REPORT
2024

Norwegian National Network for Arthroplasty and Hip Fractures

Norwegian Arthroplasty Register
Norwegian Hip Fracture Register
Norwegian Knee Ligament Register
Norwegian Paediatric Hip Register

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https://helse-bergen.no/nrl

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ANNUAL REPORT 2024

The Annual Report presents the results and descriptive statistics for operations up until 2023 from our four registries. For details, we refer to the introduction of each individual registry's report.

We received a lot of positive feedback on the shorter version of the Annual Report, which was sent along with Norsk ortopedpost before the 2023 Autumn Meeting. We are planning a new edition in 3-4 years.

Results tailored for the public are published annually on June 15th on the website of the Norwegian Advisory Unit for Medical Quality Registries, www.kvalitetsregistre.no. Some of these results are also included in this annual report.

The Annual Report is sent electronically to all Norwegian orthopedic surgeons. Paper copies can be obtained by contacting the registry. On our website (http://www.helse-bergen.no/nrl), all our annual reports are available in both Norwegian and English, along with references to scientific articles and presentations. Most of the articles are also electronically accessible from this website. We publish most of our results on implants and surgical methods in scientific journals, where we can explain the materials and methods used, discuss weaknesses and strengths, and the significance of our findings. See the reference lists at the end of the report.

Quality and Competence Network

The Advisory Unit has been renamed the Norwegian National Network for Arthroplasty and Hip Fractures from 2023. This is defined as a professional, interregional collaboration where the participants share responsibility for the dissemination of competence, and where one professional environment coordinates the activity. The network aims to contribute to equal health services of high quality, with the goal of reducing unwarranted variation in health care services. The primary task will be the dissemination of competence by assisting in the implementation of existing and new knowledge from research and quality registries in all regions. The network will assist owners and national health authorities in clarifying professional questions. Unfortunately, we receive less funding for this network than for the Advisory Unit, which will likely affect our service to hospitals and researchers. However, we have received funding to hire four regional collaborators (nodes). Marianne Westberg (South-Eastern Norway Regional Health Authority), Knut Erik Mjaaland (South-Eastern Norway Regional Health Authority), and Cato Kjærvik (Northern Norway Regional Health Authority) have been hired so far, and we hope to hire a collaborator in Central Norway Regional Health Authority by 2024.

Registry-Based Randomized Controlled Trials (R-RCT)

We would like to remind you of our ongoing registry-based randomized controlled trials (R-RCTs). These studies are organized so that once the patients are enrolled and the surgery is performed, the registry takes over the follow-up, with no additional workload for either the patient or the healthcare provider. The ALBA study (an R-RCT where patients undergoing primary total knee replacement are randomized to bone cement with or without antibiotics) began enrollment in January 2021, and as of June 1, 2024, 3,299 knee prostheses have been included. The study plans to include 9,172 knee prostheses, so we encourage all hospitals to start including patients and those already participating to include an even greater proportion of their knees.

The Knee Ligament Registry is conducting an R-RCT where patients are randomized between early surgery or active rehabilitation. All major hospitals in Norway are participating in this study; the first patient was included in May 2021, and we are now in the process of collecting 2-year follow-up data for the first participants.

Quality Improvement

The Paediatric Hip Register has initiated a quality improvement project to identify where the delays in diagnosis occur for patients with Calvé-Legg-Perthes (CLP) disease and slipped capital femoral epiphysis (SCFE). All data have been analyzed, and we observe that for CLP, it takes about 14 weeks before patients seek primary healthcare and approximately 17 weeks until the diagnosis is made.

Hospitals have good routines for quickly assessing referrals and scheduling consultations. For SCFE, it takes 10 weeks from the onset of symptoms until patients seek primary healthcare and about 19 weeks until the diagnosis is established. We also see a delay between primary and specialized healthcare services, which is important to address. The challenge is how to disseminate information to parents, patients, and primary healthcare providers so that patients quickly seek medical attention when symptoms appear and are promptly referred for diagnosis and treatment. It is planned to contact the National Center for Health Promotion and School Health Services at the Norwegian Institute of Public Health to see if they can help distribute information at health stations.

The project on *Cemented stems for women over 75 years old receiving total hip replacements and cemented stems for patients receiving arthroplasties after hip fractures* has been completed, and an article reporting the results has been published in Acta (Gjertsen JE, Acta 2024). Now, 88% of stems in women over 75 years old are cemented, an increase from 60% before the project started. For the 19 hospitals that participated in the project, the percentage increased from under 30% to 80%. For hip fractures, the percentage increased from 27% to 91% in 2021 for participating hospitals, and in the last three years, 97% of hemiarthroplasties in Norway have been cemented. Reoperations have decreased for both participating hospitals and all hospitals. The project is considered a success, and the indicators will continue to be published on the hospital dashboard.

We encourage the use of registry data in local quality improvement projects. Please feel free to contact us if you need more data or assistance with analyses, even for small projects. An annual report form will be sent to contact persons to gather information on local projects. It is important that the registries receive reports on local quality improvement projects where registry data are used, as it is a requirement from the authorities that the data be utilized in quality improvement initiatives.

Hospital Reports

As in previous years, annual hospital-specific reports, containing data from each hospital, will be sent electronically to our contact persons at the hospitals and to the CEOs of each health trust by October. We encourage the contact persons to share the reports with the administration and staff and to verify that the number of registered operations and the data are correct. The reports should be used for local improvement work. If you find any errors in the hospital-specific reports, please contact us.

Completeness of reporting

Completeness of reporting analyses are published for each of the registries every two years. No new analyses have been conducted this year due to capacity issues at the Norwegian Patient Registry (NPR). Therefore, this year we are presenting figures for 2019 and 2020. Hospitals with low reporting rates must review their reporting routines. Some hospitals have low reporting rates for revision surgeries.

Electronic Reporting in MRS

For the Knee Ligament Register (NKLR), paper forms for reporting were discontinued as of January 1, 2024. As of December 2023, 85.6% of the operations were reported digitally to the NKLR. Electronic reporting has also been well established for shoulder, knee, and hip prostheses. In December 2023, 88%, 82%, and 98% of all operations were reported by the surgeons directly in the MRS system for hip, knee, and shoulder prostheses, respectively. As of mid-November 2023, it became possible to report digitally for elbow and ankle arthroplasties, which also includes PROM reporting with Quick Dash and SEFAS scores, respectively. Digital reporting for hand/wrist and finger, as well as toe prostheses, is planned for introduction in the fall of 2025. We will discontinue the registration of disc prostheses in the spine, as this will instead be registered in the Spine Register.

In the Paediatric Hip Register, all patients are electronically registered by the surgeons. We remind you that hip surgeries in adults related to pediatric hip disorders (osteotomies, arthroscopic procedures, open joint-preserving surgeries) should also be registered in the Paediatric Hip Register.

For the Hip Fracture Registry, the digital registration form was implemented in 2022, and nearly 70% of operation forms from surgeons were digitally registered by December 2023. We encourage all hospitals to transition to electronic registration. PROM forms for hip fracture patients are sent out by the registry at 4 months, 1 year, and 3 years after surgery. It is now also possible for digitally active patients to complete the electronic PROM forms through Helsenorge.no. In 2023, the Hip Fracture Register introduced a new digital discharge form, which has already been adopted by several major hospitals. This new form will serve as the basis for several new quality indicators, so we hope that hospitals will adopt this new form. For more information, see the introduction to the Hip Fracture Register.

We have engaged a consultant responsible for training hospital staff in digital registration and PROM reporting. Instructions are available on our website.

As a surgeon, you must register as a user in the Norwegian Arthroplasty Register via Norsk helsenett at https://falk.nhn.no. You can then log in at mrs.nhn.no and register the patient in the operation form. The user guide can be found on our website (https://www.helse-bergen.no/nrl). We remind surgeons working at multiple hospitals that they must request access to each hospital when creating a user account so that the operation forms are registered at the hospital where the surgery was performed.

PROM Reporting
Digital registration of patient-reported outcomes (PROM) for hip, knee, and shoulder arthroplasties is in use at 43 hospitals, while 3 hospitals have their own solution for exporting data to us. A total of 48 hospitals reported (electronically or on paper) in 2023. We ask hospitals to facilitate the collection of preoperative PROM data from patients receiving hip, knee, shoulder, elbow, and ankle arthroplasties. The goal is for patients at all hospitals to complete the PROM form before surgery. Please ask your patients before surgery if they have completed the PROM form digitally. Patients will automatically receive the PROM forms through Helsenorge.no 1 year, 6 years, and 10 years after the surgery. The Advisory Board has approved that 80% preoperative PROM registration is a good target for each hospital, which will be published as a quality indicator. Only 6 hospitals achieved this in 2023, so most hospitals have work to do.

PROM forms for hip fracture patients are sent out by the registry at 4 months, 1 year, and 3 years after surgery. It is now also possible for digitally active patients to complete the electronic PROM forms through Helsenorge.no.

Consent
We would like to remind you that the Data Protection Authority requires that consent forms be signed by patients before surgeries are reported to the registries, and that these consent forms be stored in a secure archive system. Since 2021, the Hip Fracture Register has been approved as an opt-out registry, meaning that patients do not need to sign a written consent form. However, an information sheet about the registry must be distributed to patients. Hospitals must ensure that the opt-out option is genuine and that patients are informed about the registration in the Hip Fracture Register.

Social Media
The registries has its own website, Nasjonalt kvalitets- og kompetansenettverk for leddproteser og hoftebrudd - Helse Bergen HF (helse-bergen.no), and its own Facebook page, which we hope everyone will visit: https://www.facebook.com/leddregisteret/ or use the QR code on the back of this year's report. These pages will feature information about published studies and other important updates from the registries.

Thank You!
We extend our gratitude to all orthopedic surgeons in the country for their excellent reporting to the registries. We also thank the contact persons for the various registries at all hospitals, the Advisory Boards, the Norwegian Orthopaedic Association, Helse Bergen, Western Norway Regional Health

Authority, Central Norway Regional Health Authority, Northern Norway Regional Health Authority, South-Eastern Norway Regional Health Authority, the Norwegian Advisory Unit for Medical Quality Registries at SKDE and the Regional Centre for Clinical Quality Registries in Western Norway Regional Health Authority, Central Norway Regional Health Authority's IT department (HEMIT) and Western Norway Regional Health Authority's IT department, equipment suppliers, the University of Bergen, the Norwegian Patient Register (NPR), the Norwegian Institute of Public Health, the Directorate of Medical Products (DMP), the Norwegian Directorate of Health, and the Ministry of Health and Care Services for their collaboration and support.

Bergen, June 2024

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CONTENTS

Norwegian Arthroplasty Register

Total Hip Arthroplasty (THA)

Report 2024

Nasjonalt Register for Leddproteser

Highlights from 2023

Hip prostheses

	Reported 1987-2023	Reported in 2023
Primary operations	**249,514**	**10,812**
Revisions	**38,851**	**1,222**

58
Hospitals reported
98%
Of the hospitals

Completeness
97.0%
Primary operations
90.8%
revisions

9 Published Papers

0 PhDs

16 Podium Presentations

Research

Patient activity after hip replacement

We found that patients with a hip replacement were more physically active than an age-matched control group.

Find us:
https://helse-bergen.no/nrl
https://www.facebook.com/leddregisteret
Nasjonalt servicemiljø for medisinske kvalitetsregistre

Results and activities

Quality indicators

- 95.9% 10-years survival
- 95% well documented cups
- 100% well documented stems
- 96.8 % wear-resistand joint surfaces
- 87.9% proportion of cemented stems in women>75 years

ePROM

electronic patient reported data

13,171 pre-op ePROM

48 Participating hospitals

14,499 post-op ePROM

ANNUAL REPORT HIP ARTHROPLASTY REGISTER

There is a steady increase in the number of hip arthroplasties year by year, except during the Covid pandemic. The incidence of hip arthroplasties is slightly increasing, but the calculation does not take population changes into account; a larger proportion of the population is in the " arthroplasty age."

In 2023, there were 12,320 hip arthroplasty surgeries reported; 10,812 primary, 1,222 revisions, 113 reoperations, and 173 closed repositions. The Hip Arthroplasty Registry is approaching 300,000 registrations in total.

In the past few years, the proportion of revisions has been less than 10% (compared to 14% in 2015). The reason for this is likely that Norwegian hospitals and surgeons have made good choices over the past 10-15 years. Arthroplasties that were found to have poorer results than expected (most recently the cemented Reflection cup and the Titan stem) were discontinued more than 10 years ago, and most of the patients who received these arthroplasties and developed problems (early loosening and/or wear) have now been revised. We have an annual review of the results for all implants used in Norway and have not identified any new implants with poor results. Hip arthroplasties are considered well-documented when prosthesis survival is > 95% after 10 years. In 2023, 99.7% of patients in Norway received well-documented stems and 94.6% received well-documented cups.

At the same time, we encourage surgeons to contribute to innovation and the development/testing of new methods, but this should be done in controlled forms (research, quality projects) so that the results are closely monitored and not an unnecessarily large number of patients are exposed to the method before the results are known.

Results with hip arthroplasties are good. Patients operated with primary arthroplasty in the period 2012-2023 have an estimated 10-year prosthesis survival rate of 95.9% (Figure A.29). The differences between hospitals are small. Some hospitals score lower, and these should review their results and see if anything can and should be changed. We are available to assist with the provision of data.

SURGICAL TRENDS:

- *Approach:* 73% are operated on with the posterior approach, 23% with the direct anterior or anterolateral approach. The direct lateral approach was used on 107 patients (1%). The posterior approach is also dominant in revisions (71%).
- *Head Size:* 32mm is standard, but 36mm is clearly increasing and is now used in 25% of those receiving a conventional articulation. Larger heads than this are practically not used.
- *Fixation:* There is increased use of uncemented cups, primarily because the classic hybrid with a cemented stem and uncemented cup has become more common (nearly 30% in 2023). In women over 75 years, uncemented stems are used in 12%. This latter group should generally have a cemented stem.
- *Articulation:* Metal heads against cross-linked polyethylene dominate. Approximately 15% receive a ceramic head, while ceramic-ceramic was used in only 30 patients in 2023.
- *Dual Mobility Articulations:* These are increasingly used in primary arthroplasties and were used in 12% of primary operations in 2023. The use of modular DM cups is particularly increasing. The modular DM concept is new and not very well documented, so caution is advised. Conventional DM cups have results as good as regular articulations in NARA studies with medium-term follow-up.

Most hospitals now report either fully or partially electronically, and in December 2023, 88% of hip prosthesis patients were reported electronically through MRS or by exporting data from their own registration systems. The electronic form primarily collects the same information as the paper form did, with some exceptions:

1. All reoperations related to the prosthesis must be reported, including those that do not involve changing or removing the implant. This also applies to closed reduction of prosthesis dislocations, for which a very simplified registration form is used.
2. We now inquire about joint space; 70% of the patients had <2 mm joint space in 2023.
3. We record the method of skin closure; 38% used continuous skin sutures, 23% used intracutaneous sutures, and 21% used clips.
4. We record the use of drains and registered 71 patients (0.7 per mille) who received drains during primary surgery in 2023.
5. We record if screws are used in uncemented cups, and if so, how many. The screws should not be scanned.
6. We record the use of a cement restrictor/cement plug, and this should be scanned.

PROM registration is still incomplete. We ask that hospitals facilitate the registration of preoperative PROM. This is most easily done by sending the PROM form with the appointment letter for the surgery so that the patient completes it before coming for preoperative clearance. Postoperative PROM registration occurs automatically through MRS and helsenorge.no. If assistance is needed with organizing the preoperative PROM collection, contact the registry (Mikal Solberg; 90583174). A larger selection of PROM results is presented in this report, also at the hospital level.

PUBLICATIONS 2023-2024

Gjertsen JE presented results from our national quality improvement project, where we found a significant increase in the use of cemented stems in older hip fracture patients and women over 75 years old in the NRL during the project period.

Østerås N presented results from a cluster-randomized study on 393 patients with symptomatic osteoarthritis of the hip and knee. A structured treatment model with patient information and 8-12 weeks of training was compared to standard treatment. One year after treatment, patients reported better treatment quality in the treatment group, and the treatment cost less.

Kirkebø R studied outcomes with hip prostheses in patients who had ipsilateral acetabular fractures. Prosthesis survival after 10 years was 80%, and the risk of revision was 1.4 compared to osteoarthritis patients. There was no difference in outcomes between patients who were operated on with osteosynthesis for their acetabular fracture and those who were treated conservatively.

Furnes O presents an overview of our registries in Norwegian Epidemiology.

Hailer NP describes and discusses the use of registry-randomized studies.

Dale H found an almost doubled risk of revision due to infected hip prosthesis in a NARA study from 2004 to 2018. Particularly early revisions were more frequent towards the end of the period. It is uncertain whether this is due to an increase in the number of infections or a lower threshold for revision, or possibly improved reporting.

Mikkelsen RT studies outcomes with different articulations in younger patients (20-55 years) in this NARA study. There were equivalent results for metal against XLPE as for ceramic against XLPE and ceramic-ceramic. Metal-metal articulations had a four times increased risk of revision compared to metal against XLPE.

Lutro O studied the accuracy of reporting hip arthroplasty infections to the NRL. Medical records in Helse Vest for patients reported to the NRL with hip arthroplasty reoperations due to loosening, infection, and prolonged wound drainage were studied, and the diagnosis on the registry form was validated. The accuracy of infection registration was 87%.

Thanks for excellent reporting!

Bergen, June 2024

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IT consultant

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Kalyana Srujana Mulpuri
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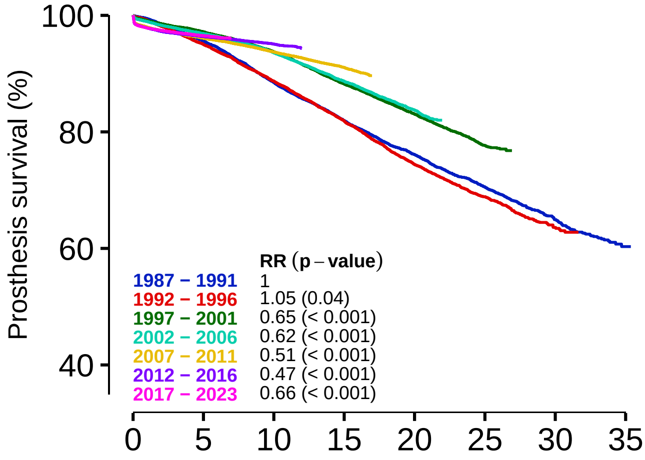
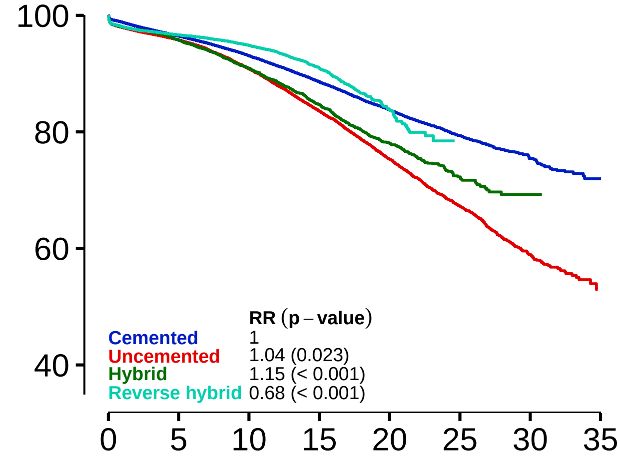
Survival of total hip prosthesis 1987−2023

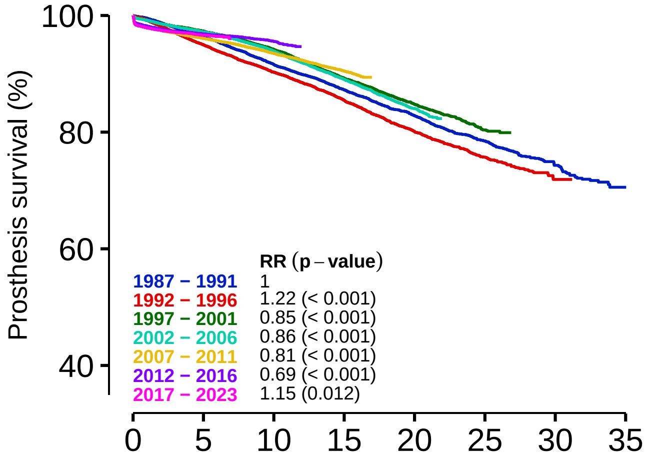
A.1) All



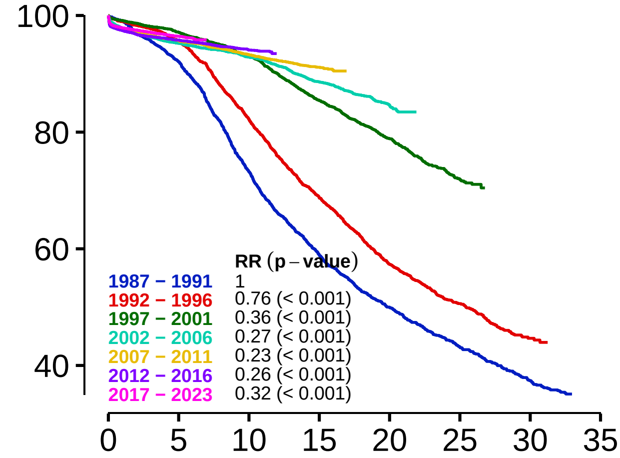
A.2) Fixation



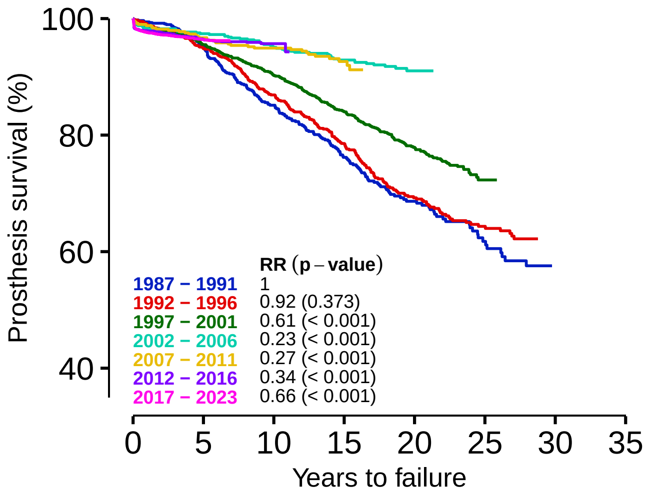
A.3) Cemented



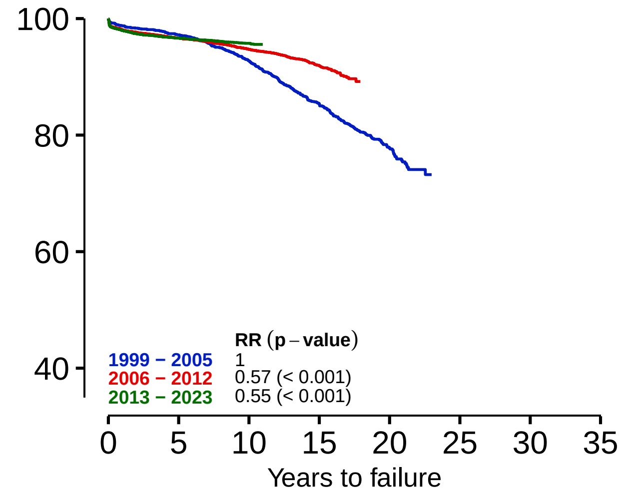
A.4) Uncemented



A.5) Hybrid



A.6) Reversed hybrid

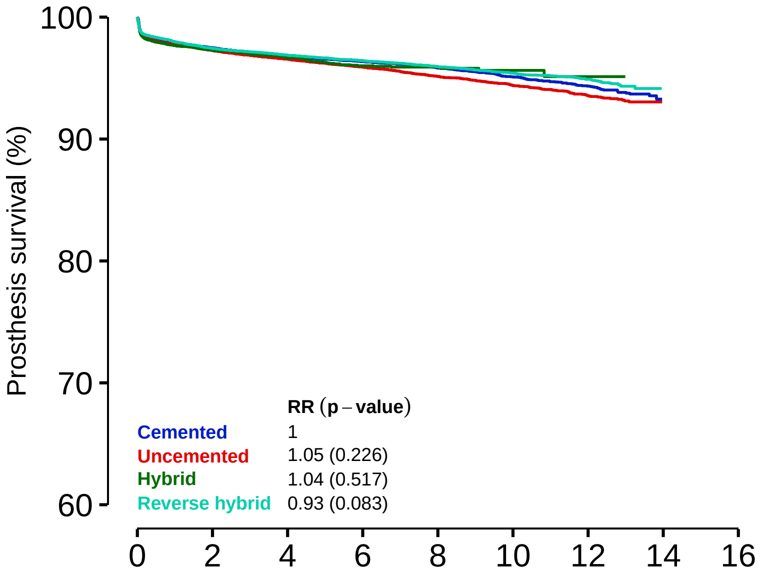


Kaplan−Meier survival curves. Risk ratio (RR) is adjusted for age, gender and diagnosis.
Survival estimate is given as long as more than 50 prostheses are at risk.
There is some uncertainty tied to the risk estimates from the Cox−analyses as the assumption of proportional hazard does not hold for all models.

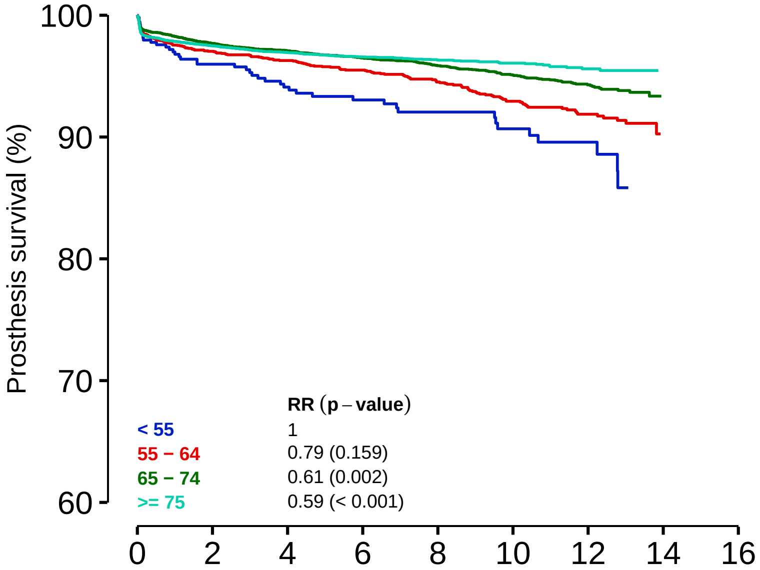
Survival of total hip prosthesis
2010−2023

Norwegian Arthroplasty Register

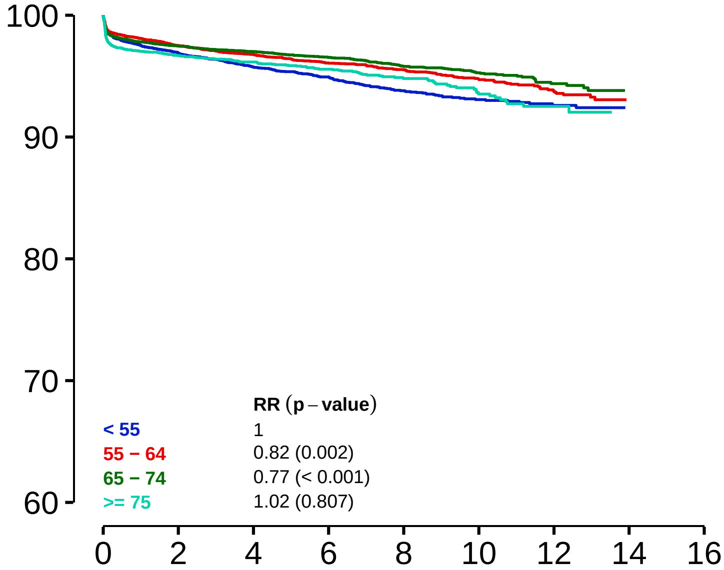
A.7) Fixation



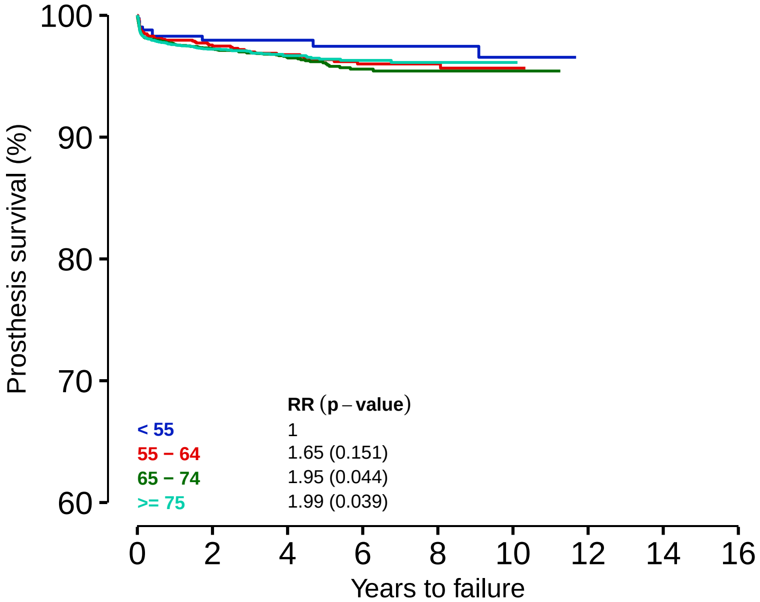
A.8) Cemented



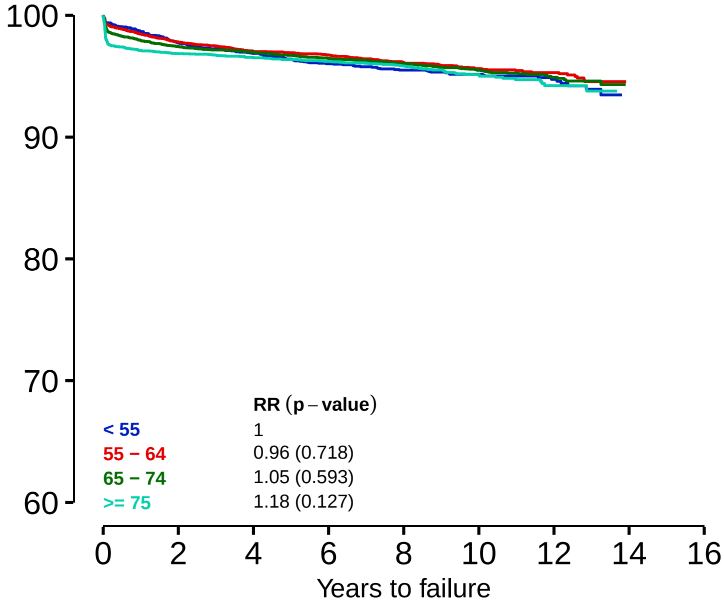
A.9) Uncemented



A.10) Hybrid



A.11) Reversed hybrid



Kaplan−Meier survival curves. Risk ratio (RR) is adjusted for age, gender and diagnosis.
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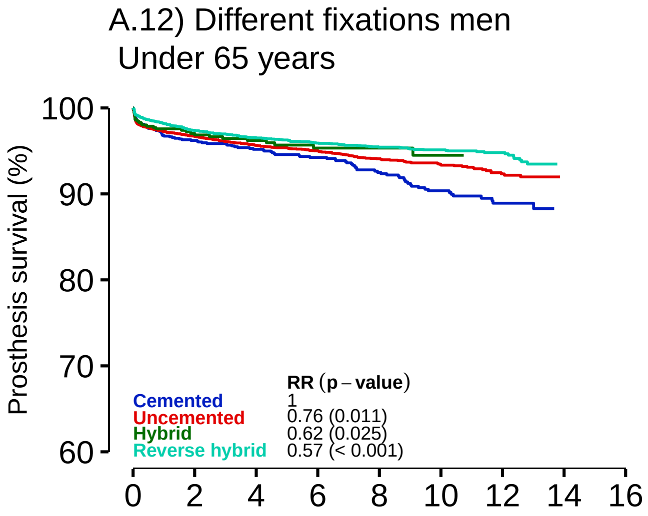
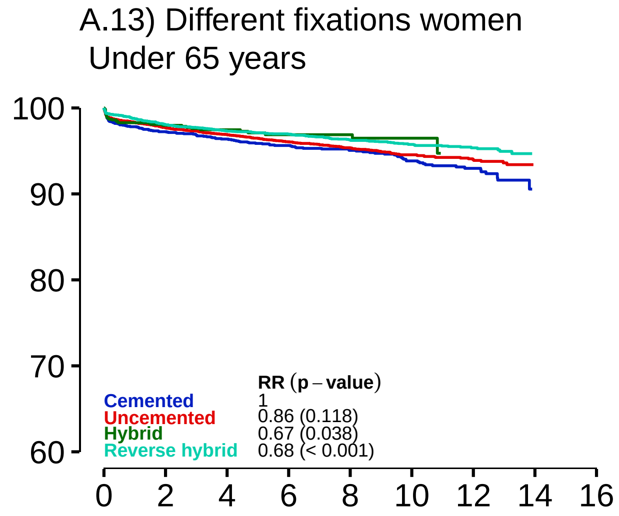
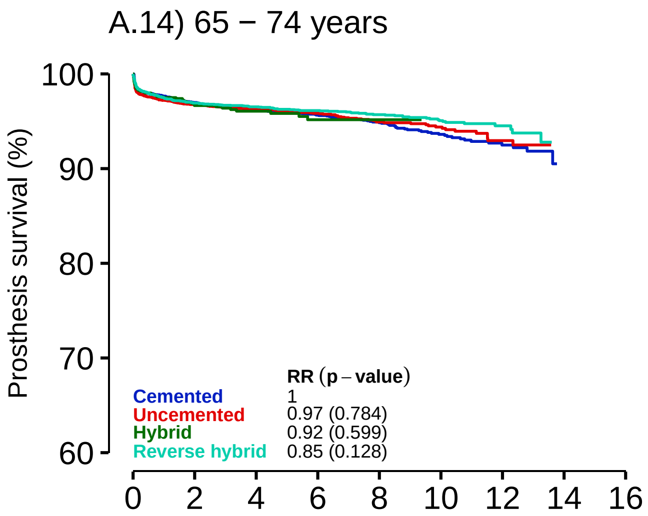
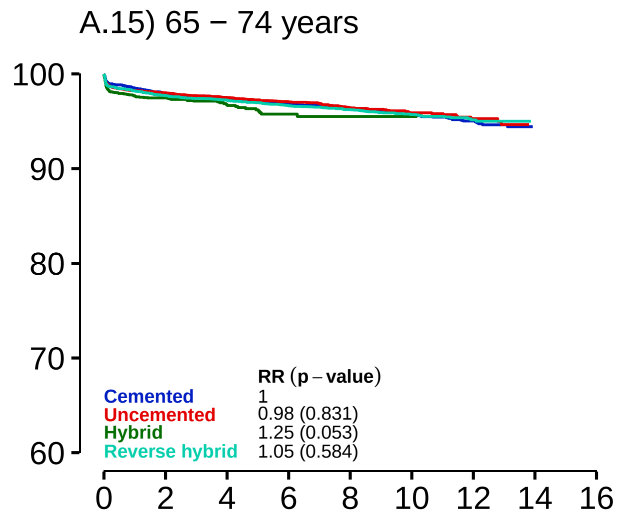
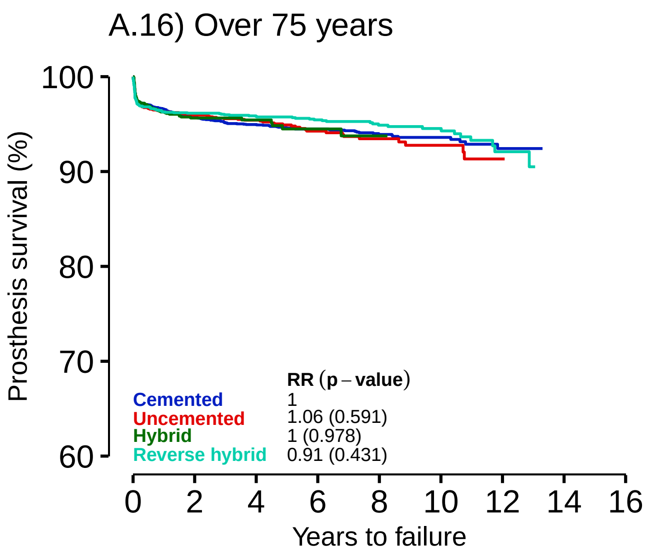
Survival of total hip prosthesis
2010−2023

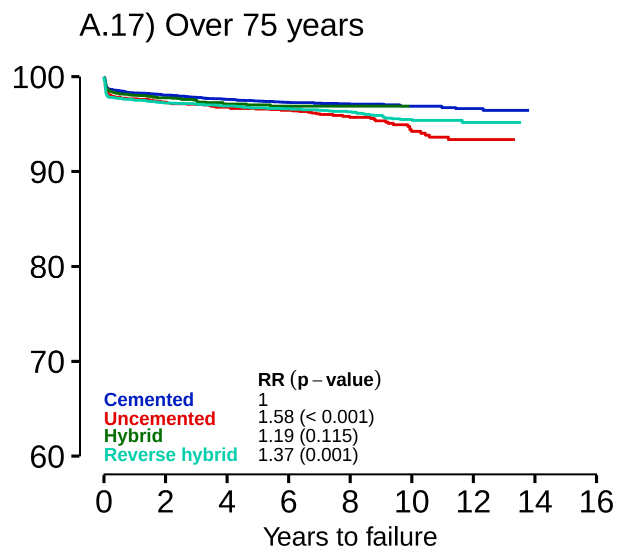












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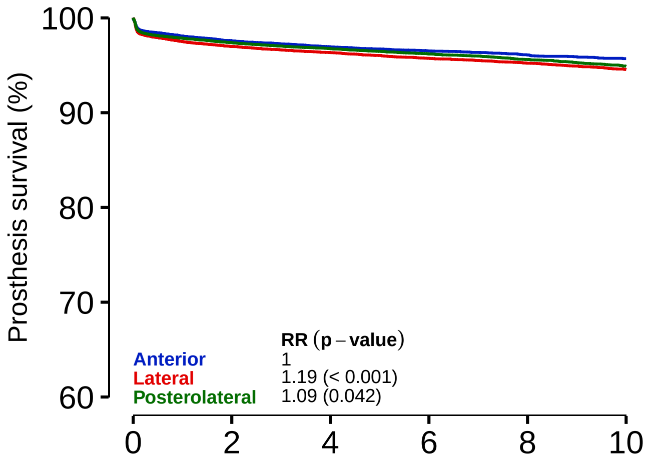
Survival of total hip prosthesis

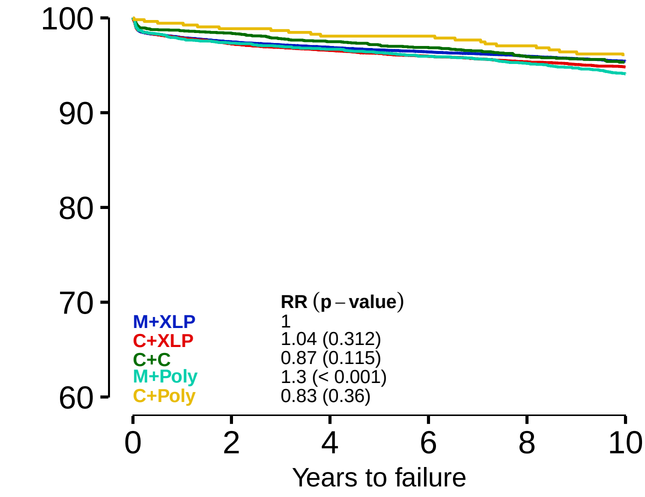
2010−2023

Norwegian Arthroplasty Register

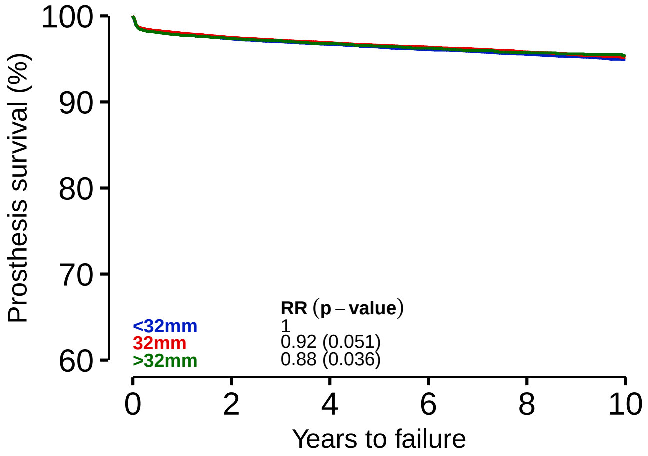
A.18) Approach



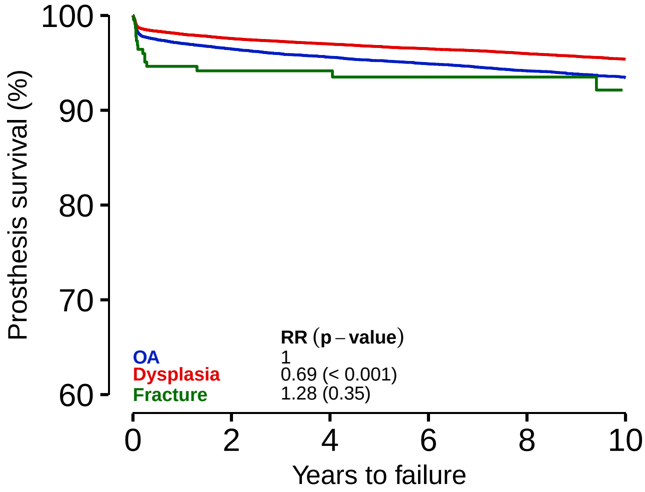
A.19) Articulation (without dual mobility)



A.20) Head size (without dual mobility or metal on metal)



A.21) OA, dysplasia and fracture



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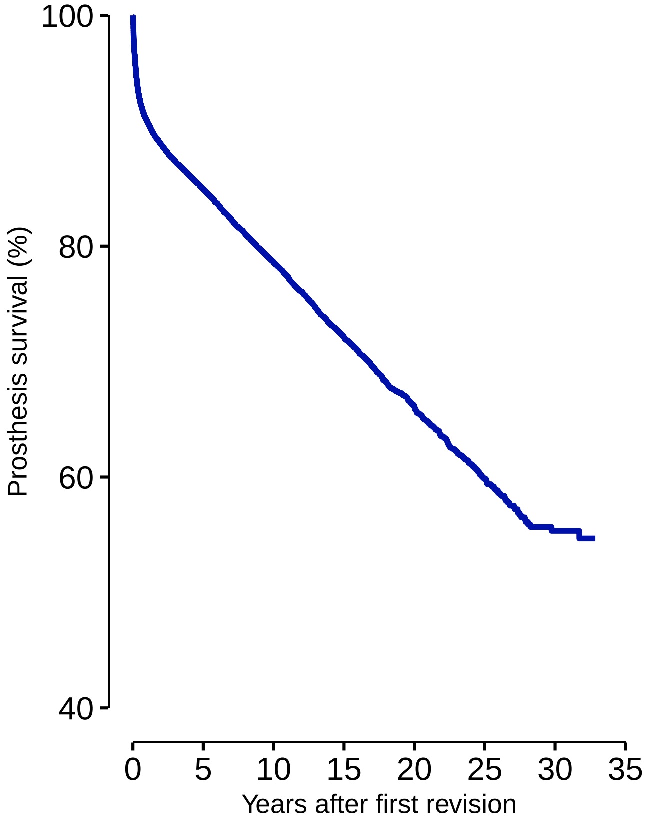
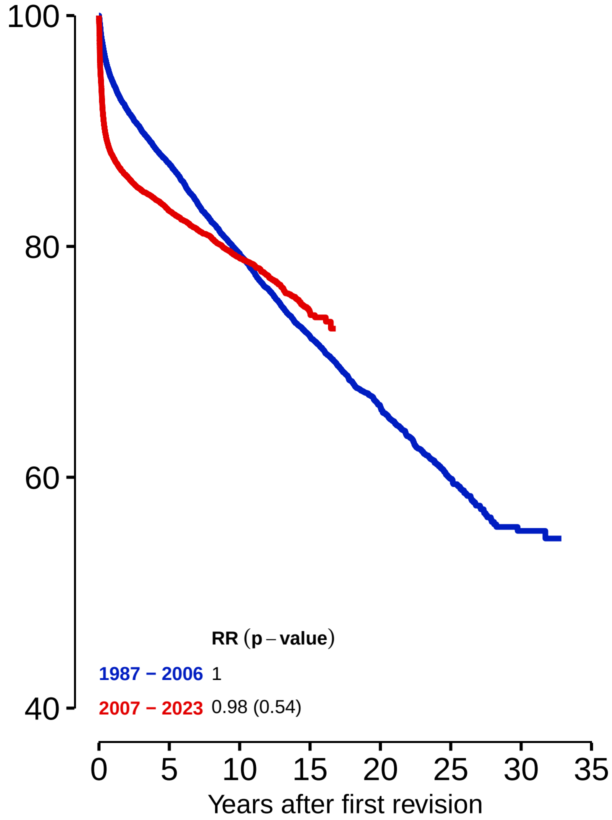
Survival curves for revision of hip prosthesis

1987 − 2023

A.22) All



A.23) Two time−periods



Kaplan−Meier survival curves. Risk ratio (RR) is adjusted for age, gender and diagnosis.
Survival estimate is given as long as more than 50 prostheses are at risk.
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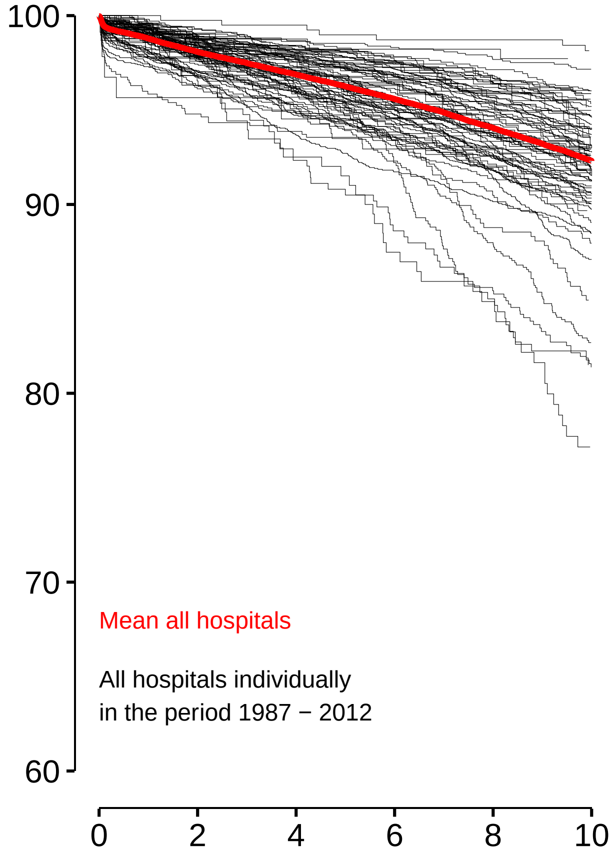
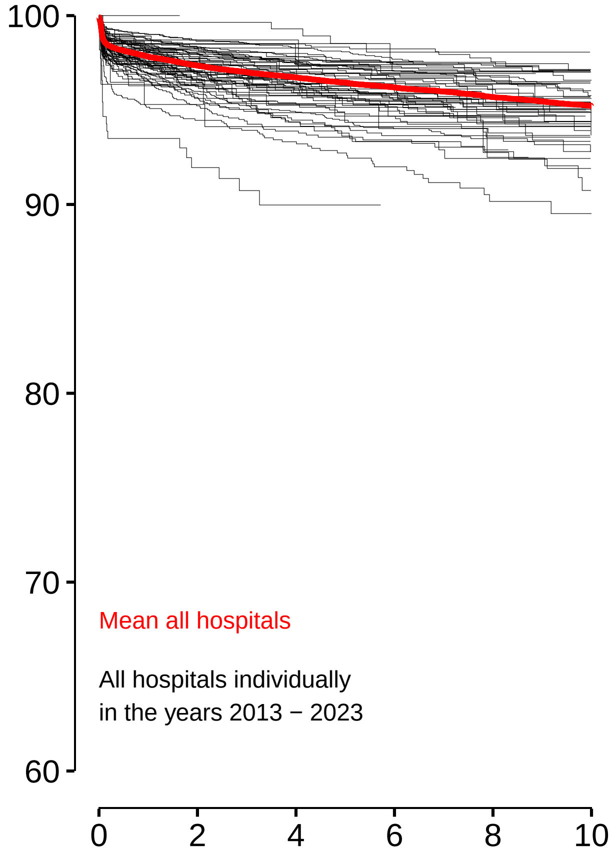
Survival curves for all hospitals individually

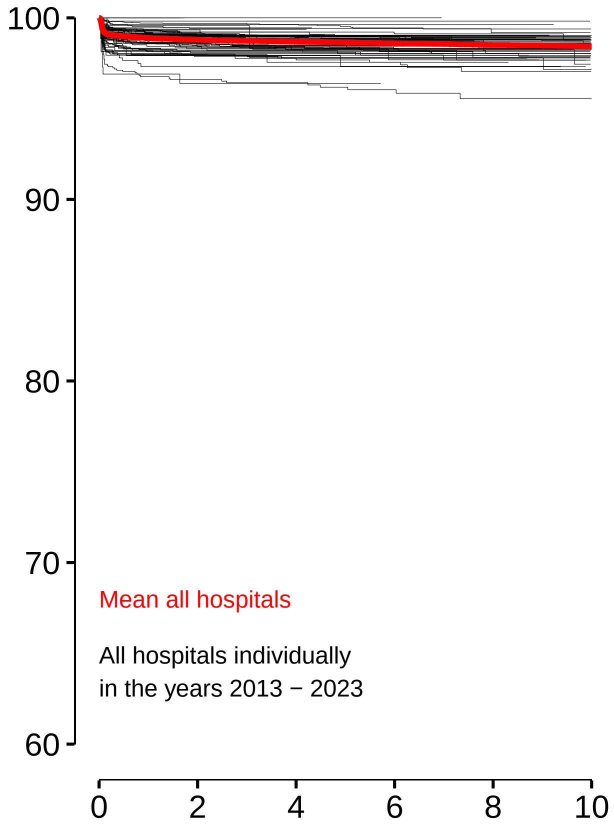
A.24) All hospitals in the years 1987 − 2012



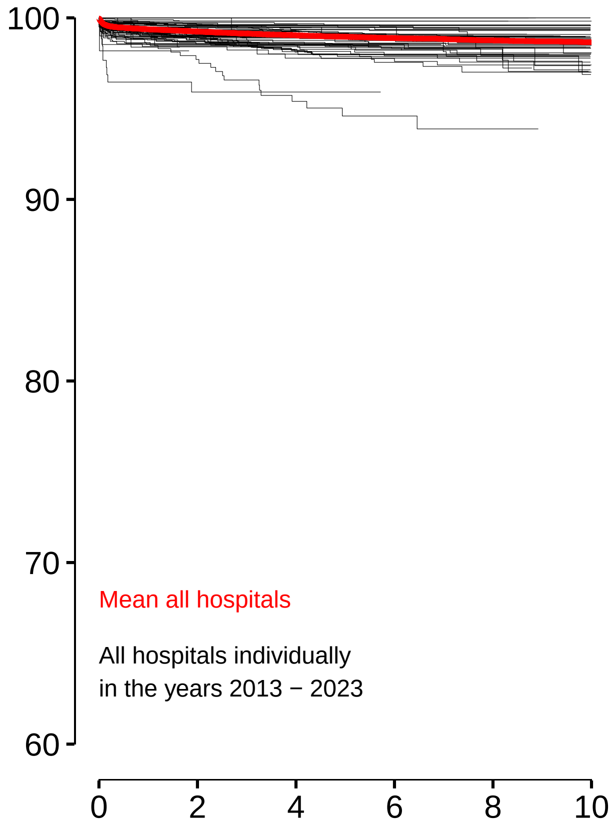
A.25) All hospitals in the years 2013 − 2023



A.26) Endpoint revision due to infection,
2013 − 2023



A.27) Endpoint revision due to dislocation,
2013 − 2023



One stage bilateral hip prosthesis operations

Year	1987-2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Sum:
Number of patients	304	22	28	32	47	72	70	100	96	108	96	975

A one stage bilateral operation is an operation where the patient is operated on both hips during the same operation or on the same day. Only primary operations are included.

FIGURE A.28: Fixation for women over 75 years, 1987 to 2023

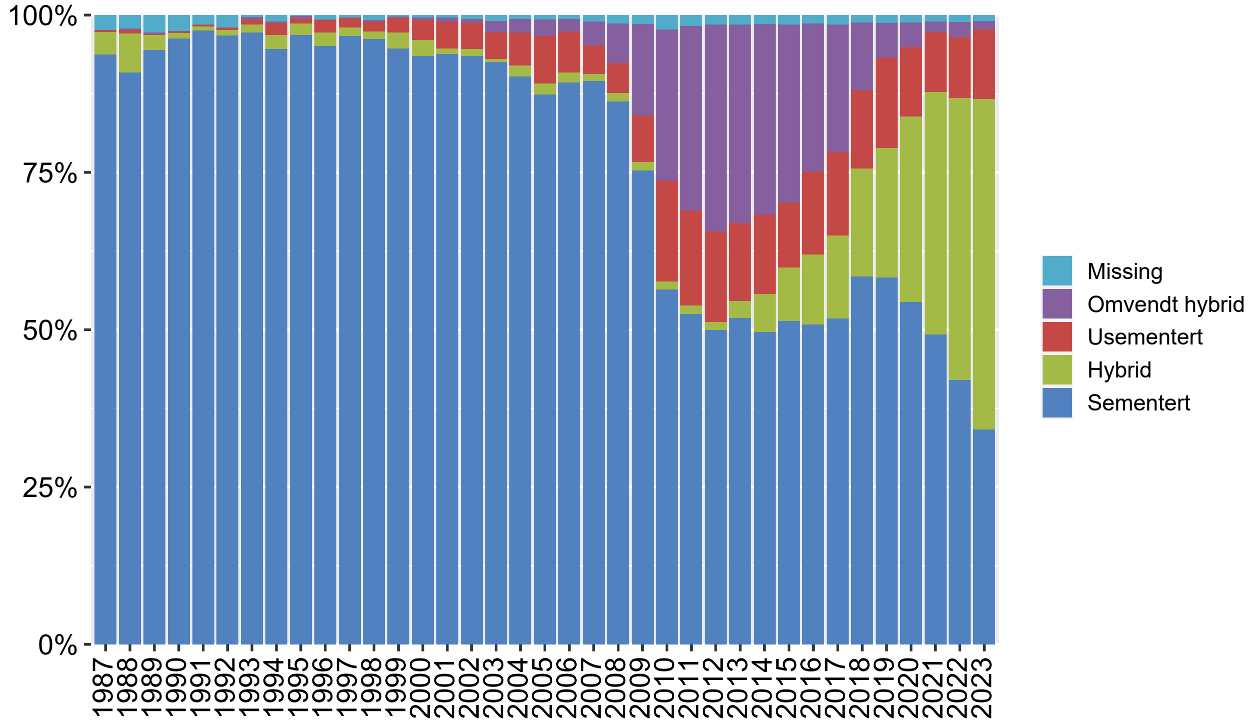


FIGURE A.29: Number of primary THA operations, 2023

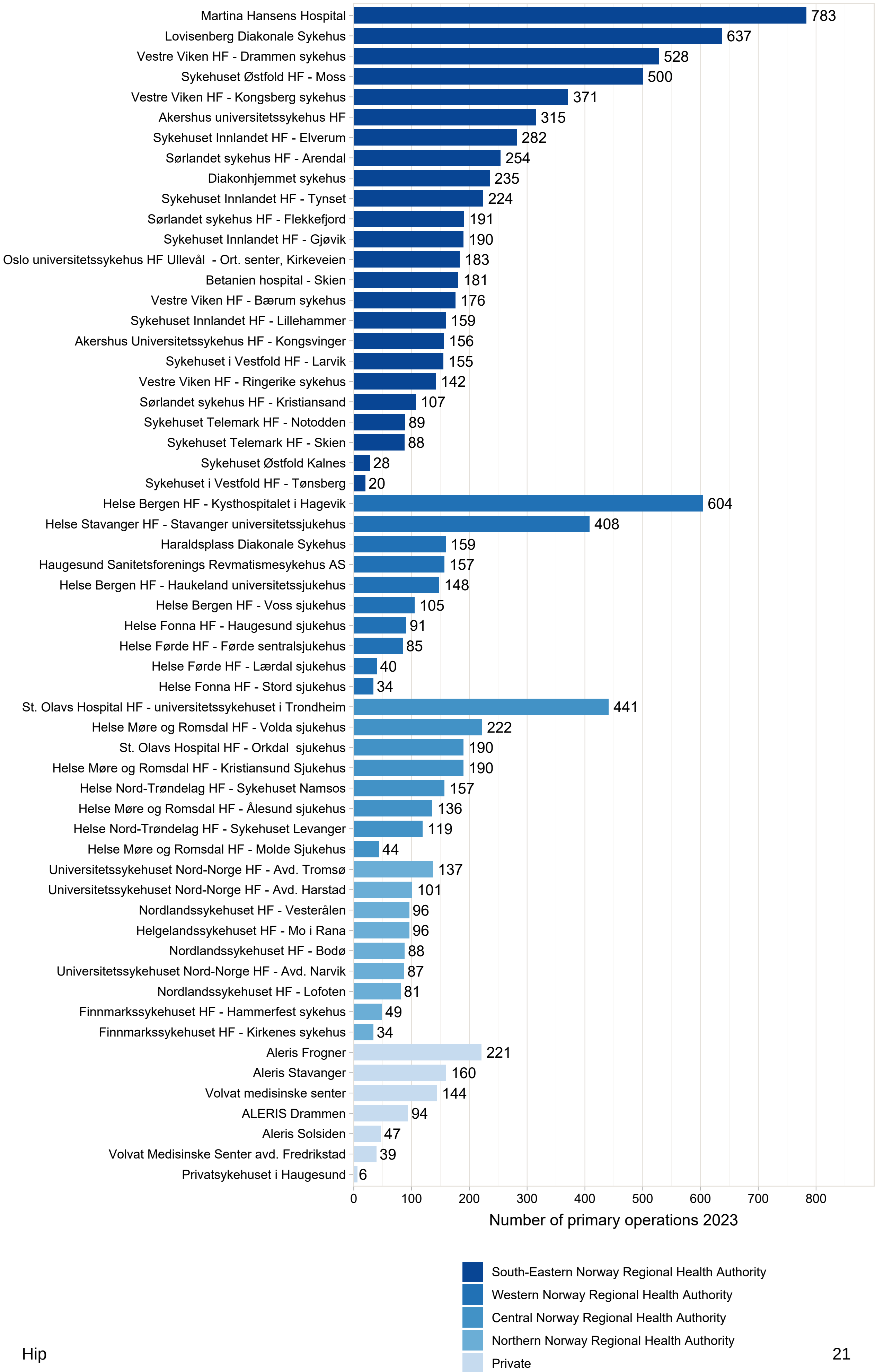
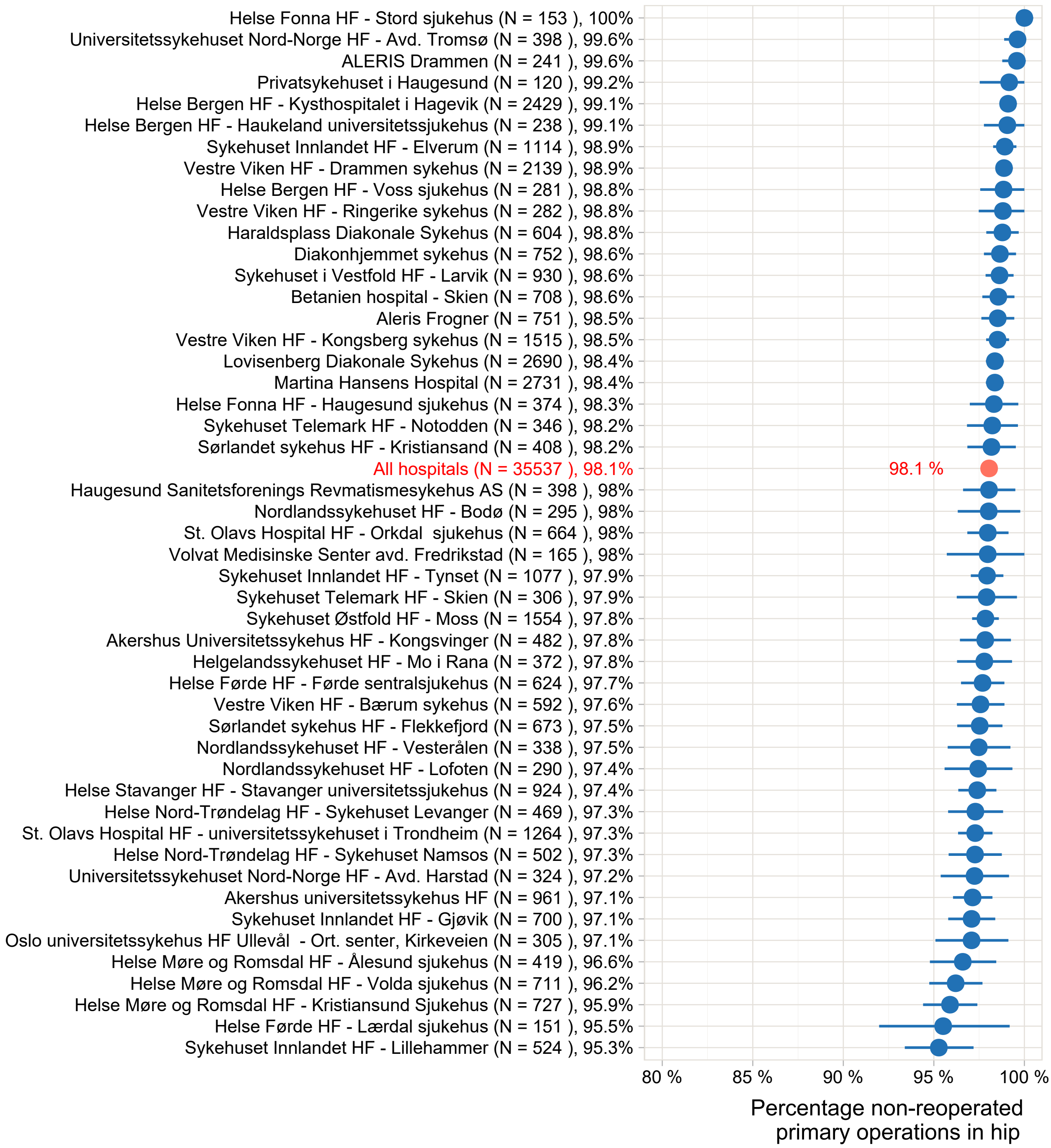


FIGURE A.30: Percentage non-revised standard patients two years after operations in 2017-2023



Kaplan-Meier estimates of percentage non-revised standard patients after two years with 95 % confidence interval. Endpoint is all revisions. Standard patients are patients between 55 and 85 years old, with ASA class 1 or 2 and with primary osteoarthritis at primary operation. Reoperations, i.e. revision operations without insertion, removal or replacement of the prosthesis, are excluded. Included are all patients operated on in the years 2017 to 2023. Only hospitals with operations in 2023 and with more than 50 operations from 2017 to 2023 are included. A further requirement is that the hospital must have at least 30 patients followed up for more than two years. Only hospitals with coverage of at least 80 % for revisions from 2017 to 2020 are included.
See section «How to interpret the hospital-based results:».

Figure A.31: Percentage nonrevised standard patients two years after operastions in 2017-2023 in hospitals with completeness of reporting <80% of revisions

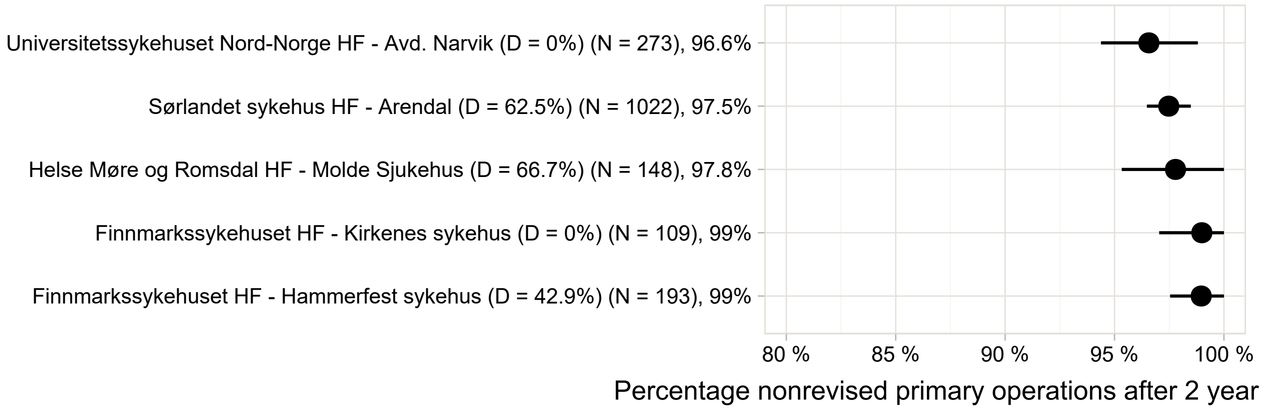
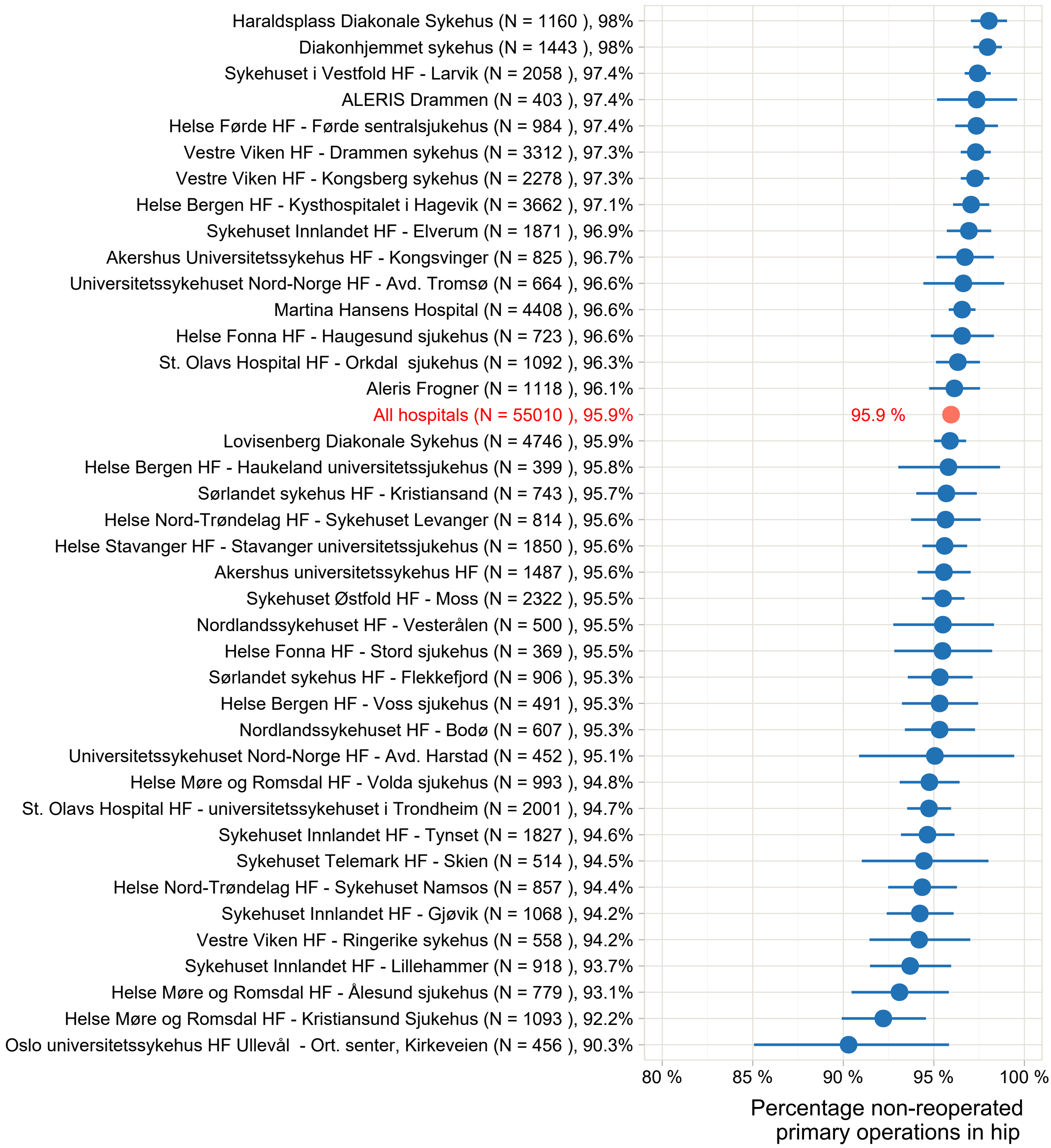
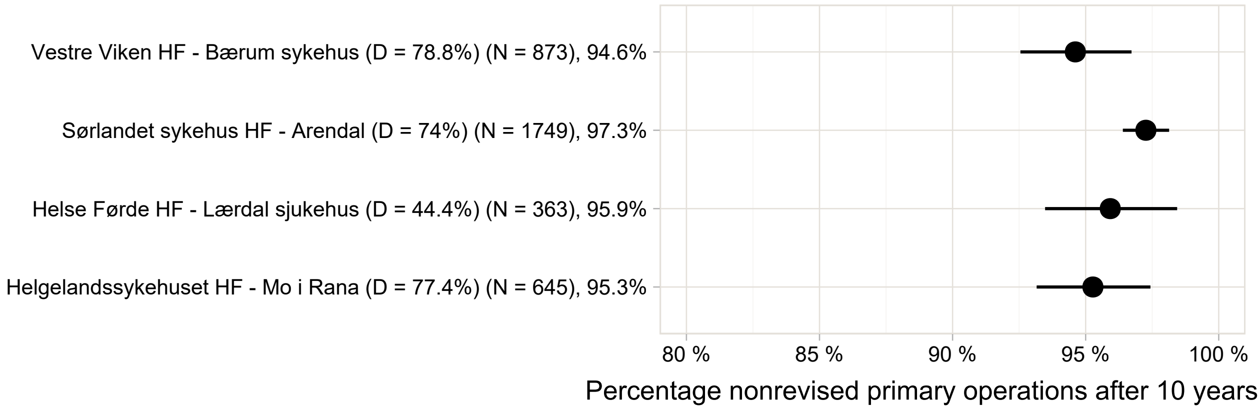


FIGURE A.32: Percentage non-revised standard patients ten years after operations in 2012-2023



Kaplan-Meier estimates of percentage non-revised standard patients after ten years with 95 % confidence interval. Endpoint is all revisions. Standard patients are patients between 55 and 85 years old, with ASA class 1 or 2 and with primary osteoarthritis at primary operation. Reoperations, i.e. revision operations without insertion, removal or replacement of the prosthesis, are excluded. Included are all patients operated on in the years 2012 to 2023. Only hospitals with operations in 2023 and with more than 50 operations from 2012 to 2023 are included. A further requirement is that the hospital must have at least 30 patients followed up for more than ten years. Only hospitals with coverage of at least 80 % for revisions from 2012 to 2020 are included.
See section «How to interpret the hospital-based results:».

