcup trio/ccl.	3,159	CoXLPE	1.5 (1.1-2.0)	2.8 (2.3-3.4)	3.9 (3.3-4.6)	6.7 (5.9-7.7)	9.4 (8.1-10.8)
Amistem-H	Versafitcup trio/ccl.	1,290	MoXLPE	2.9 (2.1-3.9)	4.1 (3.1-5.3)	5.8 (4.7-7.3)	9.7 (8.1-11.6)	12.4(10.1-15.3)
Amistem-H collared	Versafitcup trio/ccl.	546	CoC	0.9 (0.4-2.2)	1.9 (1.0-3.4)	1.9 (1.0-3.4)	3.3 (2.0-5.5)	
Amistem-H prox coating	Versafitcup trio/ccl.	1,390	CoC	1.5 (1.0-2.3)	2.2 (1.6-3.2)	2.7 (2.0-3.7)		
Amistem-H prox coating	Versafitcup trio/ccl.	1,338	CoXLPE	2.7 (2.0-3.7)	3.5 (2.6-4.6)	3.8 (2.9-5.0)		
Amistem-P	Versafitcup trio/ccl.	3,489	CoC	1.7 (1.3-2.2)	2.4 (1.9-3.0)	2.8 (2.3-3.5)		
Amistem-P	Versafitcup trio/ccl.	2,771	CoXLPE	2.6 (2.1-3.3)	3.2 (2.6-4.0)	3.9 (3.1-4.8)		
Amistem-P	Versafitcup trio/ccl.	625	MoXLPE	5.2 (3.7-7.3)	7.4 (5.5-9.9)	8.0 (6.0-10.7)		
Avenir	Allofit	9,074	CoXLPE	1.9 (1.6-2.2)	2.5 (2.2-2.9)	2.9 (2.5-3.2)	3.7 (3.3-4.2)	4.3 (3.6-5.2)
Avenir	Allofit	2,355	MoXLPE	2.4 (1.8-3.1)	3.1 (2.5-3.9)	3.4 (2.7-4.2)	4.1 (3.3-5.1)	4.8 (3.6-6.4)
Avenir	Fitmore	2,081	CoXLPE	3.3 (2.6-4.1)	3.9 (3.2-4.9)	4.2 (3.4-5.2)	4.8 (3.9-5.9)	4.8 (3.9-5.9)
Avenir	Fitmore	566	MoXLPE	2.7 (1.6-4.4)	3.7 (2.5-5.7)	3.7 (2.5-5.7)	4.2 (2.8-6.3)	5.1 (3.2-8.1)
CLS Spotorno	Allofit	1,209	CoXLPE	3.3 (2.4-4.5)	4.7 (3.6-6.1)	5.1 (4.0-6.5)	6.7 (5.3-8.6)	7.1 (5.5-9.0)
CLS Spotorno	Fitmore	937	CoXLPE	2.0 (1.3-3.2)	2.6 (1.7-3.8)	3.7 (2.6-5.1)	4.4 (3.2-6.1)	4.9 (3.4-6.9)
CLS Spotorno	Fitmore	955	MoXLPE	1.4 (0.8-2.3)	1.9 (1.2-3.0)	2.3 (1.5-3.4)	3.2 (2.1-4.8)	3.5 (2.3-5.3)
Corail	Pinnacle	1,870	CoC	2.1 (1.6-2.9)	3.4 (2.7-4.4)	4.4 (3.5-5.4)	6.2 (5.0-7.5)	8.4 (6.6-10.6)
Corail	Pinnacle	10,841	CoXLPE	2.2 (1.9-2.5)	3.0 (2.7-3.4)	3.5 (3.1-3.9)	4.9 (4.4-5.5)	5.6 (4.9-6.4)
Corail	Pinnacle	922	MoXLPE	1.9 (1.2-3.0)	2.6 (1.7-3.8)	2.9 (2.0-4.3)	6.4 (4.5-9.0)	8.6 (5.5-13.3)
Corail collared	Gyros	817	CoCPE	2.1 (1.3-3.3)	2.8 (1.9-4.2)	3.0 (2.0-4.4)	4.8 (3.2-7.1)	
Corail collared	Novae TH/Bi-Mentum	1,997	CoCPE	2.0 (1.4-2.7)	2.8 (2.1-3.8)	2.8 (2.1-3.8)		
Corail collared	Pinnacle	2,361	CoC	1.8 (1.4-2.5)	2.6 (2.0-3.3)	3.1 (2.4-3.9)	4.0 (3.1-5.1)	4.0 (3.1-5.1)
Corail collared	Pinnacle	16,166	CoXLPE	1.3 (1.1-1.5)	1.8 (1.6-2.0)	2.1 (1.8-2.3)	2.8 (2.4-3.2)	2.8 (2.4-3.2)
Exception	Avantage	902	CoXLPE	3.6 (2.5-5.0)	4.6 (3.4-6.1)	5.3 (4.0-7.0)	7.3 (5.7-9.4)	8.4 (6.5-10.9)

Table 4.14 – Part one

Long term evaluation: Failure rates of primary total hip arthroplasty uncemented combinations and different bearing surfaces (primary OA)

Time since operation, 2012–2025. Please note that if reported stem-cup combinations involve multiple sub-variants, it is possible that the long-term performance of these sub-variants may be significantly different from their combined performance.

Stem component	Cup component	Total N	Bearing surface	1 year (95% CI)	3 years (95% CI)	5 years (95% CI)	10 years (95% CI)	13 years (95% CI)
Fitmore	Allofit	7,381	CoXLPE	1.6 (1.3-1.9)	2.3 (2.0-2.7)	2.5 (2.2-3.0)	3.1 (2.6-3.6)	3.2 (2.7-3.9)
Fitmore	Allofit	2,494	MoXLPE	2.2 (1.7-2.8)	3.1 (2.5-3.9)	3.5 (2.8-4.4)	4.3 (3.5-5.3)	4.7 (3.8-5.8)
Fitmore	Fitmore	3,135	CoXLPE	1.7 (1.3-2.2)	2.3 (1.8-2.9)	2.8 (2.3-3.5)	3.3 (2.6-4.3)	3.3 (2.6-4.3)
Fitmore	Fitmore	3,045	MoXLPE	2.0 (1.6-2.6)	3.0 (2.5-3.7)	3.3 (2.7-4.0)	4.5 (3.7-5.4)	5.2 (4.2-6.5)
Fitmore	RM pressfit vitamys	1,640	CoXLPE	1.0 (0.6-1.6)	1.6 (1.0-2.3)	1.7 (1.1-2.5)	2.0 (1.3-3.1)	
Individual/custom hip	April ceramic	1,553	CoC	1.7 (1.2-2.5)	2.7 (2.0-3.7)	3.2 (2.4-4.3)	3.6 (2.6-4.9)	4.1 (2.9-6.0)
Optimys	RM pressfit vitamys	28,203	CoXLPE	1.8 (1.7-2.0)	2.3 (2.1-2.4)	2.5 (2.3-2.7)	2.8 (2.6-3.1)	2.9 (2.6-3.1)
Optimys	RM pressfit	695	CoCPE	1.7 (1.0-3.1)	1.9 (1.1-3.3)	2.4 (1.4-4.0)	3.5 (2.1-5.8)	
Optimys	Trident II	561	CoXLPE	2.4 (1.4-4.2)	2.7 (1.6-4.5)	2.7 (1.6-4.5)		
Polarstem	Polarcup	1,496	CMoXLPE	2.4 (1.7-3.3)	2.5 (1.8-3.4)	2.6 (1.9-3.6)		
Polarstem	Polarcup	868	CoXLPE	2.2 (1.4-3.4)	2.4 (1.6-3.7)	2.6 (1.7-3.9)	3.2 (2.2-4.6)	5.2 (2.8-9.7)
Polarstem	R3	7,059	CMoXLPE	1.0 (0.8-1.3)	1.5 (1.2-1.8)	1.8 (1.4-2.2)	2.4 (1.8-3.0)	
Polarstem	R3	3,039	CoXLPE	1.7 (1.3-2.2)	2.1 (1.6-2.7)	2.3 (1.8-3.0)	2.8 (2.2-3.5)	2.9 (2.3-3.7)
Quadra-H	Versafitcup trio/ccl.	1,129	CoC	1.5 (0.9-2.4)	2.5 (1.7-3.6)	3.1 (2.2-4.3)	4.7 (3.4-6.5)	
Quadra-H	Versafitcup trio/ccl.	4,513	CoXLPE	2.1 (1.7-2.6)	3.3 (2.8-3.8)	4.1 (3.6-4.7)	7.5 (6.6-8.7)	9.3 (7.8-11.0)
Quadra-H	Versafitcup trio/ccl.	1,429	MoXLPE	2.2 (1.6-3.2)	3.0 (2.3-4.1)	3.8 (2.9-4.9)	7.1 (5.6-8.8)	8.1 (6.3-10.3)
Quadra-P	Mpact	580	CoC	2.4 (1.4-4.1)	2.9 (1.7-4.8)	3.7 (2.1-6.7)		
Quadra-P	Versafitcup trio/ccl.	1,355	CoC	1.4 (0.9-2.2)	2.0 (1.3-3.1)	2.0 (1.3-3.1)		
Quadra-P	Versafitcup trio/ccl.	3,529	CoXLPE	1.7 (1.3-2.2)	2.1 (1.7-2.7)	2.2 (1.7-2.9)		
SBG	R3	778	CMoXLPE	1.3 (0.7-2.4)	2.2 (1.4-3.5)	3.0 (2.0-4.5)	4.0 (2.5-6.3)	
SBG	R3	858	CoC	1.4 (0.8-2.5)	1.6 (1.0-2.8)	1.9 (1.2-3.1)	3.9 (2.4-6.3)	
SL-plus MIA	EP-fit	572	CoC	2.8 (1.7-4.5)	2.8 (1.7-4.5)	3.0 (1.9-4.8)	3.7 (2.3-5.8)	3.7 (2.3-5.8)
SL-plus MIA	R3	1,996	CMoXLPE	1.0 (0.7-1.6)	1.3 (0.9-1.9)	1.4 (1.0-2.1)	2.0 (1.4-2.9)	3.0 (1.8-4.8)
SPS evolution	April ceramic	1,751	CoC	5.0 (4.1-6.1)	6.4 (5.3-7.7)	6.7 (5.6-8.0)	7.7 (6.4-9.2)	8.0 (6.6-9.6)
Tri-Lock	Pinnacle	737	CoXLPE	1.1 (0.5-2.2)	1.9 (1.1-3.2)	2.4 (1.5-3.8)	2.7 (1.7-4.3)	2.7 (1.7-4.3)
Twinsys	RM pressfit vitamys	5,353	CoXLPE	2.3 (1.9-2.7)	2.9 (2.5-3.4)	3.3 (2.9-3.9)	4.9 (4.2-5.8)	7.1 (5.5-9.1)

Table 4.14 – Part two

Long term evaluation: Failure rates of primary total hip arthroplasty uncemented combinations and different bearing surfaces (primary OA)

Time since operation, 2012–2025. Please note that if reported stem-cup combinations involve multiple sub-variants, it is possible that the long-term performance of these sub-variants may be significantly different from their combined performance.

Rare uncemented implants for primary OA

SIRIS documents a bewildering variety of stem-cup combinations in total hip arthroplasty. Most combinations were used rarely, and questions arise about the performance of particularly rare implants. The implant combinations of the197,788 uncemented THA, used for the treatment of primary osteoarthritis between 2012 and 2025, were classified based on their frequency of use. grouped into “exotic” implants (‹100; two variants based on rarity of stem **and/or** cup), “eccentric” implants (‹100 combinations using stems/cups not actually rare individually), and low- (100–999), mid (1,000-4,999) and high-volume implants (5,000+).

A total of 696 stem-cup combinations were identified, based on 118 stems and 96 cups (sub-variants combined at brand level). Of those, 669 combinations were used less than 100 times (96%). “Exotic” combinations with both rare stems **and** cups (n = 42) accounted for 0.3% of primary THA. “Exotic” combinations with either a rare stem **or** a rare cup (n = 212) accounted for 0.7%. “Eccentric” combinations (n = 332) accounted for 2.6%, low-volume (83) for 14.1%, medium volume (15) for 15.2%. The 12 most common combinations accounted for 67.1% of all THA **(Figure 4.22).**

Figure 4.23 shows the median annual case load of surgeons grouped by the classification of the implants. In the high-volume group, 50% of cases were made by surgeons with a total annual volume between 41 and 118 cases. A quarter had a lower volume than 41 and another quarter had a higher volume than 118. In contrast, the exotic stem/cup group, the caseload differed. Here, a quarter had an annual volume of less than 12 and only a quarter had more than 34, which is even below the 25th percentile of the high-volume group. In conclusion, rare implants were typically used by surgeons with limited experience, whilst high-volume implants were typically used by more experienced surgeons.

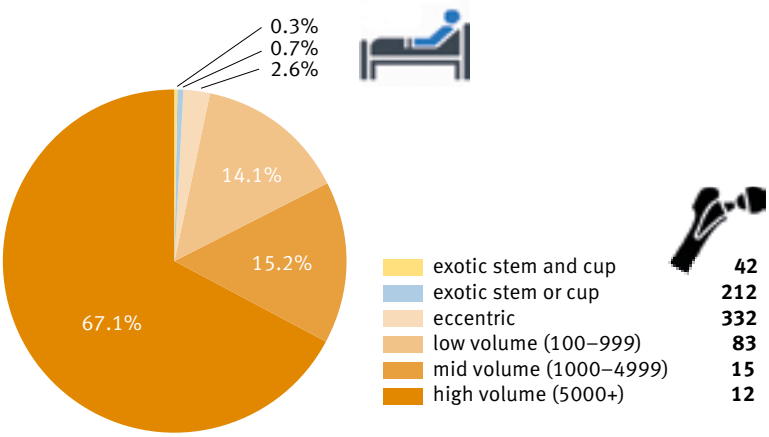


Figure 4.22

Primary total hip arthroplasty: types of uncemented stem-cup combinations used in primary osteoarthritis and their shares of procedures (in %)

2012 – 2025

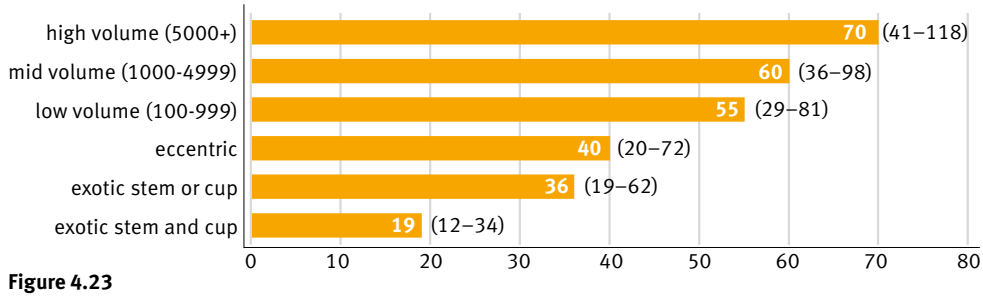


Figure 4.23

Primary total hip arthroplasty: median annual surgeons’ volumes for types of uncemented stem-cup combinations used in primary osteoarthritis

2012–2025, in brackets 25th and 75th percentiles (endpoints of interquartile range; the middle 50% of cases)

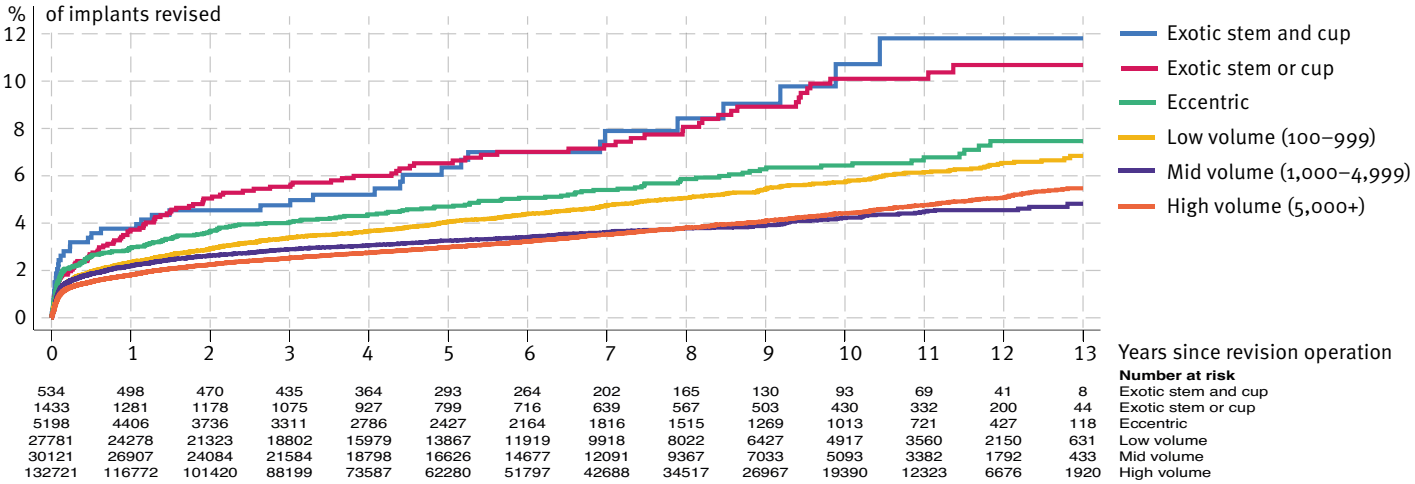
The two-year revision rates were significantly worse for 'exotic' implants compared to high- and mid-volume implants and reached 4.5% (CI 3.1–6.7%) and 5.0% (CI 4.0–6.3%), respectively. At 12 years, the estimated revision risk rose to 11.8% (CI 8.2–16.9%) for "exotic stem and cups" and 10.7% (CI 8.7–13.0%) for "exotic stem or cups". It is interesting that also eccentric implant combinations, e.g. implants that were commonly used but only rarely in combination – including some mix-and-match combinations, also had a significantly elevated revision risks compared to the high- and mid- volume groups **(Figure 4.24).**

Due to small numbers, the outcome of exotic implants remains unreported and troublesome implants may remain undetected. The share of exotic implants accounts for 1%, the absolute numbers were small, accounting for 1'967 primary THA and approx. 200 revisions over 12 years. Nevertheless, it would be important to identify and monitor such implants over time. Exotic implants are more often used by surgeons with a lower median number of operations. The higher revision rate may show up in the yearly surgeon report.

Hybrid combinations for primary OA

There were 23 hybrid implant combinations, indicating an uncemented cup combined with a cemented stem, covering 75% of all primary THA for primary OA. The combinations are based on eleven stems which were combined with 13 different cups **(Table 4.15).**

At 13 years, the average revision rate for all hybrid stem/cup combinations was 5.2% (CI 4.7–5.7%) **(Table 4.16).** Note that a reported stem/cup combination may include subvariants. It is possible that the long-term performance of these subvariants may be significantly different from their aggregated performance.



Typ of stem-cup	1 year	2 years	3 years	5 years	6 years	8 years	9 years	10 years	13 years
Exotic stem and cup	**3.8** (2.4-5.8)	**4.5** (3.1-6.7)	**4.8** (3.2-7.0)	**6.4** (4.5-9.0)	**7.0** (5.0-9.8)	**8.4** (6.0-11.7)	**9.0** (6.4-12.6)	**10.7**(7.5-15.2)	
Exotic stem or cup	**3.7** (2.8-4.9)	**5.0** (4.0-6.3)	**5.5** (4.4-6.9)	**6.5** (5.3-8.0)	**7.0** (5.7-8.6)	**8.1** (6.6-9.8)	**8.9** (7.3-10.9)	**10.1**(8.3-12.3)	**10.7**(8.7-13.0)
Eccentric	**2.9** (2.5-3.5)	**3.6** (3.1-4.2)	**4.0** (3.5-4.6)	**4.7** (4.1-5.4)	**5.1** (4.4-5.8)	**5.9** (5.1-6.7)	**6.3** (5.5-7.2)	**6.4** (5.6-7.4)	**7.5** (6.4-8.7)
Low volume	**2.3** (2.2-2.5)	**2.9** (2.7-3.1)	**3.4** (3.2-3.6)	**4.1** (3.8-4.3)	**4.4** (4.1-4.7)	**5.1** (4.8-5.4)	**5.4** (5.1-5.8)	**5.7** (5.4-6.1)	**6.8** (6.3-7.4)
Mid volume	**2.2** (2.0-2.4)	**2.6** (2.5-2.8)	**2.9** (2.7-3.1)	**3.3** (3.1-3.5)	**3.4** (3.2-3.6)	**3.8** (3.5-4.0)	**3.9** (3.7-4.2)	**4.2** (3.9-4.5)	**4.8** (4.4-5.3)
High volume	**1.8** (1.7-1.9)	**2.2** (2.2-2.3)	**2.5** (2.4-2.6)	**3.0** (2.9-3.1)	**3.2** (3.1-3.3)	**3.8** (3.7-3.9)	**4.1** (4.0-4.2)	**4.4** (4.3-4.6)	**5.5** (5.2-5.8)

Figure 4.24

Estimated failure rates of primary total hip arthroplasty for different types of stem-cup combinations

Time since operation, 2012–2025, diagnosis primary OA

Stem component	Cup component	2020	2021	2022	2023	2024	2025	2020-2025
Amistem-C	Mpact	31	15	20	22	37	59	**184**
Amistem-C	Versafitcup DM	28	26	24	44	49	64	**235**
Amistem-C	Versafitcup trio/ccl.	161	181	191	163	183	169	**1,048**
Avenir cemented	Allofit	95	93	96	103	198	244	**829**
Avenir cemented	Fitmore	53	77	132	111	13	1	**387**
Centris	RM pressfit vitamys	54	65	0	0	0	0	**119**
Corail cemented	Novae TH/Bi-Mentum	14	41	74	96	104	137	**466**
Corail cemented	Pinnacle	152	170	188	234	234	215	**1,193**
Corail cemented	RM pressfit vitamys	0	0	8	20	30	44	**102**
Exeter V40	Symbol DMHA/DS evol.	0	25	38	40	22	31	**156**
Harmony evol (cem.)	Serenity	0	0	3	37	31	45	**116**
MS-30	Allofit	43	68	235	225	216	142	**929**
MS-30	Fitmore	56	16	32	35	11	1	**151**
Polarstem cemented	Polarcup	15	18	18	23	16	14	**104**
Quadra-C	Versafitcup trio/ccl.	156	80	13	1	0	0	**250**
Quadra-P cemented	Mpact	0	15	14	18	24	37	**108**
Quadra-P cemented	Versafitcup DM	1	11	20	28	38	39	**137**
Quadra-P cemented	Versafitcup trio/ccl.	10	49	72	87	66	110	**394**
SPII Lubinus	Mobilelink	6	12	14	28	25	18	**103**
Twinsys cemented	RM pressfit vitamys	200	283	317	414	531	585	**2,330**
Twinsys cemented	Symbol DMHA/DS evol.	20	14	31	19	27	28	**139**
Weber	Allofit	38	31	31	29	23	1	**153**
Weber	Fitmore	162	148	104	39	9	0	**462**
other combinations	-	456	527	475	513	590	722	**3,283**
Total		**1,751**	**1,965**	**2,150**	**2,329**	**2,477**	**2,706**	**13,378**

Table 4.15

Top 75% of primary total hip arthroplasty hybrid combinations (primary OA) 2020 – 2025

Stem component	Cup component	Total N	CSS*	1 year (95% CI)	3 years (95% CI)	5 years (95% CI)	10 years (95% CI)	13 years (95% CI)
Amistem-C	Versafitcup trio/ccl.	2,699	20	2.5 (1.9-3.1)	3.1 (2.5-3.8)	3.6 (2.9-4.4)	5.0 (4.1-6.2)	5.0 (4.1-6.2)
Avenir cemented	Allofit	1,228	17	1.6 (1.0-2.5)	2.2 (1.5-3.3)	3.1 (2.1-4.5)	3.1 (2.1-4.5)	
Avenir cemented	Fitmore	502	58	2.0 (1.1-3.7)	2.9 (1.7-4.8)	2.9 (1.7-4.8)	2.9 (1.7-4.8)	
Corail cemented	Pinnacle	2,193	14	1.4 (1.0-2.1)	2.0 (1.4-2.7)	2.3 (1.7-3.1)	2.7 (2.0-3.7)	2.7 (2.0-3.7)
MS-30	Allofit	1,250	51	1.2 (0.7-2.0)	1.7 (1.1-2.7)	1.7 (1.1-2.7)	2.2 (1.2-3.9)	3.5 (1.6-7.6)
MS-30	Fitmore	862	53	1.3 (0.7-2.3)	1.6 (1.0-2.8)	1.8 (1.1-3.0)	3.3 (2.1-5.2)	3.7 (2.3-5.8)
Quadra-C	Versafitcup trio/ccl.	1,054	32	2.5 (1.7-3.6)	3.3 (2.4-4.6)	4.0 (3.0-5.5)	6.1 (3.9-9.6)	
Twinsys cemented	RM pressfit vitamys	2,955	20	1.2 (0.9-1.7)	1.9 (1.4-2.5)	2.6 (1.9-3.6)	3.5 (2.2-5.6)	3.5 (2.2-5.6)
Weber	Allofit	803	27	1.9 (1.1-3.1)	3.1 (2.1-4.6)	3.6 (2.5-5.2)	5.6 (4.0-8.0)	6.2 (4.3-8.8)
Weber	Fitmore	2,411	28	1.6 (1.2-2.2)	2.6 (2.0-3.3)	3.5 (2.8-4.3)	5.8 (4.7-7.1)	6.8 (5.4-8.6)
other combinations	-	10,457		2.2 (1.9-2.5)	3.1 (2.8-3.5)	3.8 (3.4-4.2)	4.9 (4.3-5.5)	5.3 (4.6-6.0)
CH average for group				**1.9 (1.7-2.1)**	**2.7 (2.5-2.9)**	**3.3 (3.1-3.5)**	**4.6 (4.3-5.0)**	**5.2 (4.7-5.7)**

Table 4.16

Long term evaluation: Failure rates of primary total hip arthroplasty hybrid combinations (primary OA)

Time since operation, 2012–2025. Please note that if reported stem-cup combinations involve multiple sub-variants, it is possible that the long-term performance of these sub-variants may be significantly different from their combined performance.

* Share of implants accounted for by main user hospital service. A higher share signifies an increased likelihood of biased figures due to local effects. A share of 50%+ would suggest that reported results are likely determined by one hospital service.

There were no combinations with elevated mid-term revision rates, nor outliers, to be observed. Two implant combinations (Corail [cem]/Pinnacle and MS-30/Allofit) had a below-average long-term revision rate **(Figure 4.25)**. All remaining implants were within the upper and lower limits **(Figure 4.26)**. Some curves did run below the lower limit but were not implant combinations with below-average long-term revision rates because their confidence intervals were wide due to small numbers and overlapping with the reference group. Therefore, these combinations were not identified as statistically different.

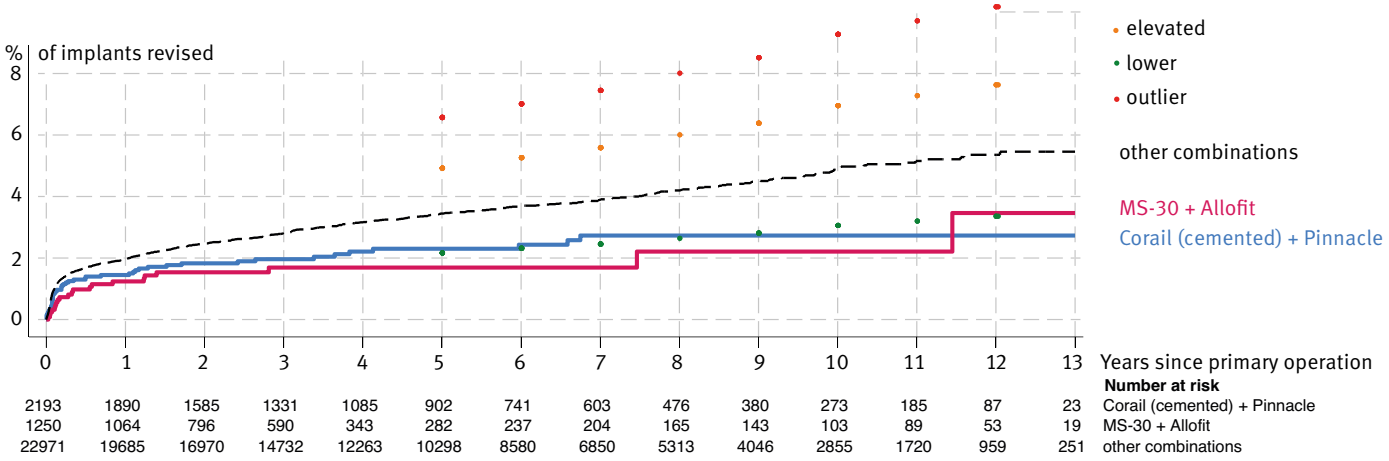


Figure 4.25

Implant combinations with below-average long-term revision rates (primary OA, hybrid THA)

Below-average was defined as a 9-year/10-year revision rate of up to 66% of the group average (and upper bounds of the 95% confidence interval staying below the lower bound of the group average; and at least 25 cases at risk at 9 years/10 years). The dots indicate upper and lower limits.

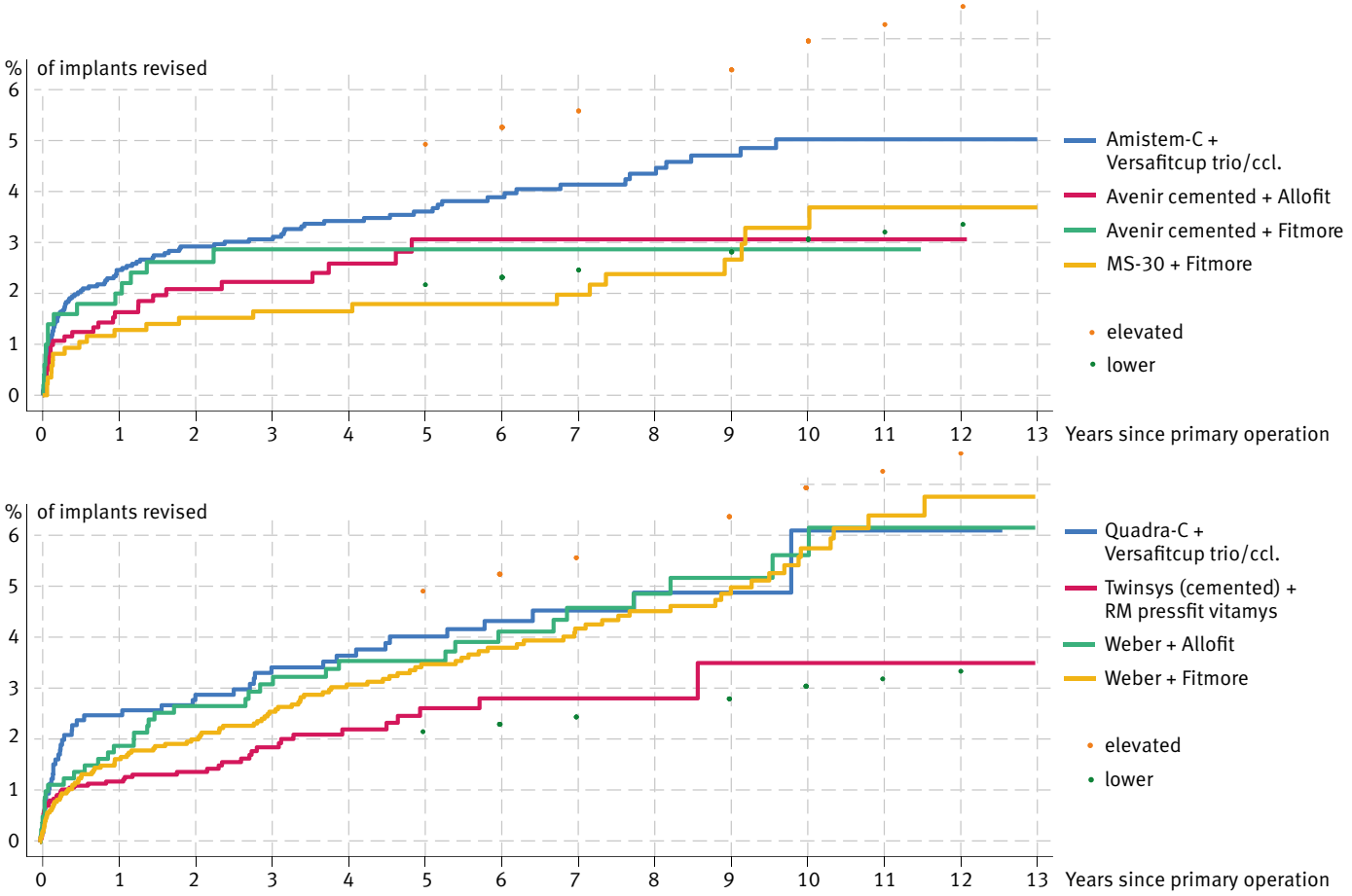


Figure 4.26

All remaining implant combinations with average revision risks (primary OA, hybrid fixation THA)

Also showing upper and lower limits (corresponding to elevated and below-average version risk at 150% and 66% of the group average respectively).

Uncemented combinations for secondary OA

Table 4.17 shows the 15 implant combinations that cover 75% of all uncemented THA performed for secondary OA and their use over the last 5 years. The 13-year revision rates for the period since 2012 was 6.9% (CI 6.4–7.5%) (Table 4.18), being significantly higher than the revision rates observed for uncemented and hybrid THA performed for primary OA. This

Stem component	Cup component	2020	2021	2022	2023	2024	2025	2020–2025
Actis	Pinnacle	15	36	69	73	84	142	**419**
Amistem-P	Versafitcup trio/ccl.	111	117	98	78	79	80	**563**
Avenir	Allofit	101	54	67	64	59	31	**376**
Corail	Pinnacle	78	98	62	55	43	32	**368**
Corail collared	Novae TH/Bi-Mentum	17	40	40	57	69	73	**296**
Corail collared	Pinnacle	128	215	265	215	234	282	**1,339**
Fitmore	Allofit	131	172	179	163	176	128	**949**
Fitmore	Fitmore	53	38	46	52	12	1	**202**
Fitmore	G7 hemispherical	0	2	12	15	49	52	**130**
Individual/custom hip	April ceramic	19	35	23	29	31	38	**175**
Optimys	RM pressfit vitamys	179	218	266	295	339	363	**1,660**
Polarstem	Polarcup	30	29	46	37	33	35	**210**
Polarstem	R3	89	89	91	99	144	158	**670**
Quadra-P	Versafitcup trio/ccl.	21	44	102	133	152	227	**679**
Twinsys	RM pressfit vitamys	33	40	37	39	43	39	**231**
other combinations	-	489	456	458	411	466	542	**2,822**
Total		**3,514**	**3,704**	**3,883**	**3,838**	**4,037**	**4,248**	**11,089**

Table 4.17

Top 75% of primary total hip arthroplasty uncemented combinations (secondary OA) 2020–2025

Stem component	Cup component	Total N	CSS*	1 year (95% CI)	3 years (95% CI)	5 years (95% CI)	10 years (95% CI)	13 years (95% CI)
Amistem-H	Versafitcup trio/ccl.	555	14	1.8 (1.0-3.3)	2.6 (1.5-4.3)	3.8 (2.5-5.8)	8.0 (5.8-10.9)	9.5 (7.0-12.8)
Amistem-P	Versafitcup trio/ccl.	605	17	3.9 (2.6-5.8)	4.3 (2.9-6.3)	5.3 (3.5-7.9)		
Avenir	Allofit	901	13	3.6 (2.5-5.0)	4.6 (3.4-6.3)	5.1 (3.8-6.9)	6.7 (4.9-9.1)	6.7 (4.9-9.1)
Corail	Pinnacle	1,016	11	2.9 (2.0-4.1)	4.2 (3.1-5.6)	4.8 (3.6-6.4)	7.5 (5.7-9.9)	8.1 (6.0-10.8)
Corail collared	Pinnacle	1,932	29	2.2 (1.7-3.0)	3.2 (2.4-4.1)	3.8 (2.9-4.9)	4.5 (3.4-6.1)	4.5 (3.4-6.1)
Fitmore	Allofit	1,809	87	1.5 (1.0-2.1)	2.5 (1.8-3.3)	2.6 (2.0-3.6)	3.7 (2.7-5.2)	3.7 (2.7-5.2)
Optimys	RM pressfit vitamys	2,390	17	2.3 (1.8-3.0)	2.9 (2.3-3.7)	3.6 (2.8-4.6)	4.3 (3.3-5.6)	
Polarstem	R3	1,102	75	2.0 (1.3-3.1)	2.8 (1.9-4.1)	3.0 (2.1-4.3)	4.1 (2.7-6.1)	4.1 (2.7-6.1)
Quadra-H	Versafitcup trio/ccl.	604	26	3.5 (2.3-5.3)	5.2 (3.7-7.4)	7.8 (5.9-10.4)	9.7 (7.3-12.8)	14.2 (8.8-22.3)
Quadra-P	Versafitcup trio/ccl.	681	57	2.8 (1.8-4.5)	3.1 (2.0-4.8)	4.0 (2.3-7.0)		
other combinations	-	8,255		3.5 (3.1-3.9)	4.6 (4.2-5.1)	5.4 (4.9-6.0)	7.1 (6.4-7.9)	7.9 (6.9-9.0)
CH average for group				**2.9 (2.7-3.1)**	**3.9 (3.6-4.2)**	**4.7 (4.3-5.0)**	**6.4 (5.9-6.9)**	**6.9 (6.4-7.5)**

Table 4.18

Long term evaluation: Failure rates of primary total hip arthroplasty uncemented combinations (secondary OA)

Time since operation, 2012–2025. Please note that if reported stem-cup combinations involve multiple sub-variants, it is possible that the long-term performance of these sub-variants may be significantly different from their combined performance.

* Share of implants accounted for by main user hospital service. A higher share signifies an increased likelihood of biased figures due to local effects. A share of 50%+ would suggest that reported results are likely determined by one hospital service.

illustrates the importance of coding the underlying diagnosis correctly for proper analysis of the results. Although there were no outliers at 13 years, one combination in this subgroup (Quadra-H/Versafitcup Trio/ccl.) continued to have an elevated long-term revision rate **(Figure 4.27).** There was one combination (Fitmore/Allofit) showing a below-average long-term revision rate until 13 years **(Figure 4.28).** The majority of implants showed an average long-term revision risk **(Figure 4.29).**

Hybrid and cemented combinations for secondary OA

Because of the relatively small numbers entered in the database, the data for cemented and hybrid fixations for secondary OA are not presented, while the results for THA used to treat fractures are presented in Chapter 4.8.

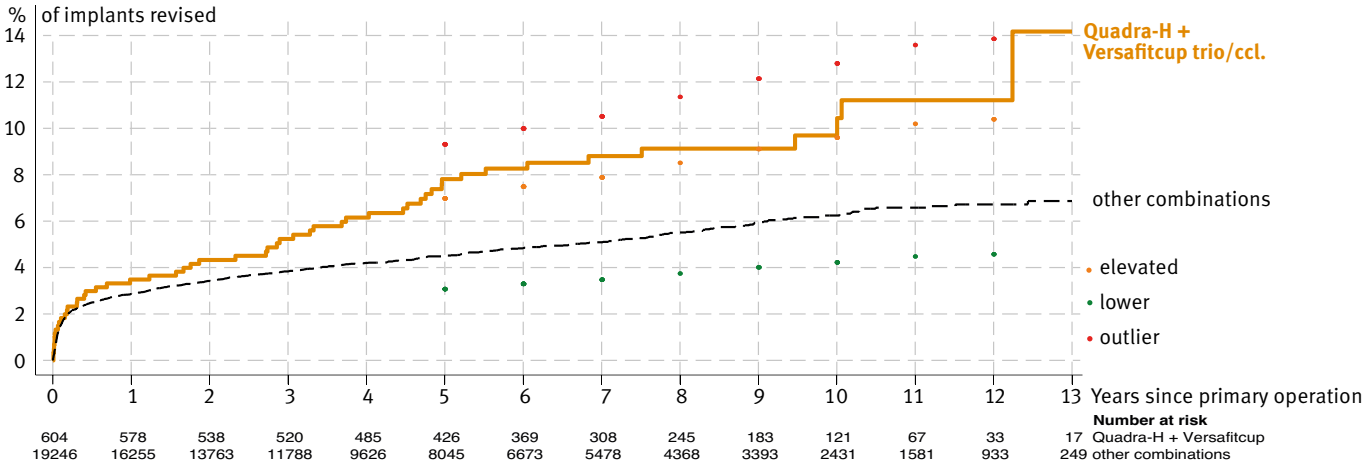


Figure 4.27

Implant combinations with elevated long-term revision rates (secondary OA, uncemented THA)

An elevated revision rate was defined as a deviation of at least 50% above the group average at any time between year 5 and year 12 (and lower bounds of the 95% confidence interval exceeding the upper bound of the group average; and at least 50 cases at risk at 5 years). The dots indicate upper and lower limits.

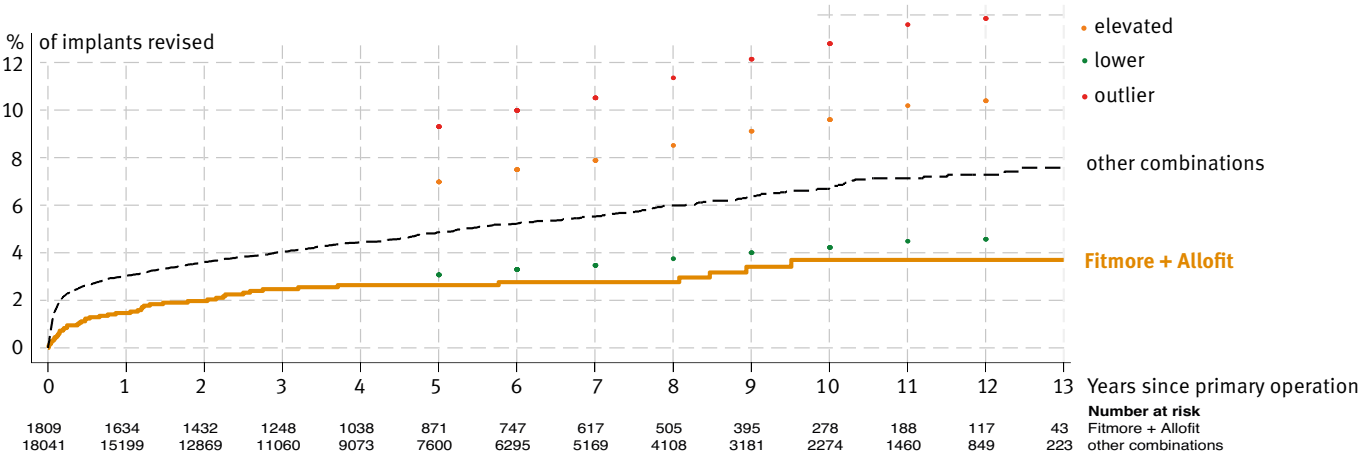


Figure 4.28

Implant combinations with below-average long-term revision rates (sec OA, uncemented THA)

Below-average was defined as a 9-year/10-year revision rate of up to 66% of the group average (and upper bounds of the 95% confidence interval staying below the lower bound of the group average; and at least 25 cases at risk at 9 years/10 years). The dots indicate upper and lower limits.

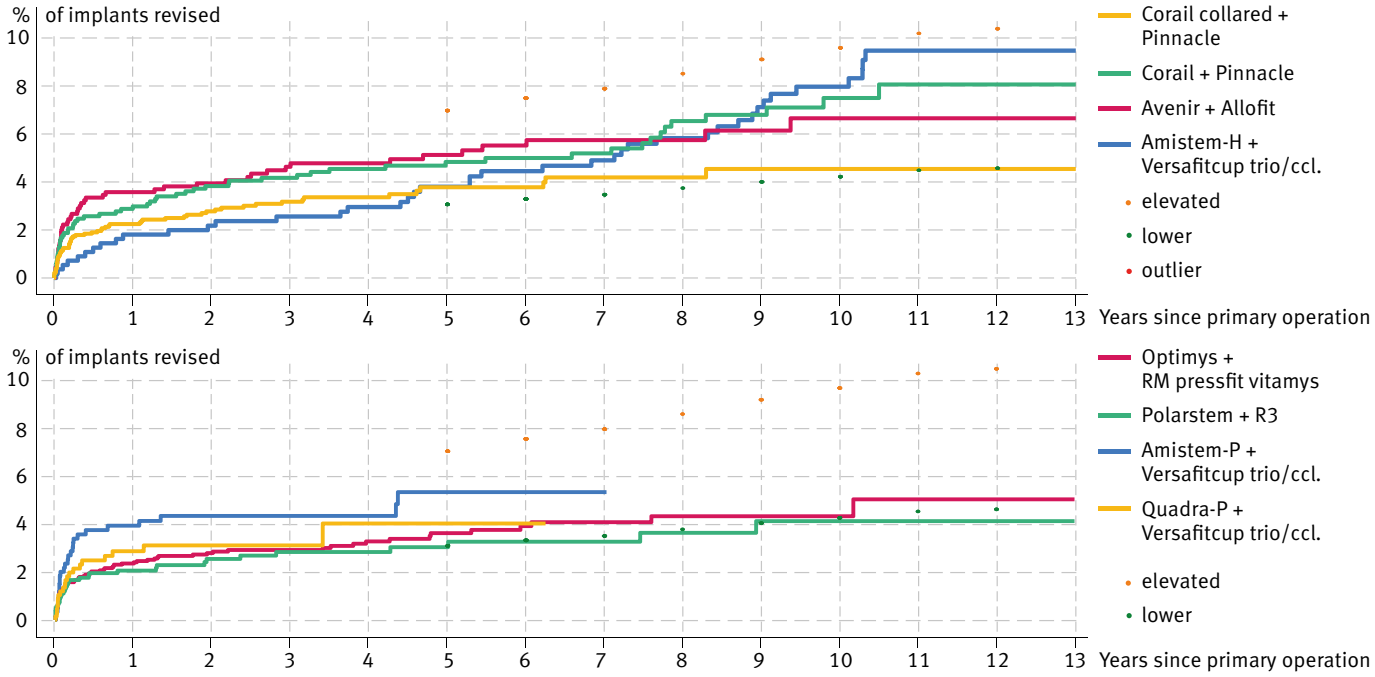


Figure 4.29

All remaining implant combinations with average revision risks (secondary OA, uncemented THA)

Also showing upper and lower limits (corresponding to elevated and below-average version risk at 150% and 66% of the group average respectively).

4.6 Treatment of hip fractures

Between 2020 and 2025, the registry recorded a total of 28,919 primary hip arthroplasties performed for fractures, of which 47.6% were THA and 52.4% HHA **(Table 3.8).** Previous internal fixation of the femur was registered in 8.0% of the THA and 1.1% of the HHA. Previous internal fixation of acetabular fractures was recorded in 1.0% of the patients treated with THA. However, the lapse of time between internal fixation and arthroplasty is unknown, as internal fixation was not registered.