FIGURE A.33: Percentage nonrevised standard patients ten years after operastions in 2012-2023 in hospitals with completeness of reporting <80% of revisions



How to interpret the hospital-based results:

When hospitals are ranked by percentage of revisions, results must be interpreted with caution, as there may be many reasons for different revision percentages:

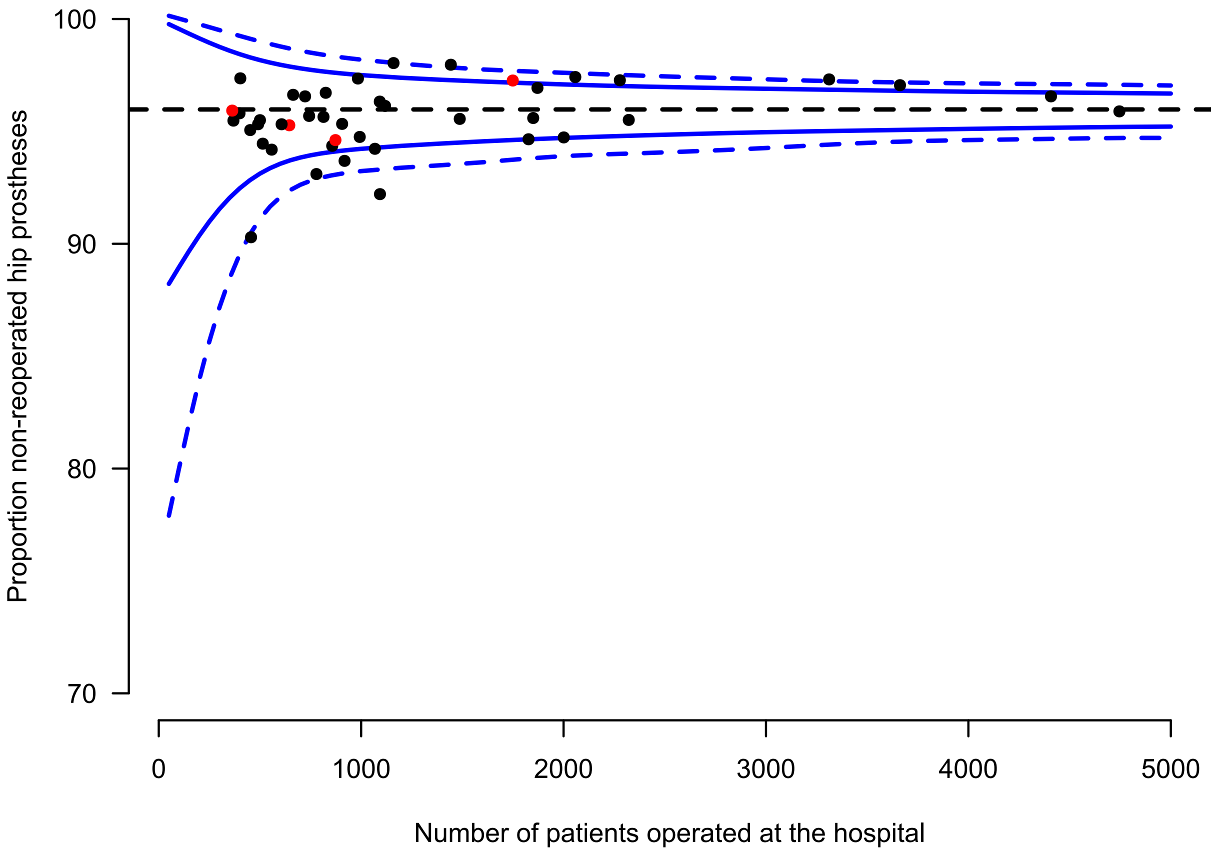
1. Hospitals that are more rigorous in reporting their complications and reoperations to the Register could have unfairly negative results in the analyses.
2. If surgeons at one hospital are more diligent in facilitating check-ups for patients than at other hospitals, and thus discover more complications, this could lead to unfortunate results despite the fact that this hospital in reality is doing a better job than other hospitals.
3. If the waiting time for reoperations is longer in some hospitals than others, the longer wait could erroneously lead to better results than those of hospitals with a short waiting time.
4. If the surgeons at one hospital have a higher threshold for recommending reoperation than at other hospitals and thus prolong patients' problems, this will also give skewed results in the statistics.
5. Poor hospital results from an earlier period will remain with the hospital, even though the hospital may have acted upon previous problems by switching to better prostheses and improving procedures and surgical skills.

There is also a statistical uncertainty in the ranking lists because the data from the NAR are poorly suited for such calculations. The NAR was designed to compare the results of implants and surgical procedures nationwide. To compare quality in hospitals is a complex matter, because some hospitals operate on more patients with poor prognosis than other hospitals, and because many hospitals, especially the small ones, have so few reoperations that the statistics are too weak, and are further weakened by the fact that the hospitals' coverage (reporting rate) of reoperations varies from 0 % to 100 %. This issue is explained in detail in the following articles: Ranstam J, Wagner P, Robertsson O, Lidgren L. "Health-care quality register outcome-orientated ranking of hospitals is unreliable." J Bone Joint Surg Br. 2008 and Ranstam J, Wagner P, Robertsson O, Lidgren L. "Ranking in health care results in wrong conclusions". Läkartidningen. 2008 Aug 27-Sep 2;105(35):2313-4.

Moreover, it is a well-known phenomenon in quality assurance that if those who report their complications and errors the most accurately receive a lower ranking because of this, the reporting may eventually deteriorate.

If league tables of hospitals are publicised, there is thus a danger that hospitals' reporting of revisions may become poorer, leading to inferior quality of the registers. In order to achieve complete reporting of reoperations (revisions), reporting to the Register should be linked to performance-based financing, reporting should be made mandatory, and the requirement for the patient's written consent to reporting of the operation to the Register should be waived and replaced by presumed consent.

FIGURE A.34: Funnel plot, percentage non-revised standard patients ten years after operations in 2012-2023



Each point shows the percentage non-revised prostheses after 10 years for standard patients operated from 2012 to 2023 at Norwegian hospitals. Hospitals that have reported less than 80% of reoperations (2008- 2020) are marked in red in the figure. Some hospitals are excluded. This can be due to that less than 50 hip prostheses have been operated in the period, that fewer than 10 patients have been followed up for more than 10 years, or that the hospital don't have any operations in 2023. The solid blue lines show the interval where 95 % of the Norwegian patients will be. The dotted blue lines show the interval where 99.8 % of the patients will be. Points to the right represents hospitals with many operations (see the x-axis). Points above or below the dotted lines are regarded as outliers with exceptionally good or exceptionally bad results respectively.

All of the black points in the funnel plot correspond to a hospital in figure A.32. By choosing any point, and using the corresponding values for "Number of patients" and "Proportion non-reoperated" on the x and y axis respectively, the hospital belonging to the point can be found in figure A.32.

FIGURE A.35: Durability of THA 2012-2023

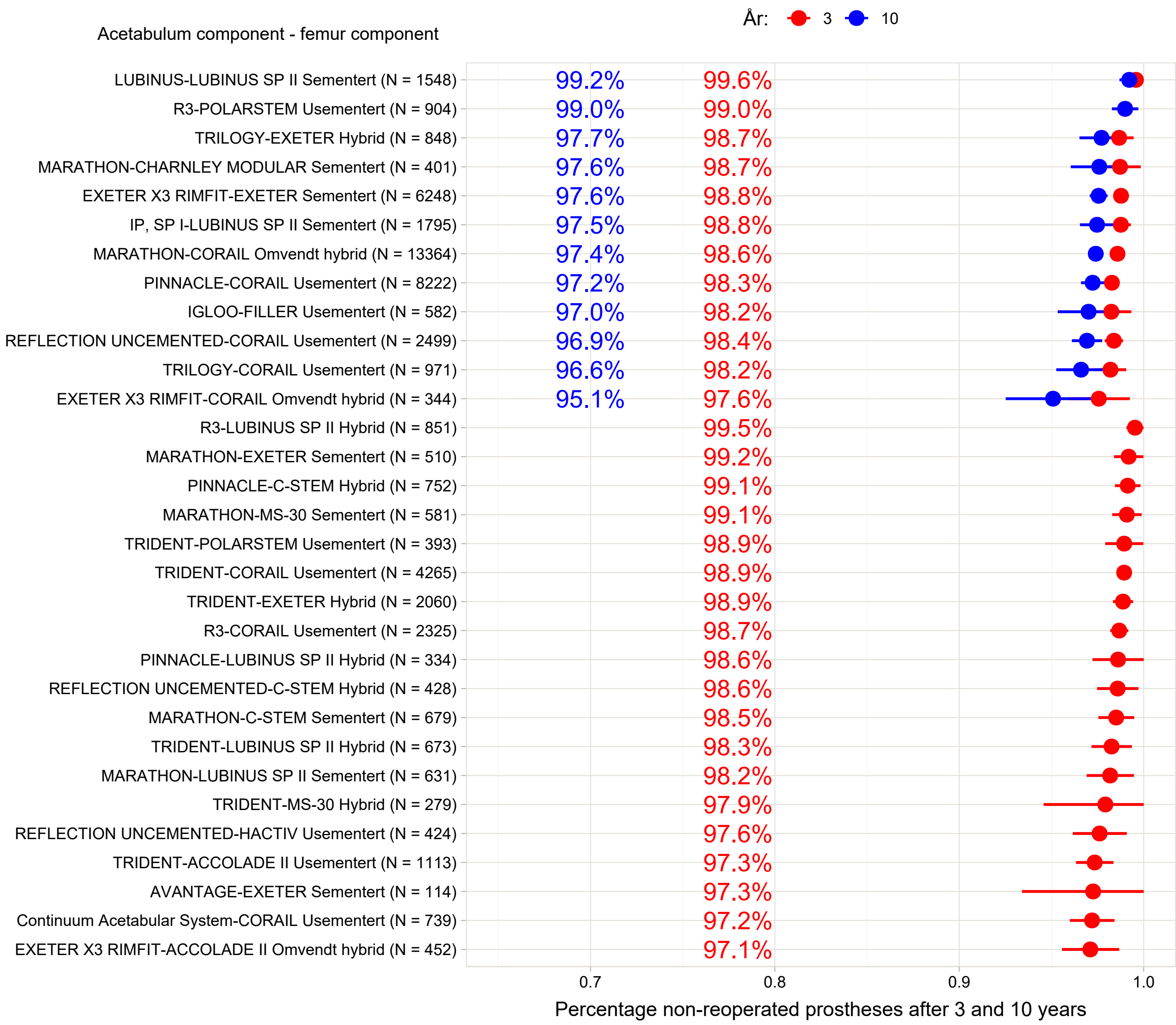


Figure A.35 shows the estimated Kaplan-Meier percentage at three and ten years for different combinations of hip prostheses. We have only included combinations used in 500 or more operations in 2012-2023. A further requirement for inclusion in the figure is that there must still be at least 50 examples of the combination at three and ten years respectively. Only standard patients from 2012 to 2023 have been included, and the number of prostheses will therefore be below 500 in some cases. A standard patient is aged 55-85 years, has ASA class 1 or 2 and was diagnosed with primary osteoarthritis at primary surgery. Using standard patients provides a more homogenous group of patients, and we believe that this makes the results more comparable.

Endpoint is all revision operations, except infections and reoperations without insertion, removal or replacement of the prosthesis. As recommended in Report No. 6/2002 from the Norwegian Centre for Health Technology Assessment (SMM), "Choice of Implants in Primary Total Arthroplasty in Norway", most health trusts will require ten-year documentation on the prosthesis. The results in this report must be compared with results in our publications, where we can account for materials and methods and discuss strengths and weaknesses and the significance of the findings.

How to interpret the prosthesis results:

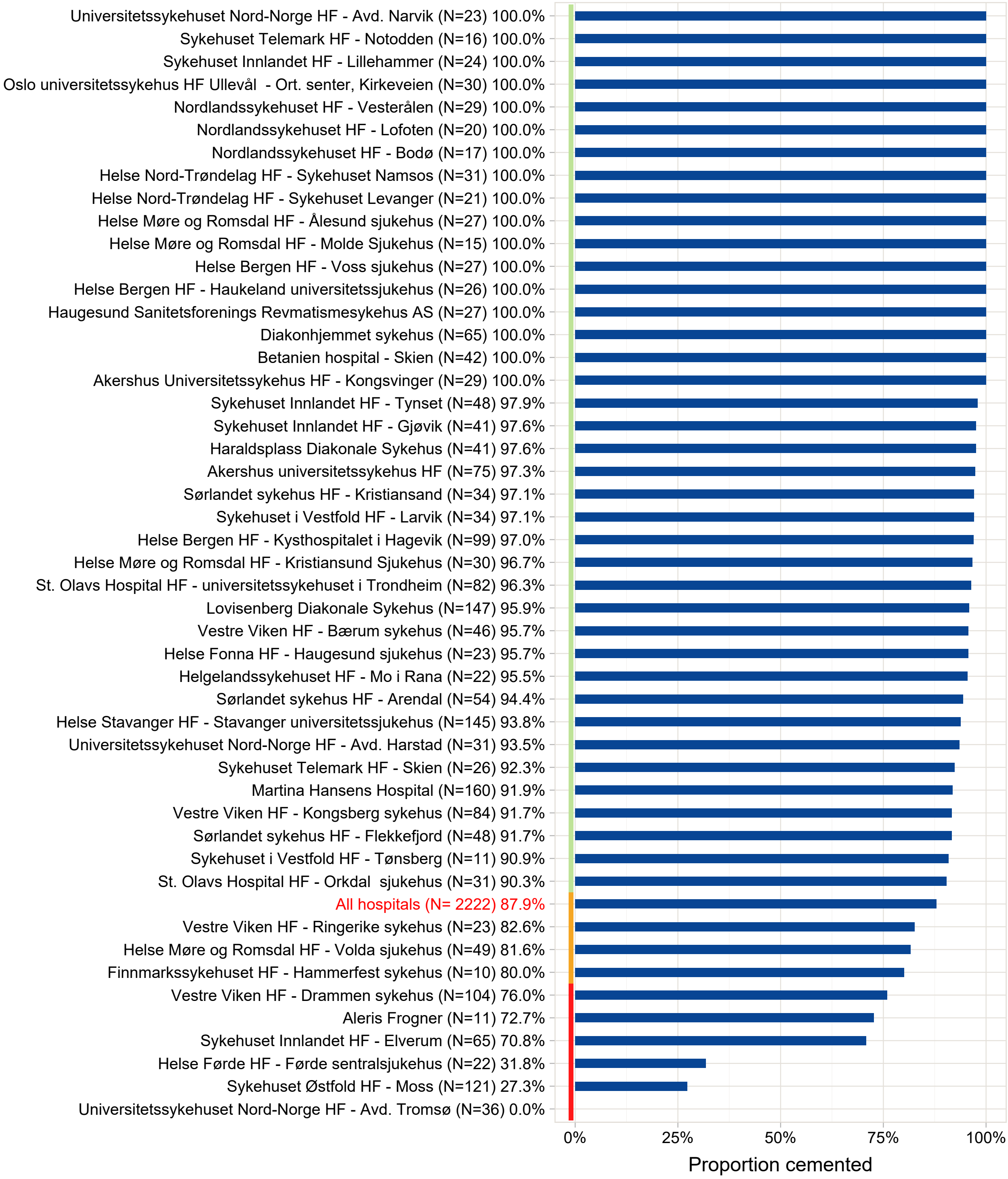
When prostheses are ranked by percentage of revisions, results must be interpreted with caution, as there may be many reasons for different revision percentages. We mainly publish prosthesis results in scientific journals and presentations where we account for materials and methods and discuss strengths and weaknesses and the significance of the findings (see the reference list on our website `https://helse-bergen.no/nrl`).

In general, we can state the following:

1. A poor result for a particular prosthesis may be caused by a learning curve for its use, which means that some patients will be revised due to the lack of experience with the particular implant.
2. In our papers, we adjust for differences in patient groups such as age, gender, diagnosis, joint surface material and fixation. Some prostheses and materials tend to be used in younger and more active patients. Such patients may wear out the prosthesis faster. A prosthesis used in many such patients may have poorer results than a prosthesis used in older and less active patients. The degree of activity has not been recorded in the register until recently; we now collect activity data through the PROMs.
3. If a prosthesis is used in a large number of patients (>3000) and in several hospitals (>5), we consider the results more reliable.
4. Scientific papers discuss the reason for revision of the prosthesis. If there is a natural biological or mechanical reason, we have more faith in the results, i.e. we consider a high revision rate to be due to qualities of the prosthesis rather than the surgeon.
5. National registers are observational studies and cannot normally explain the reasons for the results of a particular group of prostheses. The results must be compared with those of experimental studies and randomised controlled trials. Furthermore, the results must be reproduced in other studies and registers before being considered valid.

Results of hip and knee arthroplasty in Norway are generally good and comparable to results in the other Nordic countries (Mäkelä K 2014, Junnila M 2016 and Robertsson O 2010), see the reference list in our annual report. The two hip prostheses with poorest ten-year results (Titan/Titan and Reflection cemented/Spectron EF) have been discontinued in Norway on the basis of results in our earlier publications (Espehaug B 2010, Hallan 2012 and Kadar T 2011). This also applies to the Duracon knee prosthesis (Gøthesen 2013).

FIGURE A.36: Proportion of women over 75 years with cemented stem in 2023



The figure shows that some hospitals use cemented femoral stems in all women over 75 years, others differentiate and some choose uncemented femoral stems for all these patients. The Register recommends using a cemented stem for this patient group. On a national level, 87.9 % of femoral stems were cemented in women over 75 years of age.

Figure A.37: Proportion of patients with wear resistant cup materials (cross-linked polyethylene/ceramic) in 2023

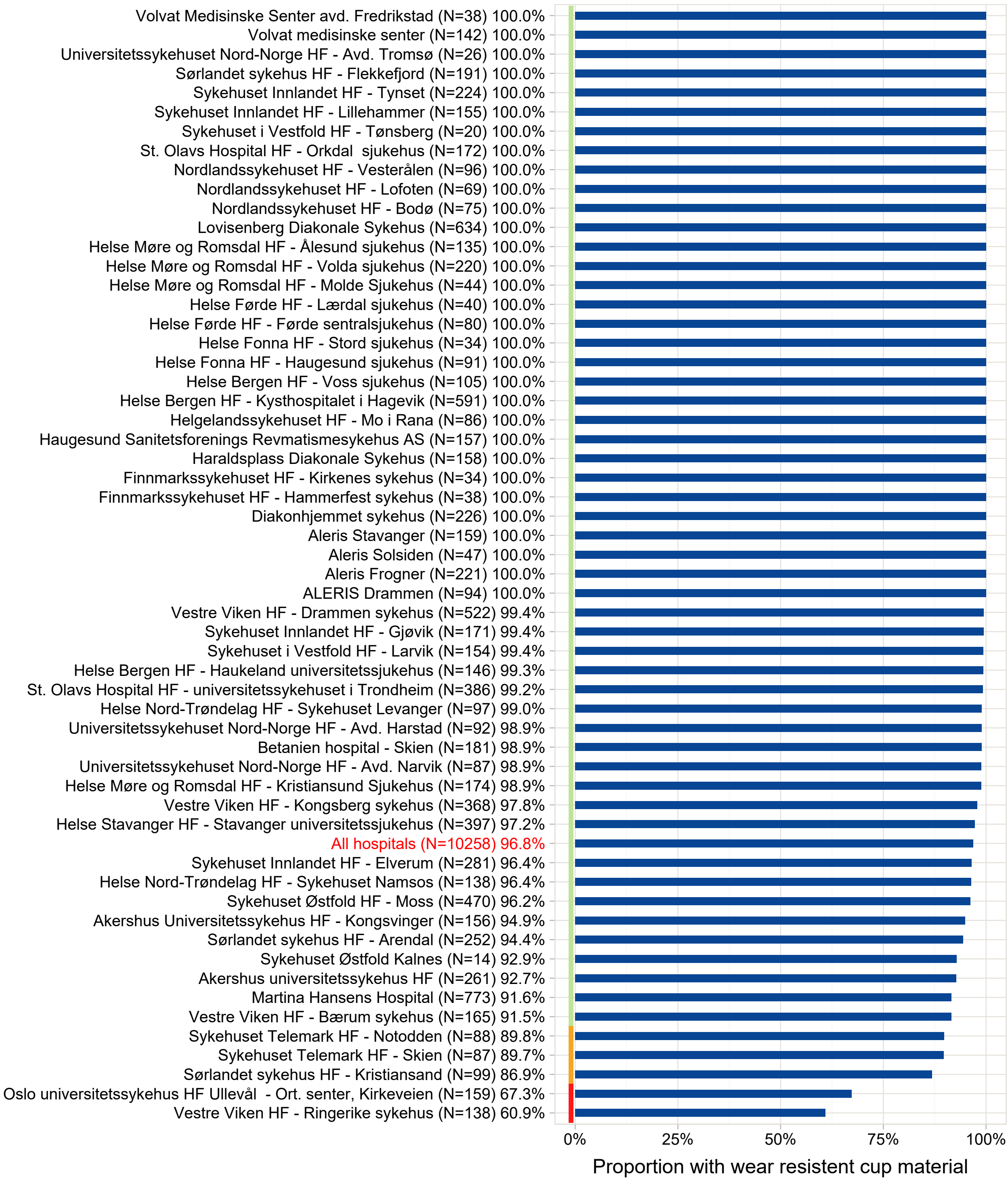
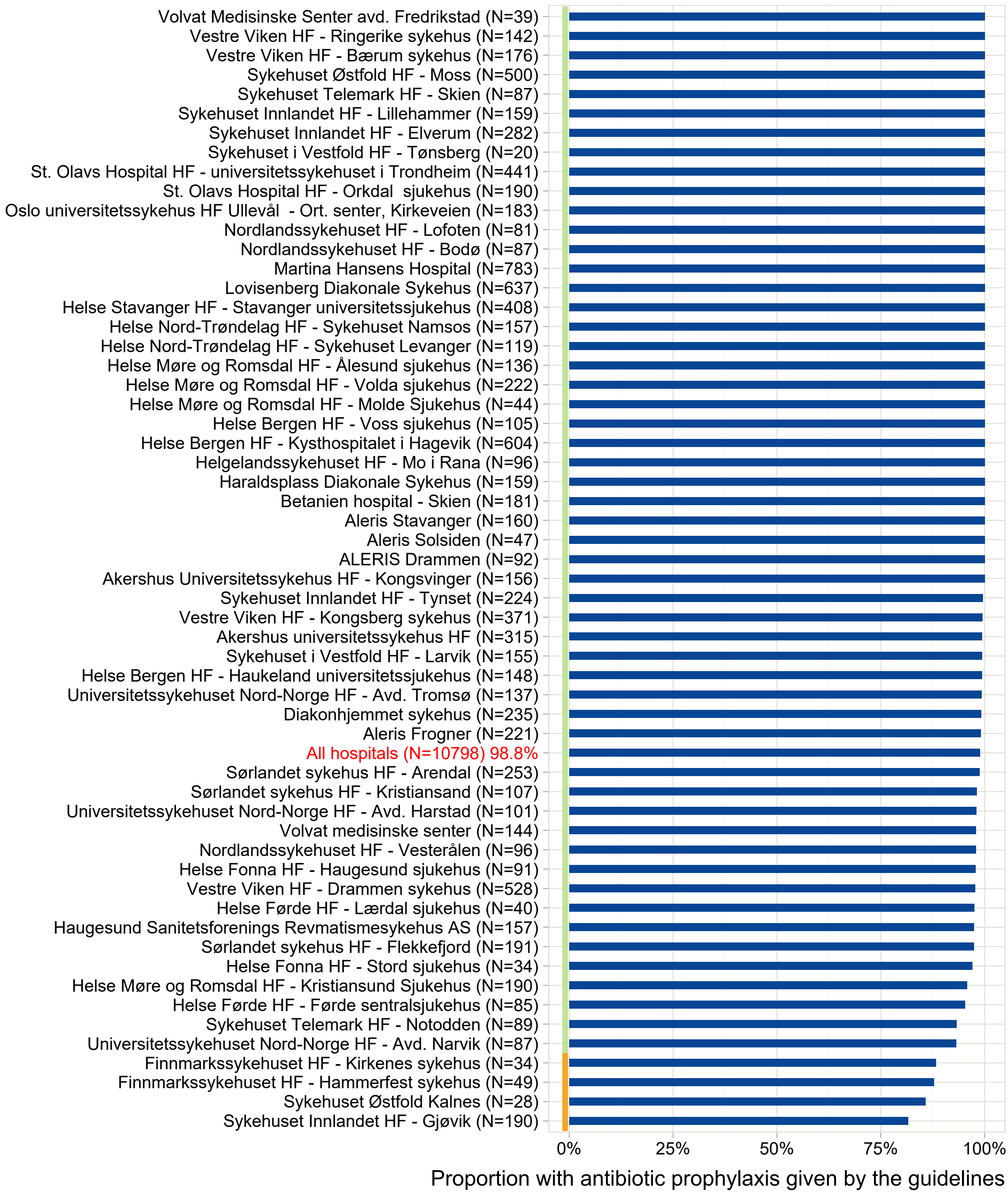


Figure A.37 shows that most patients at all hospitals receive hip prostheses with wear-resistant joint surfaces (Nationally: 96.8 %). The use of ordinary polyethylene is justified in certain patients who do not need a prosthesis lasting longer than 10-15 years.

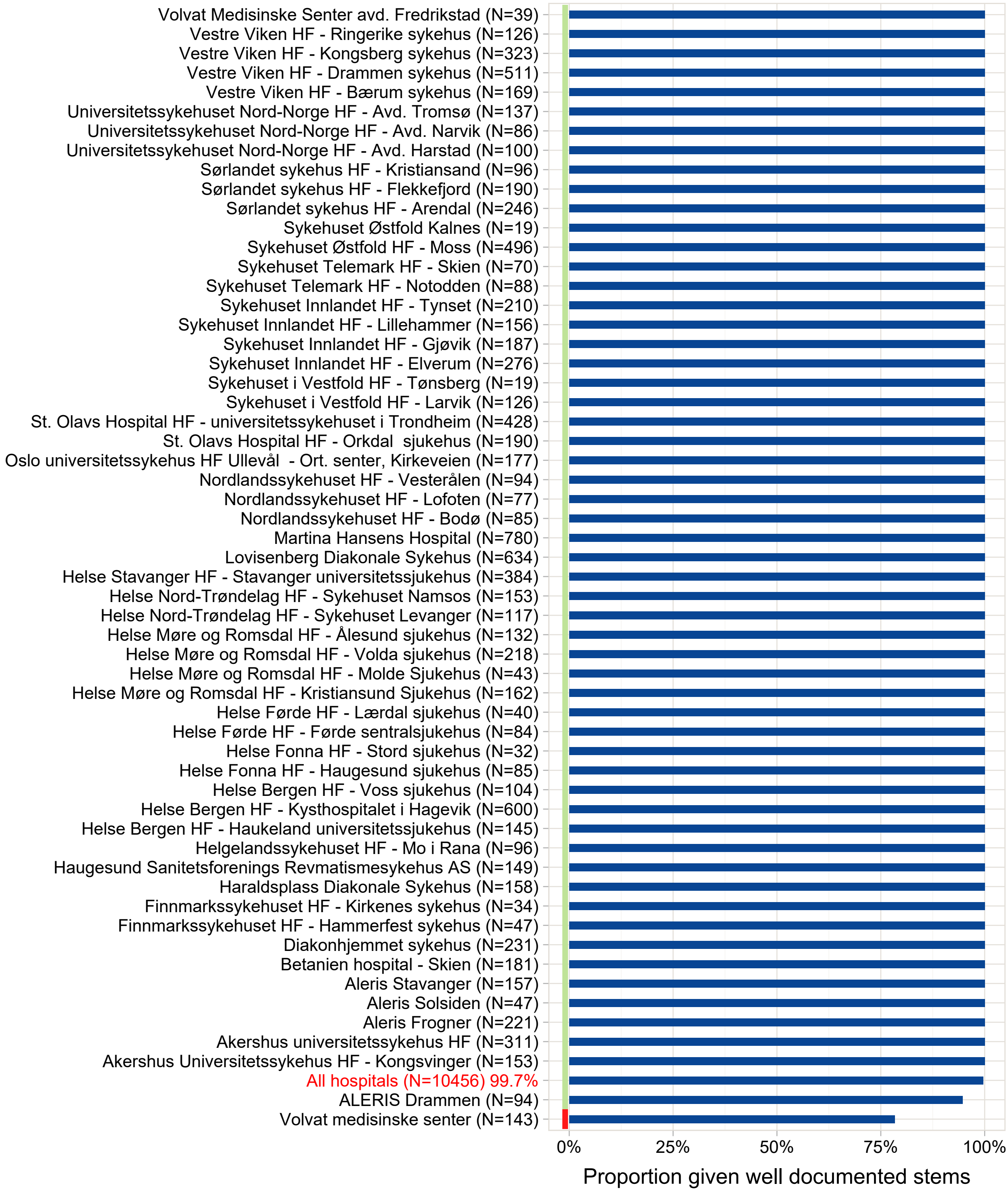
A special type of cups (Dual Mobility (DM) cups) are still delivered with conventional polyethylene. The hospitals in the lower part of the figure uses these cups. It is not clear from literature that it is necessary to use cross-linked polyethylene in DM cups.

FIGURE A.38: Proportion of patients with antibiotic prophylaxis as given by the guidelines in 2023



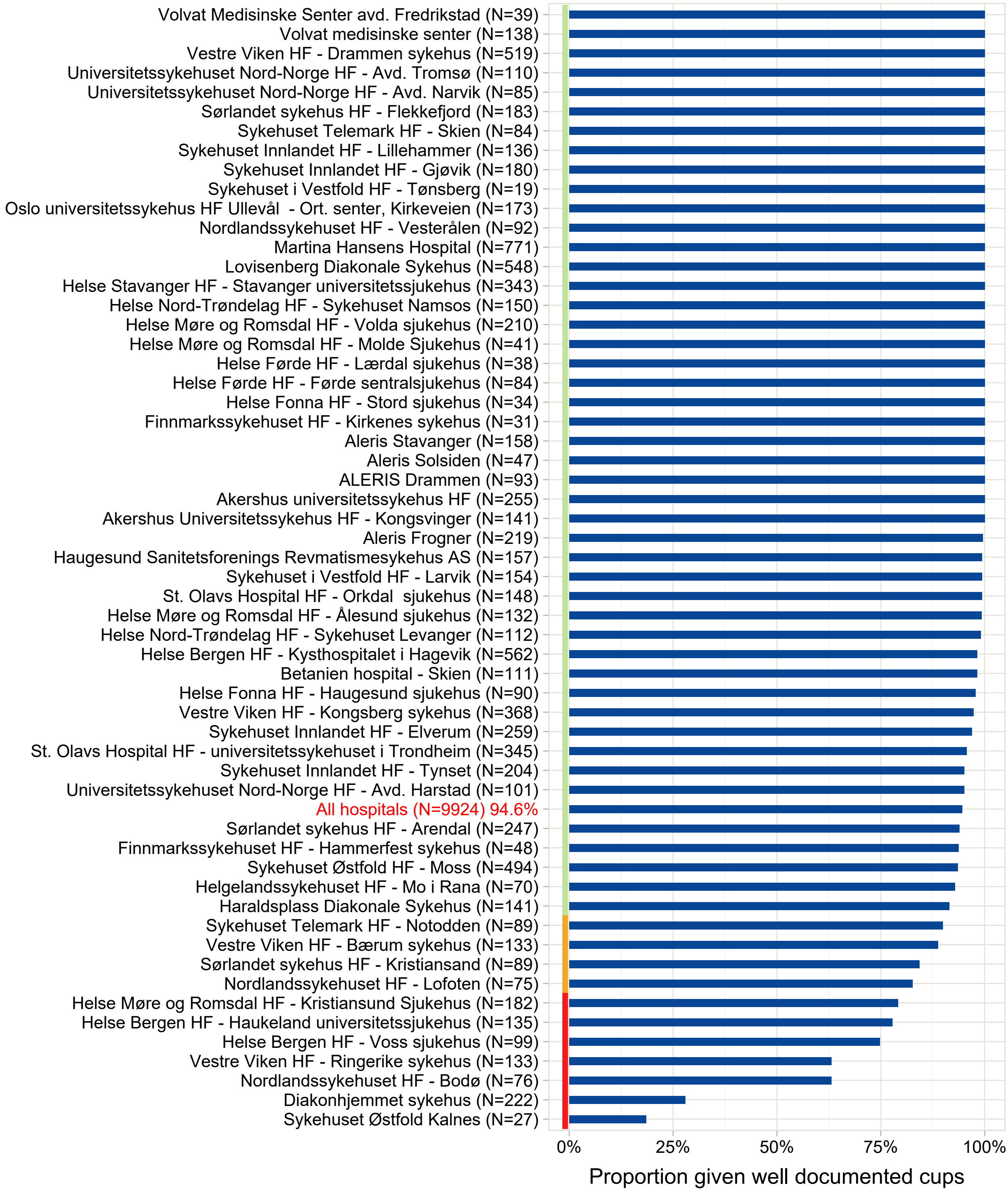
Antibiotica prophylaxis was administered according to the guidelines in 98.8% of all operations. A low score (at the bottom of the figure) does not mean that patients have not received antibiotics; it generally means that they were given antibiotics in a manner contrary to the guidelines. Some hospitals have several cases of inaccurate reporting, which means the hospitals will perform poorly in the figure, even if they do administer antibiotic prophylaxis according to guidelines. When reporting electronically this inaccuracy will be strongly reduced.

FIGURE A.39: Proportion of patients recieving well documented hip stem in 2023



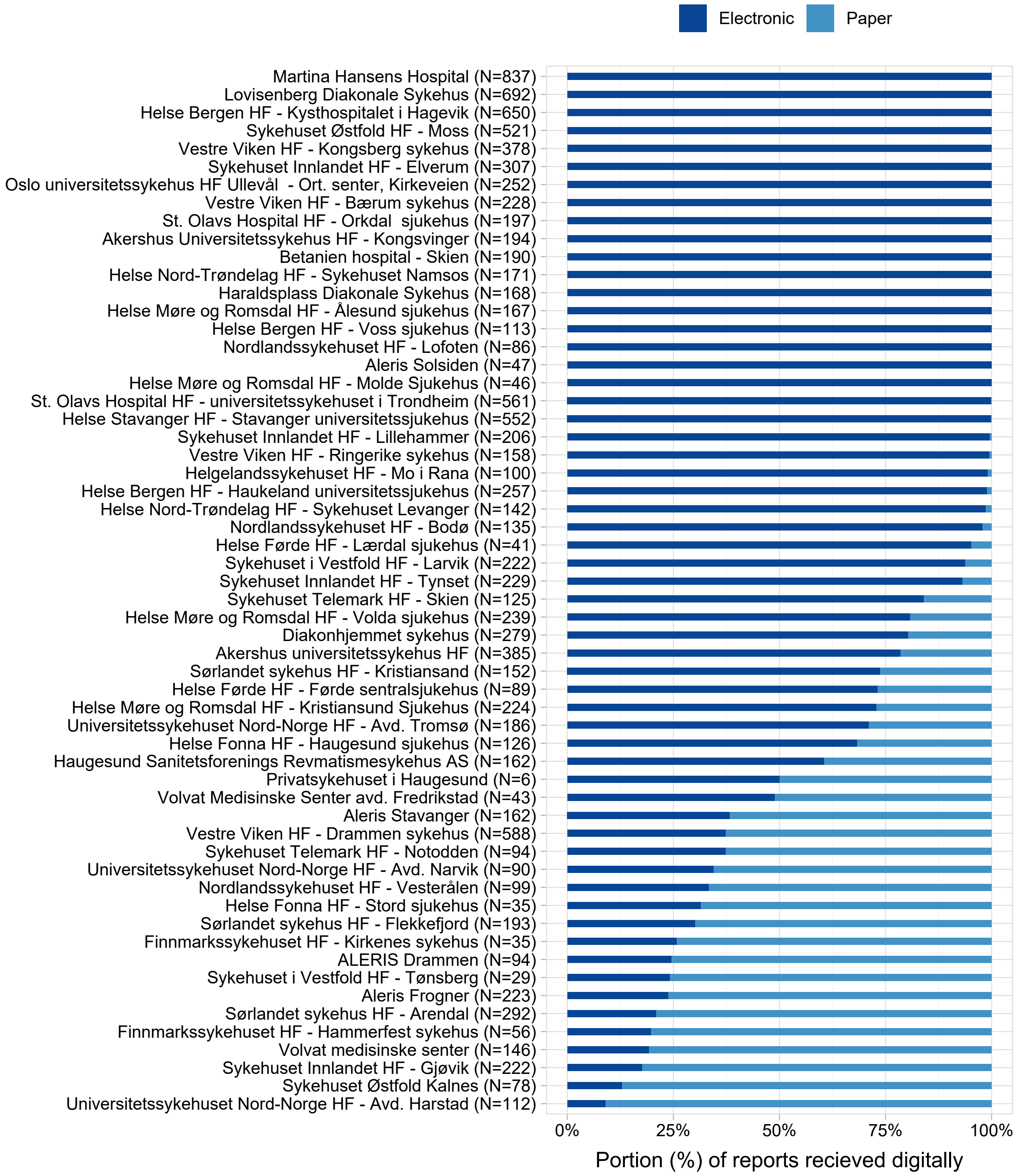
The overwhelming majority of all inserted hip stems are well documented. On a national level, 99.7 % of all hip prostheses use well documented hip stems. All hospitals have been asked to report these prostheses to the registry so that they could be excluded from the above presentation.

FIGURE A.40: Proportion of patients recieving well documented hip cups in 2023



On a national level, 94.6 % of all hip prostheses use well documented hip cups. Some hospitals fall short of satisfying the requirements. This is partly due to hospitals use of newer cups in ongoing clinical trials. All hospitals have been asked to report these prostheses to the registry so that they could be excluded from the above presentation.

FIGURE A.41: Form registration by format in 2023, all operations



National average for electronic form registration in 2023 is 80.6 %. 10006 was registered electronically and in total was 12411 registered in 2023.

TOTAL HIP ARTHROPLASTY

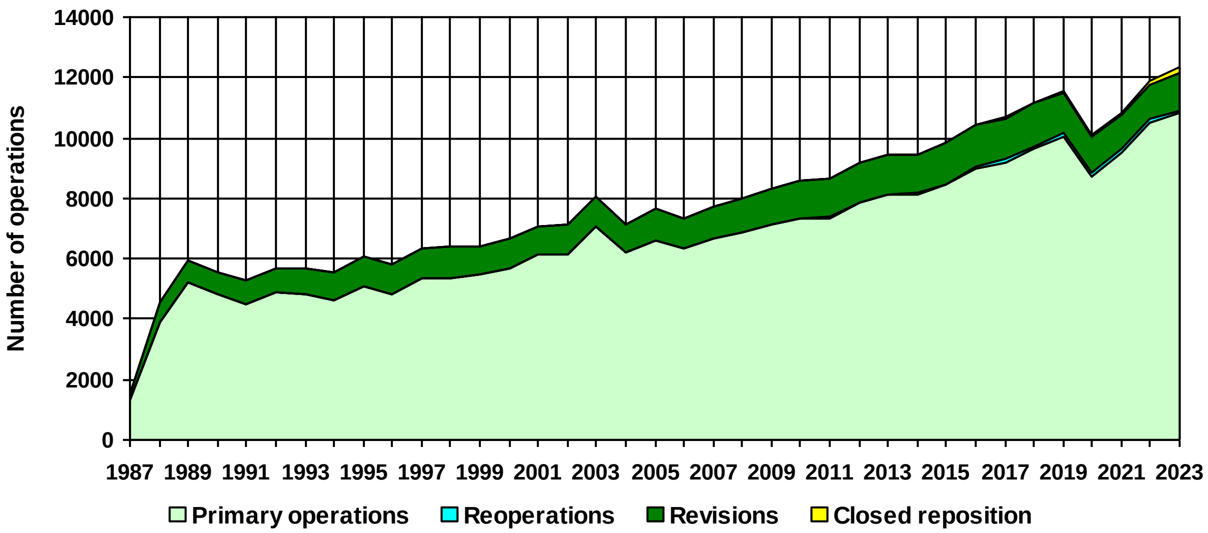
Table 1: Annual numbers of operations

Year	Primary operations *		Reoperations **		Closed reposition		Revisions		Total
2023	10 812	(87,8%)	113	(0,9%)	173	(1,4%)	1 222	(9,9%)	**12 320**
2022	10 484	(88,2%)	137	(1,2%)	109	(0,9%)	1 160	(9,8%)	**11 890**
2021	9 515	(87,9%)	113	(1,0%)	72	(0,7%)	1 129	(10,4%)	**10 829**
2020	8 726	(86,4%)	101	(1,0%)	35	(0,3%)	1 241	(12,3%)	**10 103**
2019	10 044	(86,8%)	106	(0,9%)	44	(0,4%)	1 371	(11,9%)	**11 565**
2018	9 610	(86,0%)	120	(1,1%)	40	(0,4%)	1 401	(12,5%)	**11 171**
2017	9 176	(85,9%)	110	(1,0%)	32	(0,3%)	1 361	(12,7%)	**10 679**
2016	8 954	(85,7%)	82	(0,8%)	25	(0,2%)	1 391	(13,3%)	**10 452**
1987-15	172 193	(85,7%)	149	(0,1%)	2	(0,0%)	28 575	(14,2%)	**200 919**
Total	**249 514**	**(86,1%)**	**1 031**	**(0,36%)**	**532**	**(0,2%)**	**38 851**	**(13,4%)**	**289 928**

* In addition, there were reports 207 primary hemi prostheses done for other reasons than hip fractures.

** Reoperations where prosthetic parts are not changed or removed (soft tissue debridements for infected prosthesis, soft tissue procedures for gluteal insufficiency etc.).

Figure 1: Annual numbers of operations



54,6 % of all operations were performed on the right side. 34,1 % performed in men.
Mean age at primary surgery was 68,8 years, 69,7 years for women and 67,1 years for men

Incidence

Figure 2a: Incidence of primary hip prostheses

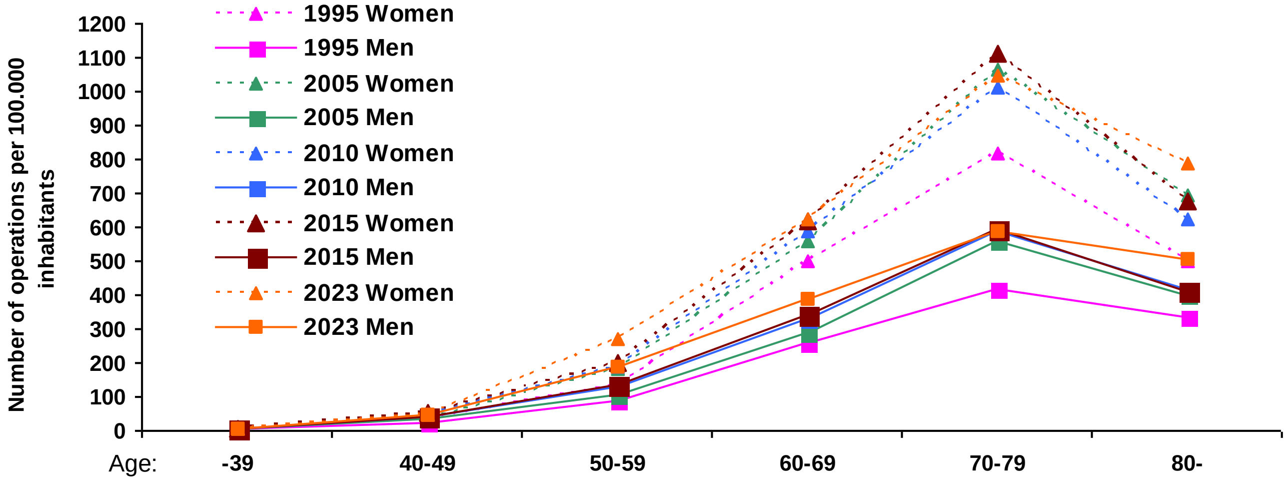


Figure 2b: Annual incidence of all primary hip prostheses

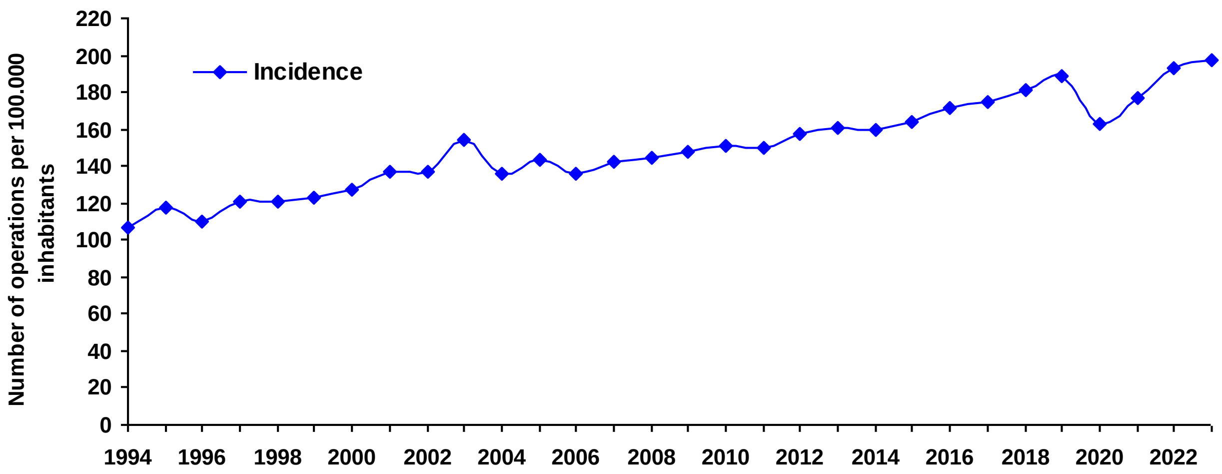
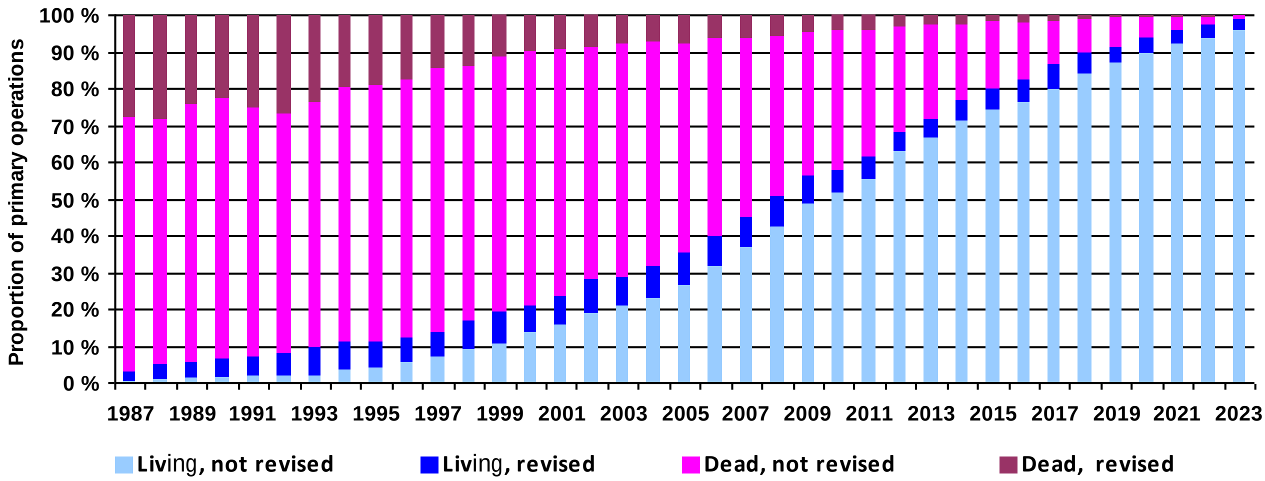


Figure 2c: Status of hip replacement surgery in the period 1987-2023 per 31.12.2023



Reasons for primary operations

Table 2a:

Year	Primary osteoarthritis	Rheumatoid arthritis	Sequelae after hip fracture	Congenital dysplasia *	Cong. dysplasia with dislocation	Epiphysiol./Perthes' disease	Spondyloarthropathy	Acute fracture of the femoral neck	Avascular necrosis of the femoral head	Sequelae after acetabular fracture	Other	Missing information
2023	8 795	104	225	785	6	91	25	562	349	5	358	4
2022	8 453	107	255	787	6	90	24	545	316	13	337	16
2021	7 739	92	243	604	15	83	9	522	254	15	269	14
2020	6 902	103	271	615	6	74	18	526	222	25	236	25
2019	7 938	88	312	664	17	94	20	619	301	30	299	22
2018	7 628	97	298	653	24	112	21	574	266	23	282	9
2017	7 301	108	299	679	19	105	26	404	272	34	282	13
2016	7 109	137	355	685	11	107	19	343	229	33	246	9
2010-15	37 368	765	2 128	3 629	111	584	169	1 446	1 079	130	1 147	162
2005-09	25 958	734	2 344	2 397	118	476	113	690	808	84	653	80
2000-04	23 329	823	2 769	2 176	124	399	134	356	396	63	461	131
1987-99	41 394	2 184	7 676	4 619	688	793	277	239	351	186	1 165	559
Totalt	**189 914**	**5 342**	**17 175**	**18 293**	**1 145**	**3 008**	**855**	**6 826**	**4 843**	**641**	**5 735**	**1 044**

Diseases are not mutually exclusive. More than one reason for operation is possible.

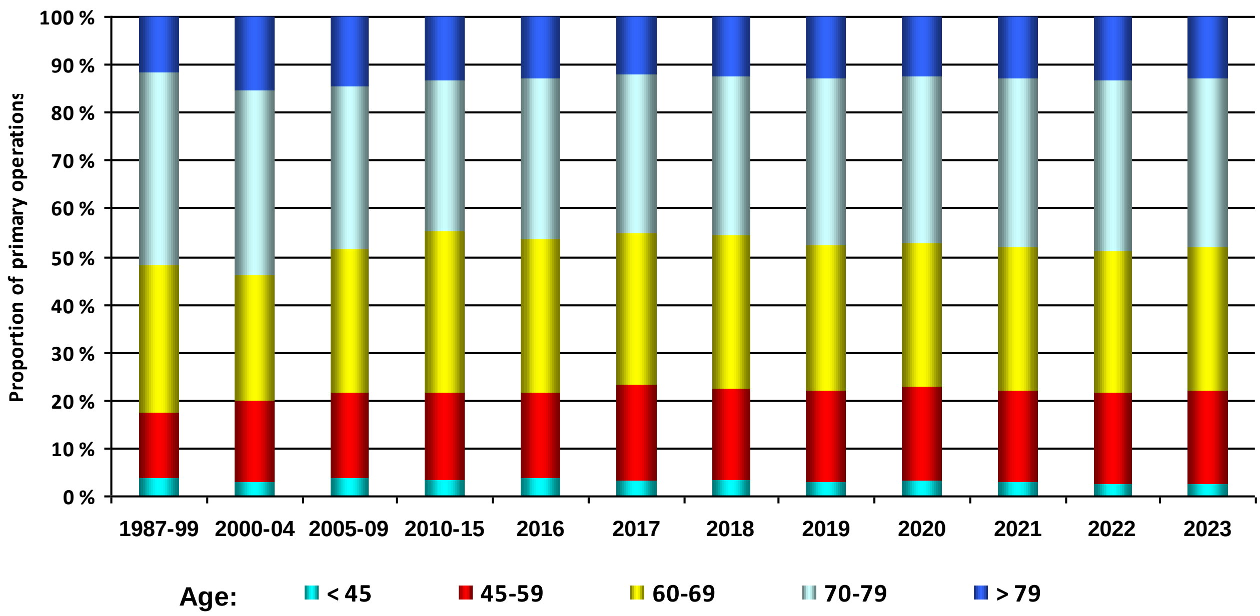
Table 2b: Crowe Classification *

Year	Grade 1	Grade 2	Grade 3	Grade 4	Missing	Total
2023	566	48	6	2	37	659
2022	101	6	1	0	202	310
Total	**667**	**54**	**7**	**2**	**239**	**969**

* Congenital dysplasia classification. Electronic registration started during 2022.

Grade 1:= less than 50% subluxation
Grade 2:= hip has between 50% and 75% subluxation
Grade 3:= hip has between 75% and 100% subluxation
Grade 4:= hip has more than 100% subluxation

Figure 3: Age by year of operation



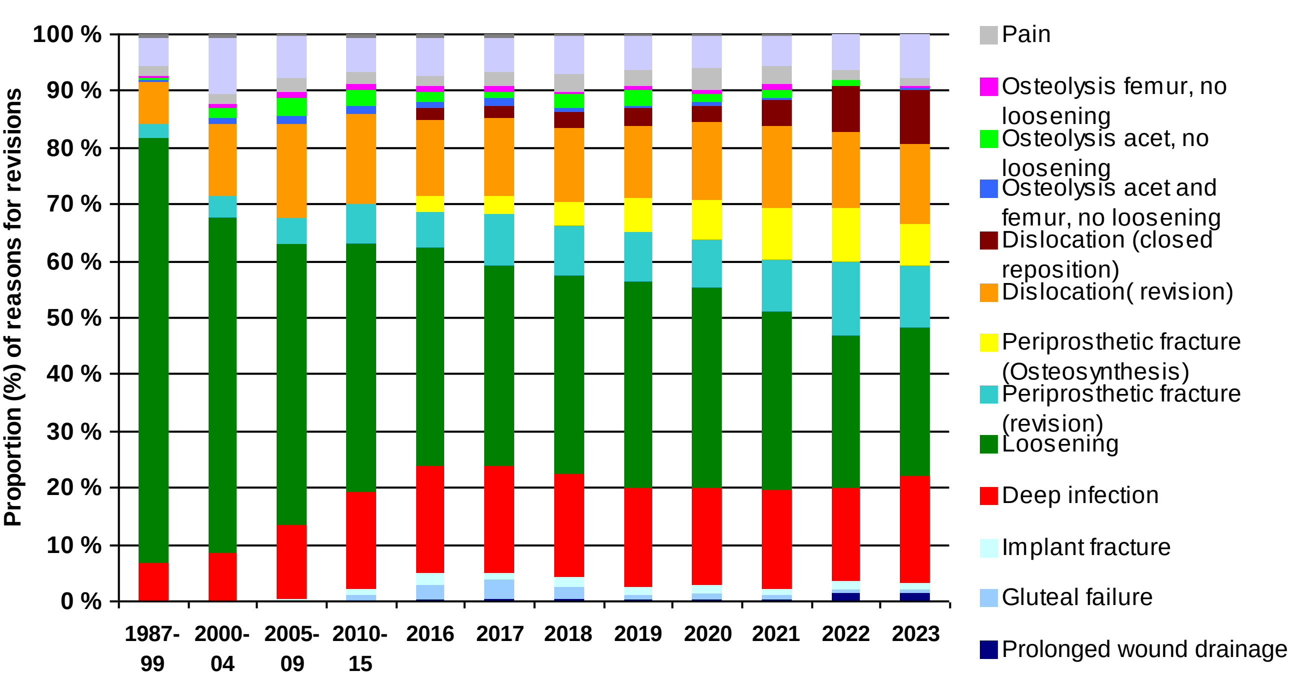
Reasons for reoperations

Table 3:

Year of reoper.	Loosening of acetabular component	Loosening of femoral component	Dislocation (revision)	Dislocation (closed reposition)	Deep infection	Periprosthetic fracture (revision)	Periprosthetic fracture (Osteosynthesis)	Pain	Osteolysis acet.,no loosening	Osteolysis femur, no loosening	Polyethylene wear	Implant fracture	Gluteal failure	Prolonged wound drainage	Other	Missing information
2023	229	133	160	96	191	140	75	29	3	6	56	20	13	21	74	1
2022	224	139	150	78	161	185	92	73	15	12	44	24	14	18	64	1
2021	256	153	148	39	148	112	76	123	23	20	26	17	8	3	46	2
2020	315	163	157	27	158	126	64	138	30	22	33	22	11	4	57	3
2019	318	204	155	34	176	130	59	138	35	16	35	25	12	5	62	2
2018	329	214	158	29	187	129	47	153	45	24	37	34	28	5	66	5
2017	331	207	171	22	195	129	34	149	39	37	35	26	43	2	68	7
2016	371	227	159	19	181	109	25	116	43	33	28	37	34	3	61	8
2010-15	2 112	1 547	939	2	883	630	1	774	293	224	278	113	62	4	315	28
2005-09	1 644	1 295	686	0	456	297	0	482	218	202	292	19	4	0	180	16
2000-04	1 593	1 519	439	0	245	251	0	332	122	145	344	14	0	0	387	20
1987-99	4 746	5 481	606	0	445	383	0	770	68	142	202	86	0	0	567	56
Total	**12 468**	**11 282**	**3 928**	**346**	**3 426**	**2 621**	**473**	**3 277**	**934**	**883**	**1 410**	**437**	**229**	**65**	**1 947**	**149**

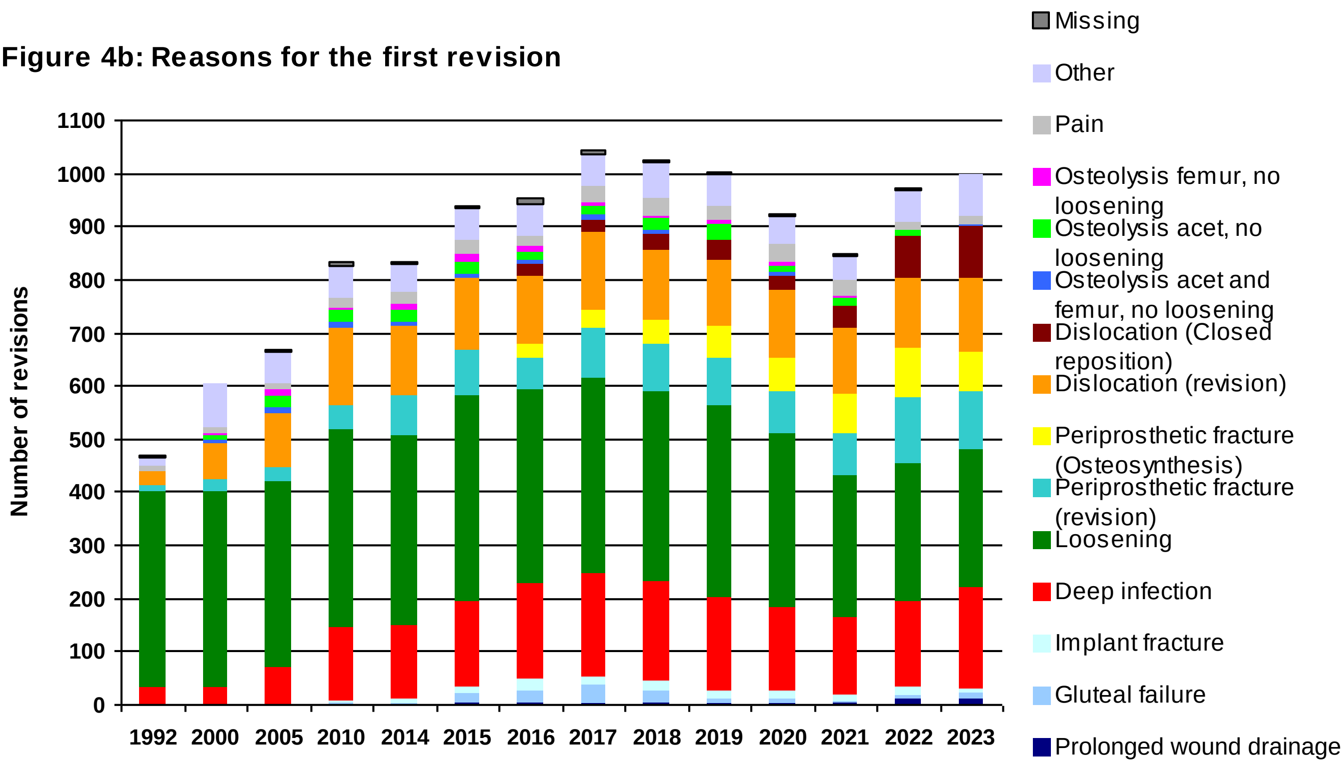
Reoperation causes are not mutually exclusive. More than one reason of reoperation is possible. Only the first reoperation is counted. Reoperations (other reoperations such as osteosynthesis of a fracture where the prosthesis has not been replaced) are counted.

Figure 4a:



The graph is hierarchical, i.e. if a reoperation is marked both "Deep infection" and "Loosening", only "Deep infection" is counted. Only the first reoperation is counted. Reoperations (other reoperations such as osteosynthesis of a fracture where the prosthesis has not been replaced) are counted.

Figure 4b: Reasons for the first revision



The graph is hierarchical, i.e. if a reoperation is marked both "Deep infection" and "Loosening", only "Deep infection" is counted. Only the first reoperation is counted.

Reoperations (other reoperations such as osteosynthesis of a fracture where the prosthesis has not been replaced) are counted.

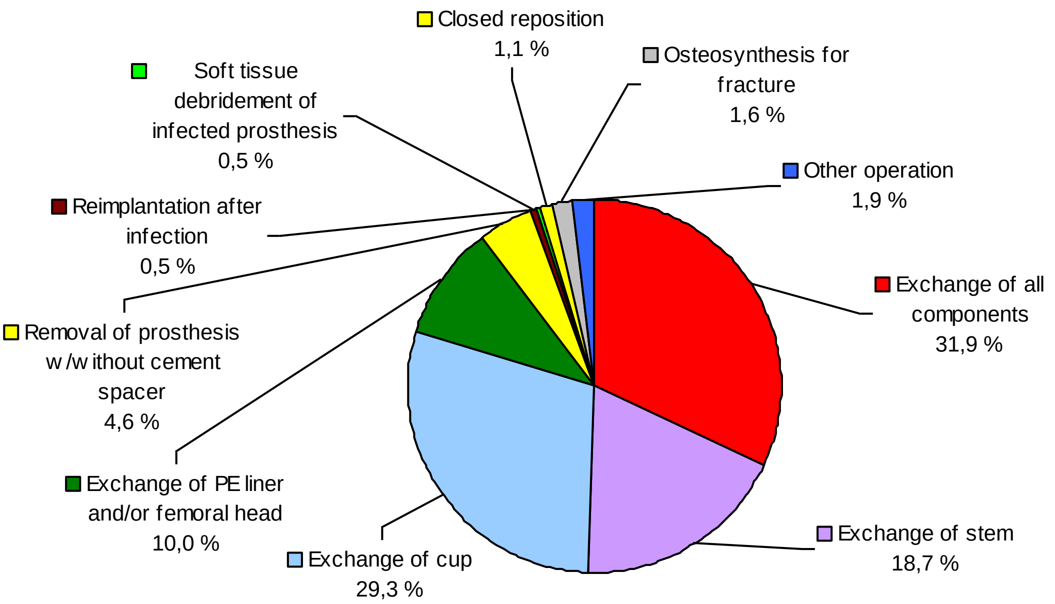
Type of revision

Table 5:

Type of revision	1987-13	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Exchange of femoral stem and head	4 072	117	142	103	144	147	131	121	92	131	110	**5 310**
Exchange of stem, PE liner, head	210	24	16	16	28	28	35	19	22	26	30	**454**
Exchange of acetabular cup	2 864	157	155	122	160	143	185	200	147	134	145	**4 412**
Exchange of femoral head	760	79	92	98	96	93	80	67	54	60	50	**1 529**
Exchange of femoral head and acetabular cup	2 873	189	214	237	203	214	172	151	118	137	128	**4 636**
Exchange of all components	7 746	216	226	248	228	205	200	189	202	177	208	**9 845**
Exchange of PE liner only	74	3	7	1	3	8	7	8	8	6	8	**133**
Exchange of PE liner and femoral head	684	46	60	59	74	76	87	65	76	87	98	**1 412**
Removal of prosthesis or cement spacer	867	20	22	8	11	13	5	6	5	9	10	**976**
Removal of prosthesis and insertion of cement spacer	79	34	38	46	38	43	40	36	39	32	31	**456**
IInsertion of new prosthesis (after Girdlestone)	145	1	1	1								**148**
Soft tissue debridement of infected prosthesis	40	18	9	13	16	13	13	7	6	13	7	**155**
Muscle resonance and transposition	9	1	15	19	35	18	5	8	4	4	5	**123**
Osteosynthesis for fracture		1		31	35	46	63	66	81	100	80	**503**
Resemented	5		2	1	2		1					**11**
Closed reposition		1	1	19	22	29	34	27	39	78	96	**346**
Other operation	78	24	25	32	21	26	15	14	13	16	28	**292**
Missing information	114	4	3	4	4	4	2	4	3	3	5	**150**
Total	**20 620**	**935**	**1 028**	**1 058**	**1 120**	**1 106**	**1 075**	**988**	**909**	**1 013**	**1 039**	**30 891**

More than one cause of reoperation is possible. Only the first reoperation is counted.

Figure 5:



Bone transplantation in revisions

Table 6: Acetabular cup

Year	Yes	No	Bone impaction[1]	Missing	Total
2023	325 (24,5 %)	914 (69 %)	4 (0,3 %)	81 (6,1 %)	**1 324**
2022	106 (8,2 %)	991 (76,8 %)	26 (2 %)	168 (13 %)	**1 291**
2021	44 (3,5 %)	879 (70,5 %)	39 (3,1 %)	285 (22,9 %)	**1 247**
2020	41 (3,1 %)	914 (69 %)	52 (3,9 %)	318 (24 %)	**1 325**
2019	61 (4,2 %)	953 (65,1 %)	70 (4,8 %)	380 (26 %)	**1 464**
2018	50 (3,3 %)	965 (63,4 %)	76 (5 %)	430 (28,3 %)	**1 521**
2017	66 (4,5 %)	961 (65,4 %)	83 (5,6 %)	360 (24,5 %)	**1 470**
2016	72 (4,9 %)	942 (63,9 %)	96 (6,5 %)	364 (24,7 %)	**1 474**
2010-15	651 (8,3 %)	5 107 (64,9 %)	830 (10,6 %)	1 275 (16,2 %)	**7 863**
2005-09	629 (11,5 %)	3 057 (56,1 %)	1080 (19,8 %)	680 (12,5 %)	**5 446**
2000-04	932 (19,6 %)	3 023 (63,5 %)	663 (13,9 %)	143 (3 %)	**4 761**
1987-99	2 781 (26,3 %)	7 073 (66,8 %)	521 (4,9 %)	217 (2 %)	**10 592**
Total	**5 758 (14,5 %)**	**25 779 (64,8 %)**	**3 540 (8,9 %)**	**4 701 (11,8 %)**	**39 778**

Table 7: Femoral stem

Year	Yes	No	Bone impaction[1]	Missing	Total
2023	167 (12,7 %)	1 065 (80,7 %)	2 (0,2 %)	86 (6,5 %)	**1 320**
2022	54 (4,2 %)	1 042 (81,7 %)	3 (0,2 %)	177 (13,9 %)	**1 276**
2021	20 (1,6 %)	903 (74,2 %)	4 (0,3 %)	290 (23,8 %)	**1 217**
2020	32 (2,6 %)	891 (71,2 %)	4 (0,3 %)	325 (26 %)	**1 252**
2019	33 (2,4 %)	952 (68,8 %)	5 (0,4 %)	393 (28,4 %)	**1 383**
2018	26 (1,8 %)	956 (66,8 %)	4 (0,3 %)	445 (31,1 %)	**1 431**
2017	45 (3,2 %)	957 (69 %)	7 (0,5 %)	377 (27,2 %)	**1 386**
2016	43 (3,1 %)	964 (68,4 %)	3 (0,2 %)	399 (28,3 %)	**1 409**
2010-15	533 (6,8 %)	5 202 (66,7 %)	116 (1,5 %)	1 945 (24,9 %)	**7 796**
2005-09	724 (13,3 %)	3 198 (58,7 %)	351 (6,4 %)	1 173 (21,5 %)	**5 446**
2000-04	809 (17 %)	3 176 (66,7 %)	631 (13,2 %)	149 (3,1 %)	**4 765**
1987-99	2 345 (22,1 %)	7 319 (69,1 %)	711 (6,7 %)	219 (2,1 %)	**10 594**
Total	**4 831 (12,3 %)**	**26 625 (67,8 %)**	**1 841 (4,7 %)**	**5 978 (15,2 %)**	**39 275**

1 Registration of "Bone impaction" started in 1996.

Bone loss in revisions

Table 8: Acetabular cup

Year	Type I	Type IIA	Type IIB	Type IIC	Type IIIA	Type IIIB	Missing	Total
2023	84	118	71	65	43	23	356	**760**
2022	116	94	65	37	40	13	346	**711**
2021	229	176	68	46	37	23	208	**787**
2020	279	164	98	41	42	24	220	**868**
2019	234	198	110	54	62	19	250	**927**
2018	310	173	93	48	49	20	264	**957**
2017	311	166	99	62	55	9	256	**958**
2016	267	219	103	82	55	29	231	**986**
2010-15	1 363	1 134	616	451	362	134	1 386	**5 446**
2005-09	1 042	761	428	386	316	131	1 042	**4 106**

Bone loss in revision - acetabulum (Paprosky Classification):

Type I: Hemispheric acetabulum without edge defects. Intact posterior and anterior column. Defects in anchoring holes that do not destroy the subchondral bone plate.
Type IIA: Hemispheric acetabulum without major edge defects, intact posterior and anterior column, but with small metaphyseal fractures again.
Type IIB: Hemispheric acetabulum without major edge defects, intact posterior and anterior column, but with small metaphyseal fractures again and some lack of support superiort.
Type IIC: Hemispheric acetabulum without major edge defects, intact posterior and anterior column, but with defect in medial wall.
Type IIIA: Significant component migration, osteolysis and bone loss. Bone loss from 10 o'clock until 2.
Type IIIB: Significant component migration, osteolysis and bone loss. Bone loss from 9 o'clock until 5.

Table 9: Femoral stem

Year	Type I	Type II	Type IIIA	Type IIIB	Type IV	Missisng	Total
2023	91	92	23	16	9	343	**574**
2022	143	64	31	16	6	310	**570**
2021	244	94	45	15	8	201	**607**
2020	232	111	52	11	5	216	**627**
2019	256	133	59	10	7	236	**701**
2018	296	123	59	15	10	247	**750**
2017	275	140	51	13	8	219	**706**
2016	253	153	70	24	4	214	**718**
2010-15	1 174	942	438	111	38	1 348	**4 051**
2005-09	833	750	339	94	44	929	**2 989**

Bone loss in revision - femoral stem (Paprosky Classification):

Type I: Minimal loss of metaphyseal bone and intact diaphysis.
Type II: Major loss of metaphyseal bone, but intact diaphysis.
Type IIIA: Significant loss of metaphyseal bone without possibility of proximal mechanical support. Over 4 cm of intact corticalis in the isthmus area.
Type IIIB: Significant loss of metaphyseal bone without possibility of proximal mechanical support. Below 4 cm of intact corticalis in the isthmus area.
Type IV: Significant loss of metaphyseal bone without possibility of proximal mechanical support. Wide isthmus with little possibility of cortical support.

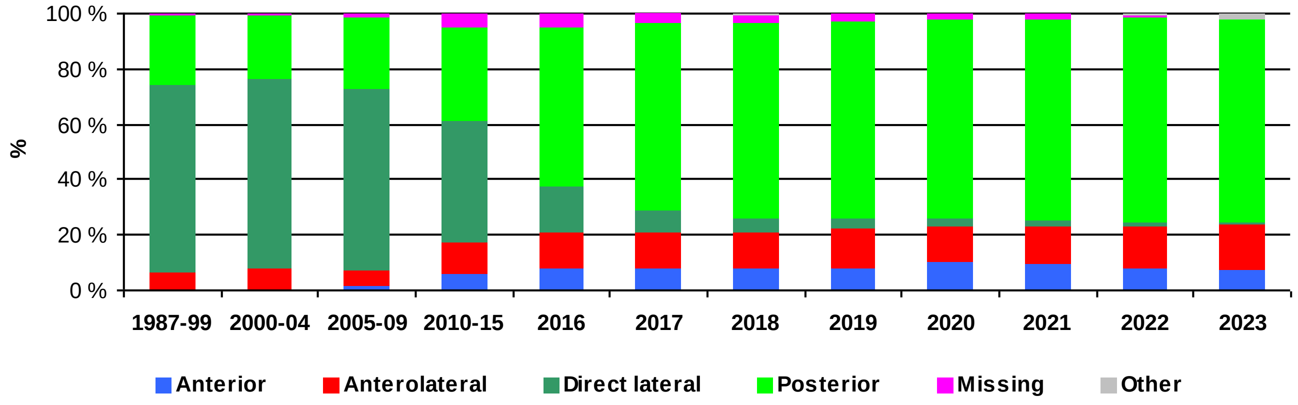
Registration of bone loss started in 2005

Surgical approach

Table 10: In primary operations *

Year	Anterior		Anterolateral		Direct lateral		Posterior		Other		Missing information		Total
2023	804	(7,4 %)	1 722	(15,9 %)	107	(1 %)	7 928	(73,3 %)	202	(1,9 %)	49	(0,5 %)	**10 812**
2022	813	(7,8 %)	1 608	(15,3 %)	166	(1,6 %)	7 707	(73,5 %)	63	(0,6 %)	127	(1,2 %)	**10 484**
2021	910	(9,6 %)	1 296	(13,6 %)	192	(2 %)	6 902	(72,5 %)	1	(0 %)	214	(2,2 %)	**9 515**
2020	862	(9,9 %)	1 171	(13,4 %)	237	(2,7 %)	6 257	(71,7 %)	11	(0,1 %)	188	(2,2 %)	**8 726**
2019	794	(7,9 %)	1 423	(14,2 %)	414	(4,1 %)	7 109	(70,8 %)	23	(0,2 %)	281	(2,8 %)	**10 044**
2018	771	(8 %)	1 249	(13 %)	465	(4,8 %)	6 801	(70,8 %)	43	(0,4 %)	281	(2,9 %)	**9 610**
2017	713	(7,8 %)	1 170	(12,8 %)	753	(8,2 %)	6 177	(67,3 %)	4	(0 %)	359	(3,9 %)	**9 176**
2016	718	(8 %)	1 165	(13 %)	1 437	(16 %)	5 170	(57,7 %)	5	(0,1 %)	459	(5,1 %)	**8 954**
2010-15	2 694	(5,7 %)	5 528	(11,7 %)	20 768	(44 %)	16 007	(33,9 %)	133	(0,3 %)	2 093	(4,4 %)	**47 223**
2005-09	417	(1,2 %)	2 104	(6,3 %)	21 821	(65,1 %)	8 619	(25,7 %)	36	(0,1 %)	541	(1,6 %)	**33 538**
2000-04	55	(0,2 %)	2 319	(7,4 %)	21 545	(68,8 %)	7 224	(23,1 %)	71	(0,2 %)	84	(0,3 %)	**31 298**
1987-99	142	(0,2 %)	3 941	(6,6 %)	40 414	(67,2 %)	15 259	(25,4 %)	54	(0,1 %)	324	(0,5 %)	**60 134**
Total	**9 693**	**(3,9 %)**	**24 696**	**(9,9 %)**	**108 319**	**(43,4 %)**	**101 160**	**(40,5 %)**	**646**	**(0,3 %)**	**5 000**	**(2 %)**	**249 514**

Figure 6: In primary operations *

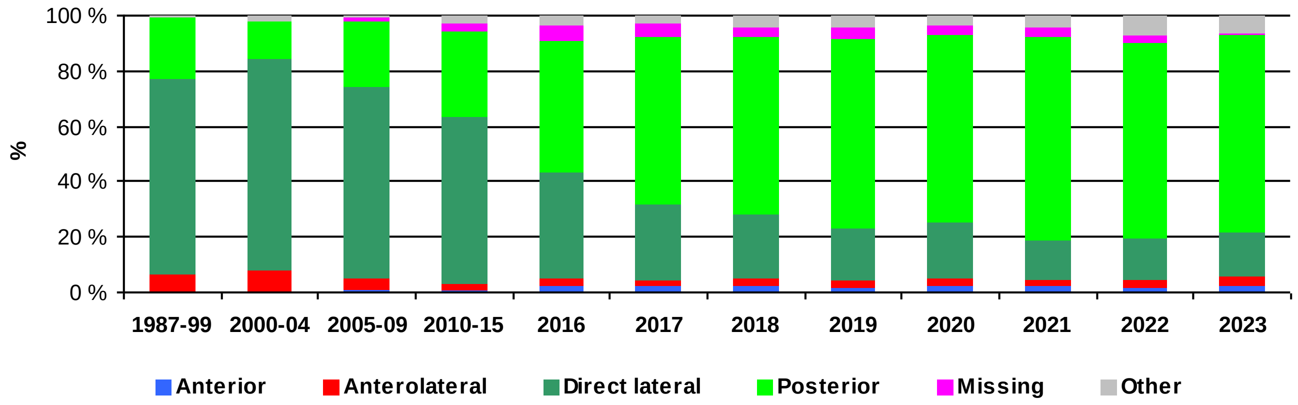


* Anterior:	Operative approach between sartorius and tensor
Anterolateral:	Operative approach between glut. medius and tensor
Direct lateral:	Operative approach transgluteal
Posterior:	Operative approach behind gluteus medius

Table 11: In revisions *

Year	Anterior		Anterolateral		Direct lateral		Posterior		Other		Missing information		Total
2023	33	(2,5 %)	43	(3,2 %)	210	(15,7 %)	952	(71,1 %)	86	(6,4 %)	15	(1,1 %)	**1 339**
2022	23	(1,8 %)	37	(2,8 %)	197	(15,1 %)	917	(70,2 %)	92	(7 %)	40	(3,1 %)	**1 306**
2021	26	(2,1 %)	26	(2,1 %)	186	(14,7 %)	916	(72,2 %)	50	(3,9 %)	64	(5 %)	**1 268**
2020	33	(2,4 %)	36	(2,7 %)	272	(20,2 %)	899	(66,7 %)	52	(3,9 %)	55	(4,1 %)	**1 347**
2019	26	(1,7 %)	35	(2,3 %)	285	(19,1 %)	1 010	(67,7 %)	60	(4 %)	75	(5 %)	**1 491**
2018	34	(2,2 %)	47	(3,1 %)	344	(22,5 %)	974	(63,6 %)	63	(4,1 %)	69	(4,5 %)	**1 531**
2017	29	(1,9 %)	35	(2,3 %)	409	(27,4 %)	900	(60,2 %)	41	(2,7 %)	80	(5,4 %)	**1 494**
2016	27	(1,8 %)	45	(3 %)	570	(38,1 %)	714	(47,8 %)	54	(3,6 %)	85	(5,7 %)	**1 495**
2010-15	81	(1 %)	169	(2,1 %)	4 769	(60,4 %)	2 415	(30,6 %)	202	(2,6 %)	255	(3,2 %)	**7 891**
2005-09	32	(0,6 %)	254	(4,7 %)	3 751	(68,9 %)	1 294	(23,8 %)	40	(0,7 %)	76	(1,4 %)	**5 447**
2000-04	13	(0,3 %)	377	(7,9 %)	3 606	(75,4 %)	645	(13,5 %)	91	(1,9 %)	53	(1,1 %)	**4 785**
1987-99	25	(0,2 %)	674	(6,4 %)	7 479	(70,5 %)	2 324	(21,9 %)	51	(0,5 %)	49	(0,5 %)	**10 602**
Total	**382**	**(1 %)**	**1 778**	**(4,4 %)**	**22 078**	**(55,2 %)**	**13 960**	**(34,9 %)**	**882**	**(2,2 %)**	**916**	**(2,3 %)**	**39 996**

Figure 7: In revisions *



* Anterior: Operative approach between sartorius and tensor
Anterolateral: Operative approach between glut. medius and tensor
Direct lateral: Operative approach transgluteal
Posterior: Operative approach behind gluteus medius

Fixation in primary operations

Figure 8a: All patients

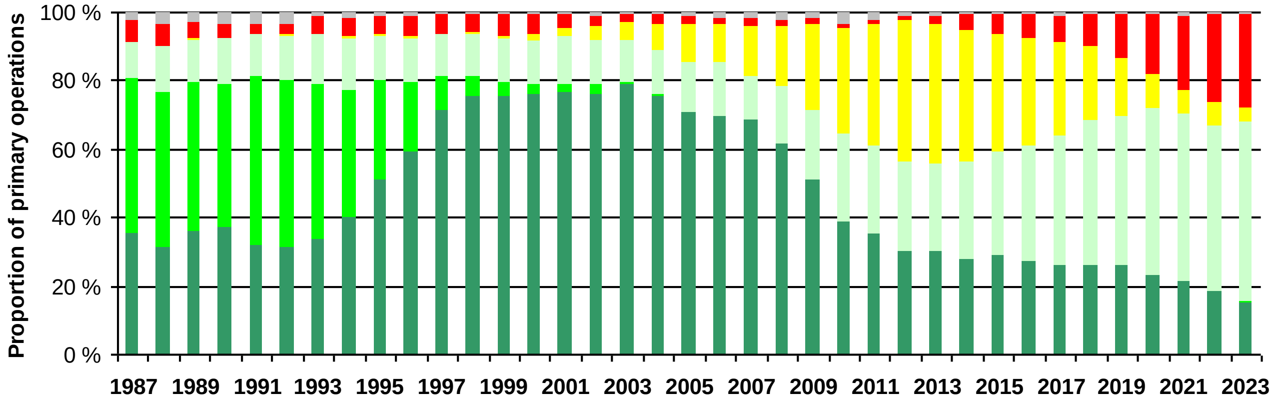
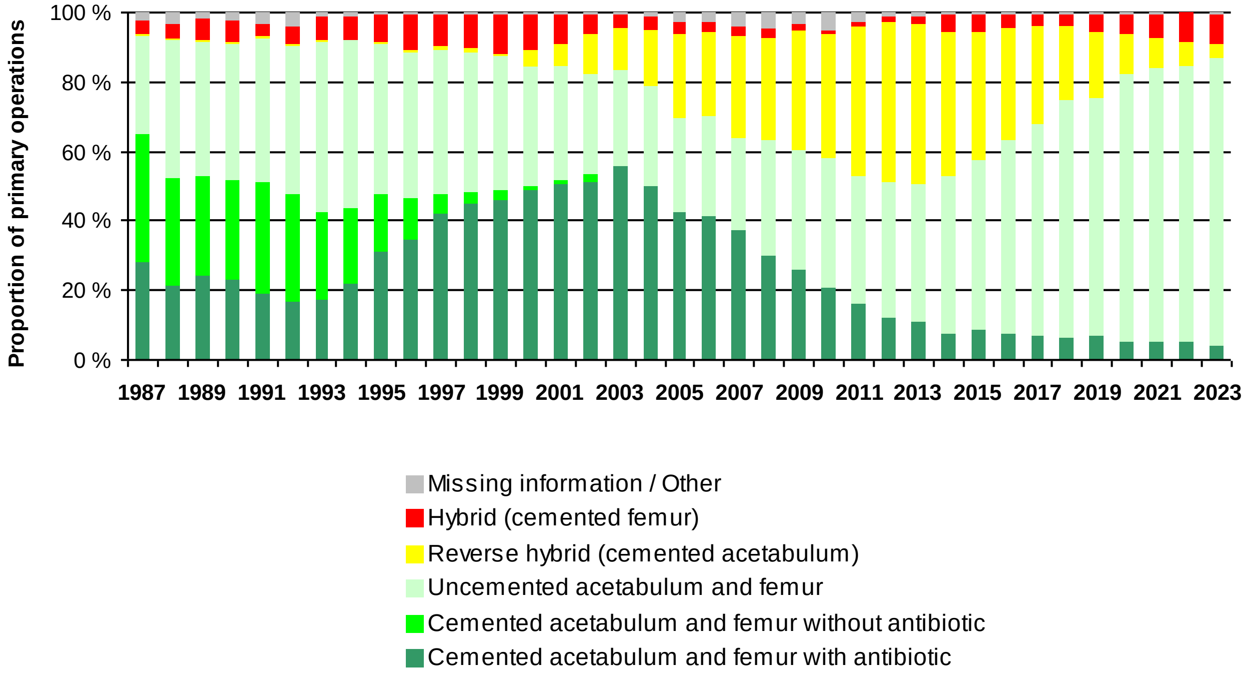


Figure 8b: Patients under 65 years old



Fixation in primary operations (cont.)

Figure 8c: Patients between 65 years and 75 years old

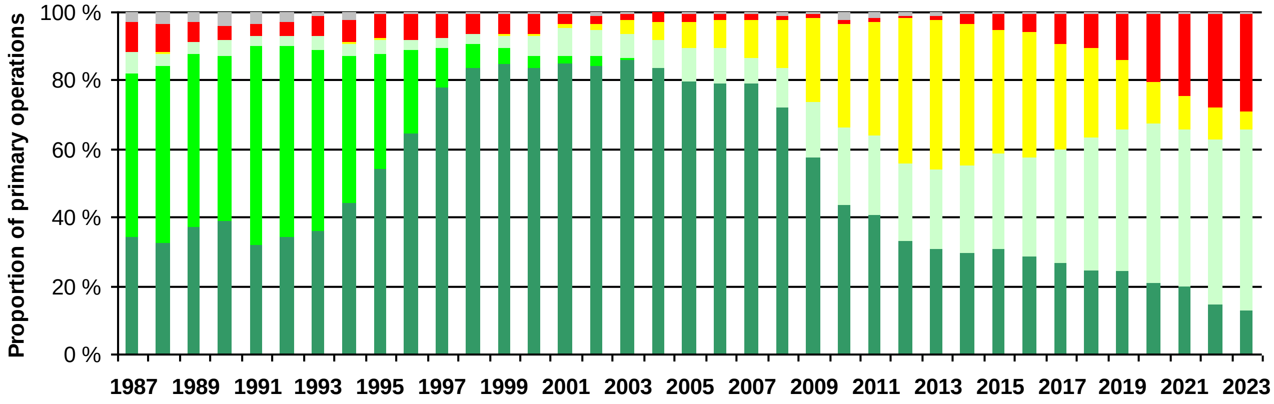
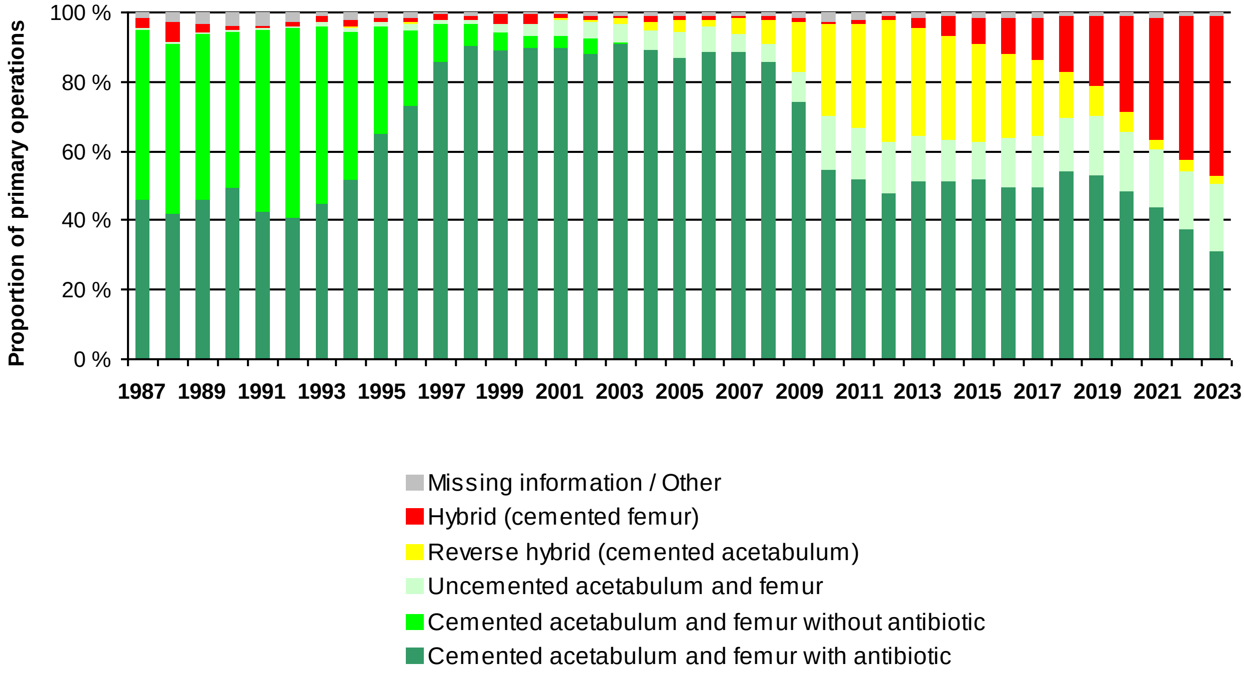


Figure 8d: Patients over 75 years old



Fixation in revisions

Figure 9: Acetabular cup - All patients

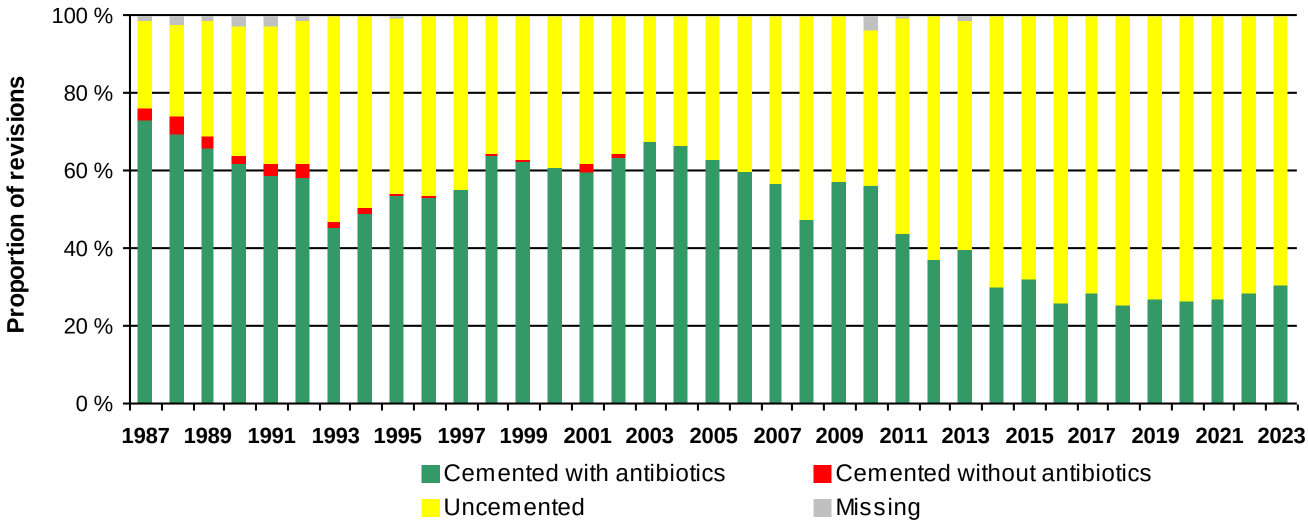
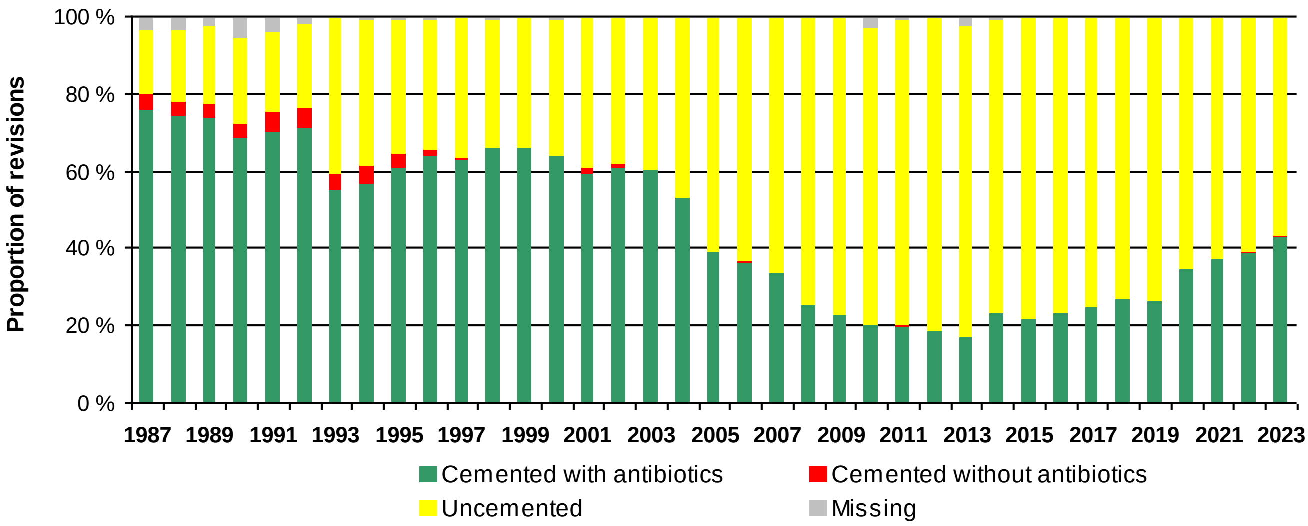


Figure 10: Femoral stem - All patients



Type of fixation and bone transplantation in revisions

Table 12: Acetabular cup

	Cemented					Uncemented				
	Bone impaction	Bone transpl.	No	Missing	Total	Bone impaction	Bone transpl.	No	Missing	Total
2023	1%	44%	52%	2%	261	0%	31%	65%	4%	589
2022	5%	18%	72%	5%	223	3%	10%	77%	10%	567
2021	8%	6%	75%	11%	213	4%	5%	72%	19%	579
2020	9%	2%	73%	17%	230	5%	5%	71%	19%	639
2019	11%	5%	69%	15%	251	6%	7%	66%	22%	687
2018	12%	5%	61%	22%	237	7%	5%	65%	23%	701
2017	16%	7%	56%	20%	258	5%	7%	73%	16%	658
2016	16%	7%	57%	20%	235	6%	8%	70%	17%	703
2010-15	33%	8%	51%	8%	2 081	4%	15%	69%	13%	3 137
2005-09	44%	9%	41%	6%	2 109	8%	25%	60%	7%	1 612
2000-04	30%	21%	48%	1%	2 011	5%	40%	52%	2%	1 119
1987-99	10%	24%	65%	1%	4 353	4%	58%	37%	2%	2 878
Total	**23%**	**17%**	**56%**	**5%**	**12 462**	**5%**	**25%**	**60%**	**10%**	**13 869**

Table 13: Femoral stem

	Cemented					Uncemented				
	Bone impaction	Bone transpl.	No	Missing	Total	Bone impaction	Bone transpl.	No	Missing	Total
2023	0%	19%	77%	3%	234	0%	29%	65%	6%	302
2022	1%	7%	87%	6%	191	0%	8%	80%	12%	305
2021	2%	1%	83%	14%	175	0%	4%	76%	20%	297
2020	1%	2%	80%	16%	169	0%	5%	72%	22%	319
2019	1%	1%	79%	19%	145	0%	4%	72%	24%	401
2018	1%	0%	73%	26%	149	0%	4%	71%	24%	412
2017	3%	3%	76%	18%	130	0%	7%	74%	19%	399
2016	0%	1%	77%	22%	126	1%	7%	76%	17%	413
2010-15	12%	4%	64%	20%	635	1%	16%	71%	12%	2 502
2005-09	34%	8%	50%	8%	744	3%	31%	58%	8%	1 627
2000-04	35%	12%	53%	1%	1 524	8%	47%	43%	2%	1 004
1987-99	10%	15%	73%	1%	5 338	7%	61%	31%	1%	2 296
Total	**15%**	**12%**	**69%**	**5%**	**9 560**	**3%**	**29%**	**58%**	**10%**	**10 277**

Registration of "Bone impaction" started in 1996

Cements used in the acetabulum and femur

Table 14: In primary- and revision surgeries

Cements	1987-15	2016	2017	2018	2019	2020	2021	2022	2023	Total
Boneloc	1 353	0	0	0	0	0	0	0	0	**1 353**
Cemex System Genta FAST	1 578	0	0	0	1	0	0	0	0	**1 579**
Cemex system genta ID green	0	18	197	204	139	3	0	0	0	**561**
Cemex w/gentamicin	735	234	0	0	1	3	0	0	0	**973**
CMW I	5 110	0	0	0	0	0	0	0	0	**5 110**
CMW I w/gentamicin	3 340	1	0	0	0	0	0	0	0	**3 341**
CMW II	15	0	0	0	0	0	0	0	0	**15**
CMW III	1 956	0	0	0	0	0	0	0	0	**1 956**
CMW III w/gentamicin	189	0	0	0	0	0	0	0	0	**189**
Copal G+ V	24	11	25	32	93	86	89	97	84	**541**
Copal w/gentamicin+clindamycin	28	3	13	23	41	42	29	46	56	**281**
Optipac Refobacin Bonecement R	12 593	2 207	1 633	1 180	88	0	3	52	65	**17 821**
Optipac Refobacin Bonecement R-3	0	0	0	0	131	120	139	119	116	**625**
Optipac Refobacin Revision	58	17	13	1	0	0	0	0	0	**89**
Palacos	6 990	0	0	0	0	0	0	0	0	**6 990**
Palacos E-Flow (low viscosity)	99	0	0	0	0	0	0	0	0	**99**
Palacos R + G	28 545	2 335	1 666	1 541	1 018	529	539	496	296	**36 965**
Palacos R+G pro	4	59	790	2 081	3 751	3 559	3 925	4 413	4 411	**22 993**
Palacos w/gentamicin	62 764	0	0	1	0	0	0	0	0	**62 765**
Palamed G (gentamicin)	13	0	0	0	0	0	0	0	0	**13**
Refobacin Bone Cement R	10 819	632	913	59	1	0	0	0	0	**12 424**
Refobacin Revision	387	24	70	24	5	0	0	5	0	**515**
Refobacin Revision-3	0	0	0	35	38	30	36	26	30	**195**
Refobacin-Palacos	2 386	0	0	0	0	0	0	0	0	**2 386**
Simplex	7 147	0	0	0	0	0	0	1	0	**7 148**
Simplex unknown	827	0	0	0	0	0	0	0	0	**827**
Simplex w/erythr.+colistin	2 598	0	0	0	0	0	0	0	0	**2 598**
Simplex w/Tobramycin	7 507	534	488	503	491	333	390	435	415	**11 096**
SmartSet GHV	159	0	0	0	0	0	0	0	0	**159**
SmartSet GHV Genta. Smartmix	214	156	179	99	117	33	1	0	0	**799**
SmartSet HV	15	0	0	0	0	0	0	0	0	**15**
Vancogenx	9	1	5	4	10	6	7	0	7	**49**
Annet (n<10)	20	0	1	0	0	1	4	11	6	**43**
Missing information	498	55	66	60	112	90	20	56	54	**1 011**

Cemented primary prostheses

Table 15: (The 45 most common combinations of cup and stem)

Cup	Stem	1987-15	2016	2017	2018	2019	2020	2021	2022	2023	Total
CHARNLEY	CHARNLEY	40 366									**40 366**
EXETER	EXETER	12 987									**12 987**
EXETER X3 RIMFIT	EXETER	5 374	1 321	992	1 044	1 009	633	537	447	311	**11 668**
REFLECTION CEM. ALL POLY	SPECTRON-EF	9 740									**9 740**
IP	LUBINUS SP II	5 575	262	217	203	222	157	183	217	179	**7 215**
TITAN	TITAN	6 986									**6 986**
CONTEMPORARY	EXETER	4 754	3	1		3	4				**4 765**
SPECTRON	ITH	2 405									**2 405**
LUBINUS	LUBINUS SP II	559	213	214	201	228	227	271	178	150	**2 241**
MARATHON	CHARNLEY MODULAR	1 572	46	26		2	13				**1 659**
MARATHON	EXETER	429	187	197	244	241	95	59	66	15	**1 533**
KRONOS	TITAN	1 496									**1 496**
MARATHON	C-STEM	76	129	118	180	249	250	233	128	121	**1 484**
MARATHON	LUBINUS SP II	176	111	40	41	110	184	215	232	229	**1 338**
MARATHON	MS-30	15	19	72	115	167	197	219	269	178	**1 251**
ELITE	TITAN	1 237									**1 237**
ELITE	CHARNLEY	932									**932**
REFLECTION CEM. ALL POLY	ITH	927									**927**
REFLECTION CEM. ALL POLY	BIO-FIT	905									**905**
WEBER ALLO PRO	MS-30	813									**813**
ELITE	EXETER	778									**778**
AVANTAGE	EXETER	309	40	32	65	71	74	72	55	56	**774**
ZCA	CPT	756									**756**
CHARNLEY	CHARNLEY MODULAR	672									**672**
IP	LUBINUS	587									**587**
ELITE	ELITE	579									**579**
CHARNLEY	EXETER	571									**571**
TITAN	FJORD	523									**523**
ELITE	CHARNLEY MODULAR	521									**521**
POLARCUP	LUBINUS SP II	63	15	25	16	45	55	77	79	91	**466**
SPECTRON	SP I	432									**432**
MODULAR HIP SYSTEM	BIO-FIT	430									**430**
SPECTRON	TITAN	414									**414**
EXCEED ABT CEMENTED SYS	MS-30			65	97	97	38	73	38	4	**412**
MARATHON	CORAIL	248	61	28	25	14	5	16	6	9	**412**
CHARNLEY	C-STEM	378									**378**
CHARNLEY	ELITE	375									**375**
OPERA	SPECTRON-EF	356									**356**
ELITE	MS-30	339									**339**
PEARL	TITAN	285									**285**
AVANTAGE	LUBINUS SP II	15	3	4	7	12	20	39	72	112	**284**
EXCEED ABT CEMENTED SYS	CPT			106	113	64					**283**
MODULAR HIP SYSTEM	ITH	277									**277**
SPECTRON	BIO-FIT	226									**226**
IP	SP I	214									**214**
Other	Other	3 080	43	248	157	125	85	83	143	208	**4 172**

Uncemented primary prostheses

Table 16: (The 45 most common combinations of cup and stem)

Cup	Stem	1987-15	2016	2017	2018	2019	2020	2021	2022	2023	Total
PINNACLE	CORAIL	2 311	491	1 241	1 675	1 742	1 634	1 759	1 850	2 099	**14 802**
TRIDENT	CORAIL	277	270	240	303	660	1 067	1 303	1 680	1 950	**7 750**
REFLECTION UNCEMENTED	CORAIL	4 549	170	219	427	182	277	189	10	2	**6 025**
TRILOGY	CORAIL	2 410	331	270	200	329	148	58	73	81	**3 900**
IGLOO	FILLER	3 200	165	108	121	136	73	39			**3 842**
R3	CORAIL	122	493	568	519	463	334	382	428	478	**3 787**
TROPIC	CORAIL	2 676									**2 676**
TRIDENT	ACCOLADE II	291	127	116	174	234	216	248	157	168	**1 731**
R3	POLARSTEM	335	74	50	14	25	108	164	315	441	**1 526**
Continuum Acetabular System	CORAIL	493	332	88	41	48	78	84	71	48	**1 283**
ATOLL	CORAIL	1 282									**1 282**
DURALOC	CORAIL	1 072									**1 072**
REFLECTION UNCEMENTED	HACTIV	131	185	187	184	95					**782**
TRIDENT	POLARSTEM	102	21	60	59	121	93	74	105	77	**712**
BICON-PLUS	ZWEYMÜLLER	590									**590**
REFLECTION UNCEMENTED	SECURFIT	518									**518**
TRILOGY	SCP/UNIQUE	512									**512**
R3	FILLER	120	90	114	96	44					**464**
TRILOGY	HACTIV	451				8					**459**
GEMINI	PROFILE	407									**407**
BICON-PLUS	HACTIV	387									**387**
DURALOC	PROFILE	333									**333**
REFLECTION UNCEMENTED	OMNIFIT	307									**307**
G7 MDM	CORAIL						2	26	119	123	**270**
DURALOC	SCP/UNIQUE	267									**267**
TRILOGY	FILLER	263									**263**
REFLECTION UNCEMENTED	SCP/UNIQUE	239	10	2							**251**
TRABECULAR METAL	CORAIL	62	36	26	26	35	28	16	11	8	**248**
ENDLER	ZWEYMÜLLER	247									**247**
EUROPEAN CUP SYSTEM	TAPERLOC	240									**240**
PLASMACUP	BICONTACT	232									**232**
LMT	TAPERLOC	227									**227**
AVANTAGE	CORAIL	93	29	10	12	25	14	15	12	13	**223**
TRIDENT	ABG II	212									**212**
IGLOO	CORAIL	92						17	39	29	**177**
TI-FIT	BIO-FIT	175									**175**
REFLECTION UNCEMENTED	SL-PLUS MIA	173									**173**
SECURFIT	OMNIFIT	166									**166**
ABG I	ABG I	165									**165**
HARRIS/GALANTE	HARRIS/GALANTE	158									**158**
ABG II	ABG II	155									**155**
COXA	FEMORA	155									**155**
PARHOFER	PARHOFER	152									**152**
BICON-PLUS	CORAIL	150									**150**
REFLECTION UNCEMENTED	PROFEMUR GLADIATOR	143									**143**
Other	Other	3 411	214	189	259	244	167	245	207	165	**5 101**

Hybrid primary prostheses

Table 17: Hybrid primary prostheses. (The 20 most common)

Cup (uncemented)	Stem (cemented)	1987-15	2016	2017	2018	2019	2020	2021	2022	2023	Total
TRIDENT	EXETER	127	31	12	178	457	558	652	742	719	**3 476**
TRILOGY	EXETER	1 042	245	259	171	60	32	26	18	4	**1 857**
TRIDENT	LUBINUS SP II	4	7	21	14	64	214	305	385	529	**1 543**
R3	LUBINUS SP II	44	159	142	145	95	80	143	230	277	**1 315**
PINNACLE	C-STEM		3	2	25	94	121	236	365	387	**1 233**
TROPIC	TITAN	894									**894**
REFLECTION UNCEMENTED	C-STEM	27	64	108	124	146	198	143			**810**
MORSCHER	MS-30	703									**703**
PINNACLE	LUBINUS SP II	3	4	5	28	36	108	153	154	177	**668**
TRIDENT	C-STEM		1			4	24	105	244	271	**649**
TRIDENT	MS-30		1	1	4	39	67	118	103	203	**536**
TRILOGY	CHARNLEY	395									**395**
ENDLER	TITAN	346									**346**
PINNACLE	EXETER	13	9	7	20	8	21	44	106	85	**313**
REFLECTION UNCEMENTED	LUBINUS SP II	199	1		22	9	4	5	2		**242**
AVANTAGE	EXETER	53	32	26	24	19	12	12	16	10	**204**
DURALOC	CHARNLEY	154									**154**
REFLECTION UNCEMENTED	BIO-FIT	145									**145**
G7 MDM	LUBINUS SP II							13	58	71	**142**
TRILOGY	CPT	93		46	2	1					**142**
Other	Other	1 698	25	99	137	235	69	96	273	248	**2 880**

Table 18: Reverse hybrid primary prostheses. (The 20 most common)

Cup (cemented)	Stem (uncemened)	1987-15	2016	2017	2018	2019	2020	2021	2022	2023	Total
MARATHON	CORAIL	14 201	2 350	2 187	1 819	1 497	796	630	600	316	**24 396**
ELITE	CORAIL	2 677	2								**2 679**
REFLECTION CEM. ALL POLY	CORAIL	1 277	29	31	7	2	7	3	5		**1 361**
TITAN	CORAIL	987									**987**
EXETER X3 RIMFIT	ACCOLADE II	251	157	121	116	62	1	1	3	5	**717**
CONTEMPORARY	CORAIL	684									**684**
KRONOS	CORAIL	640									**640**
EXETER X3 RIMFIT	CORAIL	306	129	54	24	21	11	5	13	23	**586**
REFLECTION CEM. ALL POLY	HACTIV	476									**476**
REFLECTION CEM. ALL POLY	FILLER	261		2							**263**
AVANTAGE	CORAIL	116	12	14	20	10	7	12	24	16	**231**
IP	CORAIL	206	5	1	3	4				2	**221**
EXETER	CORAIL	174									**174**
EXETER	ABG II	173									**173**
REFLECTION CEM. ALL POLY	TAPERLOC	162									**162**
EXETER X3 RIMFIT	ABG II	148									**148**
EXETER X3 RIMFIT	FILLER	105	25	7		2					**139**
CHARNLEY	CORAIL	118									**118**
MARATHON	KAR/Corail Revision	52	15	10	8	6	3	2	5	1	**102**
ELITE	SCP/UNIQUE	99									**99**
Other	Other	1 264	104	84	51	66	57	49	72	67	**1 814**

Acetabular cups in primary operations

Table 19: (The 45 most common)

Cup	1987-13	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
CHARNLEY	43 169	40										**43 209**
MARATHON	10 799	3 193	3 045	3 000	2 762	2 495	2 331	1 555	1 387	1 323	878	**32 768**
TRIDENT	446	347	441	548	546	783	1 626	2 301	2 932	3 540	4 005	**17 515**
PINNACLE	1 727	331	398	519	1 286	1 810	1 949	1 906	2 227	2 517	2 838	**17 508**
REFLECTION CEM. ALL POLY	14 031	53	36	33	34	8	17	15	10	20	12	**14 269**
EXETER	13 518	1										**13 519**
EXETER X3 RIMFIT	3 289	1 363	1 571	1 635	1 178	1 185	1 099	648	547	515	424	**13 454**
REFLECTION UNCEMENTED	5 496	968	798	435	520	834	452	495	349	13	2	**10 362**
TITAN	8 816											**8 816**
IP	6 236	286	315	267	220	211	228	160	183	218	181	**8 505**
TRILOGY	4 943	509	517	582	576	374	468	196	87	114	97	**8 463**
ELITE	7 754	95	5	2								**7 856**
R3	236	84	308	829	885	808	692	523	698	996	1 240	**7 299**
CONTEMPORARY	5 443	58	15	3	1		3	4				**5 527**
IGLOO	3 125	175	124	169	110	121	136	74	57	39	29	**4 159**
TROPIC	3 823											**3 823**
SPECTRON	3 652											**3 652**
AVANTAGE	773	119	98	158	190	182	223	191	223	232	248	**2 637**
LUBINUS	157	169	253	213	215	205	230	230	279	185	155	**2 291**
KRONOS	2 193											**2 193**
DURALOC	1 983											**1 983**
POLARCUP	193	66	64	49	91	99	183	185	192	219	195	**1 536**
ATOLL	1 491											**1 491**
Continuum Acetabular System		194	320	348	98	50	60	83	89	75	49	**1 366**
BICON-PLUS	1 211	1	1									**1 213**
ZCA	1 063											**1 063**
EXCEED ABT CEMENTED SYS	28	19	32	23	206	274	179	42	75	38	4	**920**
MODULAR HIP SYSTEM	878											**878**
MORSCHER	843											**843**
WEBER ALLO PRO	830											**830**
ENDLER	662											**662**
G7 MDM								2	48	303	231	**584**
BIRMINGHAM HIP RESURFACI	522											**522**
GEMINI	510											**510**
OPERA	457											**457**
TRABECULAR METAL	43	33	35	54	41	44	57	34	34	24	20	**419**
EUROPEAN CUP SYSTEM	332											**332**
TI-FIT	312											**312**
PEARL	287											**287**
PLASMACUP	283											**283**
LMT (Uncemented)	275											**275**
HARRIS/GALANTE	252											**252**
PE-PLUS	247											**247**
MÜLLER TYPE	242											**242**
ABG II	236											**236**
Other	2 517	26	65	81	204	121	106	74	94	101	192	**3 581**

Acetabular cups in revisions

Table 20: (The 45 most common)

Cup	1987-13	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
CHARNLEY	2 864				1							**2 865**
AVANTAGE	1 225	85	86	76	90	97	91	118	88	114	112	**2 182**
TRIDENT	153	44	94	88	111	169	228	268	260	308	301	**2 024**
TROPIC	1 885											**1 885**
TRABECULAR METAL	486	214	160	204	158	153	155	111	85	56	66	**1 848**
PINNACLE	663	117	97	111	115	134	114	119	84	57	85	**1 696**
TRILOGY	1 328	56	65	59	46	42	24	29	21	9	14	**1 693**
ELITE	1 594	6										**1 600**
POLARCUP	305	113	132	118	129	111	123	89	99	92	92	**1 403**
MARATHON	639	66	94	66	60	46	45	35	24	15	18	**1 108**
EXETER	943					1						**944**
REFLECTION CEM. ALL POLY	906	3	4	2				1				**916**
REFLECTION UNCEMENTED	399	83	74	35	41	28	26	20	23	13	11	**753**
IGLOO	474	15	15	25	18	17	20	4		2		**590**
TITAN	527											**527**
ATOLL	396											**396**
R3	13	6	20	61	79	67	31	27	34	14	20	**372**
IP	255	3	5	3	4	1	1	1	2	4	1	**280**
Continuum Acetabular System		13	51	66	37	37	38	15	7	2	1	**267**
CONTEMPORARY	240											**240**
KRONOS	225											**225**
EXETER X3 RIMFIT	79	25	29	29	9	5	11	6	6	7	13	**219**
CHRISTIANSEN	196											**196**
SPECTRON	189											**189**
DURALOC	125	11	9	2	6	5	7	6	6	4	1	**182**
G7 MDM								3	28	38	45	**114**
OPERA	101											**101**
HARRIS/GALANTE	99											**99**
ZCA	96											**96**
MODULAR HIP SYSTEM	95											**95**
CAPTIV	71			7								**78**
BI-MENTUM									5	27	45	**77**
BICON-PLUS	54		2	1	5	4	5	4			1	**76**
EUROPEAN CUP SYSTEM	73											**73**
LMT (Uncemented)	67											**67**
ENDLER	66											**66**
HG II	53											**53**
MORSCHER	51											**51**
GEMINI	47											**47**
SECURFIT	45											**45**
REGENEREX RINGLOC	40							1				**41**
OCTOPUS	40											**40**
NOVAE								6	12	14	7	**39**
TRIDENT ALL POLY	9	2	2	2	2	1	2		5	4	8	**37**
TI-FIT	36											**36**
Other	457	3	2	5	16	18	17	8	2	8	13	**549**

Femoral stems in primary operations

Table 21: (The 45 most common)

Stem	1987-13	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
CORAIL	28 846	4 712	4 459	4 759	5 031	5 171	5 081	4 432	4 556	4 996	5 312	**77 355**
CHARNLEY	42 487	44										**42 531**
EXETER	23 325	1 651	1 850	1 894	1 553	1 838	1 928	1 475	1 444	1 550	1 277	**39 785**
LUBINUS SP II	5 581	589	780	786	670	682	895	1 073	1 465	1 680	1 885	**16 086**
TITAN	12 188											**12 188**
SPECTRON-EF	10 645	10	3	1	2	6	6	10	4	7	15	**10 709**
FILLER	3 660	328	262	287	245	235	196	94	70	1		**5 378**
C-STEM	541	2	76	203	250	360	585	643	766	806	858	**5 090**
MS-30	1 876		17	21	144	227	320	329	459	638	549	**4 580**
ITH	3 723											**3 723**
CHARNLEY MODULAR	2 441	261	154	46	28		2	13				**2 945**
ACCOLADE II	110	137	314	342	266	305	325	262	312	165	173	**2 711**
POLARSTEM	315	103	110	97	111	112	169	219	253	460	559	**2 508**
HACTIV	1 425	9	150	281	242	204	134					**2 445**
CPT	1 114	2	1	2	440	262	175	1			1	**1 998**
BIO-FIT	1 993											**1 993**
SCP/UNIQUE	1 334	36	28	35	11		1	1	1			**1 447**
ZWEYMÜLLER	1 102											**1 102**
ELITE	1 030											**1 030**
OMNIFIT	890											**890**
PROFILE	890											**890**
ABG II	745	81	23									**849**
TAPERLOC	787											**787**
SP I	780											**780**
FJORD	652											**652**
LUBINUS	624											**624**
SECURFIT	558											**558**
CPS-PLUS	496											**496**
KAR/Corail Revision	202	21	29	42	39	24	37	21	17	20	23	**475**
BICONTACT	443											**443**
LMT (Cemented)	417											**417**
ABG I	304											**304**
FURLONG EVOLUTION		4	19	19	36	32	32	25	41	56	26	**290**
PROFEMUR GLADIATOR	167	4				33	20	11				**235**
TI-FIT	221											**221**
MÜLLER TYPE	213											**213**
FEMORA	182											**182**
BI-METRIC	152	3	7	16	1							**179**
SL-PLUS MIA	177											**177**
RESTORATION	44	9	8	9	2	6	20	18	18	17	19	**170**
HARRIS/GALANTE	169											**169**
PARHOFER	159											**159**
FURLONG		41	16	19	23	18	15			3	14	**149**
KAREY	136											**136**
MÜLLER TYPE V	132											**132**
Other	1 294	52	102	47	22	47	49	42	44	33	49	**1 781**

Femoral stems in revisions

Table 22: (The 45 most common)

Stem	1987-13	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
KAR/Corail Revision	2 539	120	138	103	99	90	106	76	67	57	71	**3 466**
CHARNLEY	2 980	2	1			1						**2 984**
EXETER	1 835	63	77	78	68	84	84	91	95	98	98	**2 671**
CORAIL	1 468	40	51	66	57	50	45	40	42	45	64	**1 968**
RESTORATION	343	63	70	55	36	73	51	62	52	51	44	**900**
CPT	483	5	7	6	23	18	9	1	8	2	5	**567**
TITAN	538											**538**
LUBINUS SP II	183	30	16	9	17	30	28	34	34	43	53	**477**
FJORD	476											**476**
FILLER	350	16	10	19	19	16	19	6	10	2	5	**472**
TTHR	293	37	21	24	24	16	19	6	7		1	**448**
ARCOS	16	17	27	32	42	41	26	51	54	61	44	**411**
SPECTRON-EF	367	3	3	2	1		2	3		5	3	**389**
ELITE	352											**352**
REEF	327											**327**
REVITAN	41	20	36	31	38	33	34	15	14	10	11	**283**
MP RECONSTRUCTION	119	18	17	12	14	14	10	10	6	17	18	**255**
Securus	7	15	11	19	20	21	38	34	20	16	10	**211**
C-STEM	13	1	3	12	11	14	19	26	24	31	52	**206**
ANATOMIC BR	192											**192**
ITH	192											**192**
REACTIV	60	19	13	27	14	9	13	2	3	2	6	**168**
BIO-FIT	167											**167**
HACTIV	110		13	9	10	8	7					**157**
BI-METRIC	134	1		2	2							**139**
PRIUS		2	11	17	8	22	9	6	9	23	20	**127**
TAPERLOC	115											**115**
RECLAIM	14	9	12	12	6	10	5	10	3	16	7	**104**
MS-30	34			2	4	4	4	9	9	11	7	**84**
ZWEYMÜLLER	83											**83**
Profemur	72	5										**77**
ECHELON	68											**68**
SP I	66											**66**
SCAN HIP	59											**59**
LUBINUS	51											**51**
HARRIS/GALANTE	44											**44**
CHARNLEY MODULAR	31	3	3	5	1							**43**
FEMORA	43											**43**
PARHOFER	43											**43**
MRP-TITAN					6	18	12	2	1	1	1	**41**
PROFEMUR GLADIATOR	36	3										**39**
AURA	38											**38**
LANDOS (Reconstruction)	33											**33**
POLARSTEM	11			1	4	1	4	3	5	1	3	**33**
MÜLLER TYPE	32											**32**
Other	344	2	12	5	6	1	4	6	10	7	5	**402**

The 7 most common primary prostheses in last 5 years

Table 23a: Acetabular cup

2019	2020	2021	2022	2023
MARATHON (2 331)	TRIDENT (2 301)	TRIDENT (2 932)	TRIDENT (3 540)	TRIDENT (4 005)
PINNACLE (1 949)	PINNACLE (1 906)	PINNACLE (2 227)	PINNACLE (2 517)	PINNACLE (2 838)
TRIDENT (1 626)	MARATHON (1 555)	MARATHON (1 387)	MARATHON (1 323)	R3 (1 240)
EXETER X3 RIMFIT (1 099)	EXETER X3 RIMFIT (648)	R3 (698)	R3 (996)	MARATHON (878)
R3 (692)	R3 (523)	EXETER X3 RIMFIT (547)	EXETER X3 RIMFIT (515)	EXETER X3 RIMFIT (424)
TRILOGY (468)	REFLECTION * (495)	REFLECTION * (349)	G7 MDM (303)	AVANTAGE (248)
REFLECTION * (452)	LUBINUS (230)	LUBINUS (279)	AVANTAGE (232)	G7 MDM (231)

Table 23b: Femoral stem

2019	2020	2021	2022	2023
CORAIL (5 081)	CORAIL (4 432)	CORAIL (4 556)	CORAIL (4 996)	CORAIL (5 312)
EXETER (1 928)	EXETER (1 475)	LUBINUS SP II (1 465)	LUBINUS SP II (1 680)	LUBINUS SP II (1 885)
LUBINUS SP II (895)	LUBINUS SP II (1 073)	EXETER (1 444)	EXETER (1 550)	EXETER (1 277)
C-STEM (585)	C-STEM (643)	C-STEM (766)	C-STEM (806)	C-STEM (858)
ACCOLADE II (325)	MS-30 (329)	MS-30 (459)	MS-30 (638)	POLARSTEM (559)
MS-30 (320)	ACCOLADE II (262)	ACCOLADE II (312)	POLARSTEM (460)	MS-30 (549)
FILLER (196)	POLARSTEM (219)	POLARSTEM (253)	ACCOLADE II (165)	ACCOLADE II (173)

Table 23c: Combinations of cup and stem

2019	2020	2021	2022	2023
PINNACLE + CORAIL (1 743)	PINNACLE + CORAIL (1 634)	PINNACLE + CORAIL (1 759)	PINNACLE + CORAIL (1 851)	PINNACLE + CORAIL (2 105)
MARATHON + CORAIL (1 511)	TRIDENT + CORAIL (1 068)	TRIDENT + CORAIL (1 303)	TRIDENT + CORAIL (1 686)	TRIDENT + CORAIL (1 962)
EXETER X3 RIMFIT + EXETER (1 009)	MARATHON + CORAIL (801)	TRIDENT + EXETER (662)	TRIDENT + EXETER (763)	TRIDENT + EXETER (733)
TRIDENT + CORAIL (660)	EXETER X3 RIMFIT + EXETER (633)	MARATHON + CORAIL (647)	MARATHON + CORAIL (606)	TRIDENT + LUBINUS SP II (537)
R3 + CORAIL (464)	TRIDENT + EXETER (558)	EXETER X3 RIMFIT + EXETER (538)	EXETER X3 RIMFIT + EXETER (449)	R3 + CORAIL (478)
TRIDENT + EXETER (460)	R3 + CORAIL (334)	R3 + CORAIL (382)	R3 + CORAIL (430)	R3 + POLARSTEM (467)
TRILOGY + CORAIL (329)	REFLECTION * + CORAIL (277)	TRIDENT + LUBINUS SP II (315)	TRIDENT + LUBINUS SP II (399)	PINNACLE + C-STEM (393)

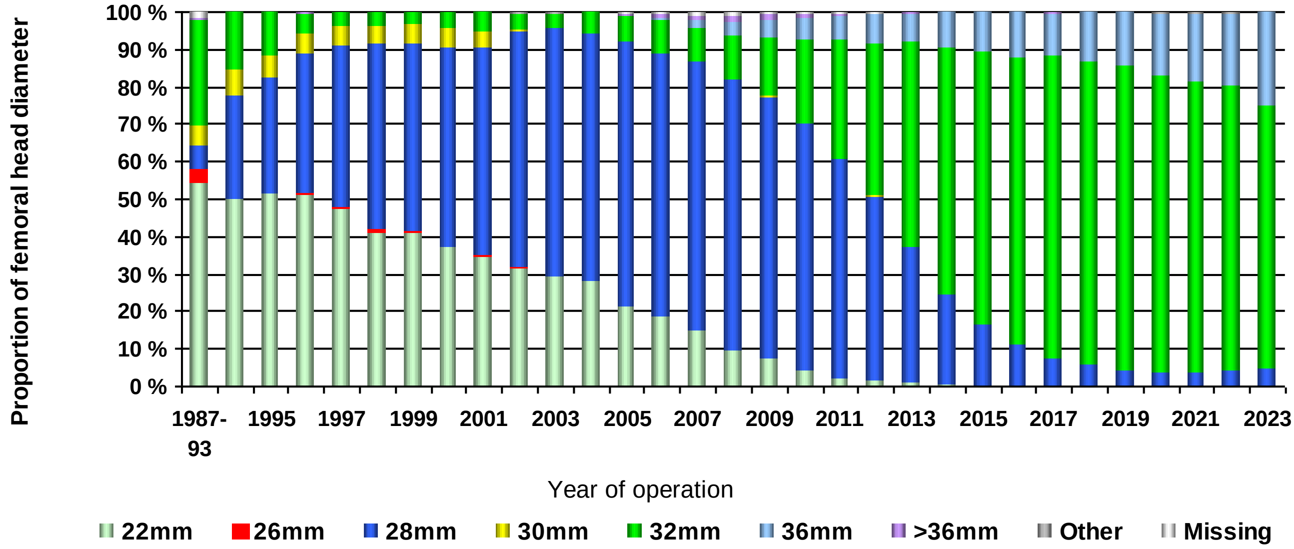
* UNCEMENTED
**' MODULAR

Femoral head diameter (No dual mobility has been taken).

Table 24: In primary operations and revisions

Year	22 mm	26 mm	28 mm	30 mm	32 mm	36 mm	>36 mm	Other	Missing	Total
2023	25		445		7 347	2 558	1	2	17	**10 395**
2022	16		417		7 710	1 962	3	23	19	**10 150**
2021	11		318		7 329	1 723	4	10	17	**9 412**
2020	16		292		7 044	1 489	7	12	18	**8 878**
2019	23		442	2	8 450	1 471	11		6	**10 405**
2018	13		585		8 223	1 363	6	4	10	**10 204**
2017	7		720		7 873	1 137	9	2	17	**9 765**
2016	9		1 084	1	7 375	1 188	1	2	14	**9 674**
2015	22		1 508		6 748	948	5	2	8	**9 241**
2014	57		2 094	1	5 866	808	4	3	10	**8 843**
2013	83	2	3 224	1	4 852	677	3	5	18	**8 865**
2012	148		4 214	3	3 503	671	25	4	24	**8 592**
2011	158		4 783		2 610	522	52	1	22	**8 148**
2010	348		5 347	3	1 833	490	82	1	27	**8 131**
2009	598	2	5 529	4	1 242	386	115	1	47	**7 924**
2008	732	2	5 495	2	882	281	134	2	62	**7 592**
2007	1 081		5 316	2	665	148	112	2	62	**7 388**
2006	1 287	6	4 908	3	639	58	60	5	33	**6 999**
2005	1 563	9	5 171		522	4	41	2	24	**7 336**
2004	1 931	26	4 527	7	393		4	3	5	**6 896**
2003	2 257	24	5 121	13	309		1	10	14	**7 749**
2002	2 173	16	4 317	62	275		2	22	13	**6 880**
2001	2 385	18	3 811	317	344		1	3	11	**6 890**
2000	2 392	6	3 426	347	269			3	7	**6 450**
1999	2 546	26	3 105	337	198			2	6	**6 220**
1998	2 507	66	3 038	306	225				1	**6 143**
1997	2 860	24	2 627	297	226		6	1	7	**6 048**
1996	2 863	7	2 102	287	306	1	15		4	**5 585**
1995	3 014	4	1 821	342	673		7		5	**5 866**
1994	2 639	13	1 474	359	807		5		6	**5 303**
1987-93	16 959	1 113	1 955	1 725	8 869	1	86		503	**31 211**
Total	**50 723**	**1 364**	**89 216**	**4 421**	**103 607**	**17 886**	**802**	**127**	**1 037**	**269 183**

Figure 11: In primary operations and revisions



Dual Mobility articulation

Table 25 In primary operation

Prosthesis	1987-15	2016	2017	2018	2019	2020	2021	2022	2023	Total
AVANTAGE	991	158	191	182	223	191	222	213	244	**2 615**
TRIDENT MDM	53	22	35	49	96	177	263	408	478	**1 581**
POLARCUP	323	49	91	98	183	186	192	204	189	**1 515**
G7						2	48	303	231	**584**
NOVAE						10	25	28	55	**118**
BI-MENTUM							3	34	77	**114**
ACE					23			29	39	**91**
Restoration Anatomic Cup	5	5	4	1	4		4	5	1	**29**
CAPTIV		19								**19**
Other (n<5)	2									**2**
Total	**1 374**	**253**	**321**	**330**	**529**	**566**	**757**	**1 224**	**1 314**	**6 668**

Table 26 In revisions

Prosthesis	1987-15	2016	2017	2018	2019	2020	2021	2022	2023	Total
AVANTAGE	1 454	92	121	108	107	136	104	135	136	**2 393**
POLARCUP	587	129	141	123	129	100	104	106	122	**1 541**
TRIDENT MDM	93	33	44	90	137	195	199	230	242	**1 263**
G7						3	28	39	46	**116**
Restoration Anatomic Cup	37	17	28	11	4		3	11	1	**112**
BI-MENTUM							5	27	45	**77**
NOVAE						6	12	14	7	**39**
CAPTIV		10								**10**
GYROS	10									**10**
ACE					1			2	2	**5**
Other (n<5)			1	1						**2**
Total	**2 181**	**281**	**335**	**333**	**378**	**440**	**455**	**564**	**601**	**5 568**

ASA classification

Figure 12: Primary operations

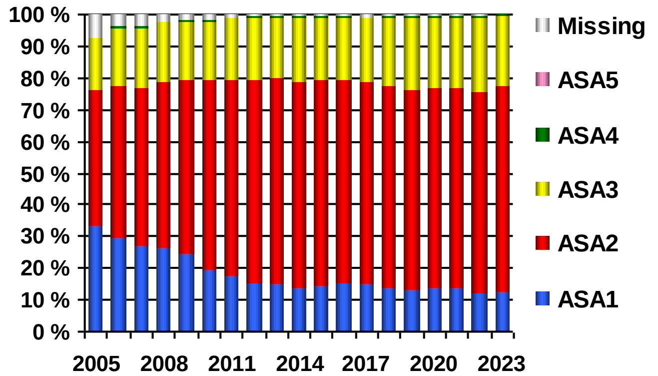
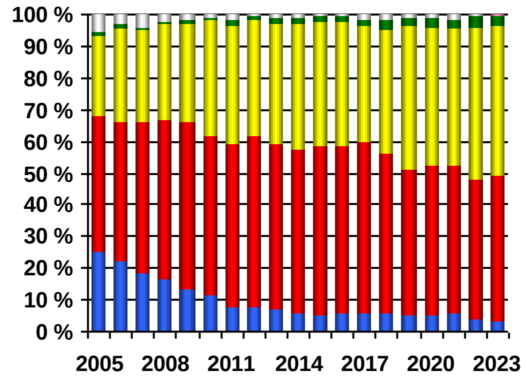


Figure 13: Revisions



ASA 1 = Healthy patients who smoke less than 5 cigarettes a day.
ASA 2 = Patients with an asymptomatic condition who are kept under medical control (f.ex. hypertension), or with diet (f. ex. diabetes mellitus type 2), and otherwise healthy patients who smoke five cigarettes or more daily.
ASA 3 = Patients having a condition that can cause symptoms. However, patients are kept under medical control (f. ex. moderate angina pectoris and mild asthma).
ASA 4 = Patients with a condition that is out of control (f. ex. heart failure and asthma).
ASA 5 = A moribund patient who is not expected to survive the operation.

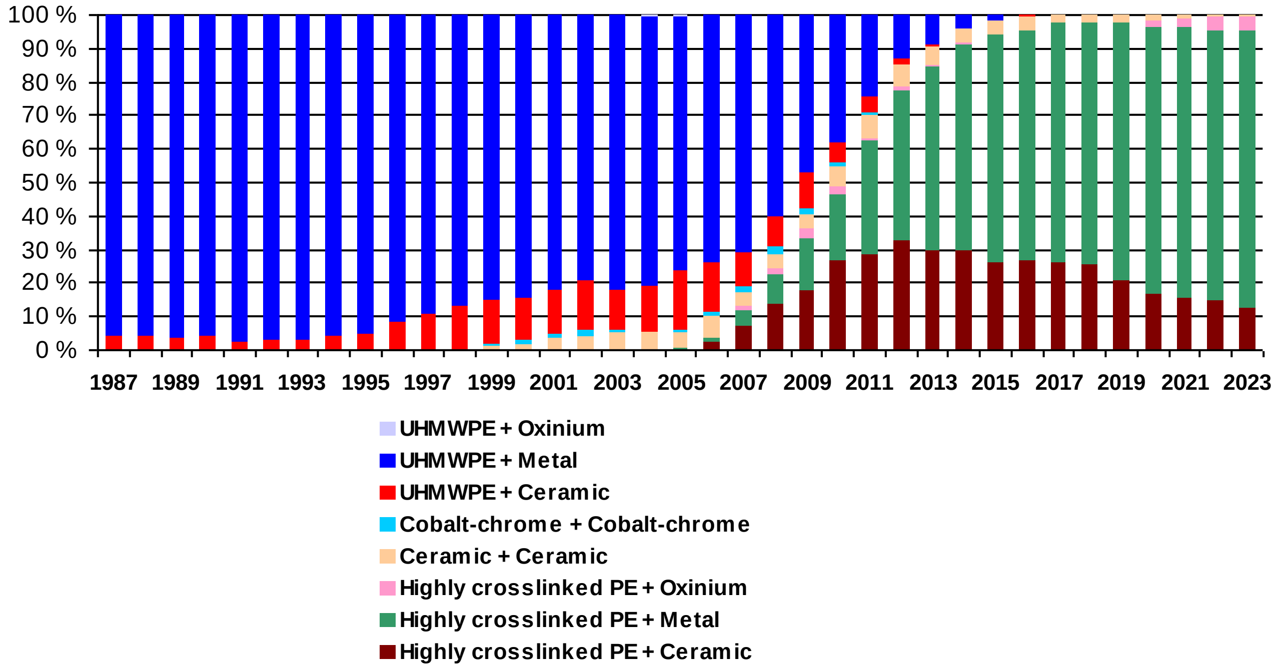
Registration of ASA classification started in 2005

Articulations (except dual mobility)

Table 27: In primary operations - All patients

Cup + Femoral head	1987-15	2016	2017	2018	2019	2020	2021	2022	2023	Total
Highly crosslinked PE + Cobalt-chrome	20 131	5 229	5 774	6 195	6 849	6 194	6 759	7 045	7 585	71 761
UHMWPE + Steel	71 308	0	0	0	0	0	0	0	0	71 308
UHMWPE + Cobalt-chrome	33 738	25	13	8	21	18	2	2	1	33 828
Highly crosslinked PE + Alumina	12 701	1 424	860	696	291	149	136	76	58	16 391
Highly crosslinked PE + Alumina/Zirconium[1]	3 306	904	1 423	1 688	1 656	1 207	1 220	1 312	1 110	13 826
UHMWPE + Alumina	10 916	2	0	0	0	0	0	0	0	10 918
Highly crosslinked PE + Steel	3 888	682	493	427	422	266	262	310	239	6 989
Alumina + Alumina	3 790	0	1	0	0	0	0	0	0	3 791
Alumina/Zirconium + Alumina/Zirconium[1]	1 545	372	218	205	193	118	122	44	30	2 847
Highly crosslinked PE + Oxinium	769	2	2	2	21	161	211	377	419	1 964
UHMWPE + Titanium	1 908	0	0	0	0	0	0	0	0	1 908
UHMWPE + Zirconium	1 402	0	0	0	0	0	0	0	0	1 402
Cobalt-chrome + Cobalt-chrome	1 045	0	0	0	0	0	0	0	0	1 045
UHMWPE + Alumina/Zirconium[1]	346	0	0	0	0	0	0	0	0	346
Titanium + Alumina	149	2	1	0	0	0	0	0	0	152
Highly crosslinked PE + Titanium	83	0	0	0	0	0	0	0	0	83
UHMWPE + Oxinium	77	0	0	0	0	0	0	0	0	77
Titanium + Alumina/Zirconium[1]	31	5	5	1	4	1	0	2	1	50
Missing	3 412	44	52	45	23	31	24	33	28	3 692
Other (n<50)	173	2	2	2	3	1	3	3	0	189
Total	**170 718**	**8 693**	**8 844**	**9 269**	**9 483**	**8 146**	**8 739**	**9 204**	**9 471**	**242 567**

Figure 14: In primary operations



[1]Alumina/Zirconium = Aluminum oxide and zirconium oxide composite.