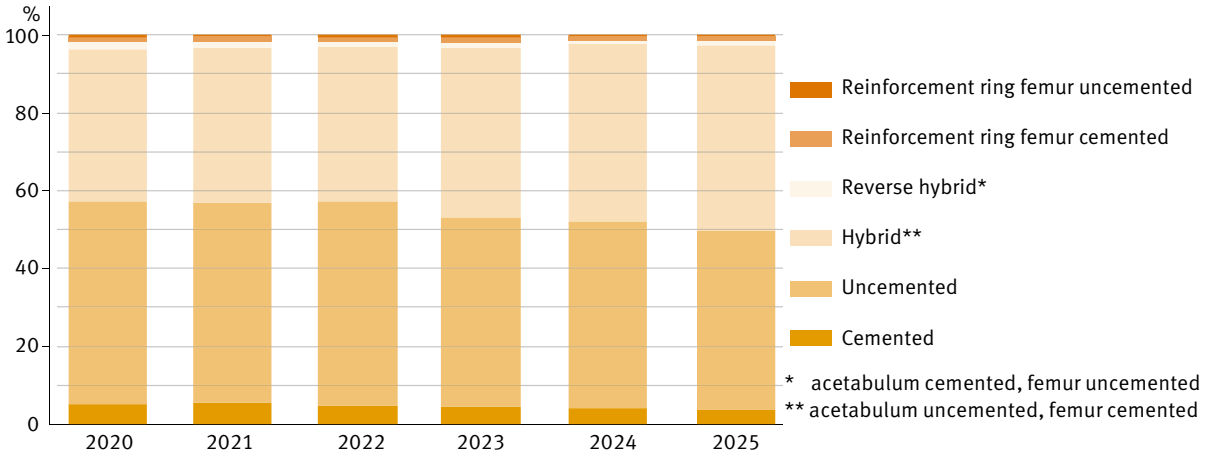
Most HHA stems were cemented (87.5%), compared to 49.4% uncemented stems in the THA group **(Table 4.19).** The share of cemented stems for HHA increased from 85.7% in 2020 to 92.0% in 2025. The use of uncemented stems in the THA group reached a maximum of 52.3% in 2022, the share declining thereafter to 45.8% in 2025. Simultaneously, hybrid fixation showed a compensatory rise **(Table 4.20 and Figure 4.30).**

The most common approaches for both procedures were a direct anterior approach, followed by the anterolateral approach. The choice of the approach

Main treatment group		THA		HHA	
N (2020 – 2025)		**N revised**	**%**	**N revised**	**%**
Previous surgery[1]	None	12,338	89.6	14,877	98.3
	Internal fixation femur	1,099	8.0	159	1.1
	Osteotomy femur	75	0.5	15	0.1
	Internal fixation acetabulum	138	1.0	6	0.0
	Osteotomy pelvis	7	0.1	3	0.0
	Arthrodesis	1	0.0	0	0.0
	Other previous surgery	166	1.2	84	0.6
Approach	Anterior	8,202	59.5	7,709	50.9
	Anterolateral	3,011	21.9	4,048	26.7
	Posterior	1,692	12.3	2,188	14.5
	Lateral	675	4.9	1,082	7.1
	Other approach	197	1.4	114	0.8
Fixation	All uncemented / uncemented stem	6,811	49.4	1,799	11.9
	Hybrid acetabulum uncemented, femur cemented	5,926	43.0		
	All cemented / cemented stem	630	4.6	13,245	87.5
	Reverse hybrid acetabulum cemented, femur uncemented	194	1.4		
	Reinforcement ring, femur uncemented	56	0.4		
	Reinforcement ring, femur cemented	161	1.2		

Table 4.19
Fractures of the hip: Surgery characteristics by treatment group
[1] multiple responses possible; does not sum to 100%

Total hip arthroplasty (THA)	2020	2021	2022	2023	2024	2025
Reinforcement ring, femur uncemented	0.4	0.4	0.5	0.5	0.3	0.3
Reinforcement ring, femur cemented	1.2	1.2	1.0	1.6	0.9	1.1
Reverse hybrid*	1.9	1.8	1.4	1.2	1.2	1.1
Hybrid**	39.3	39.9	39.8	43.6	45.6	47.8
Uncemented	52.1	51.3	52.3	48.8	47.7	45.8
Cemented	5.0	5.4	4.9	4.3	4.2	3.8
Total [N]	**1,791**	**2,129**	**2,289**	**2,405**	**2,513**	**2,651**



Hemi hip arthroplasty (HHA)	2020	2021	2022	2023	2024	2025
Uncemented stem	14.3	15.0	12.9	12.7	9.3	8.0
Cemented stem	85.7	85.0	87.1	87.3	90.7	92.0
Total [N]	**2,356**	**2,338**	**2,580**	**2,548**	**2,675**	**2,547**

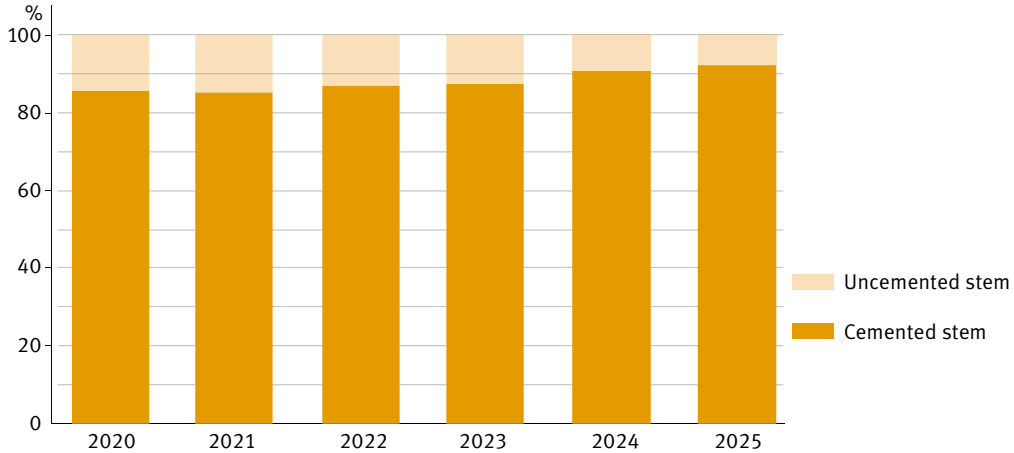
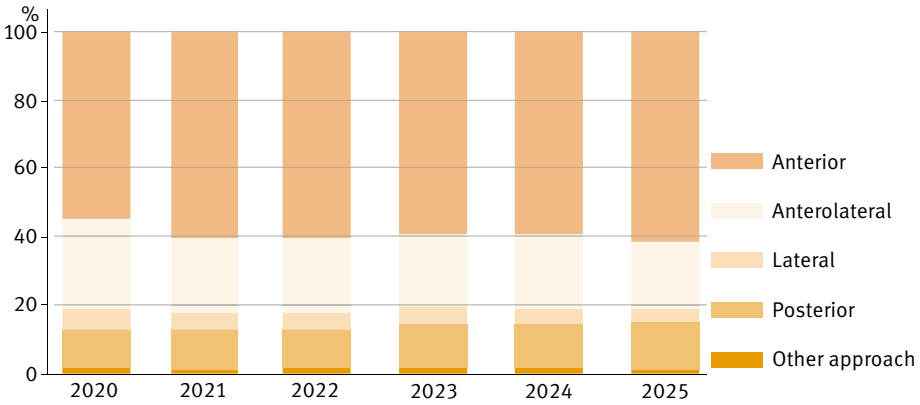


Table 4.20 and Figure 4.30

Fracture of the hip: Component fixation methods by type of treatment by year

changed significantly between 2020 and 2025, particularly for HHA. The use of the anterior approach for HHA rose from 43.1% in 2020 to 52.9% in 2025. The use of the anterolateral approach declined, as did the other approaches. The development was similar for THA, however less pronounced **(Table 4.21 and Figure 4.31).**

Total hip arthroplasty (THA)	2020	2021	2022	2023	2024	2025
Anterior	55.1	60.3	60.2	59.5	59.3	61.7
Anterolateral	26.0	21.9	21.9	21.2	22.0	19.4
Lateral	6.1	5.2	5.3	5.0	4.3	4.0
Posterior	11.4	11.3	11.1	12.8	12.9	13.6
Other approach	1.4	1.4	1.5	1.4	1.6	1.3
Total [N]	**1,791**	**2,128**	**2,289**	**2,405**	**2,513**	**2,651**



Hemi hip arthroplasty (HHA)	2020	2021	2022	2023	2024	2025
Anterior	43.1	51.6	52.0	52.3	52.9	52.9
Anterolateral	26.9	26.3	26.9	27.0	25.2	28.3
Lateral	12.9	8.3	5.7	6.1	6.4	4.0
Posterior	15.4	13.3	14.6	14.0	15.2	14.2
Other approach	1.7	0.5	0.8	0.5	0.4	0.6
Total [N]	**2,363**	**2,373**	**2,597**	**2,559**	**2,691**	**2,558**

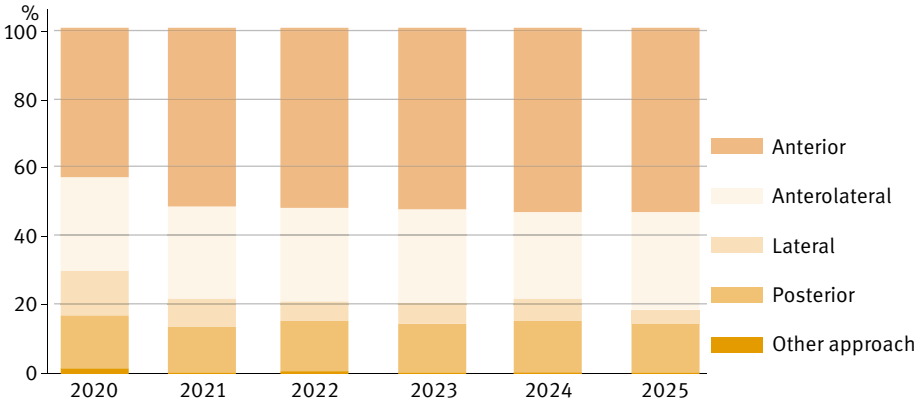


Table 4.21 and Figure 4.31

Fracture of the hip: Surgical approach by type of treatment by year

4.7 Early revision after arthroplasty for fracture of the hip

The 2-year revision rate after THA for fracture of the hip was 4.9% (CI 4.5–5.4%) and higher than in HHA patients, where 3.8% (CI 3.3–4.0%) had been revised **(Table 3.10).** The 2-year revision rate of THA for the treatment of fractures was more than twice that of THA for primary OA (4.9% vs. 2.4%).

In the HHA group, uncemented stems had an increased risk for revision caused by a periprosthetic fracture. A posterior approach bore a not significantly higher risk of revision for both THA and HHA, whereby for THA the effect was higher (7.5% vs 6.1%), as shown in **Table 4.22.**

	Total hip arthroplasty					Hemi hip arthroplasty				
	At risk*	Revised		95% CI		At risk*	Revised		95% CI	
	N	N	%**	lower	upper	N	N	%**	lower	upper
Overall (moving average)	8,613	407	4.9	4.5	5.4	9,893	331	3.8	3.4	4.2
Cemented / cemented stem	422	26	6.7	4.6	9.8	8,476	259	3.5	3.1	4.0
Uncemented / uncem. stem	4,397	218	5.1	4.5	5.8	1,347	69	5.6	4.4	7.0
Hybrid	3,512	145	4.3	3.7	5.1	0	0			
Anterior	5,080	222	4.5	4.0	5.2	4,932	164	3.8	3.3	4.4
Anterolateral	1,942	82	4.4	3.5	5.4	2,652	64	2.7	2.1	3.5
Lateral	459	21	4.8	3.1	7.2	806	23	3.4	2.3	5.1
Posterior	1,008	73	7.5	6.0	9.3	1,417	78	6.1	4.9	7.5
Other approach	123	9	7.6	4.0	14.1	86	2	2.5	0.6	9.5

Table 4.22

Fracture of the hip: First revisions according to stem fixation and approach

4-year moving average covering implants between 01.01.2020 and 31.12.2023, with two years follow-up (31.12.2025)

* Number of patients with at least two years follow-up (i.e. primary prosthesis in moving average).

** Rates adjusted for effects of mortality and emigration.

4.7.1 Reasons for early first revision

Dislocation, periprosthetic fractures and infections were the three leading reasons for revision in both the THA and the HHA groups (Table 4.23). However, share of revision for infection increased by 2025, from 25.8% to 30.7% in the THA group and from 34.8% to 38.1% in the HHA group. Infection was now the most frequent reason for revision after arthroplasty for fracture of the hip. Dislocation decreased slightly in frequency, while revisions for periprosthetic fractures remained at the same level.

A more detailed analysis of the reasons for revision of HHA, analysing unipolar and bipolar heads separately, showed notable differences. However, small numbers limit any further analysis (Table 4.24).

The revision rates of unipolar and bipolar heads for cemented HHA showed that bipolar heads had a higher revision rate in the first year, whereas afterwards the difference was not significant. After 4 years and up to 13 years of follow-up, the revision rates of unipolar heads and bipolar heads remained similar (Figure 4.32). The analysis is again limited by small numbers, at the end of the observation period. The

	THA		HHA	
Reason	**N**	**%**	**N**	**%**
Infection	125	30.7	126	38.1
Periprosthetic fracture	103	25.3	70	21.1
Dislocation	99	24.3	84	25.4
Loosening femoral	51	12.5	33	10.0
Position/Orientation of cup	34	8.4	5	1.5
Loosening acetabular	32	7.9		
Position/Orientation of stem	21	5.2	16	4.8
Implant breakage	8	2.0	3	0.9
Acetabular osteolysis	2	0.5		
Femoral osteolysis	2	0.5		
Status after spacer	1	0.2	1	0.3
Impingement	1	0.2		
Wear			4	1.2
Acetabular protrusion			12	3.6
Other	40	9.8	31	9.4
N revisions	**407**		**331**	

Table 4.23

Fracture of the hip: Reasons for early first revisions

4-year moving average covering implants between 01.01.2020 and 31.12.2023, with two years follow-up (31.12.2025).
Early first revisions are those occurring within 2 years of the primary arthroplasty. Multiple responses possible (percentages do not sum to 100)

	Unipolar heads		Bipolar heads	
Reason	**N**	**%**	**N**	**%**
Infection	74	46.0	35	36.5
Periprosthetic fracture	28	17.4	12	12.5
Dislocation	26	16.1	38	39.6
Loosening femoral	15	9.3	14	14.6
Impingement	9	5.6	1	1.0
Implant breakage			2	2.1
Other	19	11.8	4	4.2
N revisions	**161**		**96**	

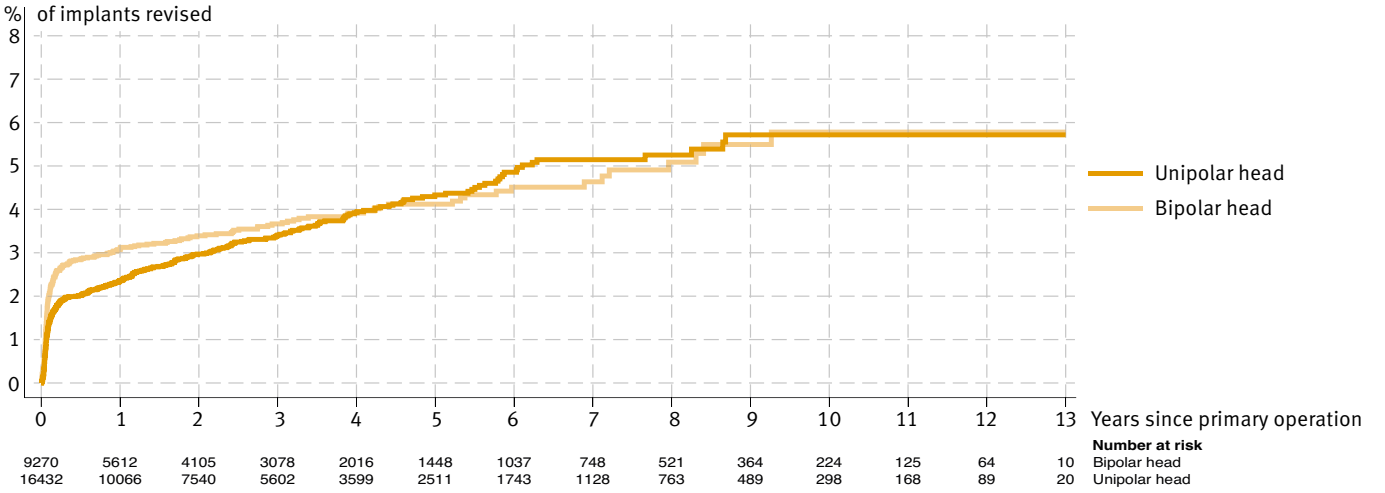
Table 4.24

Fracture of the hip: Reasons for early first revisions (unipolar vs. bipolar hemi heads; cemented stems only)

4-year moving average covering implants between 01.01.2020 and 31.12.2023, with two years follow-up (31.12.2025).
Early first revisions are those occurring within 2 years of the primary arthroplasty. Multiple responses possible (percentages do not sum to 100).

higher early revision rate of bipolar heads was due to revision for dislocation, which occurred significantly more frequently than after unipolar HHA. Periprosthetic fractures and infection were more frequently the reason for revision in HHA with unipolar heads **(Table 4.24).**

The cumulative incidence figures of revision rates over time provide an additional perspective on the reasons for revision **(Figure 4.33).** It highlights revisions for infection and for dislocation tended to occur early on, as indicated by a steep initial increase of the curve, followed by very gradual long-term rise. These revisions were more frequent in THA than after HHA. Incidents of loosening and periprosthetic fractures were the drivers of later revisions. Acetabular wear or protrusion are often discussed as potential reason for revision. However, both are rare and account combined for only 4.8% of all revisions.



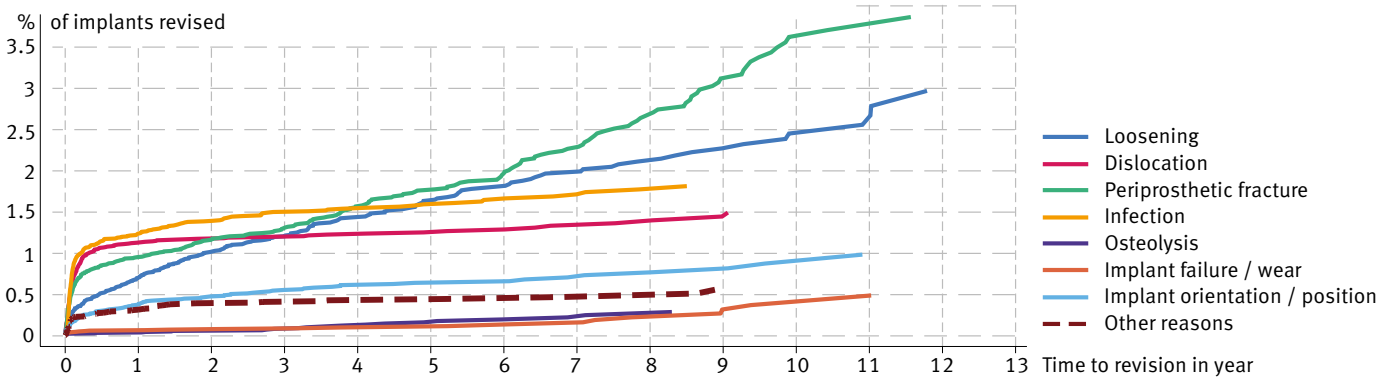
Head type	1 year	2 years	3 years	5 years	6 years	8 years	10 years	13 years
Unipolar head	2.4 (2.1-2.6)	3.0 (2.7-3.3)	3.4 (3.1-3.7)	4.3 (3.9-4.8)	4.9 (4.3-5.4)	5.3 (4.7-5.9)	5.7 (5.0-6.6)	5.7 (5.0-6.6)
Bipolar head	3.1 (2.7-3.5)	3.4 (3.0-3.8)	3.7 (3.3-4.1)	4.1 (3.6-4.7)	4.5 (3.9-5.2)	5.1 (4.3-6.0)	5.8 (4.7-7.0)	5.8 (4.7-7.0)

Figure 4.32

Fracture of the hip: Estimated failure rates of hemiarthroplasty of the hip: unipolar heads versus bipolar heads

Time since operation, 2012–2025, only cemented stems

Fracture of total hip arthroplasty	1 year	2 years	3 years	5 years	9 years	10 years	13 years
Loosening	0.7 (0.6-0.8)	1.0 (0.9-1.2)	1.2 (1.0-1.4)	1.6 (1.4-1.8)	2.3 (1.9-2.6)	2.4 (2.1-2.9)	3.0 (2.4-3.7)
Dislocation	1.1 (1.0-1.3)	1.2 (1.0-1.3)	1.2 (1.0-1.3)	1.2 (1.1-1.4)	1.4 (1.2-1.7)	1.5 (1.3-1.7)	1.5 (1.3-1.7)
Periprosthetic fracture	0.9 (0.8-1.1)	1.1 (1.0-1.3)	1.3 (1.1-1.5)	1.7 (1.5-2.0)	3.1 (2.7-3.6)	3.6 (3.1-4.2)	3.8 (3.2-4.6)
Infection	1.2 (1.1-1.4)	1.4 (1.2-1.5)	1.5 (1.3-1.7)	1.6 (1.4-1.8)	1.8 (1.6-2.0)	1.8 (1.6-2.0)	1.8 (1.6-2.0)
Osteolysis	0.0 (0.0-0.1)	0.0 (0.0-0.1)	0.1 (0.0-0.1)	0.1 (0.1-0.2)	0.3 (0.2-0.4)	0.3 (0.2-0.4)	0.3 (0.2-0.4)
Implant failure / wear	0.0 (0.0-0.1)	0.1 (0.0-0.1)	0.1 (0.0-0.1)	0.1 (0.0-0.1)	0.3 (0.2-0.5)	0.4 (0.2-0.6)	0.5 (0.2-0.9)
Implant orientation / position	0.4 (0.3-0.4)	0.5 (0.4-0.6)	0.5 (0.4-0.7)	0.6 (0.5-0.8)	0.8 (0.6-0.9)	0.9 (0.7-1.1)	1.0 (0.7-1.3)
Other reasons	0.3 (0.3-0.4)	0.4 (0.3-0.5)	0.4 (0.3-0.5)	0.4 (0.3-0.5)	0.6 (0.4-0.7)	0.6 (0.4-0.7)	0.6 (0.4-0.7)



Fracture of hemiarthroplasty	1 year	2 years	3 years	5 years	9 years	10 years	13 years
Loosening	0.2 (0.2-0.3)	0.4 (0.3-0.5)	0.5 (0.4-0.6)	0.8 (0.6-0.9)	1.5 (1.1-2.0)	1.5 (1.1-2.0)	1.5 (1.1-2.0)
Dislocation	0.8 (0.7-0.9)	0.8 (0.7-0.9)	0.8 (0.7-1.0)	0.9 (0.8-1.0)	0.9 (0.8-1.1)	1.0 (0.8-1.3)	1.0 (0.8-1.3)
Periprosthetic fracture	0.6 (0.5-0.7)	0.7 (0.6-0.8)	0.8 (0.7-0.9)	0.9 (0.8-1.1)	1.2 (1.0-1.5)	1.2 (1.0-1.5)	1.5 (1.0-2.3)
Infection	1.1 (1.0-1.3)	1.2 (1.1-1.3)	1.2 (1.1-1.4)	1.3 (1.1-1.4)	1.4 (1.2-1.6)	1.4 (1.2-1.6)	1.4 (1.2-1.6)
Osteolysis	0.0 (0.0-0.0)	0.0 (0.0-0.0)	0.0 (0.0-0.1)	0.1 (0.0-0.1)	0.1 (0.0-0.2)	0.1 (0.0-0.2)	0.1 (0.0-0.2)
Implant failure / wear	0.1 (0.0-0.1)	0.1 (0.0-0.1)	0.1 (0.1-0.2)	0.2 (0.1-0.3)	0.3 (0.2-0.5)	0.4 (0.2-0.7)	0.4 (0.2-0.7)
Implant orientation / position	0.1 (0.1-0.2)	0.1 (0.1-0.2)	0.1 (0.1-0.2)	0.2 (0.1-0.2)	0.2 (0.1-0.2)	0.2 (0.1-0.2)	0.2 (0.1-0.2)
Other reasons	0.3 (0.3-0.4)	0.5 (0.4-0.6)	0.6 (0.5-0.7)	0.9 (0.7-1.1)	1.3 (1.1-1.7)	1.3 (1.1-1.7)	1.5 (1.1-2.0)

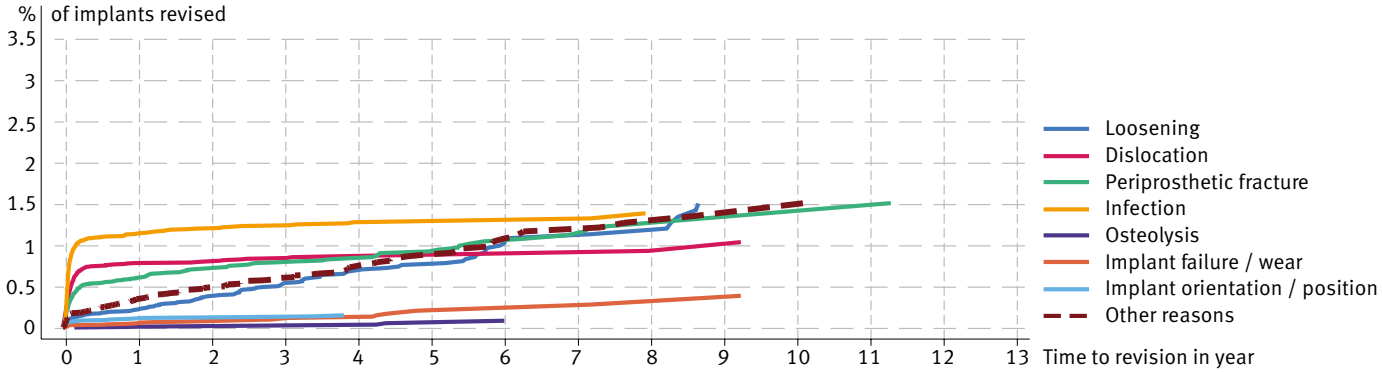


Figure 4.33

Fracture of the hip: cumulative incidence rates for different revision diagnoses, THA and HHA

Time since operation, 2012–2025, all services, % of implants revised

4.7.2 Type of revision

Among the hip arthroplasties performed for fracture of the hip, 407 revisions of THA and 331 revisions of HHA were carried out during the current moving observation period. The most frequent type of revision was conversion of HHA to THA (almost 31.7% of the revisions). The second most frequent revision in the HHA group was the exchange of the head followed by revision of the stem **(Table 4.25).**

Type of revision	Total hip arthroplasty		Hemiarthroplasty	
	N revised	%	N revised	%
Exchange acetabular and femoral components	53	13.0		
Exchange acetabular component	30	7.4		
Exchange acetabular component and head	50	12.3		
Exchange femoral component	90	22.1	80	24.2
Exchange femoral component and insert	20	4.9	1	0.3
Exchange head	42	10.3	117	35.3
Exchange insert	8	2.0		
Exchange head and insert	83	20.4	7	2.1
Conversion of hemi-prosthesis to THA without stem exchange			59	17.8
Conversion of hemi-prosthesis to THA with stem exchange			46	13.9
Component removal, spacer implantation	9	2.2	8	2.4
Component reimplantation (after spacer or Girdlestone)	2	0.5	1	0.3
Girdlestone	5	1.2	3	0.9
Exchange femoral component, insert and osteosynthesis	6	1.5	1	0.3
Other intervention	9	2.2	8	2.4
N revisions	**407**	**100**	**331**	**100**

Table 4.25

Fracture of the hip: Type of revisions by primary treatment modality, THA versus HHA

4-year moving average covering implants between 01.01.2020 and 31.12.2023, with two years follow-up (31.12.2025)
HHA: in approx. 10% of cases response categories involving acetabular components were chosen.
These were recoded to conversions.

4.8 Results of implants after hip fracture

4.8.1 Uncemented THA combinations for hip fracture

There were 17 uncemented stem/cup combinations accounting for 75% of all uncemented THA performed for fracture of the hip **(Table 4.26).** The table also shows the distribution of the implants used between 2020 and 2025.

The revision rates for combinations with N › 50 are shown in **Figure 4.34.** None of the implant combinations were conspicuous.

Stem component	Cup component	2020	2021	2022	2023	2024	2025	2020-2025
Amistem-P	Mpact	3	6	9	10	16	20	**64**
Amistem-P	Versafitcup trio/ccl.	83	87	119	96	77	48	**510**
Avenir	Allofit	78	69	65	80	86	69	**447**
Corail	Pinnacle	66	71	58	51	23	6	**275**
Corail collared	Bimobile	0	20	122	94	96	97	**429**
Corail collared	Liberty	13	54	4	1	0	1	**73**
Corail collared	Novae TH/Bi-Mentum	28	65	73	101	118	150	**535**
Corail collared	Pinnacle	65	111	155	146	136	123	**736**
Fitmore	Allofit	15	26	20	39	38	45	**183**
Fitmore	Fitmore	21	14	26	13	6	0	**80**
Optimys	RM pressfit vitamys	115	157	159	160	182	171	**944**
Optimys	Symbol DMHA/DS evol.	11	19	16	25	21	19	**111**
Polarstem	R3	16	11	23	20	12	18	**100**
Quadra-H	Versafitcup trio/ccl.	31	19	10	0	0	0	**60**
Quadra-P	Versafitcup DM	5	10	5	21	17	34	**92**
Quadra-P	Versafitcup trio/ccl.	10	16	21	34	37	48	**166**
Twinsys	RM pressfit vitamys	26	34	31	36	30	35	**192**
other comb.		305	282	263	233	272	282	**1,637**
Total		**2,911**	**3,092**	**3,201**	**3,183**	**3,191**	**3,191**	**6,634**

Table 4.26
Top 75% of primary total hip arthroplasty uncemented combinations to treat fractures 2020–2025

Stem component	Cup component	CSS*	at risk N**	Revised N	Revised % (95%CI)***
Amistem-P	Versafitcup trio/ccl.	29	385	21	5.5 (3.6-8.3)
Avenir	Allofit	36	292	16	5.6 (3.5-9.0)
Corail	Pinnacle	15	245	7	2.9 (1.4-6.1)
Corail collared	Bimobile	51	236	5	2.2 (0.9-5.2)
Corail collared	Liberty	83	72	5	7.8 (3.3-17.8)
Corail collared	Novae TH/Bi-Mentum	55	267	9	3.5 (1.8-6.5)
Corail collared	Pinnacle	11	477	23	4.9 (3.3-7.3)
Fitmore	Allofit	74	100	0	0.0 (.-.)
Fitmore	Fitmore	36	74	4	5.4 (2.1-13.8)
Optimys	RM pressfit vitamys	15	591	25	4.3 (2.9-6.3)
Optimys	Symbol DMHA/DS evol.	80	71	3	4.3 (1.4-12.8)
Polarstem	R3	34	70	2	2.9 (0.7-11.2)
Quadra-H	Versafitcup trio/ccl.	27	60	6	10.0 (4.6-20.9)
Quadra-P	Versafitcup trio/ccl.	40	81	3	3.7 (1.2-11.1)
Twinsys	RM pressfit vitamys	20	127	6	4.8 (2.2-10.3)
other combinations			1,127	77	7.0 (5.6-8.7)
CH average for group					**5.1 (4.4-5.8)**

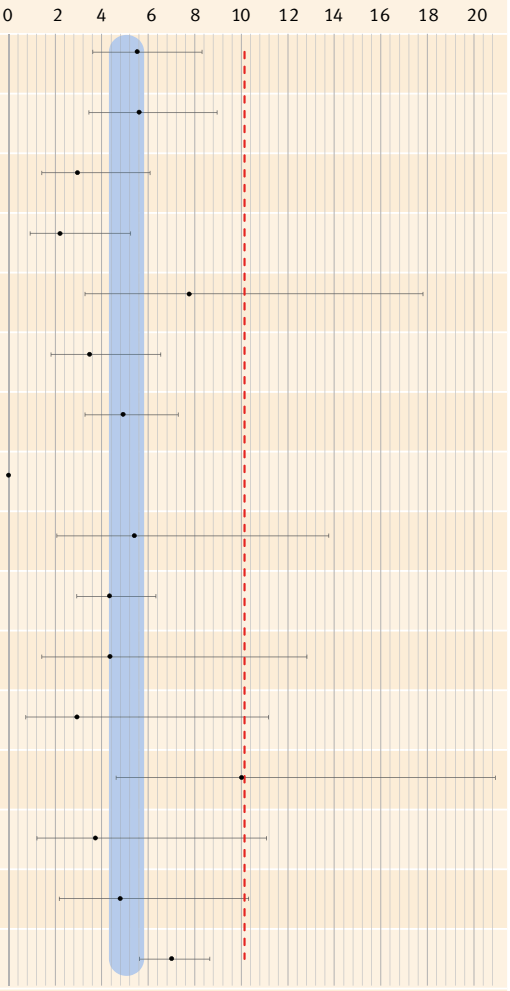


Figure 4.34

2-year evaluation: Revision rates within 24 months of uncemented primary total hip arthroplasty combinations to treat fractures

4-year moving average covering implants between 01.01.2020 and 31.12.2023, with two years follow-up (31.12.2025)

* Share of implants accounted for by main user hospital service. A higher share signifies an increased likelihood of biased figures due to local effects. A share of 50%+ would suggest that reported results are likely determined by one hospital service.

** Number of patients with at least two years follow-up (i.e. primary prosthesis in moving average).

*** Rates adjusted for effects of mortality and emigration.

Group average

2-year revision rate and 95% CI

Outlier alert boundary

Important information on the use of the implant performance tables below

- Estimated revision rate exceeds the alert boundary, but we do not identify this implant combination as an outlier because the 95% confidence interval overlaps the confidence zone of the reference group.
- Identified as potential outliers. Please note the statistical confidence intervals. The outlier status comes with varying degrees of statistical probability. We consider the potential outlier status „highly likely“ when both the estimated revision rate and the complete confidence interval exceed the outlier alert boundary.

Please be aware that relatively rare implant combinations are frequently used in only a small number or indeed only in one hospital in Switzerland. Observed revision rates may be determined by local factors and performance may differ significantly between locations. Manufacturers of detected outlier implants and the hospitals where they were used (and revisions occurred) have been informed by SIRIS.

4.8.2 Hybrid THA combinations for fractures

There were 20 stem/cup combinations covering 75% of the hybrid THA performed for fractures of the hip, but nine of these combinations were used fewer than 100 times during the observed period between 2020 and 2025 **(Table 4.27).** The revision rates for the 10 combinations with N ›50 are presented in **Figure 4.35.** Contrary to the last report, there were two implant combinations appearing in 2025 for the first time as outliers. During the current observation period, they reached the threshold of N ›50 implantations and could be analysed for the first time. Both combinations had a CCS of 100, indicating their use in one hospital only. There were two different stems but both combined with the same DM cup.

Stem component	Cup component	2020	2021	2022	2023	2024	2025	2020-2025
Amistem-C	Mpact DM	5	4	0	18	15	17	**59**
Amistem-C	Versafitcup DM	12	10	6	17	11	13	**69**
Amistem-C	Versafitcup trio/ccl.	94	107	106	81	126	150	**664**
Avenir (cemented)	Allofit	33	39	49	76	137	129	**463**
Avenir (cemented)	Fitmore	37	65	58	45	14	1	**220**
CCA	RM pressfit vitamys	9	10	19	6	5	6	**55**
Centris	RM pressfit vitamys	34	51	0	0	0	0	**85**
Corail (cemented)	Novae TH/Bi-Mentum	8	29	53	70	99	165	**424**
Corail (cemented)	Pinnacle	38	78	120	146	102	113	**597**
Corail (cemented)	RM pressfit vitamys	0	0	11	14	33	13	**71**
Exacta S	Symbol DMHA/DS evol.	0	5	24	39	49	38	**155**
Exeter V40	Symbol DMHA/DS evol.	0	7	16	29	14	24	**90**
MS-30	Allofit	0	10	29	43	24	22	**128**
Quadra-C	Mpact	19	16	8	16	6	1	**66**
Quadra-C	Mpact DM	32	34	33	17	22	12	**150**
Quadra-C	Versafitcup trio/ccl.	64	35	21	4	4	0	**128**
Quadra-P (cemented)	Versafitcup trio/ccl.	4	5	4	17	19	27	**76**
Twinsys (cemented)	RM pressfit vitamys	72	75	119	147	146	180	**739**
Twinsys (cemented)	Symbol DMHA/DS evol.	3	4	13	13	19	45	**97**
Weber	Fitmore	46	37	33	26	8	0	**150**
other combinations		210	234	199	236	287	309	**1,475**
Total		**2,740**	**2,876**	**2,943**	**3,083**	**3,164**	**3,290**	**5,961**

Table 4.27
Top 75% of primary total hip arthroplasty hybrid combinations to treat fractures 2020 – 2025

Stem component	Cup component	CSS*	at risk N**	Revised N	% (95% CI)***
Amistem-C	Versafitcup trio/ccl.	22	388	11	2.9 (1.6-5.2)
Avenir (cemented)	Allofit	60	196	4	2.1 (0.8-5.5)
Avenir (cemented)	Fitmore	73	205	8	4.0 (2.0-7.9)
Centris	RM pressfit vitamys	32	85	6	7.7 (3.5-16.4)
Corail (cemented)	Novae TH/Bi-Mentum	28	160	8	5.3 (2.7-10.3)
Corail (cemented)	Pinnacle	18	377	12	3.4 (1.9-5.8)
Exacta S	Symbol DMHA/DS evol.	100	67	7	10.6 (5.2-20.9)
Exeter V40	Symbol DMHA/DS evol.	100	52	6	11.9 (5.5-24.6)
MS-30	Allofit	96	82	2	2.4 (0.6-9.4)
Quadra-C	Mpact	86	59	3	6.3 (2.1-18.3)
Quadra-C	Mpact DM	71	116	4	3.8 (1.4-9.7)
Quadra-C	Versafitcup trio/ccl.	66	124	8	6.7 (3.4-12.9)
Twinsys (cemented)	RM pressfit vitamys	15	413	11	2.8 (1.5-4.9)
Weber	Fitmore	70	142	6	4.5 (2.0-9.8)
other combinations			1,051	46	4.5 (3.4-6.0)
CH average for group					**4.2 (3.6-5.0)**

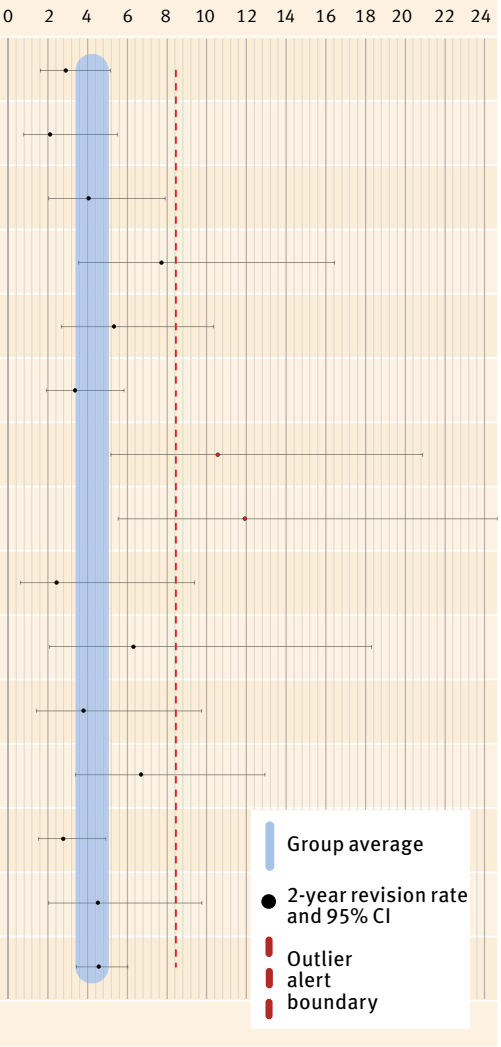


Figure 4.35

2-year evaluation: Revision rates within 24 months of hybrid primary total hip arthroplasty combinations to treat fractures

4-year moving average covering implants between 01.01.2020 and 31.12.2023, with two years follow-up (31.12.2025)

* Share of implants accounted for by main user hospital service. A higher share signifies an increased likelihood of biased figures due to local effects. A share of 50%+ would suggest that reported results are likely determined by one hospital service.

** Number of patients with at least two years follow-up (i.e. primary prosthesis in moving average).

*** Rates adjusted for effects of mortality and emigration.

4.8.3 Hip Hemiarthroplasty

The choice of implant combination for the treatment of hip fractures with HHA was less variable than for THA and there were only nine stem/head combinations accounting for 75% of all implantations **(Table 4.28).** These combinations were used rather frequently over the last 12 years, and it is worth noting that neither combination was used fewer than 400 times during the last 5 years. The revision rates for combinations with N ›50, which are more than the above-mentioned nine combinations, are shown in **Figure 4.36.**

The average revision rate of this subgroup was 3.4% (CI 3.0–3.9%). There were no implant combinations that were detected as outliers. The Harmony combinations, both conspicuous as outlier in the previous report, showed an improvement of their revision rate.

Stem component	Head component	2020	2021	2022	2023	2024	2025	2020–2025
Amistem-C	Medacta bipolar head	114	150	172	196	222	198	**1,052**
Amistem-C	Medacta endohead	329	381	420	384	357	296	**2,167**
Avenir (cemented)	ZB bipolar head	99	69	101	120	161	104	**654**
Avenir (cemented)	ZB unipolar head	44	72	69	69	77	91	**422**
CCA	Hemihead SS	396	350	289	190	169	148	**1,542**
Corail (cemented)	J&J modular head carthcart	106	182	263	279	324	381	**1,535**
Twinsys (cemented)	Bipolar steel head	46	30	65	57	92	156	**446**
Twinsys (cemented)	Hemihead SS	127	121	238	331	299	326	**1,442**
Weber	ZB unipolar head	168	140	151	103	69	22	**653**
other combinations		553	479	458	460	595	543	**3,088**
Total		**1,982**	**1,974**	**2,226**	**2,189**	**2,365**	**2,265**	**13,001**

Table 4.28
Fracture of the hip: top 75% stem/head combinations used in hemi hip arthroplasty (HHA) 2020 – 2025

Stem component	Head component	CSS*	at risk N**	Revised N	Revised % (95% CI)***
Amistem-C	Hemihead SS	60	78	1	1.4 (0.2-9.8)
Amistem-C	Medacta bipolar head	31	631	13	2.3 (1.3-3.9)
Amistem-C	Medacta endohead	20	1,515	57	4.4 (3.4-5.7)
Avenir (cemented)	ZB bipolar head	27	390	9	2.4 (1.3-4.6)
Avenir (cemented)	ZB unipolar head	25	255	2	0.9 (0.2-3.7)
CCA	Bipolar steel head	60	161	5	3.8 (1.6-8.9)
CCA	Hemihead SS	31	1,224	31	3.1 (2.2-4.4)
Centris	Hemihead SS	42	215	4	2.0 (0.8-5.3)
Corail (cemented)	J&J mod. head carthcart	23	830	30	4.1 (2.9-5.8)
Corail (cemented)	S&N bipolar ballhead	78	50	0	0.0 (.-.)
Exacta S	Endoheads	100	124	5	5.8 (2.4-13.8)
Harmony (cemented)	Acropole bipolar head	97	131	6	5.5 (2.5-11.8)
Harmony (cemented)	OHST bipolar head	81	96	6	7.0 (3.2-15.0)
Original Mueller	ZB unipolar head	31	117	3	3.4(1.1-10.3)
Polarstem (cemented)	Tandem unipolar	56	64	0	0.0 (.-.)
Quadra-C	Medacta bipolar head	52	107	6	6.1 (2.8-13.1)
Quadra-P (cemented)	Medacta bipolar head	37	54	1	2.6 (0.4-16.8)
Twinsys (cemented)	Bipolar steel head	17	199	5	2.7 (1.1-6.4)
Twinsys (cemented)	Hemihead SS	19	818	23	3.1 (2.1-4.6)
Weber	ZB bipolar head	51	144	4	3.0 (1.1-7.8)
Weber	ZB unipolar head	43	562	15	2.8 (1.7-4.7)
other combinations			586	24	4.5 (3.0-6.6)
CH average for group					**3.4 (3.0-3.9)**

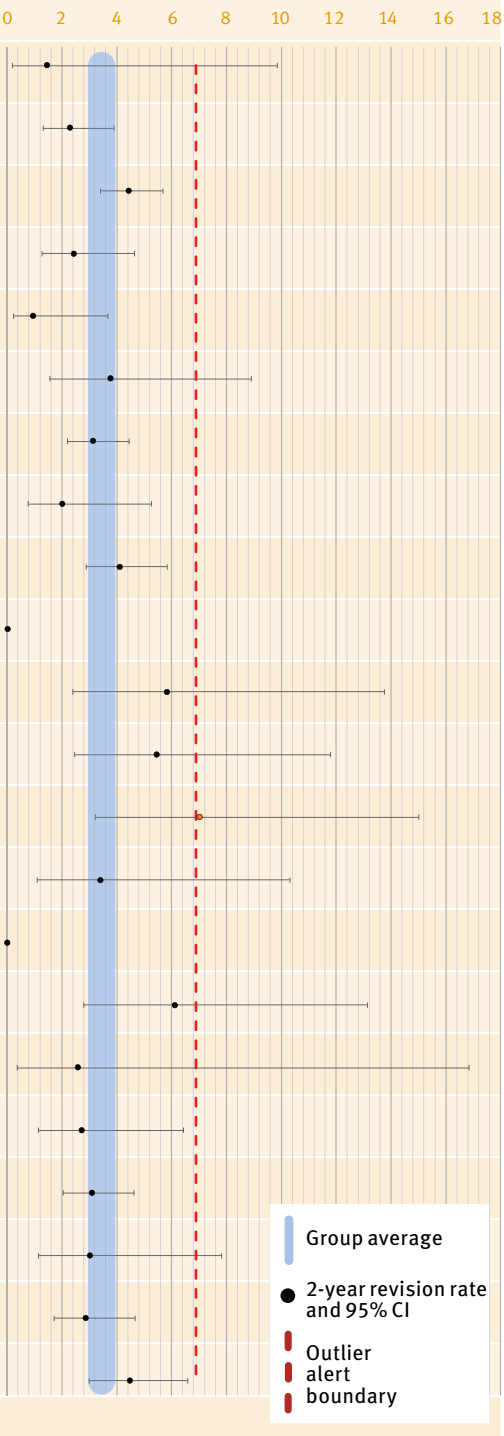


Figure 4.36

2-year evaluation: Revision rates within 24 months of stem/head combinations to treat fractures

4-year moving average covering implants between 01.01.2020 and 31.12.2023, with two years follow-up (31.12.2025)

* Share of implants accounted for by main user hospital service. A higher share signifies an increased likelihood of biased figures due to local effects. A share of 50%+ would suggest that reported results are likely determined by one hospital service.

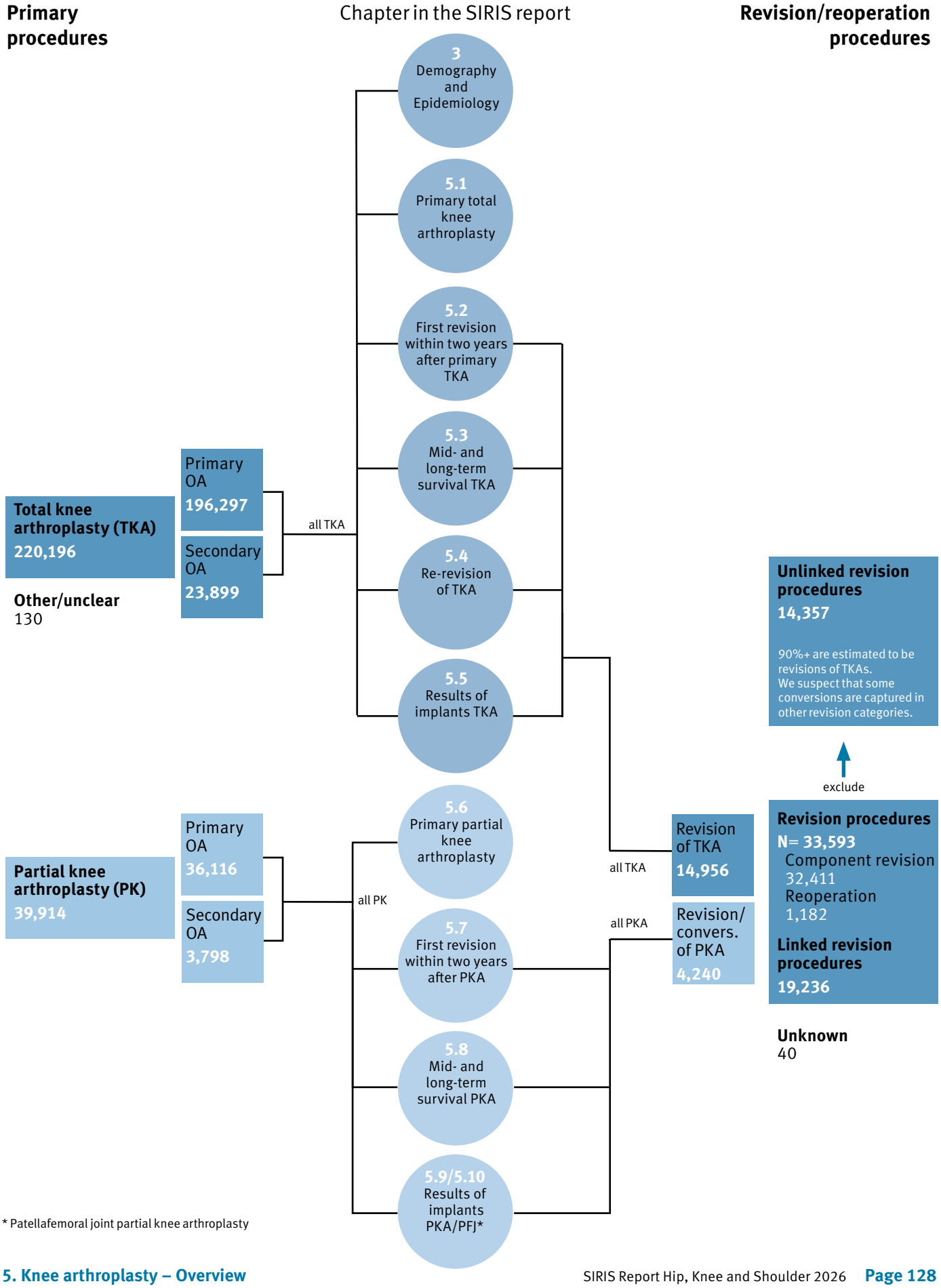
** Number of patients with at least two years follow-up (i.e. primary prosthesis in moving average).

*** Rates adjusted for effects of mortality and emigration.

Knee arthroplasty

5. Knee arthroplasty

Overview of data structure



* Patellafemoral joint partial knee arthroplasty

Overview of types of analyses for determining revision rates

Types of analysis / Report section	**Kaplan-Meier estimates** 2012 – 2025 **Adjusted for censoring events**	**2-year revision rates** (implants 2020 – 2023 with completed 2-year follow-up) **Adjusted for censoring events**	**Funnel plots of 2-year hospital revision rates** (implants 2020 – 2023 with completed 2-year follow-up) **Risk-adjusted and adjusted for censoring events**
Knee overview	All total knee arthroplasties (TKA) All partial knee arthroplasties (PKA)		TKA after primary osteoarthritis (primary OA). **ANQ online reporting, above 99.8%= outlier status** All partial knee arthroplasties (PKA) TKA after primary OA without isolated patella resurfacing
First revision of primary TKA	TKA for various subgroups	TKA for various subgroups	
First revision of primary PKA	PKA for various subgroups	PKA for various subgroups	
Re-revision after revision of TKA/PKA	Re-revision after revised TKA for various subgroups Re-revision after conversion from PKA to TKA		
Knee implants (minimal number in group)	Bicondylar total knee systems, all diagnoses (500+) Unicondylar partial knee systems, all diagnoses (500+) Patellofemoral joint systems, all diagnoses (500+) **Long-term evaluation 5–13 years: elevated revision rate or outlier**	Bicondylar total knee systems, all diagnoses (50+) Unicondylar partial knee systems, all diagnoses (50+) Patellofemoral joint systems, all diagnoses (50+) **2-year evaluation (two times group average= outlier status)**	

5.1 Primary total knee arthroplasty

The total number of primary TKA registered in SIRIS at the end of 2025 reached 220,196 cases **(Table 3.12).** The share of women (58.7%) and the mean age of the patients (69.8 years) remained constant throughout the entire registration period **(Table 3.13).** Please consult also Chapter 3.3.2 for further details regarding incidence and demographic characteristics.

N (2020 – 2025)	N	%
Previous surgery		
None	80,164	68.5
Knee arthroscopy	17,736	15.2
Meniscectomy	21,392	18.3
ACL reconstruction	6,953	5.9
Osteotomy tibia close to knee	2,620	2.2
Osteosynthesis tibia close to knee	1,665	1.4
Surgery for patella stabilization	1,502	1.3
Synovectomy	906	0.8
Osteotomy femur close to knee	458	0.4
Osteosynthesis femur close to knee	572	0.5
Surgery for treating infection	214	0.2
Surgery for tumor	53	0.0
Other	1,950	1.7
Intervention		
CS (cruciate sacrificing) / UCOR	26,647	22.8
PS (posterior stabilised)	29,793	25.5
PCR (posterior cruciate retaining)	29,485	25.2
BCR (bicruciate retaining)	953	0.8
Hinge type	2,340	2.0
SC/ CCK (semi-constrained/ constrained)	1,459	1.2
Other (Medial-Pivot)[1]	25,917	22.2
Other	308	0.3
Technology		
Conventional (including minimally invasive)	74,580	63.8
Computer navigation	9,882	8.4
Patient specific instrumentation (PSI)	22,213	19.0
Robotic-assisted (v2021)	10,911	9.3
Other	1,043	0.9

N (2021 – 2025)	N	
Additional intervention		
None	96,519	95.7
Osteosynthesis FE	122	0.1
Osteosynthesis TI	97	0.1
Osteosynthesis PAT	7	0.0
Removal of metalwork	1,255	1.2
Operation extensors	565	0.6
Reconstruction plasty	97	0.1
Tibial tubercle osteotomy	1,283	1.3
Other additional intervention(s)	1,112	1.1
Additional components		
Stem FE (cemented)*	1,732	1.7
Stem FE (uncemented)**	533	0.5
Stem TI (cemented)***	6,100	6.0
Stem TI (uncemented)****	871	0.9
Sleeve FE	56	0.1
Sleeve TI	170	0.2
Augments FE	116	0.1
Augments TI	205	0.2
Augments PAT	3	0.0
Bone homologous	54	0.1
Bone autologous	165	0.2
Cone FE	8	0.0
Cone TI	59	0.1

* 61% with cement restrictor.
** 33% with coating.
*** 25% with cement restrictor.
**** 36% with coating

Table 5.1

Primary total knee arthroplasty: Surgery characteristics

All diagnoses. Multiple responses possible (percentages do not sum to 100) [1]Medial pivot was not available as a response category before SIRIS v2021. All GMK Sphere knee systems are counted as medial pivot, regardless of the type chosen locally at data entry.

Previous surgery

Between 2020 and 2025, no previous surgery was recorded in 68.5% of the TKA registered, while 18.3% had prior meniscectomy and 15.2% arthroscopy. Preceding ACL reconstruction was registered in 5.9%, and osteotomy at tibial level in 2.2%, but at the femur only in 0.4%. All other conditions were rare, in 1.7% "other" prior surgeries were reported **(Table 5.1).** The rate of previous arthroscopies preceding TKA in primary OA was constantly decreasing since 2012 and reached only 13% in 2025. The share of previous arthroscopy was much higher in secondary OA, reaching 26% in 2025, a rate slightly increasing to the same value as in 2021 **(Figure 5.1).**

Type of knee prosthesis, type of bearing

The classification of the TKA systems registered in SIRIS was adapted in 2021 with the last revision of the case report form (CRF), because of previously not unambiguous terminology. Between 2020 and 2025, the share of cruciate-sacrificing/ultra-congruent systems (CS/UCOR) was 22.8%, for posterior stabilised (PS) it was 25.5% and posterior cruciate retaining (PCR/CR) it was 25.2%. A medial pivot (MP) was used in 22.2%, whereas semi-constrained/constrained condylar knees (SC/CCK) or hinged implants were used only in 1.2% and 2.0% of the cases, respectively. Bi cruciate retaining knees (BCR) were rarely used (0.8%) as well **(Table 5.1).** The share of MP implants seemed to further increase nationwide and replace more traditional designs such as PS, PCR/CR and CS/UCOR. The proportion of SC/CCK TKA was approximately 1.3% in primary and approximately 2.8% in secondary OA. For hinged systems, the share almost tripled in secondary OA (approx. 4.6% versus approx. 1.6% in primary OA). Of note, the knee replacement systems used varied significantly between cantons, regions, and hospitals (see annual report 2025). The rate of mobile polyethylene (PE) inserts rapidly decreased over the past six years, from 34.0% in 2020 to 12.3% in 2025 **(Figure 3.17).** As SIRIS started in 2012, most of the implanted PE inserts were made of highly cross-linked PE (HXLPE) and comparison to conventional PE (CPE) does not make sense.

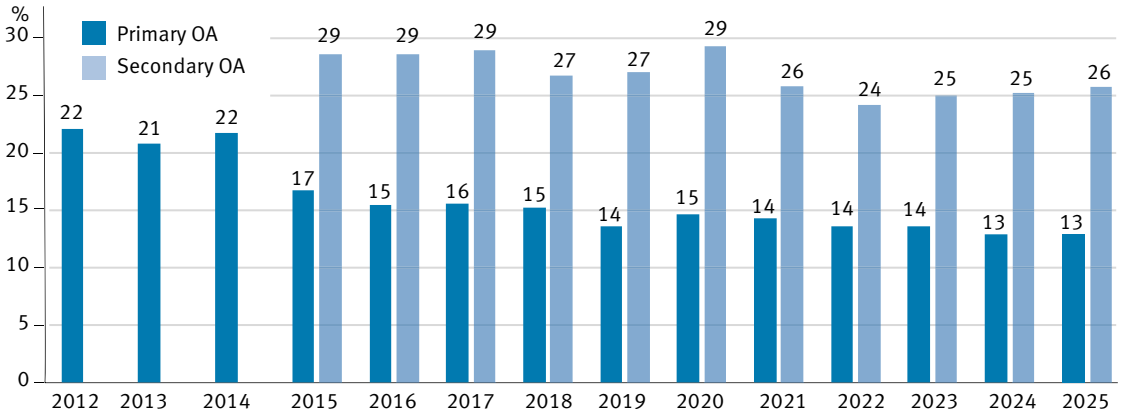


Figure 5.1

Share of TKA patients who had knee arthroscopy prior to arthroplasty (%)

Sec. OA categories were different before 2015 and therefore cannot be compared

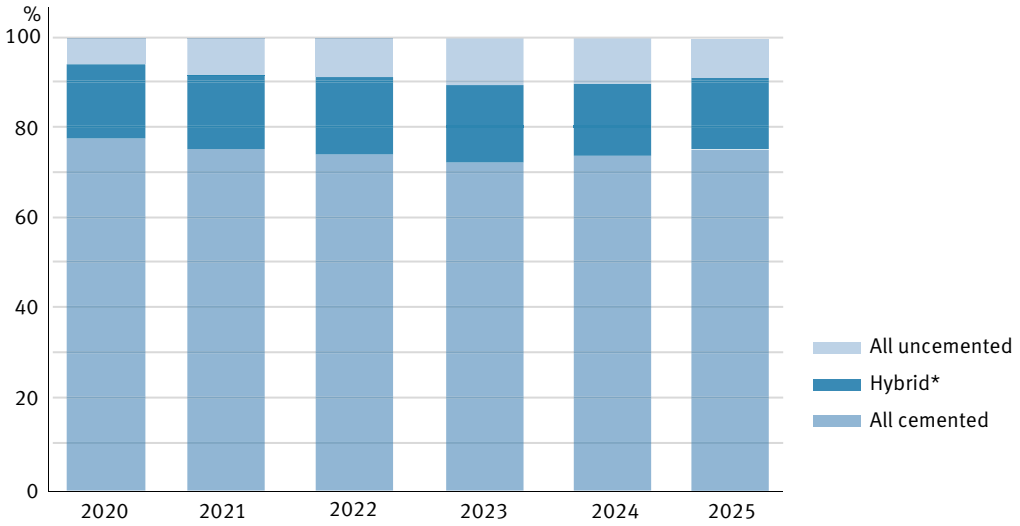
* Including "arthritis after meniscus surgery"

Patella resurfacing

The patella was not resurfaced in 60.6% of primary TKA during the period 2020 to 2025 **(Figure 3.18).** However, the resurfacing rate increased continuously from 32.0% in 2020 to 46.3% in 2025. For details about fixation of patella component see next section.

Fixation, stems and additional components

Fixation of TKA was predominantly fully cemented, with a proportion of 74.7% over the past six years. Use of hybrid fixation of the components remained constant with 16.3%. Interestingly, uncemented fixation represented only 4.0% of the TKA in 2019, but the share almost doubled within 7 years to 9.4% in 2025 **(Figure 5.2).** The share of uncemented TKA differed considerably in Switzerland depending on cantons, hospitals and surgeon preference, as many other topics. **Figure 5.3** demonstrates that canton JU was taking the lead, followed by SO and TI on third place. **Figure 5.4** illustrates the share of hybrid fixation, which was not the same as for entirely uncemented fixation. Concerning hybrid TKA fixation SO was in the lead, followed by AG and GE.



Component fixation [%]	2020	2021	2022	2023	2024	2025	2012–2025
N	**15,467**	**16,849**	**19,320**	**20,757**	**21,752**	**22,802**	**116,947**
All uncemented	5.5	8.0	8.5	10.3	10.0	9.4	8.8
Hybrid*	16.3	16.2	17.0	16.9	15.6	15.8	16.3
All cemented	77.7	75.6	74.4	72.6	74.2	74.7	74.7

Figure 5.2

Primary total knee arthroplasty: Component fixation

All diagnoses. * femur uncemented, tibia cemented

Even more interesting is **Figure 5.5,** which shows the share of uncemented patella, which got a revival with improved PE quality and 3D printing of titanium alloys to solve the problems of the nineties linked to poor PE quality and osteointegration problems. The mean share of uncemented patella between 2020 and 2025 in Switzerland was 6.8%, whereas from 2020 to 2025, uncemented patella increased from 3.6% to 9.2%. Regarding uncemented patella, BE was taking the lead by far, followed by BS and BL. In all the other cantons, surgeons seem to be very reluctant to this newer technology.

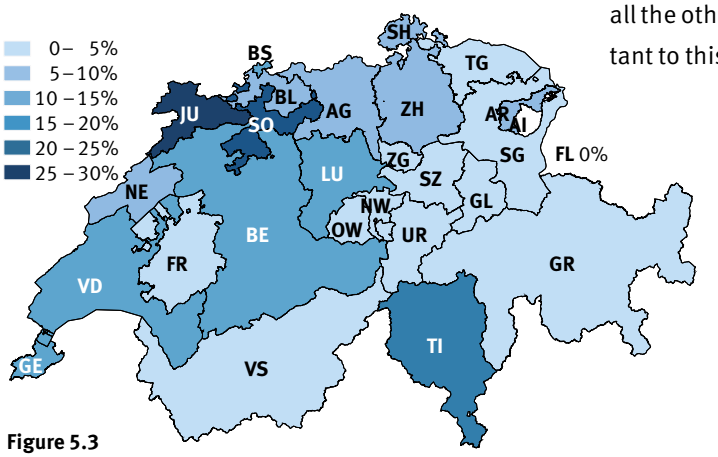


Figure 5.3

Share of uncemented fixation used in total knee arthroplasty, 2020 – 2025

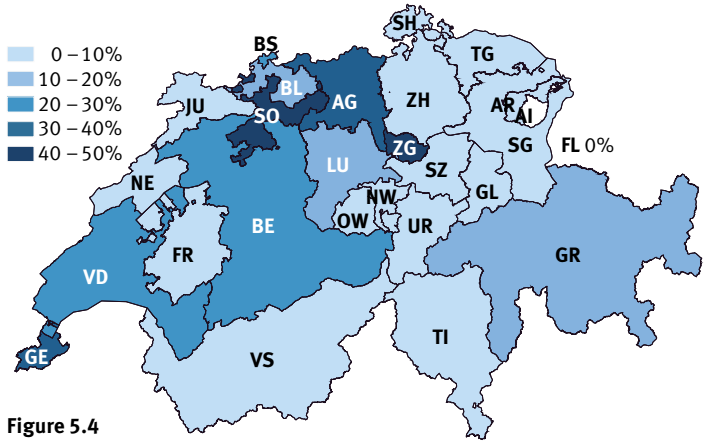


Figure 5.4

Share of hybrid fixation used in total knee arthroplasty, 2020 – 2025

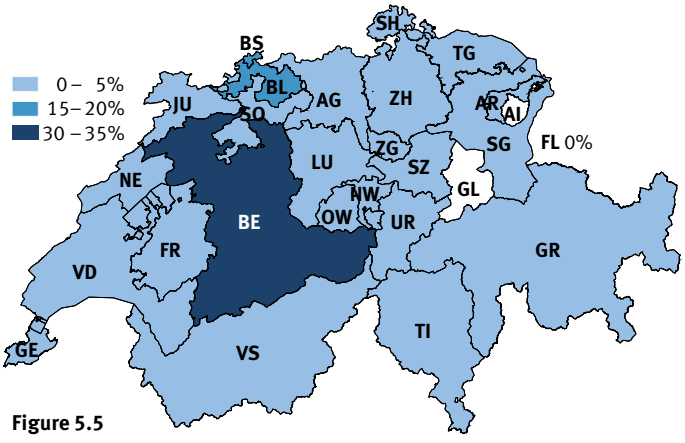


Figure 5.5

Share of uncemented patella components in total knee arthroplasty with primary patellar resurfacing 2020 – 2025

More information about components in primary TKA was introduced with the 2021 version of the CRF, improving registering precision.

Stems (femoral and/or tibial) were used in 9.6% of primary TKA. In three quarters (75.5%) of the cases, this was on the tibial side. Tibial stems were cemented in 87.5%, femoral ones in 76.5% **(Table 5.1).** When using cemented tibial components, tibial stems were added in 10.9%, a share slightly increasing since 2021 **(Figure 5.6).** Regarding the influence of BMI or specific knee systems on the use of stems, please consult the annual report 2025. Sleeves, cones, augments, or additional homologous or autologous bone grafting were rarely necessary in primary TKA **(Table 5.1).**

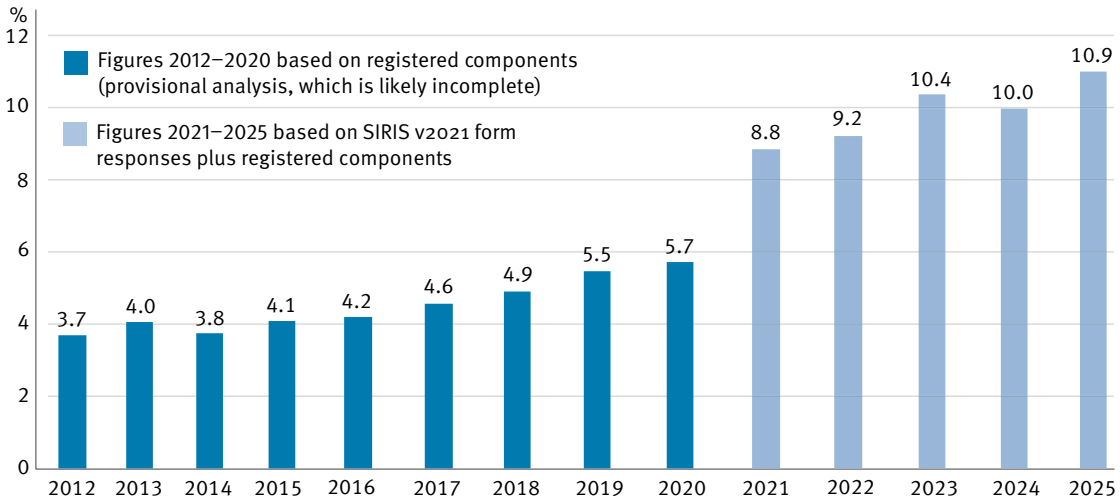


Figure 5.6

Use of stems as a percentage of primary TKAs with cemented tibial components

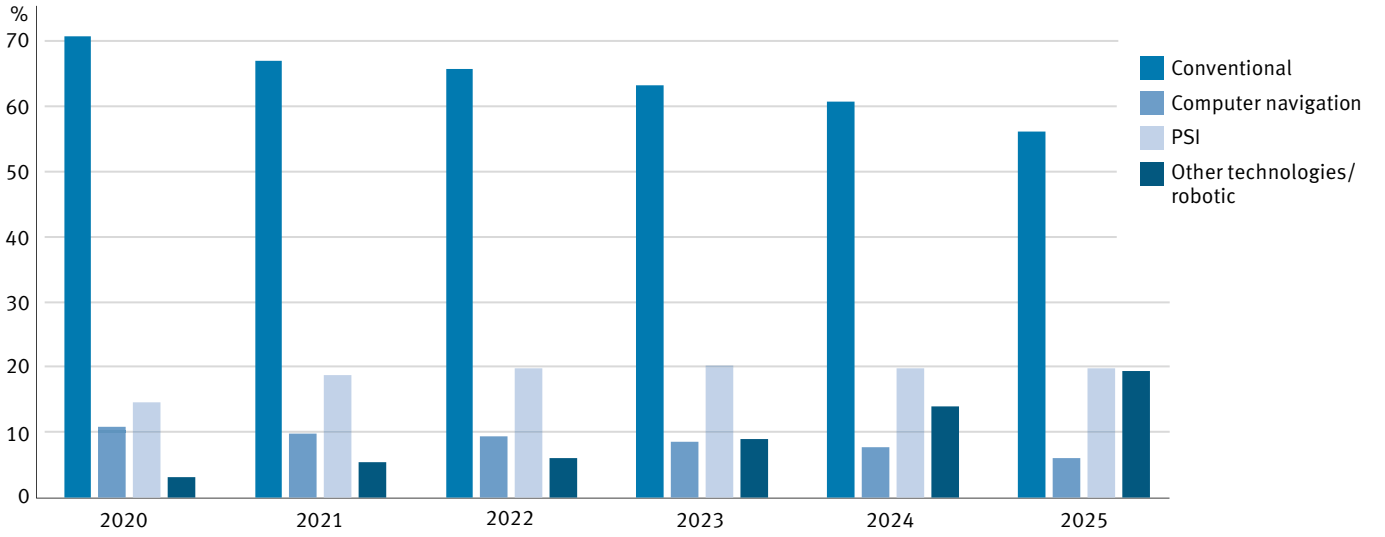
Can be femoral or tibial stems; form responses suggest 3:1 TI stems to FE stems

Additional interventions

Additional interventions were rarely performed during primary TKA (reported in 4.5% of the cases on average between 2020 to 2025). The removal of internal fixation devices (1.2%) and osteotomies of the tibial tubercle (1.3%) were the most common additional surgical steps, while 1.1% were reported as "other" **(Table 5.1).**

Technology

Between 2020 and 2025, 63.8% of the primary TKA in Switzerland were performed conventionally, without additional technological assistance. Surgeons used technical support in 37.6% of TKA over the past 6 years **(Table 5.1).** The share of conventional TKA and computer navigation decreased continuously from 70.5% in 2020 to 55.9% in 2025 and from 10.8% in 2020 to 6.0% in 2025, respectively **(Table 5.1, Figure 5.7)**. On the other hand, the use of patient-specific instrumentation (PSI) increased from 14.6% in 2020 to approximately 20% in the following years, reaching 19.8% in 2025. Robotic-assisted TKA (imageless and image-based), formerly classified as "other", increased from 3.1% in 2020 to 19.4% in 2025 **(Figure 5.7).**



Technology [%]	2020	2021	2022	2023	2024	2025	2020–2025
N	**15,469**	**16,851**	**19,321**	**20,757**	**21,752**	**22,803**	**116,953**
Conventional	70.5	66.8	65.6	63.0	60.5	55.9	63.1
Computer navigation	10.8	9.8	9.2	8.6	7.5	6.0	8.4
PSI	14.6	18.7	19.7	20.2	19.8	19.8	19.0
Other technologies/robotic	3.1	5.5	6.0	8.9	14.0	19.4	10.1

Figure 5.7

Primary total knee arthroplasty: technologies used

All diagnoses. Multiple responses possible (percentages do not sum to 100).

5.2 First revision within two years after primary TKA

Following international guidelines, a revision is defined as the addition or exchange of any component. Therefore, a secondary patella resurfacing is classified as a revision. SIRIS has been recording all revision procedures since 2012, irrespective of whether it was the first or any subsequent revision. Linked revisions form the basis for calculations of survival and revision rates and may be separated into first revisions and re-revisions. The first revision serves to define primary implant survival, but only primary OA is used for this benchmark, following international guidelines. Cases with isolated previous meniscus surgery were also included in the group of primary OA.

Other causes of secondary OA, such as previous ligament surgery, fracture fixation, osteotomy or inflammatory arthritis, etc., were excluded, as associated revision rates may be influenced by and increased due to the underlying diagnosis.

In the current 4-year moving window from 01.01.2020 to 31.12.2023 with a complete 2-year follow-up until 31.12.2025, a total of 72,398 TKA have been registered. Of those, 2,387 were revised within two years, resulting in a 2-year revision rate of 3.3% (CI 3.2–3.5%) **(Table 5.2).** For incidence and demography please consult **chapter 3.3.4.**

		Primary	Revised within 24 months			
			Revised		95% CI	
		N at risk*	N	%**	lower	upper
Overall (moving average)		72,398	2,387	3.3	3.2	3.5
Diagnosis	Primary OA	63,286	2,003	3.2	3.1	3.3
	Secondary OA	9,112	384	4.3	3.9	4.7
Overall Primary OA		63,286	2,003	3.2	3.1	3.3
Sex	Women	38,393	1,151	3.0	2.9	3.2
	Men	24,893	852	3.5	3.3	3.7
Age	<55	2,929	159	5.5	4.7	6.3
group [%]	55–64	14,562	553	3.8	3.5	4.1
	65–74	22,974	730	3.2	3.0	3.4
	75–84	19,905	496	2.5	2.3	2.8
	85+	2,914	65	2.3	1.8	2.9
BMI group	<18.5	282	10	3.6	2.0	6.6
	18.5–24.9	12,441	364	3.0	2.7	3.3
	25–29.9	21,913	657	3.0	2.8	3.3
	30–34.9	14,603	457	3.2	2.9	3.5
	35–39.9	6,186	237	3.9	3.4	4.4
	40+	2,596	89	3.5	2.8	4.2
	BMI unknown	5,265	189	3.6	3.2	4.2
Morbidity	ASA 1	3,846	112	2.9	2.4	3.5
state	ASA 2	38,300	1,202	3.2	3.0	3.3
	ASA 3	18,664	610	3.3	3.1	3.6
	ASA 4/5	272	13	5.0	2.9	8.4
	ASA unknown	2,204	66	3.0	2.4	3.9

Table 5.2
First revision of primary total knee arthroplasty within 24 months overall and according to baseline characteristics
4-year moving average covering implants between 01.01.2020 and 31.12.2023, with two years follow-up (31.12.2025).
* Number of patients with at least two years follow-up (i.e. primary prosthesis in moving average).
** Rates adjusted for effects of mortality and emigration.

5.2.1 Reasons for first revision

The most frequent reason for first revision were patella problems, registered in 36.0%. Additionally, an instability of the patella was reported in 3.9%. Infection (22.8%) and femorotibial instability (18.3%) were the second and third most frequent reasons. Loosening of the tibial component was indicated in 7.2% of the cases, joint stiffness in 8.6% and pain of unclear origin in 2.4%. The share of the latter diagnosis was rapidly decreasing over the past few years. Wear of the insert was reported rarely (0.6%) but nevertheless represents a surprising reason for early revision **(Table 5.3).** Periprosthetic fractures of the femur, tibia, and/or patella were rarely responsible for early revision. However, most cases treated with internal fixation only were probably not registered, respectively do not represent revisions following the usual definition but qualify as re-operations. Still, 9.6% of the reasons for revision were classified as "other". This diverse group mostly includes the same reasons as listed above, but with added details and includes wound healing problems and further reasons, such as insert dislocation.

Besides periprosthetic infections and fractures, most of the other reasons appeared to be related to surgical errors in technique and/or indication.

Reason for revision	N	%
Patella problems	860	36.0
Infection	545	22.8
Femorotibial instability	438	18.3
Loosening tibia	173	7.2
Pain (of unclear origin)*	57	2.4
Joint stiffness/arthrofibrosis	205	8.6
Component malposition femur	77	3.2
Component malposition tibia	99	4.1
Loosening femur	92	3.9
Patellar instability	98	4.1
Wear of insert	15	0.6
Loosening patella	16	0.7
Periprosthetic fracture femur	31	1.3
Sizing femoral component	42	1.8
Periprosthetic fracture tibia	19	0.8
Sizing tibial component	18	0.8
Periprosthetic fracture patella	8	0.3
Other	230	9.6
N revisions	**2,387**	

Table 5.3

Reason for revision* of primary total knee arthroplasty

All diagnoses. 4-year moving average covering implants between 01.01.2020 and 31.12.2023, with two years follow-up (31.12.2025). Early first revisions are those occurring within 2 years of the primary arthroplasty.
Multiple responses possible (percentages do not sum to 100).
* Pain was frequently reported alongside other reasons. The proportion of "isolated pain" was 3.2%. The wording was adapted in v2021 and the share dropped accordingly in 2021

5.2.2 First revision by fixation

Uncemented TKA were revised more often (3.7%, CI 3.3–4.2%) than fully cemented TKA (3.3%, CI 3.1–3.4%) within the first two years after the index surgery, but the difference was not significant anymore for the first time in this registry **(Table 5.4).** The wider confidence interval of uncemented TKA reflects the smaller number of cases (the share of uncemented TKA was 9.4% only in 2025) **(Figure 5.2).** Hybrid fixation performed as well as fully cemented TKA, with a 2-year revision rate of 3.3% (CI 3.0–3.7%) **(Table 5.4).**

Younger age (‹60 years) was correlated with an elevated early revision rate, irrespective of the fixation method **(see chapter 3.3.2).**

		Primary TKA	Revised within 24 months			
			Revised		95% CI	
		N at risk[1]	N	%[2]	lower	upper
	Overall	72,398	2,387	3.3	3.2	3.5
Component fixation	Cemented	54,206	1,763	3.3	3.1	3.4
	Uncemented	5,978	221	3.7	3.3	4.2
	Hybrid[3]	12,038	397	3.3	3.0	3.7
	Reverse hybrid[4]	171	6	3.5	1.6	7.7
Patellar replacement	With patellar replacement	26,058	686	2.7	2.5	2.9
	Without patellar replacement	46,307	1,700	3.7	3.5	3.9
	Status after patellectomy	28	1	3.6	0.5	22.8

Table 5.4

First revision of primary total knee arthroplasty within 24 months overall and according to component fixation

All diagnoses. 4-year moving average covering implants between 01.01.2020 and 31.12.2023, with two years follow-up (31.12.2025).

[1] Number of patients with at least two years follow-up (i.e. primary prosthesis in moving average).

[2] Rates adjusted for effects of mortality and emigration.

[3] femur uncemented, tibia cemented

[4] femur cemented, tibia uncemented

5.2.3 First revision by type of TKA

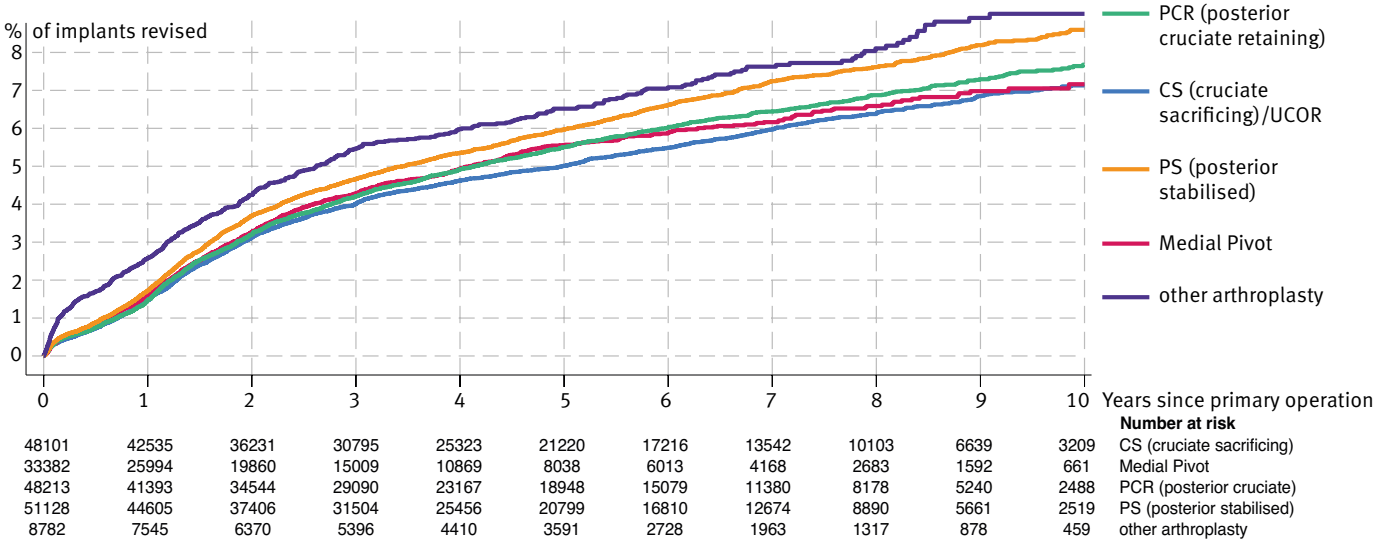
At two years of follow-up, differences in revision rates among types of TKA were small. Only PS showed a significantly higher revision rate (3.7%, CI 3.5 – 3.9%) than PCR/CR, UCOR or MP **(Figure 5.8).** This would not automatically speak for an inferior survival of PS knee but may be consequence of a certain selection bias as more intrinsic stability as PS may be used in more complex cases with bigger deformity or more ligamentous deterioration **(compare also 5.3.4).**
Different systems grouped as "other arthroplasty" had a significantly higher early revision rate than PCR/CR or UCOR and MP systems. The difference compared to PS TKA remained statistically not significant due to small numbers and therefore wider confidence intervals (4.2%, CI 3.8 – 4.7%).

5.2.4 First revision by patella resurfacing

Early revision rates at two years after primary TKA differed significantly from 2.7% (CI 2.6 – 2.9%) to 3.6% (CI 3.5 – 3.7%) for TKA with patella resurfacing vs. without, respectively **(Figure 5.9).**

5.2.5 First revision by technology

Figure 5.10 compares estimated failure rates for conventional TKA with the use of computer navigation, PSI and robotic assistance. At 2 years revision rate for PSI and robotic assistance were significantly lower than conventional or computer assisted techniques.

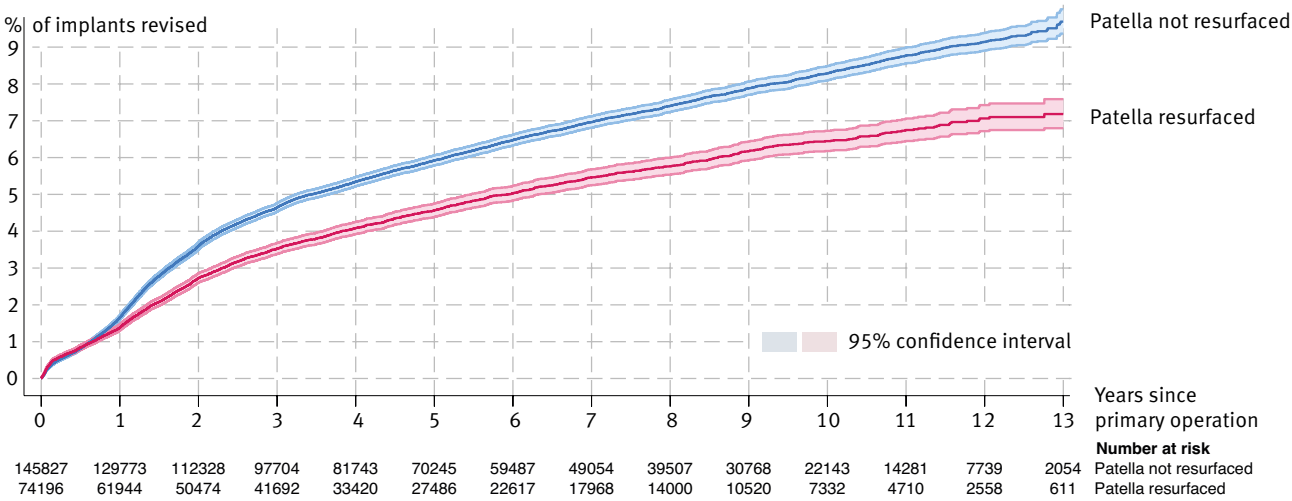


Implant type	1 year	2 years	3 years	5 years	6 years	8 years	10 years
PCR (posterior cruciate retaining)	**1.5** (1.4-1.6)	**3.2** (3.0-3.4)	**4.2** (4.0-4.4)	**5.5** (5.3-5.8)	**6.0** (5.8-6.3)	**6.9** (6.6-7.2)	**7.7** (7.3-8.1)
CS (cruciate sacrificing) / UCOR	**1.5** (1.4-1.6)	**3.1** (3.0-3.3)	**4.0** (3.8-4.2)	**5.0** (4.8-5.2)	**5.5** (5.3-5.7)	**6.4** (6.1-6.7)	**7.1** (6.8-7.5)
PS (posterior stabilised)	**1.7** (1.6-1.8)	**3.7** (3.5-3.9)	**4.7** (4.5-4.9)	**6.0** (5.7-6.2)	**6.6** (6.4-6.9)	**7.6** (7.3-7.9)	**8.6** (8.2-9.0)
Medial Pivot*	**1.6** (1.4-1.7)	**3.3** (3.1-3.5)	**4.3** (4.0-4.5)	**5.6** (5.2-5.9)	**5.9** (5.5-6.2)	**6.6** (6.2-7.0)	**7.2** (6.6-7.7)
other arthroplasty	**2.6** (2.3-2.9)	**4.2** (3.8-4.7)	**5.5** (5.0-6.0)	**6.5** (6.0-7.1)	**7.1** (6.5-7.7)	**8.1** (7.4-8.9)	**9.0** (8.1-10.0)

Figure 5.8

Estimated failure rates of primary total knee arthroplasty for different implant types

Time since operation, 2015–2025, all diagnoses. Confidence intervals not shown in graphic for reasons of clarity.
*Medial pivot was not available as a response category before SIRIS v2021. Free text responses were recoded accordingly. All GMK Sphere total knee systems were counted as medial pivot, regardless of the type chosen locally at data entry.

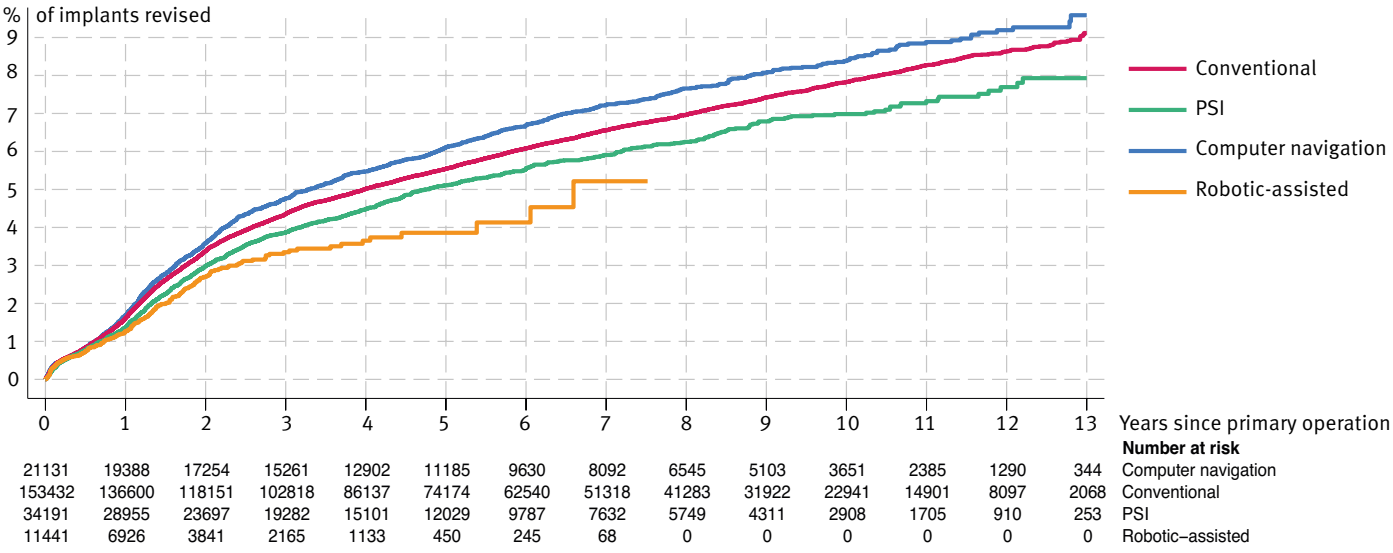


Status of patella	1 year	2 years	3 years	5 years	6 years	8 years	9 years	10 years	13 years
Patella resurfaced	**1.4** (1.3-1.5)	**2.7** (2.6-2.9)	**3.5** (3.4-3.7)	**4.6** (4.4-4.7)	**5.0** (4.8-5.2)	**5.8** (5.5-6.0)	**6.2** (5.9-6.4)	**6.4** (6.2-6.7)	**7.2** (6.8-7.6)
Patella not resurfaced	**1.7** (1.6-1.7)	**3.6** (3.5-3.7)	**4.6** (4.5-4.8)	**5.9** (5.8-6.1)	**6.5** (6.3-6.6)	**7.4** (7.2-7.6)	**7.9** (7.7-8.1)	**8.3** (8.1-8.5)	**9.7** (9.4-10.0)

Figure 5.9

Estimated failure rates of primary total knee arthroplasty: status of patella after primary operation

Time since operation, 2012–2025, all diagnoses.



Technology	1 year	2 years	3 years	5 years	6 years	8 years	9 years	10 years	12 years
Conventional	**1.6** (1.6-1.7)	**3.4** (3.3-3.5)	**4.4** (4.2-4.5)	**5.5** (5.4-5.7)	**6.1** (5.9-6.2)	**7.0** (6.8-7.1)	**7.4** (7.3-7.6)	**7.8** (7.6-8.0)	**9.1** (8.8-9.4)
PSI	**1.4** (1.2-1.5)	**3.0** (2.8-3.2)	**3.9** (3.6-4.1)	**5.1** (4.8-5.4)	**5.6** (5.3-5.9)	**6.3** (5.9-6.6)	**6.8** (6.4-7.2)	**7.0** (6.6-7.4)	**7.9** (7.3-8.6)
Computer nav.	**1.7** (1.5-1.9)	**3.6** (3.3-3.9)	**4.8** (4.5-5.1)	**6.1** (5.8-6.5)	**6.7** (6.3-7.1)	**7.7** (7.2-8.1)	**8.1** (7.6-8.5)	**8.4** (7.9-8.9)	**9.6** (8.9-10.4)
Robotic-assisted	**1.3** (1.1-1.5)	**2.7** (2.3-3.1)	**3.3** (2.9-3.9)	**3.9** (3.3-4.5)	**4.1** (3.4-5.0)				

Figure 5.10

Estimated failure rates of primary total knee arthroplasty: technology assistance

Time since operation, 2012–2025, all diagnoses.

5.2.6 Type of surgery at first early revision

Complete revision of both femoral and tibial components was performed in 21.1% of the cases when revision had to be performed within two years of follow-up. In 27.7% of the cases, only the insert was exchanged. Isolated tibial revision was registered in 5.5%, and isolated femoral revision in 3.7%. Component removal with spacer implantation was recorded in 3.3%, without spacer in 0.2%, reimplantation of prosthesis in 1.1%, all three representing surgical procedures predominantly for periprosthetic infections **(Table 5.5).** Patella surgery is discussed separately.

Intervention type[1]	N	%
Complete revision	503	21.1
Exchange of PE insert	661	27.7
Subsequent patella prosthesis	558	23.4
Tibial revision	132	5.5
Reimplantation of prosthesis	27	1.1
Subsequent patella prosthesis with exchange of PE insert	167	7.0
Patella revision	131	5.5
Comp. removal with spacer implantation	79	3.3
Femoral revision	89	3.7
Prosthesis preserving revision	1	0.0
Osteosynthesis	3	0.1
Arthrodesis	36	1.5
Comp. removal without spacer implantation	11	0.2
Reconstruction after injury of extensor mechanism	4	0.1
Plastic reconstruction	4	0.1
Other	104	2.0

Additional intervention	N	%
None	1,740	78.8
Osteosynthesis FE	18	0.8
Osteosynthesis TI	7	0.3
Osteosynthesis PAT	0	0.0
Removal of metalware	25	1.1
Operation extensors	104	4.7
Reconstruction plasty	31	1.4
Tibial tubercle osteotomy	166	7.5
Other additional intervention(s)	173	7.8
N revisions	**2,209**	

Type of arthroplasty	N	%
SC / CCK (semi-constrained / constrained)	236	30.7
Hinge type	179	23.3
PS (posterior stabilized)	158	20.6
CS (cruciate sacrificing) / UCOR	67	8.7
PCR (posterior cruciate retaining)	53	6.9
Medial-Pivot[2]	52	6.8
BCR (bicruciate retaining)	6	0.8
Other	17	2.2

Technology	N	%
Conventional	2,194	96.5
Computer assisted / navigation	24	1.1
Patient specific instrumentation	44	1.9
Robotic-assisted (v2021)	7	0.3
Other	6	0.3

Additional components[3]	N	%
Stem FE (cemented)*	295	38.6
Stem FE (uncemented)**	136	17.8
Stem TI (cemented)***	345	45.1
Stem TI (uncemented)***	148	19.3
Sleeve FE	33	4.3
Sleeve TI	94	12.3
Augments FE	241	31.5
Augments TI	84	11.0
Augments PAT	0	0.0
Bone homologous	11	1.4
Bone autologous	20	2.6
Cone FE	12	1.6
Cone TI	35	4.6
Total revisions (multiple responses)	**765**	

Table 5.5

Early first revision of primary total knee arthroplasty: Surgery characteristics

4-year moving average covering implants between 01.01.2020 and 31.12.2023, with two years follow-up (31.12.2025)

* 61% with cement restrictor
** 27% with coating
*** 52% with cement restrictor
**** 30% with coating

[1] includes a small proportion of reoperations that are not counted as component revisions in the evaluative parts of this report

[2] Entered as "other" intervention and then recoded before 2021. As of form version 2021, SIRIS lists Medial Pivot as a separate main category

[3] After complete, FE, TI revisions or component reimplantations. Detailed data available since 2021, but main categories available since 2015.

Type of implants

With 30.7%, SC/CCK systems formed the largest group of implants used at first early TKA revision, followed by hinge-type prosthesis in 23.3% and PS in 20.6%. In 2025, hinge-type prostheses were used more often than PS for the first time in this registry. The share of PCR/CR TKA was 6.9% of the revisions, 8.7% were classified as CS or UCOR implants, whereas MP was used in 6.8% **(Table 5.5).**

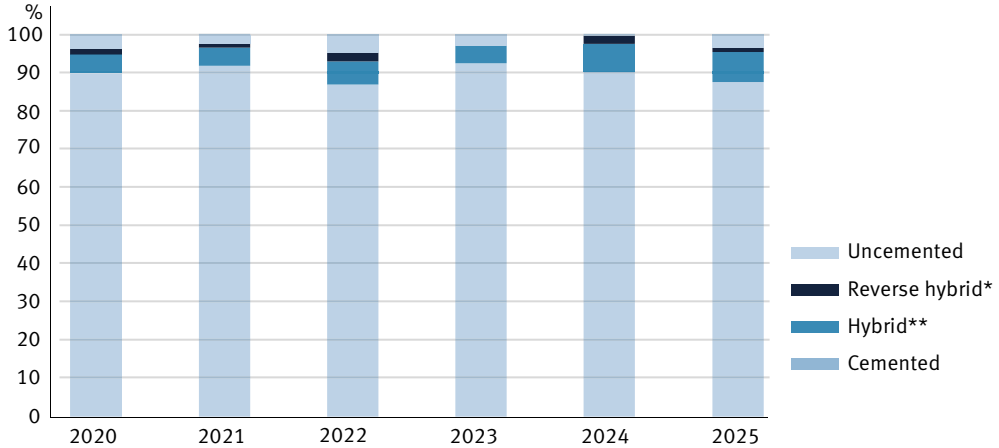
Patella

An exact count of how many patella components were added or revised at complete or partial revision is limited by incomplete registration of the primary components. Secondary patella resurfacing was performed in up to 60% of revision TKA.

Isolated patella resurfacing was performed in 23.4% of the first early revisions. An additional 7.0% had secondary patella resurfacing combined with insert exchange **(Table 5.5).** The share of primary patella resurfacing not revised at revision TKA remains unknown, possibly explaining the rather low rate of patella resurfacing at first revision, although patella problems were the most frequent reason for another surgery. A revision of a patella component was registered in 5.5%, making any patella revision the most frequent component revision. However, reasons for revision cannot be simply added up, as several options can be combined at registration.