Periprosthetic femur fractures (Vancouver Classification)

Table 28: Vancouver classification for periprosthetic femoral stem fractures operated with or without replacement of the prosthesis - including osteosynthesis

	With replacement of the prosthesis					Without replacement of the prosthesis					
	Type A	Type B1	Type B2	Type B3	Type C	Type A	Type B1	Type B2	Type B3	Type C	Missing
2023	16	5	93	31	7	23	34	15	4	14	12
2022	21	8	86	50	6	14	47	23	2	24	33
2021	6	5	65	23	5	14	38	16	2	12	31
2020	7	9	62	28	2	14	25	16	7	8	43
2019	12	10	67	39	1	11	31	10	5	11	30
2018	12	7	71	25	4	10	22	14	2	6	44
2017	14	7	48	25	1	8	15	2	3	5	50
2016	17	1	24	23		7	11	6		4	70
2015			1			1					143

Thrombosis prophylaxis

Figure 15: Primary operations

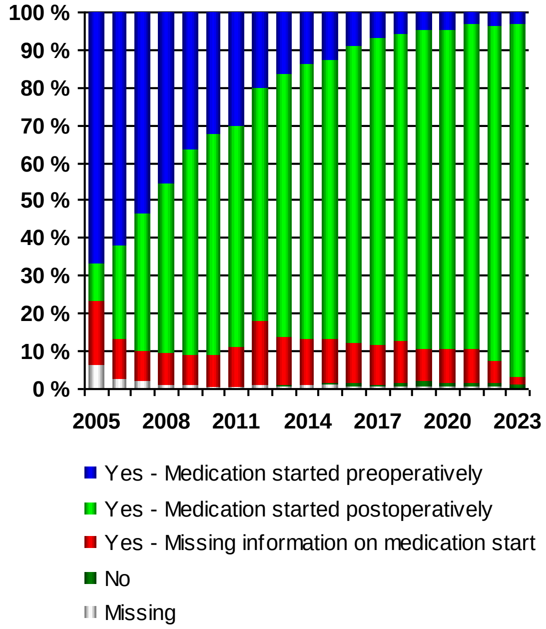
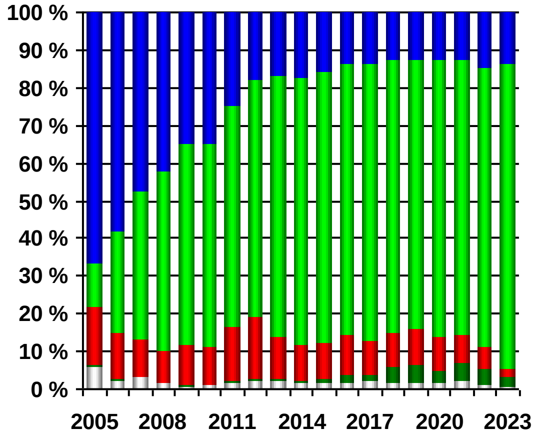


Figure 16: Revisions



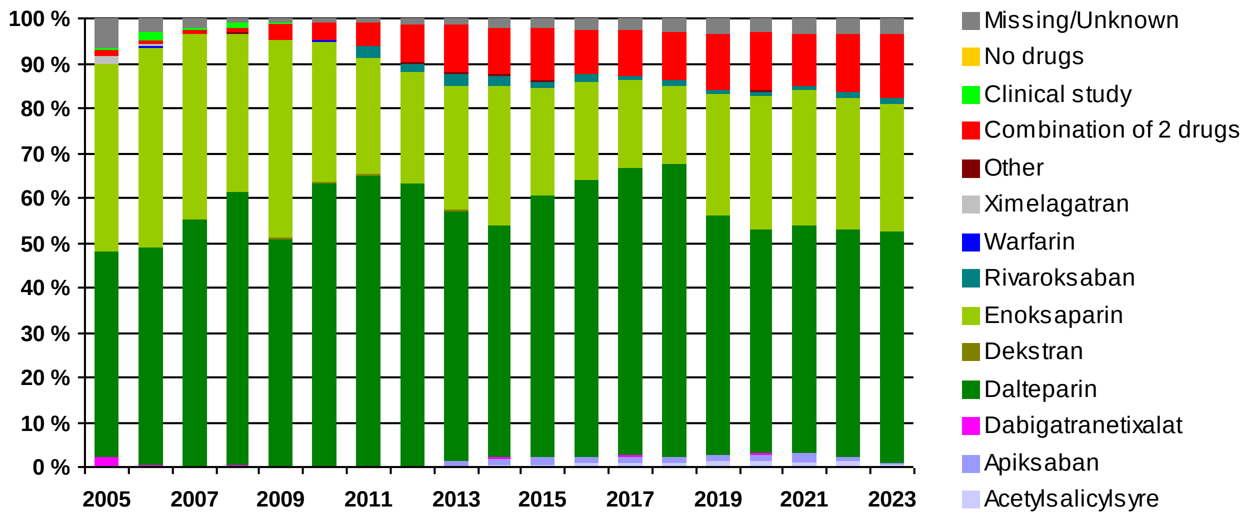
Registration of thrombosis prophylaxis started in 2005

Thrombosis prophylaxis

Table 29: All operations

Drugs	2005-13	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Acetylsalicylsyre (Albyl-E, Globoid, Acetyratio, Magnyl E)		0,4 %	0,6 %	0,8 %	0,8 %	1,0 %	1,1 %	1,1 %	1,1 %	1,4 %	0,7 %
Apiksaban (Eliquis)	0,2 %	1,5 %	1,5 %	1,5 %	1,6 %	1,4 %	1,3 %	1,8 %	1,9 %	0,7 %	0,4 %
Dabigatranetixalat (Re-Novate, Pradaxa)	0,3 %	0,1 %	0,1 %								
Dalteparin (Fragmin)	56,8 %	51,6 %	58,4 %	61,6 %	64,1 %	64,9 %	53,7 %	50,1 %	50,9 %	51,0 %	51,3 %
Dekstran (Macrodex, Dextran)	0,1 %	0,1 %									
Enoksaparin (Klexane)	34,6 %	31,4 %	24,1 %	22,0 %	19,6 %	17,6 %	26,8 %	29,7 %	29,9 %	29,2 %	28,4 %
Rivaroksaban (Xarelto)	0,9 %	2,2 %	1,5 %	1,5 %	1,1 %	1,1 %	1,0 %	0,9 %	0,9 %	1,2 %	1,3 %
Warfarin (Marevan)	0,1 %		0,1 %								
Ximelagatran (Exanta, Malagatran)	0,3 %										
Other		0,1 %						0,1 %	0,1 %	0,1 %	
Combination of 2 drugs	4,2 %	10,6 %	11,5 %	10,0 %	10,2 %	10,9 %	12,5 %	13,0 %	11,6 %	12,7 %	14,2 %
Clinical study	0,5 %										
No drugs											
Missing/Unknown	1,9 %	2,0 %	2,2 %	2,6 %	2,5 %	2,9 %	3,4 %	3,2 %	3,5 %	3,6 %	3,7 %
Total	**74 875**	**9 455**	**9 878**	**10 467**	**10 690**	**11 183**	**11 570**	**10 119**	**10 847**	**11 900**	**12 333**

Figure 17: Drugs - All operations



Registration of thrombosis prophylaxis started in 2005

Thrombosis prophylaxis

Table 30: Duration - All operations

Year	Days: 1-7	8-14	15-21	22-28	29-35	>35	No drugs	Missing	Total
2023	3 927	5 297	852	6	1 055	29	0	1 167	12 333
2022	3 136	4 805	872	14	1 136	18	0	1 919	11 900
2021	2 610	4 612	783	21	950	16	0	1 855	10 847
2020	2 534	3 997	767	42	1 115	13	1	1 650	10 119
2019	2 658	4 473	919	118	1 411	14	0	1 977	11 570
2018	2 173	4 029	1 026	176	1 860	19	0	1 900	11 183
2017	1 457	3 927	1 003	542	1 911	25	0	1 825	10 690
2016	1 427	3 483	1 114	732	2 046	22	0	1 643	10 467
2015	1 440	2 882	725	943	2 338	26	0	1 524	9 878
2014	1 402	2 277	578	904	2 944	45	0	1 305	9 455
2013	1 432	1 408	598	1 481	3 231	63	0	1 254	9 467
2012	1 163	1 594	702	1 496	3 088	34	0	1 096	9 173
2011	699	1 745	693	1 397	3 197	40	1	885	8 657
2010	758	2 173	636	1 079	3 155	44	2	744	8 591
2005-09	4 578	11 276	4 980	2 513	10 002	547	17	5 074	38 987

Registration of thrombosis prophylaxis started in 2005

Table 31: Use of drain in all operations

Year	Yes	No	Missing	Total
2023	71	8 673	1 020	**9 764**
2022	49	4 061	312	**4 422**
2021	3	422	20	**445**
Total	**123**	**13 156**	**1 352**	**14 631**

Registration started during 2021

Table 32: Joint gap in primary operation (mm)

Year	0 mm	1 mm	2 mm	> 2 mm	Missing	Total
2023	3 755	2 244	1 006	637	1 033	**8 675**
2022	1 594	868	417	323	651	**3 853**
2021	91	72	23	30	181	**397**
Total	**5 440**	**3 184**	**1 446**	**990**	**1 865**	**12 925**

Electronic registration started during 2021

Table 33: Suture technique in all operations

Year	Continuous skin suture	Single skin suture	Intracutaneous skin suture	Clip	Glue	Other	Total
2023	4 020	901	2 445	2 230	836	39	**10 471**
2022	2 124	729	1 179	472	59	1	**4 564**
2021	71	96	198	7	0	0	**372**
Total	**6 215**	**1 726**	**3 822**	**2 709**	**895**	**40**	**15 407**

Electronic registration started during 2021. More than one suture technique is possible.

Figure 18: Suture technique in all operations

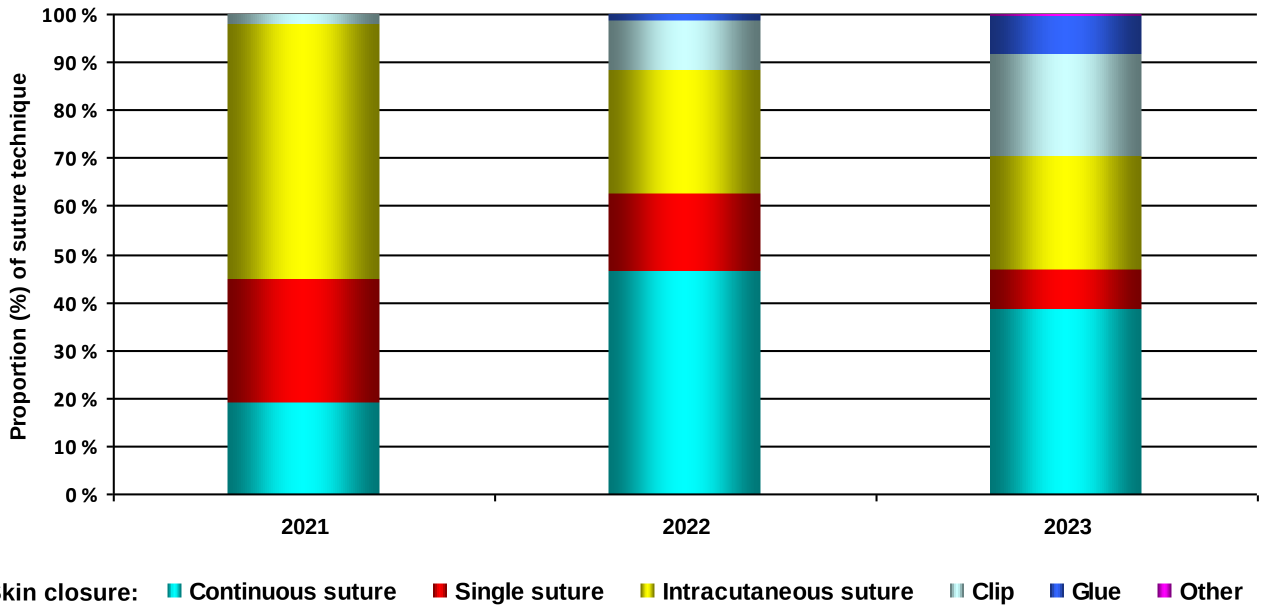
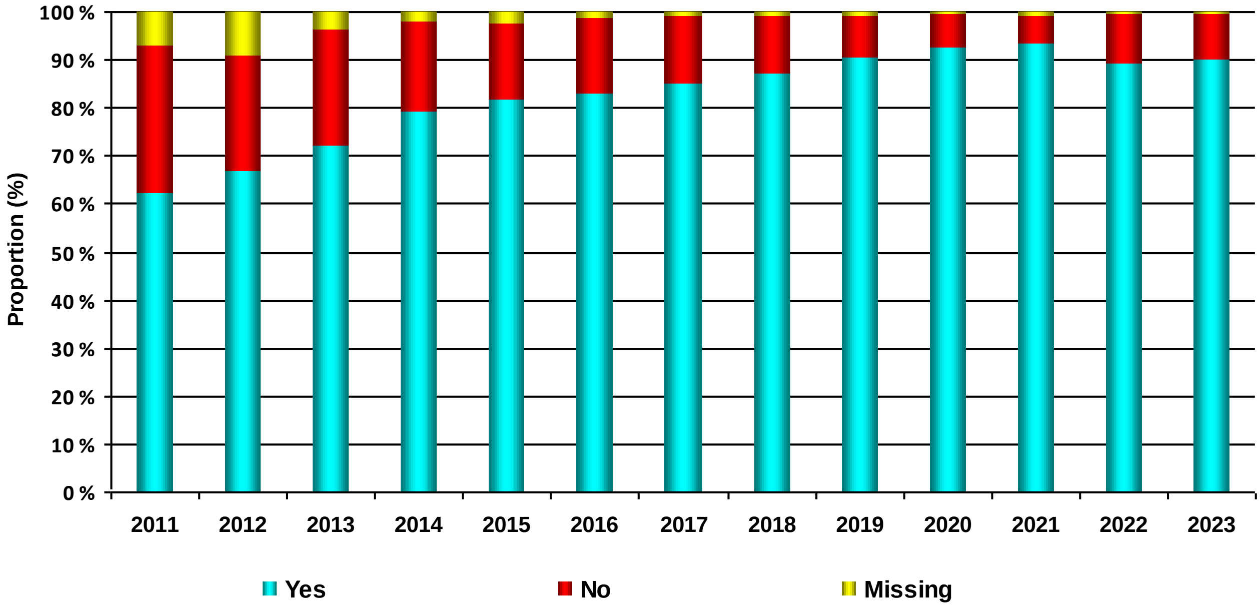


Table 34: Fibrinolysis inhibitor in all operations

Year	Yes	No	Unknown/Missing	Total
2023	10 941	1 171	29	**12 141**
2022	10 272	1 173	62	**11 507**
2021	10 035	625	87	**10 747**
2020	9 301	695	53	**10 049**
2019	10 407	1 030	74	**11 511**
2018	9 698	1 312	113	**11 123**
2017	9 063	1 495	79	**10 637**
2016	8 654	1 645	118	**10 417**
2015	8 036	1 566	251	**9 853**
2014	7 461	1 749	214	**9 424**
2013	6 806	2 249	371	**9 426**
2012	6 128	2 198	828	**9 154**
2011	2 623	1 303	299	**4 225**
Total	**109 425**	**18 211**	**2 578**	**130 214**

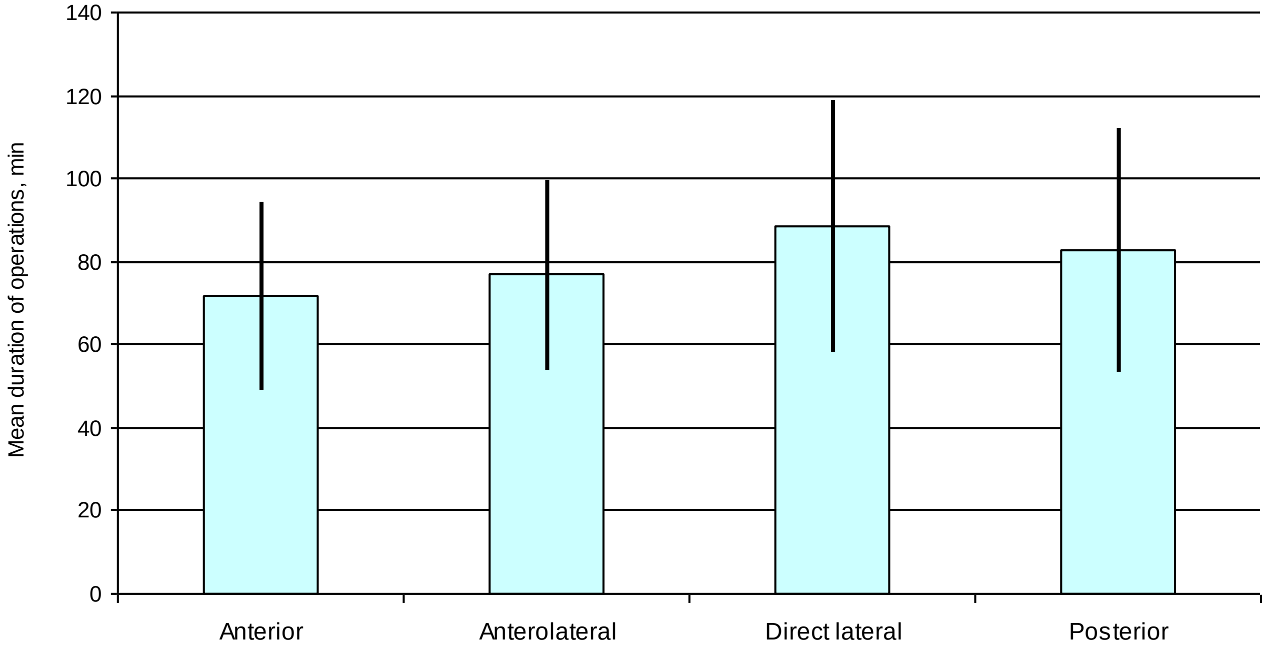
Registration started during 2011

Figure 19: Fibrinolysis inhibitor in all operations



Duration of surgery (for the last 10 years)

Figure 20: Duration of surgery for the different types of surgical approaches (primary operation)



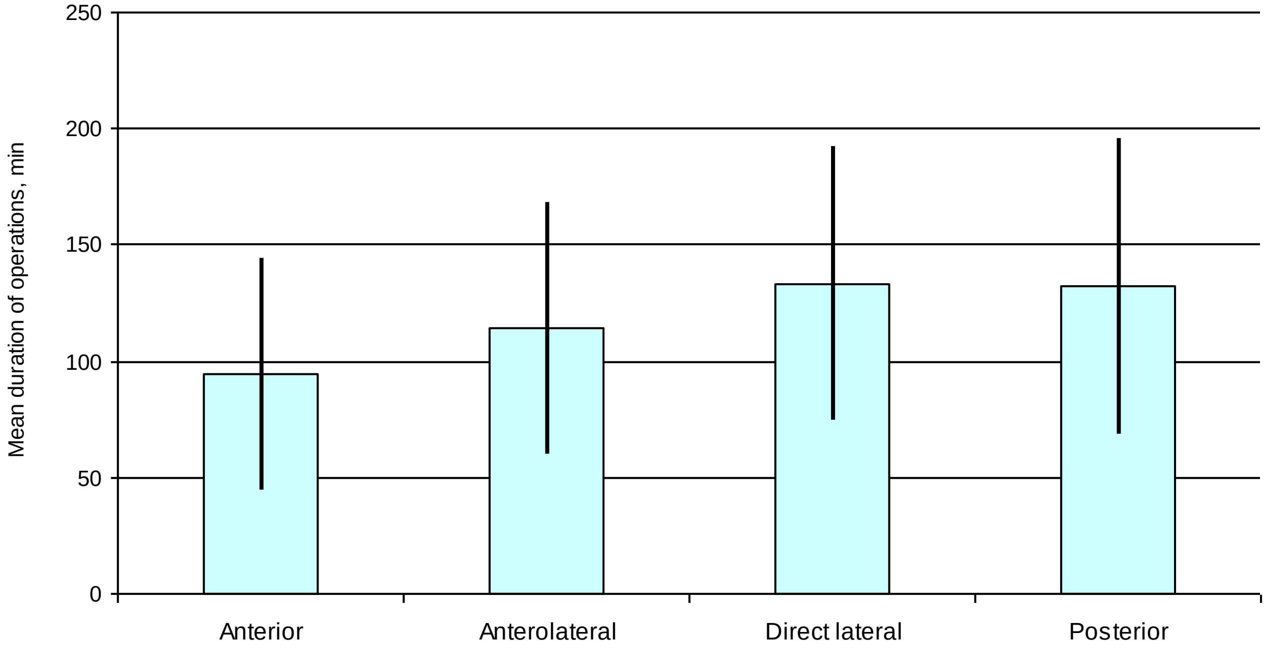
The vertical bars indicate the mean duration ± a standard deviation.

Table 35: Duration of surgery for the different types of surgical approaches (primary operation)

Surgical approach	Total	Mean duration of operations (minutes)	Standard deviation
Anterior	7 476	72	23
Anterolateral	13 917	77	23
Direct lateral	12 566	89	30
Posterior	62 765	83	29

Duration of surgery (for the last 10 years)

Figure 21: Duration of surgery for the different types of surgical approaches (reoperation)



The vertical bars indicate the mean duration ± a standard deviation.

Table 36: Duration of surgery for the different types of surgical approaches (reoperation)

Surgical approach	Total	Mean duration of operations (minutes)	Standard deviation
Anterior	270	95	50
Anterolateral	387	114	54
Direct lateral	4 597	134	59
Posterior	8 467	132	63

PROM in the Hip Prosthesis Register

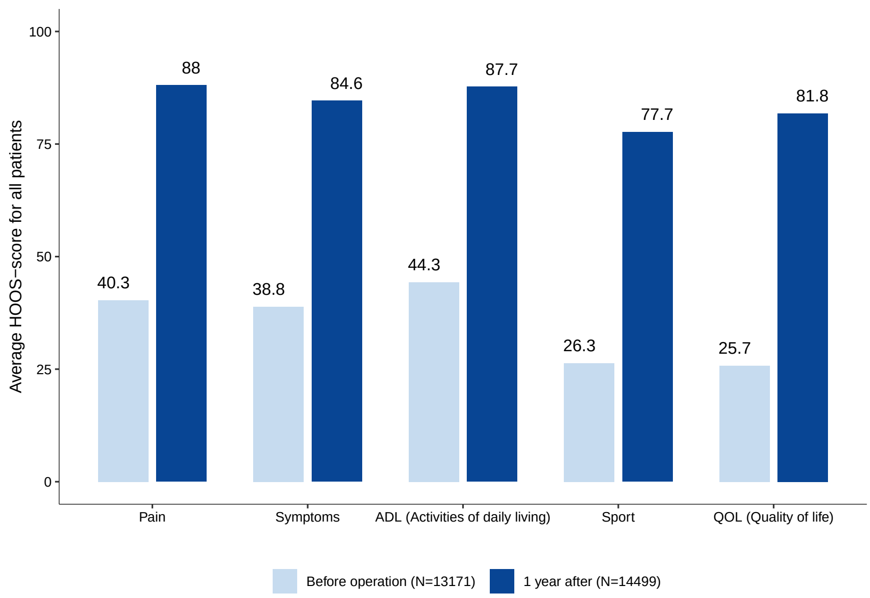
The Hip Prosthesis Register has been collecting electronically patient-reported data (Patient Reported Outcome Measures (PROM)) since 2019. The register aims to place more emphasis on patients' self-perceived quality of life and joint function before and after operation. Patients fill out an electronic questionnaire before operation and at 1, 6, and 10 years after operation. The data we collect from the patients will be compiled with the data reported by the surgeon for the same patient group. This will allow us to focus on function and quality of life in addition to any potential revision of the prosthesis.

13,171 forms have been filled out before primary hip prosthesis operation and 14,499 one year after operation (these are the numbers for all primary operations from 2019 onwards). To date, 48 hospitals have started reporting preoperative PROM forms, but many hospitals have low reporting of preoperative PROM. The goal is to increase this proportion to >80%. A total of 1,145 paper forms have been submitted from 36 hospitals, the rest have been registered digitally. All hospitals will receive their own results in the hospital report. Please feel free to contact our consultant Mikal Solberg at mikal.solberg@helse-bergen.no if you have any questions about electronic registration of PROM.

Patient demographics	Before operation	1 year after
Number of forms (n)	13171	14499
Men (%)	36.7	38.5
Median Age (min-max)	68.7 (16.7-99.1)	68.1 (17.4-95.7)
Body Mass Index mean (SD)	28 (10.2)	27.6 (8.8)
Drinking alcohol n (%)	10053 (76.3)	11378 (78.5)
Smoking n (%)	1081 (8.2)	1197 (8.3)
Diabetes n (%)	491 (3.7)	875 (6)
Education upper secondary school or higher n (%)	6934 (52.6)	7814 (53.9)
Working n (%)	3053 (23.2)	4530 (31.2)
Living alone n (%)	3333 (25.3)	3627 (25)
Activity score UCLA activity* mean (SD)	4.6 (2)	5.9 (2)
State of health** (VAS) mean (SD)	58.8 (44.5)	75.8 (23.7)
Charnley (Category) Class A	9620 (73)	10311 (71)
Charnley (Category) Class B	2643 (20)	2557 (18)
Charnley (Category) Class C	900 (7)	1631 (11)

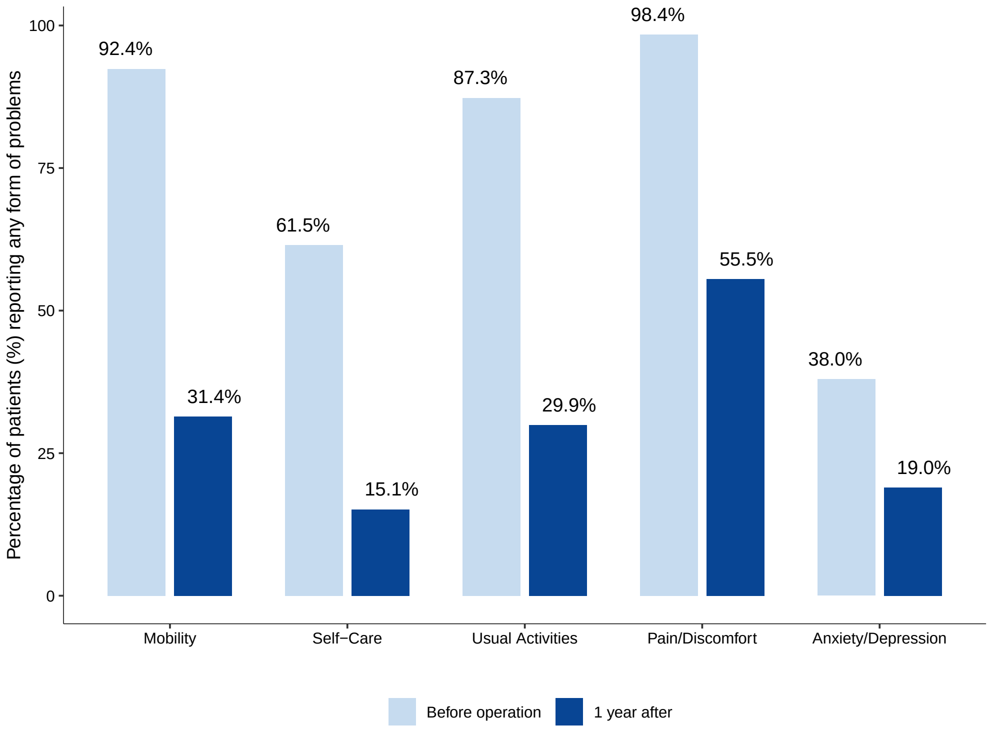
*Best possible score is 10, **100 is the best possible health

Figure A.42 Average HOOS score before/after primary operation*



*100 is the best possible score

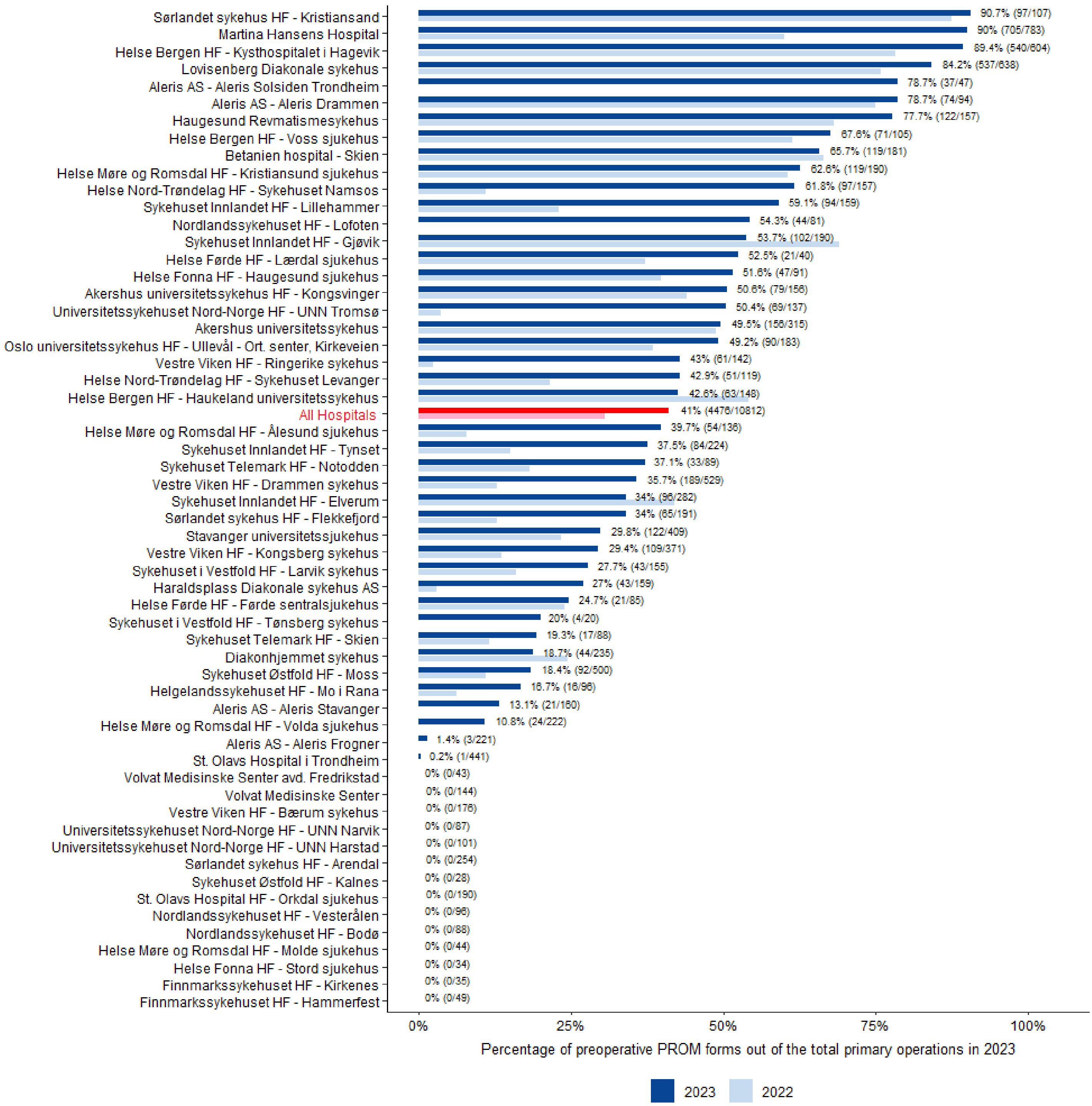
Figur A.43 Proportion of problems reported with mobility, self-care, usual activities, or reporting pain or anxiety before/after primary operation (EQ-5D-5L)



Health Authority	Reporting Hospital (2022)	Number of Preoperative Forms (2022)
Central Norway	4/9	214
Northern Norway	2/9	14
South-Eastern Norway	20/24	1993
Western Norway	9/10	827
Private	2/7	83

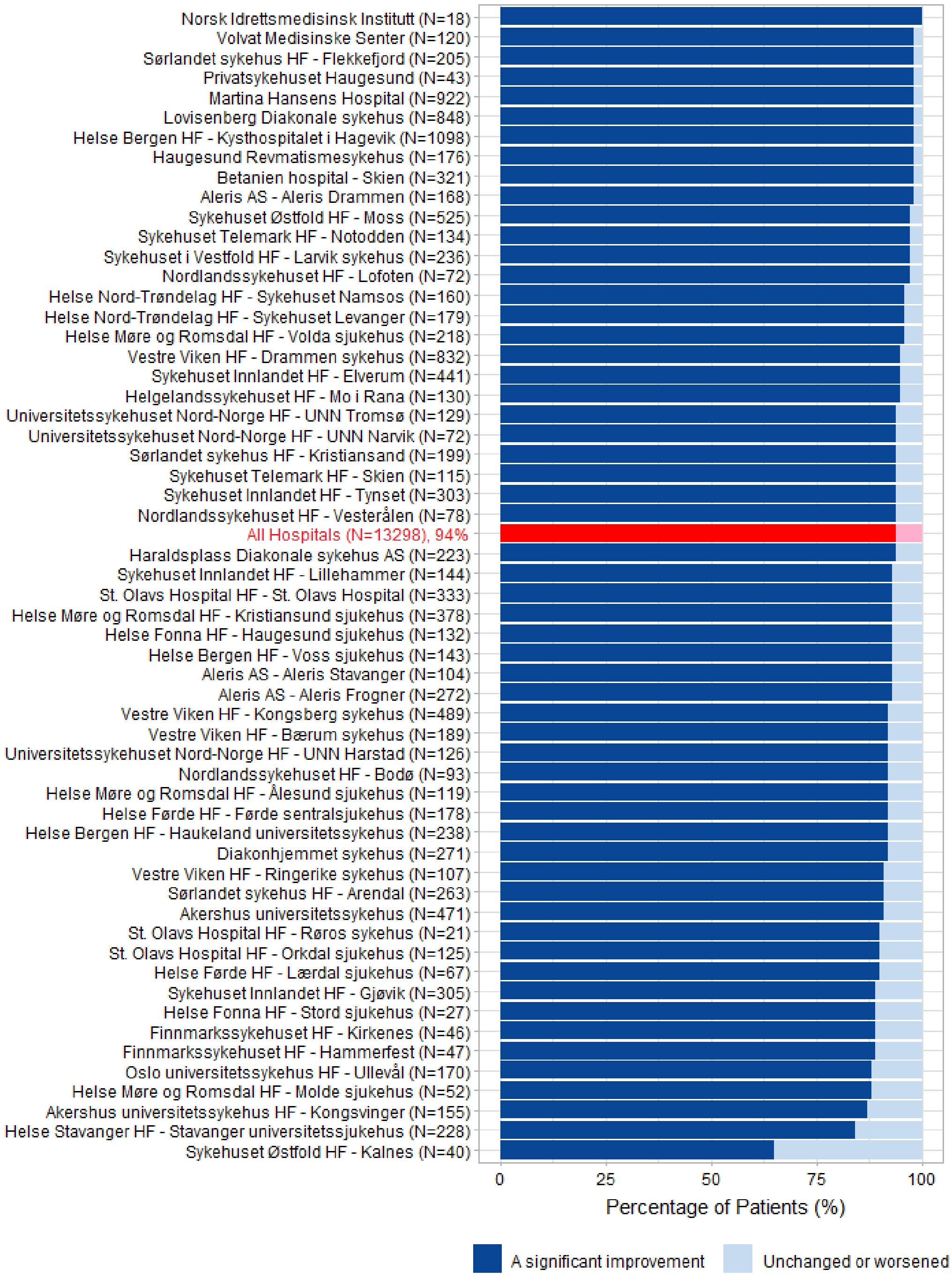
Health Authority	Reporting Hospital (2023)	Number of Preoperative Forms (2023)
Central Norway	6/9	346
Northern Norway	3/9	129
South-Eastern Norway	21/24	2816
Western Norway	9/10	1050
Private	4/7	135

Figure A.44 Proportion of primary hip prosthesis operations where a preoperative PROM form is completed



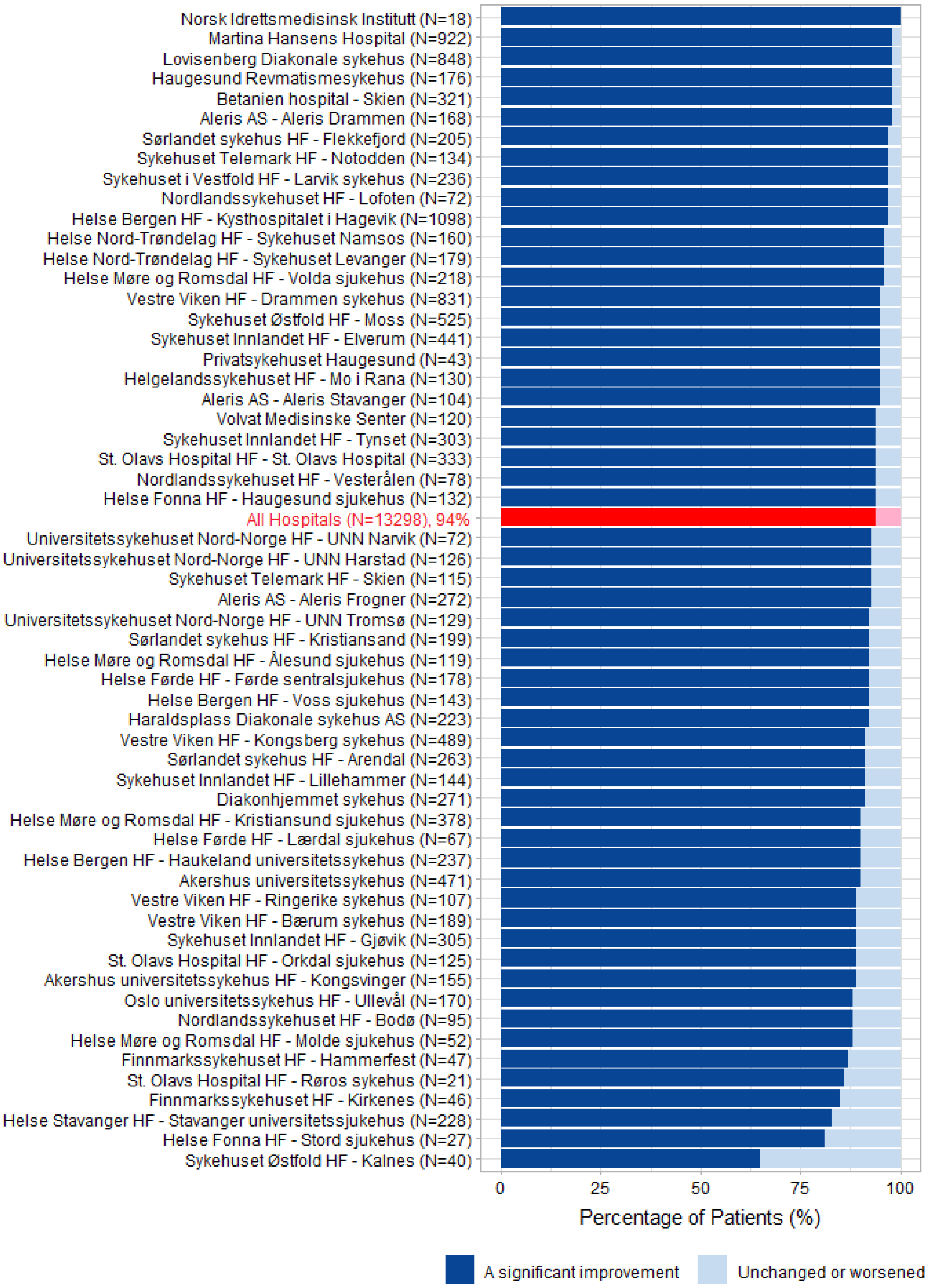
The diagram above shows the hospitals that have submitted preoperative PROM forms either on paper, digitally via the web solution in MRS, or through their own solution. Reporting is still low, but some hospitals seem to have taken steps to improve reporting. We would like to remind you that any questions regarding reporting in MRS can be sent to the registry.

Figure A.45: Anchor questions for HOOS-PAIN 1 year after the primary operation, 2019-2023



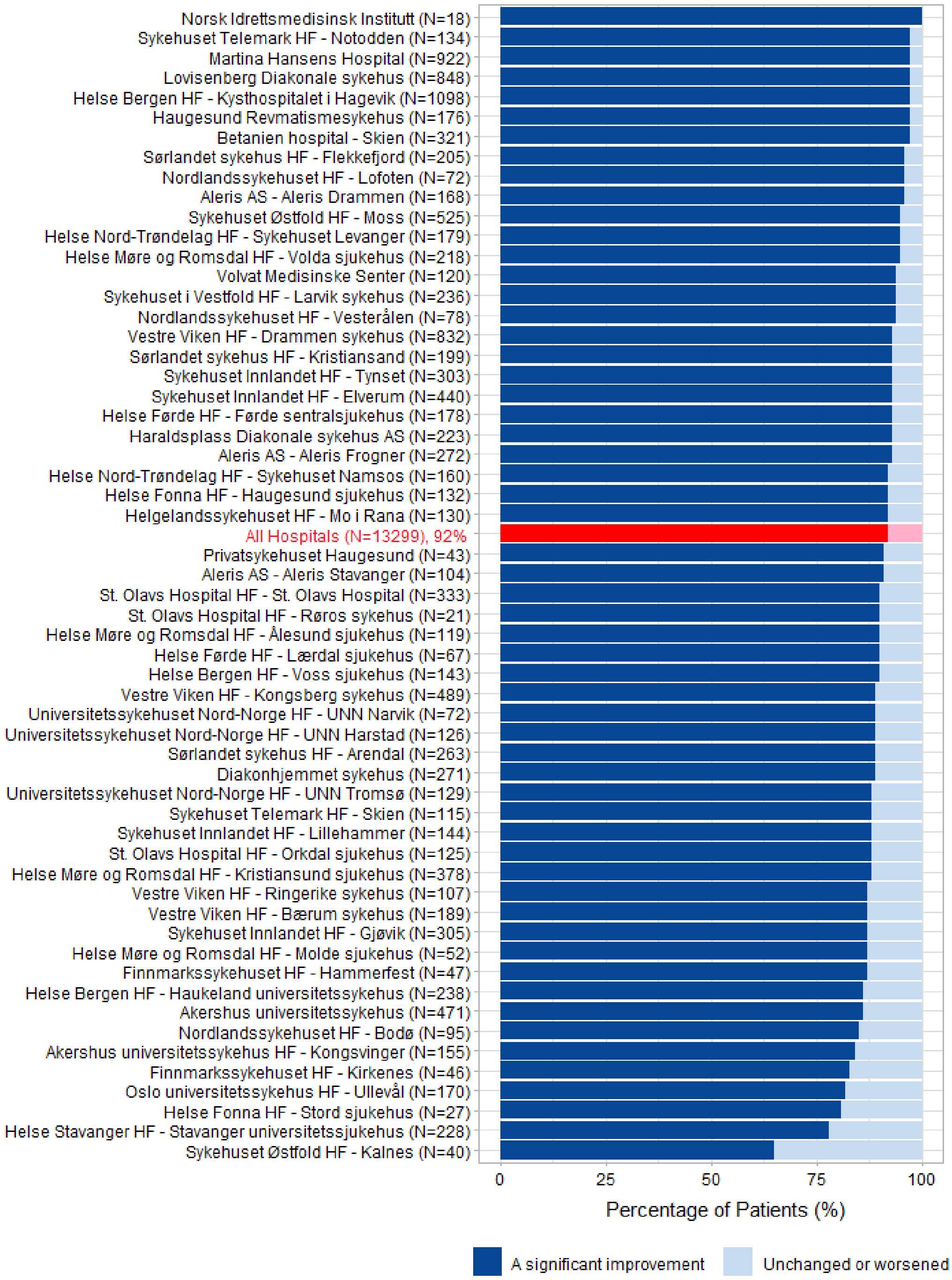
The patients answered the question, ”How do you experience your hip pain now, compared to before the operation?” The options ”Less, a significant improvement” and ”Slightly less, enough to be a significant improvement” are included in the dark blue category in the figure as ”a significant improvement.” The other options ”Very little change, not enough to be a significant improvement,” ”Unchanged,” ”Very little change, not enough to be a significant worsening,” ”Slightly worse, enough to be a significant worsening,” and ”Worse, a significant worsening” are included in the light blue category ”Unchanged or worsened.” Only hospitals with more than 10 responses are shown in the figure.

Figure A.46: Anchor questions for HOOS-SYMPTOMS 1 year after the primary operation, 2019-2023



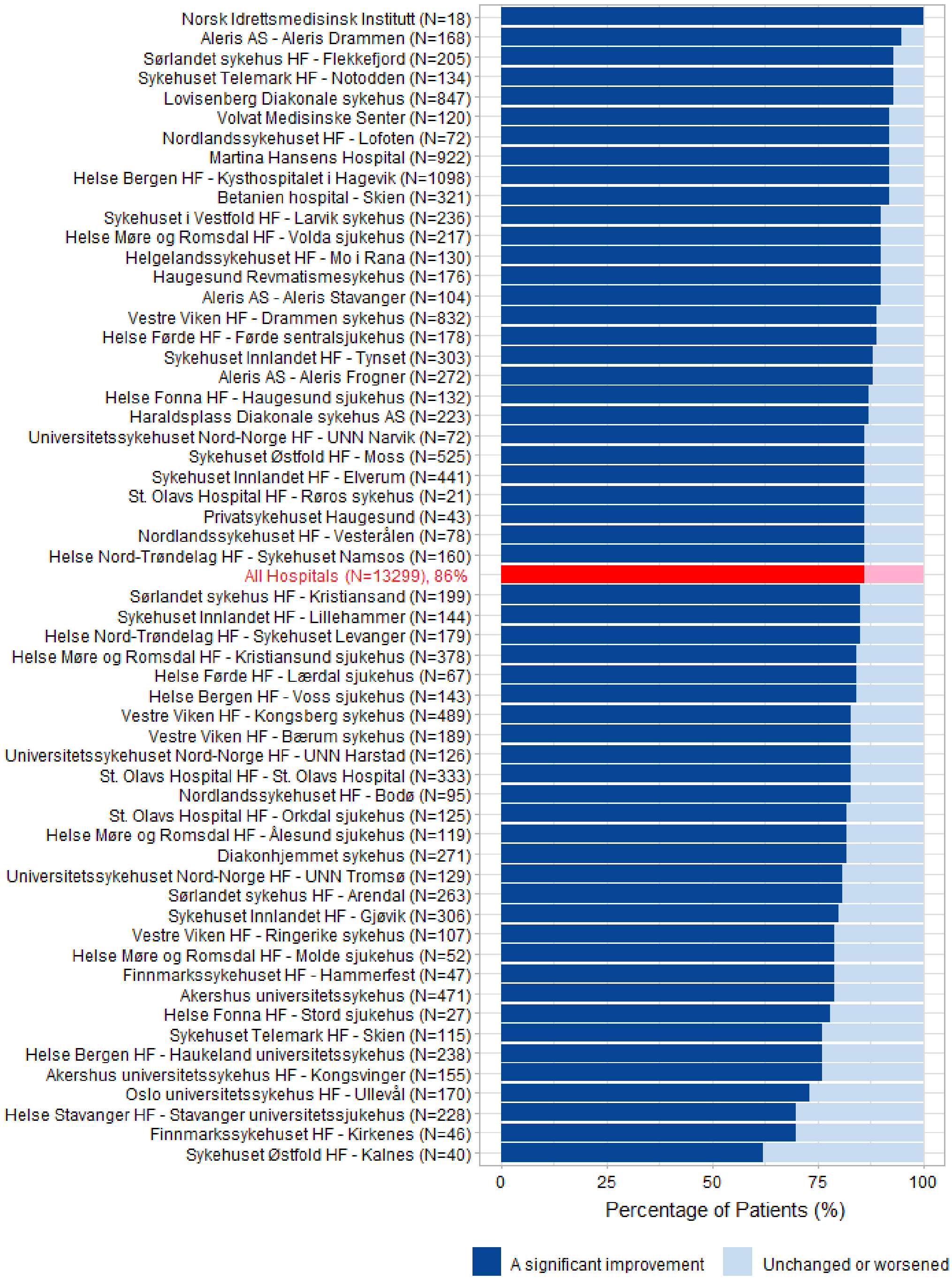
The patients answered the question, "How do you experience other symptoms in the hip now compared to before the operation (stiffness, clicking, and reduced mobility)?" The options "Less, a significant improvement" and "Slightly less, enough to be a significant improvement" are included in the dark blue category in the figure as "a significant improvement." The other options "Very little change, not enough to be a significant improvement," "Unchanged," "Very little change, not enough to be a significant worsening," "Slightly worse, enough to be a significant worsening," and "Worse, a significant worsening" are included in the light blue category "Unchanged or worsened." Only hospitals with more than 10 responses are shown in the figure.

Figure A.47: Anchor questions for HOOS-ADL 1 year after the primary operation, 2019-2023



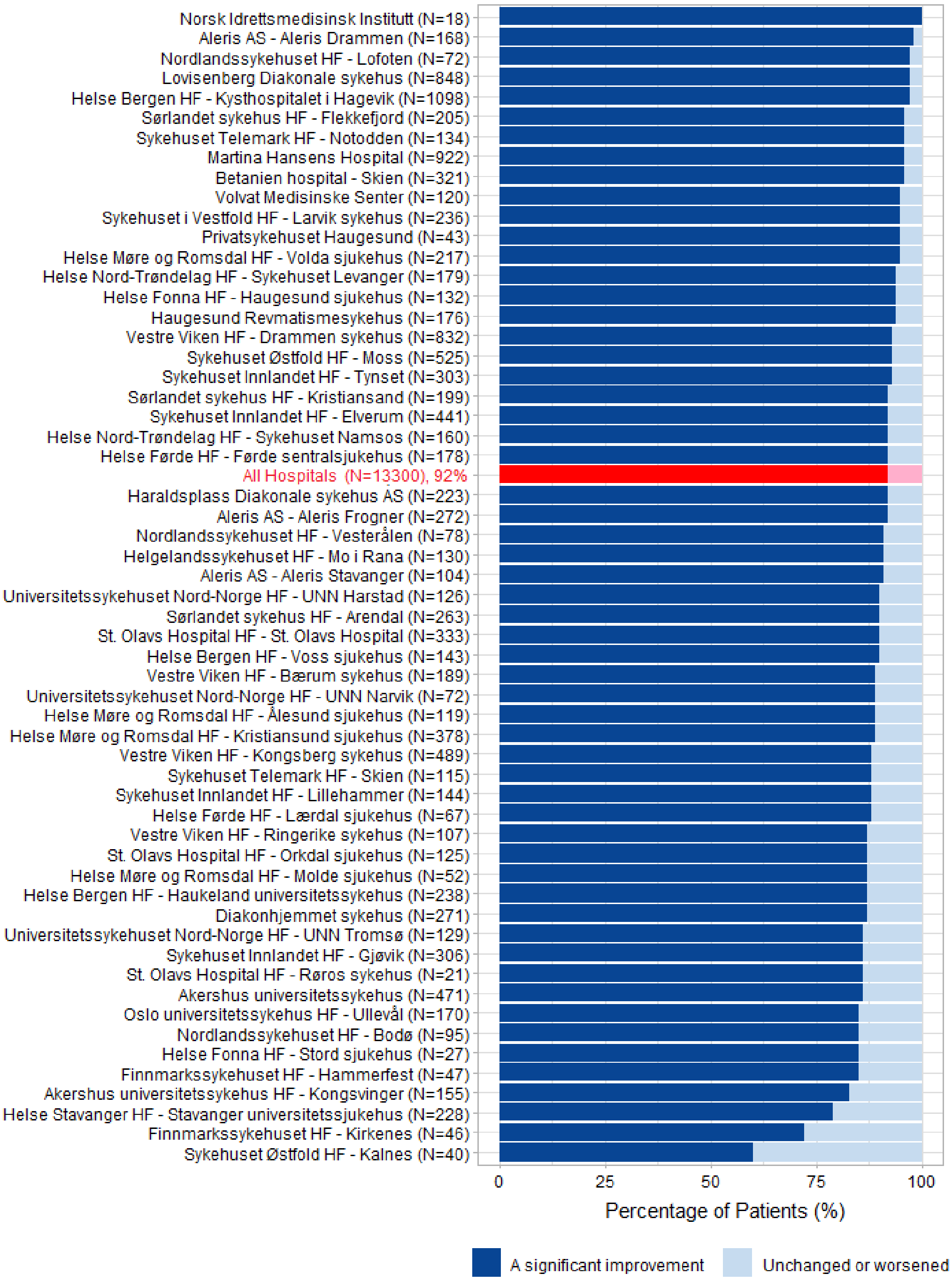
The patients have answered the question, ”How is your ability to perform daily activities now compared to before the operation (sitting, standing, walking, stair climbing, putting on/taking off socks, household chores, etc.)?” The options ”Better, a significant improvement” and ”Slightly better, enough to be a significant improvement” are included in the dark blue category in the figure as ”a significant improvement.” The other options ”Very little change, not enough to be a significant improvement,” ”Unchanged,” ”Very little change, not enough to be a significant worsening,” ”Slightly worse, enough to be a significant worsening,” and ”Worse, a significant worsening” are included in the light blue category ”Unchanged or worsened.” Only hospitals with more than 10 responses are shown in the figure.

Figure A.48: Anchor questions for HOOS- SPORT 1 year after primary operation, 2019-2023



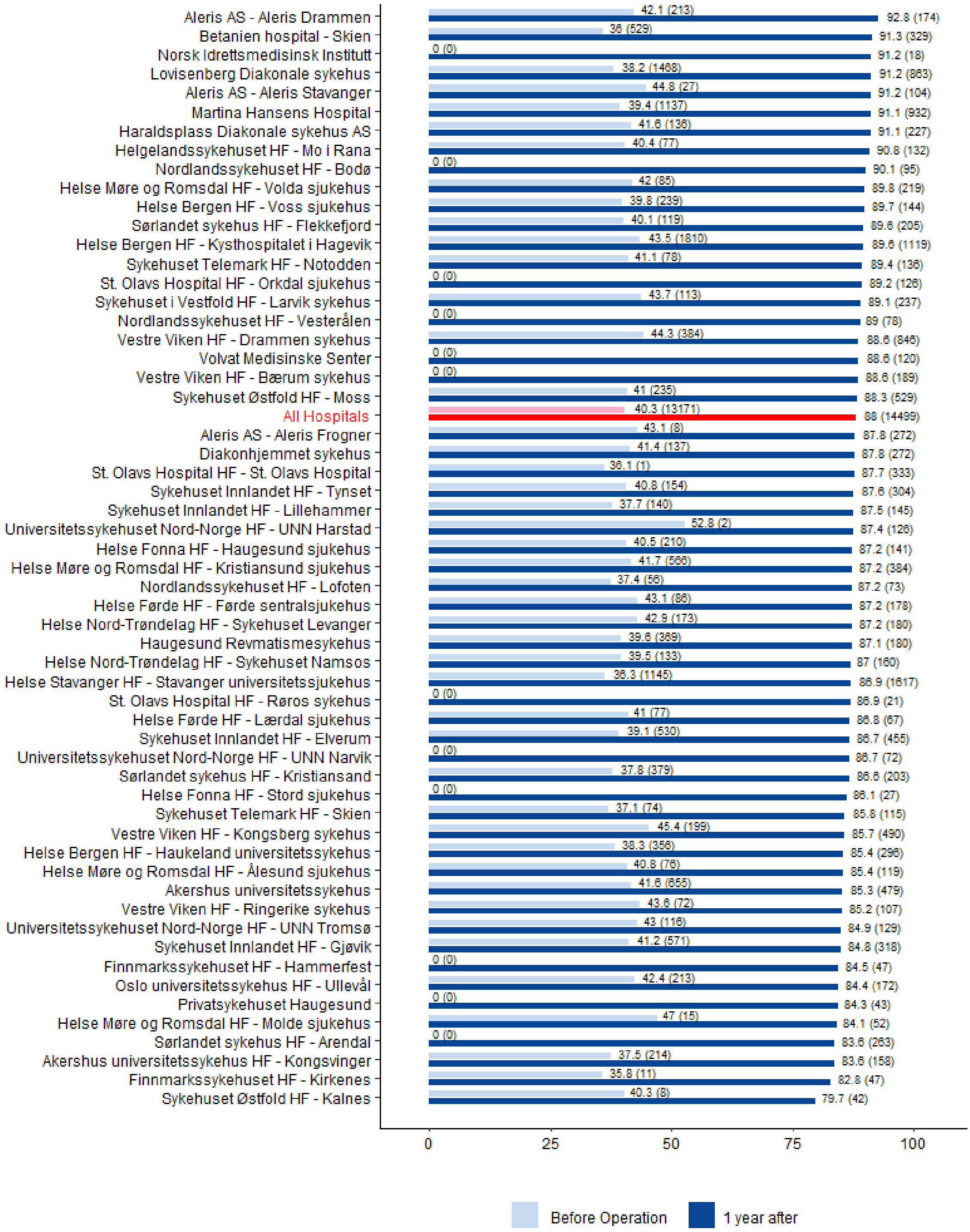
The patients have answered the question, ”How is your ability to perform sports and leisure activities now compared to before the operation (running, squatting, twisting and pivoting on the operated leg)?” The options ”Better, a significant improvement” and ”Slightly better, enough to be a significant improvement” are included in the dark blue category in the figure as ”a significant improvement.” The other options ”Very little change, not enough to be a significant improvement,” ”Unchanged,” ”Very little change, not enough to be a significant worsening,” ”Slightly worse, enough to be a significant worsening,” and ”Worse, a significant worsening” are included in the light blue category ”Unchanged or worsened.” Only hospitals with more than 10 responses are shown in the figure.

Figure A.49: Anchor questions for HOOS-QOL 1 year after the primary operation, 2019-2023



The patients have answered the question, ”How is your quality of life related to your hip now compared to before the operation (degree of trust in your hip, lifestyle changes, how often you are reminded of hip problems)?” The options ”Better, a significant improvement” and ”Slightly better, enough to be a significant improvement” are included in the dark blue category in the figure as ”a significant improvement.” The other options ”Very little change, not enough to be a significant improvement,” ”Unchanged,” ”Very little change, not enough to be a significant worsening,” ”Slightly worse, enough to be a significant worsening,” and ”Worse, a significant worsening” are included in the light blue category ”Unchanged or worsened.” Only hospitals with more than 10 responses are shown in the figure.

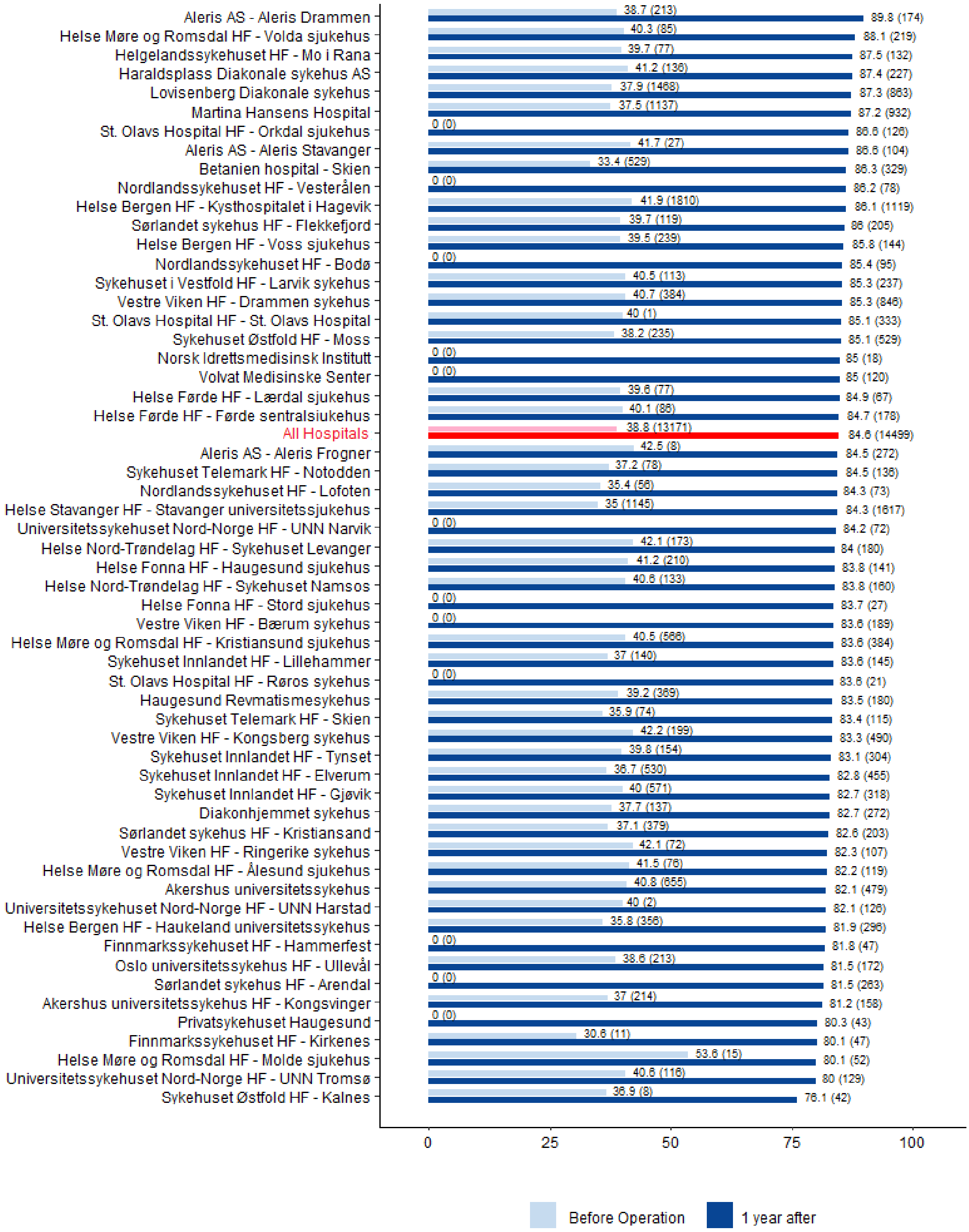
Figure A.50: Average HOOS-PAIN score for all primary operations before and 1 year after operation * (Number of completed forms)



* 100 is the best possible score

Only hospitals with more than 10 responses are shown in the figure.

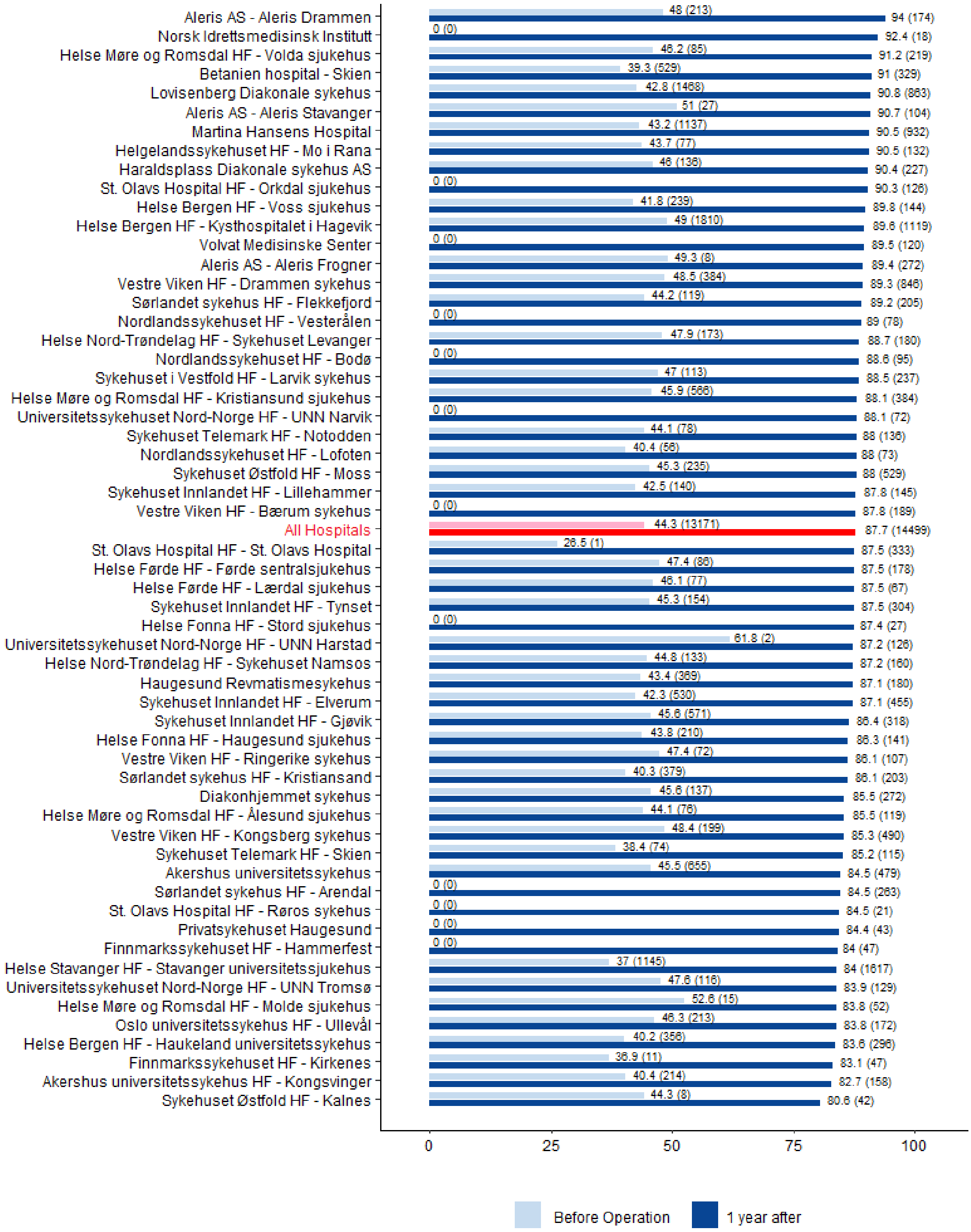
Figure A.51: Average HOOS-SYMPTOMS score for all primary operations before and 1 year after operation * (Number of completed forms)



* 100 is the best possible score

Only hospitals with more than 10 responses are shown in the figure.

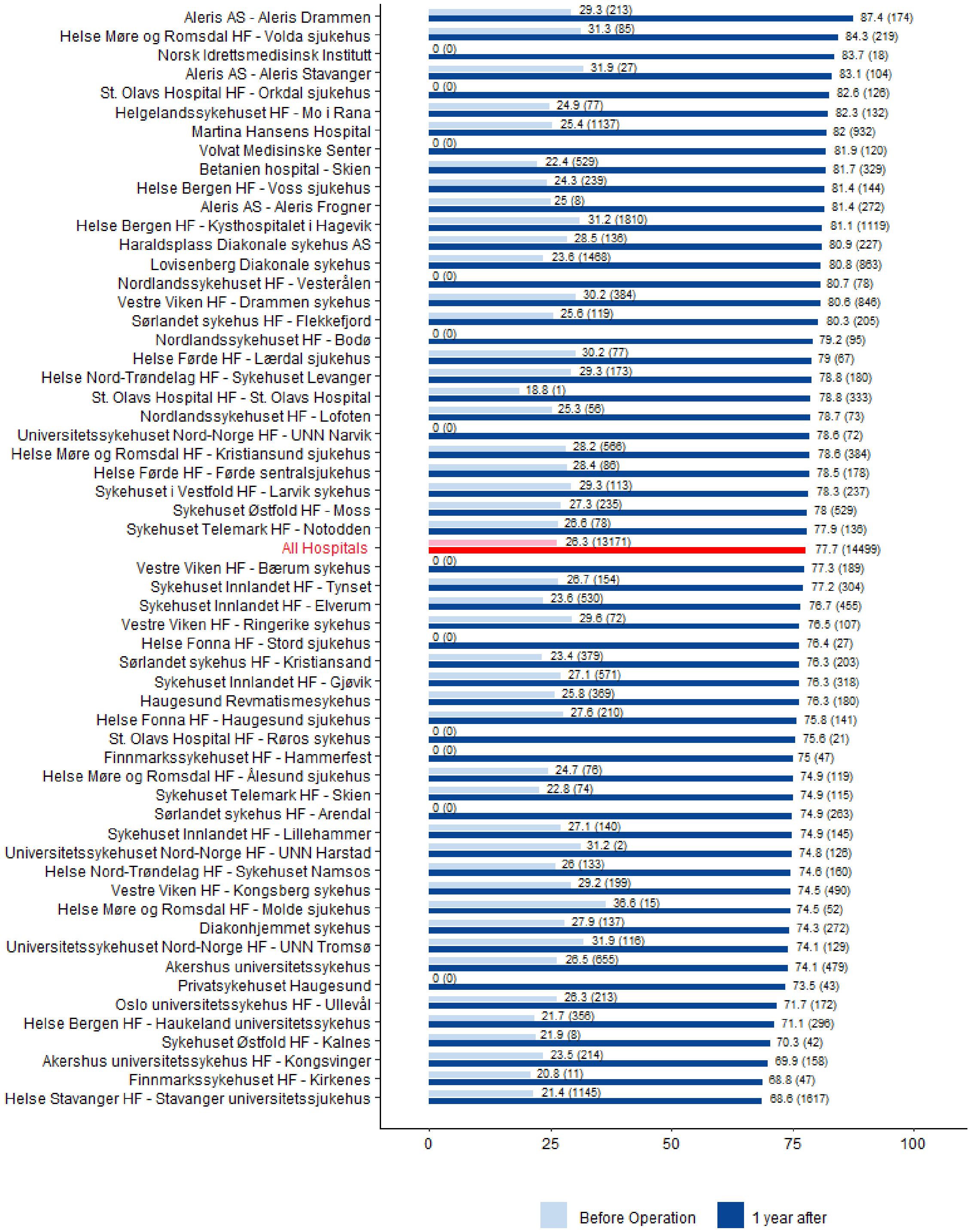
Figure A.52: Average HOOS-ADL score for all primary operations before and 1 year after operation * (Number of completed forms)



* 100 is the best possible score

Only hospitals with more than 10 responses are shown in the figure.

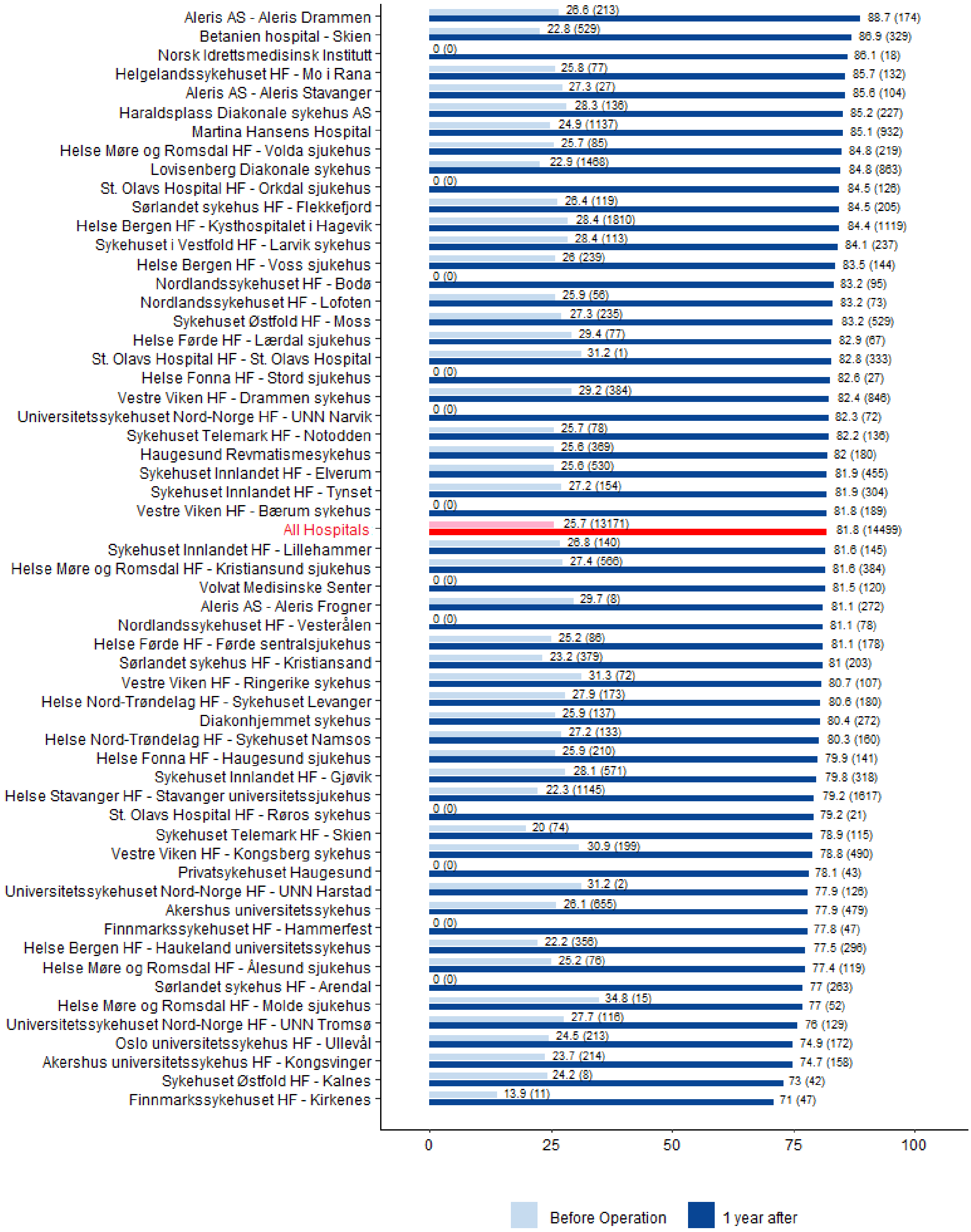
Figure A.53: Average HOOS-SPORT score for all primary operations before and 1 year after operation * (Number of completed forms)



* 100 is the best possible score

Only hospitals with more than 10 responses are shown in the figure.