Fixation

Fixation of the revision implants was fully cemented in the vast majority, with a mean value of 89.7% over the last 6 years, fluctuating between 86.8% and 92.3% since 2020 **(Figure 5.11).**



Component fixation [%]	2020	2021	2022	2023	2024	2025	2020–2025
N	**184**	**192**	**182**	**195**	**190**	**191**	**1,134**
Uncemented	3.8	2.6	4.9	3.1	0.5	3.7	3.1
Reverse hybrid*	1.6	1.0	2.2	0.0	2.1	1.0	1.3
Hybrid**	4.9	4.7	6.0	4.6	7.4	7.9	5.9
Cemented	89.7	91.7	86.8	92.3	90.0	87.4	89.7

* femur cemented, tibia uncemented

** femur uncemented, tibia cemented

Figure 5.11

Early first revision of primary total knee arthroplasty: Component fixation

Component fixation only applicable when new components were implanted. Early first revisions are those occurring within 2 years of the primary arthroplasty.

Stems and additional components

Since 2015, tibial and femoral stems were used increasingly **(Figure 5.12).** At first early TKA revision, 64.4% received a tibial and 56.4% a femoral stem, and 70.0% of the tibial and 68.4% femoral stems were cemented. Augments were also used more frequently on the femoral side (31.5%), but this stayed on previous levels on the tibial side (11.0%).

Reinforcement of the metaphysis by tibial sleeves was registered in 12.3%, femoral ones in 4.3%, this share being constant since 2015. Cones were rarely used, in 4.6% at the tibial and in 1.6% at the femoral level. Whereas cones are available in most of the brands providing revisions systems, sleeves are mainly associated with one brand. Therefore, this reflects mainly the selection of revision TKA system used.

Bone grafting was used in 4.0% (31 cases) only of the first revisions, and then autologous bone in 64.5% and can be considered as replaced mostly by stems, augments, cones and sleeves **(Table 5.5).**

Additional interventions

In 78.8% of first early revisions, no additional intervention was necessary. Tibial tubercle osteotomy was performed in 7.5% of the cases, compared to 1.3% in primary TKA. In 4.7% of the cases, an additional intervention at the extensor apparatus was performed, while a formal reconstruction of the extensor apparatus was registered in 1.4% only. Removal of orthopaedic or fracture fixation devices was done in combination with revision in only 1.1%. In 7.8%, "other" additional interventions were recorded **(Table 5.5).**

Technology

Technology was mostly conventional (96.5%), technical assistance was registered rarely (3.6% for all technological support together), slightly increasing over time. Computer navigation (1.1%) or PSI (1.9%) did play minor rolls. Robotic assistance (0.3%) would technically be possible in revision TKA but may be hindered by medicolegal constraints in some of the systems available **(Table 5.5).**

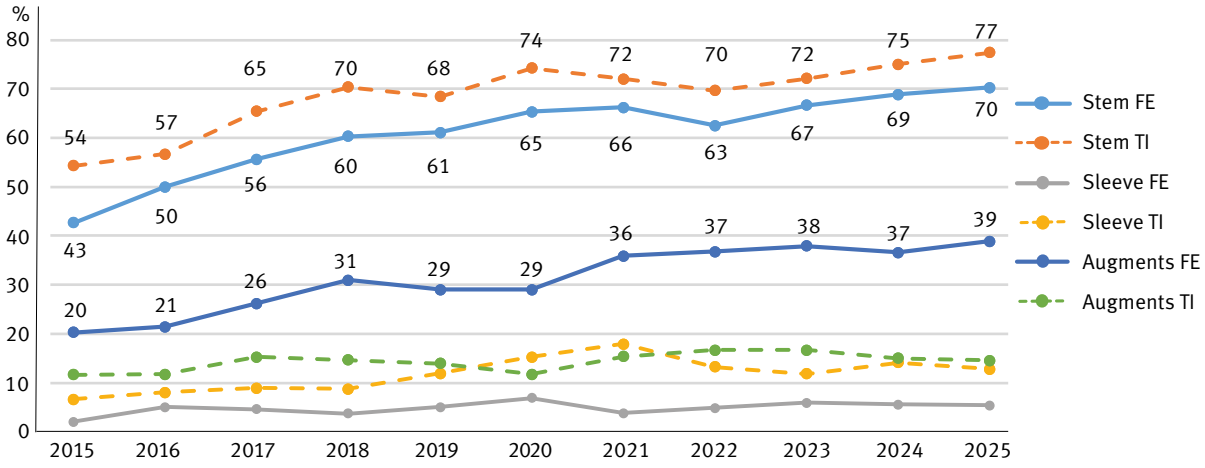


Figure 5.12

Selected additional components used in early first revisions (%)

5.3 Mid- and long-term survival after primary total knee arthroplasty

A key feature of an arthroplasty registry is to analyse failure and revision rates over time. While short-term results **(see 5.2)** largely reflect a surgeon's or an institution's performance by indication for and conduction of the intervention, long-term results depend more on other factors like the design and quality of the implants.

5.3.1 Revision of primary TKA implanted before 2012

Revisions that cannot be linked to an index arthroplasty registered in SIRIS are named "unlinked" revisions, whereas index arthroplasties were registered in SIRIS for "linked" revisions.

The proportion of unlinked TKA revisions over the whole observation period therefore was 42.9%. The share of unlinked revisions steadily decreased from 96% in 2013 to 30.0% in 2025 (1,022 cases). A total of 6,050 unlinked TKA revisions were performed between 2020 and 2025 **(Table 3.12).** The rate of unlinked revision TKA decreases more rapidly than in THA, most probably attributable to the fact that TKA are revised earlier and more frequently than THA.

Because of rapidly decreasing share of unlinked revisions, these older cases are of limited and continuously decreasing value and were not analysed further since 2025.

5.3.2 Reasons for revision TKA

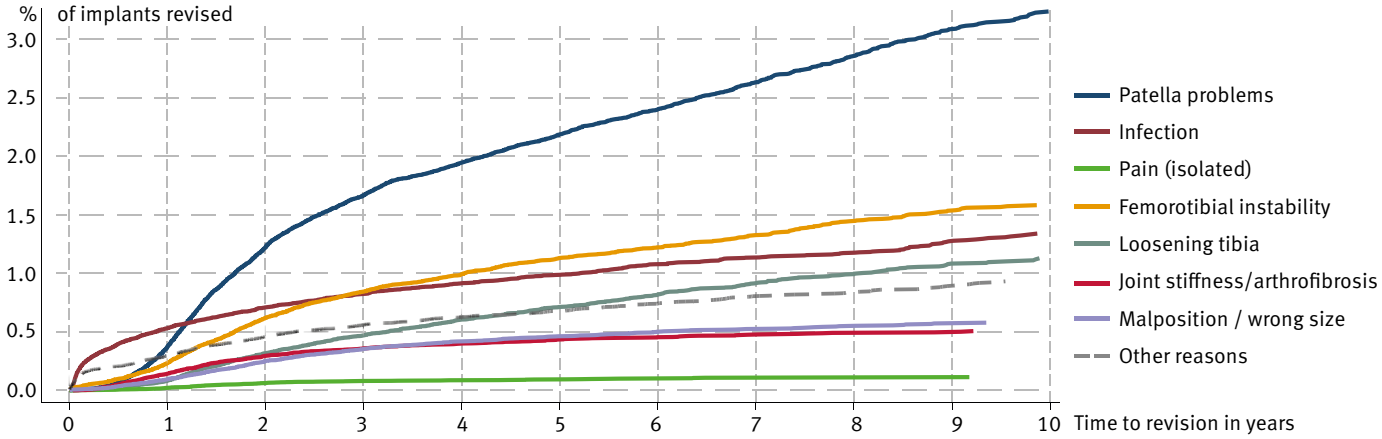
Cumulative incidence rates of revision from 2015 to 2025 show patella problems to be the most frequent reason for revision within one year after TKA, and corresponding revision rates increase thereafter far more rapidly than for all other reasons **(Figure 5.13).**

For Kernel density estimation – an evaluation of the frequency of an event as a revision TKA at a given time – please refer to **annual report 2025.**

5.3.3 Revision by fixation

Over the long-term, the difference among the revision rates of the various fixation types was statistically significant only during the first three years after TKA. It seems that the higher revision rate of uncemented TKA may reflect failed osteointegration or failures due to malalignment and/or insufficient bone quality. From the 4th year after the index surgery and onwards, the curve is moving on a higher level than for the cemented and the hybrid fixation TKA but evolving in parallel. All curves seem to converge 8 years after surgery **(Figure 5.14).**

It is important to consider that all TKA brands were included in this KM estimation of cumulative revision risk, mixing in various effects.

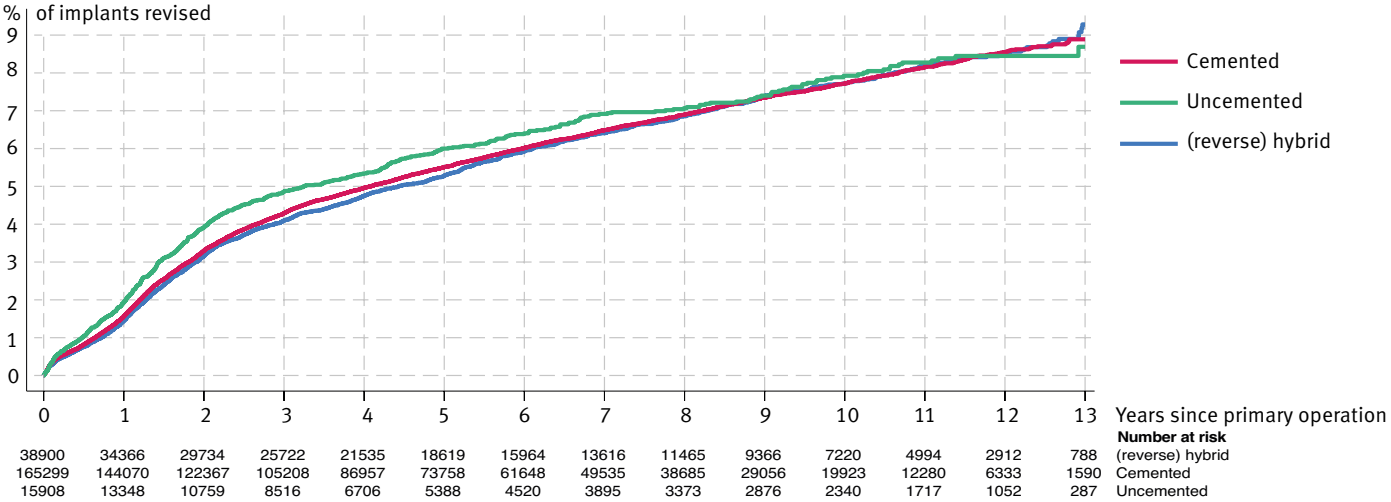


Revision diagnosis	1 year	2 years	3 years	5 years	6 years	7 years	8 years	10 years
Patella problems	**0.4** (0.3-0.4)	**1.2** (1.2-1.3)	**1.7** (1.6-1.7)	**2.2** (2.1-2.3)	**2.4** (2.3-2.5)	**2.6** (2.5-2.7)	**2.9** (2.8-3.0)	**3.2** (3.1-3.4)
Infection	**0.5** (0.5-0.6)	**0.7** (0.7-0.7)	**0.8** (0.8-0.9)	**1.0** (0.9-1.0)	**1.1** (1.0-1.1)	**1.1** (1.1-1.2)	**1.2** (1.1-1.2)	**1.3** (1.3-1.4)
Pain (isolated)	**0.0** (0.0-0.0)	**0.1** (0.1-0.1)	**0.1** (0.1-0.1)	**0.1** (0.1-0.1)	**0.1** (0.1-0.1)	**0.1** (0.1-0.1)	**0.1** (0.1-0.1)	**0.1** (0.1-0.1)
Femorotibial instability	**0.2** (0.2-0.3)	**0.6** (0.6-0.7)	**0.8** (0.8-0.9)	**1.1** (1.1-1.2)	**1.2** (1.2-1.3)	**1.3** (1.3-1.4)	**1.4** (1.4-1.5)	**1.6** (1.5-1.7)
Loosening TI	**0.1** (0.1-0.1)	**0.3** (0.3-0.3)	**0.5** (0.4-0.5)	**0.7** (0.7-0.8)	**0.8** (0.8-0.9)	**0.9** (0.9-1.0)	**1.0** (0.9-1.1)	**1.1** (1.0-1.2)
Joint stiffness/arthrofibrosis	**0.1** (0.1-0.2)	**0.3** (0.3-0.3)	**0.4** (0.3-0.4)	**0.4** (0.4-0.5)	**0.5** (0.4-0.5)	**0.5** (0.4-0.5)	**0.5** (0.5-0.5)	**0.5** (0.5-0.6)
Malposition/wrong size	**0.1** (0.1-0.1)	**0.2** (0.2-0.3)	**0.4** (0.3-0.4)	**0.5** (0.4-0.5)	**0.5** (0.5-0.5)	**0.5** (0.5-0.6)	**0.5** (0.5-0.6)	**0.6** (0.5-0.6)
Other reasons	**0.3** (0.3-0.3)	**0.5** (0.4-0.5)	**0.6** (0.5-0.6)	**0.7** (0.6-0.7)	**0.7** (0.7-0.8)	**0.8** (0.8-0.9)	**0.8** (0.8-0.9)	**0.9** (0.9-1.0)

Figure 5.13

Cumulative incidence rates for different revision diagnosis of primary total knee arthroplasty

Time since operation, 2015–2025, all services, % of implants revised. Detailed reasons for revisions available since 2015



Fixation method	1 year	2 years	3 years	5 years	6 years	8 years	9 years	10 years	13 years
All cemented	**1.6** (1.5-1.6)	**3.3** (3.2-3.4)	**4.3** (4.2-4.4)	**5.5** (5.4-5.6)	**6.0** (5.9-6.2)	**6.9** (6.7-7.1)	**7.3** (7.2-7.5)	**7.7** (7.5-7.9)	**8.9** (8.6-9.2)
All uncemented	**1.9** (1.7-2.2)	**3.9** (3.6-4.3)	**4.9** (4.5-5.2)	**6.0** (5.6-6.5)	**6.4** (5.9-6.9)	**7.1** (6.6-7.6)	**7.4** (6.9-8.0)	**7.9** (7.3-8.6)	**8.7** (7.9-9.6)
(reverse) hybrid	**1.5** (1.3-1.6)	**3.2** (3.0-3.3)	**4.1** (3.9-4.3)	**5.3** (5.0-5.5)	**5.9** (5.7-6.2)	**6.9** (6.5-7.2)	**7.4** (7.1-7.7)	**7.7** (7.4-8.1)	**9.3** (8.7-9.9)

Figure 5.14

Estimated failure rates of primary total knee arthroplasty for different fixation methods

Time since operation, 2012–2025, all diagnoses

5.3.4 Revision by type of knee arthroplasty, use of stems and the BMI

Up to mid-term, CS/UCOR seemed to perform best. This could be partially explained by a certain selection bias, as PS knees are usually selected for more complex cases with more pronounced deformities and ligament insufficiencies **(Figure 5.8).**

Revision rates did not significantly differ with or without the use of stems, irrespectively of the knee system applied. A BMI ≥ 30 kg/m² was associated again with higher revision rates if stems were used **(see annual report 2025).**

5.3.5 Revision by patella resurfacing

There was clearly a higher probability of early revision when the patella was not resurfaced initially, becoming significant from the first year onwards and remaining significant at up to thirteen years of follow-up. Between 3 and 12 years after TKA, the revision rates developed in a more linear manner for TKA without and with patella resurfacing, still worsening progressively if the patella had not been resurfaced **(Figure 5.9).**

5.3.6 Revision by technology

In the longer term conventional TKA and computer navigation had similar failure rates, although navigation always performed slightly worse, but the difference was not statistically significant **(Figure 5.10).** PSI had significantly lower failure rates than conventional or navigation, with exception after 1, 5 and 6 years. As PSI was used mostly with one brand and one knee system (GMK Sphere of Medacta International) low revision rates could be related to that specific knee system and not the use of PSI as technology speaking for a selection bias. Robotic assistance even toped PSI significantly at one, two, five and six years. Low numbers may explain the stepwise increase of failures from the 6th year onwards approaching the PSI curve at seven years.

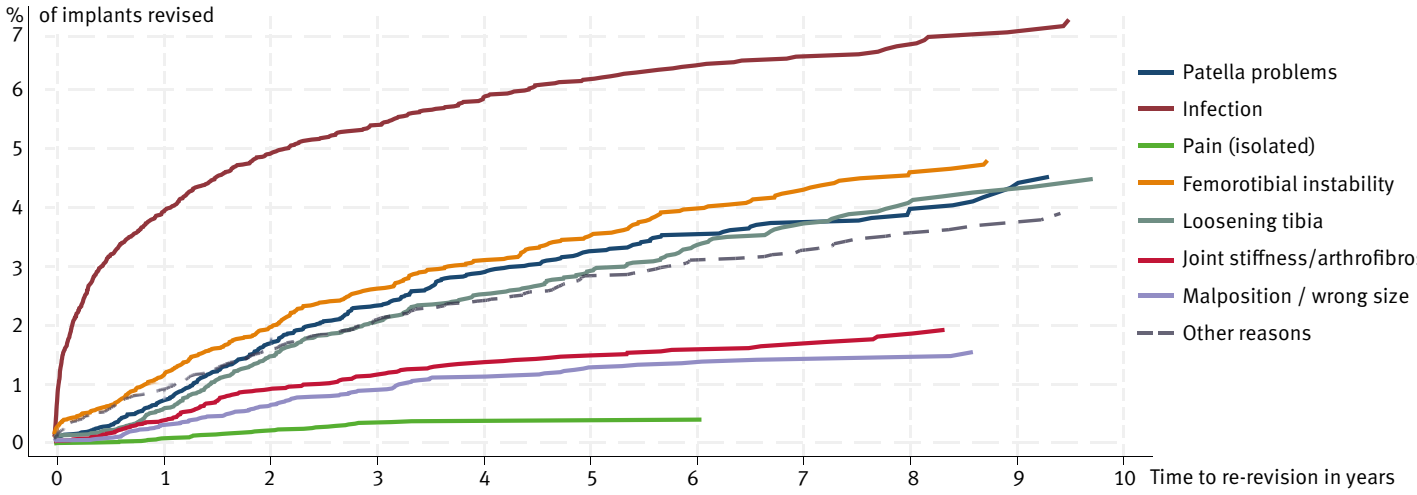
In addition, it is important to note that the robotic cases had a significantly shorter follow-up of maximally 7 years, compared to 13 years with all the other technologies. Therefore, differences in failure rates cannot automatically be contributed to robotics but may have profited from other effects leading to deceasing revision rates over time like a higher rate of primary patella resurfacing.

5.4 Re-revision of total knee arthroplasty

Re-revisions after TKA revision were considered when occurring after partial or complete revisions, re-implantations or isolated exchange of the insert. We call these first revisions "index revisions" for this analysis. Please note that this does not include revisions after conversions of PKA to TKA, which are presented in a separate analysis **(see 5.4.4).**

5.4.1 Reasons for TKA re-revision

As multiple reasons for re-revision may be registered, individual rates do not add up to 100%. This may also lead to under- or overestimation of some topics. Cumulative re-revision rates after TKA revision from 2015 onwards are depicted in **Figure 5.15.** Infection took the lead early on as reason for re-revision, followed by the equally prevalent but far less common problems of femorotibial instability, patella problems, loosening of the tibial component and "other reasons". Interestingly, patella problems still played an important role in TKA re-revision, even while one would assume the patella was resurfaced either at primary TKA or at first revision. The share of unresurfaced patellae at time of re-revision is unknown, as is the rate of revision for malposition or wear/loosening



Diagnosis for re-revision	1 year	2 years	3 years	5 years	6 years	8 years	10 years
Patella problems	**0.7** (0.6-0.9)	**1.7** (1.5-2.0)	**2.3** (2.1-2.7)	**3.3** (2.9-3.7)	**3.6** (3.2-4.0)	**3.9** (3.4-4.3)	**4.6** (4.0-5.2)
Infection	**3.9** (3.6-4.3)	**4.9** (4.6-5.3)	**5.4** (5.0-5.8)	**6.2** (5.8-6.7)	**6.4** (6.0-6.9)	**6.8** (6.3-7.3)	**7.2** (6.6-7.9)
Pain (isolated)	**0.1** (0.1-0.2)	**0.2** (0.2-0.3)	**0.4** (0.3-0.5)	**0.4** (0.3-0.5)	**0.4** (0.3-0.5)	**0.4** (0.3-0.6)	**0.4** (0.3-0.6)
Femorotibial instability	**1.1** (1.0-1.3)	**2.0** (1.7-2.2)	**2.6** (2.3-3.0)	**3.5** (3.2-3.9)	**4.0** (3.6-4.5)	**4.5** (4.1-5.1)	**4.8** (4.3-5.4)
Loosening TI	**0.6** (0.5-0.7)	**1.5** (1.3-1.7)	**2.1** (1.8-2.4)	**2.9** (2.6-3.3)	**3.4** (3.0-3.8)	**4.1** (3.6-4.6)	**4.5** (3.9-5.2)
Joint stiffness / arthrofibrosis	**0.4** (0.3-0.5)	**0.9** (0.8-1.1)	**1.2** (1.0-1.4)	**1.5** (1.3-1.8)	**1.6** (1.4-1.9)	**1.8** (1.5-2.2)	**2.0** (1.6-2.3)
Malposition / wrong size	**0.3** (0.2-0.4)	**0.6** (0.5-0.8)	**0.9** (0.8-1.1)	**1.3** (1.1-1.6)	**1.4** (1.2-1.7)	**1.4** (1.2-1.7)	**1.6** (1.3-1.9)
Other reasons	**0.9** (0.8-1.1)	**1.6** (1.4-1.8)	**2.1** (1.8-2.4)	**2.9** (2.5-3.2)	**3.1** (2.8-3.5)	**3.6** (3.2-4.1)	**3.9** (3.4-4.5)

Figure 5.15

Cumulative incidence rates for different re-revision diagnosis of primary total knee arthroplasty

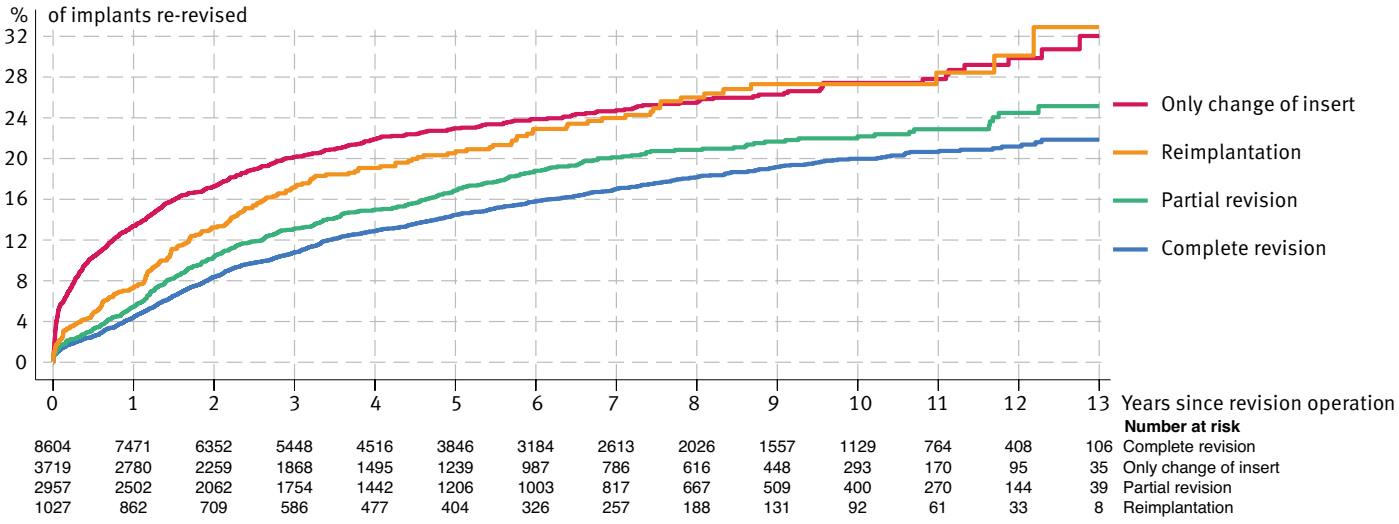
Time since revision, 2015–2025, % of implants re-revised. Detailed reasons for revisions available since 2015
Comprises of all complete revisions, partial revisions, reimplantations and PE replacements.

of patella buttons or patella instability up to subluxation or dislocation. Joint stiffness seemed to play a minor role, as did malposition or wrong sizing of the components. Presumably the frustrating results after revision for a stiff knee after TKA are better known meanwhile, preventing further surgery for this indication. Isolated pain of unknown origin was rarely the reason for a re-revision.

5.4.2 Re-revision by type of previous TKA revision

Early, 2-year re-revision rates reached 10.4% (CI 9.3–11.6%) for partial and 8.4% (CI 7.8–9.0%) for complete revision respectively **(Figure 5.16),** whereas it was 3.3% (CI 3.2–3.4%) after primary TKA **(Figure 3.21).** The difference between partial and complete revision was statistically significant. If only the insert was exchanged at the first revision, the early re-revision rate was 17.3% (CI 16.0–18.6%), significantly worse than for other types of revision. This could be explained by the fact that isolated insert exchange is usually performed in case of early periprosthetic infection (PPI) rending diagnosis more important for outcome than the type of surgery performed.

The re-revision rate at 13 years was 25.1% (CI 22.4–28.2%) for partial and 21.9% (CI 20.4–23.4%) for complete revision **(Figure 5.16).** This rate was almost three times higher than after primary TKA **(Figure 3.21).** Despite cumulative re-revision risk curves appearing to run separately from each other, the difference of partial and complete revision had a statistically significant difference only between 2 and up to 8 years. At thirteen years of follow-up, sole insert exchange had a re-revision rate of 32.0% (CI 28.1–36.4%) **(Figure 5.16).**



Typ of revision	1 year	2 years	3 years	5 years	6 years	8 years	10 years	13 years
Complete rev.	**4.4** (4.0-4.9)	**8.4** (7.8-9.0)	**10.8** (10.1-11.5)	**14.5** (13.6-15.3)	**15.8** (14.9-16.7)	**18.2** (17.2-19.2)	**20.0** (18.8-21.2)	**21.9** (20.4-23.4)
Partial revision	**5.5** (4.7-6.4)	**10.4** (9.3-11.6)	**13.1** (11.8-14.5)	**16.9** (15.4-18.5)	**18.8** (17.2-20.6)	**20.9** (19.1-22.8)	**22.2** (20.2-24.3)	**25.1** (22.4-28.2)
Only change PE	**13.4**(12.3-14.5)	**17.3**(16.0-18.6)	**20.2** (18.8-21.6)	**23.0** (21.5-24.5)	**23.9** (22.3-25.5)	**25.5** (23.8-27.2)	**27.4** (25.5-29.5)	**32.0** (28.1-36.4)
Reimplantation	**7.4** (5.9-9.2)	**13.2**(11.2-15.6)	**17.1** (14.8-19.8)	**20.7** (18.1-23.7)	**22.9** (20.0-26.1)	**26.0** (22.7-29.7)	**27.3** (23.8-31.2)	

Figure 5.16

Estimated failure rates after revision of total knee arthroplasty: types of revisions

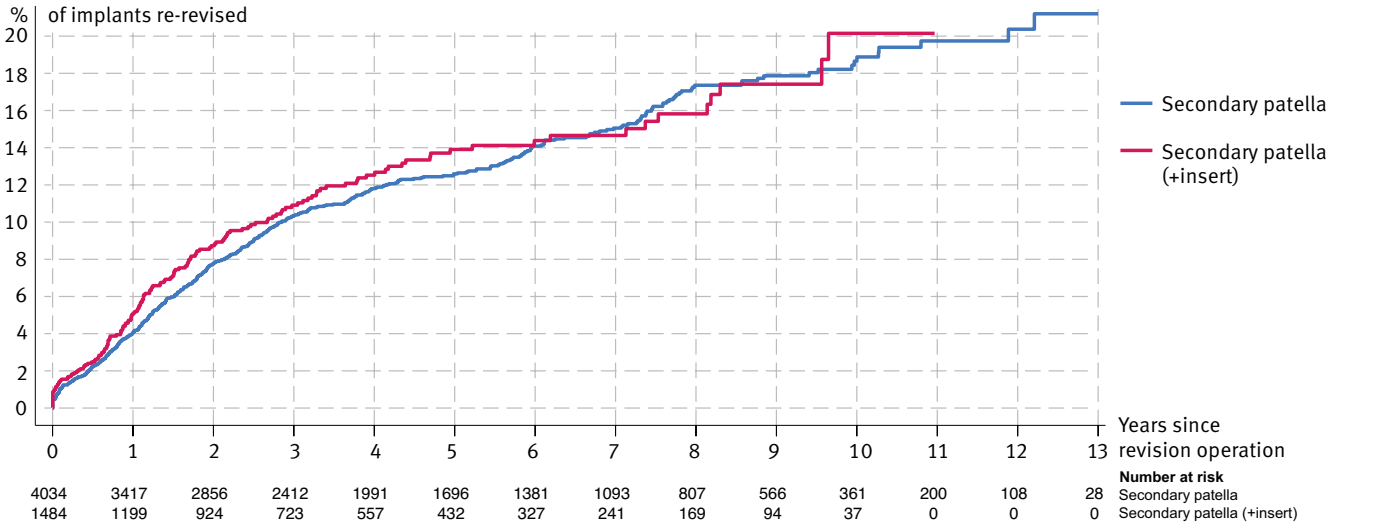
Time since revision, 2012–2025. Start point of analysis: first registered component revision in SIRIS that meets the inclusion criteria.End point of analysis: next registered component revision. Partial revision comprises femoral revision, tibial revision and patella revision.
Reimplantation refers to implantation of total knee system after spacer (revisions due to infection).
Comprises linked and unlinked revisions. A small proportion of revisions of partial knees may be included because they cannot be reliably excluded when the revision is not linked to a primary SIRIS case.

Component reimplantation – standing mostly for staged revision due to periprosthetic joint infection and previous temporary spacer implantation – had an early (two-year) re-revision rate of 13.2% (CI 11.2 –15.6%). The re-revision rate increased over time up to 30.1% (CI 25.2 –35.7%) 12 years after reimplantation. Reimplantation performed even better regarding re-revision than partial revision until three years and then picked continuously up to the same level from the seventh year up to the last follow-up at 12 years **(Figure 5.16).**

5.4.3 Re-revision by secondary patella resurfacing

Isolated secondary patella resurfacing was associated with an early, 2-year re-revision rate of 7.8% (CI 7.0 –8.7%), which is in the range of the results after complete revision. Secondary patella resurfacing combined with insert exchange led to 8.7% (CI 7.3–10.4%) of re-revisions, not significantly worse than isolated secondary patella resurfacing **(Figure 5.17).** At up to 10 years of follow-up, secondary patella resurfacing in combination with insert exchange performed similarly to secondary resurfacing alone. This was comparable to the re-revision rates after complete TKA revision **(Figure 5.16).**

The main reason for re-revision after secondary patella resurfacing, with or without insert exchange, was femorotibial instability **(Figure 5.18)** which contrasts with cumulative re-revision reasons overall **(see 5.4.1).** Astonishingly, (persistent) patella problems were the second most frequent reason, confirming



Replacement	1 year	2 years	3 years	5 years	6 years	8 years	10 years	13 years
sec. patella	**4.1** (3.5-4.7)	**7.8** (7.0-8.7)	**10.4** (9.4-11.4)	**12.6** (11.5-13.8)	**14.1** (12.9-15.4)	**17.4** (15.8-19.0)	**18.7** (16.9-20.6)	**21.2** (18.5-24.3)
sec. patella +insert	**5.0** (4.0-6.3)	**8.7** (7.3-10.4)	**10.9** (9.3-12.8)	**13.9** (11.9-16.2)	**14.4** (12.3-16.8)	**15.8** (13.4-18.6)	**20.2** (15.8-25.5)	

Figure 5.17

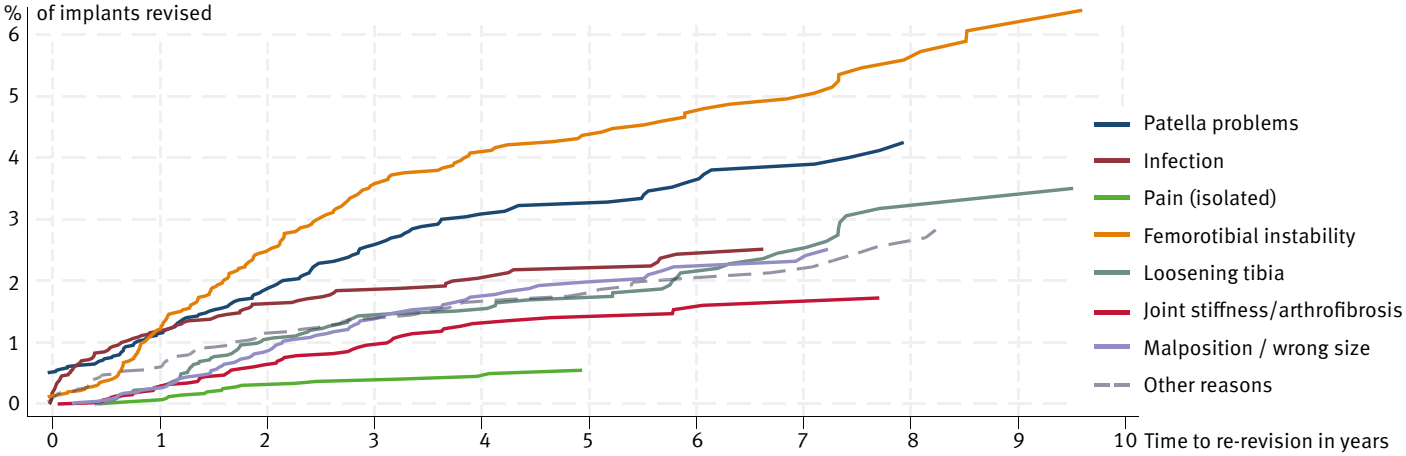
Estimated failure rates after revision of total knee arthroplasty: secondary patella replacement

Time since revision, 2012–2025. Start point of analysis: first registered component revision in SIRIS that meets the inclusion criteria.End point of analysis: next registered component revision. Comprises of linked and unlinked revisions. A small proportion of revisions of partial knees may be included because they cannot be reliably excluded when the revision is not linked to a primary SIRIS case.

that anterior knee pain after TKA often has other causes, which cannot be solved by addressing the patella alone. Loosening of the tibial component was an important cause of re-revision followed by infection, whereas joint stiffness, isolated pain or "other reasons", fortunately, did not play an important role in this context **(Figure 5.18).**

5.4.4 Re-revision after conversion of PKA to TKA

Re-revision rates after conversion of a PKA to TKA reached 9.8% (CI 8.7–11.1%) after two years and 24.5% (CI 19.5–30.6%) after 12 years, respectively **(Figure 5.19).** This is comparable to the re-revision rates after revision TKA **(Figure 5.16),** but far worse than the revision rates after primary TKA, which were 3.3% at two years (CI 3.2–3.5%) and 8.9% (CI 8.6 – 9.2%) for cemented or 8.7% (CI 7.0–9.6%) for uncemented TKA at 13 years **(Figure 5.14).** Therefore, the widespread opinion that a PKA would be the preferred first surgery as a later conversion to TKA would lead



Re-revision diagnosis	1 year	2 years	3 years	5 years	6 years	8 years	10 years
Patella problems	**1.1** (0.9-1.4)	**1.8** (1.5-2.3)	**2.6** (2.1-3.1)	**3.2** (2.7-3.9)	**3.6** (3.0-4.3)	**4.3** (3.5-5.2)	**4.3** (3.5-5.2)
Infection	**1.2** (0.9-1.5)	**1.6** (1.3-2.1)	**1.9** (1.5-2.3)	**2.2** (1.8-2.7)	**2.5** (2.0-3.0)	**2.5** (2.0-3.1)	**2.5** (2.0-3.1)
Pain (isolated)	**0.0** (0.0-0.2)	**0.3** (0.2-0.6)	**0.4** (0.2-0.6)	**0.6** (0.4-0.9)	**0.6** (0.4-0.9)	**0.6** (0.4-0.9)	**0.6** (0.4-0.9)
Femorotibial instability	**1.2** (0.9-1.5)	**2.5** (2.0-3.0)	**3.5** (3.0-4.2)	**4.4** (3.7-5.1)	**4.7** (4.1-5.5)	**5.6** (4.7-6.6)	**6.4** (5.3-7.8)
Loosening TI	**0.3** (0.2-0.5)	**1.0** (0.8-1.4)	**1.4** (1.1-1.9)	**1.7** (1.3-2.2)	**2.1** (1.7-2.8)	**3.2** (2.5-4.1)	**3.5** (2.6-4.7)
Joint stiffness / arthrofibrosis	**0.3** (0.1-0.5)	**0.6** (0.4-0.9)	**1.0** (0.7-1.3)	**1.4** (1.1-1.9)	**1.6** (1.2-2.1)	**1.7** (1.3-2.4)	**1.7** (1.3-2.4)
Malposition / wrong size	**0.3** (0.1-0.5)	**0.8** (0.6-1.2)	**1.4** (1.0-1.8)	**2.0** (1.6-2.6)	**2.2** (1.8-2.9)	**2.5** (2.0-3.3)	**2.5** (2.0-3.3)
Other reasons	**0.6** (0.4-0.9)	**1.1** (0.9-1.5)	**1.4** (1.1-1.8)	**1.8** (1.4-2.3)	**2.1** (1.6-2.6)	**2.6** (2.0-3.3)	**2.9** (2.2-3.8)

Figure 5.18

Cumulative incidence rates for different re-revision diagnosis after secondary patella replacements (TKA)

Time since revision, 2015–2025, % of implants re-revised. Detailed reasons for revisions available since 2015.
Comprises of all secondary patella replacements (with or without insert exchange)

to comparable results as after primary TKA cannot be supported by this report. Obviously, a conversion from PKA to TKA is not equivalent to a primary TKA but remains a revision with higher re-revision rates than observed after primary TKA.

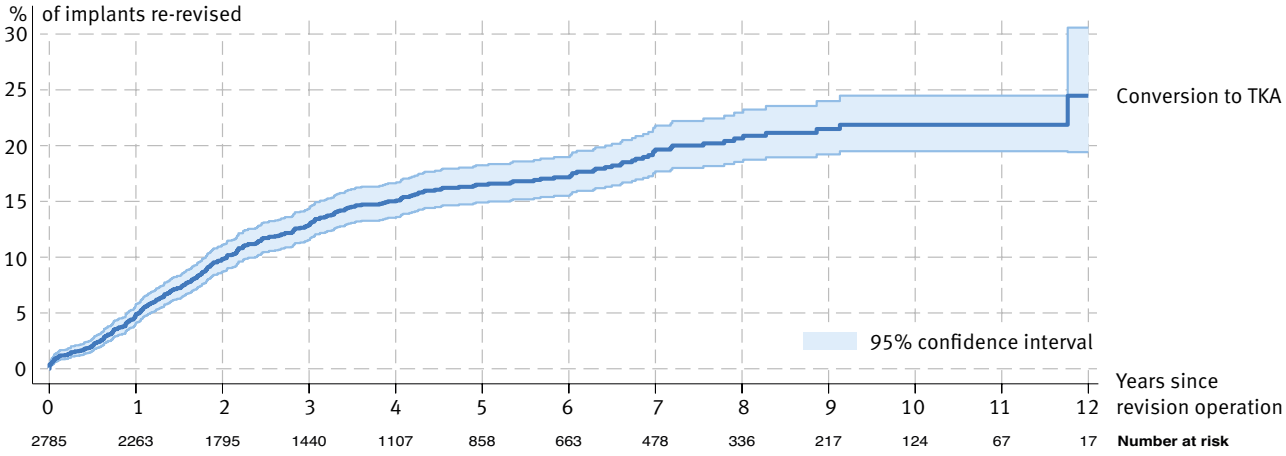
The main reasons for re-revision after conversion of PKA to TKA were femorotibial instability and tibial loosening, followed by patella problems. All other reasons were noted less frequently, isolated pain playing only a limited role this time (compare to first revision of PKA in chapter 5.7) **(Figure 5.20).**

System*	2020	2021	2022	2023	2024	2025	2020–2025
Attune CR-FB	842	1,247	1,698	2,097	2,709	3,892	**12,485**
Attune CR-RP	1,336	1,429	1,605	1,516	1,423	876	**8,185**
Attune PS-RP	750	754	1,037	1,083	1,104	968	**5,696**
Balansys CR	355	526	923	752	931	856	**4,343**
Balansys PS	600	623	571	611	672	711	**3,788**
Balansys UC	386	442	597	759	659	631	**3,474**
GMK sphere	2,085	2,509	3,067	3,284	3,458	3,425	**17,828**
Origin PS	355	427	539	555	733	814	**3,423**
Persona CR-MC	975	1,282	1,801	2,173	2,639	3,222	**12,092**
Persona CR-UC	1,162	1,122	1,258	1,405	1,084	848	**6,879**
Persona PS	478	787	938	914	847	709	**4,673**
Triathlon PS	356	554	516	640	838	899	**3,803**
Other systems	5,656	4,989	4,608	4,796	4,461	4,727	**29,237**
Total	**15,336**	**16,691**	**19,158**	**20,585**	**21,558**	**22,578**	**115,906**

Table 5.6

Top 75% of primary total knee arthroplasty systems (all diagnoses, all component fixations) 2020 – 2025

*Constrained/hinged systems were included if used for cases of primary OA including OA after meniscectomy

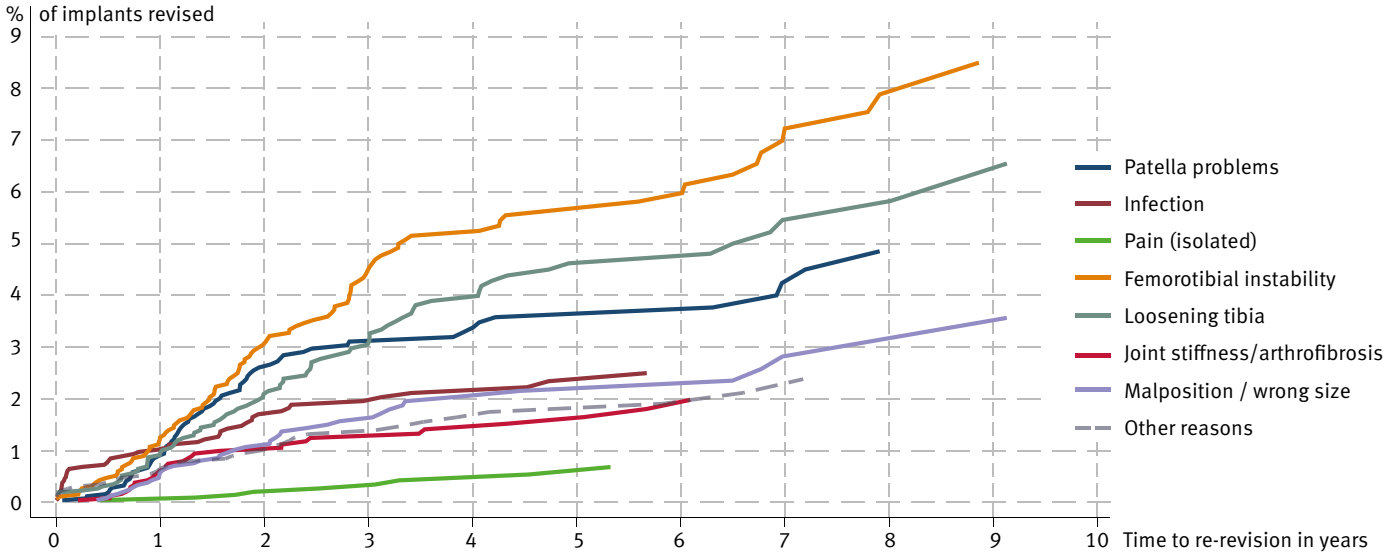


Typ of revision	1 year	2 years	3 years	5 years	6 years	8 years	10 years	11 years
Conversion to TKA	**4.9** (4.1-5.8)	**9.8** (8.7-11.1)	**12.9** (11.5-14.4)	**16.5** (14.9-18.2)	**17.2** (15.5-19.0)	**20.6** (18.5-23.0)	**21.9** (19.5-24.5))	**24.5** (19.5-30.6)

Figure 5.19

Estimated failure rates after conversion from partial knee to total knee arthroplasty

Time since revision, 2012–2025, all services, % of implants re-revised



Diagnosis for re-revision	1 year	2 years	3 years	5 years	6 years	8 years	10 years
Patella problems	**0.9** (0.6-1.4)	**2.6** (2.0-3.4)	**3.1** (2.4-4.0)	**3.6** (2.8-4.6)	**3.6** (2.8-4.6)	**4.9** (3.6-6.5)	**4.9** (3.6-6.5)
Infection	**1.0** (0.7-1.5)	**1.7** (1.2-2.3)	**2.0** (1.4-2.6)	**2.3** (1.7-3.2)	**2.5** (1.8-3.4)	**2.5** (1.8-3.4)	**2.5** (1.8-3.4)
Pain (isolated)	**0.0** (0.0-0.3)	**0.2** (0.1-0.5)	**0.3** (0.1-0.7)	**0.5** (0.3-1.1)	**0.7** (0.3-1.4)	**0.7** (0.3-1.4)	**0.7** (0.3-1.4)
Femorotibial instability	**1.3** (0.9-1.8)	**3.0** (2.4-3.9)	**4.5** (3.6-5.5)	**5.7** (4.6-6.9)	**5.8** (4.8-7.1)	**7.9** (6.3-9.9)	**8.5** (6.6-10.9)
Loosening TI	**0.9** (0.6-1.4)	**2.1** (1.6-2.8)	**3.0** (2.4-3.9)	**4.6** (3.7-5.8)	**4.6** (3.7-5.8)	**5.5** (4.3-7.0)	**6.5** (4.8-9.0)
Joint stiffness / arthrofibrosis	**0.6** (0.4-1.0)	**1.0** (0.7-1.5)	**1.2** (0.8-1.8)	**1.5** (1.0-2.2)	**1.8** (1.2-2.7)	**2.0** (1.3-2.9)	**2.0** (1.3-2.9)
Malposition / wrong size	**0.6** (0.3-1.0)	**1.1** (0.7-1.6)	**1.6** (1.1-2.2)	**2.2** (1.6-3.0)	**2.2** (1.6-3.0)	**2.8** (2.0-4.1)	**3.6** (2.2-5.9)
Other reasons	**0.6** (0.4-1.1)	**1.0** (0.7-1.5)	**1.3** (0.9-1.9)	**1.7** (1.2-2.5)	**1.9** (1.3-2.7)	**2.4** (1.6-3.6)	**2.4** (1.6-3.6)

Figure 5.20

Cumulative incidence rates for different re-revision diagnoses of conversions to primary total knee arthroplasty

Time since revision, 2012–2025, all services, % of implants re-revised. Detailed reasons for revisions available since 2015.

5.5 Results of implants in total knee arthroplasty

Another key feature of an arthroplasty registry is to analyse the performance of implants comparing survival and revision rates over time. While short-term results largely reflect a surgeon's or an institution's performance, long-term results depend more on the design and quality of the implants.

Other than in total hip arthroplasty mix and match is not an important topic in primary TKA as sizes and shapes must correspond regarding femoral component to insert in addition to stability features as e.g. medial congruence in MP designs or of box and pegs in PS. In addition, in fixed bearing knees the insert is connected to the tibial component with a specific locking mechanism different from system to system. The only exception for mix and match in TKA may be the patellar button if patella is resurfaced. In some of the brands patella components may have poor designs or e.g. only cemented versions leading to mix and match by choosing a patellar component from another brand as congruence in the femoropatellar joint may be considered less important when both trochlea and patella are resurfaced.

TKA performed for primary and for secondary OA are considered separately. The internationally recognised benchmark considers only primary OA. The reader is reminded to consider statistical precision of the results. A single revision weighs much more in a small group than in a large group. Hence, there is always a trade-off between statistical precision and the necessity to identify possible low-volume outliers. Methodological details are provided in chapter 2 Methods.

A so-called case concentration score (CCS) was introduced in 2022. It indicates the percentage of arthroplasties performed by the main user hospital service. A higher value signifies an increased likelihood of bias due to local effects induced by a single provider unit. A low score would indicate that the implant was used in many different hospitals. In contrast, a share of >50% would suggest that reported results are likely dominated by data from one hospital service while a score of 100% indicates that the implant is used in one hospital only.

5.5.1 Two-year revision rate of TKA systems and brands

The two-year revision rates of the individual implants are shown in **Figure 5.21,** reflecting results from TKA performed between 01.01.2020 and 31.12.2023, providing a completed two-year follow-up by 31.12.2025.

Of the 61 implant combinations used (the rest being summarised under "other systems"), two systems (Genus and Sigma PS-RP) must be considered as confirmed outliers. Please refer to Chapter 2 Methods regarding methodological details of this definition. As usual, the outlier identification results in a detailed outlier report investigating the reasons for the observed deviations from the national average.

One outlier system at two years (Sigma PS-RP) concerns a subtype of an older implant with otherwise solid results overall and very solid long-term results **(Figure 5.24 d).** A CCS of 49 indicates these short-term problems could be related to certain specific providers.

The same seems to be true for Genus, as the CSS is 99, indicating that the implant was used by just one hospital service. In addition, only 144 TKA's were at risk, of which 8 had to be revised, resulting in a 2-year revision rate of 7.0% (CI 3.6–13.6%). Though the confidence intervals were wide due to small numbers, the lower margin was not anymore within the boundaries of the national average.

"Other systems", summarising TKA with insufficient numbers to be represented individually, had an elevated 2-year revision rate but within the boundaries of the national average. Of 284 TKA at risk, 9 had to be revised.

Only Attune CR-FB and Persona CR-UC had a significantly better short-term revision rate than Swiss average and could be called low outliers **(Figure 5.21).**

The remaining brands of TKA had 2-year survival rates within the margins of the lower and upper limits at 66% and 150% of the group average, respectively **(Figure 5.21).**

5.5.2 Long-term revision rate of TKA systems and brands

Table 5.6 shows the TKA systems used mostly frequently in Switzerland, representing 74.8% (n = 86,669) of the primary TKA registered from 2020 until 2025. The 25.2% less commonly used implants accounted for 29,237 cases only during this period. Only 223 implant combinations (0.2%) could not be classified, less than the rate of missing implants observed in the previous annual reports.

The long-term failure rates for all systems, all diagnoses, and all fixation types are depicted in **Table 5.7,** showing results up to 13 years after primary TKA. Wider confidence intervals reflect higher variability due to small numbers.

The 13-year failure rate for all TKA systems was 8.5% (CI 8.3 – 8.7%). However, the various implant systems performed rather differently and varied from 4.8% for the best to 12.5% for the worst TKA system of the list, **(Table 5.7).** Most TKA systems performed within the Swiss average but with prominent exceptions.

An older knee system (Innex) had elevated failure rates for years but still within the boundaries of the Swiss national average. At thirteen years, the rotating platform type had a significantly elevated failure rate.

Important information on the use of the implant performance tables below

- Estimated revision rate exceeds the alert boundary, but we do not identify this implant combination as an outlier because the 95% confidence interval overlaps the confidence zone of the reference group.
- Identified as potential outliers. Please note the statistical confidence intervals. The outlier status comes with varying degrees of statistical probability. We consider the potential outlier status „highly likely" when both the estimated revision rate and the complete confidence interval exceed the outlier alert boundary.

Please be aware that relatively rare implant combinations are frequently used in only a small number or indeed only in one hospital in Switzerland. Observed revision rates may be determined by local factors and performance may differ significantly between locations. Manufacturers of detected outlier implants and the hospitals where they were used (and revisions occurred) have been informed by SIRIS.

System	CCS*	Mean age	at risk N**	Revised N	Revised % (95% CI)
Advance	26	68	651	26	4.0 (2.8-5.9)
Anatomic	37	69	105	4	3.8 (1.5-9.9)
Attune CR-FB	11	69	5,884	151	2.6 (2.2-3.0)
Attune CR-RP	10	69	5,886	215	3.7 (3.2-4.2)
Attune CRS	16	69	191	7	3.7 (1.8-7.6)
Attune PS-FB	15	70	2,301	61	2.7 (2.1-3.4)
Attune PS-RP	15	70	3,624	133	3.7 (3.2-4.4)
Balansys CR	17	70	2,556	88	3.5 (2.8-4.3)
Balansys PS	55	70	2,405	78	3.3 (2.6-4.1)
Balansys RP	18	71	1,489	55	3.7 (2.9-4.8)
Balansys UC	20	71	2,184	90	4.2 (3.4-5.1)
E.Motion FP/UC	100	70	596	14	2.4 (1.4-4.0)
Empowr	28	69	210	8	3.8 (1.9-7.5)
Endo-Model	48	81	108	2	2.0 (0.5-7.6)
Endo-Model SL	22	77	141	7	5.2 (2.5-10.6)
Enduro	38	78	106	5	4.9 (2.1-11.4)
Evolution	35	69	537	25	4.7 (3.2-6.9)
First/First REV	46	71	520	9	1.7 (0.9-3.3)
GKS prime flex	25	69	389	15	3.9 (2.4-6.4)
GMK hinge	12	76	175	4	2.3 (0.9-6.1)
GMK primary CR/UC-FB	42	71	89	2	2.3 (0.6-8.9)
GMK primary CR/UC-RP	31	69	240	7	3.0 (1.4-6.2)
GMK primary PS	24	71	305	17	5.7 (3.6-9.0)
GMK sphere	11	70	10,945	357	3.3 (3.0-3.7)
GMK spherika	50	71	103	0	0.0 (.-)
Gemini SL	57	67	84	2	2.4 (0.6-9.3)
Genus	99	71	114	8	7.0 (3.6-13.6)
ITotal CR	37	68	688	21	3.1 (2.0-4.7)
ITotal PS	46	71	349	15	4.4 (2.7-7.1)
Innex FB	90	74	134	1	0.7 (0.1-5.2)
Innex RP	35	71	406	17	4.3 (2.7-6.8)
Journey II	39	67	625	22	3.6 (2.4-5.4)
LCS compl. cem./hybrid	33	70	1,263	57	4.6 (3.5-5.9)
LCS compl. cementless	44	69	473	18	3.8 (2.4-6.0)
Legion	24	68	875	42	4.9 (3.6-6.5)
NK flex	47	70	70	0	0.0 (.-)
Nexgen CR/LPS-Flex	23	68	386	12	3.1 (1.8-5.4)
Nexgen LCCK	29	72	151	4	2.8 (1.1-7.3)
Nexgen RHK	23	77	117	4	3.4 (1.3-8.9)
Optetrak logic	74	66	91	3	3.3 (1.1-9.9)
Origin CR	34	68	169	2	1.2 (0.3-4.7)
Origin PS	24	69	1,876	62	3.3 (2.6-4.3)
Persona CPS	21	72	638	16	2.5 (1.6-4.1)
Persona CR-MC	8	69	6,231	187	3.0 (2.6-3.5)
Persona CR-UC	38	70	4,946	95	1.9 (1.6-2.4)
Persona PS	11	70	3117	115	3.7 (3.1-4.5)
RT-plus	20	77	539	18	3.4 (2.2-5.4)
Score / Score II	82	70	194	6	3.1 (1.4-6.8)
Sigma CR-FB	30	73	729	19	2.6 (1.7-4.1)
Sigma CR-RP	49	68	315	17	5.4 (3.4-8.6)
Sigma PS-FB	91	72	243	7	2.9 (1.4-6.0)
Sigma PS-RP	34	71	61	5	8.4 (3.6-18.9)
Symphoknee	53	68	102	6	5.9 (2.7-12.7)
TC-plus primary FB	46	70	703	28	4.0 (2.8-5.8)
TC-plus primary RP	34	71	554	14	2.6 (1.5-4.3)
Triathlon CR/CS	48	69	642	16	2.5 (1.6-4.1)
Triathlon PS	43	68	2,066	85	4.2 (3.4-5.1)
U2	85	69	167	5	3.0 (1.3-7.0)
Unity	43	70	347	8	2.4 (1.2-4.7)
Vanguard CR	58	68	200	8	4.0 (2.0-7.9)
Vanguard PS	30	67	81	4	5.0 (1.9-12.7)
Other systems		70	284	9	3.2 (1.7-6.1)
CH average for group					**3.3** (3.2-3.4)

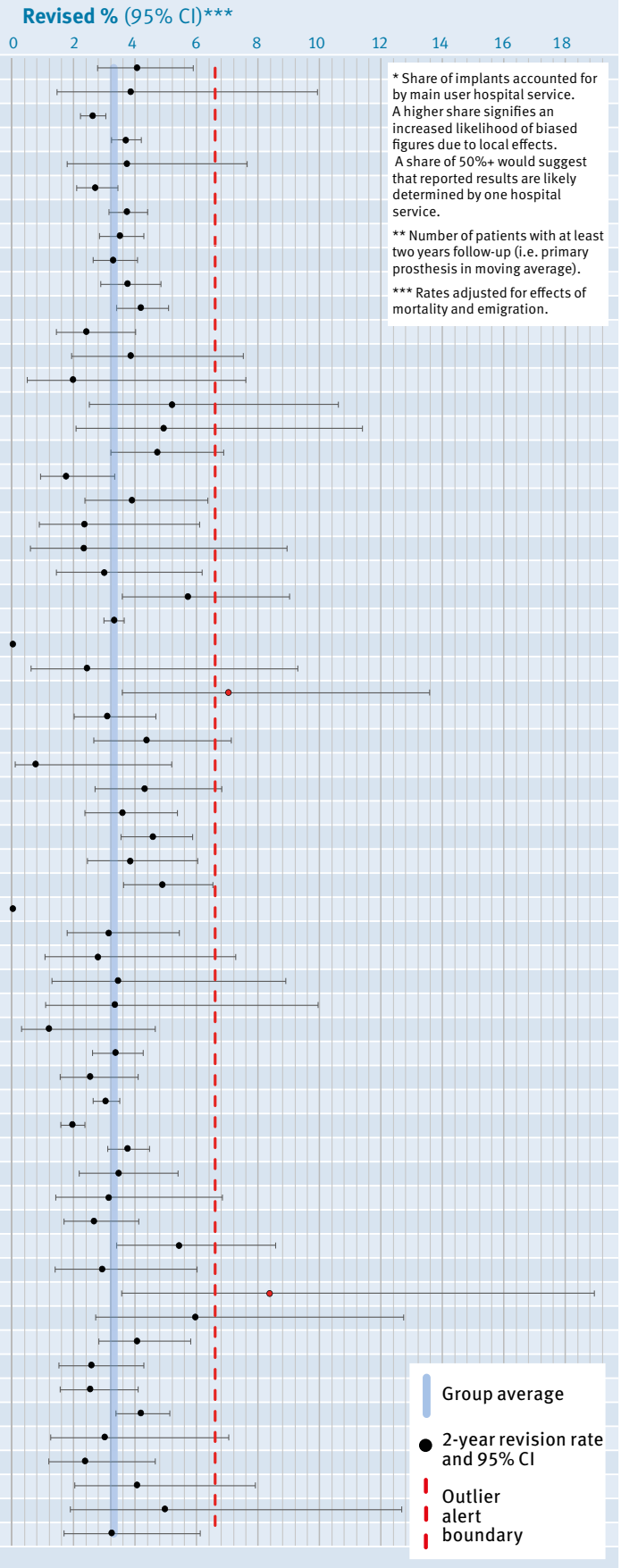


Figure 5.21

2-year evaluation: Revision rates of primary total knee arthroplasty systems within 24 months

4-year moving average covering implants between 01.01.2020 and 31.12.2023, with two years follow-up (31.12.2025).

The same is true for Triathlon CR/CS and First/First Rev, which also turned out to be significantly worse than average only after 13 years. Two TKA types of one company (Journey II and Legion) had significantly elevated failure rates at 3, 5 and 10 years after surgery. Journey II showed this elevated rate already after one year. Another two types of a newer knee system also had significantly elevated failure rates at ten years, being within the Swiss average boundaries at one to five years (Attune CR-RP and Attune PS-RP). BalanSys RP and UC also were associated with significantly elevated failure rates at ten years, which was also the case at 13 years for BalanSys RP. Finally, GKS prime flex had a normal failure rate at one year of follow-up but had significantly elevated failure rates after three and five years **(Table 5.7).**

"Other systems" were performing worse than average already one year after primary TKA and never reached average failure rates later. They had the highest failure rate with a revision rate of 12.0% (CI 10.8–13.3%) after thirteen years. Astonishingly, the group had a 2-year revision rate within the boundar-

System	Total N	CCS*	Mean age**	1 year (95% CI)	3 years (95% CI)	5 years (95% CI)	10 years (95% CI)	13 years (95% CI)
Advance	2,105	19	68	2.2 (1.7-2.9)	5.4 (4.5-6.5)	6.7 (5.7-7.9)	8.7 (7.4-10.2)	9.3 (7.9-11.0)
Attune CR-FB	15,725	10	69	1.2 (1.0-1.4)	3.5 (3.2-3.9)	4.7 (4.3-5.2)	7.4 (6.4-8.5)	
Attune CR-RP	14,797	11	69	1.8 (1.6-2.1)	5.0 (4.7-5.4)	6.3 (5.9-6.7)	8.6 (8.0-9.3)	
Attune PS-FB	6,532	14	70	1.4 (1.2-1.7)	3.9 (3.4-4.4)	5.0 (4.5-5.7)	8.4 (7.4-9.5)	
Attune PS-RP	9,561	14	70	1.7 (1.4-2.0)	4.9 (4.4-5.4)	6.4 (5.8-7.0)	9.1 (8.3-10.1)	
Balansys CR	5,705	17	70	1.2 (0.9-1.5)	3.7 (3.2-4.3)	5.0 (4.3-5.8)	7.8 (6.5-9.4)	7.8 (6.5-9.4)
Balansys PS	6,654	56	70	1.2 (0.9-1.5)	3.7 (3.2-4.2)	4.9 (4.3-5.5)	7.4 (6.4-8.4)	8.5 (7.2-10.0)
Balansys RP	7,562	14	70	1.5 (1.2-1.8)	4.4 (3.9-4.9)	5.7 (5.1-6.2)	8.8 (8.1-9.6)	12.5 (10.7-14.5)
Balansys UC	6,950	21	71	1.4 (1.1-1.7)	4.3 (3.8-4.8)	5.6 (5.0-6.2)	8.5 (7.6-9.4)	9.8 (8.3-11.4)
E.Motion FP/UC	2,228	86	70	1.4 (1.0-2.0)	3.4 (2.6-4.3)	4.6 (3.7-5.7)	7.3 (5.9-8.9)	8.0 (6.5-9.9)
Empowr	715	31	68	2.0 (1.1-3.7)	4.1 (2.1-8.0)			
Evolution	1,304	25	69	1.2 (0.7-2.1)	4.8 (3.3-6.8)	7.5 (3.9-14.3)		
First/First REV	2,811	36	70	1.6 (1.2-2.2)	4.8 (4.1-5.7)	5.8 (5.0-6.8)	8.0 (6.9-9.3)	10.7 (7.4-15.5)
GKS prime flex	627	25	69	1.9 (1.1-3.4)	7.9 (5.7-10.9)	8.3 (6.0-11.4)		
GMK primary CR/UC-RP	2,681	19	70	1.6 (1.2-2.2)	4.0 (3.4-4.9)	5.0 (4.2-5.9)	7.2 (6.2-8.4)	8.4 (7.2-9.9)
GMK primary PS	2,231	22	71	1.2 (0.8-1.8)	3.8 (3.1-4.7)	5.3 (4.4-6.4)	7.7 (6.5-9.1)	9.0 (7.5-10.8)
GMK sphere	25,545	11	69	1.6 (1.5-1.8)	4.3 (4.1-4.6)	5.6 (5.3-6.0)	7.2 (6.7-7.8)	7.6 (6.9-8.4)
GMK spherika	1,044	34	71	0.2 (0.1-1.0)				
ITotal CR	1,504	25	68	0.9 (0.5-1.5)	3.1 (2.4-4.2)	4.1 (3.2-5.3)	5.6 (4.1-7.6)	
ITotal PS	511	37	70	0.8 (0.3-2.1)	4.5 (3.0-6.7)	6.5 (4.4-9.4)		
Innex FB	1,730	42	71	1.4 (0.9-2.1)	4.3 (3.4-5.4)	5.5 (4.5-6.7)	8.1 (6.8-9.6)	9.4 (7.8-11.3)
Innex RP	4,809	17	69	1.7 (1.4-2.1)	4.6 (4.0-5.2)	5.5 (4.9-6.2)	7.8 (7.0-8.6)	9.5 (8.5-10.7)
Journey II	2,683	27	67	3.0 (2.4-3.8)	7.3 (6.4-8.4)	9.1 (8.0-10.2)	12.4 (10.9-14.1)	
LCS complete cem./hybrid	6,739	22	70	1.5 (1.3-1.8)	4.8 (4.3-5.4)	5.9 (5.4-6.5)	7.2 (6.6-7.9)	8.2 (7.2-9.2)

Table 5.7 Part one

Long term evaluation: Failure rates of primary total knee arthroplasty systems (all diagnoses, all component fixations)

Time since operation, 2012–2025. Please note that if reported system involves multiple sub-variants, it is possible that the long-term performance of these sub-variants may be significantly different from their combined performance.

* Share of implants accounted for by main user hospital service. A higher share signifies an increased likelihood of biased figures due to local effects. A share of 50%+ would suggest that reported results are likely determined by one hospital service.

** Younger mean age signifies that the case mix is less "usual" and potentially biased towards higher revision risk.

ies of the Swiss average **(see 5.5.1).** Nevertheless, it should be recommended to surgeons using more exotic implants to review their own results thoroughly and switch to a brand more frequently used in Switzerland if indicated.

There was only one older (Sigma CR-FB) and two newer knee systems of the same brand (Persona) with significantly lower failure rates than average. Sigma was significantly better than the national average at 1, 3, 5, 10 and 13 years but was a new outlier at 2 years **(see 5.5.1).** It is important to know that Sigma did completely disappear from the Swiss market in 2025. For the Persona CR-MC, only results up to five years were available. Revision rates of 3.6% (CI 3.2–4.0%) at three and 4.5% (CI 4.0–5.0%) at five years respectively were significantly lower than average. The older CR-UC version performed significantly better at 1, 3, 5 and ten years with a failure rate after ten years of 4.9% (CI 4.4–5.6) **(Table 5.7).**

System	Total N	CCS*	Mean age**	1 year (95% CI)	3 years (95% CI)	5 years (95% CI)	10 years (95% CI)	13 years (95% CI)
LCS complete cementless	3,195	30	69	1.9 (1.5-2.5)	5.3 (4.6-6.2)	6.2 (5.4-7.2)	7.4 (6.4-8.4)	8.2 (6.8-9.9)
Legion	2,440	14	68	1.9 (1.4-2.5)	6.7 (5.7-7.9)	8.9 (7.6-10.3)	13.5 (11.5-15.7)	
NK flex	1,841	41	70	1.3 (0.8-1.9)	4.1 (3.3-5.1)	5.1 (4.2-6.2)	6.7 (5.6-8.0)	7.7 (6.2-9.7)
Nexgen CR/LPS-Flex	2,397	13	69	1.5 (1.1-2.1)	3.6 (2.9-4.4)	4.7 (3.9-5.7)	6.8 (5.7-8.1)	7.6 (6.3-9.2)
Nexgen LCCK	525	15	71	1.8 (0.9-3.3)	3.3 (2.0-5.3)	5.0 (3.3-7.5)	6.5 (4.4-9.5)	
Origin CR	862	16	68	0.7 (0.2-1.8)	3.0 (1.6-5.8)			
Origin PS	3,676	22	69	1.8 (1.4-2.4)	4.1 (3.4-5.0)	5.9 (4.8-7.1)		
Persona CPS	1,333	14	72	1.5 (1.0-2.3)	3.5 (2.6-4.7)	4.4 (3.3-5.9)		
Persona CR-MC	13,781	11	69	1.4 (1.2-1.6)	3.6 (3.2-4.0)	4.5 (4.0-5.0)		
Persona CR-UC	12,065	35	70	1.0 (0.8-1.2)	2.6 (2.3-2.9)	3.5 (3.2-3.9)	4.9 (4.4-5.6)	
Persona PS	8,401	11	70	1.8 (1.5-2.1)	4.1 (3.7-4.6)	5.3 (4.8-5.9)	7.6 (6.8-8.5)	
RT-plus	1,538	13	77	2.9 (2.1-3.9)	4.4 (3.4-5.7)	5.1 (4.0-6.5)	5.4 (4.3-7.0)	5.4 (4.3-7.0)
Score / Score II	502	50	70	1.3 (0.6-2.9)	3.5 (2.1-5.8)	4.1 (2.6-6.6)	8.4 (5.2-13.2)	
Sigma CR-FB	4,831	28	71	0.9 (0.7-1.2)	2.6 (2.2-3.1)	3.6 (3.1-4.1)	4.6 (4.0-5.2)	4.8 (4.2-5.6)
Sigma CR-RP	2,257	40	68	2.5 (2.0-3.3)	5.8 (4.9-6.9)	6.6 (5.6-7.7)	8.3 (7.2-9.6)	8.9 (7.7-10.3)
Sigma PS-FB	1,334	59	72	1.1 (0.6-1.8)	3.3 (2.5-4.5)	4.2 (3.2-5.5)	5.6 (4.3-7.1)	6.3 (4.9-8.1)
Sigma PS-RP	1,661	11	70	1.6 (1.1-2.4)	4.0 (3.1-5.1)	4.8 (3.8-5.9)	6.3 (5.2-7.6)	7.3 (6.0-8.9)
TC-plus primary FB	2,765	32	69	1.5 (1.1-2.0)	3.9 (3.3-4.7)	5.2 (4.4-6.2)	7.4 (6.4-8.7)	8.4 (7.1-9.9)
TC-plus primary RP	2,081	32	70	1.2 (0.8-1.8)	3.9 (3.1-4.8)	5.2 (4.3-6.4)	8.8 (7.4-10.5)	10.0 (8.3-12.0)
Triathlon CR/CS	2,463	28	69	2.1 (1.6-2.7)	5.0 (4.1-6.0)	6.1 (5.1-7.3)	8.9 (7.5-10.6)	11.2 (9.2-13.8)
Triathlon PS	4,752	36	69	1.9 (1.5-2.3)	4.9 (4.2-5.6)	5.9 (5.1-6.9)	8.6 (7.1-10.3)	9.1 (7.4-11.1)
Unity	701	36	69	1.5 (0.8-2.7)	3.2 (2.1-4.9)	3.7 (2.4-5.6)		
Vanguard CR	1,273	33	67	1.4 (0.9-2.3)	4.4 (3.4-5.7)	5.7 (4.5-7.2)	7.3 (5.8-9.1)	9.0 (6.6-12.3)
Vanguard PS	1,076	57	68	2.0 (1.3-3.0)	5.1 (3.9-6.6)	6.7 (5.3-8.4)	8.8 (7.1-10.8)	9.2 (7.4-11.4)
Other systems	7,431		71	2.3 (2.0-2.6)	5.6 (5.1-6.2)	7.4 (6.8-8.1)	10.7 (9.8-11.7)	12.0 (10.8-13.3)
CH average for group				**1.5 (1.5-1.6)**	**4.3 (4.2-4.3)**	**5.5 (5.3-5.6)**	**7.7 (7.5-7.9)**	**8.5 (8.3-8.7)**

Table 5.7 Part two

Long term evaluation: Failure rates of primary total knee arthroplasty systems (all diagnoses, all component fixations)

Time since operation, 2012–2025. Please note that if reported system involves multiple sub-variants, it is possible that the long-term performance of these sub-variants may be significantly different from their combined performance.

* Share of implants accounted for by main user hospital service. A higher share signifies an increased likelihood of biased figures due to local effects. A share of 50%+ would suggest that reported results are likely determined by one hospital service.

** Younger mean age signifies that the case mix is less "usual" and potentially biased towards higher revision risk.

Brands and subsystems of TKA

Primary TKA subsystems (such as PCR/CR or PS) were analysed separately if numbers were both sufficient and showed relevantly different revision rates. The goal of this differentiation is to reduce camouflage effects. It could be demonstrated some years ago by other registries, such as the British NJR, that subdividing subsystems – for which the average performance of the whole brand was within the national range or even better – some subtypes performed significantly worse or were even outliers, the effect though hidden by the rest of the well-performing variants. The upper and lower limits of the Swiss national average are illustrated by green (lower) and orange (upper margin) dots.

Figures 5.22, 5.23 and 5.24 a-f show revision rates of the TKA brands, including subsystems, up to thirteen years after primary arthroplasty **(Figure 5.24 f)** up to twelve years.

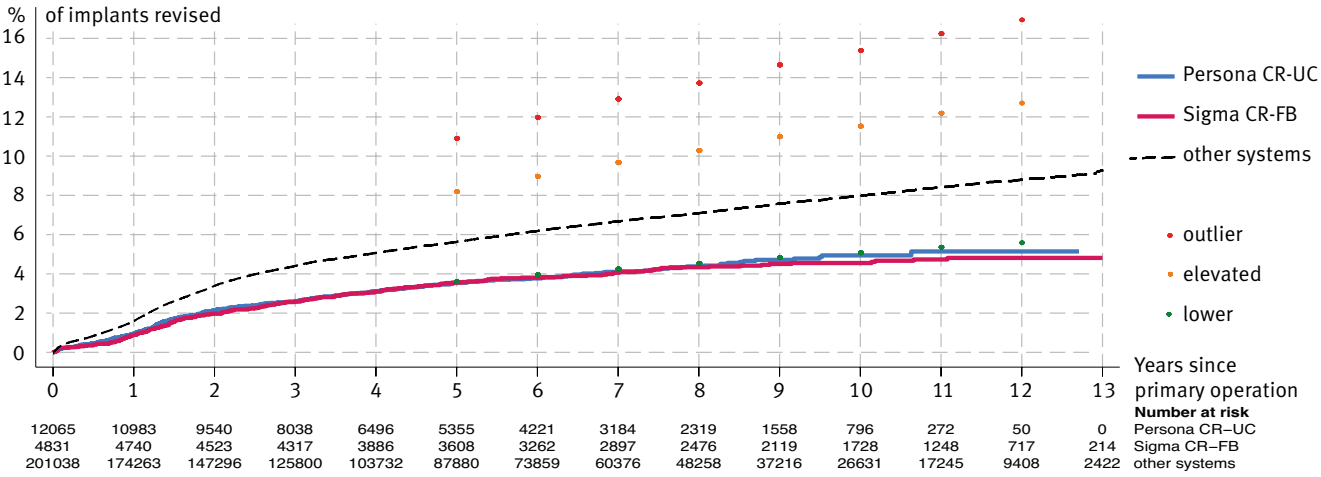


Figure 5.22

Implant combinations with below-average long-term revision rates (all TKA)

Below-average was defined as a 9-year/10-year revision rate of up to 66% of the group average (and upper bounds of the 95% confidence interval staying below the lower bound of the group average; and at least 25 cases at risk at 9 years/10-years). The dots indicate upper and lower limits.

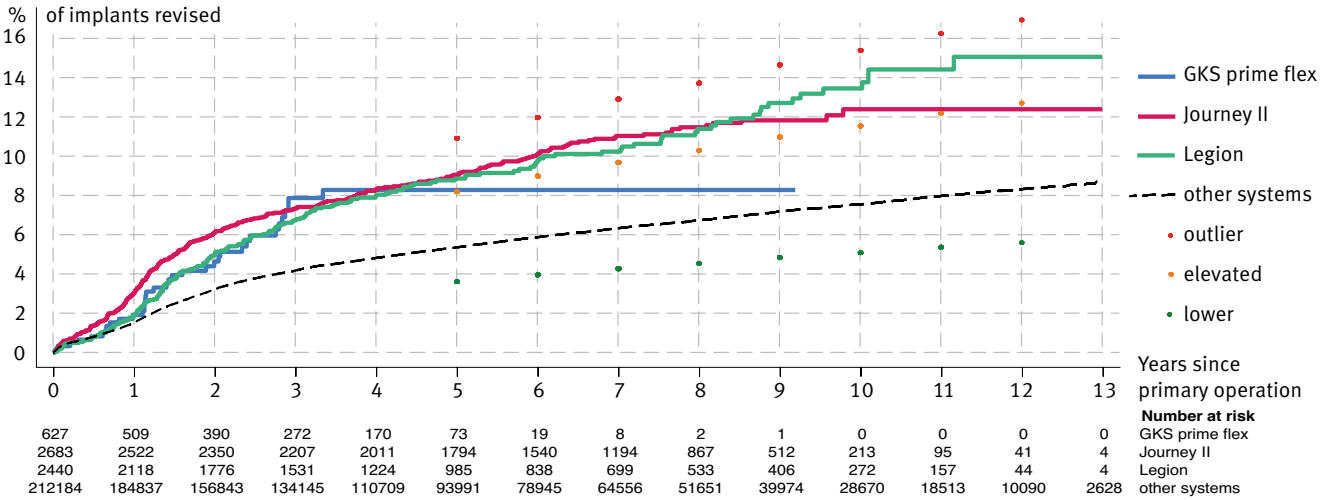


Figure 5.23

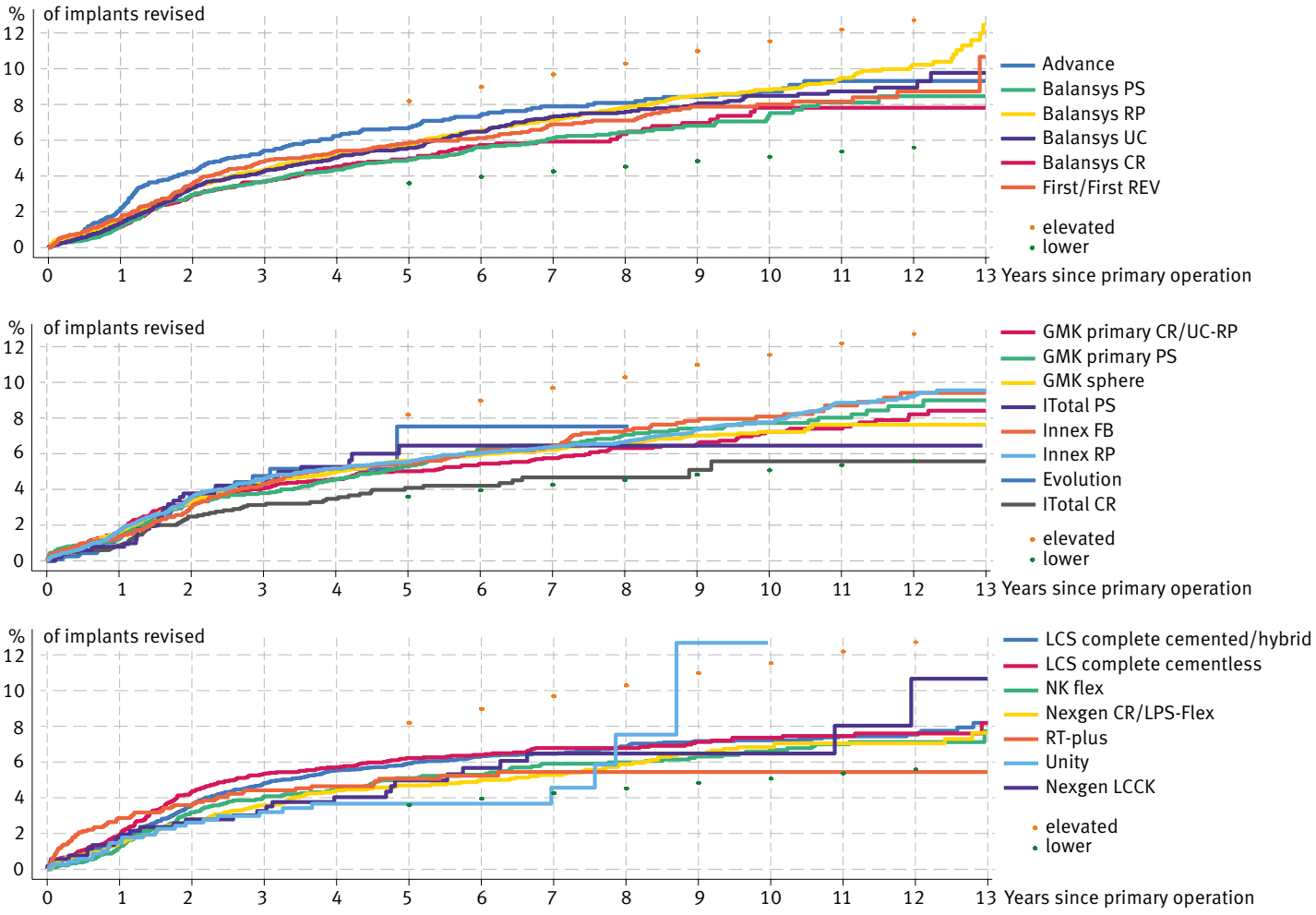
Implant combinations with elevated long-term revision rates (all TKA)

An elevated revision rate was defined as a deviation of at least 50% above the group average at any time between year 5 and year 12 (and lower bounds of the 95% confidence interval exceeding the upper bound of the group average; and at least 50 cases at risk at 5 years). The dots indicate upper and lower limits.

Sigma CR-FB and Persona CR-UC were close to the lower boundary of the Swiss average in early follow up and slightly below from 6 years after surgery onwards **(Figure 5.24).** For Sigma CR-FB, this does not speak by itself for a better performance, as older systems were often used in older patients, inherently more reluctant to proceed with revision than younger and more active patients.

Journey II and Legion performed significantly worse than the Swiss average, but still below outlier limits. They both are considered as potential outliers. Journey II improved with time and slipped underneath the borders of elevated revision rates at 11 years. GKS prime flex had elevated revision rates two and three years after surgery and reached the limits of an outlier but then reach Swiss national average at 9 years of follow-up **(Figure 5.24).**

Unity had a below normal two-year revision rate of 2.4% (CI 1.2–4.7%) **(Figure 5.24)**. After seven to nine years of follow-up, several revisions caused the system to appear as a potential outlier. One must take into consideration that the total number of 347 im-



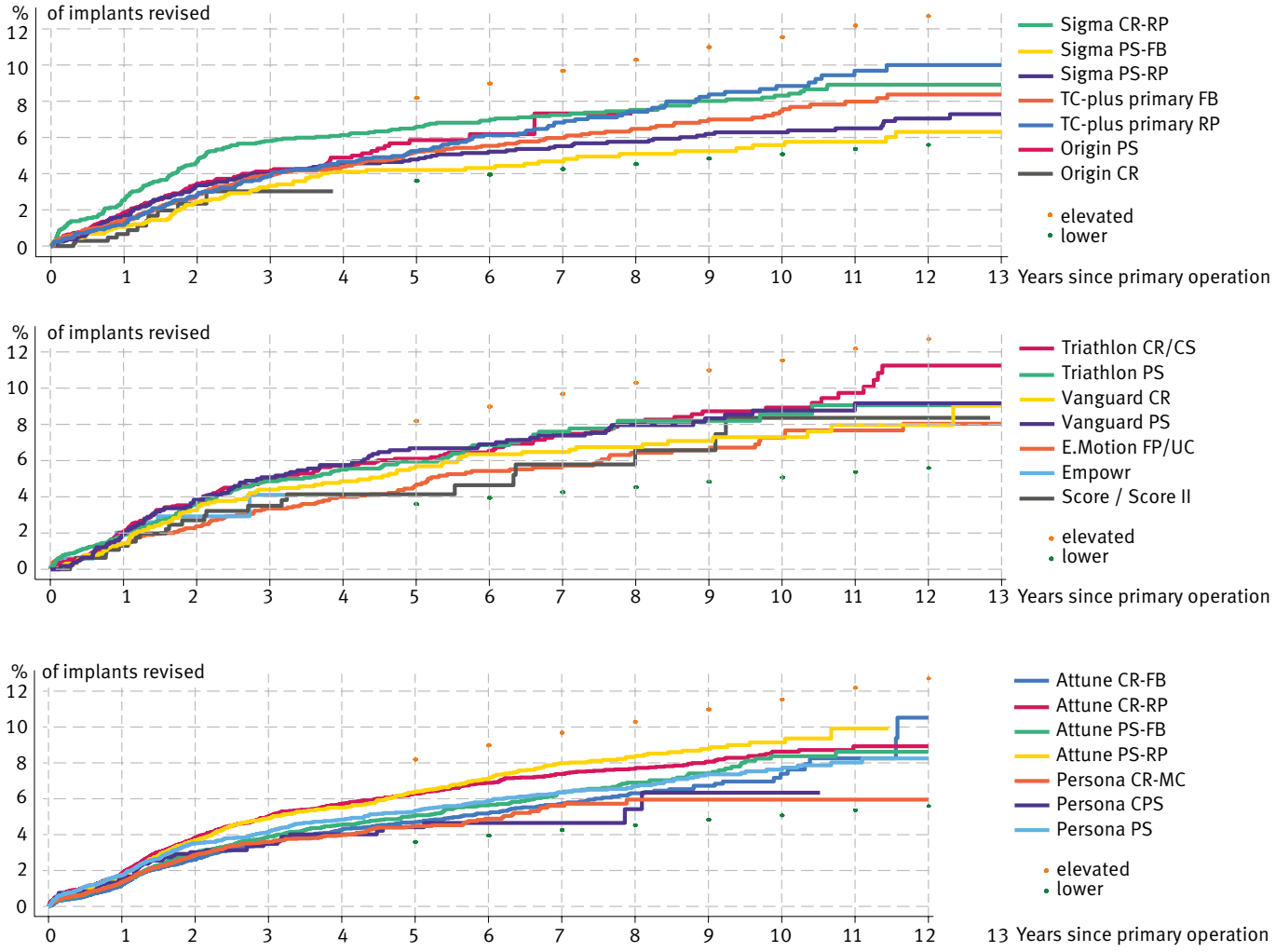
Figures 5.24 a-c

All remaining implant combinations with average revision risks (all TKA)

Also showing upper and lower limits (corresponding to elevated and below-average version risk at 150% and 66% of the group average respectively). upper and lower limits.

plants is low. Therefore, any additional revision will have a high impact on the performance. This can be detected also graphically, with rather large steps in the KM estimate curve **(Figure 5.24 c).**

The remaining brands of TKA had revision rates within the margins of the lower and upper limits at 66% and 150% of the Swiss national average, respectively **(Figures 5.24 a-f).**



Figures 5.24 d-f

All remaining implant combinations with average revision risks (all TKA)

Also showing upper and lower limits (corresponding to elevated and below-average version risk at 150% and 66% of the group average respectively). upper and lower limits.

Partial knee arthroplasty

5.6 Primary partial knee arthroplasty

Since 2012, a total of 39,914 primary PKA has been registered **(Table 3.12).** The proportion of PKA was 15.3% over the past 13 years. In 2025, 22,803 TKA and 3,951 PKA had been performed, resulting in a share of PKA of 14.8%. For further details regarding incidence and demography please consult also **Chapter 3.3.3.**

Previous surgery

Over the past six years, no previous operations were registered in 65.8% of the PKA, whereas 23.7% had a meniscectomy, and 19.1% an arthroscopy. As both these options could be selected simultaneously, this indicates that an earlier open meniscectomy was performed in 4.6%. Prior meniscal surgery declined steadily since 2012 (32%), plateauing below 20% **(Figure 5.25).** Former ACL reconstruction was noted in 2.0% of the cases, followed next by high tibial osteotomy in 1.0%. All other previous types of surgery were very rare **(Table 5.8).**

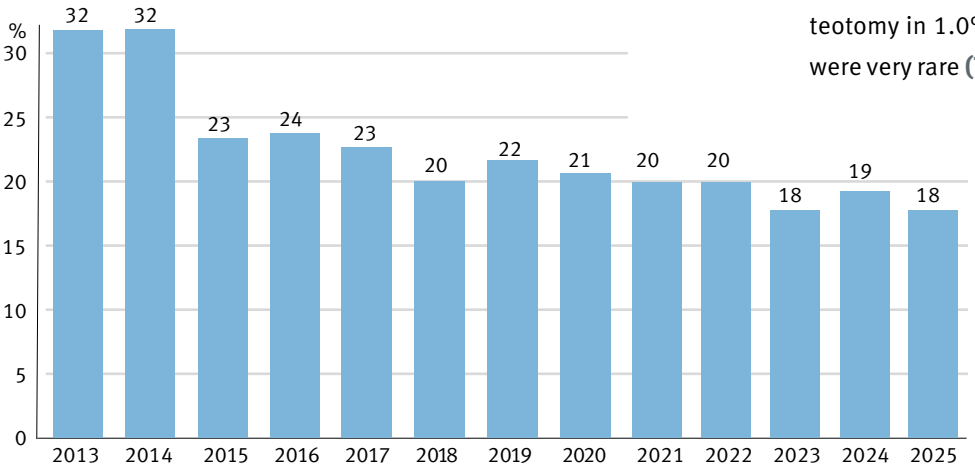


Figure 5.25
Share of partial knee patients who had knee arthroscopy prior to arthroplasty (%)

Previous surgery	N	%
None	13,794	65.8
Knee arthroscopy	4,010	19.1
Meniscectomy	4,976	23.7
ACL reconstruction	419	2.0
Osteotomy tibia close to knee	202	1.0
Osteosynthesis tibia close to knee	102	0.5
Surgery for patella stabilization	231	1.1
Synovectomy	144	0.7
Osteotomy femur close to knee	42	0.2
Osteosynthesis femur close to knee	34	0.2
Surgery for treating infection	7	0.0
Surgery for tumor	6	0.0
Other	319	1.5

Intervention	N	%
Unicompartment medial	17,581	83.9
Unicompartment lateral	1,158	5.5
Femoropatellar	1,438	6.9
Other (including combinations)	268	1.3
Other (type unknown)*	498	2.4
Conventional (including minimally invasive)	17,859	85.2

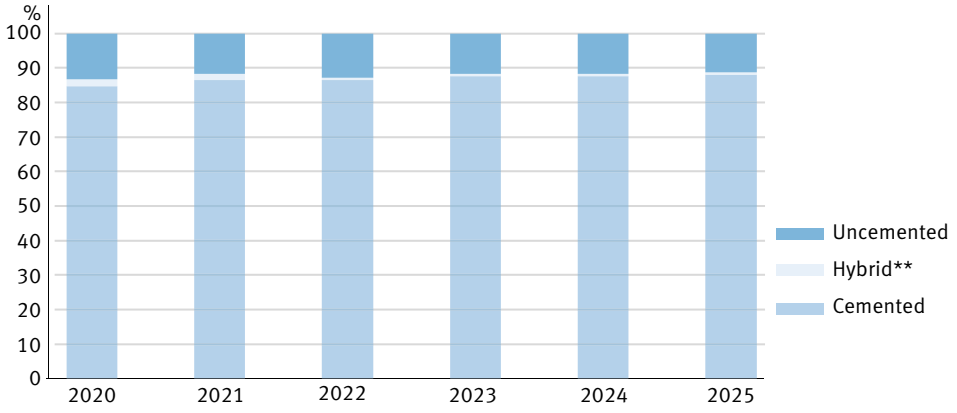
Technology	N	%
Computer navigation	193	0.9
Patient specific instrumentation (PSI)	1,514	7.2
Robotic-assisted (v2021)	1,343	6.4
Other	202	1.0

Table 5.8
Primary partial knee arthroplasty: Surgery characteristics
All diagnoses, all component fixations (2020–2025). Multiple responses possible (percentages do not sum to 100).
* In those cases TKA categories were chosen on the data entry form but partial knee systems registered. We consider implant registration more reliable than form entry and therefore recognise them as partial knee procedures.

Type of PKA and fixation

Between 2020 and 2025 medial PKA represented 83.9% of all the PKA cases, lateral PKA 5.5%, and PFJ replacement 6.9%. Other types, including combinations, were rare (1.3%). In 2.4%, the type was incorrectly classified as a TKA (mentioned as "other, type unknown"), but the implant data identified them as PKA **(Table 5.8).** This underscores the importance of checking properly the options available at case registration.

Most of the PKA were cemented during the period from 2020 to 2025. The share of cemented components continuously increased over time and reached 88.0% in 2025. Correspondingly, the share of uncemented PKA continuously decreased over the same period, with hybrid fixation playing no relevant role **(Figure 5.26).**



Component fixation	2020	2021	2022	2023	2024	2025	2020 – 2025
N	**2,921**	**3,003**	**3,187**	**3,222**	**3,500**	**3,691**	**19,524**
Uncemented	13.4	11.8	12.8	11.7	11.6	11.2	12.0
Reverse hybrid*	0.4	0.2	0.2	0.2	0.4	0.2	0.3
Hybrid**	1.9	1.8	0.8	0.7	0.7	0.7	1.1
Cemented	84.3	86.2	86.3	87.3	87.2	88.0	86.6

Figure 5.26

Primary partial knee arthroplasty: Component fixation (%)

All diagnoses

* femur cemented, tibia uncemented

** femur uncemented, tibia cemented

Technology

Between 2020 and 2025, PKA were implanted conventionally in 85.2% of the cases. Technical support was still rarely used for PKA in Switzerland, accounting for 15.5% (37.6% in TKA, **see 5.1**) of all cases during the same period **(Table 5.8)**, although a slight increase could be observed since 2019 mainly for robotic assistance **(Figure 5.27)**. Conventional computer navigation was used in 0.9%, PSI in 7.2% and robotics in 6.4% during this period **(Table 5.8)**. It may have been expected that technical support would be more frequently used in PKA than in TKA to reduce the risk of surgical errors, mainly on the tibial side, which is mostly responsible for elevated early revisions after PKA. Obviously, Swiss surgeons rely far less on technological support than surgeons in other countries like Australia.

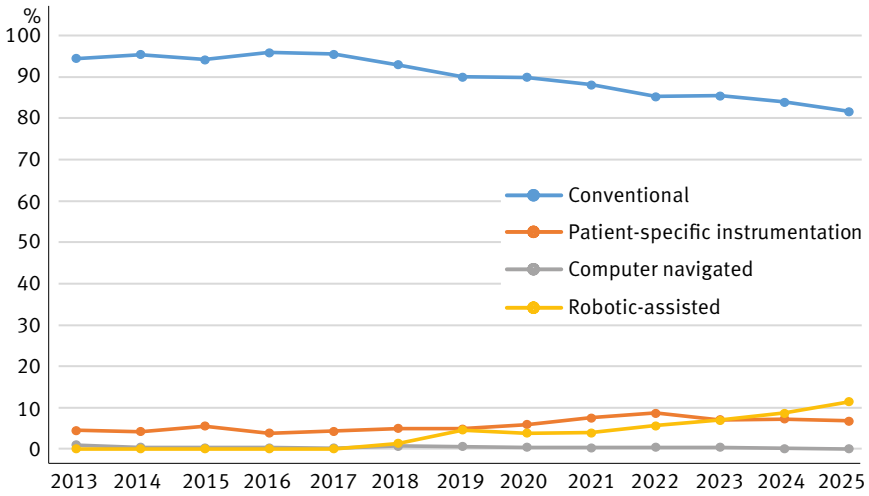


Figure 5.27

Partial knee arthroplasty: technological assistance over time (%)

NB: robotically assisted cases before v2021 were derived from free text entries.
"Other" responses were coded as "Not tech. assisted" unless they specifically mentioned robotic, PSI oder navigation". There was a recognisable overlap of computer navigated and other responses, indicating that those cases were actually robotic-assisted.

5.7 First revision within two years after primary partial knee arthroplasty

Of the 39,914 PKA documented since 2012 **(Table 3.12),** 13,255 had been performed within the current 4-year moving window between 01.01.2020 and 31.12.2023 and could be used to calculate the current 2-year revision rate by 31.12.2025. Of the implants in this cohort, 625 had been revised, accounting for a 2-year revision rate of 4.7% (CI 4.4–5.1%) **(Table 5.9).** Please refer also to Chapter 3.3.5 for incidence and demography.

5.7.1 Reasons for revision

The main reason for early revision of PKA was loosening of the tibial component (30.7%), followed by progression of OA (17.1%), loosening of the femoral component (13.0%), femorotibial instability (9.3%), patella problems (7.7%) and pain of unknown origin (6.2%). Infections were registered as reason for revision in 10.2% and periprosthetic tibial fractures in (8.5%). Malposition of the tibial component was noted in 4.5% and in 2.1% of the femoral component **(Table 5.10).** Excluding infections, most of the other reasons for early revision are linked to technical errors or poor indication when the revision had to performed within less than two years after primary PKA.