Figure A.54: Average HOOS-QOL score for all primary operations before and 1 year after operation * (Number of completed forms)



* 100 is the best possible score

Only hospitals with more than 10 responses are shown in the figure.

Completeness of reporting analysis for the Norwegian Arthroplasty Register, 2021-2023

A completeness of reporting analysis for the Norwegian Arthroplasty Register has been conducted by combining the data in the Register with data from the Norwegian Patient Register (NPR). The report and analysis were prepared by the NPR in collaboration with the Norwegian Arthroplasty Register (NAR). There are separate statistics on primary operations and revisions.

NCSP codes for combining data from NPR hospital stays and the Hip Arthroplasty Register

Type	Code	Description
Primary operation	NFB 20	Primary total prosthetic replacement of hip joint not using cement
	NFB 30	Primary total prosthetic replacement of hip joint using hybrid technique
	NFB 40	Primary total prosthetic replacement of hip joint using cement
	NFB 7y	Primary implantation of reconstruction prosthesis
with or without	NFB 99	Other Primary prosthetic replacement in hip joint
Revision (level 1)	NFC 2y	Secondary implantation of total prosthesis in hip joint not using cement
	NFC 3y	Secondary implantation of total prosthesis in hip joint using hybrid technique
	NFC 4y	Secondary implantation of total prosthesis in hip joint using cement
	NFC 7y	Secondary implantation of reconstruction prosthesis
	NFC 99	Other secondary prosthetic replacement in hip joint
	NFU 1y	Removal of total prosthesis from hip joint

Formulas for completeness of reporting

$$\text{Completeness rate NRL} = \frac{\text{Only NRL} + \text{begge registre}}{\text{Only NPR} + \text{Only NRL} + \text{both registries}}$$

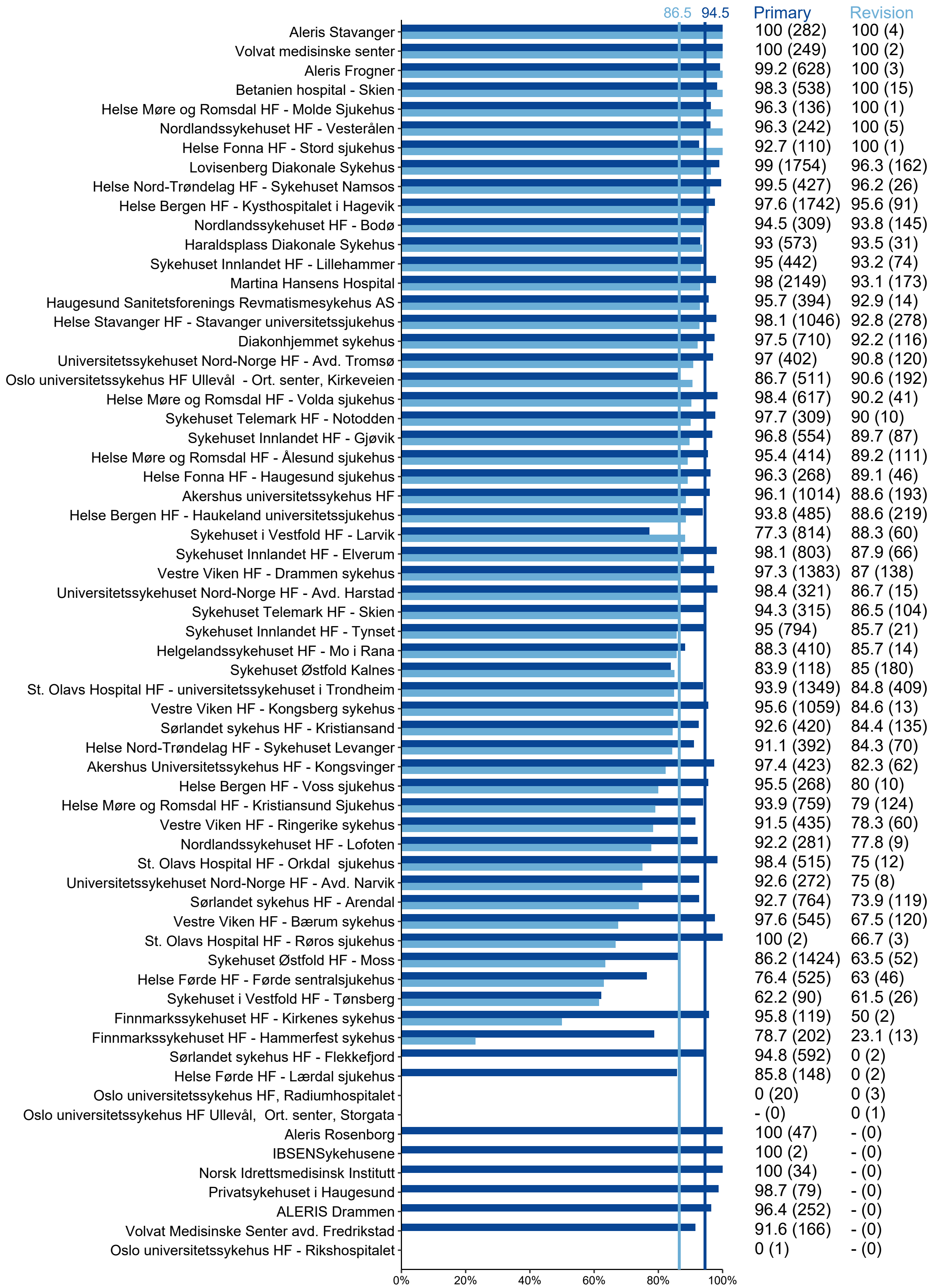
$$\text{Completeness rate NPR} = \frac{\text{Only NPR} + \text{begge registre}}{\text{Only NPR} + \text{Only NRL} + \text{both registries}}$$

Primary operations. In 2021-2023, 21394 primary hip replacements were reported to one or both of the registers. 94.7 % of these were reported to the NAR while 93.1 % were reported to the NPR. Completeness of reporting varies much between the different hospitals. For hospitals with a low completeness of reporting rate for the Norwegian Arthroplasty Register, either the form was not sent to the NAR or other interventions than hip arthroplasties were incorrectly coded with NFB 20/30/40.
Procedure codes to be used for primary operations: NFB 20 - NFB 30 - NFB 40

Revision operations. In 2021-2023, 2693 revisions were reported to one or both of the registers. 87.2 % of these were reported to the NAR while 84.2 % were reported to the NPR (revision level 1). Completeness of reporting varies much between the different hospitals. A low completeness of reporting rate may mean that the revision form was not sent to the NAR, or that other interventions than removal, replacement or insertion of a secondary prosthesis were incorrectly coded with NFC 2/3/4/99 or NFU1. The analysis shows that a number of revision forms are missing in cases where the prosthesis was removed without a new one being inserted in the same operation; in such cases, a form should be submitted both when the prosthesis is removed and when any new insertion is performed.
Procedure codes to be used for revision operations:
NFC2*- NFC3*- NFC4*- NFC99 - NFU1*

New: From 2012, revisions due to infection, even where parts of the prosthesis are not removed or replaced, are to be reported on the form to the NAR. These must be coded **NFS 19 or NFS 49 with the additional code NFW 69.**

Completeness of reporting for Norwegian Arthroplasty Register, 2021-2023



Dark blue bars and first number to the right of the bars gives completeness of reporting for primary operations. Light blue bars and second number to the right of the bars gives completeness of reporting for revision operations. The numbers in brackets gives the number of operations registered at both NAR and NPR. Vertical lines shows the national averages.

CONTENTS

Knee prostheses

Highlights from 2023

Knee prostheses

	Registered 1987-2023	Registered in 2023
Primary operations	126,975	8,653
Revisions	11,094	647

58 Hospitals reported
98% Of the hospitals

Completeness
96.5% primary operations
93.0% revisions

- **9** Published Papers
- **0** PhDs
- **14** Podium Presentations

Research

ALBA-study for knee prostheses
Shall we use antibiotic loaded cement? An R-RCT including more than 9,000 operations – per May 2023 more than 3,300 included.

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Nasjonalt servicemiljø for medisinske kvalitetsregistre

Results and activities

Quality indicators

- 87.3% well documented prostheses
- 84.3 % electronic registered in 2023
- 97.9 % non-revised standard patients at 2 years
- 96.5 % non-revised standard patients at 10 years

ePROM

electronic patient reported data

11,925 pre-op ePROM
44 participating hospitals
10,992 post-op ePROM

ANNUAL REPORT KNEE AND OTHER JOINTS

Knee Arthroplasties: For the period 1994-2023, data on a total of 138,433 knee prostheses and 11,341 prostheses in other joints have been registered. In 2023, 8,653 primary knee prostheses were implanted, which is a 10% increase from 2022. This is the highest number of primary knee prostheses ever recorded. The number of knee prosthesis revisions was 647, which represents 6.9% of the total, marking a pleasing downward trend in revision rates from 8.4% in 2017.

Elbow Arthroplasties: A total of 2,121 elbow prostheses have been registered, with 65 new ones in 2023, a decrease from 105 in 2022. Of the 65, 29 were radial head prostheses, 10 were hemiarthroplasties, and 13 were total prostheses. In the past, total elbow prostheses and several of the other small joint prostheses were primarily used for patients with rheumatoid arthritis, but now fractures and fracture sequelae are the most common diagnoses. All hemiarthroplasties and radial head prostheses, except for one, were used for fracture patients.

Ankle arthroplasties have received reports of 1,986 ankle prostheses in total, with 22 reported last year, 15 of which were primary. This represents a significant reduction in the use of ankle prostheses from the peak year of 2011, when 138 ankle prostheses were recorded. Unfortunately, around 30% of the operations are revisions.

Finger Arthroplasties: A total of 4,000 MCP (metacarpophalangeal) finger prostheses have been reported, with 43 surgeries (both revisions and primary operations) reported in 2023. Of these, 27 were primary and 16 were revisions. There has been a significant decline in the use of MCP prostheses, from over 300 annual primary prostheses in the 1990s to now under 30 per year. This decline is due to the effective medical treatment of rheumatoid arthritis patients. For PIP (proximal interphalangeal) finger prostheses, reporting has increased from 3 primary prostheses in 2009 to 23 in 2023. These prostheses are implanted for patients with osteoarthritis and fractures, with a total of 211 PIP prostheses implanted or revised over the years. Unfortunately, the completeness of reporting for hand/finger prostheses is low; the latest measurement for the years 2019-20 showed a 38% completeness of reporting for primary prostheses.

Wrist Arthroplasties: A total of 663 wrist prostheses have been registered, with 30 of these reported in 2023, 27 of which were primary and 3 revisions.

Carpal Arthroplasties: A total of 1,011 carpal (CMC-I) prostheses have been reported, with the number of primary prostheses typically around 30 annually, but in 2023 there was a significant increase in reported prostheses, from 47 in 2022 to 148 in 2023. Some of this increase may be due to improved reporting.

Toe Arthroplasties: A total of 1,560 toe joint prostheses have been reported. There has been a significant decline since 2006 when approximately 80 primary toe joint prostheses were reported annually, compared to just 1 primary prosthesis reported in 2023. Most toe joint prostheses were previously implanted in patients with rheumatoid arthritis.

REOPERATIONS AND PERIPROSTHETIC FRACTURES

Reoperations for periprosthetic fractures where the prosthesis is not replaced should be reported for all joints. A classification of periprosthetic fractures in the knee has been introduced.

We also request that you report MUA (manipulation under anesthesia) and all other procedures on wounds, soft tissues, and bones where the prosthesis or prosthetic components are not replaced, inserted, or removed. In short, **ALL** reoperations related to a prosthetic joint should be reported.

We have now separated the tables (15a, b; 16a, b; 17a, b; and the corresponding figures 18a, b, c; 19a, b, c; 20a, b, c) for revisions (replacement, removal, or insertion of prosthetic components) and reoperations (reoperations where no prosthetic components were replaced, removed, or inserted). Instability is the most common reason for knee revision, followed by infection, aseptic loosening of the tibial component, and progression of osteoarthritis. Many of these revisions can likely be attributed to poor surgical technique. Focus on good patient selection, infection prevention measures, the correct choice of prosthesis stabilization, the use of proper techniques for the placement of prosthetic components, good balancing, and correct cementing technique (Refsum et al. 2019, Dyrhovden G 2017) are key factors for better outcomes. Revisions based solely on pain as an indication should be avoided.

ELECTRONIC REPORTING

From mid-November 2023, it became possible to report digitally for elbow and ankle arthroplasties, which also includes PROM (Patient-Reported Outcome Measures) reporting for patients using the Quick DASH and SEFAS scores, respectively. Digital reporting for hand/wrist, fingers, and toe arthroplasties is planned for implementation during autumn 2025. We will discontinue the registration of spinal disc prostheses as this will now be recorded in the Spine Registry.

PROM

We request that hospitals facilitate PROM registration before surgery for patients undergoing hip, knee, shoulder, elbow, and ankle arthroplasties. We recommend that the PROM form is sent to the patient when they are scheduled for surgery. If the preoperative PROM is completed or the surgeon has digitally registered the surgery, follow-up PROM-questions will automatically be sent to patients 1 year after the operation.

An overview of the national results for EQ-5D-5L and KOOS, and for each hospital, as well as the proportion of patients who have achieved significant improvement in the operated joint, is presented in the results section of this report. The presentation shows good outcomes with knee arthroplasty surgery, although slightly less favorable than those for hip arthroplasty one year after surgery. We have also provided an overview of the proportion of patients registering preoperative PROM at each hospital. Currently, only six hospitals have over 80% preoperative PROM registration, so efforts need to be strengthened in this area. Please ask patients during preoperative clearance if they have completed the form. Hospitals can use this data for internal quality assurance, research, and improvement. Instructions for getting started can be found here: helse-bergen.no/nrl.

ALBA STUDY KNEE (ANTIBIOTICS OR NOT IN BONE CEMENT)

The ALBA study is now in its fourth year of patient inclusion. We are investigating whether antibiotics in bone cement prevent periprosthetic joint infections (PJI) in primary knee arthroplasy. The protocol has been published (Leta T 2021). The registration form is the same as for the electronic registration of knee replacements, and it includes a built-in randomization solution. The study began in January 2021, and 3,288 knees were included as of June 1, 2024. We hope that all hospitals will participate in the study. Please contact us if your hospital has not yet started including patients. Instructions can be found on our website.

DESCRIPTION OF PRACTICE IN KNEE SURGERY

Most total knee arthroplasties are cemented or hybrid CR (cruciate-retaining) prostheses. This type of prosthesis is reported to have good results across all national registries. The proportion of PS (posterior-stabilized) prostheses has increased in recent years, accounting for 11.2% of all primary total knee replacements in 2023. The use of PS polyethylene may have replaced deep dish polyethylene for patients with posterior cruciate ligament deficiency, which could justify the practice. However, several register studies show that PS knees have more revisions than CR knees, particularly due to loosening. The use of uncemented total knee prostheses has increased in recent years, but this trend has reversed in the past two years. As seen from the survivalcurves in the results section, the preliminary outcomes for uncemented prostheses in Norway appear to be good. In two Nordic NARA studies, higher revision rates were observed with uncemented total knee prostheses across all age groups (Niemeläinen M 2020, Irmola T 2021), consistent with findings from other registries.

There is an increasing use of patella components in knee replacements (10.9% in 2023). The NICE guidelines in the UK recommend the use of patella components in total knee replacements as it appears to reduce reoperations. This is likely because surgeons have the option to address patient complaints of pain by inserting a patella component. In Norway, we have not observed any difference in the risk of revision (Figure B.13).

The use of cross-linked polyethylene in total knee prostheses has increased in recent years. In 2023, 43% of primary knee arthroplasties utilized cross-linked polyethylene. So far, we have not observed better results with cross-linked polyethylene in Norway, but the follow-up time of 10 years is still short. Data from Australia shows somewhat better or similar results, with over 10 years of follow-up depending on the prosthesis brand. It therefore appears that the use of cross-linked polyethylene in knee prostheses is safe.

The use of rotating polyethylene (mobile bearing) in total knee arthroplasties has decreased, in line with both Norwegian and international register studies that show a somewhat higher revision rate with this type of prosthesis (Paxton E 2011, Gøthesen Ø 2014, Namba R 2014, Gøthesen Ø 2017).

The proportion of unicondylar knee prostheses has gradually increased and now accounts for 15.5% of all primary knee prostheses. There is still much debate internationally regarding the use of unicondylar knee prostheses. In the USA, they are used in 4% of patients, while in England, the NICE guidelines now recommend offering them to suitable patients. Approximately 40% of unicondylar knee prostheses are uncemented, and this proportion has been increasing since 2020. A recently published article from our registry (Skåden Ø 2023) found more early periprosthetic fractures, infections, and polyethylene wear/dislocations with uncemented unicondylar prostheses compared to cemented ones. We also found less femoral component loosening with the new cemented Oxford partial compared to the cemented Oxford III. We conclude that it seems safe to use the new cemented Oxford partial, but that the uncemented variant should be used with caution as we are seeing more early revisions. In Norway, 94% of unicondylar prostheses use mobile bearing. Registry studies from Australia show better results with fixed bearing implants.

In electronic reporting, we now ask about height and weight, robotic surgery, access to the knee joint, closure technique, anesthesia, degree of osteoarthritis according to Ahlbäck grading, bone loss classification at revisions, and classification of periprosthetic fractures. We also record stems, augmentations, and cones with product numbers. Tables 43-57 show these new variables. The paper form will not be updated, so hospitals that report on paper will not have data on these variables. For 2023, 14% of patients are of normal weight, 40% are overweight, 30% have class 1 obesity, and 3% have class 3 obesity (BMI over 40) according to WHO classification. There is good documentation that obese patients benefit from knee prostheses just as much as those of normal weight, and obesity should not be used as an argument to deny surgery.

We observe that 10% of patients have Ahlbäck grade 1 osteoarthritis, meaning no bone-on-bone arthritis. These patients are at increased risk of dissatisfaction with the surgery and should receive extra information about this (Olsen U 2022 and 2023). Most knee osteoarthritis patients should undergo courses and training through AktivA (https://aktivmedartrose.no/) or similar programs before considering surgery, and it is likely that patients with Ahlbäck grade I have additional benefit/need for this type of training and education.

139 knees (1.9%) were operated on using robot-assisted surgery. Computer navigation was used in 7% of total knee prostheses, with 95% of procedures using a medial parapatellar approach. Spinal anesthesia was administered to 74% of patients, while 12.9% received general anesthesia, which is an increase from 2022. Local infiltration anesthesia (LIA) was used in 81% of cases, 34% received

peripheral nerve blocks, 70% of wounds were closed with clips, and 23% with running skin sutures. Bone loss classification (Anderson) and Mayo fracture classification for tibia and patella, as well as Rorabeck and Lewis classification for femur, have been introduced.

QUALITY OF KNEE ARTHROPLASTY SURGERY IN NORWAY

Survival curves show a gradual improvement in knee prosthesis outcomes since 1994, with revision surgery as the endpoint. From 2010 to 2023, there has been a notable improvement in outcomes for unicompartmental knee prostheses. A study conducted using our registry data found that hospitals performing more than 100 knee prostheses per year had fewer revisions compared to hospitals with lower numbers of procedures (Badawy M 2013). Unicompartmental knee prostheses should be concentrated at fewer hospitals (Badawy M 2014) to reduce the risk of revision.

DOCUMENTATION OF KNEE PROSTHESES

We present the proportion of patients who received well-documented knee prostheses at individual hospitals (Figure B.37). In consultation with the reference group, we have selected the ODEP (Orthopaedic Data Evaluation Panel-UK) classification 10A as the criterion for calling a prosthesis well-documented. This corresponds to documentation of ≥93% survival of the prosthesis after 10 years. The long-term goal is 10A*, which corresponds to ≥95% survival. We have excluded prostheses used in REK-approved studies, as well as revision prostheses and prostheses with stems. In 2019, 61% of patients received well-documented prostheses, and in 2023, 87.3%. This improvement is hopefully due to increased awareness among surgeons, but also because some prostheses (e.g., Legion) now have 10-year documented good results from the Australian registry, and Persona and Attune knee prostheses have obtained 2-year RSA results. We see that some hospitals choose to use prostheses that cannot be classified as well-documented. We hope hospitals review their practices regarding procurement tenders and ensure they use prostheses as agreed in the tenders, and that they are aware of the registry's stance on the procurement processes for joint prostheses, which is available on our website. Documentation is available at helse-bergen.no/nrl under Recommendations and Guidelines.

We present the 3-year and 10-year durability of the most commonly used knee prostheses in Norway from 2012 to 2023 (where more than 500 prostheses have been used) (Figures B.33 and B.34). None of the prostheses currently in use have poor results, but several prosthesis combinations lack 10-year results from Norway and/or other countries. A more detailed overview of the durability of prostheses used in 2023 is available in an Excel sheet at helse-bergen.no/nrl under Recommendations and Guidelines.

COMPLETENESS OF REPORTING

In this report, we present the completeness of reporting for primary operations and revision operations for the years 2019-2020. The next completeness analysis will be conducted this year for the years 2021-2022 and 2023, but due to capacity issues at NPR, we did not receive the figures before the Annual Report went to print. The national average is good for primary knee prostheses (96.6%), which is a slight decrease from 97.6% for the years 2018-2019. For revisions, the rate was 92.9%, which is a slight decrease from 93.2% for the years 2018-2019. These are good figures, but it is important that you establish good routines for checking against the surgery protocol now that we have switched to electronic reporting. We have created a recommended procedure for this, which can be obtained by contacting our office. Some hospitals have low reporting of revision operations. This can result in falsely favorable prosthesis survival rates at the hospital. In the figures showing the proportion not revised after 2 and 10 years (Figures B.30 and B.31), we have excluded hospitals with a completeness of reporting rate of less than 80% for revision operations.

We remind you that arthroplasties in the ankle, hand, fingers, and toes should also be reported. For these procedures, the reporting rate is lower than for other joints. We encourage hospitals to review their reporting routines if the rate is low.

HOSPITAL RESULTS

We present some hospital results. The proportion of unrevised total knee prostheses after 2 years (operated from 2017-2023) and 10 years for standard patients in the period 2012-2023. Standard patients are aged 55-85 years, with ASA class 1 and 2, and with primary osteoarthritis. We also present funnel plots for the proportion of unrevised cases after 10 years for standard patients operated on during the period 2012-2023. The funnel plot takes into account the number of knee prostheses operated on at the hospital. Hospitals with a revision risk more than 3 standard deviations (99.8%) higher than the national average must be considered to have too high a risk of revision and should review their procedures (Figure B.32). Four hospitals that previously had a high proportion of revisions have received letters encouraging them to review their procedures. The hospitals have reported on their practices, reviewed their internal procedures, and initiated improvement measures. We hope this will yield results in the long term, but poor results from 10 years ago will linger for a few years. There are now 2 hospitals with a high proportion of revisions.

ELBOW

The number of total elbow arthroplasties implanted in recent years has decreased, except for 2019 and 2020, where there was a significant increase compared to 2018. In 2023, 13 total arthroplasties were implanted, and 13 revisions were performed. This is the lowest number of primary total prostheses implanted since 2008. Ten hemiarthroplasties were performed in 2023, which is on par with previous years. Hemiarthroplasties are used instead of total prostheses for supracondylar and intracondylar humerus fractures. The humerus component is cemented in all total arthroplasties, while the ulnar component is only cemented in about one-third of the prostheses. This is consistent with previous years. In recent years, Discovery has been the most commonly used for total arthroplasties, and Latitude for hemiarthroplasties.

The number of elbow revisions has slightly decreased. The use of radial head prostheses has steadily increased over the past 10 years, and more of these prostheses were registered in 2022 than ever before. In 2023, 29 radial head prostheses were implanted, which is significantly lower than in 2022, when 55 were implanted.

FINGER AND HAND

The number of finger prostheses implanted remains low compared to previous years, with 43 operations, of which 16 (37.2%) were reoperations. In 2023, 27 primary wrist prostheses and 3 radio-carpal arthroplasties were implanted. This is lower than it was a few years ago. The number of wrist prostheses (CMC I prostheses) has increased over the last few years, after hitting a low in 2016 with only 5 implants. In 2023, 148 primary prostheses were implanted, compared to 43 in 2022. This is the highest number ever recorded in the registry.

ANKLE

There has been a significant decrease in primary ankle arthroplasties, with only 15 primary ankle arthroplasties reported in 2023. There were 6 revisions, which corresponds to 27% of all ankle prosthesis surgeries in 2023. We found that the survival rate for ankle prostheses in Norway was 81% after 5 years and 69% after 10 years for patients operated on between 1994-2021 (Sundet M 2023).

Especially younger patients (<60 years) had poor outcomes. The results were somewhat better towards the end of the study period. However, there is good reason to be cautious with ankle prosthesis surgery. We believe that the decision-making process regarding arthrodesis versus prosthesis is challenging and should be centralized to a few hospitals. In 2023, ankle prosthesis surgeries, both primary and revisions, were performed at four hospitals. All prostheses are uncemented, as has been the case for the past 15 years. From the FDA, we received a report of a high rate of plastic breakage in the STAR ankle prosthesis. This brand has not been used in Norway since 2013.

SUMMARY OF THE MOST IMPORTANT SCIENTIFIC FINDINGS IN THE PAST YEAR

In a study from the registry (Skåden Ø 2023), we show that there are more early periprosthetic fractures, infections, and plastic breakages/dislocations with uncemented compared to cemented Oxford partial unicondylar knee prostheses. We also found less femoral component loosening with the new cemented Oxford partial compared to the cemented Oxford III. We conclude that it seems safe to use the new cemented Oxford partial, but that the uncemented variant should be avoided due to many observed early revisions.

In a study from AHUS that examined the effect of BMI on the risk of revision 3-9 years after primary total knee prosthesis, it was shown that BMI did not affect the risk of revision and therefore should not be used as an argument to deny prosthesis surgery (Mikaelsen JR 2024).

Several cartilage surgery cohorts from Norway have been linked with the knee arthroplasty registry (Birkenes T 2023). The incidence of knee arthroplasties after 20 years was 19%. Deep lesions, advanced age at the time of cartilage surgery, high BMI at follow-up, cartilage transplantation (ACI), and more than one cartilage injury were associated with knee prostheses.

58 knee prosthesis patients with prior surgery for focal cartilage injury were compared with 116 comparable (matched) knee prosthesis patients without cartilage injury (control group). Previous cartilage surgery was associated with worse patient-reported scores after knee arthroplasty surgery (Birkenes T 2024).

Olsen U et al. 2023 has published a systematic review and meta-analysis on factors correlated with pain after knee prosthesis surgery. More pain catastrophizing, more symptomatic joints, and more preoperative pain were correlated with more pain, while more severe osteoarthritis was correlated with less pain 1 year after surgery. The same research group published a similar study on factors correlated with function 1 year after knee prosthesis surgery. High preoperative BMI was correlated with lower function, while better preoperative function and more severe osteoarthritis were correlated with better function 1 year after surgery. The study used scores after 1 year and did not assess changes from before surgery. In studies where change is studied, individuals with high BMI have shown as much improvement in function and pain as those with normal weight.

We have published results for 1368 ankle arthroplasties with follow-up from 1994-2021 (Sundet M 2023). The revision rate was high, but newer implants had better outcomes, and implants with fixed bearing had better results than implants with mobile bearing polyethylene. Young age was associated with a higher risk of revision, and the study supports that ankle prostheses are best suited for patients over 60 years of age.

In a study investigating the risk of revision due to infection between clindamycin and cephalosporin as infection prophylaxis in knee arthroplasty, we found no difference. The study supports that it is safe to give clindamycin to patients who are allergic to penicillin (Pawloy K 2023).

In a large multi-registry study with data from 16 national and regional registries, we studied the use of antibiotics in bone cement and systemic antibiotic prophylaxis. Over all 77% of patients received antibiotics in the cement, while in the USA, only 31% of patients received antibiotics in the cement, and in Norway, 100%. Gentamicin was used as an antibiotic in 94% of the cements. Cefazolin was the most commonly used systemic antibiotic. The number of doses varied from 1 dose preoperatively to 4 doses on the day of surgery in Norway for 83% of patients (Leta T 2023).

In a large international meta-analysis of cement with and without antibiotics, with 10 participating registries, we found no difference in the risk of revision surgery due to infection 1 year after primary cemented total knee arthroplasties. 1.9 million knees were studied (Leta T 2024).

Brendsdal E 2023 has published results for nearly 3,000 MCP (metacarpophalangeal) arthroplasties from 1994-2019. The survival rate of the prostheses after 20 years was 84%, and the most common reason for revision was a broken implant. Most prostheses were made of silicone. The use of MCP prostheses has declined in recent years due to better medications for RA patients.

We thank the surgeons of Norway for excellent reporting, but please remember to report on the small joints in the hands and feet. If the hospitals wish, one can appoint a contact person for each of the joints. We welcome suggestions for research projects and are always interested in research collaboration.

Bergen, June 2024

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Responsible knee arthroplasty

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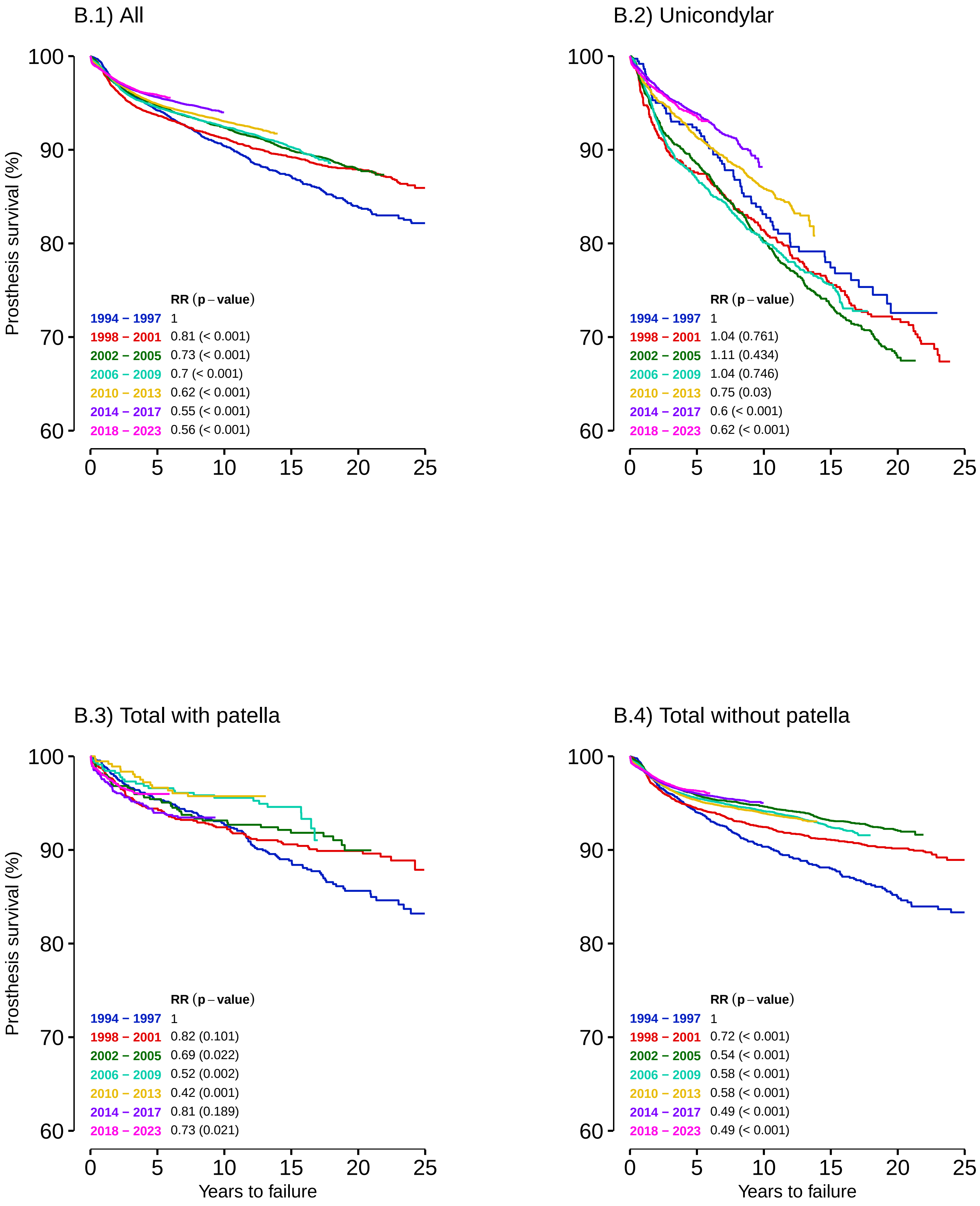
Biotatistician/researcher

Geir Hallan
Overlege/Professor
Responsible ankle/foot/hip

Kalyana Srujana Mulpuri
IT consultant

Survival curves for knee prosthesis 1994−2023

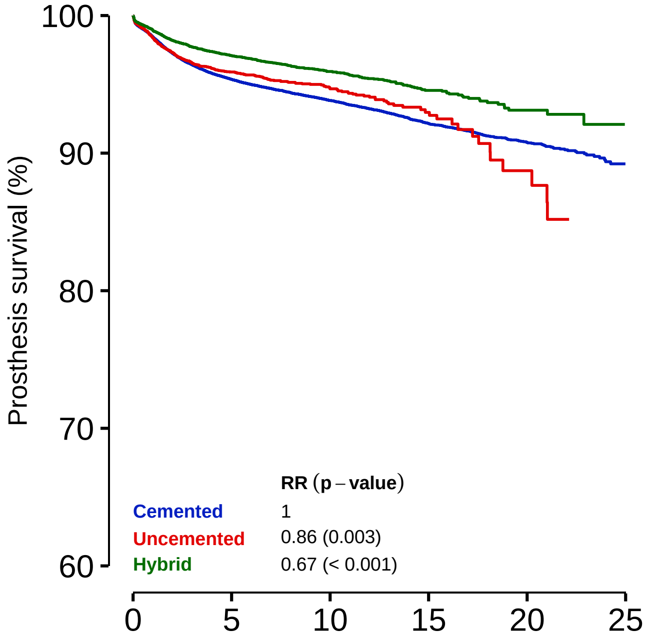


Kaplan−Meier survival curves. Survival estimate is given as long as > 50 prostheses are at risk.
Risk ratio (RR) estimates adjusted for age, sex and diagnosis.
There is some uncertainty tied to the risk estimates from the Cox−analysisis as the assumption of proportional hazard does not hold for all models.

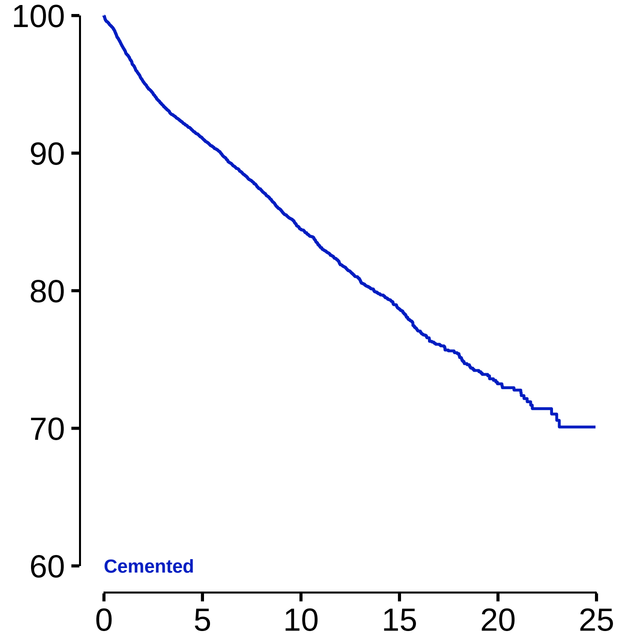
Survival curves for knee prosthesis − Fixation
1994 − 2023

Norwegian Arthroplasty Register

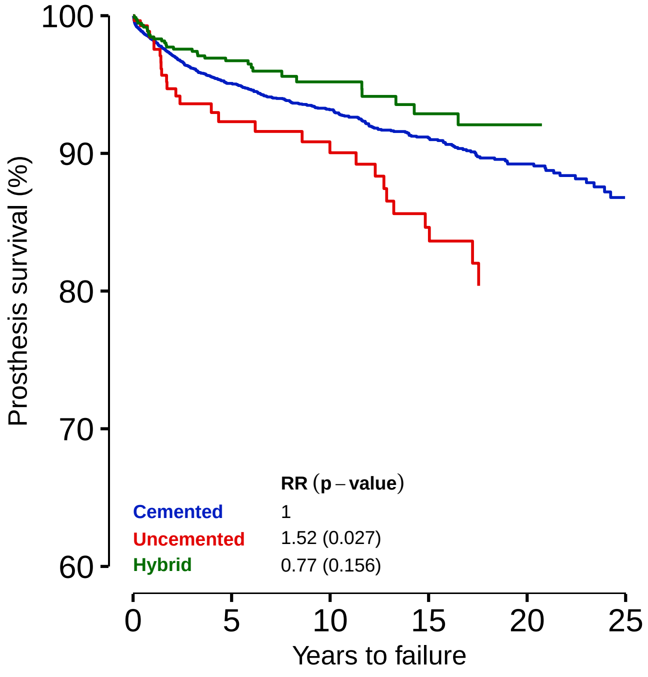
B.5) Total prosthesis



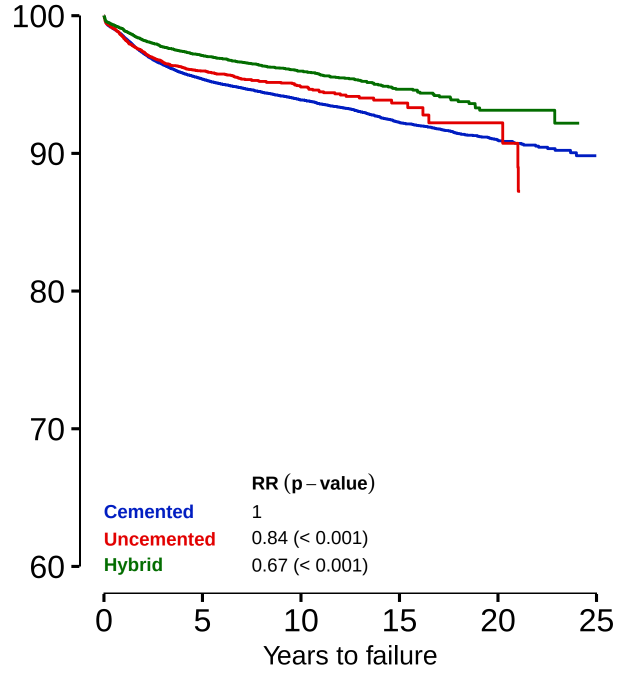
B.6) Unicondylar



B.7) Total with patella



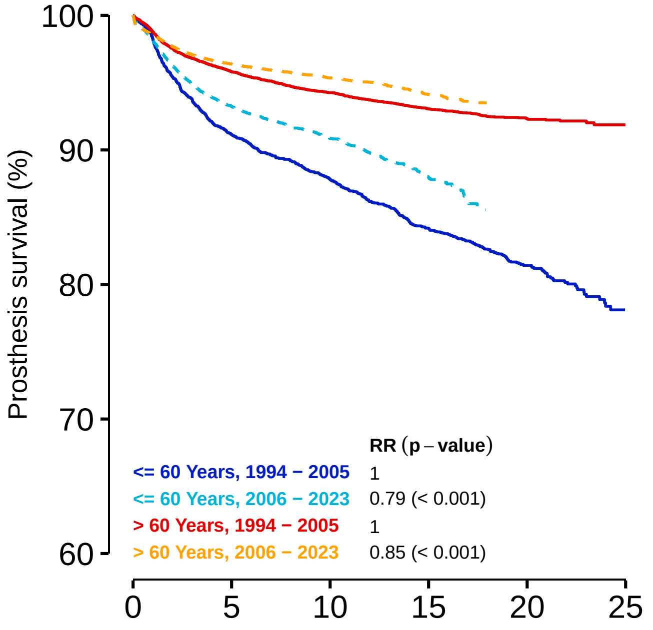
B.8) Total without patella



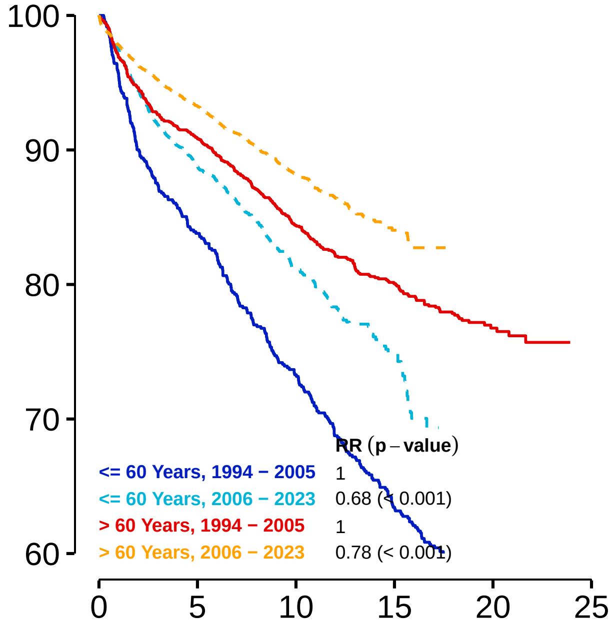
Kaplan−Meier survival curves. Survival estimate is given as long as > 50 prostheses are at risk.
Risk ratio (RR) estimates adjusted for age, sex and diagnosis.
There is some uncertainty tied to the risk estimates from the Cox−analysisis as the assumption of proportional hazard does not hold for all models.

Survival curves for knee prosthesis − Age
1994 − 2023

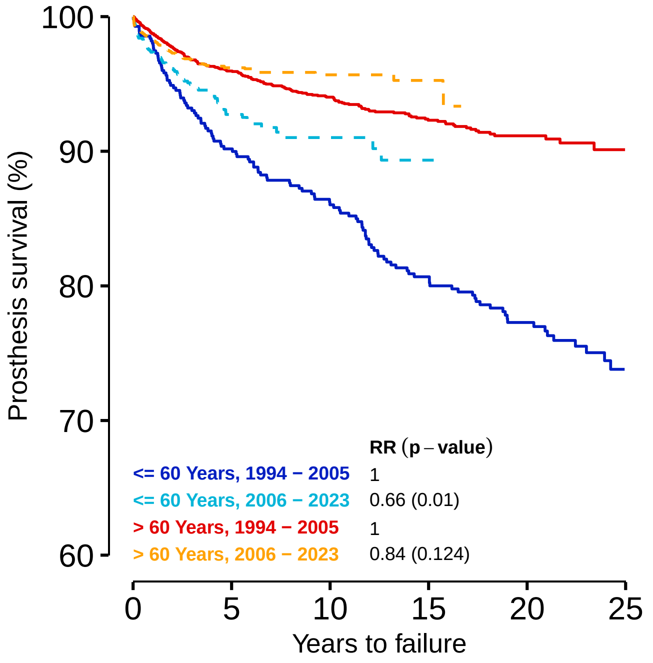
B.9) Total prosthesis



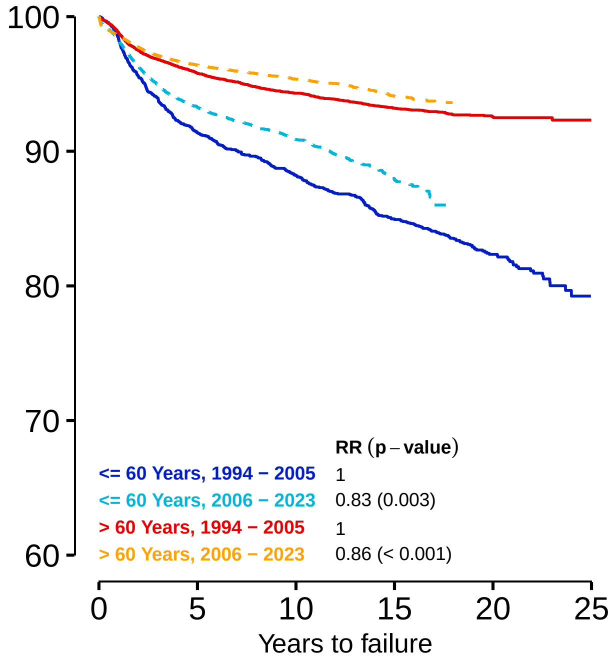
B.10) Unicondylar



B.11) Total with patella



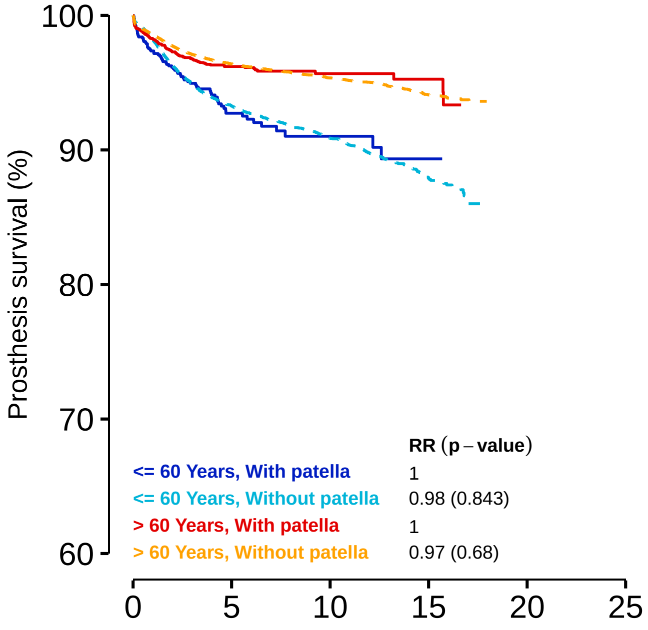
B.12) Total without patella



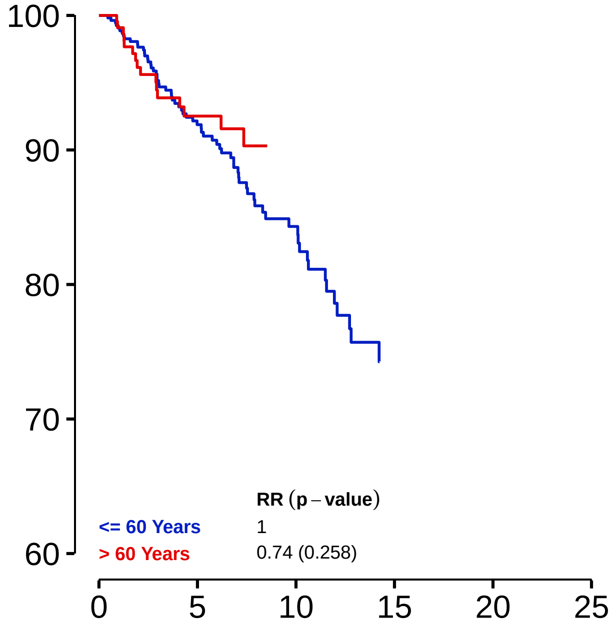
Kaplan−Meier survival curves. Survival estimate is given as long as > 50 prostheses are at risk.
Risk ratio (RR) estimates adjusted for age, sex and diagnosis.
For figures B.9−12 two Cox−regressions have been fit; one for each age group. the years 1994−2005 is used as reference in both models.
There is some uncertainty tied to the risk estimates from the Cox−analysisis as the assumption of proportional hazard does not hold for all models.

Survival curves for knee prostheses
1994 − 2023

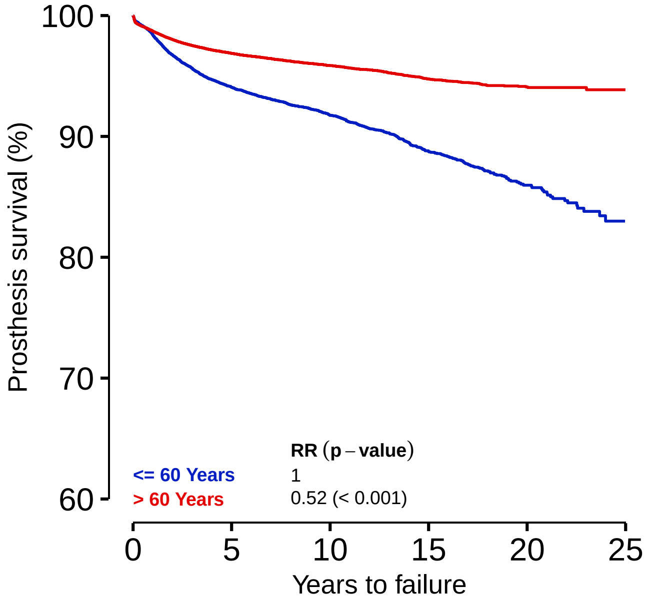
B.13) Total, 2006 − 23



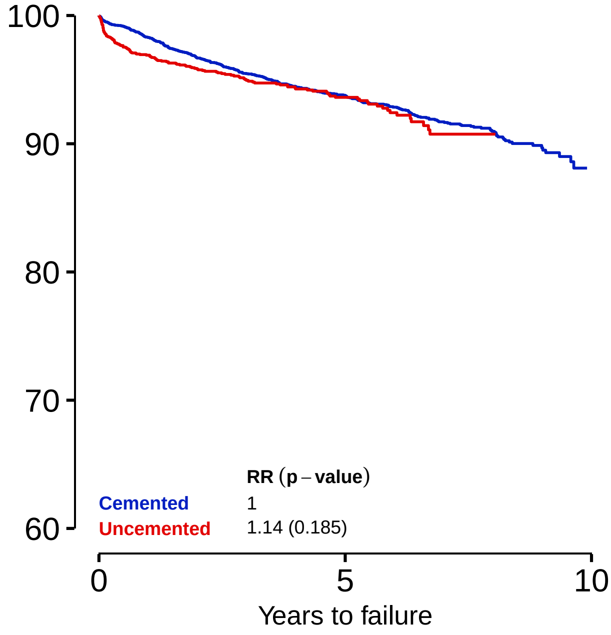
B.14) Patellofemoral



B.15) Total prostheses without patella where insertion of patella doesn't count as a revision



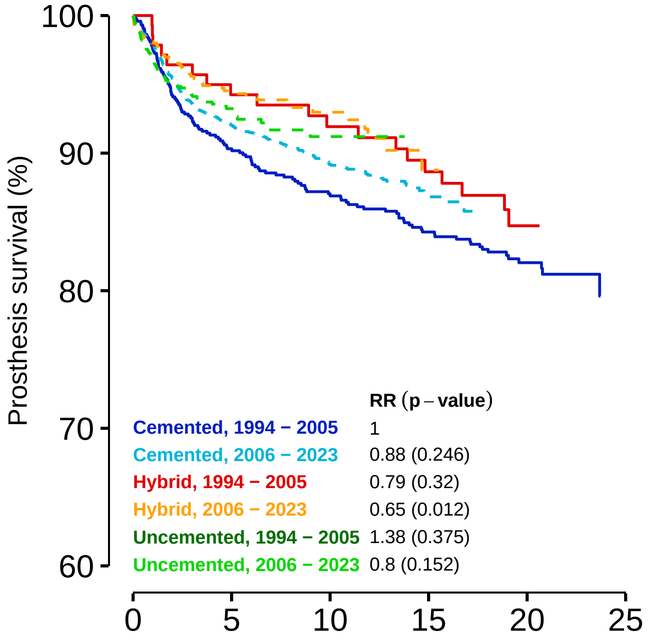
B.16) Unikcondylar prostheses cemented | uncemented



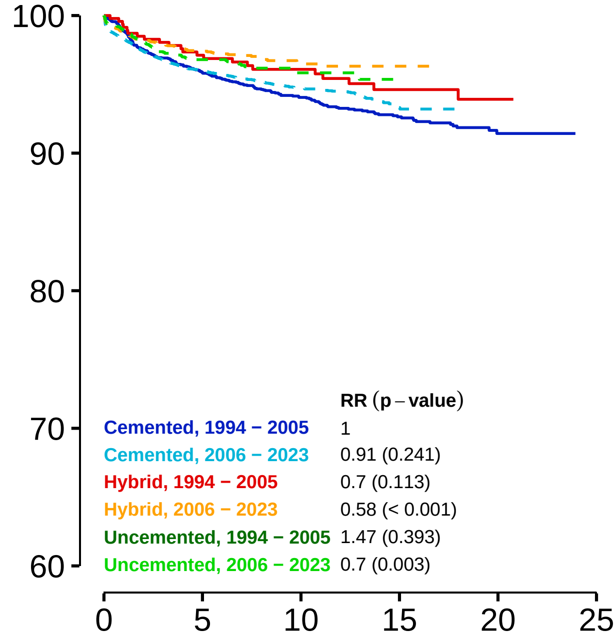
Kaplan−Meier survival curves. Survival estimate is given as long as > 50 prostheses are at risk.
Risk ratio (RR) estimates adjusted for age, sex and diagnosis.
For figure B.13 two Cox−regressions have been fit; one for each age group. the years 1994−2005 is used as reference in both models.
There is some uncertainty tied to the risk estimates from the Cox−analysisis as the assumption of proportional hazard does not hold for all models.

Survival curves for total prostheses in knee without patella component 1994 − 2023

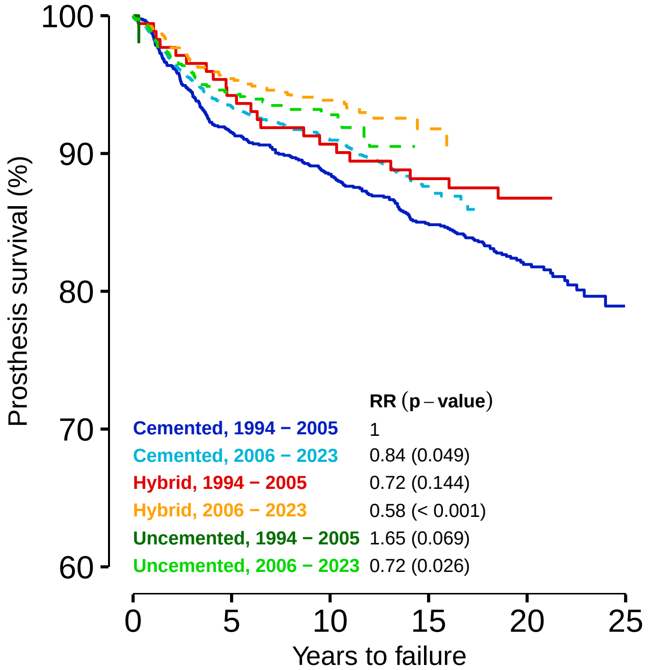
B.17) Men, under 60 years



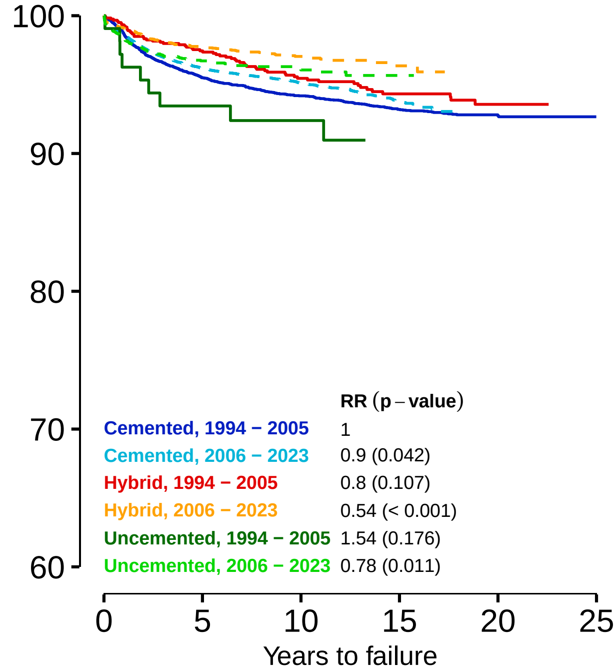
B.18) Men, over 60 years



B.19) Women, under 60 years



B.20) Women, over 60 years



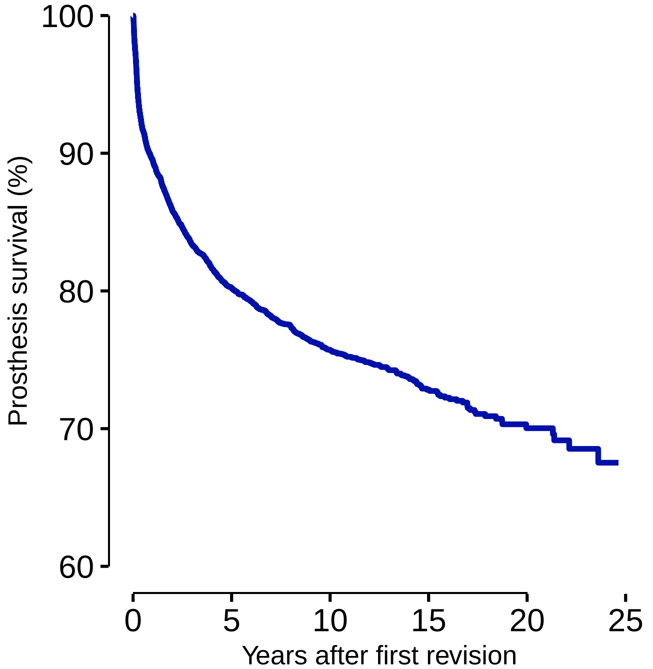
Kaplan−Meier survival curves. Survival estimate is given as long as > 50 prostheses are at risk.
Risk ratio (RR) estimates adjusted for age, sex and diagnosis.
There is some uncertainty tied to the risk estimates from the Cox−analysisis as the assumption of proportional hazard does not hold for all models.

Survival curves for revisions of knee prostheses

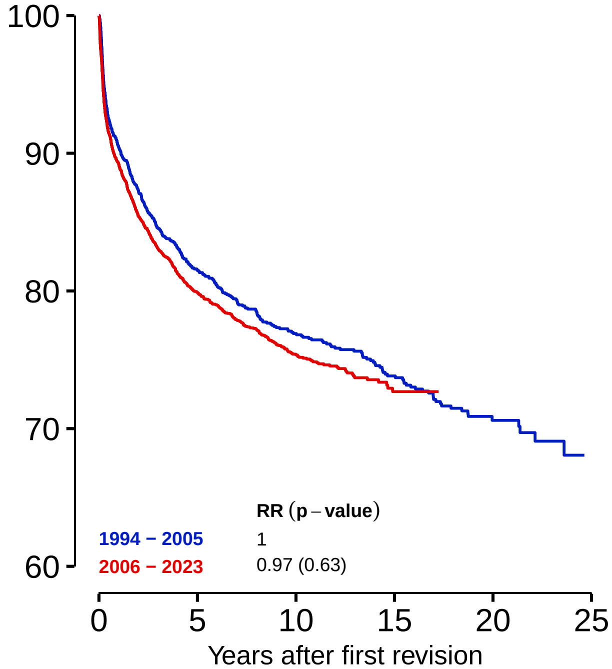
1994 − 2023

Norwegian Arthroplasty Register

B.21) All



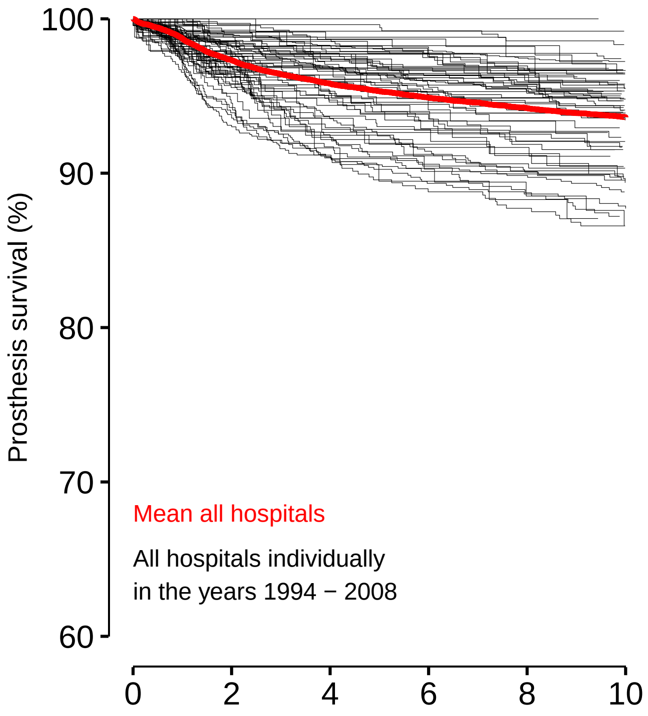
B.22) Two time−periods



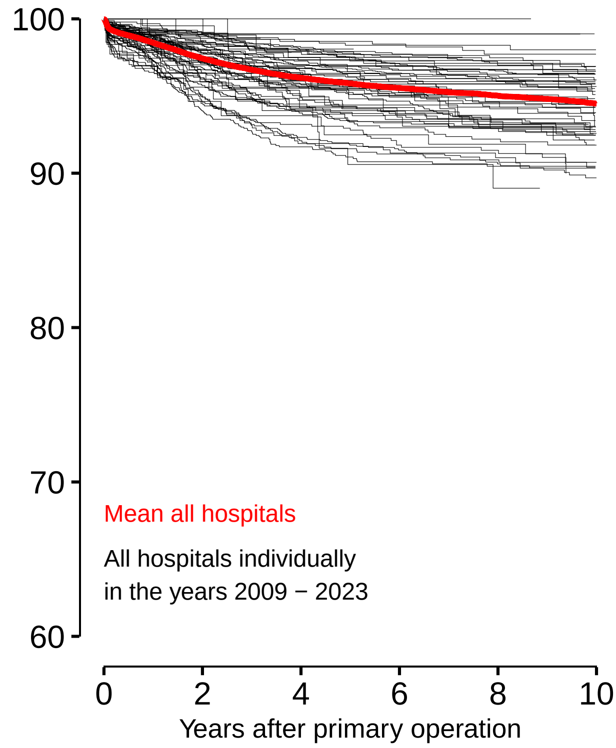
Kaplan−Meier survival curves. Survival estimate is given as long as > 50 prostheses are at risk.
Risk ratio (RR) estimates adjusted for age, sex and diagnosis.
There is some uncertainty tied to the risk estimates from the Cox−analysisis as the assumption of proportional hazard does not hold for all models.

Survival curves for total knee prostheses

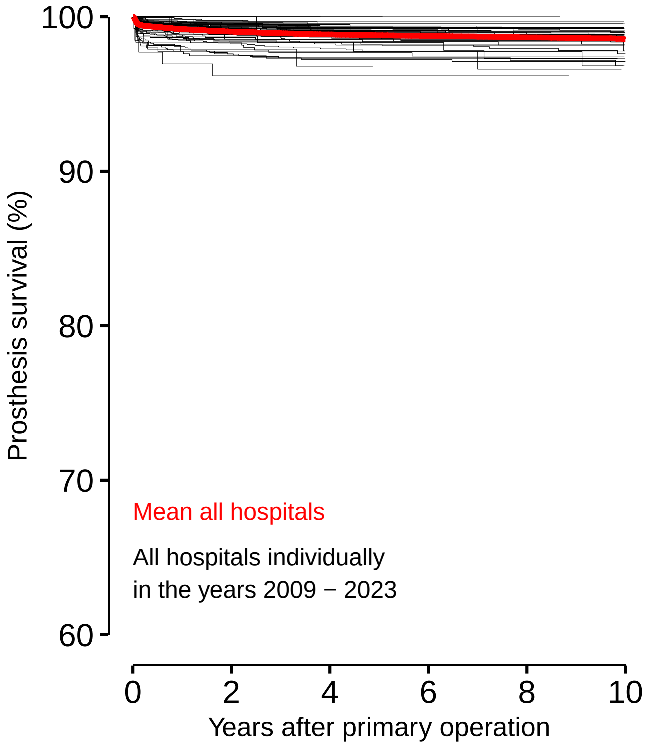
B.23) All hospitals in the years 1994 − 2008



B.24) All hospitals in the years 2009 − 2023

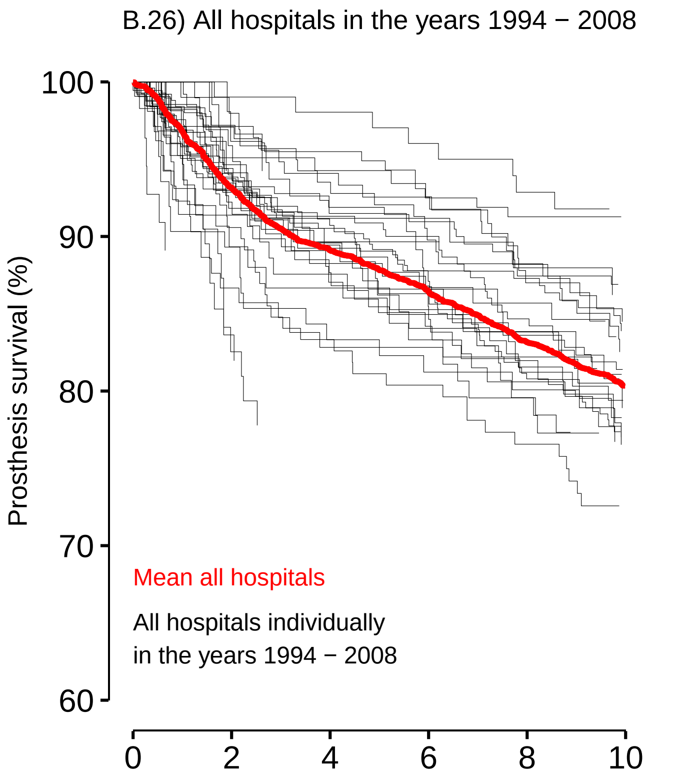


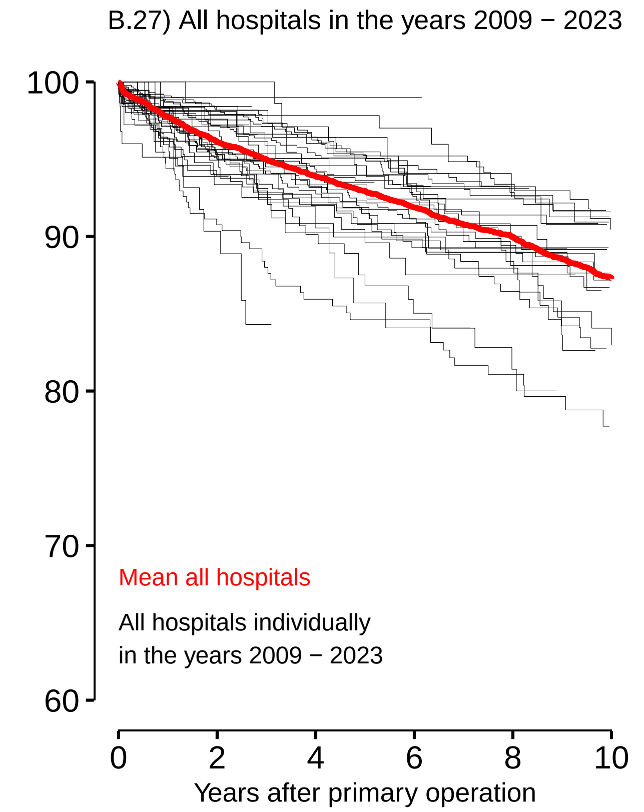
B.25) Endpoint revision for infection, 2009 − 2023

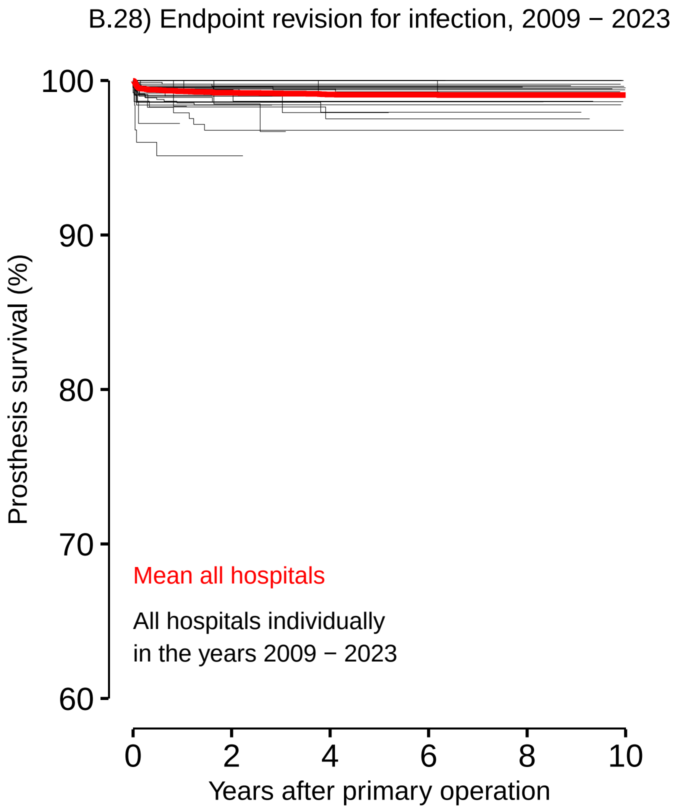


Survival curves for unicondylar knee prostheses

Norwegian Arthroplasty Register







One stage bilateral operation in knee arthroplasty

Year	1994-2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Sum:
Number of patients	124	43	50	79	74	74	88	109	89	69	84	883

A one stage bilateral operation is an operation where the patient is operated on both knees during the same operation or on the same day. Only primary operations are included.