			Revised		95% CI	
		N at risk*	N	%**	lower	upper
Overall		13,255	625	4.7	4.4	5.1
Sex	Women	5,431	275	5.1	4.5	5.7
	Men	6,390	263	4.1	3.7	4.7
Age group	‹55	1,719	110	6.4	5.4	7.7
	55–64	4,100	202	4.9	4.3	5.7
	65–74	3,756	146	3.9	3.3	4.6
	75–84	1,990	65	3.3	2.6	4.2
	85+	255	15	6.0	3.6	9.7

Table 5.9

First revision of primary partial knee arthroplasty within 24 months overall and according to baseline characteristics

All diagnoses, all component fixations.
4-year moving average covering implants between 01.01.2020 and 31.12.2023, with two years follow-up (31.12.2025).
* Number of patients with at least two years follow-up (i.e. primary prosthesis in moving average).
** Rates adjusted for effects of mortality and emigration.

Reason for early first revision	N revised	%
Loosening tibia	192	30.7
Progression of unicomp. OA	107	17.1
Loosening femur	81	13.0
Infection	64	10.2
Femorotibial instability	58	9.3
Periprosthetic fracture tibia	53	8.5
Patella problems	48	7.7
Pain (of unclear origin)	39	6.2
Component malposition tibia	28	4.5
Joint stiffness/arthrofibrosis	14	2.2
Component malposition femur	13	2.1
Wear of insert	10	1.6
Sizing tibial component	8	1.3
Loosening patella	7	1.1
Sizing femoral component	6	1.0
Patellar instability	3	0.5
Periprosthetic fracture femur	1	0.2
Periprosthetic fracture patella	0	0.0
Other	69	11.0
N revisions	**625**	

Table 5.10

Reason for early first revision of primary partial knee arthroplasty

All diagnoses, all component fixations. 4-year moving average covering implants between 01.01.2020 and 31.12.2023, with two years follow-up (31.12.2025).
Early first revisions are those occurring within 2 years of the primary arthroplasty.
Multiple responses possible (percentages do not sum to 100)

Type of early first revision	N revised	%
Conversion from unicomp. to total prosthesis*	452	72.3
Exchange of PE insert	98	15.7
Tibial revision	21	3.4
Complete revision*	13	2.1
Femoral revision	12	1.9
Subsequent partial prosthesis, second compartment	11	1.8
Patella revision	7	1.1
Component removal with spacer implantation	5	0.8
Component removal without spacer implantation	2	0.3
Subsequent patella prosthesis	1	0.2
Reimplantation of prosthesis	1	0.2
Subsequent patella prosthesis with exchange of PE insert	0	0.0
Other	2	0.3
Total Revisions	**625**	**100**

Table 5.11

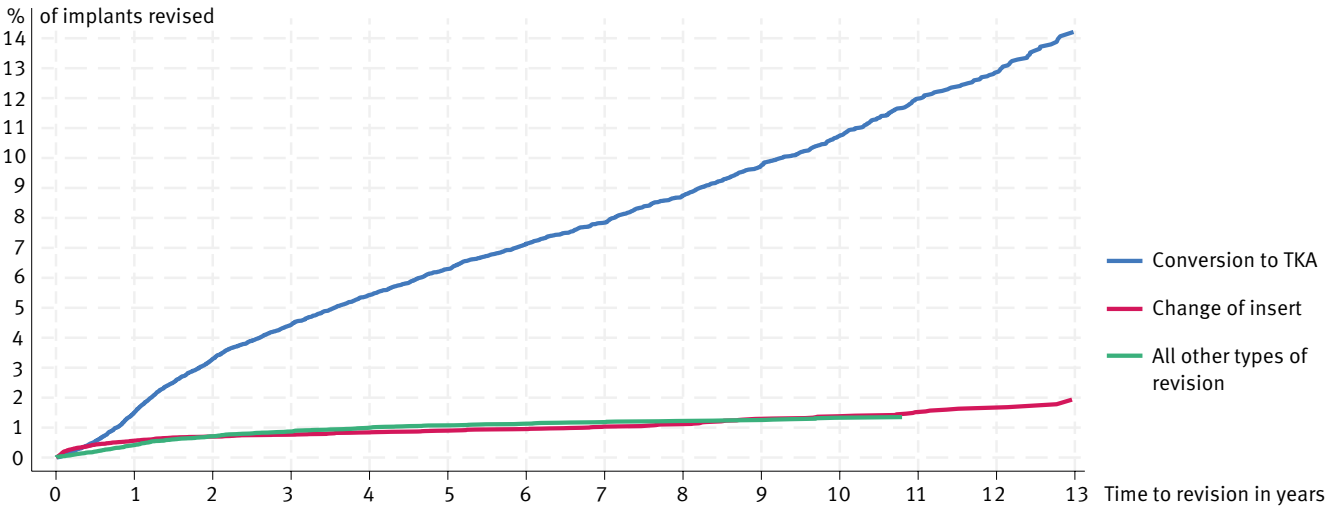
Type of early first revision of primary partial knee arthroplasty

All diagnoses, all component fixations.4-year moving average covering implants between 01.01.2020 and 31.12.2023, with two years follow-up (31.12.2025).
Early first revisions are those occurring within 2 years of the primary arthroplasty
* A large share of conversions is entered locally as “complete revisions”. Such responses have been recoded as conversions if TKA components were registered or if a TKA was indicated on the revision proforma.

5.7.2 Type of early PKA revision

A total of 72.3% of the revised PKA were conversions to TKA. Isolated insert exchange was performed in 15.7% of revisions, followed by an isolated tibial revision in 3.4%, patella revision in 2.1%, additional PKA in another compartment in 1.8% and isolated femoral revision in 1.1% **(Table 5.11).** Complete revision was performed in 1.9%, meaning conversion to TKA in many cases. These responses were reclassified as conversion if TKA components were registered at the revision. The high number of conversions to TKA in case of failed PKA is even more obvious in **Figure 5.28,** depicting cumulative incidence rates of all cases since 2012. Component removal with or without spacer implantation due to PJI was performed in only 7 of the 452 revisions performed between 01.01.2020 and 31.12.2023.

For the analysis of re-revision after primary PKA, please consult **Chapter 5.4.4.**



Type of revision	1 year	2 years	3 years	5 years	6 years	8 years	11 years	13 years
Conversion to TKA	**1.5** (1.4-1.6)	**3.3** (3.1-3.5)	**4.4** (4.2-4.7)	**6.3** (6.0-6.6)	**7.1** (6.8-7.5)	**8.7** (8.4-9.1)	**12.0** (11.4-12.5)	**14.2** (13.4-15.1)
Change of PE insert	**0.6** (0.5-0.6)	**0.7** (0.6-0.8)	**0.8** (0.7-0.9)	**0.9** (0.8-1.0)	**0.9** (0.8-1.1)	**1.1** (1.0-1.2)	**1.5** (1.3-1.7)	**1.9** (1.5-2.4)
All other types	**0.4** (0.4-0.5)	**0.7** (0.6-0.8)	**0.9** (0.8-1.0)	**1.1** (1.0-1.2)	**1.1** (1.0-1.3)	**1.2** (1.1-1.4)	**1.4** (1.2-1.5)	**1.4** (1.2-1.5)

Figure 5.28

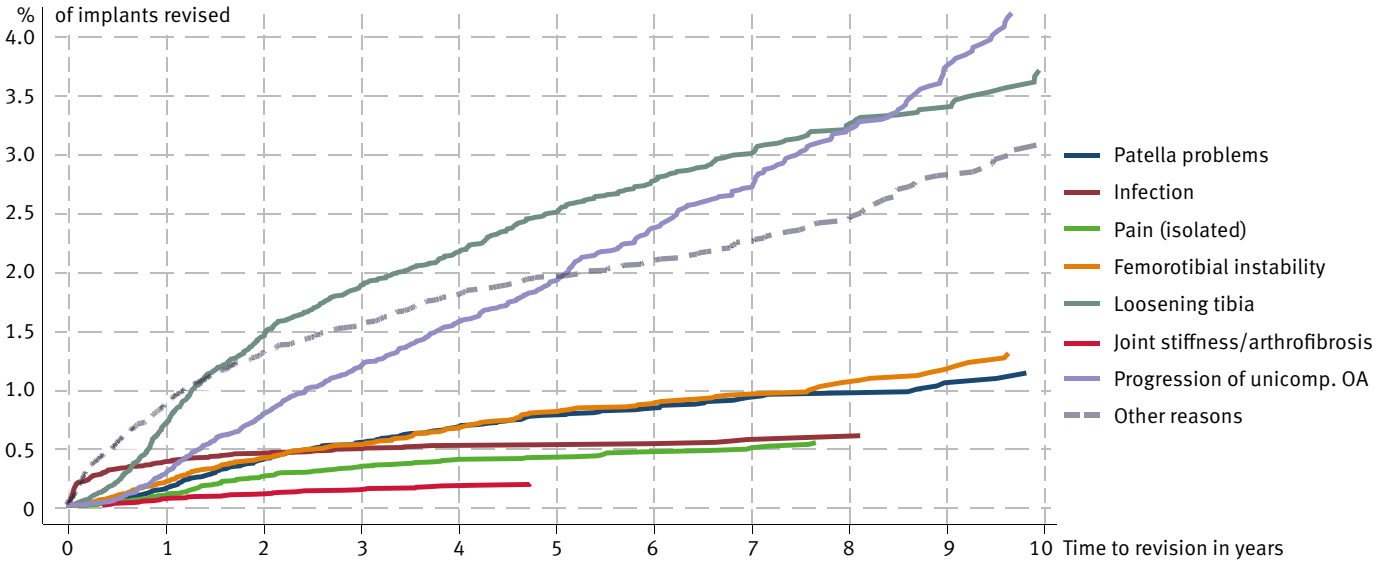
Cumulative incidence rates for different types of revisions of partial knee arthroplasty

Time since operation, 2012–2025, % of implants revised

5.8 Mid- and long-term survival after primary partial knee arthroplasty

5.8.1 Reasons for revision

Considering cumulative incidence rates for revision between 2015 and 2025, loosening of the tibial component was the most prominent reason, followed by patella problems and "other reasons". Interestingly, progression of osteoarthritis showed an almost linear progression over time. The steepness did lead to a crossing with the incidence curve of tibial loosening at nine years of follow-up, making progression of OA the leading cause of PKA revision. Among the "other reasons", more than half of the mentioned causes were component malposition and wrong sizing. The curve for all the other revision reasons had a flatter pattern adding to less than half of revision reasons in total **(Figure 5.29).** As for TKA, Kernel density estimation of the evolution over time of different revision causes are not shown this year. The interested readers are kindly referred to the annual report 2025 for this analysis.



Diagnosis for revision	1 year	2 years	3 years	5 years	6 years	7 years	8 years	10 years
Patella problems	**0.1** (0.1-0.2)	**0.4** (0.3-0.5)	**0.5** (0.5-0.6)	**0.8** (0.7-0.9)	**0.8** (0.7-1.0)	**0.9** (0.8-1.1)	**0.9** (0.8-1.1)	**1.1** (0.9-1.4)
Infection	**0.4** (0.3-0.4)	**0.4** (0.4-0.5)	**0.5** (0.4-0.6)	**0.5** (0.4-0.6)	**0.5** (0.5-0.6)	**0.6** (0.5-0.7)	**0.6** (0.5-0.7)	**0.6** (0.5-0.7)
Pain (isolated)	**0.1** (0.1-0.1)	**0.2** (0.2-0.3)	**0.3** (0.3-0.4)	**0.4** (0.3-0.5)	**0.5** (0.4-0.6)	**0.5** (0.4-0.6)	**0.5** (0.4-0.7)	**0.5** (0.4-0.7)
Femorotibial instability	**0.2** (0.2-0.2)	**0.4** (0.3-0.5)	**0.5** (0.4-0.6)	**0.8** (0.7-0.9)	**0.9** (0.8-1.0)	**0.9** (0.8-1.1)	**1.0** (0.9-1.2)	**1.3** (1.1-1.5)
Loosening TI	**0.7** (0.6-0.8)	**1.4** (1.3-1.6)	**1.9** (1.7-2.0)	**2.5** (2.3-2.7)	**2.8** (2.5-3.0)	**3.0** (2.8-3.2)	**3.2** (3.0-3.5)	**3.7** (3.4-4.1)
Joint stiffness/arthrofibrosis	**0.1** (0.0-0.1)	**0.1** (0.1-0.1)	**0.1** (0.1-0.2)	**0.2** (0.1-0.3)	**0.2** (0.1-0.3)	**0.2** (0.1-0.3)	**0.2** (0.1-0.3)	**0.2** (0.1-0.3)
Progression of unicomp. OA	**0.3** (0.2-0.3)	**0.8** (0.7-0.9)	**1.2** (1.0-1.3)	**1.9** (1.7-2.1)	**2.4** (2.2-2.6)	**2.7** (2.5-3.0)	**3.2** (2.9-3.5)	**4.2** (3.8-4.6)
Other reasons	**0.9** (0.8-1.0)	**1.3** (1.2-1.4)	**1.5** (1.4-1.7)	**1.9** (1.8-2.1)	**2.1** (1.9-2.3)	**2.2** (2.0-2.4)	**2.4** (2.2-2.7)	**3.1** (2.7-3.4)

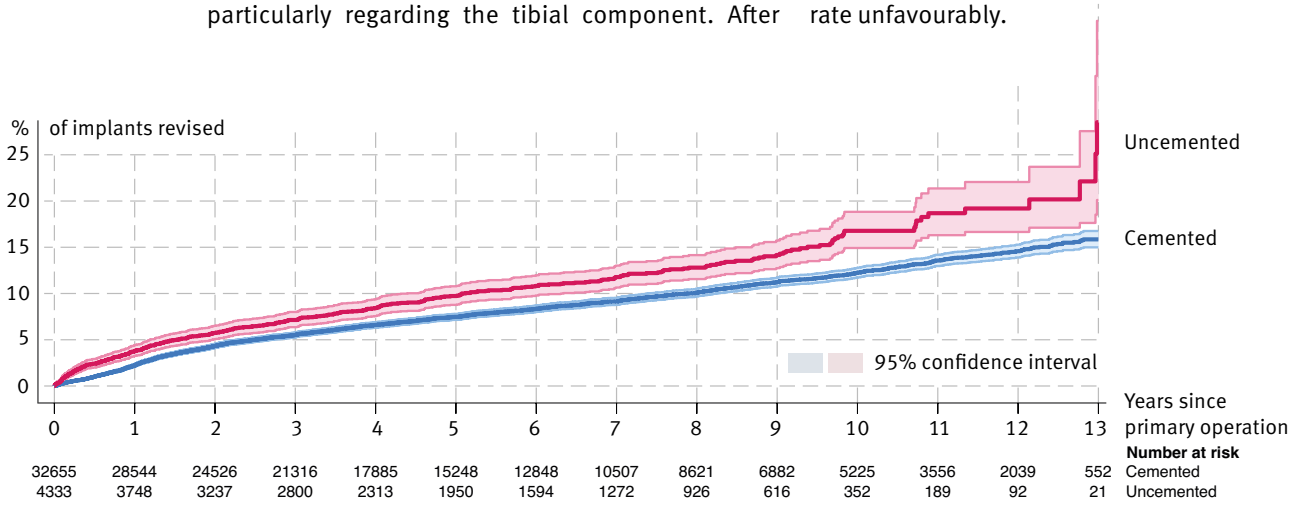
Figure 5.29

Cumulative incidence rates for different revision diagnosis of partial knee arthroplasty

Time since operation, 2015–2025, % of implants revised. Detailed reasons for revisions available since 2015.

5.8.2 Revision by fixation

Uncemented PKA had a higher revision rate than cemented ones until the maximum follow-up available within SIRIS of 13 years **(Figure 5.30).** A higher revision rate in uncemented PKA may be expected especially during the early postoperative phase, as uncemented implants require sufficient primary stability for osteointegration, a critical issue in some cases, particularly regarding the tibial component. After the initial failures manifested, the revision curve of the uncemented implants remained parallel to the one observed for cemented implants until the 10th year of follow-up. Astonishingly, the difference was getting even more later on, although with widened confidence intervals due to small numbers remaining at risk **(Figure 5.30).** Of note, patients with uncemented PKA were younger than those with cemented implants. This selection bias influences the revision rate unfavourably.



Component fixation	1 year	2 years	3 years	5 years	6 years	8 years	10 years	13 years
Cemented	**2.2** (2.1-2.4)	**4.3** (4.1-4.6)	**5.5** (5.3-5.8)	**7.5** (7.2-7.8)	**8.4** (8.0-8.7)	**10.1** (9.7-10.5)	**12.3** (11.7-12.8)	**15.9**(15.0-16.8)
Uncemented	**3.8** (3.2-4.4)	**5.8** (5.1-6.5)	**7.1** (6.4-8.0)	**9.7** (8.8-10.8)	**10.8** (9.8-12.0)	**12.8** (11.6-14.2)	**16.8** (14.9-18.8)	**28.5**(20.1-39.5)

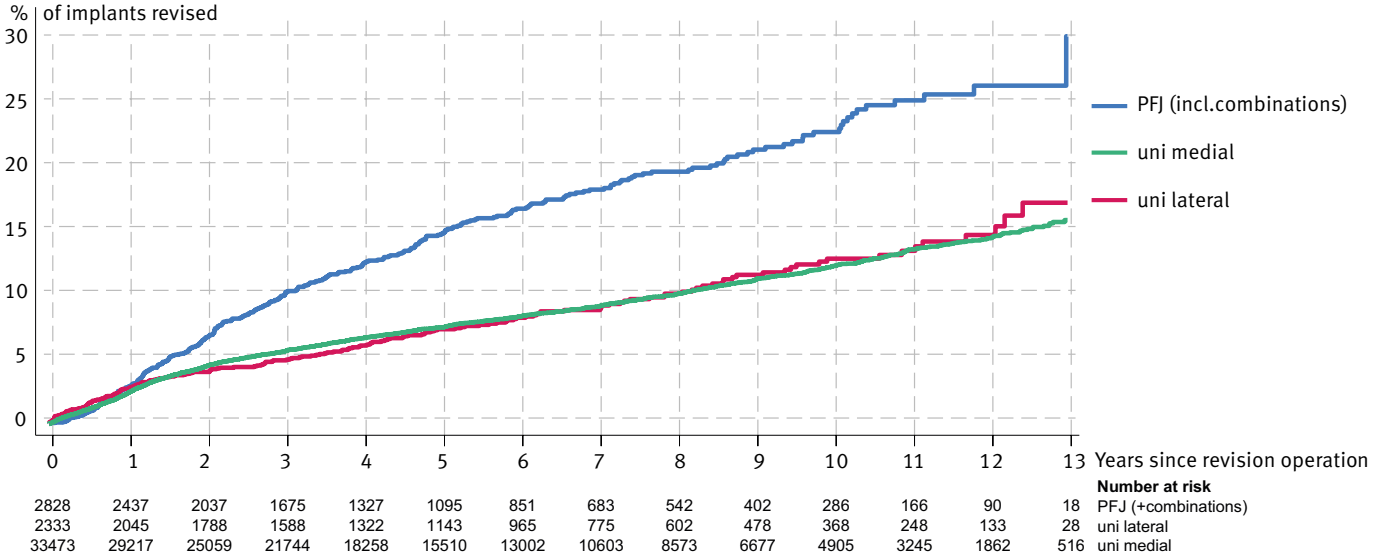
Figure 5.30

Estimated failure rates of primary partial knee arthroplasty for main types of component fixation

Time since operation, 2012–2025, all diagnoses.

5.8.3 Revision by type of PKA

Estimated failure rates of PKA since 2012 were equal for medial and lateral PKA. PFJ performed much worse regarding revision rates, diverging already between one to two years after surgery. At 4 years of follow-up, revision rates were almost twice those for medial or lateral PKA **(Figure 5.31).**



Arthroplasty	1 year	2 years	3 years	5 years	6 years	8 years	10 years	12 years
uni medial	**2.4** (2.2-2.6)	**4.5** (4.3-4.7)	**5.7** (5.4-5.9)	**7.6** (7.2-7.9)	**8.4** (8.1-8.8)	**10.2** (9.7-10.6)	**12.3** (11.8-12.9)	**16.0** (15.0-16.9)
uni lateral	**2.7** (2.1-3.5)	**4.1** (3.3-5.0)	**5.0** (4.1-6.0)	**7.4** (6.3-8.7)	**8.3** (7.1-9.7)	**10.2** (8.7-11.9)	**12.9** (11.0-15.2)	**17.3** (13.9-21.5)
PFJ (incl. comb.)	**2.9** (2.3-3.6)	**6.7** (5.8-7.8)	**10.0** (8.9-11.3)	**14.8** (13.3-16.5)	**16.9** (15.2-18.7)	**19.7** (17.8-21.9)	**22.9** (20.5-25.4)	**30.4** (23.3-39.2)

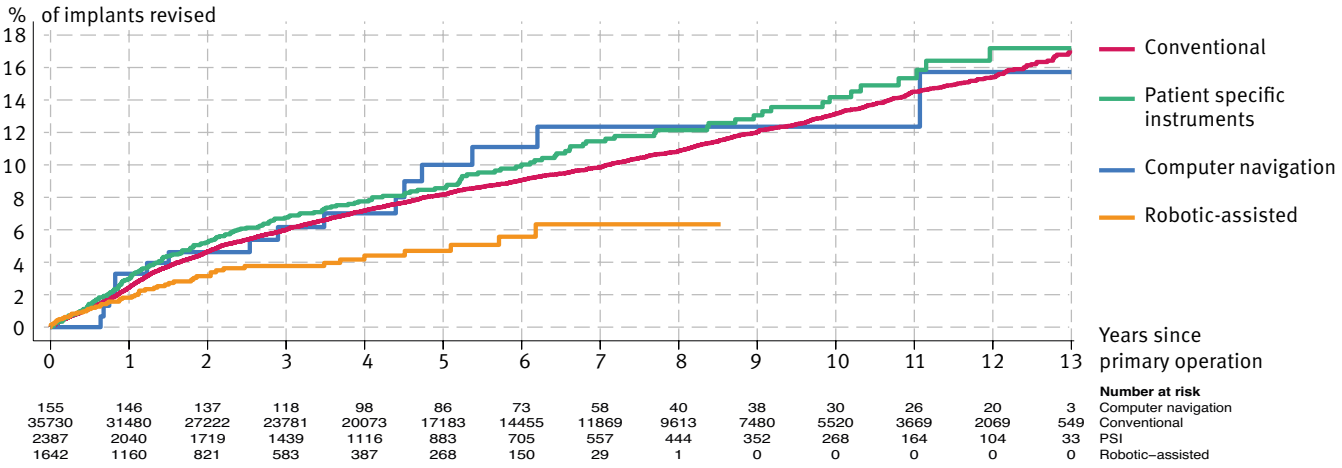
Figure 5.31

Estimated failure rates of primary partial knee arthroplasty: type of arthroplasty

Time since operation, 2012–2025, all diagnoses.

5.8.4 Revision by technology

Comparing technical support during primary PKA, PSI did not perform better than conventional technique, as did conventional computer navigation. In contrast, robotically assisted PKA was associated with less revisions from early on, although some revisions between 4 to 6 years after primary surgery did cause a certain deterioration of results **(Figure 5.32).** At 7 years of follow-up, robotically assisted PKA had a revision rate of 6.3% (CI 4.3–9.2%) compared to conventional technique with 9.8% (CI 9.5–10.2%), the difference being statistically significant. Most of these promising results in short- and mid-term were linked to a specific image-based robotic system. More robotic systems with varying value in supporting surgery and increasing numbers of surgeons with less experience could cause future deterioration of the initially promising results, as had been observed in Australia.



Assistance	1 year	2 years	3 years	5 years	6 years	8 years	10 years	13 years
Conventional	**2.4** (2.3-2.6)	**4.7** (4.4-4.9)	**6.0** (5.7-6.3)	**8.2** (7.8-8.5)	**9.1** (8.7-9.4)	**10.9** (10.5-11.3)	**13.2** (12.7-13.7)	**17.1** (16.1-18.1)
Patient spec. instr.	**3.0** (2.4-3.8)	**5.2** (4.3-6.3)	**6.8** (5.7-7.9)	**8.6** (7.3-10.0)	**10.0** (8.6-11.6)	**12.1** (10.4-14.1)	**14.2** (12.1-16.6)	**17.2** (14.2-20.8)
Computer navigation	**3.3** (1.4-7.7)	**4.6** (2.2-9.5)	**6.2** (3.3-11.5)	**10.0** (5.9-16.8)	**11.1** (6.6-18.2)	**12.4** (7.5-20.0)	**12.4** (7.5-20.0)	
Robotic-assisted	**1.8** (1.2-2.7)	**3.1** (2.3-4.3)	**3.8** (2.8-5.1)	**4.7** (3.5-6.4)	**5.6** (4.0-7.8)			

Figure 5.32

Estimated failure rates of primary partial knee arthroplasty: technological assistance

Time since operation, 2012–2025, all diagnoses.

5.9 Results of implants in unicondylar medial or lateral partial knee arthroplasty

The analysis is performed separately for medial/lateral unicondylar PKA **(chapter 5.9)** and for PFJ PKA **(chapter 5.10),** as the revision rates observed largely differed.

Table 5.12 shows Switzerland's current top ten (one of them in two versions) of the most frequently used unicondylar PKA systems, representing 96.3% (18,793) of the PKA performed between 2020 and 2025. During this period, 729 implants (3.7%) belonged to the less common systems, grouped together as "other systems". The share of these is decreasing continuously over the years. Only 36 implants (0.2%) could not be classified.

5.9.1 Two-year revision rates of unicondylar partial knee arthroplasty

The two-year revision rates of unicondylar PKA from the current moving window are shown in **Figure 5.33,** illustrating how the implants used between 01.01.2020 and 31.12.2023 performed at a two-year follow-up. Of the 14 implant combinations used most frequently (the rest being summarised under "other systems"), none was identified as an outlier.

Oxford cementless was clearly worse than the national average, with the confidence interval also outside of the 95% confidence interval but still inside the outlier alert boundary. The system reaching a definitive outlier status at the third year of follow-up (Journey Uni) had a revision rate at two years within the boundaries of the Swiss average. This reflects recent im-

System	2020	2021	2022	2023	2024	2025	2020 – 2025
Balansys uni	299	352	420	333	337	341	2,082
GMK uni	205	159	155	116	97	124	856
Journey uni	89	75	47	54	48	37	350
Link sled prosthesis	3	5	14	62	68	87	239
Moto	66	126	189	150	238	248	1,017
Oxford cemented/hybrid	270	254	211	202	272	210	1,419
Oxford cementless	354	322	363	345	365	379	2,128
Persona partial knee	412	446	519	593	609	637	3,216
Physica ZUK	329	333	399	471	468	510	2,510
Restoris MCK	110	112	178	228	290	309	1,227
Sigma partial knee	600	615	510	578	675	771	3,749
Other systems	173	194	171	81	47	63	729
Total	**2,910**	**2,993**	**3,176**	**3,213**	**3,514**	**3,716**	**19,522**

Table 5.12
Top 10 (94%) of primary partial knee arthroplasty systems (all diagnoses, all component fixations) 2020 – 2025

Important information on the use of the implant performance tables below

- Estimated revision rate exceeds the alert boundary, but we do not identify this implant combination as an outlier because the 95% confidence interval overlaps the confidence zone of the reference group.
- Identified as potential outliers. Please note the statistical confidence intervals. The outlier status comes with varying degrees of statistical probability. We consider the potential outlier status „highly likely" when both the estimated revision rate and the complete confidence interval exceed the outlier alert boundary.

Please be aware that relatively rare implant combinations are frequently used in only a small number or indeed only in one hospital in Switzerland. Observed revision rates may be determined by local factors and performance may differ significantly between locations. Manufacturers of detected outlier implants and the hospitals where they were used (and revisions occurred) have been informed by SIRIS.

provements with this implant. In contrast, the summary group "other systems" had the highest two-year revision rate of 8.4% (CI 4.1–16.9%) and remained only just below the outlier-boundary **(Figure 5.33).** Therefore, it is advisable for surgeons using less common implants to carefully review their outcomes and consider switching to brands more frequently used in Switzerland if there is any uncertainty.

5.9.2 Long term revision rate of unicondylar partial knee arthroplasty

The long-term evaluation for all systems registered since 2012, all diagnoses, and all fixation methods is depicted in **Table 5.13,** showing results up to 13 years after surgery. The revision rate after 13 years for all systems was 14.8% (CI 14.1–15.4%), considerably higher than after TKA, where an average 13-year revision rate of 8.5% (CI 8.3–8.7%) was observed **(Table 5.7).**

System	CCS*	Mean age	at risk N**	Revised N	Revised % (95% CI)***
Allegretto	100	70	229	3	1.3 (0.4-4.0)
Balansys uni	39	65	1,404	73	5.2 (4.2-6.5)
GMK uni	20	65	635	40	6.3 (4.7-8.5)
IUni	32	64	180	7	3.9 (1.9-8.1)
Journey uni	14	63	265	11	4.2 (2.3-7.4)
Link sled prosthesis	83	70	84	4	4.8 (1.8-12.3)
Moto	17	66	531	31	5.9 (4.2-8.2)
Oxford cemented/hybrid	15	66	937	45	4.8 (3.6-6.4)
Oxford cementless	15	64	1,384	87	6.3 (5.1-7.7)
Persona partial knee	16	65	1,970	77	3.9 (3.2-4.9)
Physica ZUK	34	65	1,532	81	5.3 (4.3-6.6)
Restoris MCK	52	66	628	16	2.6 (1.6-4.1)
Sigma partial knee	19	65	2,303	88	3.8 (3.1-4.7)
Triathlon PKR	60	66	127	4	3.1 (1.2-8.2)
Other systems		65	83	7	8.4 (4.1-16.9)
CH average for group					4.7 (4.3-5.1)

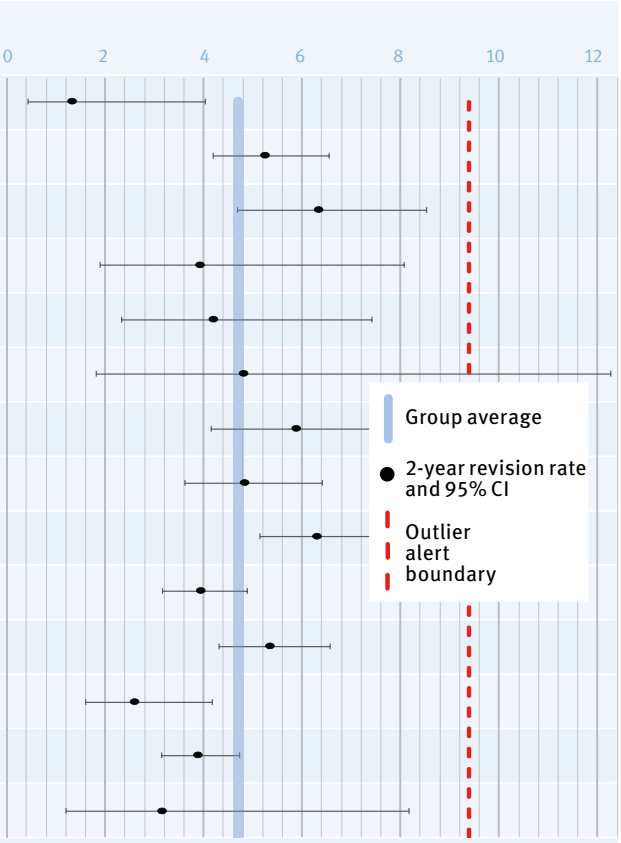


Figure 5.33

2-year evaluation: Revision rates of primary partial knee arthroplasty systems within 24 months

4-year moving average covering implants between 01.01.2020 and 31.12.2023, with two years follow-up (31.12.2025).

* Share of implants accounted for by main user hospital service. A higher share signifies an increased likelihood of biased figures due to local effects. A share of 50%+ would suggest that reported results are likely determined by one hospital service.

** Number of patients with at least two years follow-up (i.e. primary prosthesis in moving average).

*** Rates adjusted for effects of mortality and emigration.

The revision rate after 13 years varied from 6.1% for the best to 29.3% for the worst system **(Table 5.13).** One implant (Journey Uni) had a revision rate within the range of the Swiss average at the first and second year **(Figure 5.33)** but turned then to significantly worse at 3, 5, 10 and 13 years.

Cemented Oxford performed within the Swiss average up to 13 years of follow-up. Oxford cementless started within the Swiss boundaries at one to five years, although always with higher failure rates than the cemented version. Failure rates at 10 and 13 years were statistically worse than the national average. This contrasts with scientific studies as well as e.g. with the National Joint Registry NJR.

PKA systems grouped under the label "other systems" because of small numbers, accounting all together for 3.7% of the PKA, had an average revision rate at 13 years of 24.7% (CI 17.7–33.9%). This means that none of the less commonly used systems would reach a place in the midfield at thirteen years of follow-up.

As mentioned in former reports Allegretto performed better than average from the first to the thirteenth year of follow-up. Restoris MCK performed better than the Swiss average at one year but still within the lower boundaries. At three and five years the failure rate was significantly lower. Longer follow up is not yet available **(Table 5.13).**

Brands and subsystems of unicondylar PKA

Primary PKA systems and subsystems (such as cemented or uncemented) were analysed separately if numbers were sufficient and if outcomes differed relevantly. Wider confidence intervals reflect higher variability due to small numbers in the subgroups. Please take note of the case concentration score (CCS), indicating the share of the largest providing hospital. A higher value indicates an increased likelihood of bias due to local effects, i.e. individual providers influencing results of systems not frequently used otherwise. For instance, Allegretto was implanted by just one surgeon, resulting in a CCS of 100.

System	Total N	CCS*	Mean age**	1 year (95% CI)	3 years (95% CI)	5 years (95% CI)	10 years (95% CI)	13 years (95% CI)
Allegretto	1,074	100	70	0.5 (0.2-1.1)	1.7 (1.1-2.7)	3.1 (2.2-4.3)	5.7 (4.3-7.7)	6.1 (4.5-8.3)
Balansys uni	4,406	48	65	2.1 (1.7-2.6)	5.5 (4.8-6.3)	6.8 (6.1-7.7)	10.5 (9.3-11.8)	12.9 (11.2-14.8)
GMK uni	1,978	21	66	3.3 (2.5-4.2)	7.5 (6.3-8.8)	9.2 (8.0-10.7)	14.7 (12.7-17.1)	15.8 (13.3-18.7)
Journey uni	1,167	14	63	3.5 (2.6-4.7)	9.2 (7.6-11.0)	15.8 (13.7-18.2)	24.2 (21.2-27.6)	29.3 (25.0-34.2)
Moto	1,069	14	65	3.2 (2.2-4.5)	7.0 (5.3-9.1)	8.8 (6.7-11.4)		
Oxford cemented/hybrid	4,810	18	66	2.5 (2.1-3.0)	5.6 (5.0-6.3)	7.5 (6.7-8.3)	12.9 (11.7-14.1)	17.1 (15.4-19.1)
Oxford cementless	3,819	9	64	3.8 (3.2-4.4)	6.7 (5.9-7.6)	9.0 (8.1-10.1)	15.7 (13.7-17.9)	24.3 (15.6-36.7)
Persona partial knee	4,089	14	65	2.1 (1.7-2.6)	4.6 (4.0-5.4)	6.5 (5.6-7.6)		
Physica ZUK	4,984	20	65	1.8 (1.5-2.3)	5.2 (4.6-6.0)	7.0 (6.2-7.8)	11.8 (10.6-13.1)	15.9 (13.9-18.1)
Restoris MCK	1,390	46	65	1.6 (1.0-2.5)	3.5 (2.5-4.9)	4.3 (3.1-6.0)		
Sigma partial knee	6,796	19	65	2.2 (1.8-2.6)	5.4 (4.8-6.0)	7.0 (6.3-7.7)	10.1 (9.1-11.2)	13.9 (11.9-16.3)
Other systems	1,603		64	3.2 (2.4-4.2)	7.6 (6.3-9.1)	10.6 (9.0-12.5)	18.1 (15.5-21.2)	24.7 (17.7-33.9)
CH average for group				**2.4 (2.3-2.6)**	**5.7 (5.4-5.9)**	**7.7 (7.4-8.0)**	**12.5 (12.0-13.0)**	**14.8 (14.1-15.4)**

Table 5.13

Long term evaluation: Failure rates of primary partial knee arthroplasty systems (all diagnoses, all component fixations)

Time since operation, 2012–2025. Please note that if reported system involves multiple sub-variants, it is possible that the long-term performance of these sub-variants may be significantly different from their combined performance.

* Share of implants accounted for by main user hospital service. A higher share signifies an increased likelihood of biased figures due to local effects. A share of 50%+ would suggest that reported results are likely determined by one hospital service.

** Younger mean age signifies that the case mix is less "usual" and potentially biased towards higher revision risk.

Figures 5.34, 5.35 and 5.36 a and b show the performance of the different PKA brands up to thirteen years of follow-up, with upper and lower limits of the Swiss national average illustrated in dotted lines.

One system (Journey Uni) **(Figure 5.34)** had to be classified as a mid- and long-term potential outlier up to 13 years follow-up but remained just inside the outlier boundary. As usual, the potential and definitive outlier identification will result in a detailed outlier report investigating the reasons for the observed deviations from the national average.

As in former years, one PKA system (Allegretto) had a significantly better survival curve than the Swiss national average, but it must be underscored that it was used in just one surgical unit **(Figure 5.35).** These excellent results are most probably explained by the outstanding expertise of the surgeon than by the system itself. With numbers decreasing rapidly in recent years, it is expected that this system will not be used anymore in the future, either because the surgeon changed implant or is retiring.

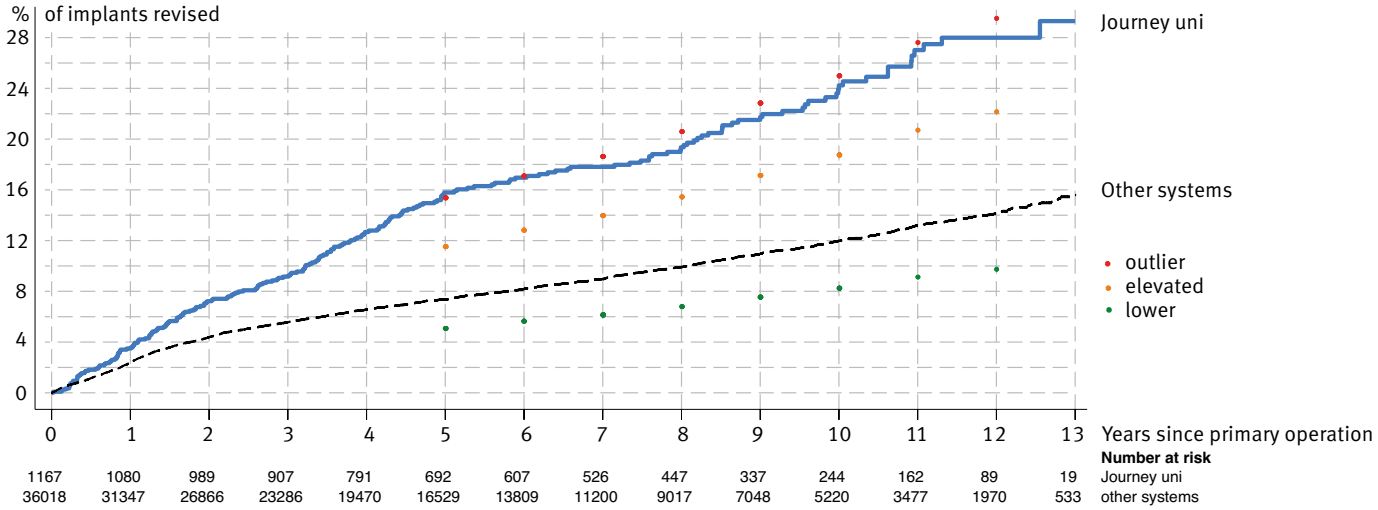


Figure 5.34

Implant combinations with long-term evaluation outlier status (all PK)

Outlier status was defined as a revision rate of twice the group average at any time between year 5 and year 12 (and lower bounds of the 95% confidence interval exceeding the upper bound of the group average; and at least 50 cases at risk at 5 years). The dots indicate upper and lower limits.

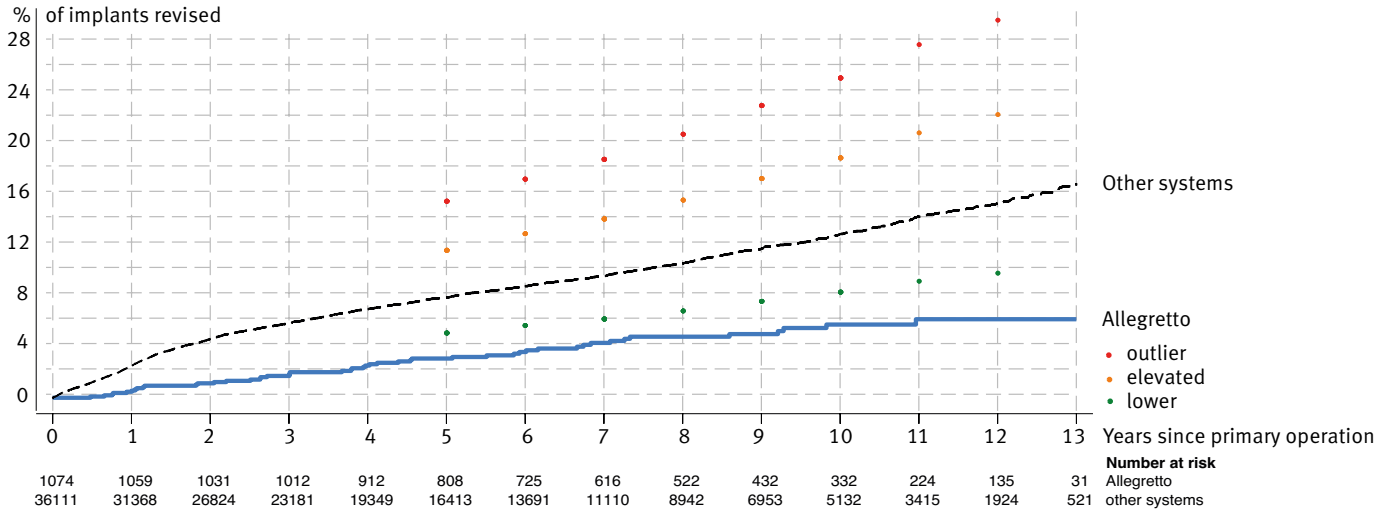


Figure 5.35

Implant combinations with below-average long-term revision rates (PK)

Below-average was defined as a 9-year/10-year revision rate of up to 66% of the group average (and upper bounds of the 95% confidence interval staying below the lower bound of the group average; and at least 25 cases at risk at 9 years/10-years). The dots indicate upper and lower limits.

Restoris MCK, which can only be implanted with image-based robotic assistance, was a low outlier at 3 and 5 years after surgery but then picked up with some revisions after six years **(Figure 5.36 b).** The stepwise increasing revision rate reflects the limited numbers of implants remaining at risk at longer follow-up.

The remaining brands of PKA had revision rates within the margins of the lower and upper limits at 66% and 150% of the group average, respectively **(Figure 5.36).**

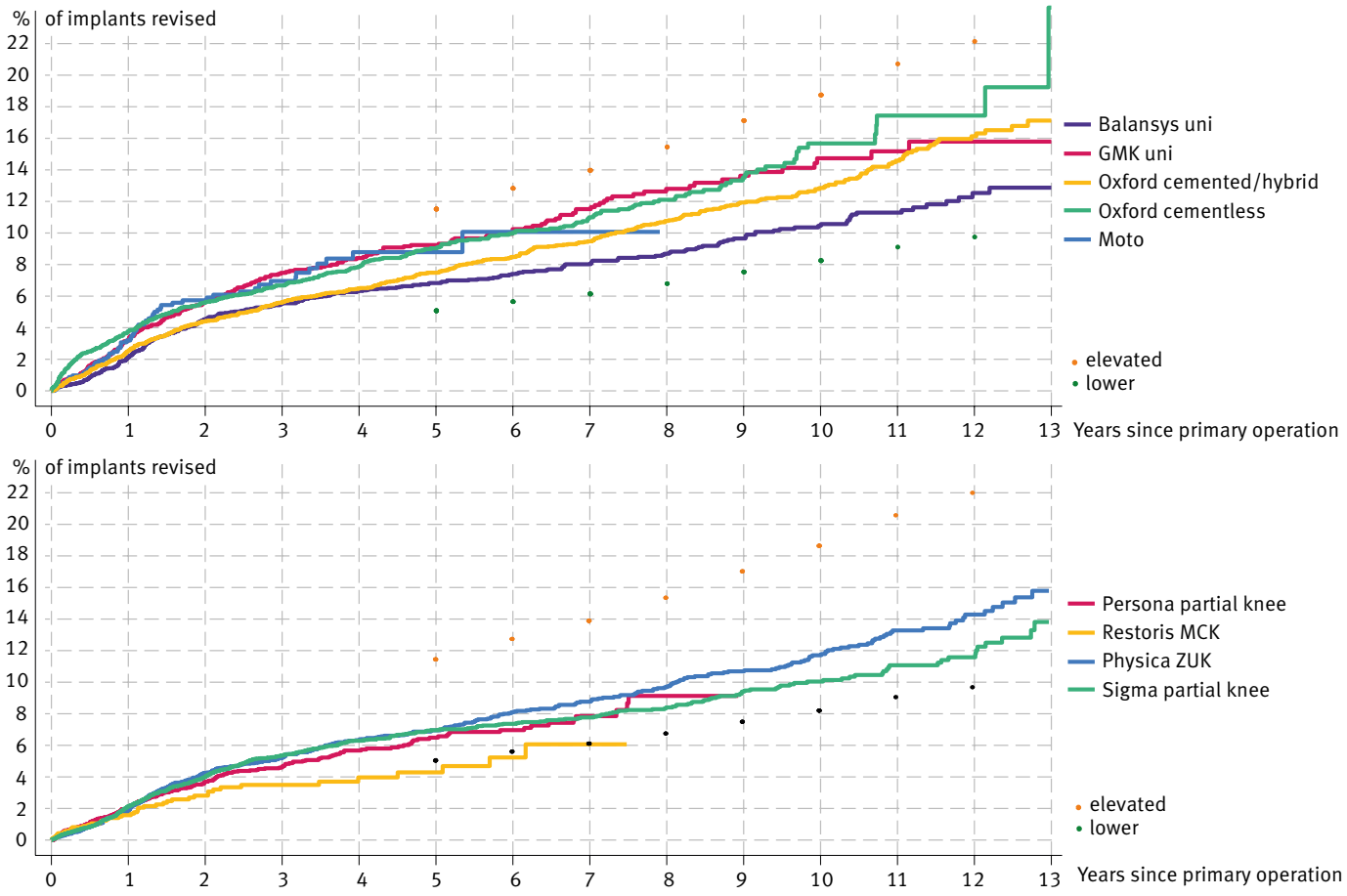


Figure 5.36 a and b

All remaining implant combinations with average revision risks (all PKA)

Also showing upper and lower limits (corresponding to elevated and below-average version risk at 150% and 66% of the group average respectively).

5.10 Results of implants in patello-femoral joint partial knee arthroplasty

Table 5.14 shows Switzerland's current top five of the most frequently used patellofemoral PKA systems, representing 97.9% (1,533) of the PFJ performed between 2020 and 2025. Only 33 implants (2.1%) in this period belonged to the less common systems, grouped as "other systems". Quite a significative share of 73 implants (4.2%) could not be identified, which is more than the 33 patellofemoral PKA summarised under "other systems".

5.10.1 Two-year revision rate of patellofemoral PKA

The two-year revision rates of the individual brands are shown in **Figure 5.37,** reflecting the PFJ performed between 01.01.2020 and 31.12.2023, with a completed two-year follow-up by 31.12.2025. Compared to the last report, early revision rate for PFJ improved from 5.8% to 5.1%. Of the five implant systems registered, including the rest summarised under "other systems", one was a definitive outlier (IBalance PFJ), with statistical significance reached for the first time. The revision rate at two years was 11.9% (CI

System	2020	2021	2022	2023	2024	2025	2020 – 2025
Gender PFJ	162	112	167	157	144	141	883
Hemicap PF classic/wave (PFJ)	33	41	48	28	29	21	200
IBalance PFJ	24	17	30	30	15	5	121
Journey PFJ	20	20	9	19	15	20	103
Restoris MCK PFJ	25	28	32	58	33	50	226
Other systems	6	13	5	4	5	0	33
Total	**270**	**231**	**291**	**296**	**241**	**237**	**1,566**

Table 5.14

Top 5 (98%) of primary patellofemoral joint systems (all diagnoses, all component fixations) 2020 – 2025

System	CCS*	Mean age	at risk N**	Revised N	Revised % (95% CI)***
Gender PFJ	10	60	598	21	3.5 (2.3-5.4)
Hemicap PF classic/wave (PFJ)	13	56	150	12	8.2 (4.7-13.9)
IBalance PFJ	10	56	101	12	11.9(6.9-20.0)
Journey PFJ	13	57	68	5	7.5 (3.2-17.1)
Restoris MCK PFJ	55	63	143	3	2.1 (0.7-6.4)
Other systems		60	28	2	7.1 (1.8-25.7)
CH average for group					5.1 (3.9-6.6)

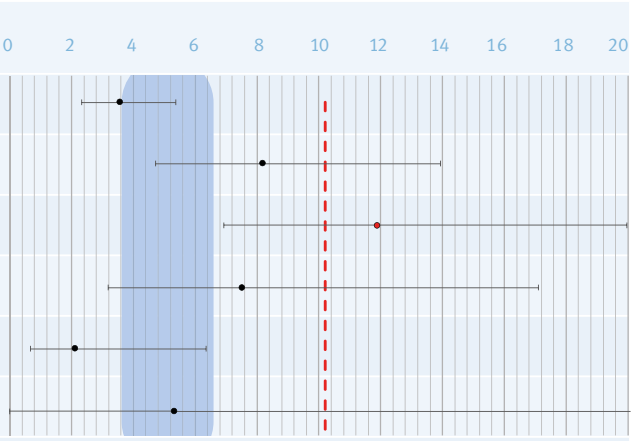


Figure 5.37

2-year evaluation: Revision rates of primary patellofemoral joint systems within 24 months

4-year moving average covering implants between 01.01.2020 and 31.12.2023, with two years follow-up (31.12.2025).

* Share of implants accounted for by main user hospital service. A higher share signifies an increased likelihood of biased figures due to local effects. A share of 50%+ would suggest that reported results are likely determined by one hospital service.

** Number of patients with at least two years follow-up (i.e. primary prosthesis in moving average).

*** Rates adjusted for effects of mortality and emigration.

6.9–20.0%), compared to the whole group of PFJ with 5.1% (CI 3.9–6.6%). It is interesting to realise that the system was still within the outlier boundaries in the 4-year moving window due to a wide confidence interval **(Figure 5.37).**

One system implanted with image-based robotic assistance (Restoris MCK PFJ) and the most frequently used PFJ system (Gender PFJ) had better results than the average but still within the lower boundary. This is of special interest as Gender PFJ had a low case concentration score (CCS) of 10% and therefore multiple providers using it. This would even introduce a risk for elevated revision rates due to small individual caseloads. Therefore, the results speak in favour of a reliable system. In contrast, Restoris MCK PFJ system had a CCS of 55%, thus concentrated in the hand of fewer surgeons with potentially higher expertise beside robotic assistance.

5.10.2 Long term revision rate of patellofemoral PKA

Numbers were still too small to differentiate each of the five brands. Therefore, comparison was reduced to the brand used most frequently (Gender PFJ with 1,385 implants) and all the rest of the implants (1,310 PFJ), summarised under "other systems" **(Table 5.15).** The singular system performed significantly better than all the other systems together from the first year and up to the tenth year. Results at 13 years of follow-up were not yet available. However, comparison is limited as "other systems" also contain Restoris MCK PFJ, which had early revision rates superior to Gender PFJ an example of an inverse camouflage effect **(Figure 5.37).** It is essential to realise that revision rates of PFJ replacements in Swiss average of 26.8% (CI 23.6–30.5) were almost two times higher than those of unicondylar PKA thirteen years after surgery, with a revision rate of 14.8% (CI 14.1–15.4%). At 10 years, the most frequently used and best performing Gender PFJ system had a revision rate of 20.6% (CI 17.0–24.9%), compared to 12.5% (CI 12.0–13.0%) of the unicondylar PKA average **(Table 5.13 and 5.15).**

System	Total N	CCS*	Mean age**	1 year (95% CI)	3 years (95% CI)	5 years (95% CI)	10 years (95% CI)	13 years (95% CI)
Gender PFJ	1,385	8	59	2.2 (1.6-3.2)	8.0 (6.5-9.7)	12.3 (10.3-14.5)	20.6 (17.0-24.9)	
Other systems	1,310		57	3.4 (2.6-4.6)	11.9 (10.1-13.9)	17.1 (14.9-19.6)	25.7 (22.4-29.4)	35.1 (25.9-46.5)
CH average for group				**2.8 (2.3-3.6)**	**9.9 (8.7-11.2)**	**14.7 (13.2-16.4)**	**23.2 (20.8-25.9)**	**26.8 (23.6-30.5)**

Table 5.15

Long term evaluation: Failure rates of primary patellofemoral joint systems (all diagnoses, all component fixations)

Time since operation, 2012–2025. Please note that if reported system involves multiple sub-variants, it is possible that the long-term performance of these sub-variants may be significantly different from their combined performance.

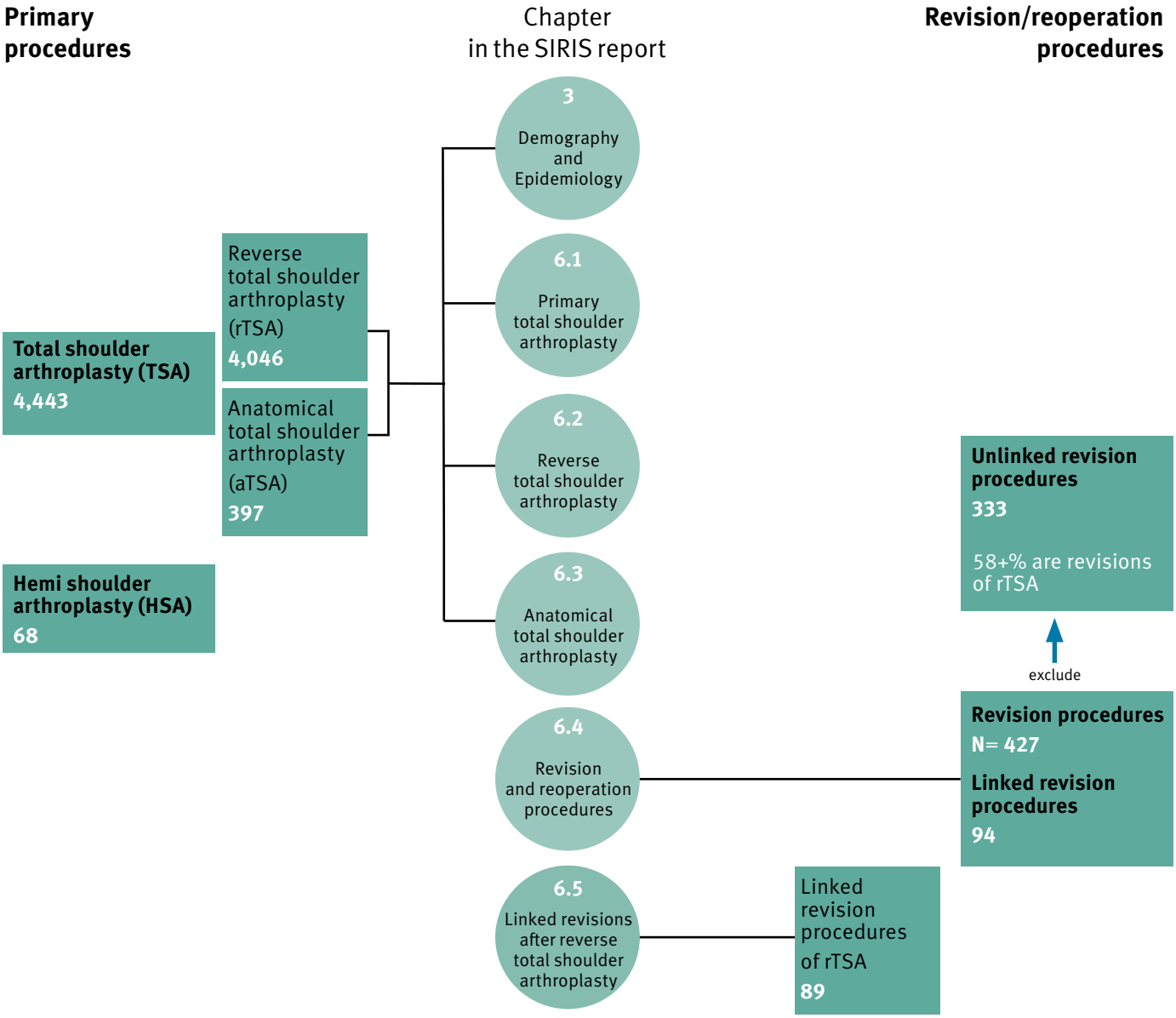
* Share of implants accounted for by main user hospital service. A higher share signifies an increased likelihood of biased figures due to local effects. A share of 50%+ would suggest that reported results are likely determined by one hospital service.

** Younger mean age signifies that the case mix is less "usual" and potentially biased towards higher revision risk.

Shoulder arthroplasty

6. Shoulder arthroplasty

Overview of data structure



6.1 Primary shoulder arthroplasty

Detailed information on patient demographics, underlying diagnoses, regional variation and hospital volumes is provided in **Chapter 3.4**. The present chapter focuses on surgical characteristics, implant configuration and revision procedures recorded during the first year of the SIRIS Shoulder registry. Given the short observation period, implant survival and longer-term revision rates cannot be assessed yet.

Surgical approach

The deltopectoral approach was used for the large majority of primary shoulder arthroplasty registered in 2025, accounting for 94.7% of procedures. A superolateral, transdeltoid or anterosuperior approach was used in the remaining 5.3%.

Subscapularis management

Subscapularis management differed between aTSA and rTSA. In aTSA, lesser tubercle osteotomy was the most frequently recorded technique (38.8%), followed by peel-off (31.2%) and tenotomy (23.9%). Subscapularis-sparing techniques were used in 3.8% only, while the subscapularis was recorded as not addressed in 2.3% of procedures. In rTSA, peel-off (28.7%) and tenotomy (26.2%) were the most frequently recorded techniques, followed by osteotomy (20.6%). The subscapularis was recorded as not addressed in 19.5% of rTSA procedures, while a subscapularis-sparing technique was used in 5.0%.

Preoperative planning and technology

No advanced preoperative planning was recorded in 56.0% of primary shoulder arthroplasties. Image-derived three-dimensional planning without patient-specific instrumentation (PSI) was used in 30.1%, while PSI was used in 11.7%. Navigation (1.0%) and augmented reality (1.1%) were used infrequently, and robotic assistance was recorded in only 0.02% of procedures. Overall, approximately 44% of primary shoulder arthroplasties involved some form of advanced preoperative planning or technology-assisted surgery.

6.2 Reverse total shoulder arthroplasty

The following section describes the principal humeral and glenoid implant characteristics recorded during the first year of the SIRIS Shoulder registry. The vast majority of primary shoulder arthroplasties registered in 2025 were rTSA. Therefore, a more detailed analysis was possible only for rTSA

Humeral component and fixation

Standard-length humeral stems were used most frequently in primary rTSA, accounting for 64.1% of procedures. Short stems were used in 28.1%, fracture-specific stems in 6.2%, and long or revision stems in 1.0%. Stemless humeral components were used infrequently (0.5%), while custom-made components were exceptional.

Humeral fixation was predominantly uncemented. 84.2% of humeral components were implanted without cement, compared with 15.8% using cemented fixation.

Glenoid component and fixation

Standard baseplates accounted for 76.0% of glenoid components used in primary rTSA, while 24.0% were augmented baseplates. Glenoid fixation was almost exclusively uncemented, accounting for 99.7% of procedures, while cemented fixation was recorded in only 0.3%.

Implant systems

Implant use was relatively concentrated during the first year of SIRIS Shoulder. The ten most frequently registered rTSA systems accounted for 3,825 of the 4,046 procedures (94.5%). The Medacta Shoulder System was the most frequently registered system (23.6%), followed by Perform (13.5%), Univers Revers (9.9%), SMR (9.5%) and Aequalis Ascend Fex (9.2%). Together, the five most frequently used systems accounted for 65.7% of all primary rTSA **(Table 6.1).**

Manufacturer	rTSA system	N	Share of primary rTSA (%)
Medacta	Medacta Shoulder System	953	23.6
Stryker	Perform	546	13.5
Arthrex	Univers Revers	401	9.9
Enovis / Lima	SMR	386	9.5
Stryker	Aequalis Ascend Flex	374	9.2
Johnson & Johnson / DePuy Synthes	Global Unite	327	8.1
Enovis / Mathys	Affinis	286	7.1
Johnson & Johnson	Delta Xtend	229	5.7
Zimmer Biomet	Anatomical Shoulder	219	5.4
FX Shoulder Solutions	Humelock Reversed System	104	2.6
Other systems		221	5.5
All primary rTSA		**4,046**	**100**

Table 6.1

Ten most frequently used reverse total shoulder arthroplasty (rTSA) systems in 2025

Note: Individual rTSA constructs may combine compatible components from different implant families e.g. an Aequalis Reversed II BIO-RSA glenoid construct with a Perform humeral stem). Therefore, the system designation does not necessarily represent a uniform glenoid-humeral component combination.

Glenosphere and insert configuration

The registry recorded a wide range of glenosphere and polyethylene insert configurations during the first year of registration of shoulder arthroplasty. As these data are currently captured through individual product descriptions rather than harmonised implant-design variables, detailed analysis of glenosphere diameter, lateralisation, eccentricity, insert thickness and constraint was not undertaken for this first report. Harmonisation of these implant characteristics will allow analysing their distribution and potential associations with clinical outcomes and revision patterns to be investigated in subsequent reporting years.

Tendon transfer

Concomitant tendon transfer was uncommon in primary rTSA. No tendon transfer was recorded in 98.8% of procedures, while a tendon transfer was performed in 1.2%.in 1.2%.

6.3 Anatomical total shoulder arthroplasty

Anatomical TSA represented 8.8% of primary shoulder arthroplasty registered during 2025. In contrast to rTSA, detailed description of component characteristics currently is very limited. Nevertheless, implant utilisation demonstrated substantial concentration among a relatively small number of systems.

The ten most frequently registered aTSA systems accounted for 378 of the 397 procedures (95.2%). Affinis short was the most frequently used system, representing 39.8% of primary aTSA, followed by the Medacta Shoulder System (13.9%), Eclipse (10.6%) and Aequalis (8.1%) **(Table 6.2).**

Manufacturer	aTSA system	N	Share of primary aTSA (%)
Enovis / Mathys	Affinis short	158	39.8
Medacta	Medacta Shoulder System	55	13.9
Arthrex	Eclipse	42	10.6
Stryker	Aequalis ascend flex	32	8.1
Enovis / Lima	SMR	23	5.8
Johnson & Johnson / DePuy Synthes	Global Icon	19	4.8
Stryker	Simpliciti	15	3.8
Stryker	Perform	13	3.3
Zimmer Biomet	Anatomical Shoulder	11	2.8
Permedica Orthopaedics	Mirai	10	2.5
Other systems		19	4.8
All primary aTSA		**397**	**100**

Table 6.2

Ten most frequently used anatomical total shoulder arthroplasty (aTSA) systems in 2025

6.4 Revisions and reoperations

During the first year of SIRIS Shoulder, 427 revisions and reoperations were registered in 82 hospital services. Of these, 94 (22.0%) could be linked to a primary shoulder arthroplasty already registered in SIRIS, whereas 333 (78.0%) remained unlinked. As described in **Chapter 3.4,** the predominance of unlinked procedures is expected during the initial phase of the registry because most index arthroplasties undergoing revision in 2025 had been performed before inception of SIRIS Shoulder.

Type of revision

Revisions covered a broad spectrum of procedures, ranging from exchange of modular components to complete revision with staged reconstruction. Exchange of all components accounted for 22.5% of revisions, while exchange of modular components (head and/or insert) represented 21.0%. Reimplantation following previous component removal or spacer treatment accounted for 12.0%, isolated humeral component revision for 10.2%, and isolated glenoidal component revision for 9.0%. Removal with spacer insertion accounted for 7.4%, while removal without spacer insertion represented 1.5%.

Conversion from HSA to TSA accounted for 4.6%, and conversion from TSA to HSA for 4.4%. Other revision procedures represented 7.4%.

Reoperations without component revision

Among procedures classified as reoperations (without component revision), open debridement or lavage was the most frequently specified intervention (35.7%). Arthroscopy, soft-tissue procedures and internal fixation each accounted for 7.1%, while 42.9% were classified as other reoperations.

Reasons for revision

Among registered revisions of rTSA, suspected infection and dislocation/instability were the two most frequently recorded indications, accounting for 34.4% and 24.3%, respectively. Glenoid component loosening was recorded in 17.0%, humeral periprosthetic fracture in 10.5%, and humeral component loosening in 9.4%.

Less frequently recorded reasons included periprosthetic fracture of the glenoid (4.4%), unexplained pain (3.3%), implant failure or breakage (2.2%), component malposition (2.2%), osteolysis (1.5%), progression of osteoarthritis following HSA (1.4%), and rotator cuff insufficiency (1.1%). Other diagnoses were recorded in 9.1%.

More than one reason for revision could be recorded for an individual procedure. Therefore, percentages are not mutually exclusive and do not sum to 100%.

6.5 Linked revisions after reverse total shoulder arthroplasty

At the time of redaction, detailed case-level information was available for 89 linked revision procedures following primary rTSA registered in SIRIS. These 89 procedures represent observed early revision events and provide the first opportunity to characterise within the registry early failure patterns following rTSA.

The unit of analysis in this section is the observed linked revision event rather than the entire population at risk for revision. Reasons for revision, characteristics of the primary arthroplasty, timing and type of revision surgery can therefore be described directly. However, because follow-up of the complete 2025 primary rTSA cohort is not yet standardised, the proportions presented in this section should not be interpreted as cumulative revision rates or estimates of relative revision risk.

Reasons for revision of linked revision

Infection and instability were the predominant reasons for revision among the 89 linked rTSA revisions registered. Suspected infection was recorded in 36 cases (40.5%) and dislocation or instability in 31 cases (34.8%). Periprosthetic fracture of the glenoid was recorded in 12 cases (13.5%), glenoidal component loosening in 9 (10.1%), and humeral component loosening in five (5.6%). Other diagnoses were recorded in six cases (6.7%), while humeral periprosthetic fracture was recorded in two cases (2.3%). Implant failure or breakage, implant wear, rotator cuff insufficiency and unexplained pain were each recorded once (1.1%).

More than one reason for revision could be recorded for an individual procedure; consequently, the categories are not mutually exclusive and percentages do not sum to 100%. The distribution is shown in **Table 6.3 and Figure 6.1.**

Characteristics of revisions for instability

Dislocation or instability was recorded in 31 of the 89 linked rTSA revisions (40.5%). Cuff-deficient conditions represented the largest diagnostic group among these events, accounting for 14 cases (45.2%), including 11 cases of CTA and three massive cuff tears without arthritis. Acute or chronic fracture accounted for a further 11 cases (35.5%). Thus, 25 of 31 instability revision events (80.6%) occurred in patients with either an established cuff-deficient indication or a fracture-related indication potentially associated with impaired cuff or tuberosity function.

Men represented 22 of the 31 instability revision events (70.9%). This predominance is noteworthy in the context of the overall primary rTSA population, in which women represented 62.2% and men only 37.8%. These proportions should not be interpreted as sex-specific instability rates because follow-up of the complete primary cohort is not yet standardised. Nevertheless, sex-related differences in patient morphology and soft-tissue characteristics may be relevant to stability and adequate soft-tissue tensioning following rTSA. Individual soft-tissue tension was not recorded in SIRIS, and this interpretation therefore remains a hypothesis.

Sex distribution

Men accounted for 53 of the 89 linked rTSA revisions (59.6%), compared with 36 women (40.5%). The proportion of men was higher among the two predominant failure modes, accounting for 22 of 31 instability revisions (70.9%) and 26 of 36 infection-related revisions (72.2%). These proportions describe the sex distribution among observed revision events rather than sex-specific revision risks.

Reason of revision	N	% of 89 linked rTSA revisions
Suspected infection	36	40.5
Dislocation / instability	31	34.8
Glenoidal periprosthetic fracture	12	13.5
Glenoidal component loosening	9	10.1
Other diagnosis	6	6.7
Humeral component loosening	5	5.6
Humeral periprosthetic fracture	2	2.3
Implant failure / breakage	1	1.1
Implant wear	1	1.1
Rotator cuff insufficiency	1	1.1
Unexplained pain	1	1.1

Table 6.3

Reasons for revision among 89 linked revision procedures following primary rTSA

More than one reason could be recorded for an individual procedure; categories are therefore not mutually exclusive and percentages do not sum to 100%.

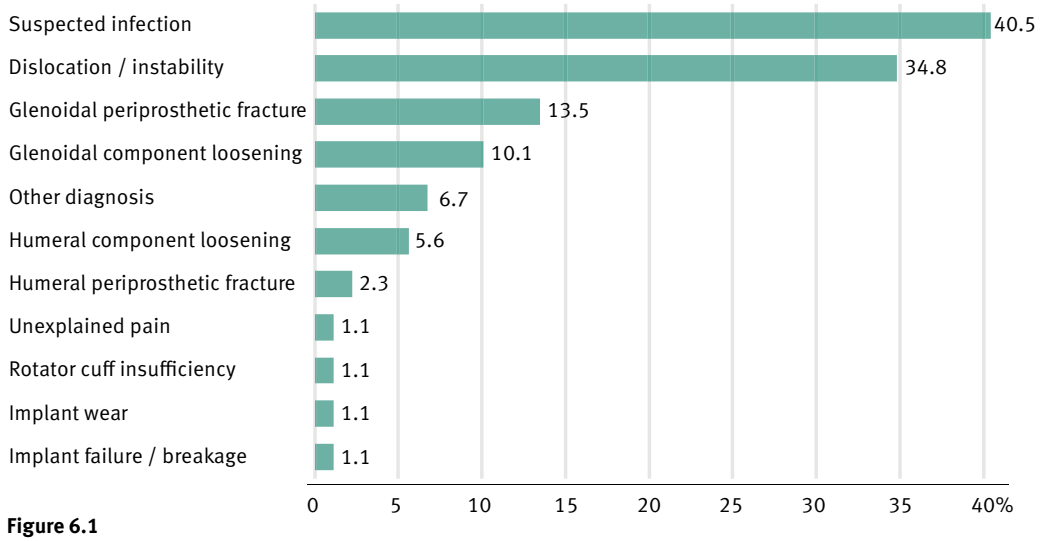


Figure 6.1

Reasons for revision among 89 linked revision procedures following primary reverse total shoulder arthroplasty (rTSA)

More than one reason could be recorded per procedure.

Type of revision

Exchange of modular components was the most frequently performed revision procedure overall, accounting for 39 of 89 linked rTSA revisions (43.8%). The type of revision differed according to the reason for revision. Modular component exchange was performed in 23 of 36 infection-related revisions (63.9%) and 15 of 31 instability revisions (48.4%).

Among revisions for instability, exchange of all components was performed in six cases (19.3%), isolated humeral component revision in four (12.9%), conversion from TSA to HSA in two (6.5%), and isolated glenoidal component revision in two (6.5%). The remaining procedures comprised other revision strategies. The overall distribution of revision procedures is summarised in **Table 6.4.**

Time to revision

Time from primary rTSA to revision was available for 88 of the 89 linked procedures. The median time to revision was 49 days (interquartile range 27–101 days), with an observed range of 2 to 411 days. Revisions associated with suspected infection occurred at a median of 34.5 days (IQR 25.5–89.5 days), while revisions associated with instability occurred at a median of 53 days (IQR 28–94.8 days).

Revision procedure	N	% of 99 linked rTSA revisions
Exchange modular components	39	43.8
Exchange all components	14	15.7
Isolated glenoid component revision	11	12.4
Isolated humeral component revision	6	6.7
Removal with spacer insertion	6	6.7
Conversion total to hemiarthroplasty	5	5.6
Other revision surgery	5	5.6
Reimplantation after spacer/removal	1	1.1
Conversion hemi to total arthroplasty	1	1.1
Removal without spacer insertion	1	1.1

Table 6.4

Type of revision surgery among 89 linked revision procedures following primary rTSA.

Patient reported outcome measures
PROMs

7. Patient reported outcome measures (PROMs)

Traditionally, joint registries have focused on revision rates as the primary benchmark of success and revision rates remain the cornerstone and foundation of every registry. However, implant survival alone only covers that single specific aspect of outcome: revision. It is important to note, that the absence of revision surgery cannot be directly translated to success, as it does not necessarily indicate meaningful patient improvement or that patients' clinical expectations have been met. Validated PROMs are the essential tools that capture those patient-reported aspects of outcome, providing an objective, robust assessment of the patient's individual perspective.

Importantly, joint-specific PROMs – which focus directly on the operated joint's function and pain - are much more precise and discriminative compared to general health questionnaires, numeric pain rating scales or simple satisfaction questions.

The core components of the Patient-Reported Outcome Measures (PROMs) instrument have been implemented in the Canton of Zürich and selected hospitals in 2019, ahead of the voluntary nationwide registration within SIRIS starting in 2025. The year 2025 also saw the introduction of PROMs in the new shoulder arthroplasty module and use of the new Oxford scores for Hip, Knee and Shoulder. These well validated joint-specific PRO scores provide a much more detailed PRO picture compared to the current core components of the SIRIS PROM instrument. However, as the take-up of PROMs was relatively slow in 2025, the first cohort of national PROMs data is only just being created at the time of producing this report. Therefore, the focus of this year's analysis is on producing an update of the existing PROMs collection mainly from the Canton of Zürich.

For this report, we analysed complete pre- and post-operative data for 12,032 THA, 9,537 TKA and 1,958 PKA, performed for primary osteoarthritis. Additionally, we included 1,498 THA and 1,416 TKA cases operated for secondary osteoarthritis. PROMs were assessed using the Swiss Orthopaedics Minimal Dataset (SO-MDS), which comprises joint-specific pain and satisfaction evaluations via a numeric rating scale (NRS), as well as general quality of life assessment using the EQ-5D-5L score. Further details on the project and coverage rates are provided in the Methods chapter. All analyses adopt an intention-to-treat (ITT) approach, meaning revised implants are included unless stated otherwise.

7.1 Joint-specific pain

Pain reduction is a central outcome measure for arthroplasty. Joint-specific pain was assessed using a 0 – 10 NRS.

Preoperative pain levels were generally similar across groups, except for secondary osteoarthritis of the hip, which showed notably higher values. Mean preoperative pain scores for primary osteoarthritis were 6.53 for THA, 6.6 for TKA and 6.36 for PKA. For secondary osteoarthritis, mean scores were 6.88 for THA and 6.32 for TKA. As illustrated in **Figure 7.1,** the distribution of preoperative pain scores across most groups was relatively consistent, with most patients reporting values of seven or eight. Patients undergoing PKA reported slightly less pain than those undergoing TKA, particularly at the higher end of the scale, while patients with secondary osteoarthritis of the hip reported the highest proportion of severe pain (scores of 9 or 10).

Postoperatively, mean pain scores decreased substantially, to 0.84 only for THA, 1.63 for TKA, and 1.73 for PKA in primary osteoarthritis, and to 1.08 for THA and 1.59 for TKA in secondary osteoarthritis. The postoperative distribution of pain scores was effectively reversed, with a significantly larger proportion of THA patients achieving complete pain remission **(Figure 7.2).** These NRS distributions have been very stable over the past few years.

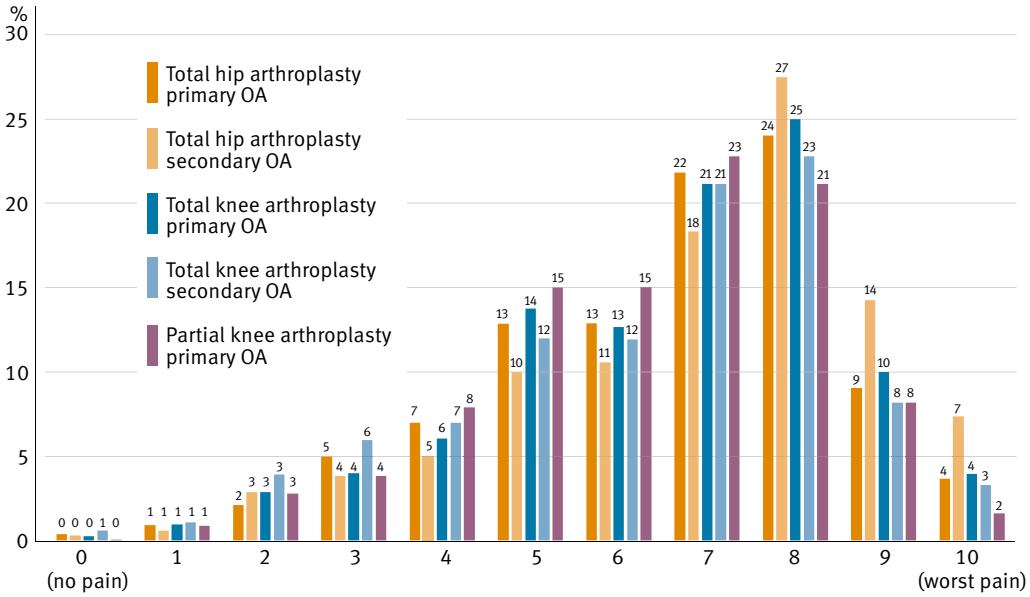


Figure 7.1

Preoperative pain

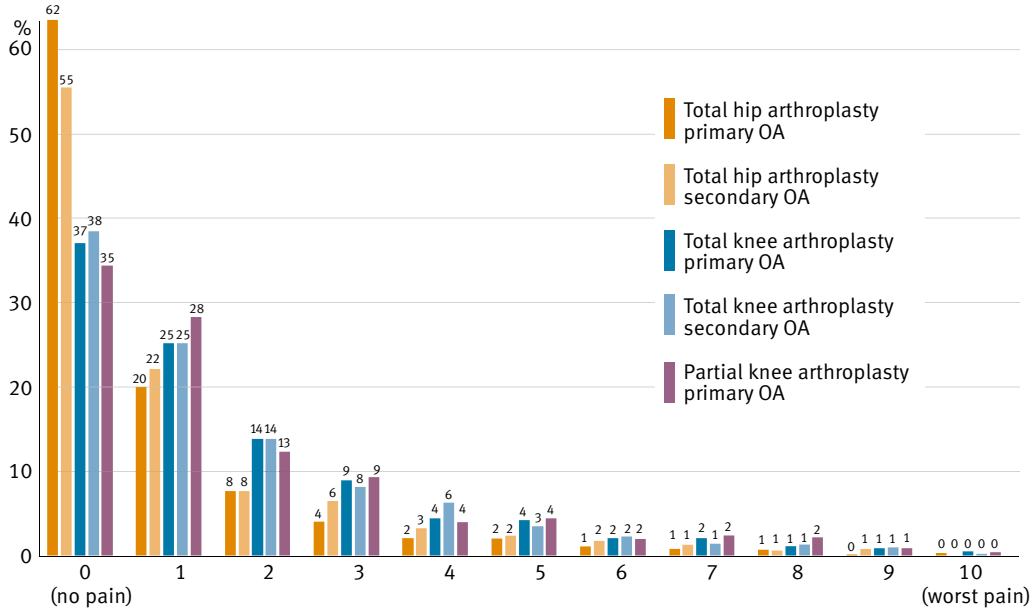


Figure 7.2

Postoperative pain

Follow-up 1 year (9 to 18 months allowed), intention-to-treat perspective

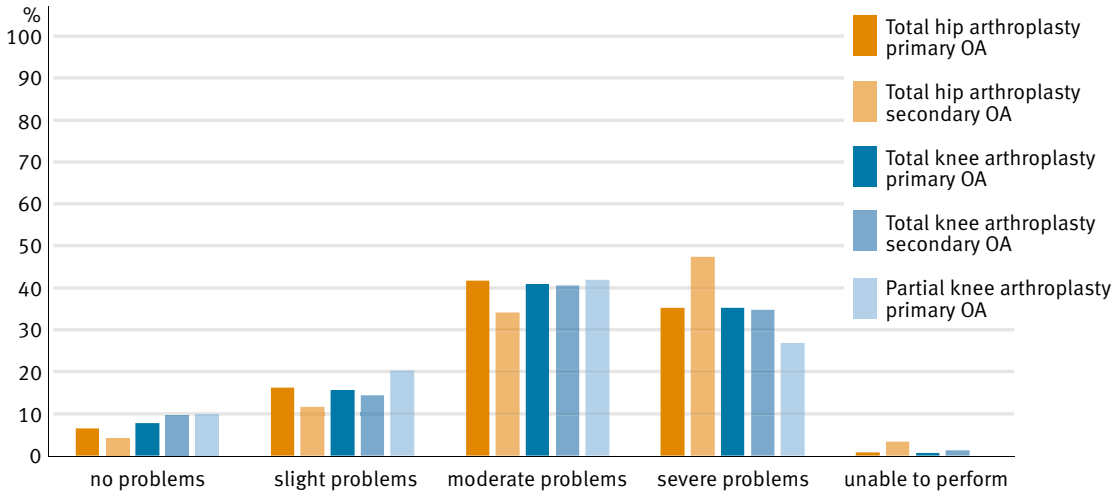
7.2 Quality of life

The EQ-5D-5L score was used to assess health-related quality of life before and after treatment across five dimensions: pain, mobility, self-care, ability to perform usual activities, and anxiety. Among these, mobility stands out as the undisputed core dimension in elective arthroplasty.

As illustrated in **Figure 7.3,** THA and TKA patients complained of remarkably similar mobility restrictions prior to treatment. The majority reported at least moderate problems, with over a third of both THA and TKA patients experiencing severe mobility limitations. PKA patients reported slightly fewer restrictions on average, while THA patients with secondary osteoarthritis were the most likely to report severe mobility issues. Notably, a small but significant proportion of patients in each group — ranging from 4.2% to 10.3% — reported no mobility problems at all before treatment.

The situation improved markedly post-treatment, though outcomes varied by procedure **(Figure 7.4).** For THA, 78.5% of the patients reported no more mobility problems, compared to 61.6% of TKA and 64.1% of PKA patients. Despite TKA and PKA patients starting from a better baseline, THA patients achieved the most substantial gains in mobility following treatment.

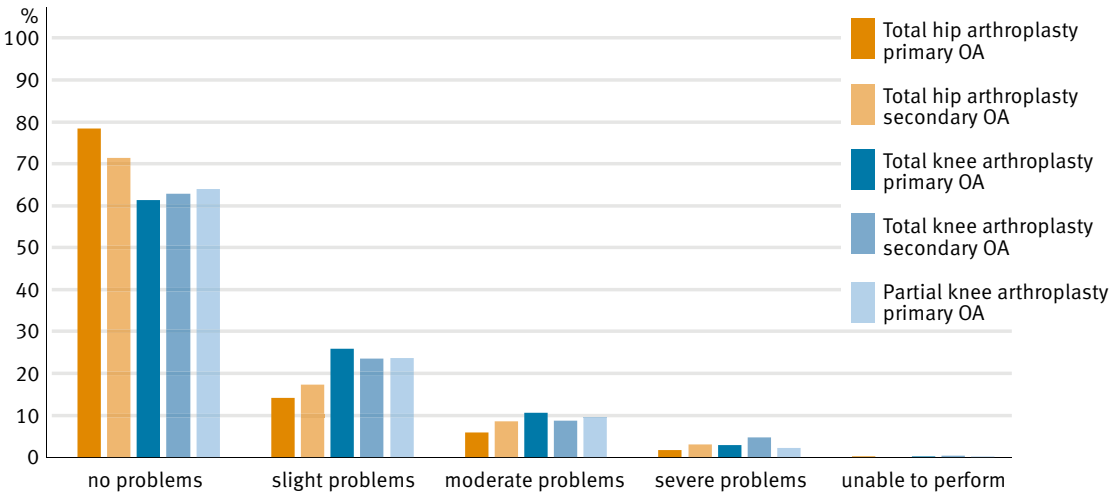
The reader is advised to refer to the radar charts in the previous annual report for a more complete picture of the various quality-of-life items considered.



	THA (prim OA)		THA (sec OA)		TKA (prim OA)		TKA (sec OA)		PKA	
	N	%	N	%	N	%	N	%	N	%
no problems	797	6.6	63	4.2	759	8.0	142	10.0	201	10.3
slight problems	1,932	16.1	180	12.0	1,521	16.0	206	14.6	390	19.9
moderate problems	5,021	41.7	506	33.8	3,883	40.7	572	40.4	844	43.1
severe problems	4,172	34.7	707	47.2	3,309	34.7	477	33.7	515	26.3
unable to perform	110	0.9	42	2.8	65	0.7	19	1.3	8	0.4
Total	**12,032**		**1,498**		**9,537**		**1,416**		**1,958**	

Figure 7.3

Preoperative quality of life (EQ5D): mobility



	THA (prim OA)		THA (sec OA)		TKA (prim OA)		TKA (sec OA)		PKA	
	N	%	N	%	N	%	N	%	N	%
no problems	9,445	78.5	1,079	72.0	5,877	61.6	908	64.1	1,278	65.3
slight problems	1,703	14.2	249	16.6	2,388	25.0	334	23.6	458	23.4
moderate problems	684	5.7	127	8.5	999	10.5	116	8.2	183	9.4
severe problems	188	1.6	42	2.8	254	2.7	54	3.8	38	1.9
unable to perform	12	0.1	1	0.1	19	0.2	4	0.3	1	0.1
Total	**12,032**		**1,498**		**9,537**		**1,416**		**1,958**	

Figure 7.4

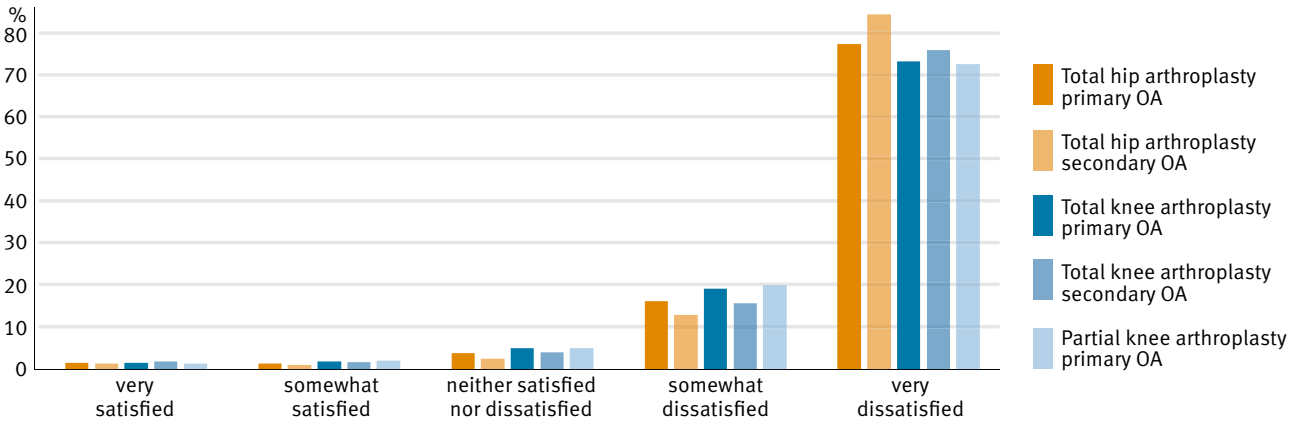
Postoperative quality of life (EQ5D): mobility

Follow-up 1 year (up to 18 months allowed), intention-to-treat perspective

7.3 Joint-specific satisfaction

Comparisons of preoperative and postoperative satisfaction ratings further corroborate the previous findings. Before surgery, hip and knee patients reported similarly high levels of dissatisfaction, with 72.7% to 83.1% stating they were very dissatisfied with their situation. One year after the operation, this picture was largely reversed.

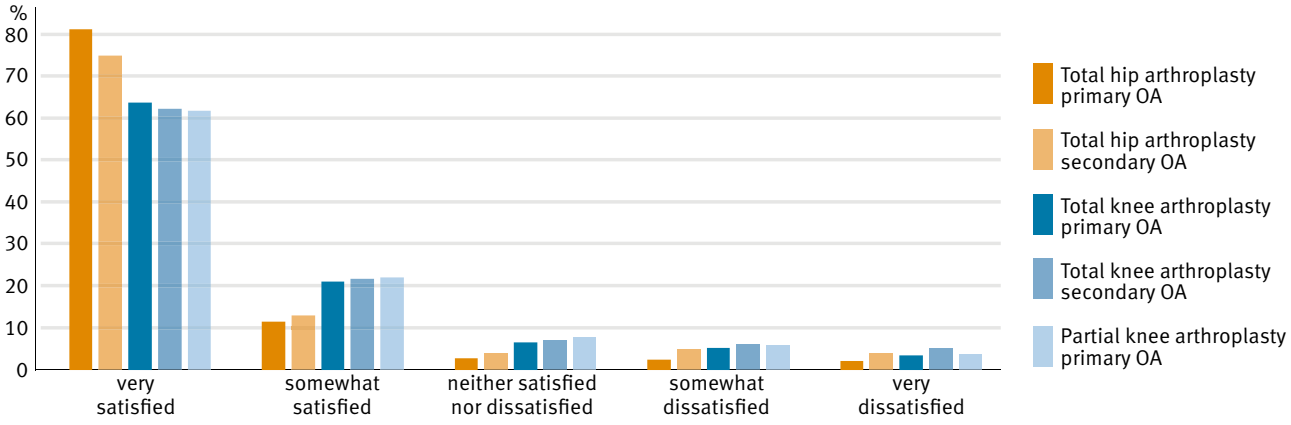
However, a clear satisfaction gap persisted between hip and knee patients. While 81.3% of THA patients operated for primary osteoarthritis reported being very satisfied, the corresponding figures for TKA and PKA recipients were only 61.8% and 62.2%, respectively **(Figures 7.5 and 7.6).** Although a larger proportion of knee patients expressed dissatisfaction with their outcomes, the primary difference lay not in outright dissatisfaction but rather in the degree of satisfaction—many knee patients fell into intermediate or less conclusive categories rather than extreme dissatisfaction.



	THA (prim OA)		THA (sec OA)		TKA (prim OA)		TKA (sec OA)		PKA	
	N	%	N	%	N	%	N	%	N	%
very satisfied	174	1.5	21	1.4	142	1.5	25	1.8	24	1.2
somewhat satisfied	151	1.3	13	0.9	172	1.8	22	1.6	33	1.7
neither satisfied nor dissatisfied	434	3.6	33	2.2	442	4.6	59	4.2	86	4.4
somewhat dissatisfied	1,983	16.5	186	12.4	1,849	19.4	228	16.1	384	19.6
very dissatisfied	9,290	77.2	1,245	83.1	6,932	72.7	1,082	76.4	1,431	73.1
Total	**12,032**		**1,498**		**9,537**		**1,416**		**1,958**	

Figure 7.5

Preoperative satisfaction with current situation



	THA (prim OA)		THA (sec OA)		TKA (prim OA)		TKA (sec OA)		PKA	
	N	%	N	%	N	%	N	%	N	%
very satisfied	9,778	81.3	1,138	76.0	6,094	63.9	881	62.2	1,209	61.8
somewhat satisfied	1,373	11.4	185	12.4	2,010	21.1	301	21.3	428	21.9
neither satisfied nor dissatisfied	336	2.8	61	4.1	627	6.6	94	6.6	143	7.3
somewhat dissatisfied	306	2.5	66	4.4	511	5.4	81	5.7	112	5.7
very dissatisfied	239	2.0	48	3.2	295	3.1	59	4.2	66	3.4
Total	**12,032**		**1,498**		**9,537**		**1,416**		**1,958**	

Figure 7.6

Postoperative satisfaction with current situation

Follow-up 1 year (9 to 18 months allowed), intention-to-treat perspective

7.4 Treatment effects

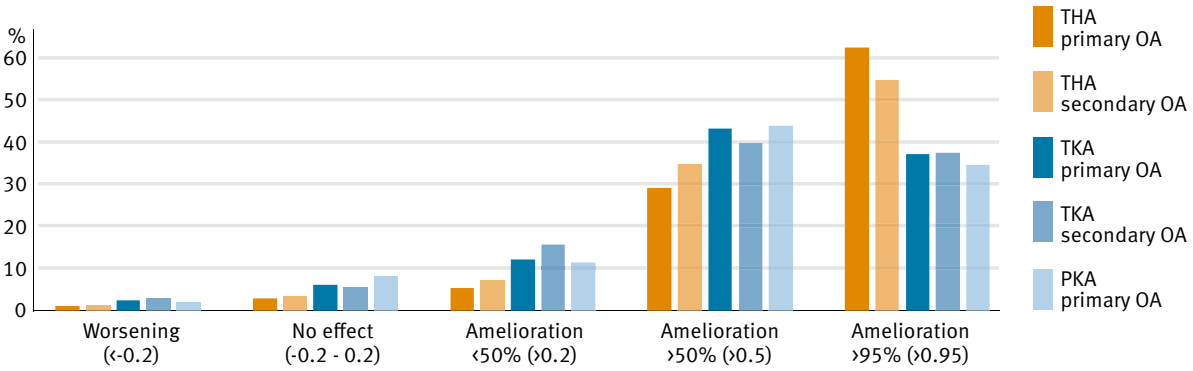
Treatment success can be assessed directly by calculating the treatment effect. **Figure 7.7** compares the distribution of pain reduction outcomes across the five patient groups, excluding the small minority who reported no preoperative pain.

THA patients operated for primary osteoarthritis achieved the most favourable results: 62% experienced a symptom reduction of 95% or more, effectively becoming pain-free after treatment. An additional 28.9% reported a pain reduction of more than 50%, classified as a good outcome. For example, such a patient would report a preoperative pain score of 8, whereas the postoperative score would be no higher than 3. Only a small fraction of THA patients had less favourable outcomes: 2.7% reported no improvement, and 1.1% experienced increased pain one year after surgery. Notably, these outcomes were observed across the full range of preoperative pain levels.

For THA patients operated for secondary osteoarthritis, the rate of pain-free outcomes was lower (54.5%), but the proportion of patients who did not benefit at all was not much higher than in the primary osteoarthritis group.

TKA and PKA patients, however, had significantly less favourable outcomes: only 34.7% to 37.7% achieved a perfect, pain-free result. While over 40% experienced a pain reduction of more than 50%, a substantial minority – 7.7% to 10.3% – reported no improvement in pain. The differences between TKA and PKA outcomes were not statistically significant, despite PKA patients generally being younger and more active, with possibly higher expectations for both pain reduction and functional restoration.

Treatment effects are not necessarily distributed equally in all types of patients within the individual diagnostic and treatment groups. As shown in **Figure 7.8,** reported treatment effects for pain clearly varied with the education level of the patient. Patients with a high education level achieved the best outcomes (66.4% in the top category) and those with a low education level achieved less favourable outcomes (53.1% in the top category). A medium education level was associated with an intermediate outcome (61.9%). The same basic relationships can be observed in knee patients **(Figure 7.9).**

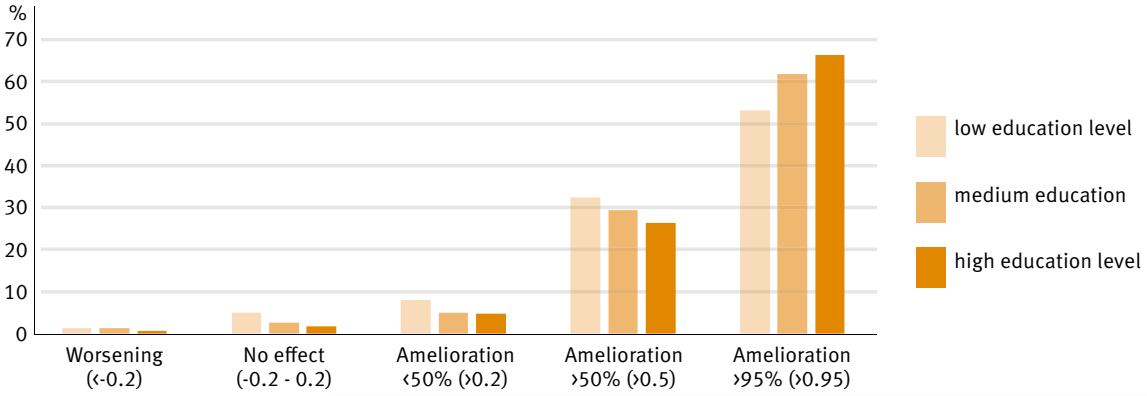


	THA (prim OA)		THA (sec OA)		TKA (prim OA)		TKA (sec OA)		PKA	
	N	%	N	%	N	%	N	%	N	%
Worsening (‹-0.2)	124	1.1	16	1.1	229	2.4	38	2.7	43	2.2
No effect (-0.2 - 0.2)	317	2.7	52	3.5	530	5.6	70	5.0	157	8.1
Amelioration ‹50% (›0.2)	630	5.3	105	7.1	1,103	11.7	200	14.3	222	11.4
Amelioration ›50% (›0.5)	3,421	28.9	500	33.8	4,044	42.9	562	40.2	847	43.6
Amelioration ›95% (›0.95)	7,341	62.0	807	54.5	3,513	37.3	527	37.7	673	34.7
Total	**11,833**		**1,480**		**9,419**		**1,397**		**1,942**	

Figure 7.7

Treatment effect pain

Follow-up 1 year (9 to 18 months allowed), intention-to-treat perspective . Patients without reported pain excluded as calculation of TE not possible.



	low education level		medium education level		high education level	
	N	%	N	%	N	%
Worsening (‹-0.2)	20	1.3	82	1.2	21	0.6
No effect (-0.2 - 0.2)	77	5.0	182	2.6	58	1.8
Amelioration ‹50% (›0.2)	123	8.1	345	5.0	160	4.8
Amelioration ›50% (›0.5)	496	32.5	2,044	29.4	876	26.4
Amelioration ›95% (›0.95)	811	53.1	4,303	61.9	2,199	66.4
Total	**1,527**		**6,956**		**3,314**	

Figure 7.8

Treatment effect pain (THA primary OA) depending on education level

Follow-up 1 year (9 to 18 months allowed), intention-to-treat perspective

7.5 Conclusion

In summary, PROMs offer a more comprehensive assessment of the clinical effectiveness of hip and knee arthroplasty, complementing revision rates, which capture only a single endpoint of treatment outcomes. It is of note, that the current geographical coverage of PROMs remains limited, raising concerns about the generalisability of the findings. The data are drawn predominantly from the Canton of Zürich, and factors such as implant selection, surgical practices, and cultural influences may not be fully representative of the broader Swiss national context. The new nationwide integration of PROMs into SIRIS, which started late 2025, is expected to address these limitations and provide a more complete and representative overview of arthroplasty outcomes across Switzerland.