FIGURE B.29: Number of primary operations in knee at each hospital, 2023

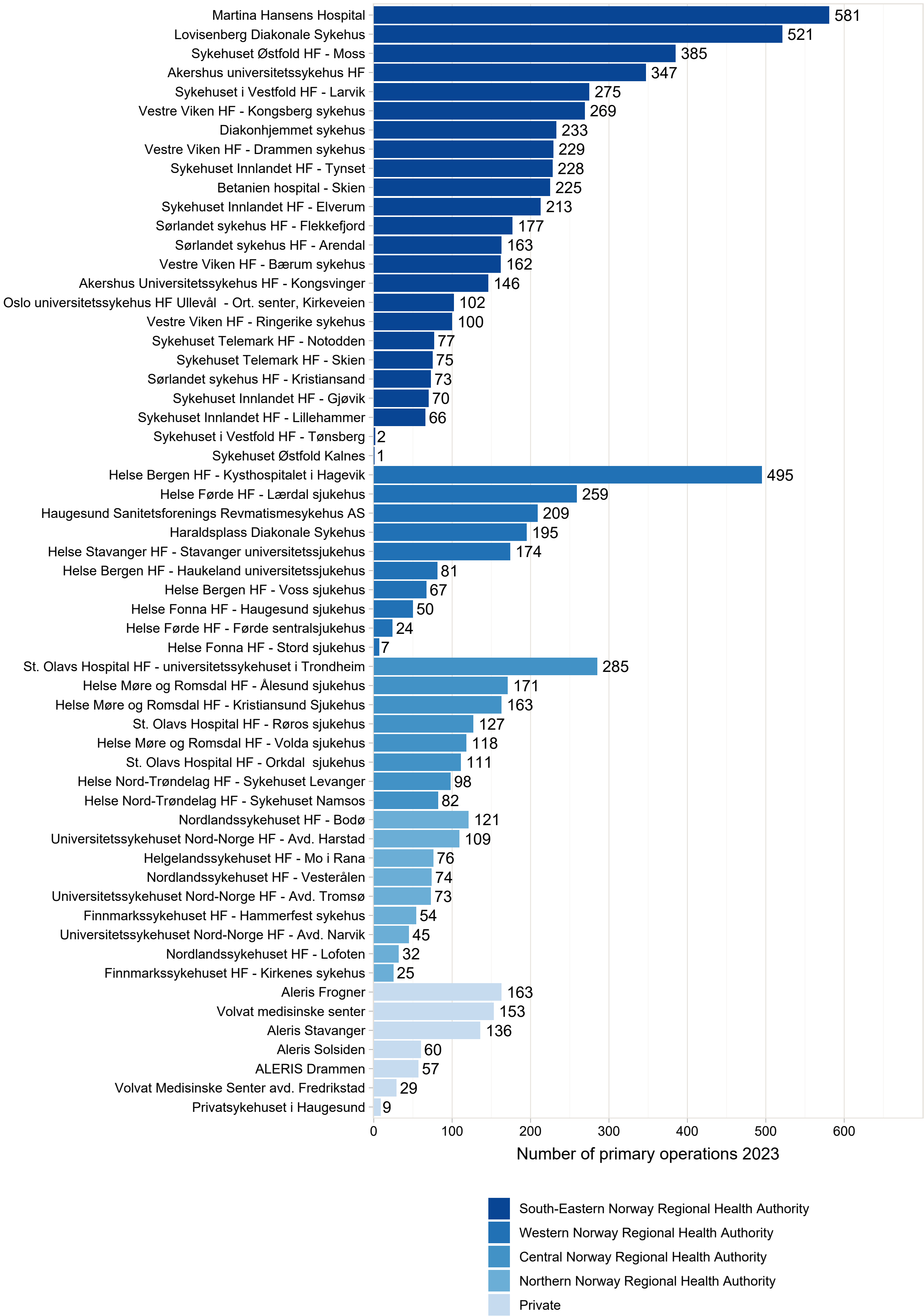
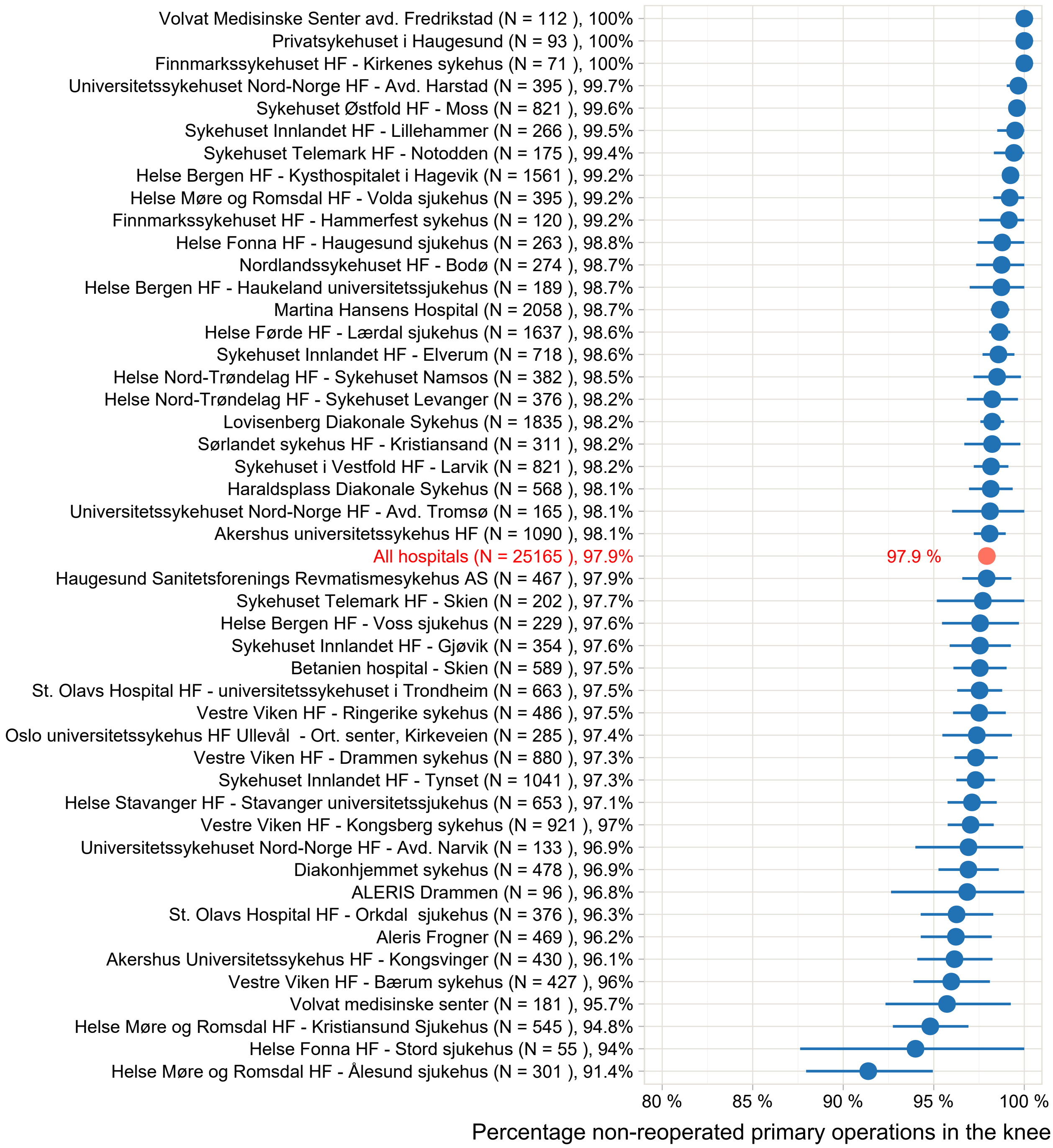


FIGURE B.30: Percentage non-revised standard knee replacement patients two years after operations in 2017-2023



Kaplan-Meier estimates of percentage non-revised standard patients after two years with 95 % confidence interval. Standard patients are patients between 55 and 85 years old, with ASA class 1 or 2, with idiopathic arthrosis at primary operation and with total prostheses. Endpoint is all revisions. Reoperations, i.e. revision operations without insertion, removal or replacement of the prosthesis, are excluded. Included are all patients operated on in the years 2017 to 2023. Only hospitals with operations in 2023 and with more than 50 operations from 2017 to 2023 are included. A further requirement is that the hospital must have at least 30 patients followed up for more than two years. Only hospitals with completeness of at least 80 % for revisions from 2017 to 2020 are included.

FIGURE B.31: Percentage nonrevised standard patients two years after operation in 2017-2023 in hospitals with completeness of reporting <80% of revisions

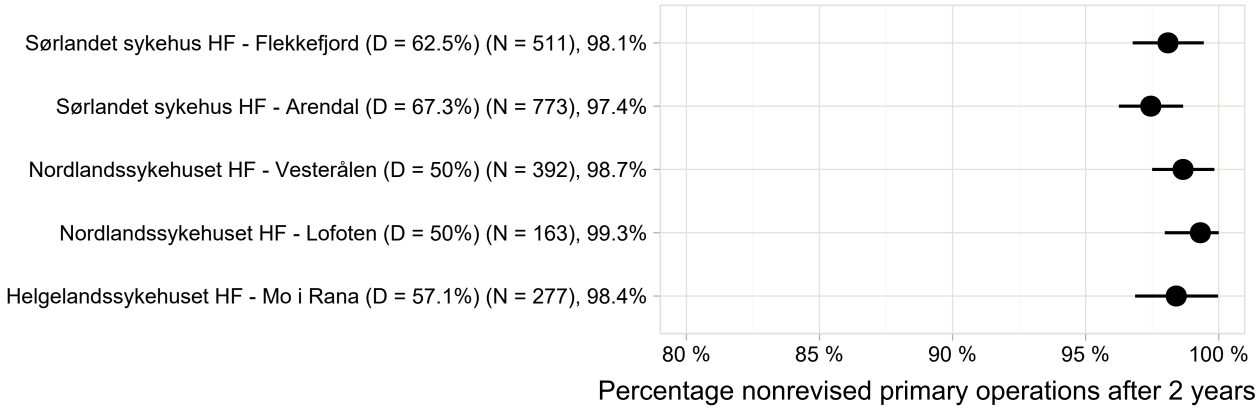
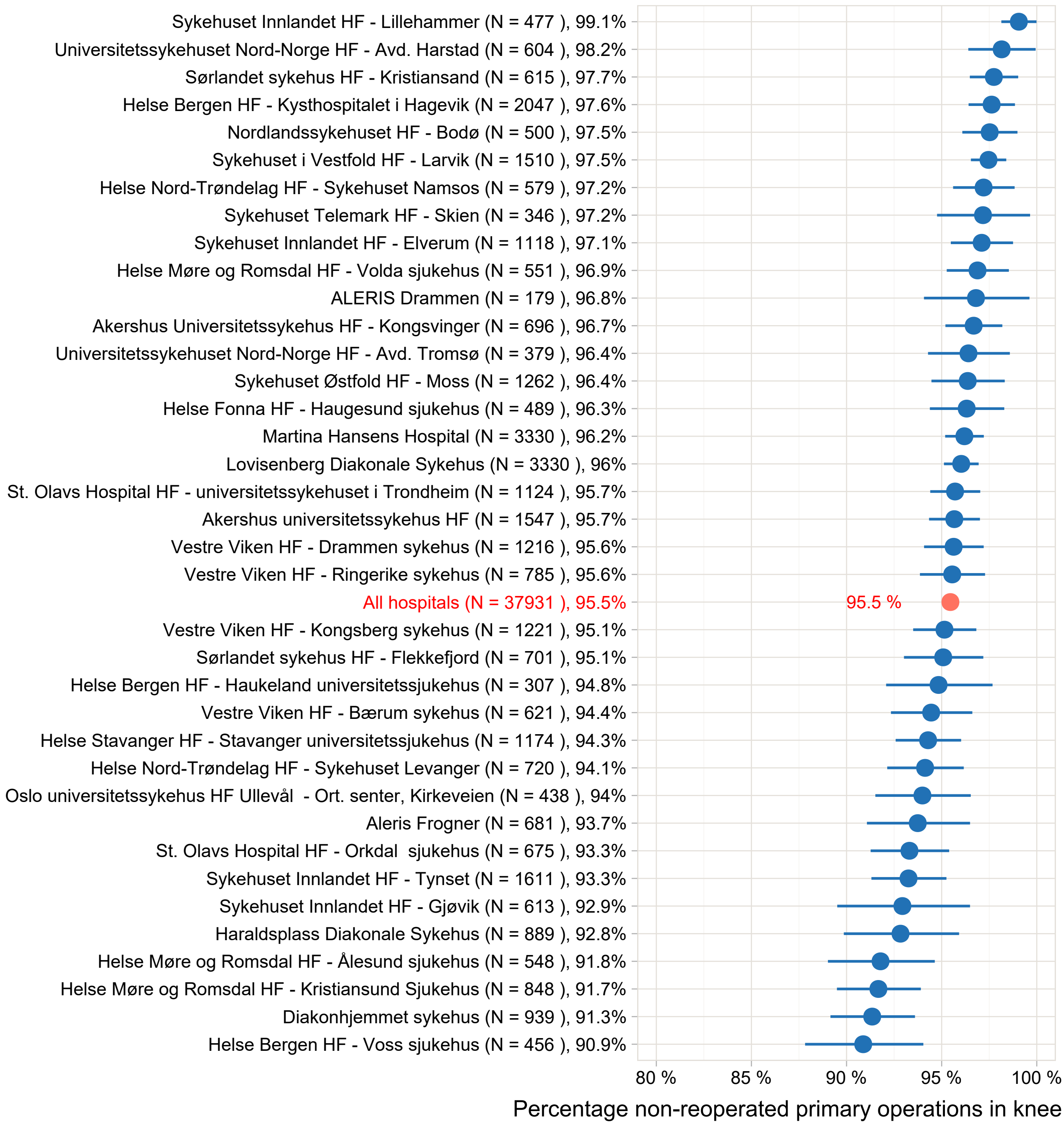


FIGURE B.32: Percentage non-revised standard patients ten years after operations in 2012-2023



Kaplan-Meier estimates of percentage non-revised standard patients after ten years with 95 % confidence interval. Standard patients are patients between 55 and 85 years old, with ASA class 1 or 2, with idiopathic arthrosis at primary operation and with total prostheses. Endpoint is all revisions. Reoperations, i.e. revision operations without insertion, removal or replacement of the prosthesis, are excluded. Included are all patients operated on in the years 2012 to 2023. Only hospitals with operations in 2023 and with more than 50 operations from 2012 to 2023 are included. A further requirement is that the hospital must have at least 30 patients followed up for more than ten years. Only hospitals with completeness of at least 80 % for revisions from 2008 to 2020 are included.

See “How to interpret the hospital-based results” page 22.

FIGURE B.33: Percentage nonrevised standard patients ten years after operation in 2012-2023 in hospitals with completeness of reporting <80% of revisions

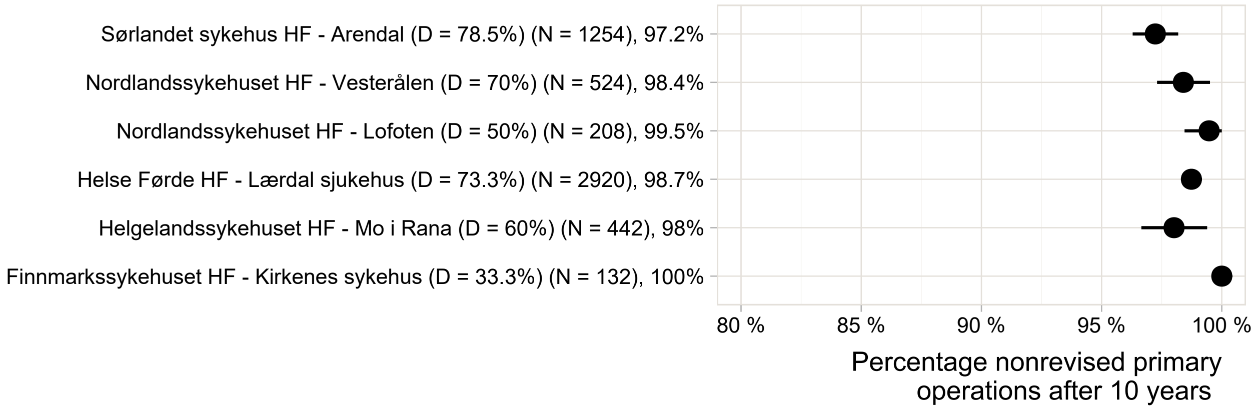
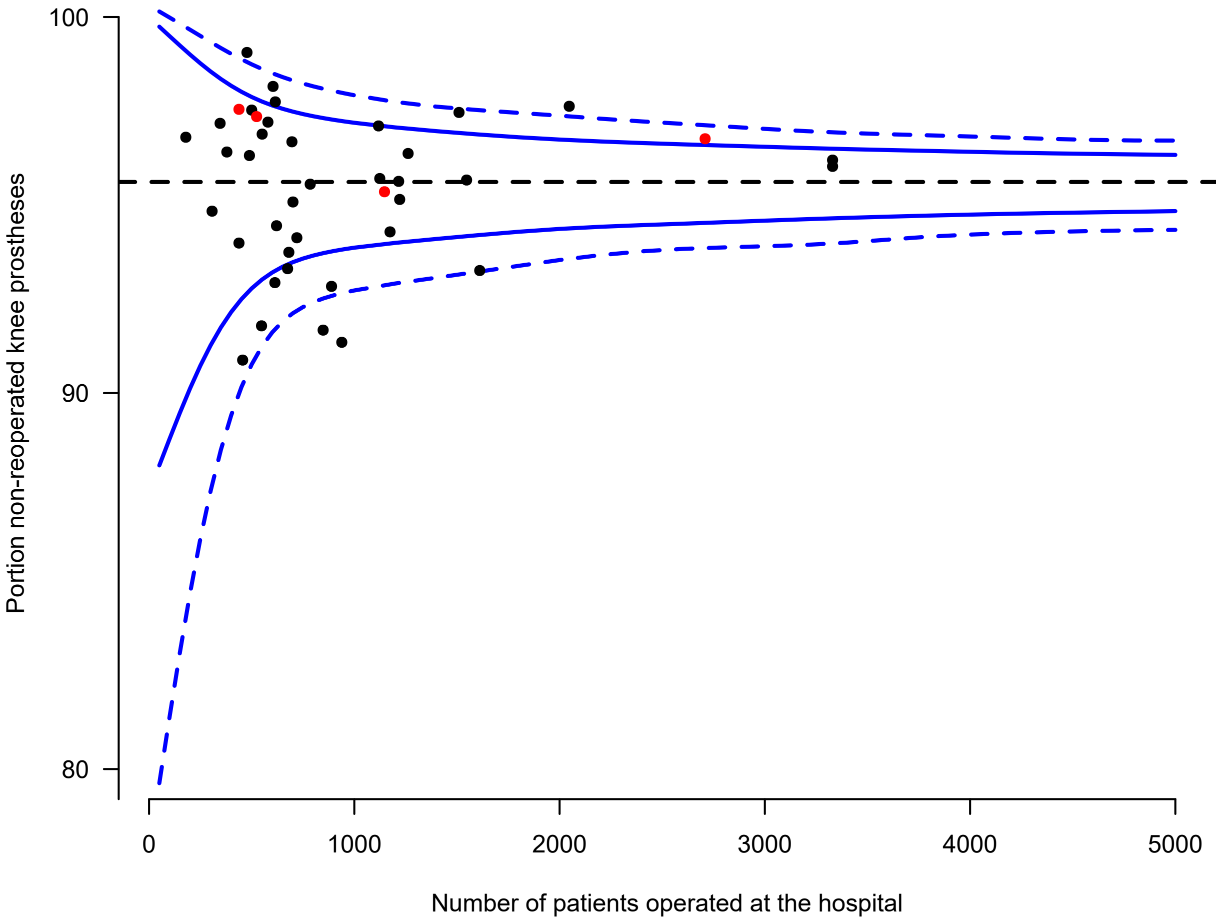


Figure B.34: Funnel plot, percentage non-revised standard patients ten years after operations in 2012-2023



Each point shows the percentage non-revised prostheses after 10 years for standard patients operated from 2012 to 2023 at Norwegian hospitals. Hospitals that have reported less than 80% of reoperations (2008- 2020) are marked in red in the figure. Some hospitals are excluded. This can be due to less than 50 knee prostheses have been operated in the period, that fewer than 30 patients have been followed up for more than 10 years, or that the hospital don't have any operations in 2023. The solid blue lines show the interval where 95 % of the Norwegian patients will be. The dotted blue lines show the interval where 99.8 % of the patients will be. Points to the right represents hospitals with many operations (see the x-axis). Points above or below the dotted lines are regarded as outliers with exceptionally good or exceptionally bad results respectively.

All of the black points in the funnel plot correspond to a hospital in figure B.32. By choosing any point, and using the corresponding values for "Number of patients" and "Portion non-reoperated" on the x and y axis respectively, the hospital belonging to the point can be found in figure B.32. The two hospitals with points below the dotted lines have inferior results. One of the hospitals has inserted patella components in many reoperations due to pain. This is a small reoperation, but can be beneficial for some patients with much pain. The threshold for inserting a patella component will therefore influence the number of reoperations at the hospital.

FIGURE B.35: Percentage non-reoperated total prostheses in knee after 3 and 10 years, 2012-2023.

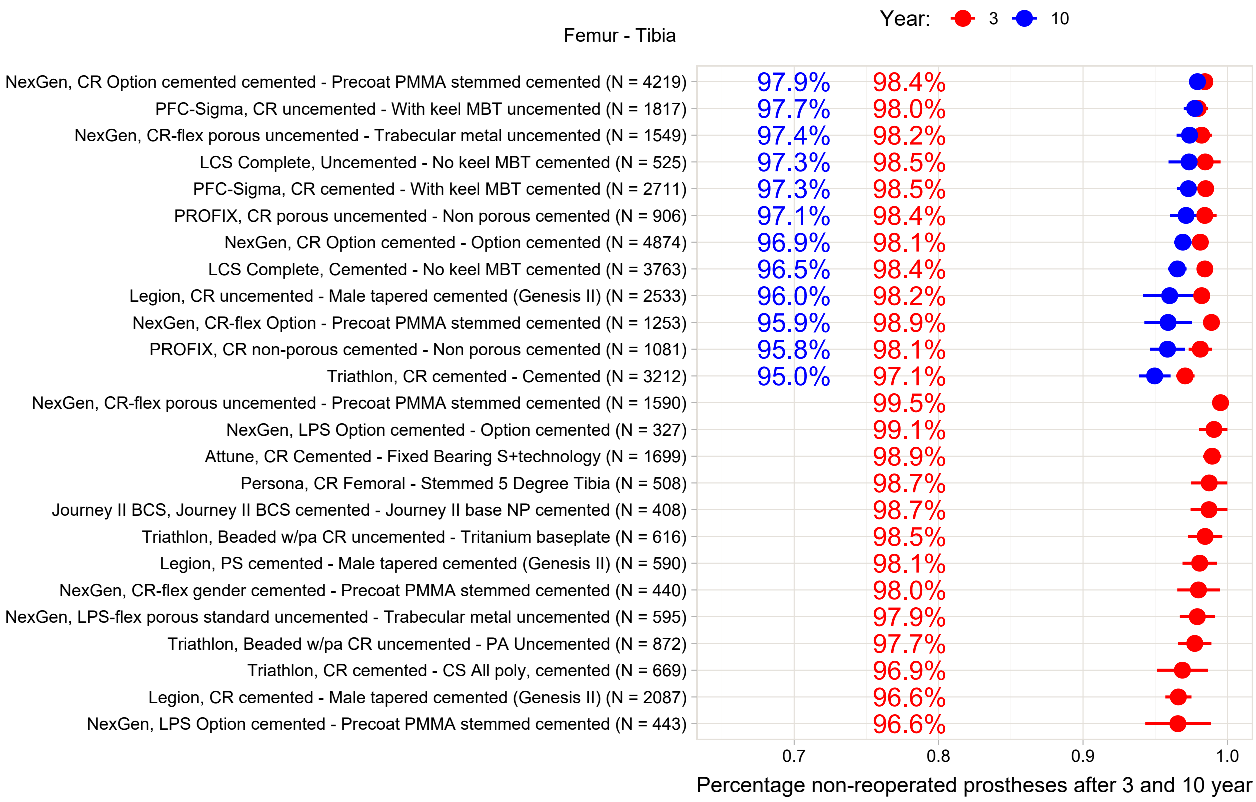


FIGURE B.36: Percentage non-reoperated uni prostheses in knee after 3 and 10 years, 2012-2023.

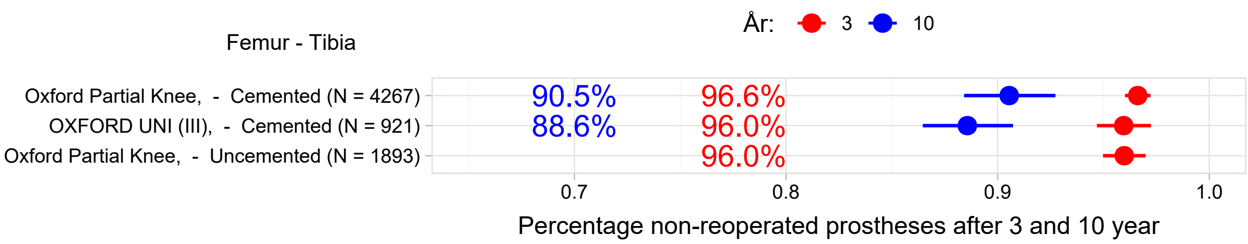
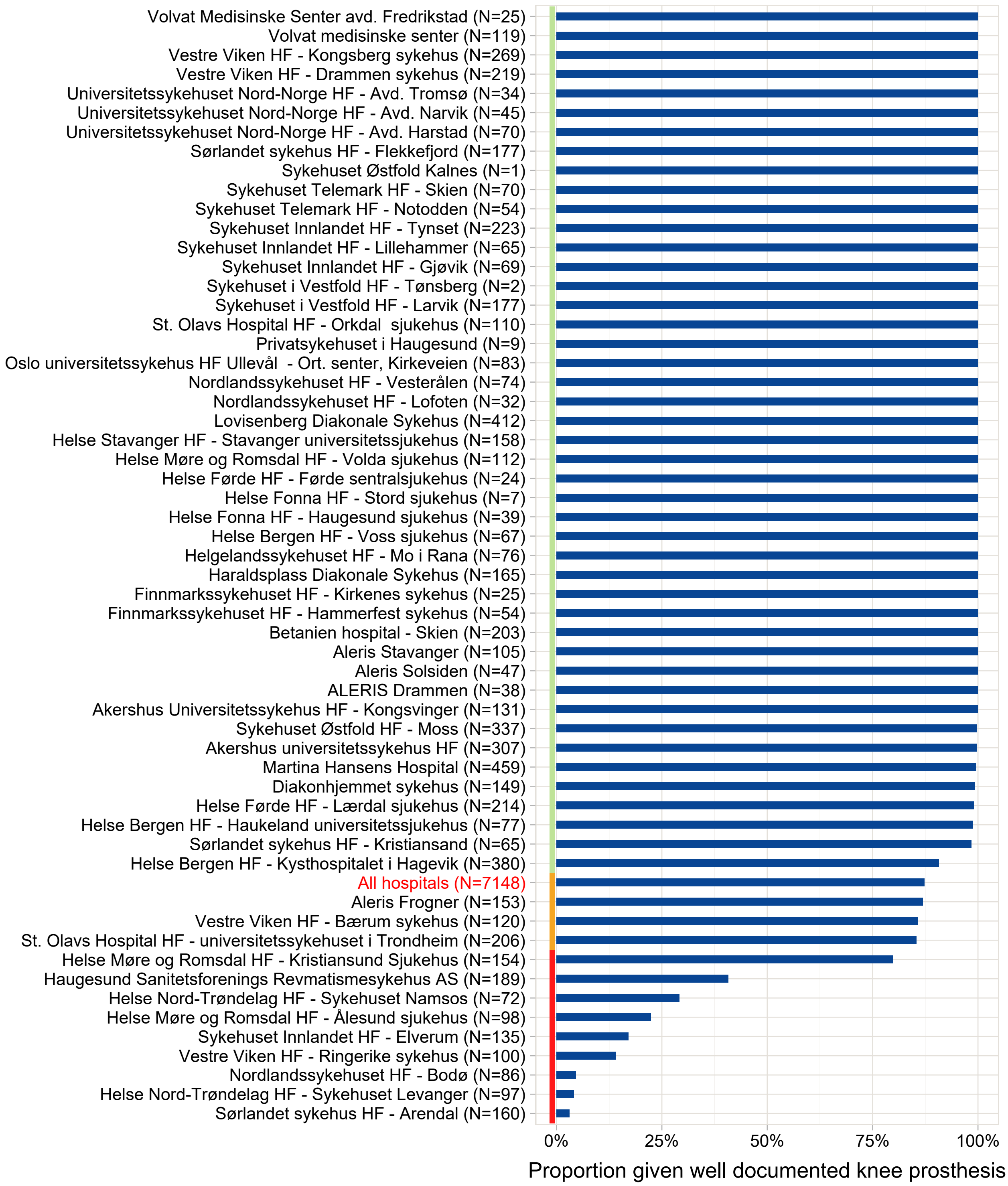


Figure B.35 and B.36 shows the estimated Kaplan-Meier percentage at three and ten years for different combinations of knee prostheses. We have only included combinations used in 500 or more operations in 2012-2023. A further requirement for inclusion in the figure is that there must still be at least 50 examples of the combination at three and ten years respectively. Only standard patients from 2012 to 2023 have been included, and the number of prostheses will therefore be below 500 in some cases. A standard patient is aged 55-85 years, has ASA class 1 or 2 and was diagnosed with idiopathic osteoarthritis at primary surgery. Using standard patients provides a more homogenous group of patients, and we believe that this makes the results more comparable. Endpoint is all revision operations, except infections and reoperations without insertion, removal or replacement of the prosthesis.

LCS and Profix knee prosthesis is no longer in use.

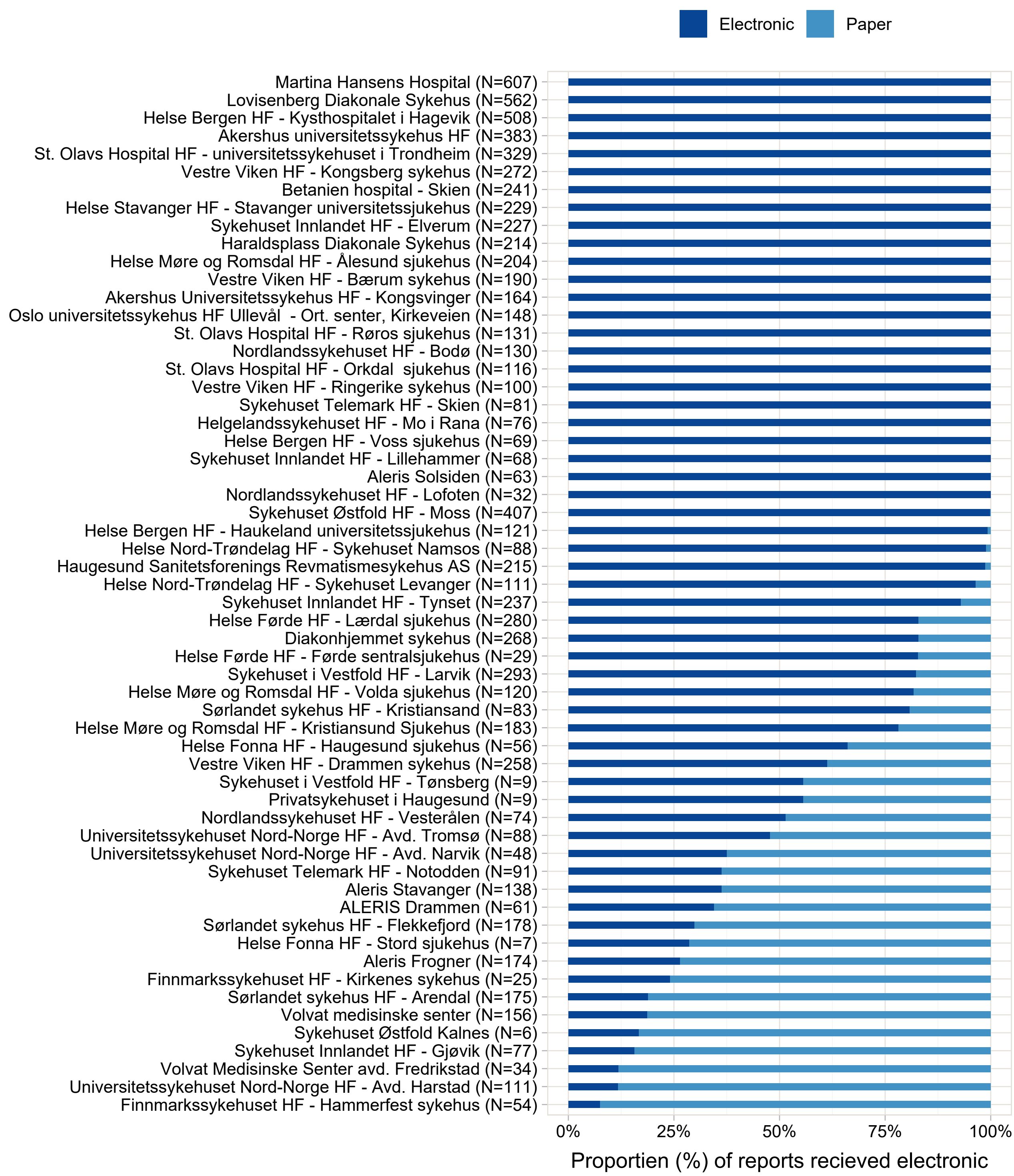
See section “How to interpret the prosthesis results” page 25.

FIGURE B.37: Portion of patients recieving well documented knee prosthesis by hospital and nationally in 2023



Most inserted knee replacements are well documented. Most hospitals that do not use well documented prosthetics use un-documented combinations of components and fixations within the well documented prosthetic-brands. Documentation is based on 10 year survival in line with the standards set by ODEP(Orthopaedic Data Evaluation Panel-UK). More information on documentation can be found on our web-page. We are grateful to hear any comments or corrections.

FIGURE B.38: Format of reporting 2023, all operations



National average for electronic form registration in 2023 is 84.3%. 7933 was registered electronically and in total 9408 registered.

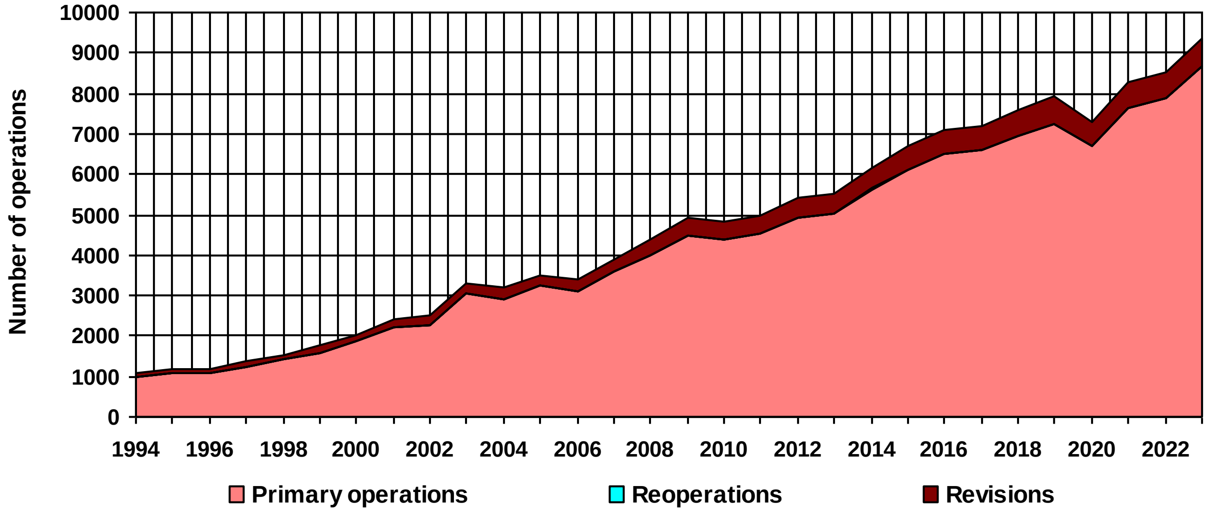
KNEE PROSTHESES

Table 1: Annual numbers of operations

Year	Primary operations		Reoperations *		Revisions		Total
2023	8 653	(92,4%)	62	(0,66%)	647	(6,9%)	**9 362**
2022	7 868	(92,5%)	58	(0,68%)	580	(6,8%)	**8 506**
2021	7 637	(92,2%)	53	(0,64%)	595	(7,2%)	**8 285**
2020	6 707	(92,0%)	36	(0,49%)	550	(7,5%)	**7 293**
2019	7 256	(91,8%)	32	(0,40%)	619	(7,8%)	**7 907**
2018	6 933	(91,2%)	29	(0,38%)	637	(8,4%)	**7 599**
2017	6 581	(91,3%)	26	(0,36%)	605	(8,4%)	**7 212**
2016	6 514	(91,5%)	25	(0,35%)	579	(8,1%)	**7 118**
2015	6 120	(91,7%)	14	(0,21%)	542	(8,1%)	**6 676**
1994-14	62 706	(91,6%)	29	(0,04%)	5 740	(8,4%)	**68 475**
Total	**126 975**	**(91,7%)**	**364**	**(0,26%)**	**11 094**	**(8,0%)**	**138 433**

* Reoperation where prosthetic parts were not changed or removed, such as soft tissue debridements for infected prosthesis where prosthetic parts were not changed and osteosyntheses of fractures.

Figure 1a: Annual numbers of operations



53 % of all operations were performed on the right side. 60,5 % performed in women.
Mean age at primary surgery was 68,5 years, 69 years for women and 67,7 years for men
Mean age at primary surgery was 70,2 years in 1994, 70,8 years for women and 68,3 years for men.
Mean age at primary surgery was 68,6 years in 2023, 68,6 years for women and 68,6 years for men.

Incidence

Figure 2a: Incidence of primary knee prostheses

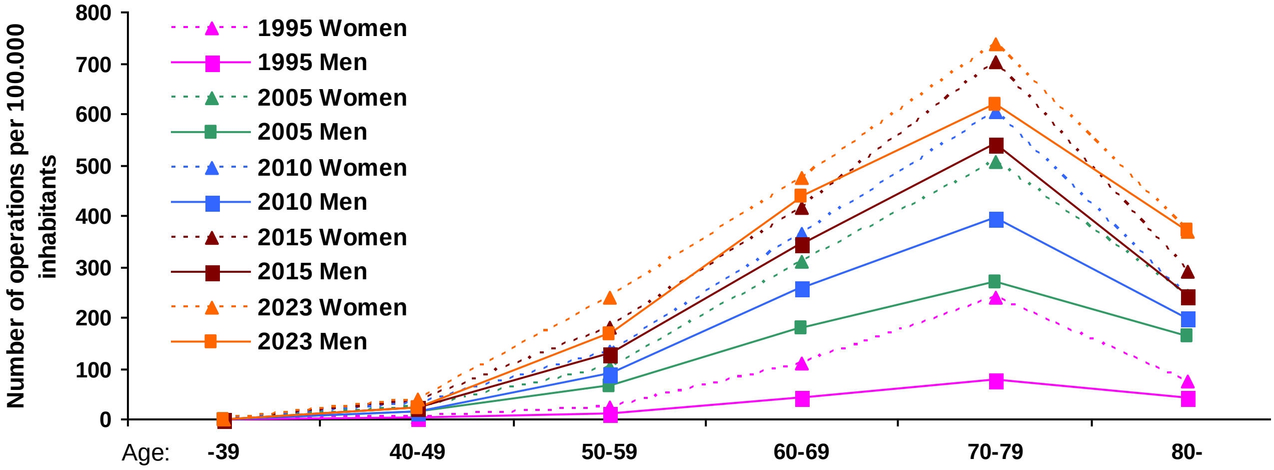


Figure 2b: Annual total incidence of primary knee prostheses for men and women

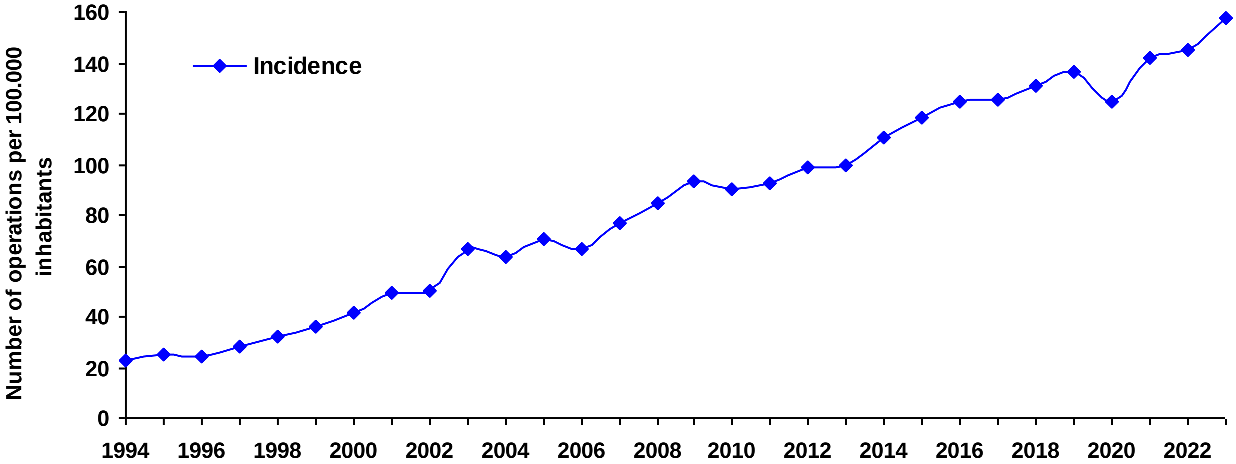


Figure 2c: Status of knee replacement surgery in the period 1994-2023 per 31.12.2023

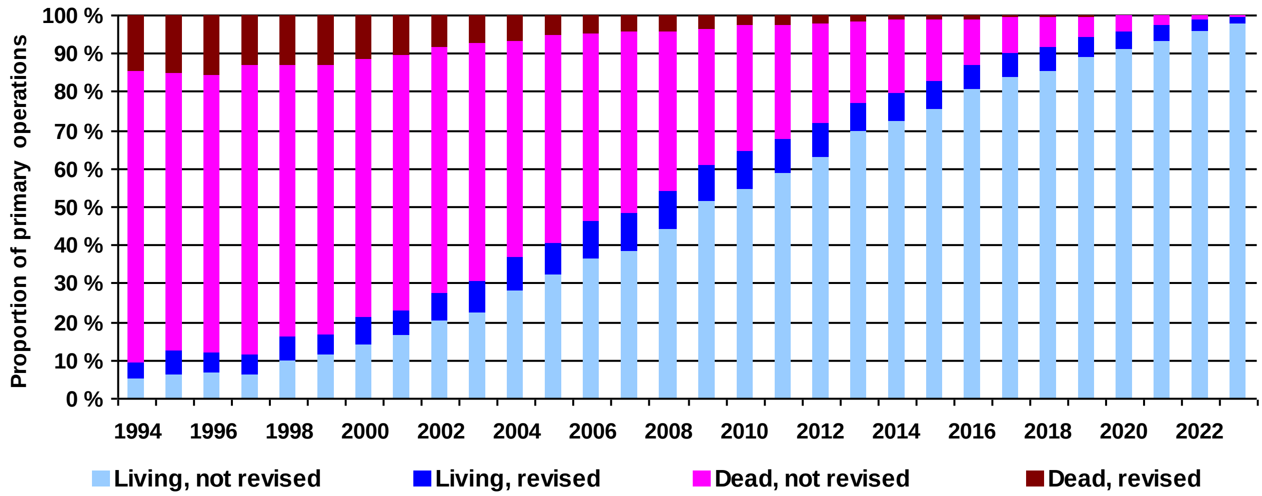


Figure 3: Age at the insertion of primary total knee prostheses

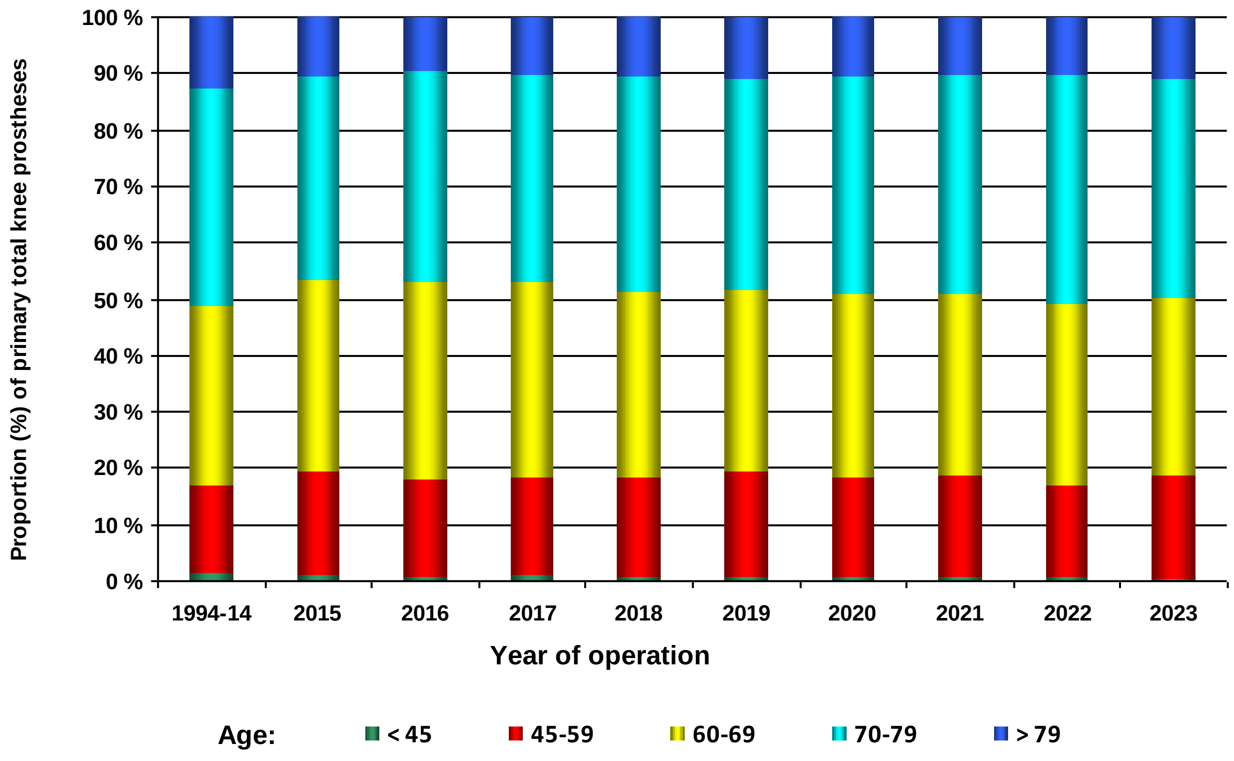


Figure 4: Age at the insertion of primary unicondylar knee prostheses

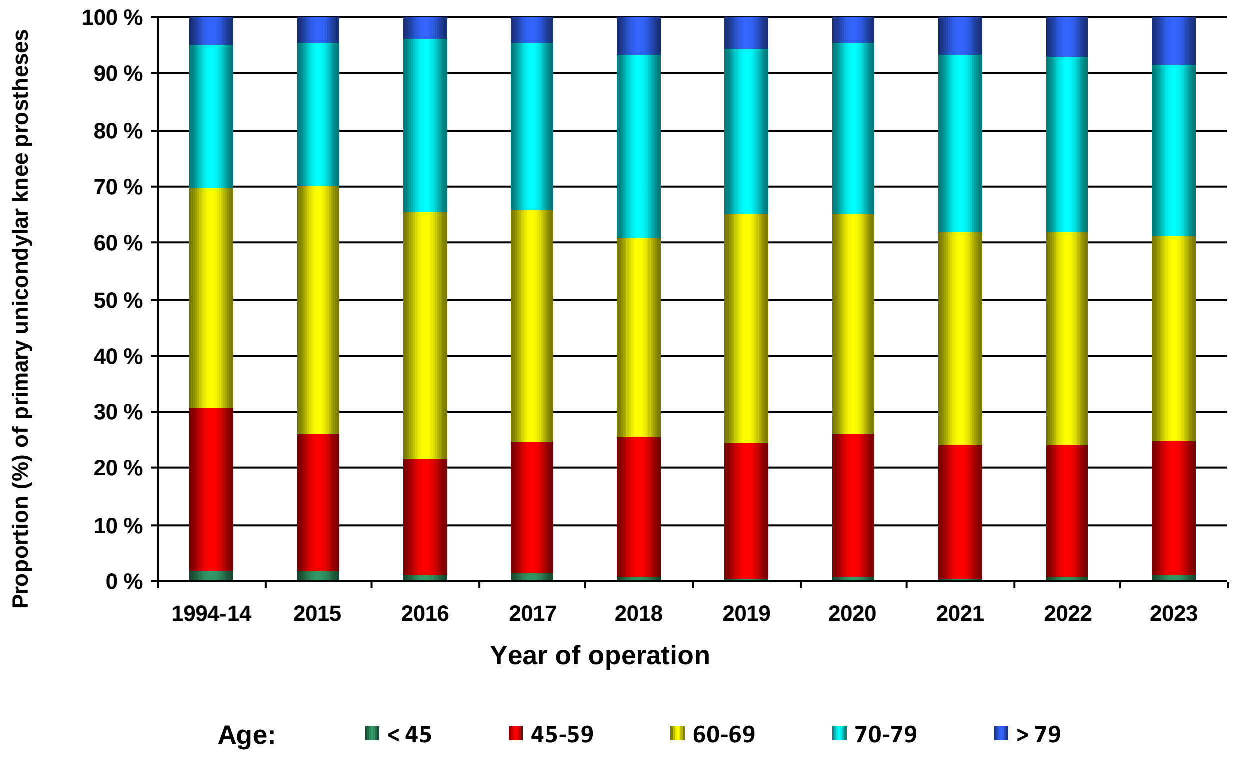


Figure 5: Age and sex at the insertion of primary total knee prostheses

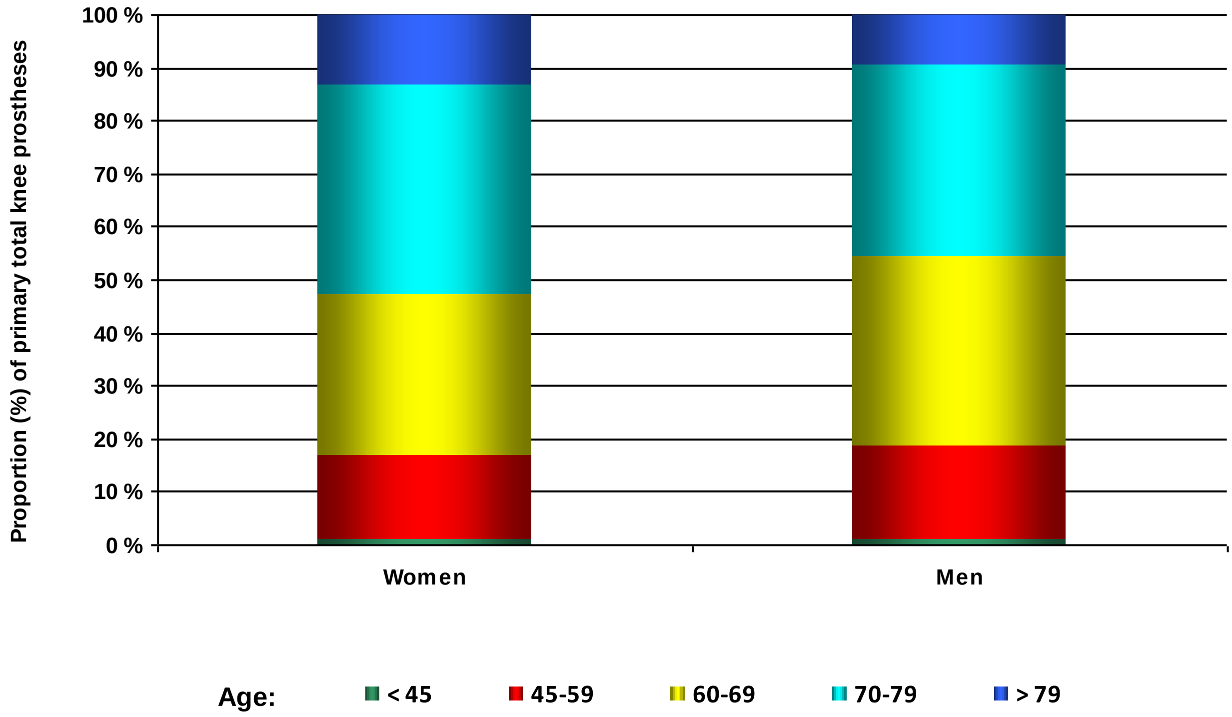
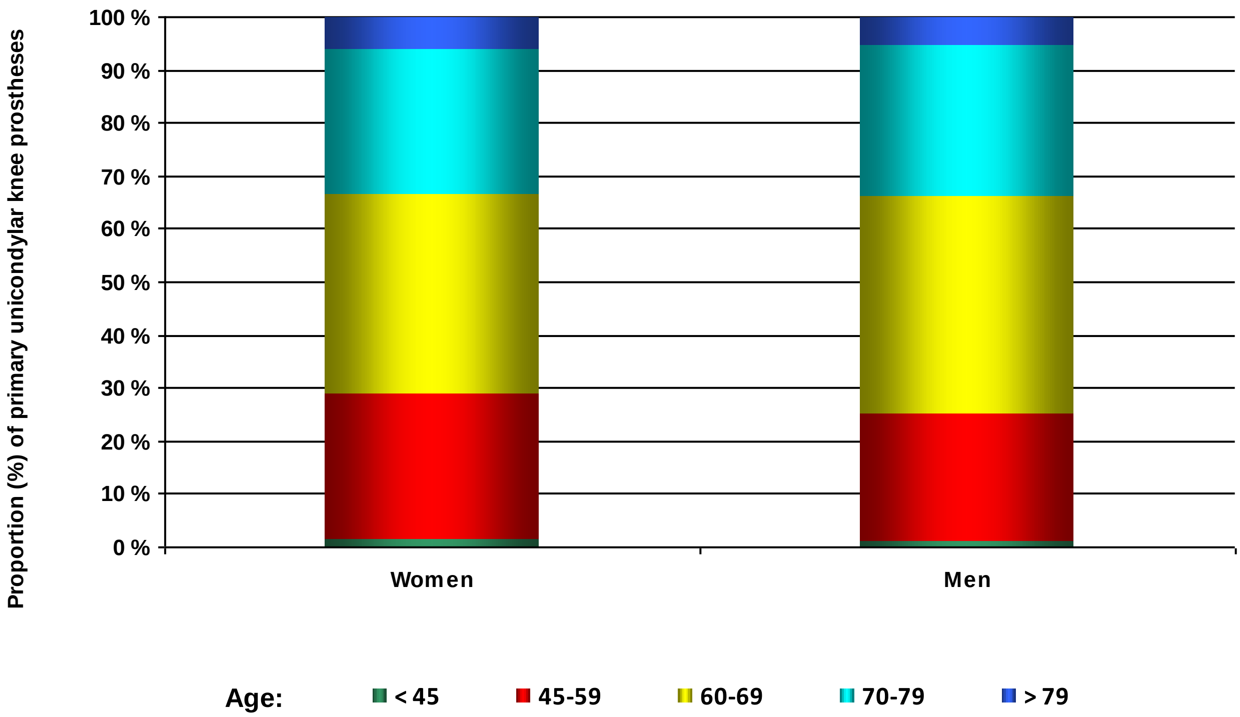


Figure 6: Age and sex at the insertion of primary unicondylar knee prostheses



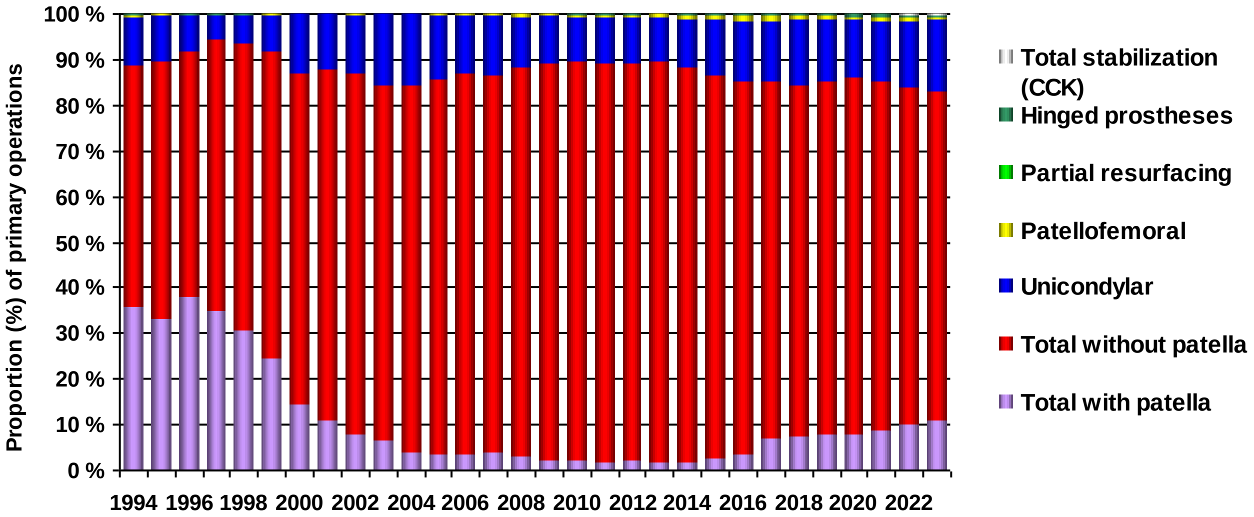
Types of knee prostheses

Table 2: Primary operations

Year	Total with patella		Total without patella		Unicondylar		Patello-femoral		Partial resurfacing		Hinged * prostheses		Total stab. (CCK)		Total
2023	940	(10,9%)	6 241	(72,1%)	1 344	(15,5%)	54	(0,6%)			44	(0,5%)	29	(0,3%)	**8 653**
2022	790	(10,0%)	5 798	(73,7%)	1 138	(14,5%)	69	(0,9%)			53	(0,7%)	20	(0,3%)	**7 868**
2021	659	(8,6%)	5 834	(76,5%)	1 007	(13,2%)	71	(0,9%)			53	(0,7%)	4	(0,1%)	**7 628**
2020	527	(7,9%)	5 248	(78,2%)	842	(12,6%)	44	(0,7%)	1	(0,0%)	45	(0,7%)			**6 707**
2019	586	(8,1%)	5 589	(77,0%)	995	(13,7%)	53	(0,7%)			33	(0,5%)			**7 256**
2018	504	(7,3%)	5 338	(77,0%)	1 001	(14,4%)	58	(0,8%)			31	(0,4%)	1	(0,0%)	**6 933**
2017	454	(6,9%)	5 152	(78,3%)	868	(13,2%)	75	(1,1%)			32	(0,5%)			**6 581**
2016	221	(3,4%)	5 329	(81,8%)	863	(13,2%)	68	(1,0%)	1	(0,0%)	32	(0,5%)			**6 514**
2015	160	(2,6%)	5 134	(83,9%)	753	(12,3%)	39	(0,6%)			33	(0,5%)			**6 119**
1994-14	4 439	(7,1%)	50 932	(81,2%)	6 931	(11,1%)	261	(0,4%)	1	(0,0%)	140	(0,2%)			**62 706**
Total	**9 280**	**(7,3%)**	**100 595**	**(79,2%)**	**15 742**	**(12,4%)**	**792**	**(0,6%)**	**3**	**(0,0%)**	**496**	**(0,4%)**	**54**	**(0,0%)**	**126 965**

* Indicated by the surgeon on the report form

Figure 7a: Primary operations



Classification of stability and modularity in primary total prostheses (with and without patella component)

Table 3a:

	MS					PS						
	CR		UC									
Year	All poly	MT	All poly	MT	MP *	All poly	MT	CCK	Rotating platform	Hinged * prostheses	Segmental prostheses	Total
2023	1	4 931	217	583	187	0	820	55	420	42	3	**7 277**
2022	0	4 102	182	460	139	0	895	38	778	47	5	**6 657**
2021	0	4 158	207	240	121	1	775	33	945	50	4	**6 547**
2020	21	3 699	224	234	129	1	608	33	821	43	3	**5 820**
2019	92	4 024	11	175	233	1	607	33	989	28	4	**6 206**
2018	1	3 579	0	137	269	1	568	26	1 244	28	3	**5 870**
2017	0	3 201	0	130	331	0	544	42	1 348	31	1	**5 637**
2016	4	3 165	0	95	408	0	472	19	1 370	27	5	**5 578**
2015	2	3 140	0	37	332	0	348	23	1 403	30	3	**5 326**
2014	2	3 077	0	34	251	0	150	23	1 416	18	2	**4 988**
2013	1	2 876	0	149	102	0	78	31	1 254	8	1	**4 522**
2012	5	2 465	0	266	42	0	39	18	1 490	16	1	**4 403**
2011	5	1 833	0	528	43	0	22	12	1 491	17	2	**4 080**
2010	3	1 740	0	605	29	0	32	7	1 429	15	3	**3 963**
2009	3	1 812	0	613	38	0	19	10	1 421	3	2	**3 989**
2008	1	1 569	0	555	15	0	43	6	1 325	8	0	**3 531**
1994-07	8	15 076	0	855	78	0	262	82	7 852	36	2	**25 951**
Total	**149**	**64 447**	**841**	**5 696**	**2 747**	**4**	**6 282**	**491**	**26 996**	**447**	**44**	**110 345**

CR = Posterior cruciate retaining
MS = Minimally stabilized = Posterior cruciate retaining prosthesis and deep dish
UC = Ultra congruent (dished)
* MP = Medial Pivot knee has no all poly
PS = Posterior cruciate stabilizing prostheses
CCK = Constrained Condylar Knee = high level stabilized
MT = Metal backed tibia
All poly = All polyethylene tibial component

* Information taken from the catalogue number of prostheses

Figure 7b:

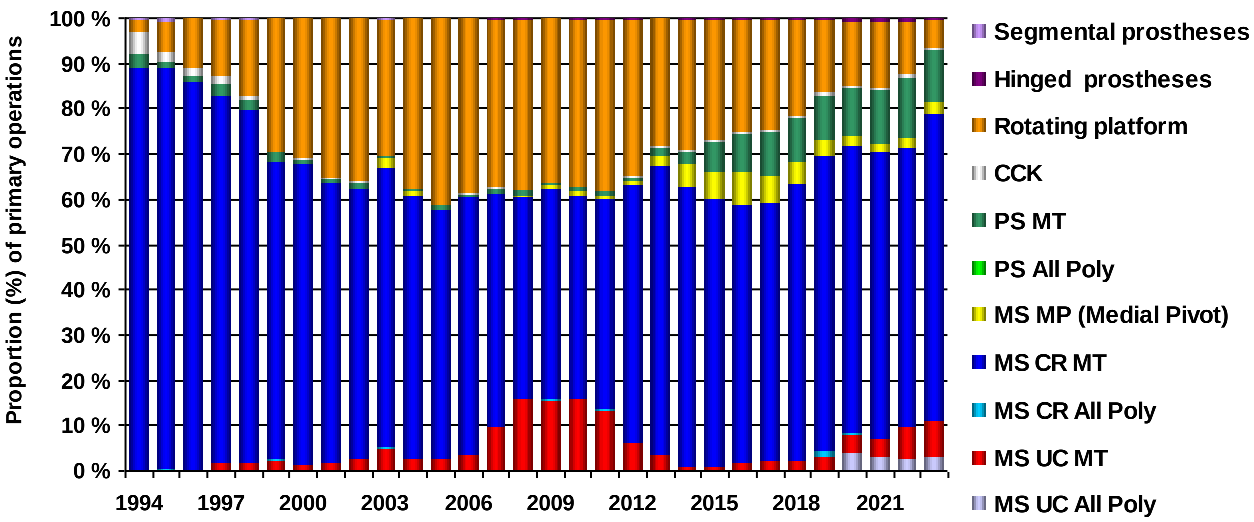


Table 3b: Classification of stability and modularity in revision total prostheses (with and without patella component)

	MS					PS						
	CR		UC									
Year	All poly	MT	All poly	MT	MP *	All poly	MT	CCK	Rotating platform	Hinged * prostheses	Segmental prostheses	Total
2023	0	97	0	38	11	0	115	66	62	93	10	**492**
2022	0	93	0	30	9	0	105	64	53	86	6	**446**
2021	0	101	0	19	11	0	106	63	71	80	7	**459**
2020	0	85	0	11	10	0	108	94	62	58	4	**432**
2019	1	88	0	30	18	0	120	80	82	72	9	**500**
2018	1	109	0	25	15	0	113	109	93	42	2	**509**
2017	0	87	0	17	20	0	134	66	89	63	2	**478**
2016	0	72	0	23	15	0	96	67	80	72	7	**432**
2015	0	82	0	29	16	0	102	50	75	59	7	**420**
2014	0	79	0	19	16	0	59	69	90	56	6	**395**
2013	1	74	0	56	0	0	61	77	87	29	3	**388**
2012	0	66	0	68	10	0	40	51	102	29	1	**369**
2011	1	77	0	52	2	0	21	63	98	22	1	**341**
2010	0	60	0	81	1	0	12	69	94	12	0	**332**
2009	0	58	0	77	4	0	13	46	121	21	0	**346**
2008	0	71	0	46	1	0	12	26	121	12	0	**291**
1994-07	1	565	0	284	3	1	199	99	518	48	0	**1 833**
Total	**5**	**1 864**	**0**	**905**	**162**	**1**	**1 416**	**1 159**	**1 898**	**854**	**65**	**8 463**

CR = Posterior cruciate retaining
MS = Minimally stabilized = Posterior cruciate retaining prosthesis and deep dish
UC = Ultra congruent (dished)
* MP = Medial Pivot knee has no all poly
PS = Posterior cruciate stabilizing prostheses
CCK = Constrained Condylar Knee = high level stabilized
MT = Metal backed tibia
All poly = All polyethylene tibial component

* Information taken from the catalogue number of prostheses

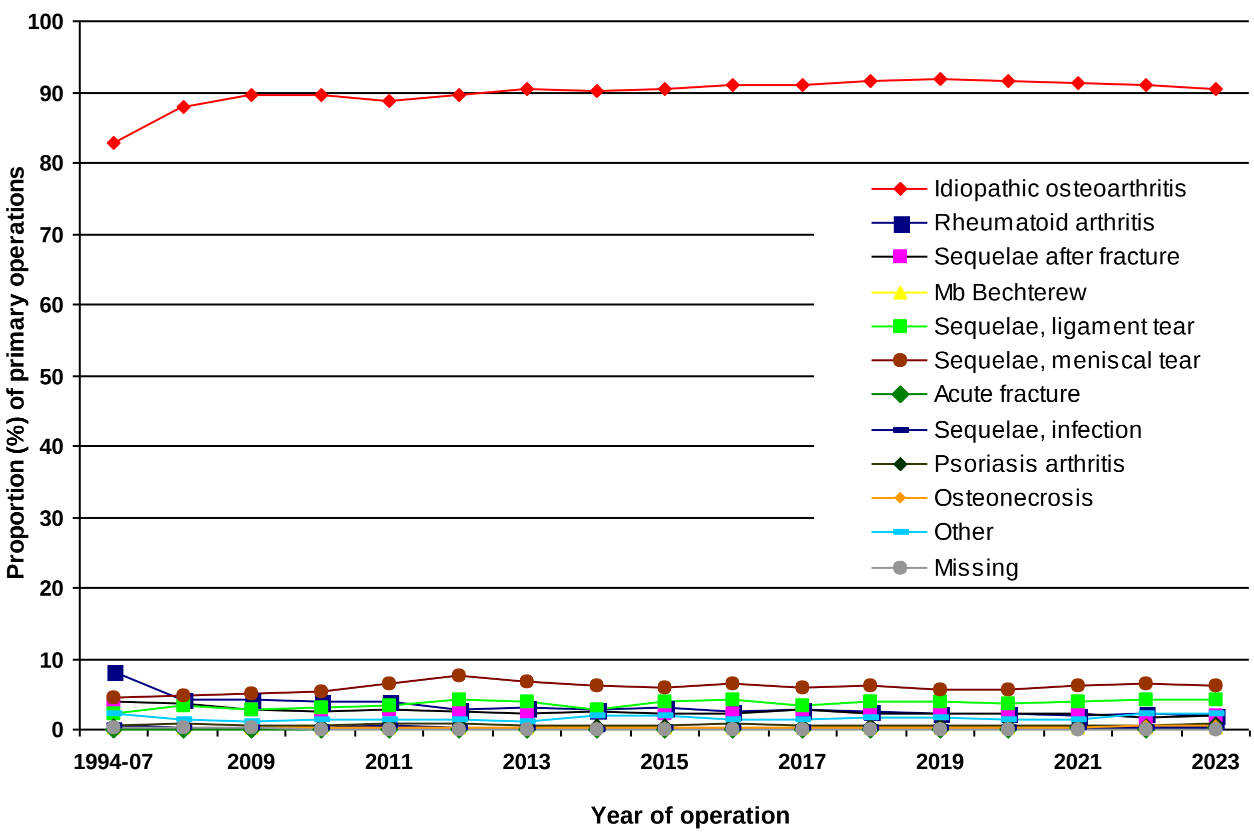
Reasons for primary operations - Total knee prostheses