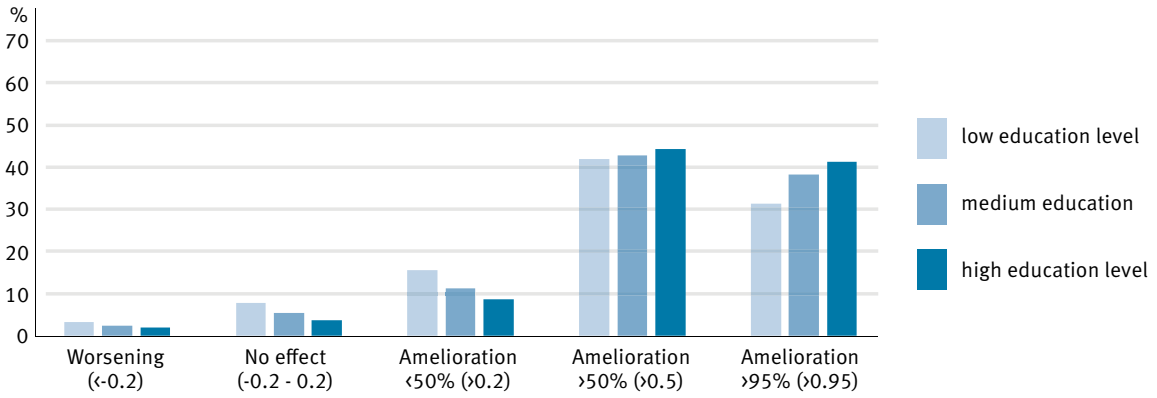
As the nationwide rollout matures into 2026 and beyond, the transitions toward electronic PROMs (ePROMs) opens highly promising new possibilities for quality assurance and improvement.

A data-driven, physician-led approach utilising digital health solutions allows for the continuous measurement of outcomes that matter most to patients. Importantly, the transition to ePROMs creates a unique added value for both: the patient and the surgeon.

For the surgeon, real-time digital eRPOM dashboards can facilitate the immediate contextualisation of scores at baseline and throughout follow-ups, transforming static data into easily interpretable outcome trajectories.

For the patient, ePROMs can significantly improve communication in daily practice and patients can more actively engage in their own recovery process.

For more information on the SIRIS ePROM software solution (free of charge) please contact us › LINK.

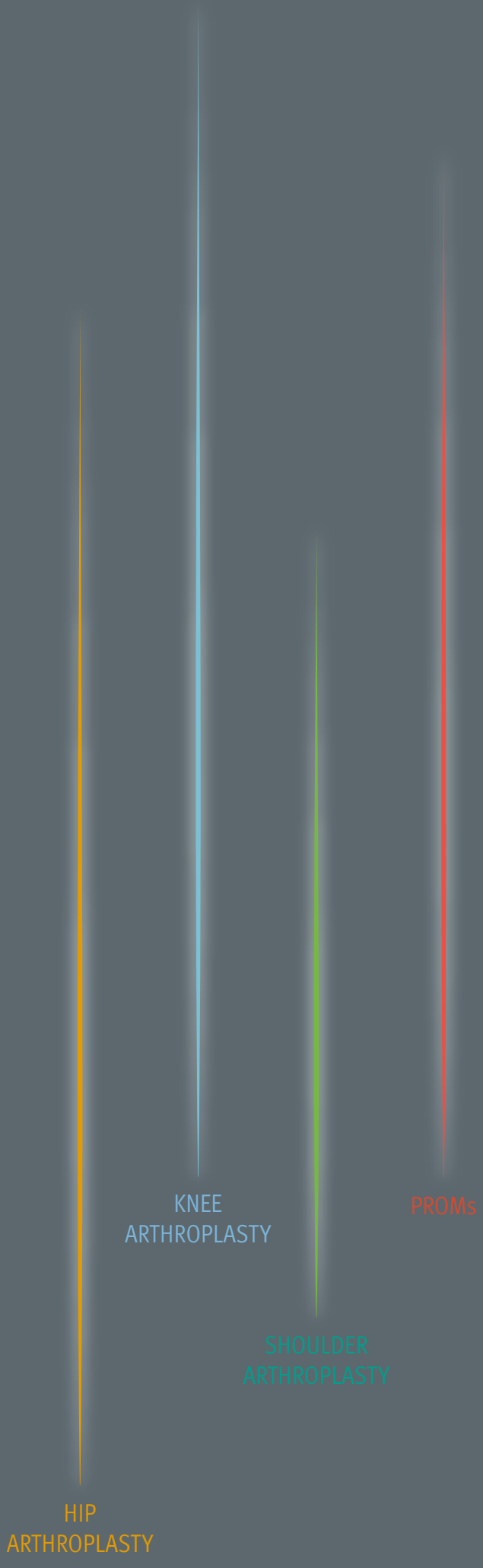


	low education level		medium education level		high education level	
	N	%	N	%	N	%
Worsening (‹-0.2)	66	3.3	128	2.3	34	2.0
No effect (-0.2 - 0.2)	156	7.8	306	5.4	65	3.7
Amelioration ‹50% (›0.2)	313	15.6	634	11.3	150	8.6
Amelioration ›50% (›0.5)	841	42.0	2,418	42.9	772	44.4
Amelioration ›95% (›0.95)	626	31.3	2,151	38.2	719	41.3
Total	**2,002**		**5,637**		**1,740**	

Figure 7.9

Treatment effect pain (TKA primary OA) depending on education level

Follow-up 1 year (9 to 18 months allowed), intention-to-treat perspective



Appendix

Definitions and abbreviations
SIRIS outlier watch list – hip implants
SIRIS outlier watch list – knee implants
Participating hospitals 2025
List of manufacturers and distributors
List of tables and figures

Definitions and abbreviations

Acetabular component The part of a hip prosthesis that is implanted into the acetabulum – the socket of the hip joint.

Acetabular inlay (insert) The intermediate component, usually made of polyethylene, that is placed inside the acetabular component of a hip prosthesis.

Anatomical total shoulder arthroplasty A total shoulder replacement that aims to reproduce the natural anatomy of the shoulder, with a prosthetic humeral head articulating with a glenoid component.

Arthrodesis A procedure in which a natural joint is surgically fused so that it no longer moves.

Arthrofibrosis Stiffness of a joint caused by excessive formation of scar-like connective tissue.

Arthroplasty Surgical reconstruction or replacement of a joint. In this report, the term mainly refers to replacement of a hip, knee or shoulder joint with a prosthesis.

Arthrotomy The surgical opening of a joint.

Articulation The surfaces of a joint or joint replacement that move against each other.

ASA score A classification of the American Society of Anaesthesiologists (ASA) used to describe a patient's overall physical health before surgery. Higher classes indicate more severe systemic disease.

Baseplate In reverse shoulder arthroplasty, the component fixed to the glenoid (shoulder socket) that supports the glenosphere.

Benchmark A reference value or comparison group used to assess results, for example by comparing a hospital or an implant with the relevant national or group average.

Bilateral Involving the same joint on both sides of the body, for example both hips or both knees. In this report, bilateral replacement may refer to both joints being replaced during the same session.

Body Mass Index (BMI) A measure relating body weight to height, calculated as weight in kilograms divided by height in metres squared. It is commonly used to classify underweight, normal weight, overweight and obesity.

Case concentration score (CCS) The percentage of procedures with a particular implant that were performed by the hospital service using that implant most frequently. A high score means that the reported result may be strongly influenced by one hospital service.

Case mix The composition of a patient population with regard to factors such as diagnosis, age, sex and health condition. Differences in case mix can influence treatment outcomes.

Cement Polymethyl methacrylate (PMMA), a material used to fix joint replacement components to bone.

Censoring / censoring event In time-to-event analyses, the end of a patient's observed follow-up without the event of interest, for example because the patient died, emigrated or reached the end of the observation period. Censoring allows the available follow-up time to be included in the analysis.

Charnley score A clinical classification used in hip arthroplasty to describe factors that may affect mobility: A, one hip affected; B1, both hips affected; B2, the opposite hip has a prosthesis; C, several joints or another chronic condition affect mobility or quality of life.

Component loosening Loss of secure fixation of a prosthetic component to the bone. Loosening may cause pain or impaired function and can lead to revision surgery.

Competing risks survival analysis A method for estimating the probability of an event while taking account of another event that prevents it from occurring. In this report, death is a competing event for revision because a patient who has died can no longer undergo a later revision.

Confidence interval (CI) A range around an estimated result that indicates its statistical uncertainty. Wider confidence intervals generally indicate less precise estimates, often because fewer cases are available.

Cumulative incidence The estimated proportion of patients or implants experiencing a particular event over a specified period, while competing events can be taken into account.

Cumulative revision percentage The estimated percentage of joint replacements that have undergone revision by a specified time after the primary operation.

Dislocation / instability Loss of stable alignment of a joint replacement. A dislocation occurs when the articulating components move completely out of their normal relationship; instability also includes a tendency to dislocate.

Femoral component The part of a hip or knee prosthesis that is implanted into or attached to the femur (thigh bone).

Funnel plot A graph used to compare results between hospitals while taking the number of procedures into account. It helps identify results that differ more from the reference value than would usually be expected from random variation.

Girdlestone procedure A hip revision procedure in which the hip prosthesis is removed and no new prosthesis is implanted, usually in difficult situations such as severe infection.

Glenoid component The component of a shoulder prosthesis implanted on the glenoid, the socket side of the shoulder joint.

Glenosphere The ball-shaped glenoid component used in reverse total shoulder arthroplasty. It is fixed to the socket side of the shoulder and articulates with the humeral liner.

Head component The ball-shaped component of a hip prosthesis that is attached to the femoral component and moves inside the acetabular component.

Hemiarthroplasty Replacement of only one side of a joint with a prosthesis. In the hip, the femoral head is replaced while the natural acetabulum is retained; in the shoulder, the humeral side is replaced while the natural glenoid is retained.

Hospital service volume The number of arthroplasty procedures performed by a hospital service during a defined period. In this report, hospitals may be grouped into volume categories for comparison.

Humeral component The part of a shoulder prosthesis implanted into or attached to the humerus (upper arm bone).

Hybrid fixation Fixation of a joint replacement in which one component is cemented and another is uncemented.

Kaplan-Meier survival analysis A statistical method used to estimate the probability that an implant remains unrevised over time. It uses the available follow-up for each patient and accounts for censored observations.

Kernel density plot A smoothed graph showing how values or events are distributed. Unlike a histogram, it displays a continuous curve rather than separate bars.

Lateral collateral ligament The ligament on the outer side of the knee that contributes to knee stability.

Liner (knee) The polyethylene insert placed between the femoral and tibial components of a knee prosthesis. It forms part of the artificial bearing surface.

Liner Stability Ratio (LSR) A biomechanical measure used in the shoulder section to describe the stability provided by a reverse shoulder arthroplasty liner. Higher values indicate greater theoretical resistance to instability under the model used.

Malalignment Positioning or alignment of a limb or prosthetic component that deviates substantially from the intended anatomical or mechanical position.

Meniscectomy Surgical removal of part or all of a meniscus in the knee.

Metallosis Accumulation of metallic wear debris in tissues around an implant.

Osteoarthritis A joint disease in which cartilage is progressively damaged and the underlying bone and other joint structures may also change.

Osteochondral bone defect A defect involving both the joint cartilage and the underlying bone.

Osteonecrosis Death of bone tissue caused by loss or impairment of its blood supply.

Osteosynthesis Surgical fixation of broken bone fragments, for example with plates, screws, nails or wires.

Osteotomy A surgical cut through a bone to change its position, alignment or length.

Outlier A hospital or implant result that lies outside predefined statistical limits compared with the relevant reference group. An outlier signal indicates that the result warrants closer examination; it does not by itself establish the cause of the difference.

Partial knee arthroplasty Replacement of only part of the knee joint, for example the medial or lateral tibiofemoral compartment or the patellofemoral joint.

Patellar component The prosthetic component implanted on the inner surface of the patella (kneecap).

Patellofemoral prosthesis A partial knee prosthesis replacing the articulating surfaces between the patella (kneecap) and the trochlea of the femur.

Periprosthetic fracture A bone fracture occurring around or close to a joint replacement or one of its components.

Primary prosthesis / primary arthroplasty The first replacement of a natural joint with a prosthesis.

Reoperation A further operation on a previously replaced joint in which no prosthetic component is removed or replaced.

Resurfacing hip arthroplasty A type of hip replacement in which the acetabular surface is replaced and the femoral head is preserved but covered with a metal cap.

Reverse hybrid fixation A form of hybrid fixation in which the pattern of cemented and uncemented components is the reverse of the usual hybrid configuration. The exact components involved depend on the joint being described.

Reverse total shoulder arthroplasty A shoulder replacement in which the normal ball-and-socket geometry is reversed: a ball (glenosphere) is placed on the glenoid side and a concave component on the humeral side.

Revision A further operation on a previously replaced hip, knee or shoulder in which one or more prosthetic components are removed, exchanged or reimplanted.

Revision burden The proportion of revision procedures relative to the total number of primary and revision arthroplasty procedures.

Risk adjustment A statistical method used to make comparisons fairer by taking account of differences in patient characteristics that can influence outcomes, such as age, sex, BMI or general health.

Sarcopenia Age-associated loss of skeletal muscle mass, strength and physical function.

Spacer A temporary implant, often containing antibiotic-loaded cement, used after removal of prosthetic components, particularly during staged treatment of a joint replacement infection.

Synovectomy Surgical removal of inflamed synovial tissue, the tissue lining the inside of a joint.

Tibial component The part of a knee prosthesis implanted into or attached to the tibia (shin bone).

Total joint arthroplasty Replacement of the principal articulating surfaces of a joint with prosthetic components.

Unicompartmental knee arthroplasty A type of partial knee arthroplasty in which only one of the two tibiofemoral compartments of the knee is replaced.

Abbreviations

aTSA	Anatomical total shoulder arthroplasty
ASA	American Society of Anaesthesiologists
AVN	Avascular necrosis
BCR	Bicruciate retaining
BMI	Body Mass Index
CCK	Constrained condylar knee
CCS	Case Concentration Score
CI	Confidence Interval
COMI	Core Outcome Measures Index
CR	Cruciate retaining
CRF	Case Report Form
CS	Cruciate sacrificing
EQ-5D-5L	EuroQol five-dimension, five-level questionnaire
HR	Hazard ratio
HHA	Hemiarthroplasty of the hip
HSA	Shoulder hemiarthroplasty
IQR	Interquartile range
ITT	Intention-to-treat
LSR	Liner Stability Ratio
acLSR	Angular-corrected Liner Stability Ratio
MCL	Medial collateral ligament
NRS	Numeric Rating Scale
OA	Osteoarthritis
PCR	Posterior cruciate retaining
PKA	Partial knee arthroplasty
PROMs	Patient-Reported Outcome Measures
PS	Posterior stabilised
PSI	Patient-specific instrumentation
rTSA	Reverse total shoulder arthroplasty
SD	Standard Deviation
SHR	Subhazard ratio
Sig.	Significance
SO-MDS	Swiss Orthopaedics Minimal Dataset
TE	Treatment effect
THA	Total Hip Arthroplasty
TKA	Total Knee Arthroplasty
UCOR	Ultra-congruent rotating

SIRIS outlier watch list – hip implants

Implant or implant combination	Detected as outlier in report	Risk-adjusted hazard ratios for either 2-year revision risk or overall revision risk (long-term evaluation)						Summary
		Adjusted for age and sex			Adjusted for age, sex, BMI, ASA, and Charnley Class (from 2015, if available)			
		HR	ll95%	ul95%	HR	ll95%	ul95%	
Uncemented stem/cup combinations (primary osteoarthritis)								
Active outlier implants								
Avenir + G7 hemispherical	**2026**	1.52	0.86	2.68	1.56	0.86	2.82	The Avenir + G7 hemispherical implant combination was first registered in 2020, with substantial use from 2021 onwards (366 implants in 16 hospitals). The 2-year revision risk of 5.0% (95% CI 2.5–9.8%) exceeds the group average of 2.3%, but the risk-adjusted hazard ratios are not significantly elevated (1.52; 0.86–2.68) and statistical precision is low. Revision rates were highest in implants used in 2023 and could be lower again in 2024 and 2025. The KM curve separates slightly from the comparison group during the first two years, but neither component alone shows a clear deviation. Cup position/orientation and dislocation were indications in 8 of 12 revisions, which may point to a technique- or cup-related issue, but numbers are too small for firm conclusions. Recommended course of action: Investigate the reasons for revision, especially cup position and dislocation, and observe future performance.
Corail collared + Bimobile	**2026**	1.86	0.83	4.14	1.20	0.45	3.21	The Corail collared + Bimobile combination was first registered in 2021 and has so far been used mainly in two hospitals. The elevated 2-year revision risk (7.0%; 3.0–16.1%) is based on only 6 early revisions, 4 of which occurred in implants used in 2022. Furthermore, all of the early revisions occurred in one of the two main users. The risk-adjusted hazard ratio is not significantly increased (1.86; 0.83–4.14) and the fully adjusted ratio is close to 1 (1.20). The Corail collared stem performs better than average, whereas the Bimobile cup shows a cluster of very early revisions; after the first months the KM curve is flat and shows no further divergence. Revision reasons are heterogeneous without a dominant pattern, and implants used since 2023 have been unremarkable so far, although follow-up is still short. Statistical precision of the potential outlier status is very low. A chance observation based on the earliest uses of the implant combination cannot be ruled out.
CLS Spotorno + Allofit	2025	1.38	1.05	1.80	1.55	1.08	2.23	The CLS Spotorno + Allofit implant combination demonstrated unremarkable revision performance between 2012 and 2019. However, an increase in early revision risk was observed starting in 2020, with relatively high rates persisting through 2021 and 2022. Given the limited number of main users during this period, the possibility of an adverse local effect cannot be ruled out. Preliminary data for 2023 and 2024 — following the involvement of a new main user — show no cause for concern. Recommended course of action: Investigate the underlying reasons for the rise in revision risk after 2019.
	2026	1.39	1.06	1.81	1.55	1.09	2.20	
Twinsys + RM pressfit	2025	1.97	1.22	3.17	2.04	1.02	4.09	The Twinsys + RM pressfit implant combination has previously avoided being classified as a potential outlier due to low statistical precision. While it exhibited unremarkable revision performance between 2012 and 2018, its usage has since declined. More recently, revision rates have risen to outlier levels and are now very close to definitive outlier status. Currently, this implant combination is only relatively infrequently registered in two remaining hospitals.
	2026	2.07	1.30	3.29	1.99	1.00	4.00	
SPS evolution + April ceramic	2020	2.22	1.72	2.88	3.67	2.47	5.47	The SPS Evolution + APRIL Ceramic implant combination has been identified as a definitive outlier based on its overall performance over multiple years, both as a combination and for its individual components, across several hospitals. The risk-adjusted hazard ratio significantly exceeds the critical value of two, including its confidence interval. This combination, which remains in active clinical use, surpasses the outlier threshold at both the 2-year and long-term (beyond 5-year) follow-up intervals. While recent data indicate some improvement in early revision performance, it remains uncertain whether these changes will be sufficient to mitigate its outlier status. Recommended course of action: Investigate the specific causes of above-average revision rates. Continue to monitor future performance closely.
	2021	2.33	1.84	2.96	3.50	2.42	5.06	
	2022	2.50	2.01	3.11	3.50	2.51	4.88	
	2023	2.44	1.97	3.02	3.46	2.53	4.74	
	2024	2.49	2.02	3.05	3.34	2.44	4.57	
	2025	2.48	2.03	3.03	3.26	2.39	4.44	
	2026	2.50	2.05	3.03	3.09	2.27	4.21	
SL-plus MIA + HI **(long-term evaluation)**	2025	1.76	1.36	2.28	2.39	1.52	3.75	The SL-plus MIA + HI implant combination was first detected as a potential long-term outlier in the 2025 report because the 11-year revision rate exceeded the upper boundary. First analyses of reasons for revisions indicate relatively frequent problems with implant position/orientation as well as acetabular loosening. The SL-plus MIA stem is widely used and has an excellent performance record, whilst the HI cup is more associated with the long-term upward separation of revision rates as shown in the KM curves in this report. **Note that the AR2026 reported risk-adjusted hazard ratios refer to all implants with full follow-up, as the implant is now only classified as a potential long-term evaluation outlier.**
	2026	1.90	1.49	2.42	2.57	1.69	3.91	

Implant or implant combination	Detected as outlier in report	Risk-adjusted hazard ratios for either 2-year revision risk or overall revision risk (long-term evaluation)						Summary
		Adjusted for age and sex			Adjusted for age, sex, BMI, ASA, and Charnley Class (from 2015, if available)			
		HR	ll95%	ul95%	HR	ll95%	ul95%	
Uncemented stem/cup combinations (primary osteoarthritis)								
Former outlier implants (improved)								
SPS HA	2021	2.61	1.44	4.73	2.85	1.18	6.87	These combinations are no longer identified as potential outliers. Please consult previous report for details.
+ April ceramic	2022	2.61	1.44	4.72	2.84	1.18	6.85	
Symbol	2023	2.62	1.31	5.23	2.40	1.19	4.81	
+ Symbol	2024	1.91	1.03	3.56	1.80	0.97	3.36	
DMHA/DS evol.	2025	1.72	1.02	2.91	1.48	0.86	2.56	
SPS evolution	2025	1.69	1.00	2.86	1.26	0.41	3.91	
+ April poly								
Former outlier implants (not in use)								
Accolade II	2023	2.96	1.54	5.69	2.60	1.08	6.26	These combinations are not currently in active use. Consult previous reports for details.
+ Trident II	2024	2.89	1.55	5.38	2.79	1.25	6.21	
	2025	2.66	1.43	4.94	2.82	1.26	6.28	
Exception	2025	1.62	1.21	2.18	2.14	1.27	3.63	
+ Avantage								
Polarstem + EP-fit	2020	1.93	1.30	2.86	2.52	1.42	4.45	
	2021	1.89	1.30	2.74	2.31	1.39	3.84	
	2022	1.92	1.36	2.71	2.14	1.38	3.33	
	2023	1.94	1.40	2.68	2.11	1.41	3.16	
	2024	1.87	1.35	2.58	1.99	1.33	2.97	
GTS	2020	5.27	3.22	8.62	3.39	1.52	7.57	
+ G7 bi-spherical	2021	5.15	3.24	8.19	3.84	1.92	7.71	
	2022	5.15	3.28	8.09	3.96	2.06	7.63	
	2023	5.15	3.28	8.09	3.96	2.05	7.62	
	2024	5.33	3.40	8.37	4.07	2.11	7.83	
Alloclassic	2022	1.49	1.02	2.17	1.26	0.60	2.64	
+ Fitmore	2023	1.55	1.07	2.24	1.24	0.59	2.61	
(AMIStem	2020	2.14	1.02	4.51	2.30	1.03	5.15	
+ Versafitcup DM)	2021	2.00	0.95	4.21	2.18	0.98	4.88	
	2022	3.11	1.29	7.49	3.17	1.31	7.62	
Amistem-H prox.coat.	2023	3.14	1.30	7.54	3.22	1.34	7.76	
+ Versafitcup DM								
Harmony + Gyracup	2020	3.97	1.98	7.94	3.55	1.76	7.13	
Harmony + Symbol	2022	3.67	1.83	7.35	3.20	1.60	6.42	
DMHA/DS evol.	2023	3.66	1.83	7.33	3.20	1.60	6.42	
SPS modular	2019							
+ April ceramic	2020	2.95	1.94	4.49	1.61	0.23	11.50	
	2021	2.90	1.91	4.41	1.59	0.22	11.32	
Stelia-stem	2019							
+ Ana.nova hybrid	2020	2.65	1.71	4.12	2.30	1.26	4.22	
	2021	2.60	1.68	4.04	2.20	1.20	4.01	
Twinsys	2020	1.96	0.98	3.93	4.93	1.58	15.34	
+ Selexys PC								
Exception	2020	1.53	0.69	3.40	1.30	0.33	5.22	
+ Exceed	2021	1.59	0.76	3.33	1.48	0.48	4.61	
AMIStem-H + Mpact	2019							
GTS + Exceed	2019							
Corail + Delta motion	2019							

Implant or implant combination	Detected as outlier in report	Risk-adjusted hazard ratios for either 2-year revision risk or overall revision risk (long-term evaluation)						Summary
		Adjusted for age and sex			Adjusted for age, sex, BMI, ASA, and Charnley Class (from 2015, if available)			
		HR	ll95%	ul95%	HR	ll95%	ul95%	
Hybrid fixation stem-cup combinations (primary osteoarthritis)								
Active outlier implants								
Amistem-C + Mpact	**2026**	1.73	0.89	3.34	0.89	0.33	2.39	The Amistem-C + Mpact hybrid combination has been registered since the early years of SIRIS, with increasing use in 2024 and 2025 (258 implants in 24 hospitals). Revision performance was unremarkable apart from implants used in 2020, which had a high early revision rate (4 of 31). The resulting 2-year revision risk of 6.9% (3.2–14.7%) is above the group average of 2.5%, but the risk-adjusted hazard ratio is not significantly elevated (1.73; 0.90–3.34) and falls below 1 in the full model (0.89; 0.33–2.39). The excess risk is confined to the first months after surgery; by 5 years the KM curve is close to the comparison group. The Amistem-C stem rather than the Mpact cup shows a slight but consistent excess. Given the wide confidence intervals and the favourable results of more recent implants, a chance observation cannot be ruled out.
Former outlier implants (improved)								
CCA + RM Pressfit vitamys	2020	1.83	0.75	4.45	1.91	0.60	6.07	These combinations are no longer identified as potential outliers. Please consult previous report for details.
	2021	2.05	0.91	4.63	1.86	0.59	5.91	
	2023	1.94	0.97	3.88	1.62	0.61	4.33	
Twinsys (cem) + RM pressfit	2019							
Former outlier implants (not in use)								
PF + Fitmore	2020	0.84	1.22	3.17	2.04	1.02	4.09	These combinations are not currently in active use. Consult previous reports for details.
Weber + Alloclassic	2019							
	2020	2.91	1.20	7.05	3.48	1.10	11.02	
Uncemented stem-cup combinations (fractures)								
Active outlier implants								
Exacta S + Symbol DMHA/DS evol.	**2026**	1.37	0.68	2.76	1.43	0.70	2.90	The Exacta S + Symbol DMHA/DS evol. combination was first registered in 2021 and is used in a single hospital to treat fractures. The 2-year revision risk of 10.6% (5.2–20.9%) is based on only 8 revisions, 3 of them in the first 5 implants used in 2021; infection accounted for 3 of the 8 revisions. The risk-adjusted hazard ratio is not significantly increased (1.37; 0.68–2.76), the KM curve of the combination broadly follows the comparison group. The Symbol DMHA/DS evol. cup, however, is above the comparison cups irrespective of the stem it is combined with, pointing to a cup-related contribution. The outlier status of this combination is statistically weak and may reflect early random events in a single hospital. Recommended course of action: Investigate the performance of the Symbol DMHA/DS evol. cup in fracture patients and observe future performance.
Exeter V40 + Symbol DMHA/DS evol.	**2026**	2.41	1.19	4.86	2.58	1.27	5.23	The Exeter V40 + Symbol DMHA/DS evol. combination was first registered in 2021 and is used in a single hospital to treat fractures. The 2-year revision risk of 11.9% (5.5–24.6%) is clearly above the group average of 4.2%, and the risk-adjusted hazard ratios are significantly above 1 (2.41; 1.19–4.86 and 2.58; 1.27–5.23), although statistical precision is low because of the small numbers (8 early revisions). The KM curve shows a first cluster of revisions within the first weeks after surgery, followed by a continued stepwise increase. Acetabular loosening accounted for 4 of the 8 revisions. Because the Exeter V40 stem is used almost exclusively in this combination, stem and combination effects cannot be separated. The Symbol DMHA/DS evol. cup is also above average in other combinations (see Exacta S), pointing to a cup-related contribution. As all implants come from one hospital, a local effect cannot be excluded. Recommended course of action: Investigate the reasons for revision, particularly acetabular loosening, and observe future performance.
Former outlier implants (improved)								
CLS Spotorno + Allofit	2022	2.18	1.20	3.95	2.12	0.94	4.81	These combinations are no longer identified as potential outliers. Please consult previous report for details.
	2023	2.09	1.15	3.79	1.97	0.87	4.45	
Fitmore + Allofit	2022	1.37	0.77	2.43	1.87	0.88	3.98	
Cemented stem-head combinations (fractures)								
Former outlier implants (not in use)								
Harmony (cem) + OHST bipolar head	2025	3.15	1.63	6.08	2.88	1.43	5.82	These combinations are not currently in active use. Consult previous reports for details.
Harmony (cem) + Symbios bibop	2024	1.75	1.14	2.68	1.53	0.79	2.98	
	2025	1.78	1.17	2.29	1.67	1.67	3.13	
Quadra-C + Medacta bipolar head	2024	1.49	0.82	2.70	1.61	0.52	5.02	

SIRIS outlier watch list – knee implants

Knee system	Detected as outlier in report	Risk-adjusted hazard ratios for 2-year revision risk: for age and sex HR	lb95%	ub95%	for age, sex, BMI, ASA and Charnley Class (from 2015, if available) HR	lb95%	ub95%	Summary
Total knee systems								
Active outlier implants								
Genius	2024	1.93	1.00	3.71	2.10	1.00	4.41	The Genus total knee system has been in steady, low-volume use since the start of SIRIS (257 implants), almost exclusively in two hospitals. The 2-year revision risk of 7.0% (3.6–13.6%) is more than twice the group average of 3.3%, and the age- and sex-adjusted hazard ratio is significantly elevated (1.88; 1.09–3.24), whereas the fully adjusted ratio narrowly includes 1 (1.80; 0.97–3.35). Early revision rates were consistently elevated over most years rather than driven by a single cohort. The excess revision risk arises between 6 and 18 months after surgery; thereafter the revision risk develops parallel to the comparison group. Tibial problems predominate: tibial revisions account for 6 of the 13 early revisions, and tibial loosening for 4. Recommended course of action: Investigate the reasons for revision, especially tibial loosening, and observe future performance.
	2026	1.88	1.09	3.24	1.80	0.97	3.35	
Legion	2024	1.60	1.36	1.87	1.35	1.05	1.73	This combination is no longer identified as a potential outlier. Please consult previous report for details. **Update 2025/2026:** 10-year revision performance just fell short of the critical threshold. Legion is now classified as showing elevated long term revision rates.
Journey II	2019							This combination is no longer identified as a potential outlier. Please consult previous report for details.
	2020	2.17	1.81	2.61	2.10	1.69	2.61	
	2021	2.06	1.74	2.46	2.00	1.63	2.45	
	2022	1.93	1.64	2.29	1.81	1.48	2.20	
Former outlier implants (not in use)								
Sigma PS-RP	2024	1.00	0.77	1.31	2.42	1.54	3.80	These combinations are not currently in active use. Consult previous reports for details
	2025	1.00	0.77	1.31	2.41	1.53	3.78	
	2026	1.05	0.81	1.37	1.81	1.48	2.20	
Physica KR	2019							
	2020	3.97	2.13	7.38	3.20	1.20	8.54	
	2021	3.80	2.04	7.07	3.06	1.14	8.17	
Physica PS	2019							
	2020	3.32	1.96	5.61	3.06	1.73	5.41	
	2021	3.11	1.84	5.25	2.91	1.65	5.51	
Physica KR/PS	2022	3.25	2.17	4.85	2.83	1.73	4.63	
E.Motion PS	2019							
Partial knee systems								
Active outlier implants								
Journey Uni (long-term evaluation)	2020	1.82	1.38	2.39	1.56	0.96	2.53	It is likely that Journey Uni was a problematic knee system at least between 2015 and 2019, but there were signs of improvement in 2020. The statistical precision within the report's main timeframe of interest (2-year revision rate) is relatively low. Whilst the system actually fell below the outlier boundary in 2022 and has so far stayed there, the development of the revision risk beyond two years follow-up strongly suggests an unusual pattern. The system was identified as an outlier in the first round of long-term-evaluation (from 5 years) in 2022 and this was confirmed in 2023 and 2024. It should also be noted that the better short-term revision position since 2022 was also due to the inclusion of poorly performing "other systems" in the evaluation and thus a right-shift of the outlier boundary. Recommended course of action: investigate reasons for revisions and observe future performance. **Note that the AR2026 reported risk-adjusted hazard ratios refer to all implants with full follow-up, as the implant is now only classified as a potential long-term evaluation outlier.**
	2021	1.81	1.39	2.35	1.68	1.10	2.58	
	2022	1.61	1.25	2.08	1.51	1.02	2.23	
	2023	1.57	1.23	2.00	1.40	0.96	2.03	
	2024	2.00	1.71	2.33	1.79	1.39	2.30	
	2025	1.94	1.67	2.24	1.74	1.37	2.22	
	2026	1.94	1.69	2.23	1.69	1.35	2.12	

Knee system	Detected as outlier in report	Risk-adjusted hazard ratios for 2-year revision risk for age and sex			for age, sex, BMI, ASA and Charnley Class (from 2015, if available)			Summary
		HR	lb95%	ub95%	HR	lb95%	ub95%	
PFJ knee systems								
Active outlier implants								
IBalance PFJ	**2026**	1.65	1.08	2.53	1.68	0.95	2.97	The IBalance PFJ patellofemoral system has been in use since the start of SIRIS (259 implants in about 35 hospitals) and is currently used less frequently. The 2-year revision risk of 11.9% (6.9–20.0%) is well above the group average of 5.1%, and the age- and sex-adjusted hazard ratio is significantly elevated (1.65; 1.08–2.53), while the fully adjusted ratio is not (1.68; 0.95–2.97). The elevated risk is consistent across implantation years (about 9–13% for 2012–2023) rather than caused by a single cohort or hospital. The deviation is confined to the first three years: 5-year revision risk is the same as for the other patellofemoral systems. Patella problems (10 of 25 revisions) and progression of osteoarthritis (7) dominate. Recommended course of action: Investigate the reasons for revision and observe future performance.

Participating hospitals 2025

	Group	Clinic
AG	Asana Gruppe	Asana - Spital Leuggern
AG	Asana Gruppe	Asana - Spital Menziken
AG	GZF - Gesundheitszentrum Fricktal	Spital Rheinfelden
AG	Hirslanden Gruppe	Hirslanden-Klinik Aarau
AG	KSA - Kantonsspital Aargau	Kantonsspital Aarau
AG		Kantonsspital Baden
AG	Swiss Medical Network Hospital SA	SMNH-Privatklinik Villa im Park
AG		Spital Muri
AG	Swiss Medical Network Hospital SA	Spital Zofingen
AI		Kantonales Spital und Pflegezentrum Appenzell
AR		Berit Klinik
AR	Hirslanden Gruppe	Hirslanden-Klinik Am Rosenberg AG
AR	Spitalverbund Appenzell Ausserrohden	Spital Heiden
AR	Spitalverbund Appenzell Ausserrohden	Spital Herisau
BE	Hirslanden Gruppe	Hirslanden-Klinik Beau-Site
BE	Hirslanden Gruppe	Hirslanden-Klinik Linde Biel
BE	Hirslanden Gruppe	Hirslanden-Klinik Permanence
BE	Hirslanden Gruppe	Hirslanden - Salem-Spital
BE	Insel Gruppe AG	Spital Aarberg
BE	Insel Gruppe AG	Spital Münsingen
BE	Insel Gruppe AG	Spital Riggisberg
BE	Insel Gruppe AG	Spital Tiefenau
BE	Insel Gruppe AG	Inselspital - Universitätsspital Bern
BE		Klinik Hohmad
BE	Lindenhofgruppe	Lindenhofspital
BE	Lindenhofgruppe	Sonnenhofspital
BE	Swiss Medical Network Hospital SA	SMNH - Hôpital de Moutier
BE	Swiss Medical Network Hospital SA	SMNH - Hôpital de Saint-Imier
BE	Swiss Medical Network Hospital SA	SMNH - Privatklinik Siloah
BE	SRO AG - Spital Region Oberaargau	SRO - Spital Langenthal
BE	Spital STS (Simmenthal-Thun-Saanenland)	STS - Spital Thun
BE	Spital STS (Simmenthal-Thun-Saanenland)	STS - Spital Zweisimmen
BE	Spital Emmental AG	Spital Emmental - Standort Burgdorf
BE	Spital Emmental AG	Spital Emmental - Standort Langnau
BE		Spitalzentrum Biel
BE	fmi AG - Spitäler Frutigen Meiringen Interlaken	fmi - Spital Frutigen
BE	fmi AG - Spitäler Frutigen Meiringen Interlaken	fmi - Spital Interlaken
BL		Ergolz Klinik AG
BL	Hirslanden Gruppe	Hirslanden - Klinik Birshof
BL	KSBL - Kantonsspital Baselland	Kantonsspital Baselland
BL		Praxisklinik Rennbahn
BS		Merian Iselin - Klinik für Orthopädie und Chirurgie
BS		Universitätsspital Basel
FL		Landesspital Liechtenstein
FR	HFR - Hôpital fribourgeois	HFR - Hôpital cantonal
FR	HFR - Hôpital fribourgeois	HFR Riaz
FR	HFR - Hôpital fribourgeois	HFR Tafers
FR	Swiss Medical Network Hospital SA	SMNH - Clinique Générale Ste-Anne
GE		HUG - Hôpitaux Universitaires de Genève
GE	Hirslanden Gruppe	Hirslanden - Clinique La Colline
GE	Hirslanden Gruppe	Hirslanden - Clinique des Grangettes
GE	La Tour Medical Group	Hôpital de La Tour
GE	Swiss Medical Network Hospital SA	SMNH - Clinique Générale-Beaulieu
GL		Kantonsspital Glarus
GL		Kantonsspital Glarus
GR	Flury Stiftung Gesundheitsversorgung	Flury Stiftung - Spital Schiers
GR	CSEB - Gesundheitszentrum Unterengadin	Gesundheitszentrum Unterengadin
GR	KSGR - Kantonsspital Graubünden	Kantonsspital Graubünden
GR	Klinik Gut	Klinik Gut Chur - Fläsch
GR	Klinik Gut	Klinik Gut St. Moritz
GR		Regionalspital Surselva
GR		Spital Davos
GR	SGO - Stiftung Gesundheitsversorgung Oberengadin	Spital Oberengadin
GR		Spital Thusis
JU	HJU - Hôpital du Jura	Hôpital du Jura - Site de Delémont
LU	Hirslanden Gruppe	Hirslanden - Klinik St. Anna
LU	LUKS - Luzerner Kantonsspital	Luzerner Kantonsspital - Standort Luzern
LU	LUKS - Luzerner Kantonsspital	Luzerner Kantonsspital - Standort Sursee
LU	LUKS - Luzerner Kantonsspital	Luzerner Kantonsspital - Standort Wolhusen
LU		SPZ Nottwil
NE		Clinique Volta
NE	RHNe - Réseau Hospitalier Neuchâtelois	Le Réseau Hospitalier Neuchâtelois
NE	Swiss Medical Network Hospital SA	SMNH - Clinique Montbrillant
NE	Swiss Medical Network Hospital SA	SMNH - Hôpital de la Providence
NE		Clinique Volta SA

	Group	Clinic
NW	LUKS - Luzerner Kantonsspital	Spital Nidwalden
OW		Kantonsspital Obwalden
SG	HOCH Health Ostschweiz	HOCH - Kantonsspital St.Gallen
SG	HOCH Health Ostschweiz	HOCH - Spital Grabs
SG	HOCH Health Ostschweiz	HOCH - Spital Linth
SG	HOCH Health Ostschweiz	HOCH - Spital Wil
SG	Hirslanden Gruppe	Hirslanden - Klinik Stephanshorn
SG	KSSG - Kantonsspital St.Gallen	Kantonsspital St.Gallen
SG	Swiss Medical Network Hospital SA	SMNH - Rosenklinik Rapperswil
SG	SRFT - Spitalregion Fürstenland Toggenburg	SRFT - Standort Wattwil
SG	SRRWS - Spitalregion Rheintal Werdenberg Sarganserland	SRRWS - Spital Altstätten
SG	SRRWS - Spitalregion Rheintal Werdenberg Sarganserland	SRRWS - Spital Walenstadt
SH	Swiss Medical Network Hospital SA	SMNH - Privatklinik Belair
SH	SSH - Spitäler Schaffhausen	Spitäler Schaffhausen
SO	Swiss Medical Network Hospital SA	SMNH - Privatklinik Obach
SO	soH - Solothurner Spitäler AG	soH - Bürgerspital Solothurn
SO	soH - Solothurner Spitäler AG	soH - Kantonsspital Olten
SO	soH - Solothurner Spitäler AG	soH - Spital Dornach
SZ	AMEOS Gruppe	AMEOS Spital Einsiedeln
SZ		Spital Lachen
SZ		Spital Schwyz
TG		Klinik Seeschau
TG	Spital Thurgau AG	Spital Thurgau - Kantonsspital Frauenfeld
TG	Spital Thurgau AG	Spital Thurgau - Kantonsspital Münsterlingen
TI	Gruppo Ospedaliero Moncucco	Clinica Moncucco
TI	Gruppo Ospedaliero Moncucco	Clinica Santa Chiara
TI	EOC - Ente Ospedaliero Cantonale	EOC - Ospedale Regionale di Bellinzona
TI	EOC - Ente Ospedaliero Cantonale	EOC - Ospedale Regionale di Locarno
TI	EOC - Ente Ospedaliero Cantonale	EOC - Ospedale Regionale di Lugano (Civico e Italiano)
TI	EOC - Ente Ospedaliero Cantonale	EOC - Ospedale Regionale di Mendrisio
TI	Swiss Medical Network Hospital SA	SMNH - Clinica Ars Medica
UR		Kantonsspital Uri
VD		CHUV - Centre hospitalier universitaire vaudois
VD	Clinique CIC Suisse	Clinique CIC Montreux
VD		Clinique La Prairie
VD		Clinique de La Source
VD	EHC - Ensemble hospitalier de la Côte	EHC - Hôpital de Morges
VD	GHOL - Groupement Hospitalier de l'Ouest Lémanique S.A.	GHOL - Hôpital de Nyon
VD	Hirslanden Gruppe	Hirslanden - Clinique Bois-Cerf
VD	Hirslanden Gruppe	Hirslanden - Clinique Cecil
VD	HRC - Hôpital Riviera-Chablais Vaud-Valais	Hôpital Riviera-Chablais HRC Vaud-Valais
VD	HIB - Hôpital intercantonal de la Broye	Hôpital intercantonal de la Broye

	Group	Clinic
VD		Le Pôle Santé du Pays-d'En-haut
VD	RSBJ - Réseau Santé Balcon du Jura. vd	RSBJ - Site des Rosiers
VD	Swiss Medical Network Hospital SA	SMNH - Clinique de Genolier
VD	Swiss Medical Network Hospital SA	SMNH - Clinique de Montchoisi
VD	eHnv - Etablissements Hospitaliers du Nord Vaudois	eHnv - Hôpital d'Yverdon-les-Bains
VD	eHnv - Etablissements Hospitaliers du Nord Vaudois	eHnv - Hôpital de Saint-Loup
VS	Clinique CIC Suisse	Clinique CIC Saxon
VS	Hôpital du Valais - Spital Wallis	Hôpital du Valais - Site Martigny
VS	Hôpital du Valais - Spital Wallis	Hôpital du Valais - Site Sion
VS	Swiss Medical Network Hospital SA	SMNH - Clinique de Valère
VS	Hôpital du Valais - Spital Wallis	Spital Wallis - Standort Brig
VS	Hôpital du Valais - Spital Wallis	Spital Wallis - Standort Visp
ZG		Zuger Kantonsspital
ZG	Hirslanden Gruppe	Hirslanden AndreasKlinik Cham Zug
ZG	Hirslanden Gruppe	Hirslanden - AndreasKlinik Cham Zug
ZG		Zuger Kantonsspital
ZH		Adus Klinik
ZH		GZO - Spital Wetzikon
ZH	Hirslanden Gruppe	Hirslanden - Klinik Hirslanden
ZH	Hirslanden Gruppe	Hirslanden - Klinik Im Park
ZH		Kantonsspital Winterthur
ZH	Swiss Medical Network Hospital SA	SMNH - Klinik Pyramide am See
ZH	Swiss Medical Network Hospital SA	SMNH - Privatklinik Bethanien
ZH	Swiss Medical Network Hospital SA	SMNH - Privatklinik Lindberg
ZH		Schulthess Klinik
ZH	See-Spital	See-Spital -Standort Horgen
ZH	See-Spital	See-Spital -Standort Kilchberg
ZH		Spital Affoltern
ZH		Spital Bülach
ZH		Spital Limmattal
ZH		Spital Männedorf
ZH		Spital Uster
ZH		Spital Zollikerberg
ZH	Stadtspital Zürich	Stadtspital Zürich Triemli
ZH	Stadtspital Zürich	Stadtspital Zürich Waid
ZH		UniversitätsSpital Zürich
ZH		Universitätsklinik Balgrist

List of manufacturers and distributors

List of companies with implants registered in the SIRIS registry 2025

Company	Headquarters Switzerland	Corporate domicile
Adler Ortho	Lugano	Italy
Amplitude	Genf	France
Argomedical	Cham	Switzerland
Arthrex	Belp	USA
Arthrosurface	-	USA
ARTIQO	-	Germany
ATF	-	France
B. Braun	Sempach	Germany
CeramTec	-	Germany
ConforMIS	-	USA
Corin	Buchs SG	United Kingdom
Dedienne Santé	-	France
DePuy Synthes / Johnson & Johnson	Zuchwil/Zug	USA
Enovis (Mathys / Lima / DJO Surgical)	Bettlach	USA
Evolutis	-	France
Exactech	Gümligen	USA
FX Shoulder Solutions	-	France
Globus Medical	Rotkreuz	USA
Groupe Acropole	-	France
Gruppo Bioimpianti	-	Italy
Implantcast	Basel	Germany
ImplanTec	-	Austria
Link	Bern	Germany
MatOrtho	-	United Kingdom
Medacta	Castel San Pietro	Switzerland
Merete	-	Germany
MicroPort	-	China
OHST Medizintechnik	-	Germany
Permedica Orthopaedics	Scairolo di Collina d'Oro	Italy
Peter Brehm	Dietikon	Germany
SERF	-	France
Smith & Nephew	Baar	United Kingdom
Stemcup Medical	Zürich	Switzerland
Stryker	Biberist	USA
Symbios	Yverdon-les-Bains	Switzerland
UOC	Yverdon-les-Bains	Taiwan
X.NOV	Porrentruy	France
Zimmer Biomet	Winterthur	USA

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