Table 4:

Year	Idiopathic osteoarthritis	Rheumatoid arthritis	Sequelae after fracture	Mb. Bechterew	Sequelae, ligament tear	Sequelae, meniscal tear	Acute fracture	Sequelae, infection	Psoriasis arthritis	Osteonecrosis	Other	Missing
2023	6 557	139	146	16	302	455	21	20	62	34	155	9
2022	6 061	147	118	17	274	427	9	26	41	29	145	3
2021	5 971	134	140	15	254	410	10	14	30	23	100	5
2020	5 320	130	131	22	216	332	5	11	28	20	86	0
2019	5 694	134	145	14	239	350	7	13	29	16	101	0
2018	5 376	146	139	13	235	365	5	13	28	13	96	0
2017	5 134	159	153	19	191	339	3	18	39	14	78	0
2016	5 076	139	126	18	232	368	2	11	40	15	86	0
2015	4 811	166	122	16	205	321	1	18	36	10	107	2
2014	4 504	142	126	22	144	308	3	7	30	16	94	2
2013	4 088	145	96	11	174	311	1	17	29	9	45	4
2012	3 951	127	111	15	184	332	2	13	33	11	61	4
2011	3 625	163	115	12	137	262	1	20	35	10	55	2
2010	3 552	157	103	13	119	217	2	9	25	9	57	3
2009	3 580	167	118	11	117	200	2	13	25	7	46	10
2008	3 109	151	125	14	117	169	3	9	30	10	52	8
1994-07	21 571	2 157	1 035	109	607	1 166	26	111	161	69	572	91
Total	**97 980**	**4 503**	**3 049**	**357**	**3 747**	**6 332**	**103**	**343**	**701**	**315**	**1 936**	**143**

Diseases are not mutually exclusive. More than one reason for operation is possible

Figure 8:



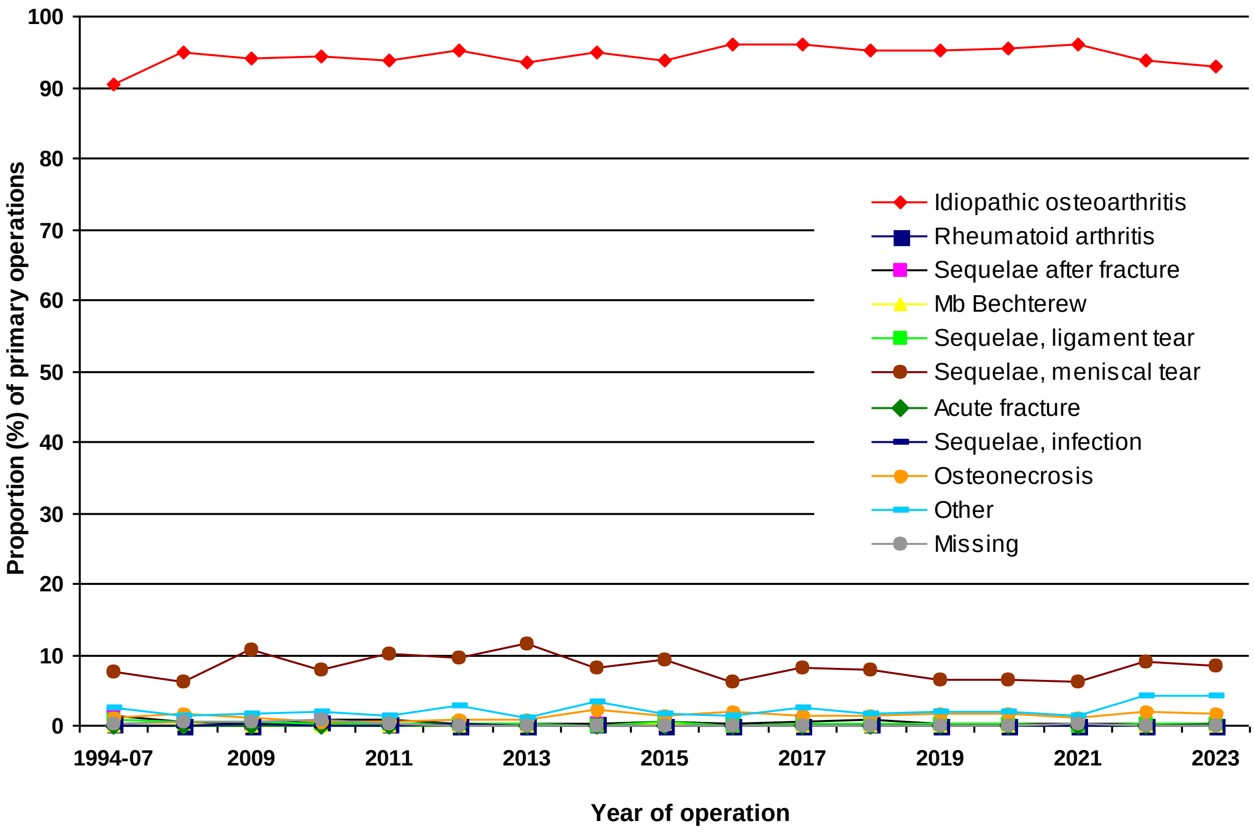
Reasons for primary operations - Unicondylar knee prostheses

Table 5:

Year	Idiopathic osteoarthritis	Rheumatoid arthritis	Sequelae after fracture	Mb. Bechterew	Sequelae, ligament tear	Sequelae, meniscal tear	Sequelae, infection	Osteonecrosis	Other	Missing
2023	1 251	0	4	1	2	113	0	21	58	0
2022	1 066	0	2	0	2	104	1	22	49	0
2021	967	0	2	1	0	61	0	11	13	2
2020	804	0	3	0	2	54	0	14	17	0
2019	948	1	2	0	2	64	0	18	20	0
2018	954	2	8	0	2	80	0	14	18	0
2017	833	1	4	0	3	71	0	13	22	0
2016	830	1	2	1	1	54	1	16	13	0
2015	706	0	4	2	5	70	0	11	13	0
2014	575	2	2	0	0	50	0	13	20	0
2013	446	0	1	0	1	55	0	4	6	0
2012	452	0	1	0	1	46	1	4	13	0
2011	412	1	4	0	1	45	0	3	6	1
2010	391	2	3	0	1	33	0	2	8	3
2009	435	0	1	0	2	50	1	5	8	2
2008	418	0	2	1	3	27	0	7	6	2
1994-07	3 271	9	51	3	28	274	3	44	93	15
Total	**14 759**	**19**	**96**	**9**	**56**	**1 251**	**7**	**222**	**383**	**25**

Diseases are not mutually exclusive. More than one reason for operation is possible

Figure 9:



Use of cement - Primary total knee prostheses

Figure 10: Femur

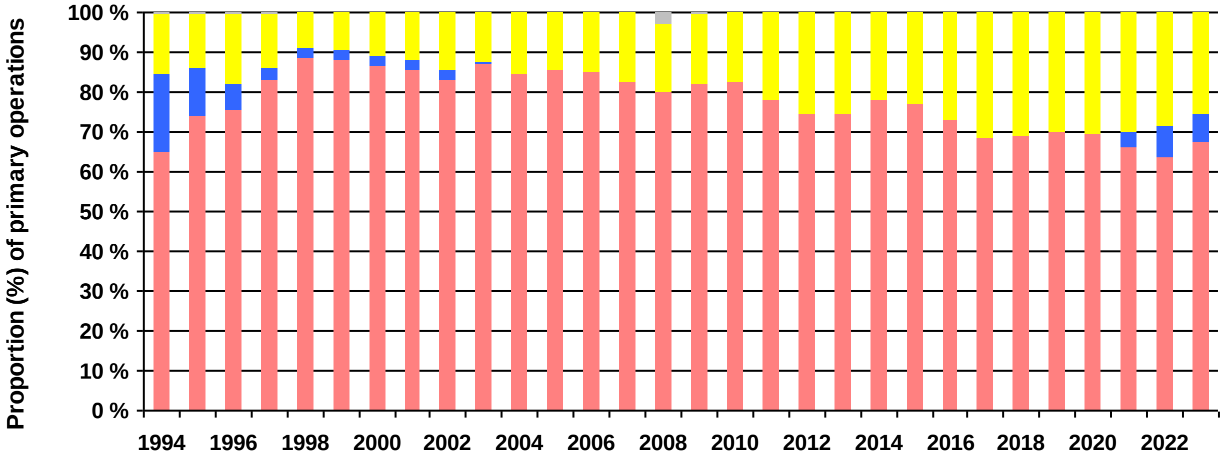


Figure 11: Tibia

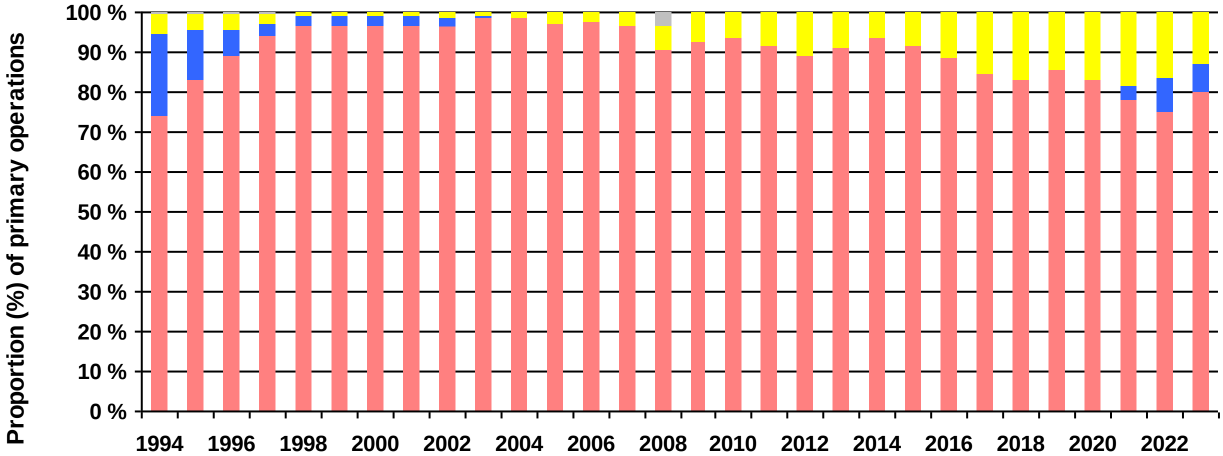
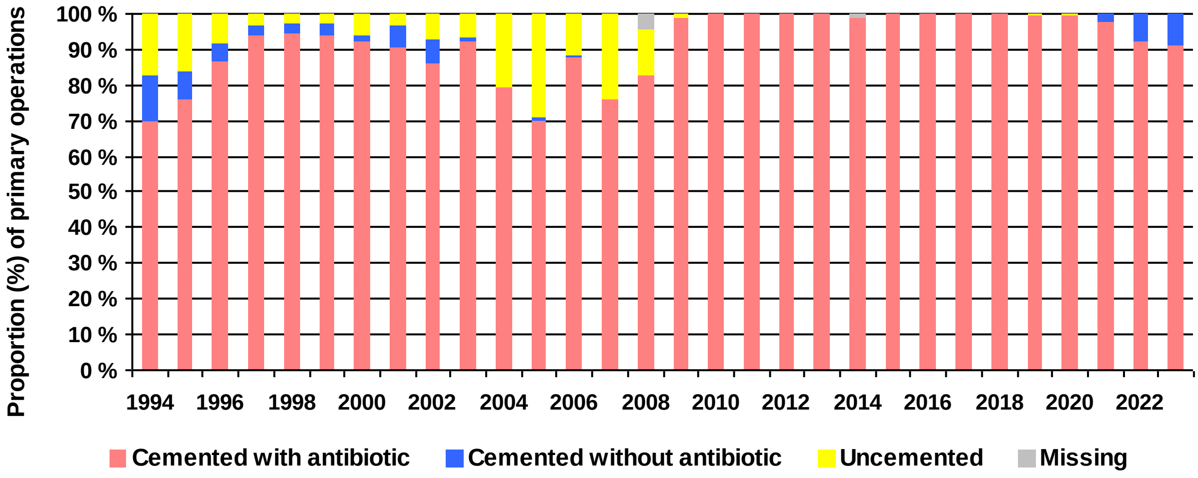


Figure 12: Patella



Use of cement in total knee prostheses

Figure 13: Primary operations

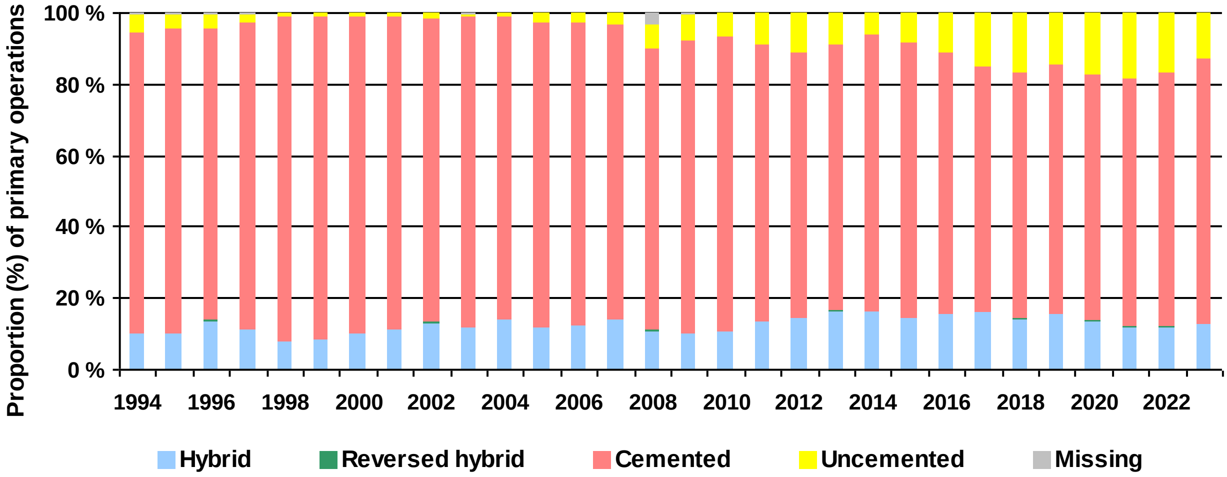
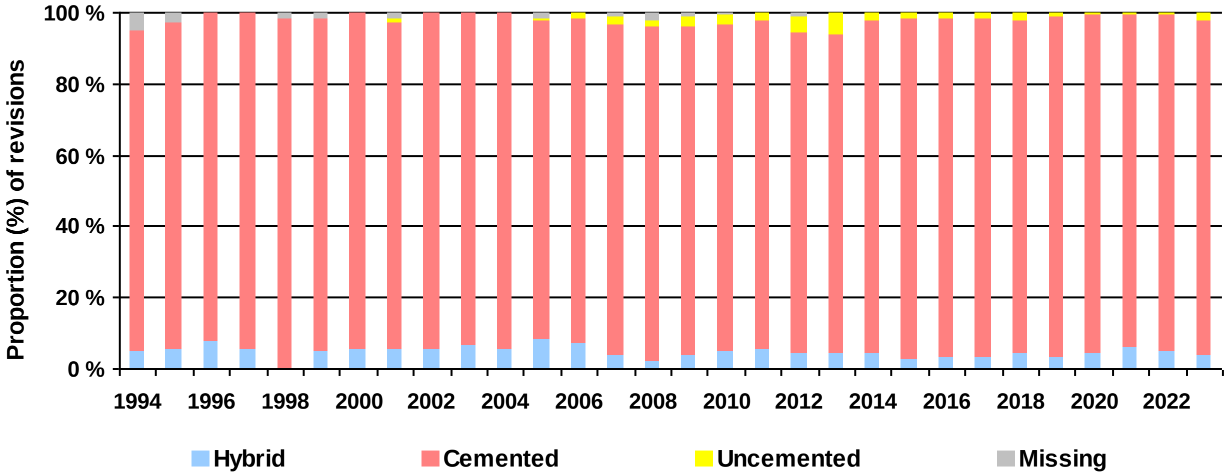
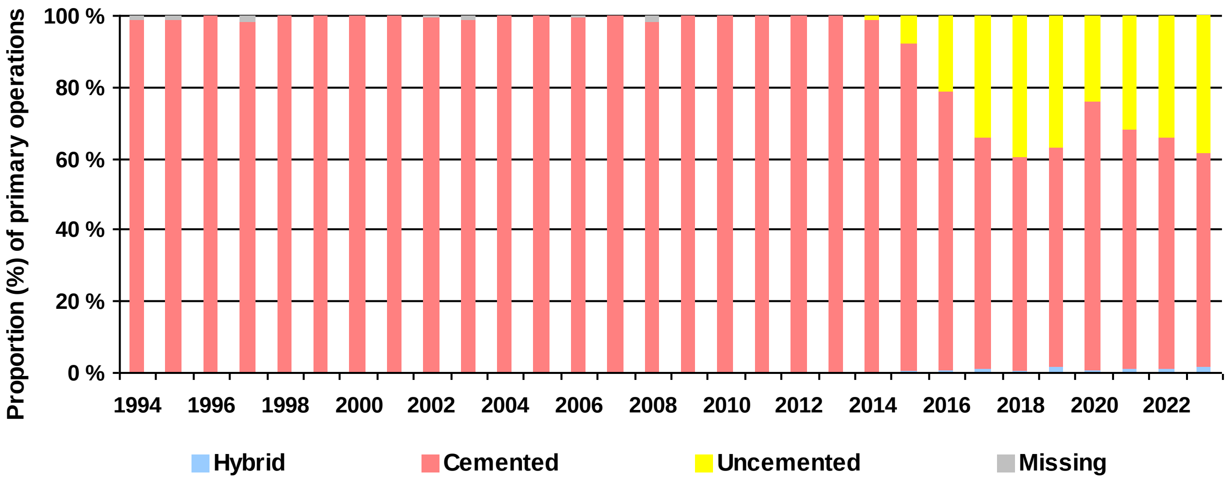


Figure 14: Revisions



Use of cement in unicondylar knee prostheses

Figure 15: Primary operations



The 8 most common primary total prostheses (with and without patella component) in 2017-2023

Table 6:

Product	Cemented *	Uncemented *	Hybrid	All poly	Rotating platform	HXLPE	Stabilization MS	PS	CCK	Total
NexGen	13 203	2 274	2 749	0	0	2 897	15 696	2 321	256	**18 235**
Triathlon	4 726	2 239	133	843	0	6 210	6 870	196	54	**7 105**
Legion	4 048	6	2 402	4	0	735	5 332	1 141	76	**6 467**
PFC-Sigma	2 812	2 010	384	113	4 918	0	5 104	39	42	**5 209**
Attune	3 293	318	111	0	341	3 720	3 166	561	0	**3 722**
LCS Complete	1 134	2	132	0	1 265	0	1 261	2	3	**1 268**
Persona	697	36	194	0	0	281	928	1	0	**928**
Journey II BCS	547	0	0	0	0	542	30	517	0	**547**

Hybrid = Uncemented femur and cemented tibia
All poly = All polyethylene tibial component
HXLPE = Highly cross linked polyethylene
MS = Minimally stabilized = Posterior cruciate retaining prostheses and deep dish
PS = Posterior cruciate stabilizing prostheses
CCK = Constrained Condylar Knee = high level stabilized
* Surgeon's report for fixation

Table 6 A: Femur component

Product: NexGen (31)

Product Category	Cemented *	Uncemented *	Stabilization MS	PS	CCK	Total
CR Option	8 394	0	8 397	0	0	**8 397**
CR-flex porous usementert	84	3 901	3 987	0	0	**3 987**
CR-flex Option	1 390	1	1 392	0	0	**1 392**
LPS Option	1 271	0	0	1 272	0	**1 272**
LPS-flex porous standard	7	725	0	732	0	**732**
CR Flex Precoat	673	0	673	0	0	**673**
CR-flex gender	672	0	672	0	0	**672**
LCCK Option	255	0	0	0	255	**255**
CR-flex porous	8	241	249	0	0	**249**
CR Precoat	206	3	209	0	0	**209**
LPS-flex Option	166	14	0	180	0	**180**
CR Porous usementert	4	95	99	0	0	**99**
LPS-flex gender	47	0	0	47	0	**47**
LPS-Flex Tivanium	17	1	0	18	0	**18**
LPS macro Option	16	0	0	16	0	**16**
Annet	6	1	0	7	0	**7**
Ukjent	20	5	0	0	0	**25**

Product: LCS Complete (48)

Product Category	Cemented *	Uncemented *	Stabilization MS	PS	CCK	Total
Sementert	1 103	1	0	0	0	**1 104**
Usementert	20	133	0	0	0	**153**
Annet	4	0	0	0	3	**4**
Ukjent	2	0	0	2	0	**2**

Product: PFC-Sigma (49)

Product Category	Cemented *	Uncemented *	Stabilization MS	PS	CCK	Total
CR sementert	2 728	1	2 732	0	0	**2 732**
CR usementert	6	2 357	2 363	0	0	**2 363**
Revision	42	1	0	0	0	**43**
PS	39	0	0	39	0	**39**
Ukjent	3	4	0	0	0	**7**

Product: Triathlon (58)

Product Category	Cemented*	Uncemented *	Stabilization MS	PS	CCK	Total
CR sementert	4 496	6	4 506	0	0	**4 506**
Beaded w/pa CR usementert	9	2 342	2 351	0	0	**2 351**
PS sementert	186	0	0	186	0	**186**
TS sementert	48	0	0	0	48	**48**
Ukjent	9	2	0	0	0	**11**

Product: Legion (62)

Product Category	Cemented*	Uncemented *	Stabilization MS	PS	CCK	Total
CR sementert	2 857	2	2 864	0	0	**2 864**
CR usementert	40	2 386	2 427	0	0	**2 427**
PS sementert	1 087	3	0	1 091	0	**1 091**
PS Oxinium sementert	41	0	0	41	0	**41**
CR Oxinium sementert	31	1	32	0	0	**32**
Annet	1	1	1	0	1	**2**

Product: Journey II BCS (75)

Product Category	Cemented*	Uncemented *	Stabilization MS	PS	CCK	Total
Journey II BCS	515	0	0	515	0	**515**
Journey II CR	30	0	30	0	0	**30**

Product: Attune (83)

Product Category	Cemented*	Uncemented *	Stabilization MS	PS	CCK	Total
CR Cemented	2 746	1	2 747	0	0	**2 747**
PS femur Cemented	634	2	0	636	0	**636**
CR Cementless	1	423	424	0	0	**424**
Annet	0	1	0	1	0	**1**

Product: Persona (84)

Product Category	Cemented*	Uncemented *	Stabilization MS	PS	CCK	Total
CR Femoral	691	3	695	0	0	**695**
CR Femoral Porous, Trabecular Metal	5	227	232	0	0	**232**
Annet	1	0	0	1	0	**1**

MS = Minimally stabilized = Posterior cruciate retaining prostheses and deep dish
PS = Posterior cruciate stabilizing prostheses
CCK = Constrained Condylar Knee = high level stabilized
* Surgeon's report for fixation

Table 6 B: Tibia

Product: NexGen (31)

Product Category	Cemented *	Uncemented *	All poly	Total
Precoat PMMA stemmed sementert	11 514	4	0	**11 521**
Option sementert	4 222	1	0	**4 223**
Trabecular metal usementert	7	2 299	0	**2 307**
Precoat AP wedge stemmed	148	0	0	**148**
Annet	0	4	0	**4**
Ukjent	22	3	0	**25**

Table 6 B: Tibia

Product: LCS Complete (48)

Product Category	Cemented *	Uncemented *	All poly	Total
No keel MBT* sementert	1 245	2	0	**1 247**
MBT* revision	15	0	0	**15**
Annet	4	0	0	**4**
Ukjent	1	0	0	**1**

* MBT = Mobile bearing tray

Product: PFC-Sigma (49)

Product Category	Cemented *	Uncemented *	All poly	Total
With keel MBT* sementert	2 797	14	0	**2 811**
With keel MBT* usementert	2	2 015	0	**2 017**
Mod.Tib Tray	141	0	0	**141**
MBT* revision	113	5	0	**118**
All poly	113	0	113	**113**
Annet	1	1	0	**2**
Ukjent	2	4	0	**6**

* MBT = Mobile bearing tray

Product: Triathlon (58)

Product Category	Cemented *	Uncemented *	All poly	Total
Sementert	3 845	4	0	**3 852**
PA Usementert	4	1 293	0	**1 297**
Tritanium baseplate	5	960	0	**965**
CS All poly, sementert	842	0	842	**842**
Universal sementert	128	0	0	**128**
Annet	1	0	1	**1**
Ukjent	15	3	0	**18**

Product: Legion (62)

Product Category	Cemented *	Uncemented *	All poly	Total
Male tapered sementert (Genesis II)	6 429	4	0	**6 439**
Porous HA tibial base w/o holes usementert	1	16	0	**17**
Annet	4	0	4	**4**
Ukjent	5	0	0	**5**

Product: Journey II BCS (75)

Product Category	Cemented *	Uncemented *	All poly	Total
Journey II base NP	545	0	0	**545**

Product: Attune (83)

Product Category	Cemented *	Uncemented *	All poly	Total
FB Tib base with S+ technology	3 091	1	0	**3 092**
RP Tib base Cementless	0	317	0	**317**
FB Tib base	284	1	0	**285**
RP Tib base	15	0	0	**15**
RP Tib base with S+ technology	5	0	0	**5**

Table 6 B: Tibia

Product: Persona (84)

Product Category	Cemented *	Uncemented *	All poly	Total
Stemmed 5 Degree Tibia	891	0	0	**891**
Two-Peg Trabecular Metal Tibia	0	35	0	**35**

All poly = All polyethylene tibial component
MS = Minimally stabilized = Posterior cruciate retaining prostheses and deep dish
PS = Posterior cruciate stabilizing prostheses
CCK = Constrained Condylar Knee = high level stabilized
* Surgeon's report for fixation

Table 6 C: Foring Tibia Insert

Product: NexGen (31)

Product Category	Rotating platform	HXLPE	Stabilization MS	PS	CCK	Total
CR-Flex	0	0	12 825	0	0	**12 825**
CR-Prolong	0	2 811	2 811	0	0	**2 811**
LPS-FlexFixed	0	0	0	2 231	0	**2 231**
LCCK	0	0	0	0	218	**218**
LPS-flex	0	86	0	87	0	**87**
CR	0	0	14	0	0	**14**
Annet	0	0	0	1	0	**1**
Ukjent	0	0	0	0	0	**35**

Product: LCS Complete (48)

Product Category	Rotating platform	HXLPE	Stabilization MS	PS	CCK	Total
Rotating platform RP	1 259	0	1 259	0	0	**1 259**
Annet	3	0	0	0	3	**3**
Ukjent	1	0	0	1	0	**1**

Product: PFC-Sigma (49)

Product Category	Rotating platform	HXLPE	Stabilization MS	PS	CCK	Total
Rotating platform RP-CV	4 840	0	4 840	0	0	**4 840**
CRVD	0	0	142	0	0	**142**
Revision TC3	42	0	0	0	42	**42**
Revision STB	37	0	0	37	0	**37**
Annet	0	0	1	0	0	**1**
Ukjent	0	0	0	0	0	**9**

Product: Triathlon (58)

Product Category	Rotating platform	HXLPE	Stabilization MS	PS	CCK	Total
CR-X3 HXLPE, EtO sterilized	0	2 440	2 440	0	0	**2 440**
CR-X3 HXLPE	0	1 693	1 693	0	0	**1 693**
CS-X3 HXLPE, EtO sterilized	0	1 098	1 098	0	0	**1 098**
CS-X3 HXLPE	0	784	784	0	0	**784**
PS-X3 HXLPE	0	137	0	137	0	**137**
PS	0	0	0	47	0	**47**
TS-X3 HXLPE	0	30	0	0	30	**30**
TS-X3 HXLPE, EtO sterilized	0	13	0	0	13	**13**
Annet	0	0	2	0	0	**2**
Ukjent	0	15	0	0	0	**15**

Table 6 C: Foring Tibia Insert

Product: Legion (62)

Product Category	Rotating platform	HXLPE	Stabilization MS	PS	CCK	Total
CR standard	0	0	4 002	0	0	**4 002**
Dished	0	0	1 052	0	0	**1 052**
PS	0	0	0	593	0	**593**
PS high flex	0	465	1	464	0	**465**
CR-highflex HXLPE	0	257	257	0	0	**257**
Constrained	0	0	0	0	75	**75**
Ukjent	0	13	0	0	0	**13**

Product: Journey II BCS (75)

Product Category	Rotating platform	HXLPE	Stabilization MS	PS	CCK	Total
Journey II BCS, XLPE	0	512	0	512	0	**512**
Journey II CR	0	30	30	0	0	**30**

Product: Attune (83)

Product Category	Rotating platform	HXLPE	Stabilization MS	PS	CCK	Total
CR FB insert	0	2 829	2 829	0	0	**2 829**
PS FB insert	0	638	0	638	0	**638**
CR RP insert	335	335	335	0	0	**335**
Annet	4	4	0	4	0	**4**

Product: Persona (84)

Product Category	Rotating platform	HXLPE	Stabilization MS	PS	CCK	Total
CR Articular Surface	0	0	537	0	0	**537**
Medial congruent bearing	0	215	215	0	0	**215**
UC Articular Surface	0	0	109	0	0	**109**
UC Articular Surface, VE	0	35	35	0	0	**35**
CR Articular Surface, VE	0	31	31	0	0	**31**

HXLPE = Highly cross linked polyethylene
MS = Minimally stabilized = Posterior cruciate retaining prostheses and deep dish
PS = Posterior cruciate stabilizing prostheses
CCK = Constrained Condylar Knee = high level stabilized

Total prostheses

Table 7a: Cemented femoral prostheses in primary operations *

Prosthesis	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
NexGen	6 022	2 313	2 047	1 794	1 857	2 141	1 630	1 759	1 835	2 220	**23 618**
LCS Complete	9 068	587	567	558	313	140	93	25			**11 351**
Profix	9 880		1								**9 881**
Triathlon	1 369	257	449	404	381	502	802	798	879	982	**6 823**
Legion	265	350	324	343	397	452	468	760	814	826	**4 999**
PFC-Sigma	721	428	473	455	548	479	327	431	365	213	**4 440**
LCS	4 164										**4 164**
Attune			44	122	424	484	466	561	562	764	**3 427**
AGC Universal	3 112										**3 112**
Genesis I	3 100										**3 100**
Duracon	2 575										**2 575**
AGC Anatomic	1 725										**1 725**
Tricon -C with Pro-Fit	1 079										**1 079**
Vanguard TM	772	65	42	2							**881**
Persona			12	78	60	72	126	85	91	185	**709**
Journey II BCS	7	69	57	31	6	35	81	98	152	142	**678**
E-motion	461										**461**
Kinemax	411										**411**
NexGen Rotating Hinge	73	29	25	29	25	23	29	34	38	35	**340**
Advance	310										**310**
Scorpio	126										**126**
Evolution Medial-Pivot		10	19	26	42	1					**98**
Tricon M	47										**47**
AGC Dual	43										**43**
Legion Hinge Knee		3	5	1	3	5	4	10	6	5	**42**
GMK Sphere			18	16	3			1		3	**41**
Search	40										**40**
S-ROM Rotat. Hinge	1	1		2	1	1	8	8	6	3	**31**
Interax I.S.A.	24										**24**
ATTUNE-REVISION							1	2	11	9	**23**
RT-Plus Modular	16					1					**17**
Other (n<15)	62		2	1	1	2	4	1	2	2	**77**
Total	**45 473**	**4 112**	**4 085**	**3 862**	**4 061**	**4 338**	**4 039**	**4 573**	**4 761**	**5 389**	**84 693**

Table 7b: Uncemented femoral prostheses in primary operations *

Prosthesis	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
NexGen	489	382	652	814	815	726	679	751	650	553	**6 511**
Profix	4 785										**4 785**
Legion	548	401	448	421	367	420	360	255	255	316	**3 791**
PFC-Sigma	443	300	280	283	314	443	420	477	355	71	**3 386**
Triathlon	162	41	57	203	257	259	293	418	476	445	**2 611**
LCS Complete	2 032	88	51	55	52	15		12			**2 305**
LCS	652										**652**
Attune							1		69	357	**427**
Tricon M	288										**288**
Persona						2	26	51	68	83	**230**
Genesis I	192										**192**
Duracon	163										**163**
Interax I.S.A.	81										**81**
GMK Sphere								10	19	21	**50**
Kotz	29										**29**
Other (n<15)	23				1	1	1	1			**27**
Total	**9 887**	**1 212**	**1 488**	**1 776**	**1 806**	**1 866**	**1 780**	**1 975**	**1 892**	**1 846**	**25 528**

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Total prostheses

Table 8a: Cemented femoral prostheses in revisions *

Prosthesis	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
NexGen LCCK Option	276	79	80	79	86	59	62	36	42	46	**845**
NexGen Rotating Hinge	142	53	53	39	27	64	48	52	63	64	**605**
Profix	557										**557**
NexGen	208	40	26	38	42	37	37	26	33	42	**529**
LCS Complete	356	11	16	23	24	17	10	3			**460**
Legion	19	33	30	46	53	62	50	57	47	61	**458**
Triathlon TS	74	12	6	20	28	31	37	31	29	31	**299**
PFC-Sigma	24	20	27	15	26	30	17	33	23	18	**233**
Genesis I	207										**207**
LCS	172										**172**
Triathlon	41	11	11	11	12	8	11	11	17	22	**155**
Legion Hinge Knee	1	7	8	9	5	3	6	21	18	18	**96**
Scorpio TS	76										**76**
LCS Complete VVS	54	5	5	1	4		1				**70**
Vanguard TM	67										**67**
Duracon	64										**64**
AGC Dual	62										**62**
AGC Universal	62										**62**
Profix constrained	45										**45**
S-ROM Rotat. Hinge	16	1	3	7	6	2	1	1	3	5	**45**
ATTUNE-REVISION							5	9	11	16	**41**
Legion constrained	24	2	3	1	2	1			1	1	**35**
Dual Articular 2000	30										**30**
Attune			2		1	2	1	3	8	10	**27**
RT-Plus Modular	22							1			**23**
Tricon -C with Pro-Fit	20										**20**
AGC Anatomic	19										**19**
Scorpio	18										**18**
E-motion	16										**16**
Kinemax	16										**16**
Other (n<15)	89		2	10	3	5	1	3	5	5	**123**
Total	**2 777**	**274**	**272**	**299**	**319**	**321**	**287**	**287**	**300**	**339**	**5 475**

Table 8b: Uncemented femoral prostheses in revisions *

Prosthesis	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Profix	79										**79**
LCS Complete	55		2	1	2	2					**62**
PFC-Sigma	9	4	3	4	7	6	5	5	6	8	**57**
Legion	6	6	5	4	5	1	4	6	1	2	**40**
NexGen	6	2	1	7	4	4	1	5	4	1	**35**
LCS Complete VVS	17										**17**
Other (n<15)	33	1	4	1	3	2		2	5	8	**59**
Total	**205**	**13**	**15**	**17**	**21**	**15**	**10**	**18**	**16**	**19**	**349**

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Table 9a: Cemented tibial prostheses in primary operations *

Prosthesis	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
NexGen	6 304	2 513	2 363	2 206	2 227	2 520	1 958	2 150	2 238	2 614	**27 093**
Profix	13 756		1								**13 757**
LCS Complete	9 959	674	618	615	364	155	94	37			**12 516**
Legion	811	751	772	764	760	866	826	1 011	1 069	1 143	**8 773**
Triathlon	1 464	294	458	408	399	521	812	808	887	1 005	**7 056**
PFC-Sigma	803	473	506	465	565	617	391	485	406	240	**4 951**
AGC Universal	4 510										**4 510**
LCS	4 351										**4 351**
Attune			44	122	424	483	454	545	551	821	**3 444**
Genesis I	3 284										**3 284**
Duracon	2 704										**2 704**
Tricon II	1 346										**1 346**
Persona			12	78	61	74	152	127	150	250	**904**
Vanguard TM	771	65	42	2							**880**
Journey II BCS	7	70	57	31	6	35	81	98	153	141	**679**
E-motion	468										**468**
Kinemax	411										**411**
LCS Universal	372										**372**
NexGen Rotating Hinge	72	29	25	29	26	23	29	34	38	35	**340**
AGC Anatomic	330										**330**
Advance	310										**310**
Scorpio	126										**126**
Interax I.S.A.	106										**106**
ATTUNE-REVISION						1	12	18	36	38	**105**
Evolution Medial-Pivot		10	19	26	42	1					**98**
Legion Hinge Knee		3	5	1	3	5	4	11	6	5	**43**
GMK Sphere			18	16	3			1		3	**41**
Search	40										**40**
AGC Dual	28										**28**
RT-Plus Modular	16					1				1	**18**
Other (n<15)	78		2	1	1	2	3	1	8	3	**99**
Total	**52 427**	**4 882**	**4 942**	**4 764**	**4 881**	**5 304**	**4 816**	**5 326**	**5 542**	**6 299**	**99 183**

Table 9b: Uncemented tibial prostheses in primary operations *

Prosthesis	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
NexGen	205	182	340	402	447	350	351	359	245	157	**3 038**
PFC-Sigma	362	257	247	273	300	306	363	431	319	47	**2 905**
Triathlon	65	4	50	199	239	241	283	408	467	423	**2 379**
LCS Complete	1 093		1		2						**1 096**
Profix	905										**905**
Attune							2		49	269	**320**
LCS	141										**141**
Tricon II	66										**66**
GMK Sphere								10	19	21	**50**
Persona								9	9	17	**35**
Duracon	28										**28**
Kotz	27										**27**
Legion	2	1	2		4	6	3	4	2	1	**25**
Other (n<15)	13					1		1			**15**
Total	**2 907**	**444**	**640**	**874**	**992**	**904**	**1 002**	**1 222**	**1 110**	**935**	**11 030**

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Table 10a: Cemented tibial prostheses in revisions *

Prosthesis	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
NexGen	501	122	114	124	132	97	94	61	72	86	**1 403**
LCS Complete	563	24	25	33	38	21	14	5	2		**725**
Profix	684	1	1	1							**687**
NexGen Rotating Hinge	140	51	51	39	25	62	48	52	64	62	**594**
Legion	49	40	38	48	64	57	47	58	42	58	**501**
Triathlon	119	24	20	31	44	43	49	44	52	57	**483**
PFC-Sigma	21	21	32	22	31	32	21	38	29	24	**271**
Genesis I	257										**257**
LCS	232										**232**
Duracon	117										**117**
Scorpio	97	1									**98**
Legion Hinge Knee	1	7	8	9	5	3	6	22	18	18	**97**
AGC Universal	77										**77**
Vanguard TM	67										**67**
ATTUNE-REVISION					1		9	13	17	22	**62**
AGC Dual	59										**59**
Tricon II	57										**57**
Dual Articular 2000	29										**29**
RT-Plus Modular	22										**22**
Maxim	20										**20**
E-motion	18										**18**
Journey II BCS			2	8	1	2		1	1	1	**16**
Kinemax	16										**16**
Other (n<15)	83		2	3	3	5	2	4	8	9	**119**
Total	**3 229**	**291**	**293**	**318**	**344**	**322**	**290**	**298**	**305**	**337**	**6 027**

Table 10b: Uncemented tibial prostheses in revisions *

Prosthesis	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
LCS Complete	66	1									**67**
PFC-Sigma	11	3	1	6	8	3	1	1	1	7	**42**
Other (n<15)	15	2	6	1	1	1	3	2		3	**34**
Total	**92**	**6**	**7**	**7**	**9**	**4**	**4**	**3**	**1**	**10**	**143**

Table 10c: Tibia insert prostheses in revisions *

Tibia insert prosthesis	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
NexGen	449	125	123	140	125	109	93	91	93	80	**1 428**
Profix	925	23	13	11	12	12	4	8	5	2	**1 015**
LCS Complete	737	34	34	45	45	30	26	9	3	3	**966**
NexGen Rotating Hinge	151	58	59	43	31	73	55	61	66	75	**672**
Legion	33	50	45	57	70	72	53	69	59	74	**582**
NexGen LCCK Option	150	36	52	46	76	44	50	31	29	37	**551**
Triathlon	85	21	15	23	32	34	27	31	47	64	**379**
Genesis I	336		1								**337**
PFC-Sigma	33	23	26	33	28	33	26	36	28	24	**290**
Triathlon TS	64	12	10	18	27	33	32	17	16	5	**234**
Duracon	200	3	2		4	2			1		**212**
LCS Universal	176										**176**
LCS	147	1	1	1		1					**151**
Legion constrained	22	4	8	11	14	17	21	20	13	20	**150**
PFC-Sigma TC3	11	12	14	8	17	15	10	21	13	14	**135**
Legion Hinge Knee	1	7	9	9	5	3	6	23	20	18	**101**
Scorpio TS	90	1									**91**
Tricon II	90										**90**
Attune			2	2	7	9	13	15	14	21	**83**
LCS Complete VVS	61	4	4	1	3	1	1				**75**
Vanguard TM	60	3	1	3		1					**68**
S-ROM Rotat. Hinge	19	1	5	9	8	2	1	1	3	5	**54**
Other (n<50)	347	6	12	21	11	11	17	26	40	50	**541**
Total	**4 187**	**424**	**436**	**481**	**515**	**502**	**435**	**459**	**450**	**492**	**8 381**

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Table 10d: Material in tibia insert for total prostheses in primary operations

Prosthesis	Material	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Advance	Uhmwpe	308										**308**
AGC	Uhmwpe	4 849										**4 849**
AGC Dual	Uhmwpe	36										**36**
Attune	HXLPE			44	122	424	484	468	560	631	1 119	**3 852**
ATTUNE-REVISION	HXLPE								2	12	9	**23**
Dual Articular 2000	Uhmwpe	4										**4**
Duracon	Uhmwpe	2 750										**2 750**
E-motion	Uhmwpe	468										**468**
Evolution Medial-Pivot	Uhmwpe		10	19	26	42	1					**98**
Freemann/Samuelson	Uhmwpe	4										**4**
Genesis I	Uhmwpe	3 284										**3 284**
GMK Sphere	Uhmwpe			18	16	3			11	19	24	**91**
INTERAX I.S.A.	Uhmwpe	103										**103**
Journey II BCS	HXLPE	7	70	57	31	6	35	81	97	150	142	**676**
Kinemax	Uhmwpe	410										**410**
LCS	Uhmwpe	4 481										**4 481**
LCS Complete	Uhmwpe	11 080	675	618	613	365	155	93	37			**13 636**
LCS Universal	Uhmwpe	383										**383**
Legion	HXLPE	20	29	18	44	62	104	57	147	156	165	**802**
Legion	Uhmwpe	789	721	752	720	701	768	772	868	915	980	**7 986**
MAXIM	Uhmwpe	5										**5**
MG II	Uhmwpe	1										**1**
Mutars	Uhmwpe	11				1	1	3		1		**17**
NexGen	HXLPE	206	152	292	493	498	522	311	336	337	400	**3 547**
NexGen	Uhmwpe	6 321	2 543	2 411	2 115	2 172	2 348	1 998	2 173	2 149	2 370	**26 600**
NexGen Rotating Hinge	Uhmwpe	73	29	24	29	25	23	29	34	38	34	**338**
Persona	HXLPE							4	53	74	150	**281**
Persona	Uhmwpe			12	78	61	74	148	83	85	117	**658**
PFC-Sigma	Uhmwpe	1 165	729	753	738	865	922	747	908	720	284	**7 831**
PROFIX	Uhmwpe	14 684		1								**14 685**
RT-Plus Modular	Uhmwpe	16					1					**17**
Scan Knee	Uhmwpe	8										**8**
Scorpio	HXLPE	18										**18**
Scorpio	Uhmwpe	109										**109**
Search	Uhmwpe	40										**40**
S-ROM Rotating Hinge	Uhmwpe	1	1		2	1	1	8	8	5	3	**30**
Triathlon	HXLPE	1 314	295	499	601	633	743	862	1 000	1 163	1 208	**8 318**
Triathlon	Uhmwpe	217	3	9	6	5	19	233	215	192	222	**1 121**
Tricon II	Uhmwpe	1 410										**1 410**
Vanguard 360 Revision	Uhmwpe	2										**2**
Vanguard TM	Uhmwpe	432	65	42	2							**541**
Total		**55 009**	**5 322**	**5 569**	**5 636**	**5 864**	**6 201**	**5 814**	**6 532**	**6 647**	**7 227**	**109 821**

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Figure 16: Material in tibia insert for total prostheses in primary operations

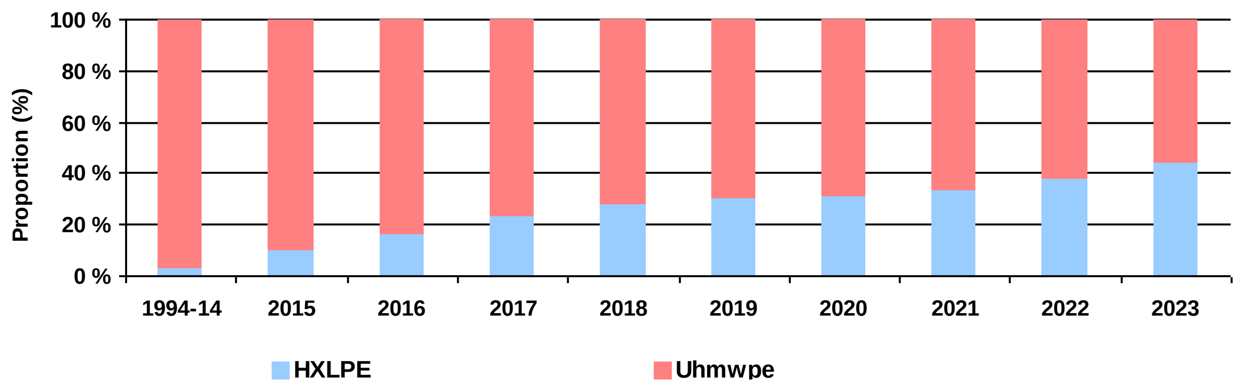

Table 10e: Material in tibia insert for unicondylar knee prostheses in primary operations

Prosthesis	Material	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Genesis UNI	Uhmwpe	231										**231**
iBalance UKA	Uhmwpe					12		10	9			**31**
Journey Uni	Uhmwpe	3	2	6	2							**13**
LINK Schlitten UNI	Uhmwpe	62	17	17	14	8	11	7	6	6	5	**153**
Miller-Galante UNI	Uhmwpe	184										**184**
Oxford Partial Knee	Uhmwpe	690	523	634	557	763	952	803	960	1 082	1 286	**8 250**
Oxford UNI (III)	Uhmwpe	4 980	191	201	292	204						**5 868**
Oxford UNI II	Uhmwpe	46										**46**
Persona Partial Knee	HXLPE						11	19	26	37	28	**121**
Preservation Uni	Uhmwpe	69										**69**
Sigma High Performance Uni	HXLPE	31	9	3	1	5						**49**
Thriathlon PKR - UNI	HXLPE	3										**3**
Total		**6 299**	**742**	**861**	**866**	**992**	**974**	**839**	**1 001**	**1 125**	**1 319**	**15 018**

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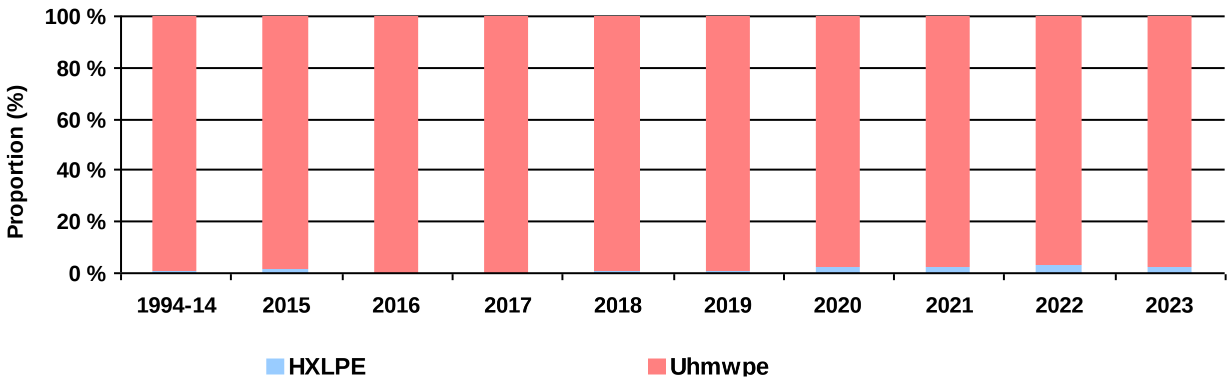
Figure 17: Material in tibia insert for unicondylar knee prostheses in primary operations



Unicondylar knee prostheses

Table 11a: Cemented femoral prostheses in primary operations *

Prosthesis	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Oxford Partial Knee	685	517	631	551	576	592	606	633	698	767	**6 256**
Oxford UNI (III)	4 977	136	18	1							**5 132**
Genesis UNI	332										**332**
Miller-Galante UNI	294										**294**
MOD III uni	198										**198**
Preservation Uni	166										**166**
LINK Schlitten UNI	62	17	17	14	8	11	7	6	6	5	**153**
Persona Partial Knee						11	18	26	37	28	**120**
Journey Uni	30	13	7	2							**52**
Duracon uni	50										**50**
Sigma High Performance Uni	31	9	3	1	5						**49**
Oxford UNI II	45										**45**
iBalance UKA					12		10	9			**31**
ZUK (Unicondylar)	27										**27**
Other (n<15)	20							2	1	3	**26**
Total	**6 917**	**692**	**676**	**569**	**601**	**614**	**641**	**676**	**742**	**803**	**12 931**

Table 11b: Uncemented femoral prostheses in primary operations *

Prosthesis	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Oxford Partial Knee	9	61	187	299	400	380	200	322	396	527	**2 781**
Other (n<15)								1		12	**13**
Total	**9**	**61**	**187**	**299**	**400**	**380**	**200**	**323**	**396**	**539**	**2 794**

Table 12a: Cemented tibial prostheses in primary operations *

Prosthesis	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Oxford Partial Knee	685	521	628	545	574	602	602	642	697	773	**6 269**
Oxford UNI (III)	4 977	131	24	3	1						**5 136**
Genesis UNI	332										**332**
Miller-Galante UNI	282										**282**
MOD III uni	199										**199**
Preservation Uni	165										**165**
LINK Schlitten UNI	62	17	17	14	8	11	7	6	6	5	**153**
Persona Partial Knee						11	19	26	37	28	**121**
Journey Uni	30	13	7	2							**52**
Duracon uni	49										**49**
Sigma High Performance Uni	31	9	3	1	5						**49**
Oxford UNI II	46										**46**
iBalance UKA					12		10	9			**31**
ZUK (Unicondylar)	27										**27**
Other (n<15)	18							2	1	14	**35**
Total	**6 903**	**691**	**679**	**565**	**600**	**624**	**638**	**685**	**741**	**820**	**12 946**

Table 12b: Uncemented tibial prostheses in primary operations *

Prosthesis	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Oxford Partial Knee	8	62	184	303	401	371	204	319	397	522	**2 771**
Total	**8**	**62**	**184**	**303**	**401**	**371**	**204**	**319**	**397**	**522**	**2 771**

* Surgeon's report for fixation

Patellofemoral prostheses

Table 13a: Cemented femoral prostheses in primary operations *

Prosthesis	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
NexGen PFJ Gender	61	32	50	53	45	35	30	60	58	41	**465**
Journey PFJ	136	7	18	17	10	16	11	10	11	11	**247**
Patella Mod III / II	29										**29**
LCS PFJ	18										**18**
iBalance PFJ					3	2	3				**8**
Legion				5							**5**
Other (n<5)	12										**12**
Total	**256**	**39**	**68**	**75**	**58**	**53**	**44**	**70**	**69**	**52**	**784**

Patellofemoral femoral prostheses in primary operations are all cemented

Table 13b: Uncemented femoral prostheses in primary operations *

Prosthesis	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Journey PFJ								1			**1**
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**

Table 14a: Cemented patella prostheses in primary operations *

Prosthesis	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
NexGen PFJ Gender	61	31	49	53	45	34	30	60	57	43	**463**
Journey PFJ	134	7	18	22	10	16	11	11	11	11	**251**
Patella Mod III / II	31										**31**
LCS PFJ	11										**11**
iBalance PFJ					2	2	3				**7**
Other (n<5)	11	1	1			1			1		**15**
Total	**248**	**39**	**68**	**75**	**57**	**53**	**44**	**71**	**69**	**54**	**778**

Table 14b: Uncemented patella prostheses in primary operations *

Prosthesis	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
LCS PFJ	6										**6**
LCS Complete	1										**1**
Total	**7**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**7**

* Surgeon's report for fixation

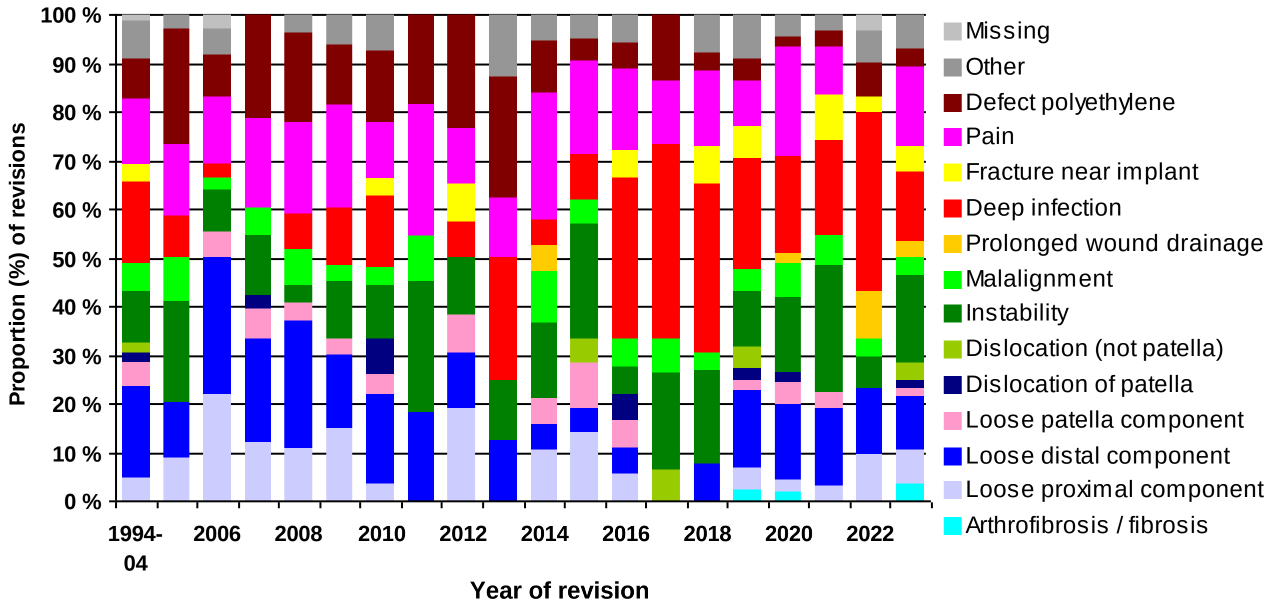
Reasons for revisions

Table 15a: Reasons for revisions of primary total knee prostheses with patella

Year of revision	Loose proximal comp.	Loose distal comp.	Loose patella comp.	Dislocation of patella	Dislocation (not patella)	Instability	Malalignment	Deep infection	Prolonged wound drainage	Fracture near implant	Pain	Defect polyethylene	Arthrofibrosis / fibrosis	Other	Missing
2023	4	6	1	1	2	10	2	8	2	3	9	2	2	4	0
2022	3	4	0	0	0	2	1	11	3	1	0	2	0	2	1
2021	1	5	1	0	0	8	2	6	0	3	3	1	0	1	0
2020	1	7	2	1	0	7	3	9	1	0	10	1	1	2	0
2019	2	7	1	1	2	5	2	10	0	3	4	2	1	4	0
2018	0	2	0	0	0	5	1	9	0	2	4	1	0	2	0
2017	0	0	0	0	1	3	1	6	0	0	2	2	0	0	0
2016	1	1	1	1	0	1	1	6	0	1	3	1	0	1	0
2015	3	1	2	0	1	5	1	2	0	0	4	1	0	1	0
2014	2	1	1	0	0	3	2	1	1	0	5	2	0	1	0
2013	0	1	0	0	0	1	0	2	0	0	1	2	0	1	0
2012	5	3	2	0	0	3	0	2	0	2	3	6	0	0	0
2011	0	2	0	0	0	3	1	0	0	0	3	2	0	0	0
2010	1	5	1	2	0	3	1	4	0	1	3	4	0	2	0
2009	5	5	1	0	0	4	1	4	0	0	7	4	0	2	0
2008	3	7	1	0	0	1	2	2	0	0	5	5	0	1	0
2007	4	7	2	1	0	4	2	0	0	0	6	7	0	0	0
2006	8	10	2	0	0	3	1	1	0	0	5	3	0	2	1
2005	3	4	0	0	0	7	3	3	0	0	5	8	0	1	0
1994-04	14	54	14	7	5	31	17	48	0	10	40	23	0	23	3
Total	**60**	**132**	**32**	**14**	**11**	**109**	**44**	**134**	**7**	**26**	**122**	**79**	**4**	**50**	**5**

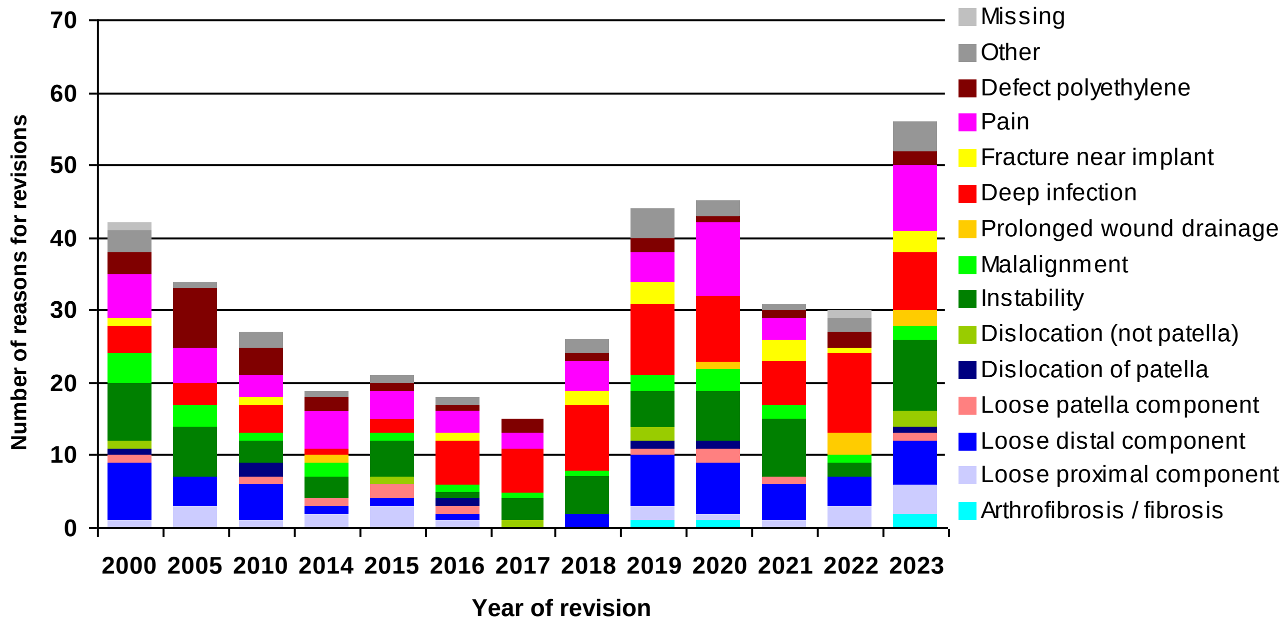
Revision causes are not mutually exclusive. More than one reason for revision is possible. Only the first revision is counted. Only revisions where both primary and revisions are reported are counted. A revision is defined as a reoperation where the implant or part of the implant is changed, added or removed.

Figure 18a: Reasons for revisions of primary total knee prostheses with patella



Reasons for revisions

Figure 18b: Reason for first revision of primary total prostheses with patellar component



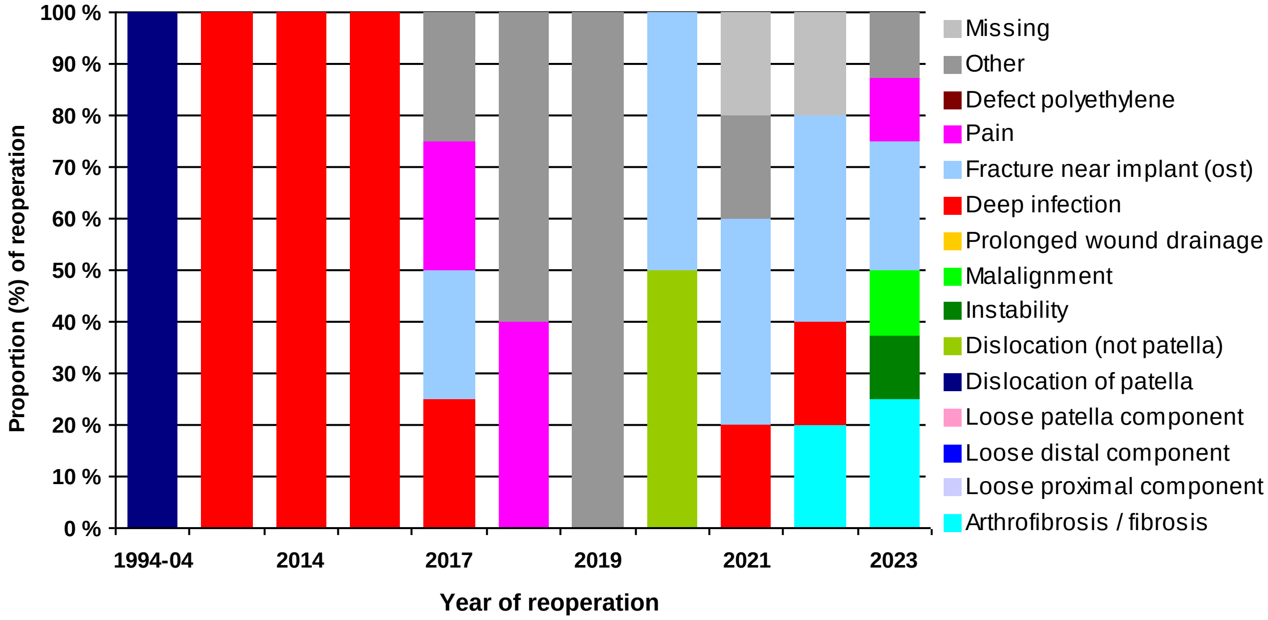
Reasons for reoperations

Table 15b: Reasons for reoperations of primary total knee prostheses with patella

Year of reoper.	Loose proximal comp.	Loose distal comp.	Loose patella comp.	Dislocation of patella	Dislocation (not patella)	Instability	Malalignment	Deep infection	Prolonged wound drainage	Fracture near implant (osteosynthesis)	Pain	Defect polyethylene	Arthrofibrosis / fibrosis	Other	Missing
2023	0	0	0	0	0	1	1	0	0	2	1	0	2	1	0
2022	0	0	0	0	0	0	0	1	0	2	0	0	1	0	1
2021	0	0	0	0	0	0	0	1	0	2	0	0	0	1	1
2020	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0
2019	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
2018	0	0	0	0	0	0	0	0	0	0	2	0	0	3	0
2017	0	0	0	0	0	0	0	1	0	1	1	0	0	1	0
2016	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
1994-04	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**1**	**1**	**1**	**1**	**6**	**0**	**8**	**4**	**0**	**3**	**7**	**2**

Reoperation causes are not mutually exclusive. More than one reason for reoperation is possible. Only the first reoperation is counted. Reoperations are defined as reoperations where the implant is not removed or parts are not added, like osteosyntheses of periprosthetic fractures.

Figure 18c: Reasons for reoperations of primary total knee prostheses with patella



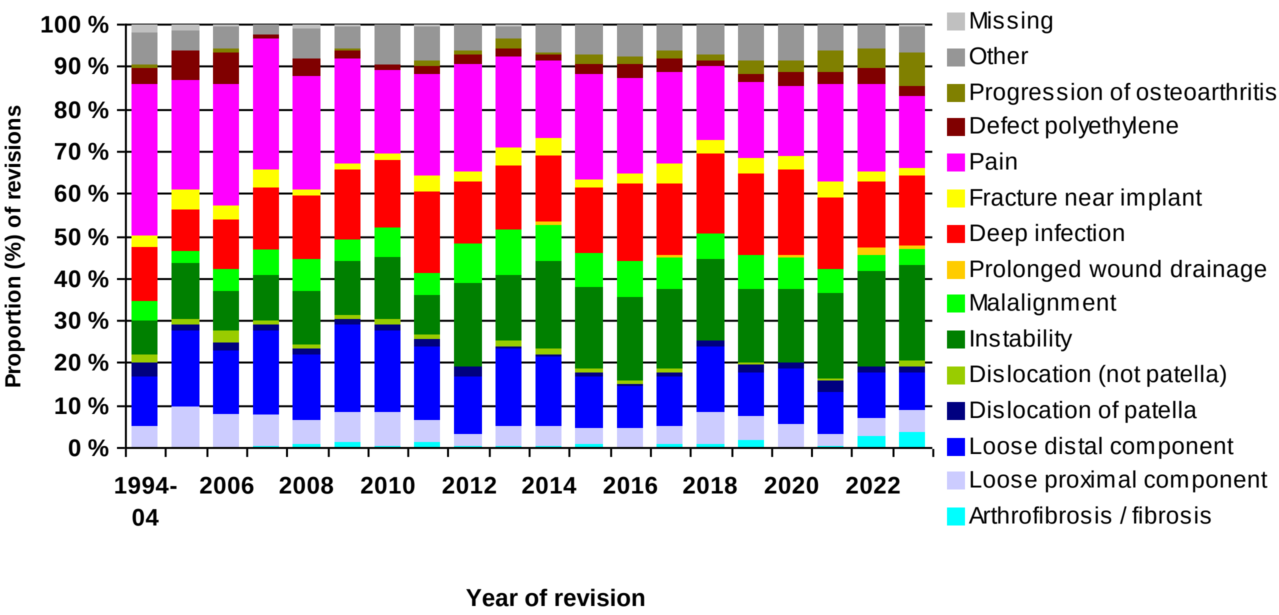
Reasons for revisions

Table 16a: Reasons for revisions of primary total knee prostheses without patella

Year of revision	Loose proximal comp.	Loose distal comp.	Dislocation of patella	Dislocation (not patella)	Instability	Malalignment	Deep infection	Prolonged wound drainage	Fracture near implant	Pain	Defect polyethylene	Progression of osteoarthritis	Arthrofibrosis / fibrosis	Other	Missing
2023	21	36	5	6	89	15	64	5	7	67	11	31	14	25	1
2022	16	42	5	1	87	16	60	6	9	81	14	19	11	22	0
2021	12	43	12	3	89	25	75	2	15	103	13	22	3	28	0
2020	21	46	6	0	63	27	72	1	13	58	12	10	0	31	0
2019	21	42	7	2	68	31	76	0	16	71	7	12	8	34	0
2018	33	68	6	0	84	26	83	0	15	74	8	6	4	30	0
2017	19	49	4	3	79	30	70	3	20	90	13	8	3	25	0
2016	19	39	3	3	81	33	73	1	9	92	13	8	0	30	0
2015	15	47	3	3	73	30	58	1	7	95	9	10	3	26	0
2014	16	60	2	4	75	31	57	2	14	67	4	2	2	24	0
2013	15	58	1	5	49	34	47	0	14	68	6	8	2	9	1
2012	8	42	7	0	60	28	45	0	7	77	8	2	2	19	0
2011	16	54	5	3	29	17	59	0	12	75	6	3	5	26	1
2010	21	51	4	4	38	19	43	0	3	52	4	0	1	25	0
2009	20	60	4	2	36	16	46	0	5	71	6	1	4	15	1
2008	15	39	4	3	32	19	39	0	3	69	11	0	2	18	2
2007	13	33	3	1	19	10	25	0	7	53	2	0	1	4	0
2006	14	26	3	5	16	9	20	0	6	50	13	1	0	9	1
2005	13	23	2	2	17	4	13	0	6	34	9	0	0	6	2
1994-04	38	86	27	13	60	34	93	0	21	265	27	8	0	55	14
Total	**366**	**944**	**113**	**63**	**1 144**	**454**	**1 118**	**21**	**209**	**1 612**	**196**	**151**	**65**	**461**	**23**

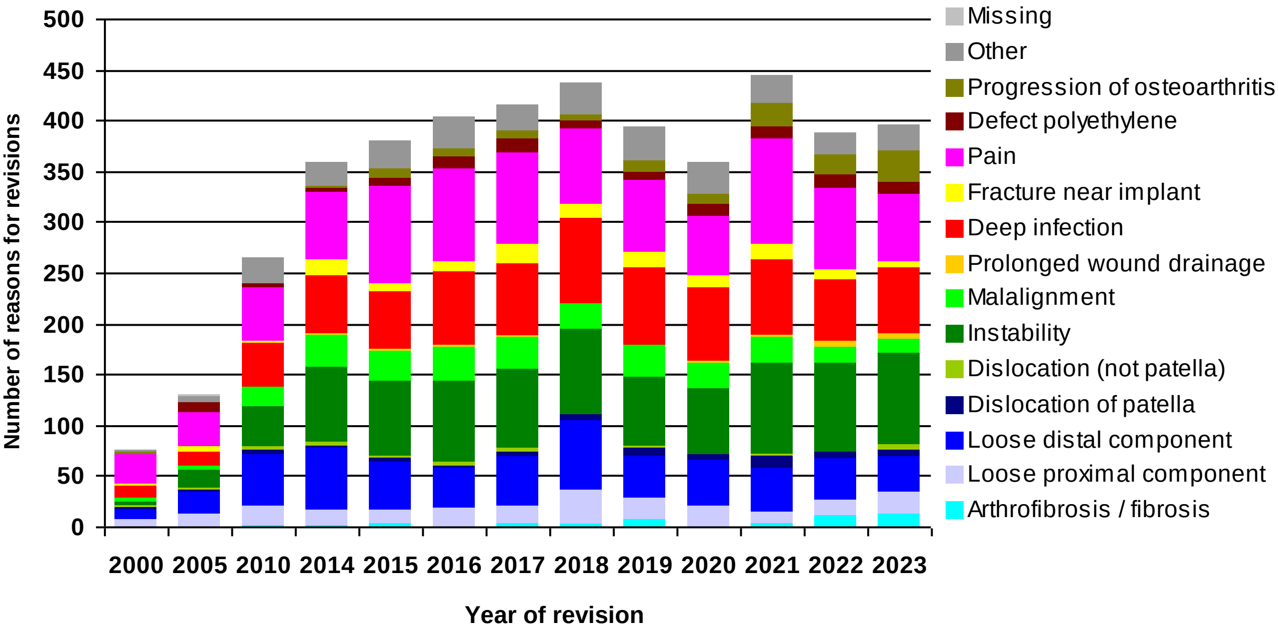
Revision causes are not mutually exclusive. More than one reason for revision is possible. Only the first revision is counted. Only revisions where both primary and revisions are reported are counted. A revision is defined as a reoperation where the implant or part of the implant is changed, added or removed.

Figure 19a: Reasons for revisions of primary total knee prostheses without patella



Reasons for revisions

Figure 19b: Reason for first revision of primary total prostheses without patellar component



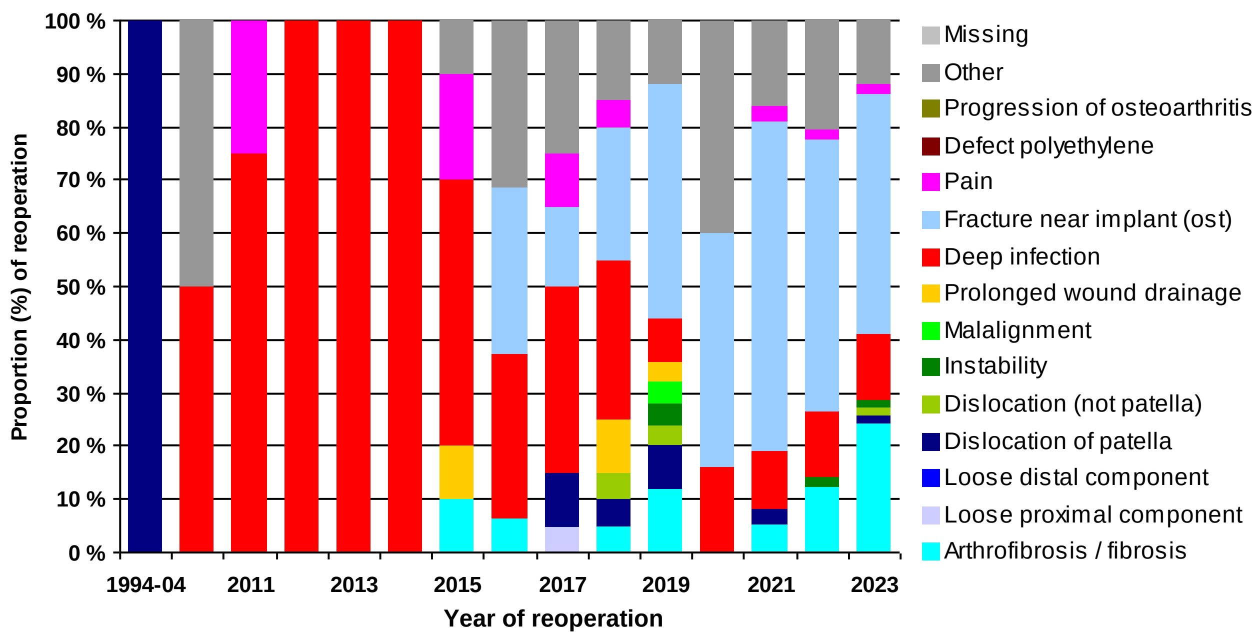
Reasons for reoperations

Table 16b: Reasons for reoperations of primary total knee prostheses without patella

Year of reoper.	Loose proximal comp.	Loose distal comp.	Dislocation of patella	Dislocation (not patella)	Instability	Malalignment	Deep infection	Prolonged wound drainage	Fracture near implant (osteosynthesis)	Pain	Defect polyethylene	Progression of osteoarthritis	Arthrofibrosis / fibrosis	Other	Missing
2023	0	0	1	1	1	0	8	0	30	1	0	0	16	8	0
2022	0	0	0	0	1	0	6	0	25	1	0	0	6	10	0
2021	0	0	1	0	0	0	4	0	23	1	0	0	2	6	0
2020	0	0	0	0	0	0	4	0	11	0	0	0	0	10	0
2019	0	0	2	1	1	1	2	1	11	0	0	0	3	3	0
2018	0	0	1	1	0	0	6	2	5	1	0	0	1	3	0
2017	1	0	2	0	0	0	7	0	3	2	0	0	0	5	0
2016	0	0	0	0	0	0	5	0	5	0	0	0	1	5	0
2015	0	0	0	0	0	0	5	1	0	2	0	0	1	1	0
2014	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	3	0	0	1	0	0	0	0	0
2009	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0
1994-04	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Total	**1**	**0**	**8**	**3**	**3**	**1**	**65**	**4**	**113**	**9**	**0**	**0**	**30**	**52**	**0**

Reoperation causes are not mutually exclusive. More than one reason for reoperation is possible. Only the first reoperation is counted. Reoperations are defined as reoperations where the implant is not removed or parts are not added, like osteosyntheses of periprosthetic fractures.

Figure 19c: Reasons for reoperations of primary total knee prostheses without patella



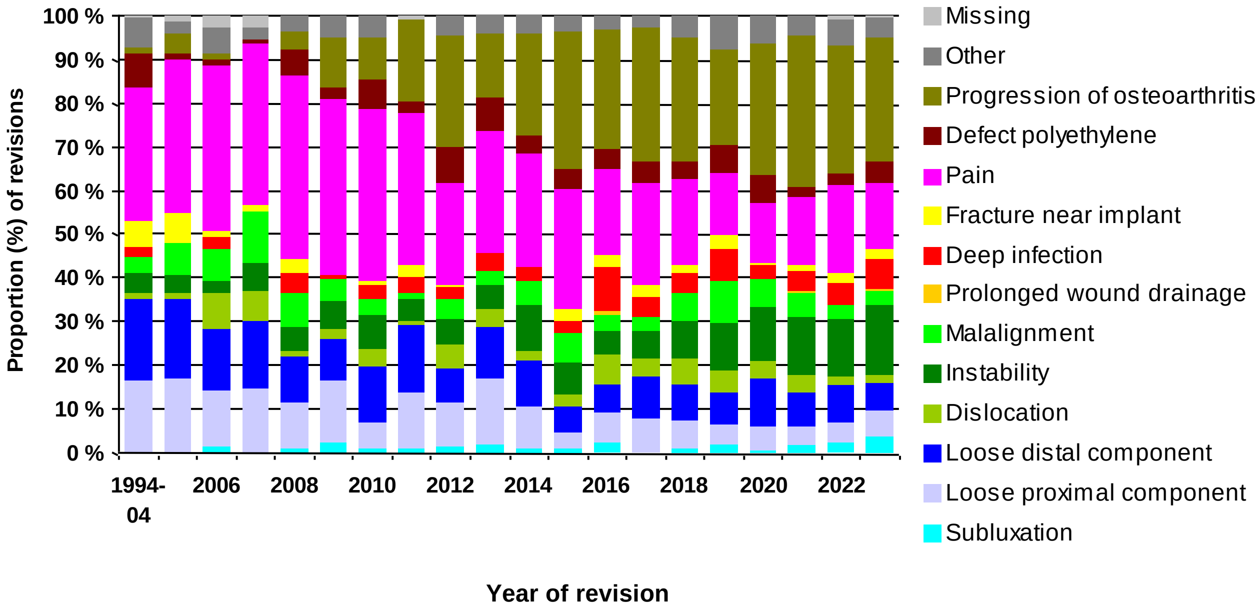
Reasons for revisions

Table 17a: Reasons for revisions of primary unicondylar knee prostheses

Year of revision	Loose proximal comp.	Loose distal comp.	Dislocation	Instability	Malalignment	Deep infection	Prolonged wound drainage	Fracture near implant	Pain	Defect polyethylene	Progression of osteoarthritis	Subluxation	Other	Missing
2023	13	14	3	33	6	15	1	5	31	10	60	7	9	1
2022	8	16	3	24	6	9	0	4	37	5	53	4	10	2
2021	6	12	6	20	8	7	1	2	23	4	52	3	7	0
2020	8	17	6	19	10	5	0	1	21	10	46	1	10	0
2019	9	13	9	20	18	13	0	6	26	12	40	3	14	0
2018	12	15	11	16	12	9	0	3	37	8	53	2	9	0
2017	12	15	7	10	5	7	0	4	37	8	48	0	4	0
2016	9	8	9	7	5	13	1	4	25	6	36	3	4	0
2015	5	8	4	10	9	4	0	4	37	6	43	1	5	0
2014	14	15	3	15	8	4	0	0	37	6	33	1	6	0
2013	18	14	5	6	4	5	0	0	33	9	17	2	5	0
2012	13	10	7	8	6	3	0	1	30	11	33	2	6	0
2011	15	18	1	6	2	4	0	3	41	3	22	1	0	1
2010	7	15	5	9	4	4	0	1	46	8	11	1	6	0
2009	20	14	3	9	7	1	0	0	57	4	16	3	7	0
2008	12	12	2	6	9	5	0	4	48	7	5	1	4	0
2007	11	12	5	5	9	0	0	1	28	1	0	0	2	2
2006	9	10	6	2	5	2	0	1	27	1	1	1	4	2
2005	12	13	1	3	5	0	0	5	25	1	3	0	2	1
1994-04	41	47	3	12	9	6	0	14	77	19	4	0	17	1
Total	**254**	**298**	**99**	**240**	**147**	**116**	**3**	**63**	**723**	**139**	**576**	**36**	**131**	**10**

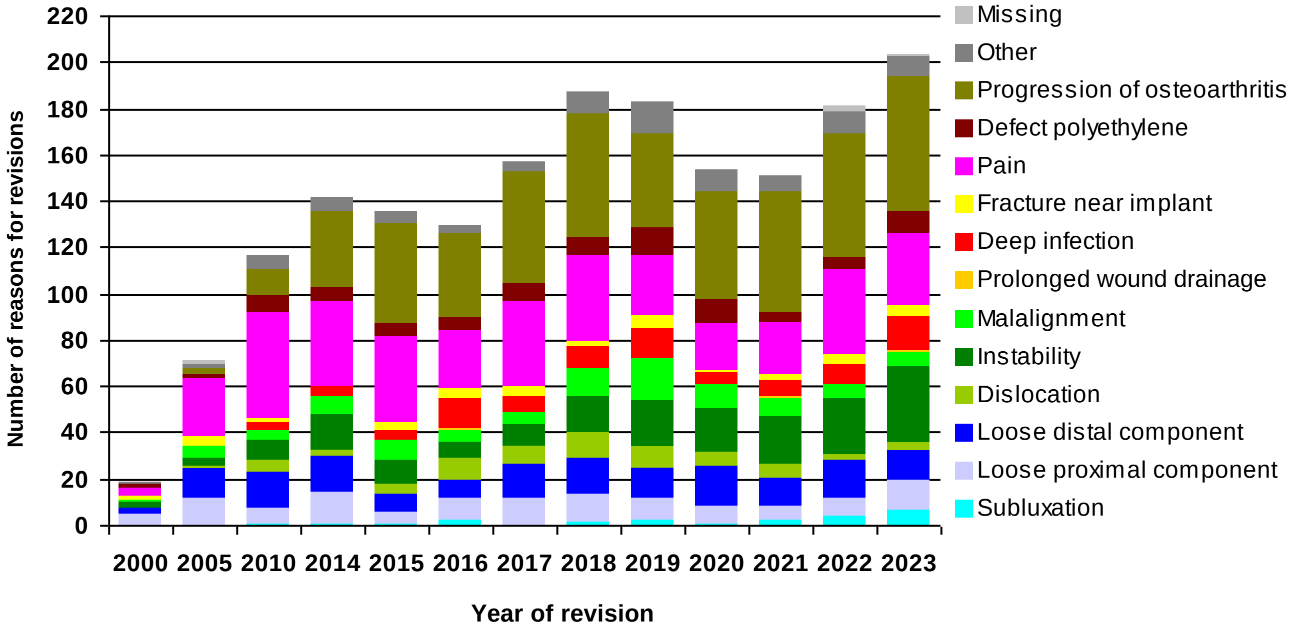
Revision causes are not mutually exclusive. More than one reason for revision is possible. Only the first revision is counted. Only revisions where both primary and revisions are reported are counted. A revision is defined as a reoperation where the implant or part of the implant is changed, added or removed.

Figure 20a: Reasons for revisions of primary unicondylar knee prostheses



Reasons for revisions

Figure 20b: Reason for first revision of primary unicondylar knee prosthese



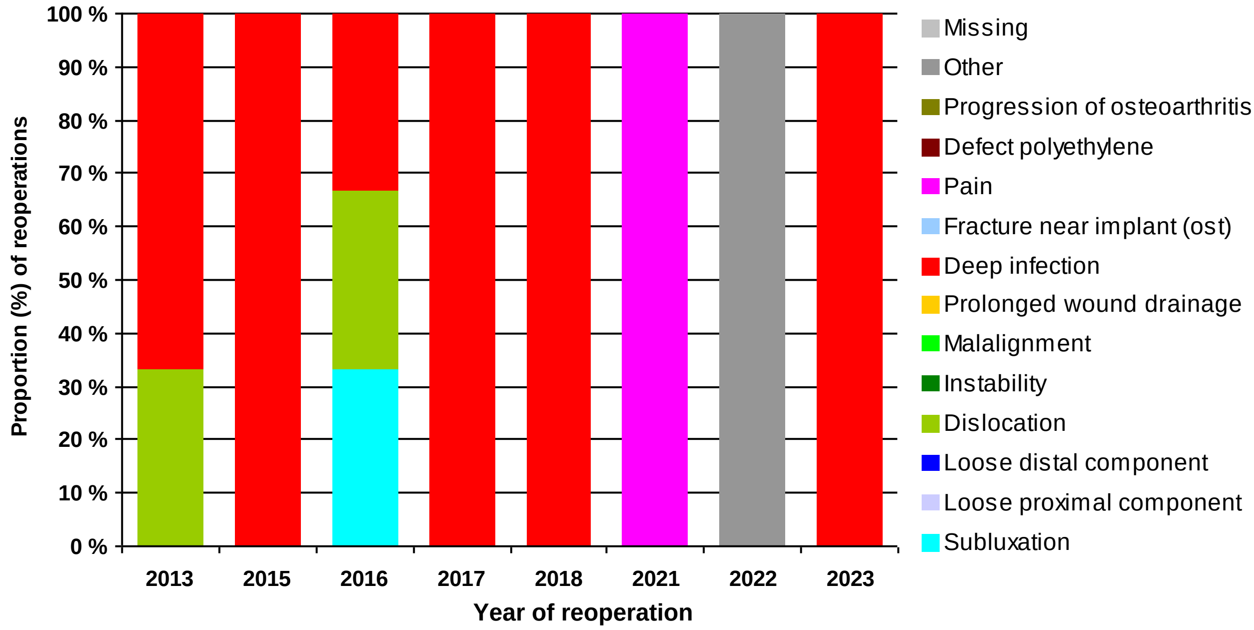
Reasons for reoperations

Table 17b: Reasons for reoperations of primary unicondylar knee prostheses

Year of reoper.	Loose proximal comp.	Loose distal comp.	Dislocation	Instability	Malalignment	Deep infection	Prolonged wound drainage	Fracture near implant (osteosynthesis)	Pain	Defect polyethylene	Progression of osteoarthritis	Subluxation	Other	Missing
2023	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2022	0	0	0	0	0	0	0	0	0	0	0	0	2	0
2021	0	0	0	0	0	0	0	0	2	0	0	0	0	0
2018	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2016	0	0	1	0	0	1	0	0	0	0	0	1	0	0
2015	0	0	0	0	0	2	0	0	0	0	0	0	0	0
2013	0	0	1	0	0	2	0	0	0	0	0	0	0	0
Total	**0**	**0**	**2**	**0**	**0**	**8**	**0**	**0**	**2**	**0**	**0**	**1**	**2**	**0**

Reoperation causes are not mutually exclusive. More than one reason for reoperation is possible. Only the first reoperation is counted. Reoperations are defined as reoperations where the implant is not removed or parts are not added, like osteosyntheses of periprosthetic fractures.

Figure 20c: Reasons for reoperations of primary unicondylar knee prostheses



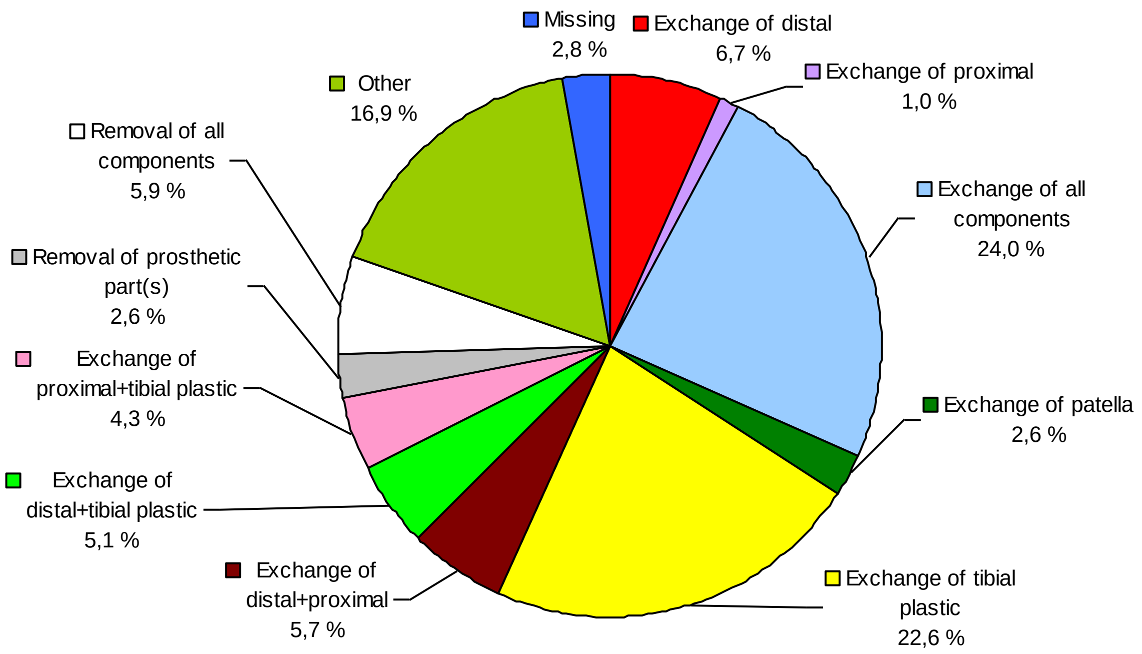
Type of revision *

Table 18: Total knee prostheses with patella in first reoperation after primary surgery

Year of primary operation	Exchange of distal	Exchange of distal+tibial plastic	Exchange of distal+ proximal	Exchange of whole prosthesis	Exchange of patella	Exchange of tibial plastic	Exchange of proximal	Exchange of proximal+tibial plastic	Removal of whole prosthesis	Removal of prosthetic part(s)	Other	Missing	Total
2023				1		7							**9**
2022				2		8		2					**13**
2021				3	1	8				1	5	1	**20**
2020		1		1		6		1			3		**13**
2019		2		5		8		2			9		**26**
2018		5		4		6		3					**19**
2017		4		3		7		3			5	1	**23**
2016	1	1		2		8					5		**17**
2015					2	1					4		**7**
2014		2				3					2	1	**8**
2013				1		2						1	**4**
2012		1	1	1		1							**4**
2011						3					1		**4**
2010				1		1					1		**3**
2009						3		1			2	1	**7**
2008				2		1		1	1			1	**6**
2007				2		2				1			**5**
2006		1		2	1			1			1		**7**
2005		1		1	1				1		1	1	**6**
1994-04	33	8	28	91	8	40	5	8	28	11	47	7	**317**
Total	**34**	**26**	**29**	**122**	**13**	**115**	**5**	**22**	**30**	**13**	**86**	**14**	**518**

* Both revisions and reoperations are counted

Figure 21: Total knee prostheses with patella in first reoperation after primary surgery



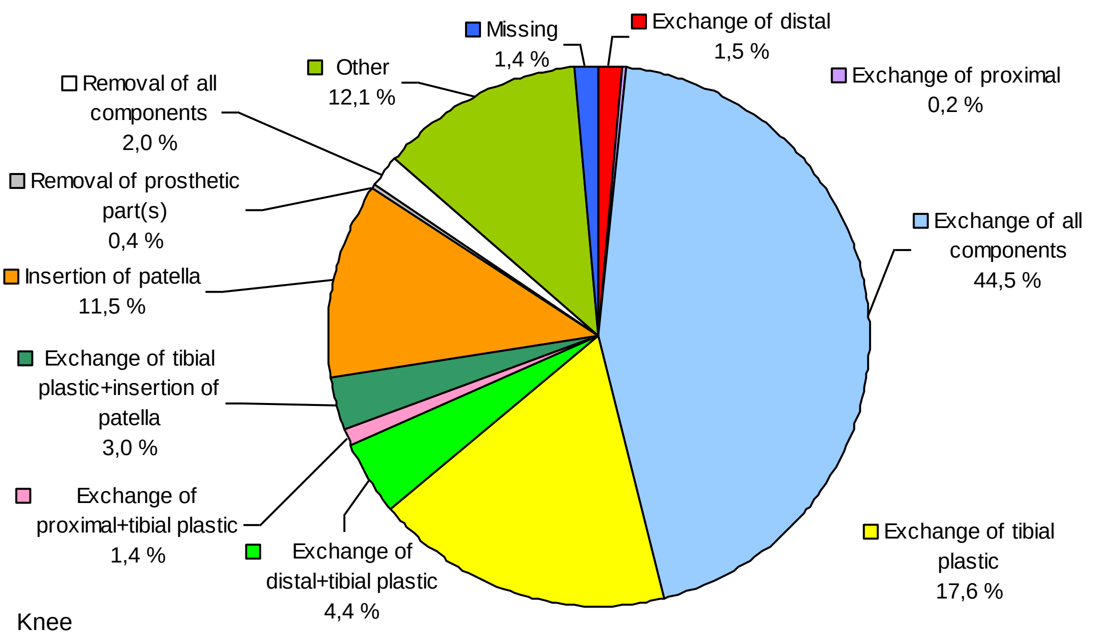
Type of revision

Table 19: Total knee prostheses without patella in first reoperation after primary surgery

Year of primary	Exchange of distal + proximal	Exchange of distal+tibial plastic	Exchange of whole prosthesis	Exchange of tibial plastic+inns. patella	Exchange of tibial plastic	Exchange of patella	Exchange of proximal+tibial plastic	Removal of whole prosthesis	Removal of prosthetic part(s)	Insertion of patella	Osteosynthesis	Other	Missing	Total
2023	1	1			35		5	1				10	3	**56**
2022	2	1	28	3	30		3			4	3	19	2	**95**
2021		7	77	9	57		4			21	1	22	1	**199**
2020		5	45	6	46		6			33	3	30	4	**178**
2019	1	5	80	9	48		7			20	7	38	1	**216**
2018		8	107	8	76		6			18	8	27	2	**260**
2017		17	85	9	71	1	9			27	3	25	4	**251**
2016		9	110	13	64		2	2		11	7	58	8	**284**
2015		8	115	12	76		4			36	5	46	4	**306**
2014		15	131	19	63		1	9	1	23	6	27	4	**299**
2013	1	10	161	11	54		5	2	1	23	7	28	8	**311**
2012	1	22	185	12	52			5	1	19	8	37	7	**349**
2011	1	24	196	11	65	1	2	8		31	7	39	6	**391**
2010	2	24	181	8	47		2	5	2	38	9	26	3	**347**
2009	4	22	189	3	55		6	9	1	30	8	31	3	**361**
2008	2	21	156	9	54		2	9	2	22	7	25	2	**311**
2007	2	14	149	6	36	1	2	6	2	22	5	25	3	**273**
2006	6	11	127	5	21		3	10	1	25	9	16	1	**235**
2005	6	11	94	3	15		2	7		27	2	26		**193**
1994-04	77	44	606	33	154	1	16	56	13	299	5	100	24	**1 428**
Total	**106**	**279**	**2 822**	**189**	**1 119**	**4**	**87**	**129**	**24**	**729**	**110**	**655**	**90**	**6 343**

* Both revisions and reoperations are counted

Figure 22: Total knee prostheses without patella in first reoperation after primary surgery



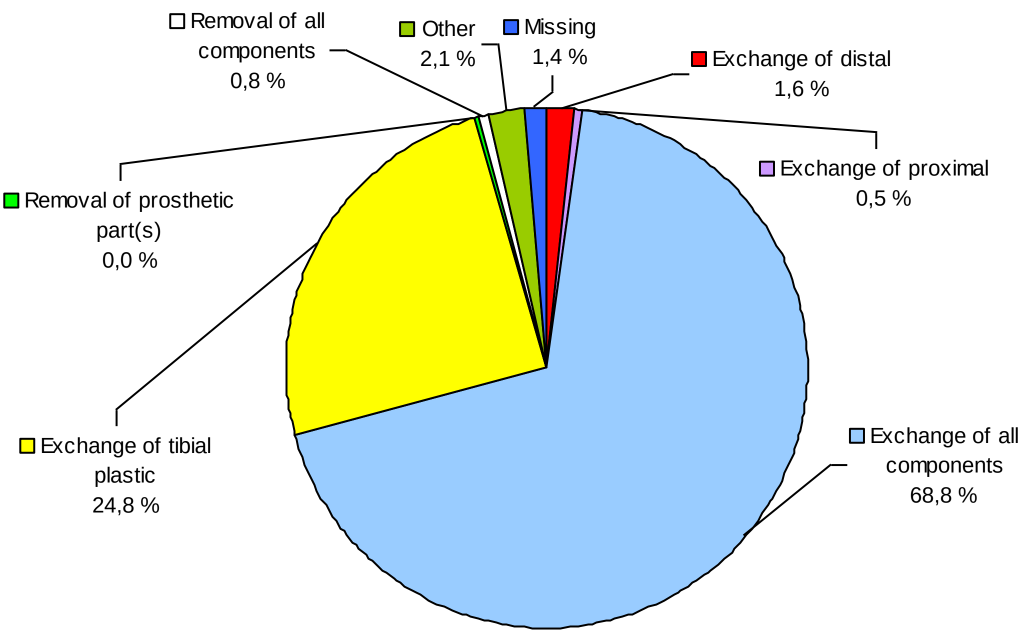
Type of revision

Table 20: Unicondylar prostheses in first reoperation after primary surgery

Year of primary operation	Exchange of distal	Exchange of whole prosthesis	Exchange of tibial plastic	Exchange of proximal	Removal of whole prosthesis	Removal of prosthetic part(s)	Other	Missing	Total
2023		4	22						**26**
2022	1	9	18						**28**
2021		23	26						**49**
2020		23	20				1		**44**
2019	4	44	44				1		**93**
2018		47	40	1			1	1	**90**
2017	1	34	40					1	**76**
2016	1	47	32				6	1	**87**
2015	1	58	26				2	1	**88**
2014	2	57	10		1		4		**74**
2013		35	24		1		1		**61**
2012	2	54	22	1	1			1	**81**
2011	1	55	16	1			1	1	**75**
2010		71	26				5	1	**103**
2009		77	26		1		1		**105**
2008	1	80	20		2			1	**104**
2007		107	14	1	2		6	2	**132**
2006	1	91	16	1	1		5	2	**117**
2005	2	99	22				1	4	**128**
1994-04	19	495	80	6	8	1	12	14	**635**
Total	**36**	**1 510**	**544**	**11**	**17**	**1**	**47**	**30**	**2 196**

* Both revisions and reoperations are counted

Figure 23: Unicondylar prostheses in first reoperation after primary surgery



ASA classification all knee prostheses

Table 21: Primary operations all knee prostheses

Year	ASA 1	ASA 2	ASA 3	ASA 4	ASA 5	Missing	Total
2023	780	6 087	1 736	16		34	**8 653**
2022	713	5 431	1 617	19		88	**7 868**
2021	720	5 149	1 604	11		153	**7 637**
2020	624	4 514	1 404	10		155	**6 707**
2019	720	4 811	1 520	7		198	**7 256**
2018	709	4 611	1 438	7		168	**6 933**
2017	668	4 410	1 275	13		215	**6 581**
2016	707	4 391	1 236	12		168	**6 514**
2015	683	4 153	1 189	7		88	**6 120**
2014	587	3 912	1 058	8		75	**5 640**
2013	551	3 520	896	5	1	68	**5 041**
2012	667	3 276	902	8		62	**4 915**
2011	582	3 023	873	6		65	**4 549**
2005-10	4 709	13 290	4 165	35	2	620	**22 821**

Table 22: Revisions

Year	ASA 1	ASA 2	ASA 3	ASA 4	ASA 5	Missing	Total
2023	44	414	231	13		7	**709**
2022	25	357	236	6		14	**638**
2021	25	333	246	13		31	**648**
2020	30	320	202	12		22	**586**
2019	27	369	212	11		32	**651**
2018	39	365	224	11		27	**666**
2017	50	354	192	5	1	29	**631**
2016	27	358	184	2		33	**604**
2015	35	314	180	7		20	**556**
2014	50	297	137	2		13	**499**
2013	45	292	133	0		12	**482**
2012	52	287	136	3		15	**493**
2011	54	249	119	0		9	**431**
2005-10	463	944	522	8		98	**2 035**

Figure 24: Primary operations

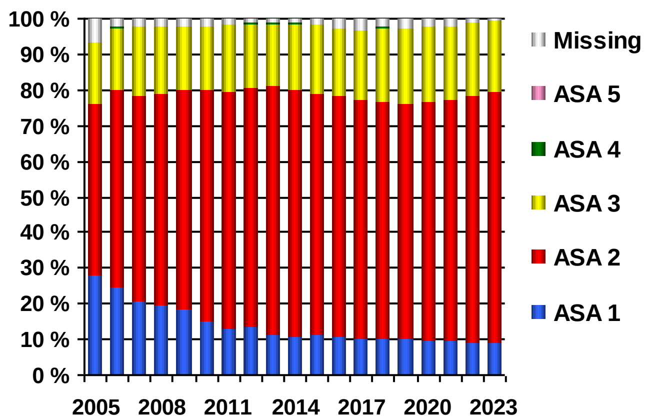
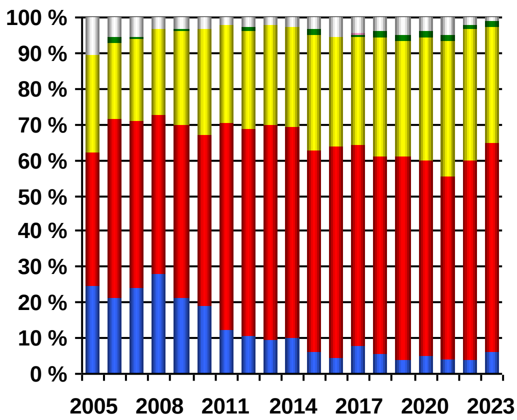


Figure 25: Revisions



ASA 1 = Healthy patients who smoke less than 5 cigarettes a day.
ASA 2 = Patients with an asymptomatic condition who are kept under medical control (f.ex. hypertension), or with diet (f. ex. diabetes mellitus type 2), and otherwise healthy patients who smoke five cigarettes or more daily.
ASA 3 = Patients having a condition that can cause symptoms. However, patients are kept under medical control (f. ex. moderate angina pectoris and mild asthma).
ASA 4 = Patients with a condition that is out of control (f. ex. heart failure and asthma).
ASA 5 = A moribund patient who is not expected to survive the operation.

Registration of ASA classification started in 2005

Thrombosis prophylaxis

Table 23: Primary operations

Year	Preoperatively	Postoperatively	Unknown* pre / post	No	Missing	Total
2023	773	7 679	94	78	29	**8 653**
2022	318	6 967	425	88	70	**7 868**
2021	399	6 402	683	81	72	**7 637**
2020	391	5 623	567	67	59	**6 707**
2019	407	5 892	805	101	51	**7 256**
2018	712	5 309	834	48	30	**6 933**
2017	778	4 896	826	51	30	**6 581**
2016	846	4 793	787	59	29	**6 514**
2015	931	4 299	816	29	45	**6 120**
2014	811	4 013	763	25	28	**5 640**
2013	909	3 352	716	10	54	**5 041**
2012	1 131	2 879	871	7	27	**4 915**
2011	1 271	2 289	952	8	29	**4 549**
2005-10	10 374	8 947	3 117	58	325	**22 821**

Table 24: Revisions

Year	Preoperatively	Postoperatively	Unknown* pre / post	No	Missing	Total
2023	99	579	8	20	3	**709**
2022	72	495	38	21	12	**638**
2021	78	496	45	17	12	**648**
2020	62	454	43	18	9	**586**
2019	74	478	70	23	6	**651**
2018	83	488	77	11	7	**666**
2017	84	460	75	7	5	**631**
2016	97	426	72	7	2	**604**
2015	65	407	68	11	5	**556**
2014	70	350	67	7	5	**499**
2013	77	317	77	6	5	**482**
2012	105	268	111	6	3	**493**
2011	97	229	100	2	3	**431**
2005-10	729	869	362	28	47	**2 035**

* Missing information on medication start

Figure 26: Primary operations

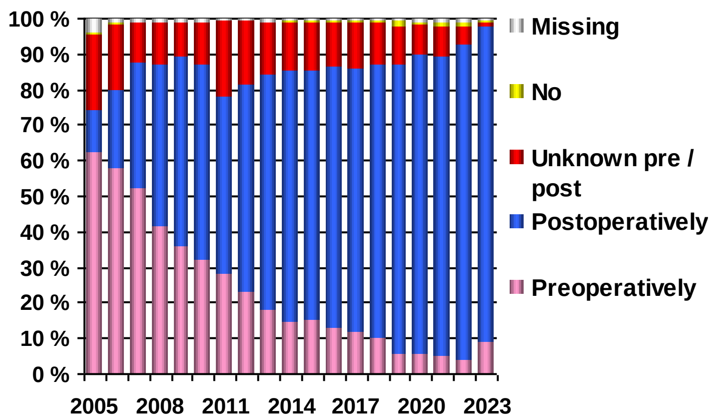
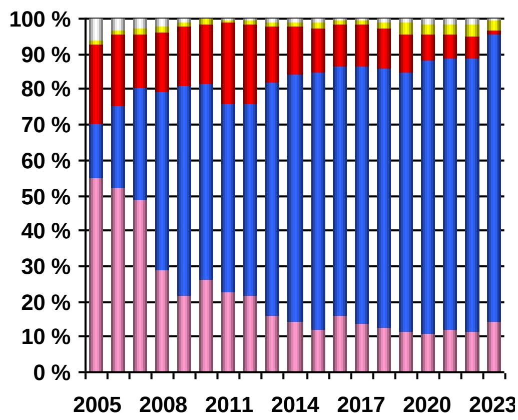


Figure 27: Revisions



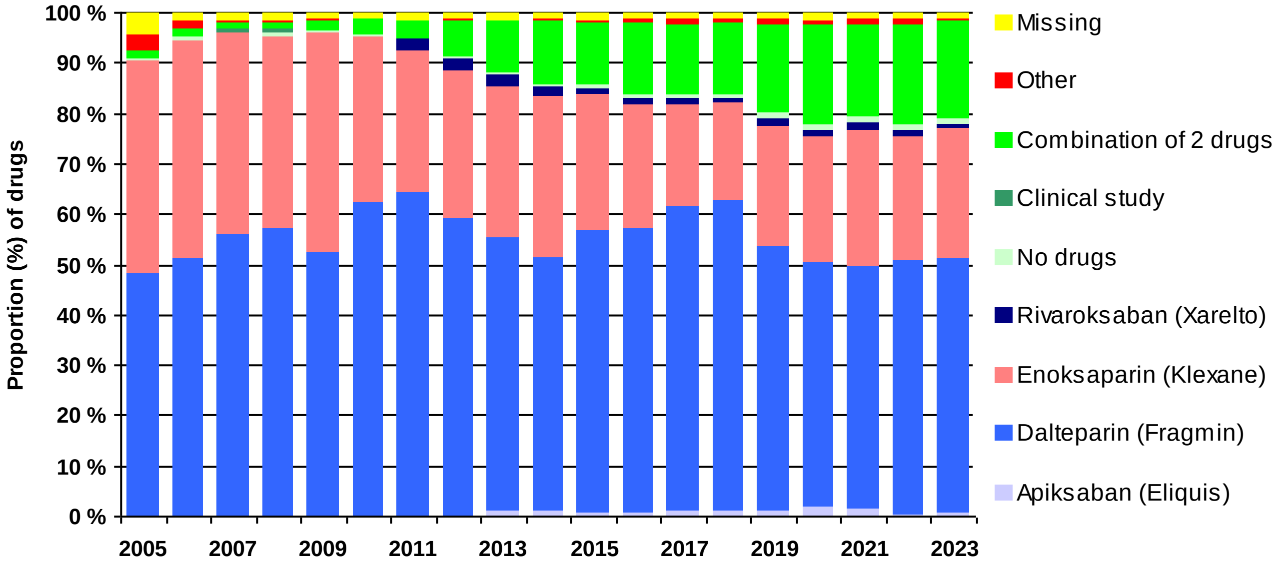
Registration of thrombosis prophylaxis started in 2005

Thrombosis prophylaxis

Table 25a: Drugs - All operations

Drugs	2005-13	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Acetylsalicylsyre (Albyl-E, Globoid, Acetyratio, Magnyl E)	0,0%	0,3%	0,4%	0,6%	0,9%	1,0%	1,0%	1,0%	0,9%	0,9%	0,2%
Apiksaban (Eliquis)	0,2%	1,1%	0,9%	1,0%	1,1%	1,3%	1,1%	1,9%	1,7%	0,6%	0,7%
Dalteparin (Fragmin)	56,7%	50,3%	56,2%	56,5%	60,6%	61,5%	52,7%	48,7%	48,1%	50,4%	50,8%
Enoksaparin (Klexane)	35,6%	32,1%	26,8%	24,4%	20,2%	19,2%	23,7%	25,0%	26,9%	24,4%	25,5%
Rivaroksaban (Xarelto)	1,0%	1,8%	1,4%	1,1%	1,1%	1,1%	1,3%	1,2%	1,4%	1,3%	0,8%
Ximelagatran (Exanta, Malagatran)	0,3%										
No drugs	0,3%	0,5%	0,6%	0,9%	0,8%	0,8%	1,6%	1,2%	1,2%	1,3%	1,0%
Clinical study	0,2%										
Combination of 2 drugs	3,9%	12,5%	12,3%	14,2%	13,9%	13,9%	17,3%	19,6%	18,5%	19,8%	19,5%
Other	0,2%	0,2%	0,1%	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
Missing	1,7%	1,2%	1,5%	1,2%	1,3%	1,1%	1,3%	1,4%	1,3%	1,3%	1,3%
Total	**40 767**	**6 139**	**6 676**	**7 118**	**7 212**	**7 599**	**7 907**	**7 293**	**8 285**	**8 506**	**9 362**

Figure 28: Drugs



Thrombosis prophylaxis

Tablle 25b: Combination of 2 drugs - All operations

Drugs	2005-13	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Enoxaparin + Apixaban	15,6%	27,3%	27,6%	33,8%	33,5%	26,6%	49,1%	47,7%	48,2%	35,8%	29,9%
Dalteparin + Apixaban	6,6%	17,8%	17,4%	21,3%	29,8%	28,5%	12,4%	13,8%	17,6%	27,9%	31,7%
Enoxaparin + Acetylsalicylsyre	30,8%	19,3%	18,3%	17,8%	15,8%	14,4%	16,3%	16,4%	13,3%	16,8%	19,5%
Dalteparin + Rivaroxaban	0,9%	0,9%	3,2%	2,6%	4,4%	1,6%	6,9%	9,9%	13,5%	14,9%	14,5%
Dalteparin + Dabigatranetixalat	18,7%	22,0%	22,4%	14,3%	3,7%	2,2%	0,1%		0,1%		0,3%
Dalteparin + Acetylsalicylsyre	3,7%	1,2%			4,4%	15,2%	11,5%	10,4%	5,0%	1,1%	0,9%
Enoxaparin + Rivaroxaban	0,7%	7,6%	7,3%	7,3%	6,8%	8,0%	2,0%	0,1%	0,1%	0,1%	1,7%
Dalteparin + Warfarin	12,2%	1,2%	1,0%	0,7%	0,1%	0,2%	0,1%			0,1%	
Enoxaparin + Dabigatranetixalat	0,2%	1,3%	1,7%	1,5%	1,3%	3,0%	1,4%	1,7%	2,0%	2,1%	0,8%
Enoxaparin + Warfarin	5,4%	1,0%	0,9%	0,4%	0,1%	0,1%			0,1%		
Enoxaparin + Dextran	3,3%										
Acetylsalicylsyre + Missing/Unknown										0,7%	
Dalteparin + Enoxaparin	0,6%								0,1%	0,1%	
Dalteparin + Missing/Unknown									0,1%	0,2%	0,1%
Enoxaparin + Missing/Unknown											0,4%
Dalteparin + Dextran	0,4%										
Apixaban + Missing/Unknown										0,2%	0,1%
Dalteparin + Clopidogrel	0,1%		0,1%	0,1%							
Enoxaparin + Clopidogrel	0,2%			0,1%							
Enoxaparin + Acetylsalicylsyre and dipyridamol	0,1%	0,1%									
Enoxaparin + Edoxaban											0,1%
Acetylsalicylsyre + Apixaban											0,1%
Acetylsalicylsyre + Clopidogrel							0,1%				
Acetylsalicylsyre + Ticagrelor		0,1%									
Acetylsalicylsyre and dipyridamol					0,1%						
Dabigatranetixalat + Missing/Unknown										0,1%	
Dalteparin + Clinical study	0,1%										
Dalteparin + Dipyridamol											0,1%
Dalteparin + Fondaparinux	0,1%										
Dalteparin + Heparin	0,1%										
Dalteparin + Prasugrel	0,1%										
Dalteparin + Ximelagatran			0,1%								
Dextran + Apixaban		0,1%									
Dextran + Clopidogrel	0,1%										
Enoxaparin + Dipyridamol										0,1%	
Enoxaparin + Heparin							0,1%				
Enoxaparin + Hydroxyethylstivelse						0,1%					
Enoxaparin + Ximelagatran	0,1%										
Fondaparinux + Rivaroxaban				0,1%							
Warfarin + Fondaparinux	0,1%										
Ximelagatran + Pyrazolidon	0,1%										
Total	**1 588**	**765**	**821**	**1 008**	**1 002**	**1 059**	**1 368**	**1 431**	**1 530**	**1 699**	**1 825**

Thrombosis prophylaxis

Table 26: Duration - All operations

Year	Days: 1-7	8-14	15-21	22-28	29-35	>35	No drugs	Missing	Total
2023	3 046	5 117	131	21	461	18	98	478	**9 370**
2022	2 529	4 008	131	13	462	16	109	1 239	**8 507**
2021	2 017	3 574	178	9	385	13	98	2 011	**8 285**
2020	2 274	3 156	235	11	572	5	85	955	**7 293**
2019	2 198	3 320	394	29	692	9	124	1 141	**7 907**
2018	1 690	3 210	442	142	803	5	59	1 248	**7 599**
2017	1 185	3 202	502	281	781	13	58	1 190	**7 212**
2016	1 178	3 162	551	314	718	38	66	1 091	**7 118**
2015	1 018	2 390	977	326	866	143	40	916	**6 676**
2014	975	1 797	1 024	370	1 065	153	32	723	**6 139**
2013	733	1 595	1 005	398	1 002	120	16	654	**5 523**
2012	584	1 633	1 205	335	890	96	13	652	**5 408**
2011	289	1 345	1 381	403	799	101	10	652	**4 980**
2005-10	2 647	7 670	5 312	982	4 112	177	86	3 870	**24 856**

Registration of thrombosis prophylaxis started in 2005

Fibrinolysis Inhibitor

Table 27: Drugs - Primary operations

Drugs	2010-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Cyclokapron (Tranexamic acid)	13 557	5 324	5 755	5 819	6 191	6 720	6 298	7 191	7 479	8 263	72 597
Missing	425	72	63	84	72	66	68	66	53	79	1 048
Total	**13 982**	**5 396**	**5 818**	**5 903**	**6 263**	**6 786**	**6 366**	**7 257**	**7 532**	**8 342**	**73 645**

Registration of fibrinolysis inhibitor started in 2010

Perioperative complications

Table 28: For primary total prostheses (the 10 most common complications)

Type	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Patella tendon rupture / Avulsion fractures / ligament rupture / tendon injury	124	17	15	6	11	19	17	8	4	2	223
Fracture	134	12	12	10	7	8	7	16	6		212
Rupture / damage MCL (medial colateral ligament)	56	5	10	19	18	22	20	15	8	1	174
Technical problem with cement	57	4		1	5	3	2	4			76
Adm. failure (missing comp. etc.)	39		4	3	7	3	1		1	2	60
Problem due to difficult anatomy	34	5	3	2	4	5		3	2		58
Blood torniquet failing	46	1			1	1	6				55
Failure of instruments	48	1	1		1						51
Anesthesia problems	33	4	1	3	3			3			47
Blødning (Uvanlig stor)	18	4	1	2	2	1	2	3	5	1	39
Other periop. compl.	262	36	26	20	21	23	17	23	10	8	446

Previous operation in relevant joint

Table 29: For primary total prostheses

Type	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Meniscus	6 396	757	882	737	764	703	637	796	868	907	13 447
Osteotomy	2 311	119	137	111	108	151	113	139	124	137	3 450
Arthroscopy (diagnostic)	1 346	205	194	166	149	93	78	83	87	87	2 488
Cruciate Ligament	800	125	188	119	143	144	148	167	192	236	2 262
Osteosynthesis of intraarticular joint fracture	1 126	94	98	114	107	109	86	91	88	105	2 018
Synovectomy	1 265	66	41	51	41	32	33	32	41	38	1 640
Artrodesis	27		2	1	1			2			33
Other previous op.	998	78	86	120	146	123	125	160	193	267	2 296

Mini-invasive surgery

Table 30: Primary operations - Total knee prostheses

Year	Yes		No		Missing		Total
2023	3	(0%)	7 078	(99%)	100	(1%)	**7 181**
2022	4	(0%)	6 199	(94%)	385	(6%)	**6 588**
2021	18	(0%)	5 160	(79%)	1 315	(20%)	**6 493**
2020	8	(0%)	5 338	(92%)	429	(7%)	**5 775**
2019	8	(0%)	5 715	(93%)	452	(7%)	**6 175**
2018	14	(0%)	5 351	(92%)	477	(8%)	**5 842**
2017	9	(0%)	5 035	(90%)	562	(10%)	**5 606**
2016	10	(0%)	4 964	(89%)	576	(10%)	**5 550**
2015	5	(0%)	4 632	(87%)	657	(12%)	**5 294**
2014	2	(0%)	4 324	(87%)	647	(13%)	**4 973**
2013	10	(0%)	3 791	(84%)	716	(16%)	**4 517**
2012	16	(0%)	3 688	(84%)	685	(16%)	**4 389**
2011	15	(0%)	3 582	(88%)	465	(11%)	**4 062**
2005-10	91	(0%)	18 908	(94%)	1 049	(5%)	**20 048**

Figure 29: Primary operations - Total knee prostheses

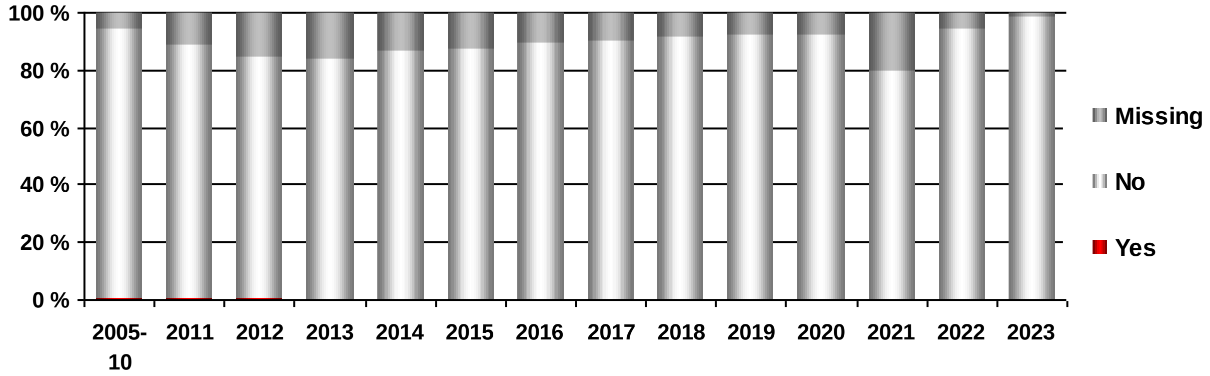


Table 31: Primary operations - Unicondylar knee prostheses

Year	Yes		No		Missing		Total
2023	464	(35%)	871	(65%)	9	(1%)	**1 344**
2022	437	(38%)	649	(57%)	52	(5%)	**1 138**
2021	392	(39%)	474	(47%)	141	(14%)	**1 007**
2020	320	(38%)	495	(59%)	27	(3%)	**842**
2019	358	(36%)	575	(58%)	62	(6%)	**995**
2018	409	(41%)	556	(56%)	36	(4%)	**1 001**
2017	382	(44%)	429	(49%)	57	(7%)	**868**
2016	318	(37%)	486	(56%)	59	(7%)	**863**
2015	285	(38%)	399	(53%)	69	(9%)	**753**
2014	240	(40%)	280	(46%)	85	(14%)	**605**
2013	224	(47%)	167	(35%)	86	(18%)	**477**
2012	199	(42%)	222	(47%)	54	(11%)	**475**
2011	196	(45%)	191	(44%)	52	(12%)	**439**
2005-10	1 157	(44%)	1 389	(53%)	92	(3%)	**2 638**

Registration of MIS started in 2005

Computernavigation

Table 32: Primary operations - Total knee prostheses

Year	Yes		No		Missing		Total
2023	488	(7%)	6 611	(92%)	82	(1%)	**7 181**
2022	501	(8%)	5 796	(88%)	291	(4%)	**6 588**
2021	544	(8%)	5 561	(86%)	388	(6%)	**6 493**
2020	503	(9%)	4 856	(84%)	416	(7%)	**5 775**
2019	514	(8%)	5 227	(85%)	434	(7%)	**6 175**
2018	597	(10%)	4 793	(82%)	452	(8%)	**5 842**
2017	569	(10%)	4 520	(81%)	517	(9%)	**5 606**
2016	584	(11%)	4 413	(80%)	553	(10%)	**5 550**
2015	475	(9%)	4 167	(79%)	652	(12%)	**5 294**
2014	443	(9%)	3 882	(78%)	648	(13%)	**4 973**
2013	390	(9%)	3 404	(75%)	723	(16%)	**4 517**
2012	416	(9%)	3 291	(75%)	682	(16%)	**4 389**
2011	445	(11%)	3 170	(78%)	447	(11%)	**4 062**
2005-10	2 976	(15%)	16 083	(80%)	989	(5%)	**20 048**

Figure 30: Primary operations - Total knee prostheses

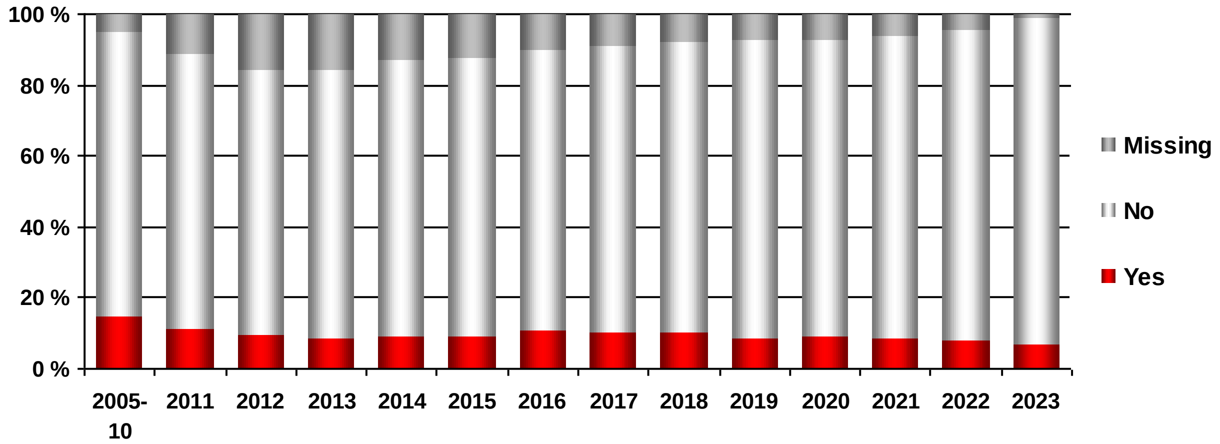


Table 33: Primary operations - Unicondylar knee prostheses

Year	Yes		No		Missing		Total
2023	2	(0%)	1 327	(99%)	15	(1%)	**1 344**
2022	3	(0%)	1 092	(96%)	43	(4%)	**1 138**
2021	3	(0%)	968	(96%)	36	(4%)	**1 007**
2020	3	(0%)	813	(97%)	26	(3%)	**842**
2019	0		930	(93%)	65	(7%)	**995**
2018	1	(0%)	962	(96%)	38	(4%)	**1 001**
2017	0		810	(93%)	58	(7%)	**868**
2016	0		800	(93%)	63	(7%)	**863**
2015	4	(1%)	681	(90%)	68	(9%)	**753**
2014	0		518	(86%)	87	(14%)	**605**
2013	0		389	(82%)	88	(18%)	**477**
2012	0		419	(88%)	56	(12%)	**475**
2011	1	(0%)	387	(88%)	51	(12%)	**439**
2005-10	46	(2%)	2 493	(95%)	99	(4%)	**2 638**

Registration of CAOS started in 2005

Cements used in total knee prostheses

Table 34: Primary operations - Femur

Cement	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Palacos R+G pro		5	15	364	1 546	2 946	3 210	3 723	3 884	4 572	**20 265**
Palacos R + G	13 006	1 483	1 437	1 007	961	634	393	396	303	249	**19 869**
Optipac Refobacin Bonecement R	7 666	2 160	1 850	1 469	1 486	484				1	**15 116**
Palacos m/gentamicin	14 675										**14 675**
Refobacin Bone Cement R	5 523	169	556	889	49	1					**7 187**
SmartSet GHV Genta. Smartmix	743	294	277	247	217	244	302	197			**2 521**
Cemex m/gentamycin	1 591	160	149	92	43	24	4	1			**2 064**
Refobacin-Palacos	1 571										**1 571**
Optipac Refobacin Bonecement R-3					2	260	373	248	244	308	**1 435**
Palacos R								190	456	449	**1 095**
Simplex m/Tobramycin	674										**674**
Palacos	424										**424**
Bone Cement R-3								46	88	74	**208**
Cemex System Genta FAST	203										**203**
Simplex	183									1	**184**
CMW I m/gentamicin	169										**169**
Copal G+ V	7	5	2	11	6	6	6	13	18	12	**86**
CMW I	53										**53**
Other (n<50)	151	5	3	10	12	12	18	8	11	15	**245**
Mangler	63										**63**
Total	**46 702**	**4 281**	**4 289**	**4 089**	**4 322**	**4 611**	**4 306**	**4 822**	**5 004**	**5 681**	**88 107**

Table 35: Primary operations - Tibia

Cement	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Palacos R+G pro	2	5	40	1 136	2 328	4 029	4 175	4 737	4 985	5 828	**27 265**
Palacos R + G	18 075	2 231	2 258	1 149	1 100	731	435	452	321	265	**27 017**
Palacos m/gentamicin	17 809										**17 809**
Optipac Refobacin Bonecement R	8 380	2 334	1 984	1 539	1 573	481				1	**16 292**
Refobacin Bone Cement R	5 951	182	572	938	47						**7 690**
SmartSet GHV Genta. Smartmix	753	296	279	247	217	244	303	199			**2 538**
Cemex m/gentamycin	1 737	165	150	91	43	24	4	1			**2 215**
Refobacin-Palacos	1 627										**1 627**
Optipac Refobacin Bonecement R-3					2	273	362	240	238	292	**1 407**
Palacos R								190	456	450	**1 096**
Simplex m/Tobramycin	679										**679**
Palacos	452										**452**
Cemex System Genta FAST	284										**284**
Bone Cement R-3								46	88	74	**208**
CMW I m/gentamicin	194										**194**
Simplex	186									1	**187**
Copal G+ V	9	10	3	13	6	7	5	27	39	17	**136**
Copal m/gentamicin+clindamycin	3				1	1		2	25	78	**110**
CMW I	54										**54**
Other (n<50)	169	5	3	17	13	13	17	8	6	4	**255**
Mangler	70										**70**
Total	**56 434**	**5 228**	**5 289**	**5 130**	**5 330**	**5 803**	**5 301**	**5 902**	**6 158**	**7 010**	**107 585**

Cements used in unicondylar knee prostheses

Table 36: Primary operations - Femur

Cement	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Palacos R + G	2 238	428	364	169	131	172	129	154	129	19	**3 933**
Palacos R+G pro	1		6	110	214	321	413	473	565	729	**2 832**
Palacos w/gentamicin	2 211										**2 211**
Optipac Refobacin Bonecement R	894	228	222	176	250	62					**1 832**
Refobacin Bone Cement R	823	25	81	111							**1 040**
Optipac Refobacin Bonecement R-3						57	99	54	47	54	**311**
Refobacin-Palacos	269										**269**
Simplex w/Tobramycin	223										**223**
Cemex w/gentamicin	63										**63**
Cemex System Genta FAST	63										**63**
SmartSet GHV	33	9	2	1	6	1					**52**
Simplex	40										**40**
Other (n<20)	73	2	1	2		1		1	1	2	**83**
Total	**6 931**	**692**	**676**	**569**	**601**	**614**	**641**	**682**	**742**	**804**	**12 952**

Table 37: Primary operations - Tibia

Cement	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Palacos R + G	2 250	427	366	170	130	172	129	154	129	19	**3 946**
Palacos R+G pro	1		6	108	214	331	410	476	564	746	**2 856**
Palacos w/gentamicin	2 205										**2 205**
Optipac Refobacin Bonecement R	888	228	223	175	250	62					**1 826**
Refobacin Bone Cement R	813	25	81	109							**1 028**
Optipac Refobacin Bonecement R-3						57	99	54	47	54	**311**
Refobacin-Palacos	266										**266**
Simplex w/Tobramycin	218										**218**
Cemex w/gentamicin	63										**63**
Cemex System Genta FAST	62										**62**
SmartSet GHV	33	9	2	1	6	1					**52**
Simplex	39										**39**
Other (n<20)	68	2	1	2		1		1	1	2	**78**
Total	**6 906**	**691**	**679**	**565**	**600**	**624**	**638**	**685**	**741**	**821**	**12 950**

Antibiotic prophylaxis

Table 38: Primary operations

Drugs	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Cefalotin (Keflin)	50 425	5 229	5 640	5 642	4 722	605	468	968	1 226	1 365	**76 290**
Cefazolin (Cephazolin)	40			339	1 670	5 919	5 765	6 243	6 205	6 835	**33 016**
Klindamycin (Dalacin, Clindamycin)	1 636	316	341	346	405	365	303	335	364	351	**4 762**
Cefuroksim (Zinacef, Cefuroxim, Lifurox)	3 959		1			74	1		1		**4 036**
Kloksacillin (Ekvacillin)	2 175	208	23	1	1	200	109	18		1	**2 736**
Dikloksacillin (Diclocil, Dicillin)	1 683	1	3	1	1			1			**1 690**
Imipenem (Tienam)	51										**51**
Cefaleksin (Keflex, Cefalexin)	21					5					**26**
Benzylpenicillin (Penicillin G)	20										**20**
Vankomycin (Vancomycin, Vancocin)	6	1		3		3	1	1	2	1	**18**
Erytromycin (Ery-max, Abboticin)	17										**17**
Cefotaksim (Claforan)	2		1	2			4	3		1	**13**
Ciprofloksasin (Ciproxin)	8		2								**10**
Combination of 2 drugs	2 210	312	462	223	107	57	26	32	41	79	**3 549**
Other (n<10)	24	3	5	1			2	1	1		**37**
Missing	429	50	36	23	27	28	28	35	28	20	**704**
Total	**62 706**	**6 120**	**6 514**	**6 581**	**6 933**	**7 256**	**6 707**	**7 637**	**7 868**	**8 653**	**126 975**

Table 39: Revisions

Drugs	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Cefalotin (Keflin)	3 624	322	356	355	277	20	28	49	76	80	**5 187**
Cefazolin (Cephazolin)	1			25	158	380	341	383	366	438	**2 092**
Klindamycin (Dalacin, Clindamycin)	243	25	27	27	35	42	22	39	34	32	**526**
Cefuroksim (Zinacef, Cefuroxim, Lifurox)	326	1	1		1	4	1			1	**335**
Kloksacillin (Ekvacillin)	158	19	15	9	15	24	20	22	12	16	**310**
Dikloksacillin (Diclocil, Dicillin)	218	6	5	4	9	2		4	1	1	**250**
Vankomycin (Vancomycin, Vancocin)	139	8	14	10	8	7	11	7	5	8	**217**
Benzylpenicillin (Penicillin G)	36	4	4	7	5	4	6	1	5	1	**73**
Cefotaksim (Claforan)	3	2		3	2	1	1	4	4	2	**22**
Ampicillin (Pentrexyl, Pondocillin, Doktacilin)	13			1	1	1	1		1		**18**
Ciprofloksasin (Ciproxin)	9		1	1			2		1	1	**15**
Combination of 2 drugs	784	158	139	150	104	111	96	90	74	64	**1 770**
Annet - MRS (Annet - MRS)								1	1		**2**
Other (n<10)	24	4	1	1	2	3	1	1	1	1	**39**
Missing	191	7	41	38	49	52	56	47	57	64	**602**
Total	**5 769**	**556**	**604**	**631**	**666**	**651**	**586**	**648**	**638**	**709**	**11 458**

Patient specific instruments

Table 40:

Year	Yes	No	Missing	Total
2023	3	9 143	216	**9 362**
2022	2	7 851	653	**8 506**
2021	4	7 517	764	**8 285**
2020	6	6 691	596	**7 293**
2019	5	7 222	680	**7 907**
2018	6	6 858	735	**7 599**
2017	1	6 313	898	**7 212**
2016	5	6 204	909	**7 118**
2015	14	5 434	1 228	**6 676**
2014	21	4 802	1 316	**6 139**
2013	25	4 032	1 466	**5 523**
2012	87	3 686	1 635	**5 408**
2011	64	1 438	3 478	**4 980**

Registration started in 2011

Drain

Table 41:

Year	Yes	No	Missing	Total
2023	129	9 003	230	**9 362**
2022	209	8 076	221	**8 506**
2021	296	7 681	308	**8 285**
2020	531	6 361	401	**7 293**
2019	698	6 602	607	**7 907**
2018	1 010	5 830	759	**7 599**
2017	1 338	4 950	924	**7 212**
2016	1 632	4 613	873	**7 118**
2015	1 843	4 170	663	**6 676**
2014	1 876	3 478	785	**6 139**
2013	1 708	2 922	893	**5 523**
2012	1 850	2 505	1 053	**5 408**
2011	928	951	3 101	**4 980**

Registration started in 2011

Table 42: Torniquet

Year	Yes	No	Mean Time (min) *	Missing	Total
2023	4 619	3 985	64	48	8 652
2022	4 525	3 042	65	50	7 617
2021	3 905	2 384	68	38	6 327
2020	3 874	2 446	70	34	6 354
2019	4 075	2 145	69	93	6 313
2018	1 900	710	70	99	2 709
Total	**22 898**	**14 712**	**67**	**362**	**37 972**

Registration started in 2018. There are 362 forms are missing registration

* Mean duration of torniquet time

Table 43a: Weight and height for primary

Year	Mean weight (kg)	Mean height (cm)	Weight missing (total)	Height missing (total)	Total
2023	87,2	173,0	1 133	1 137	7 268
2022	86,9	171,9	238	240	3 635
2021	86,0	170,9	63	64	1 317
2020	90,4	166,0	0	0	5

Reported by surgeon. Electronic reporting started during 2020. Total 1434 forms missing weight registration and 1441 forms missing height registration

* Mean for these patients where weight or height is given

Table 43b: Classification of BMI

Year	1		2		3		4		5		6		Total
2023	15	(0,2%)	874	(14,3%)	2 464	(40,2%)	1 829	(29,9%)	750	(12,2%)	195	(3,2%)	**6 127**
2022	8	(0,2%)	476	(14,0%)	1 365	(40,2%)	1 057	(31,1%)	386	(11,4%)	103	(3,0%)	**3 395**
2021	4	(0,3%)	191	(15,2%)	514	(41,0%)	361	(28,8%)	138	(11,0%)	45	(3,6%)	**1 253**
2020	0		0		1	(20,0%)	2	(40,0%)	2	(40,0%)	0	(0,0%)	**5**

WHO's classification of BMI (body mass index)
1 - Less than 18.5 is underweight
2 - 18.5 - 24 is normal weight
3 - 25 - 29 is overweight
4 - 30 - 34 is obesity degree 1
5 - 35 - 39 is obesity degree 2
6 - 40 and over is obesity degree 3

Table 44: Ahlbäck's grading of osteoarthritis grade 1-5 for all primary prostheses

Year	GRADE1	GRADE2	GRADE3	GRADE4	GRADE5	Missing	Total
2023	739	1 593	2 527	1 550	153	706	**7 268**
2022	419	878	1 355	745	79	159	**3 635**
2021	215	330	440	203	28	101	**1 317**
2020	2	1	1	1	0	0	**5**
Total	**1 375**	**2 802**	**4 323**	**2 499**	**260**	**966**	**12 225**

Electronic registration started during 2020

Table 45: Joint gap in mm for all primary prostheses

Year	0	1	2	3	4	5	6	7	10	>10	Missing	Total
2023	4 546	1 037	525	172	54	21	6	2	1	2	902	**7 270**
2022	2 363	520	300	84	30	9	1	1			327	**3 635**
2021	738	197	143	53	20	10	2	1	1		152	**1 317**
2020	1	2	2								0	**5**
Total	**7 648**	**1 756**	**970**	**309**	**104**	**40**	**9**	**4**	**2**	**2**	**1 381**	**12 227**

Electronic registration started during 2020

Table 46: Robot-assisted surgery for all primary prostheses

	Robot assisted		Robot type			
Year	No	Yees	NAVIO	CORI	Missing	Total
2023	6 788	139	14	123	341	**7 268**
2022	3 261	109	101	8	265	**3 635**
2021	1 151	54	54		112	**1 317**
2020	5	0			0	**5**
Total	**11 205**	**302**	**169**	**131**	**718**	**12 225**

Electronic registration started during 2020

Table 47: Surgical approach for all primary prostheses

Year	Parapatellar medially	Parapatellar laterally	Subvastus	Other	Missing	Total
2023	6 929	42	12	18	267	**7 268**
2022	3 579	27	1	13	15	**3 635**
2021	1 253	5	3	1	55	**1 317**
2020	5	0	0	0	0	**5**
Total	**11 766**	**74**	**16**	**32**	**337**	**12 225**

Electronic registration started during 2020

Table 48: Anesthesia for all primary prostheses

Year	General	Epidural	Spinal	Other	Missing	Total
2023	942	53	5 395	8	870	**7 268**
2022	470	43	2 544	2	576	**3 635**
2021	129	14	1 064	0	110	**1 317**
2020	1	0	4	0	0	**5**
Total	**1 542**	**110**	**9 007**	**10**	**1 556**	**12 225**

Electronic registration started during 2020

Table 49: Local infiltration anesthesia for all primary prostheses

Year	Yes	No	Missing	Total
2023	5 909	1 032	327	**7 268**
2022	3 054	557	24	**3 635**
2021	1 043	234	40	**1 317**
2020	4	1	0	**5**
Total	**10 010**	**1 824**	**391**	**12 225**

Electronic registration started during 2020

Table 50: Peripheral nerve block primary

Year	Yes	No	Missing	Total
2023	2 381	4 566	321	**6 947**
2022	1 235	2 143	257	**3 378**
2021	409	802	106	**1 211**
2020	3	2	0	**5**
Total	**4 028**	**7 513**	**684**	**12 225**

Electronic registration started during 2020

Closure of primary knee prostheses

Table 51: Skin closed for all primary prostheses

Yeas	Extension	Flexion	Both extended and flexed	Other	Missing	Total
2023	271	5 523	1 132	2	340	**7 268**
2022	172	3 235	140	48	40	**3 635**
2021	100	1 125	2	31	59	**1 317**
2020	1	4	0	0	0	**5**
Total	**544**	**9 887**	**1 274**	**81**	**439**	**12 225**

Electronic registration started during 2020

Table 52: Suture technique

Year	Continuous skin suture	Single skin suture	Intracutaneous skin suture	Clips	Glue	Strips	Subcutaneous	Other	Total
2023	1 624	60	714	4 871	995	13	57	1	**6 927**
2022	1 142	57	165	2 284	78	0	0	2	**3 600**
2021	243	13	20	1 057	6	0	0	4	**1 310**
2020	2	0	0	3	0	0	0	0	**5**
Total	**3 011**	**130**	**899**	**8 215**	**1 079**	**13**	**57**	**7**	**11 842**

Electronic registration started during 2020

Bone loss Classification of operations according to Anderson classification *

Table 53: Femur Classification

Year	Type 1		Type 2A		Type 2B		Type 3		Total
2023	20	(45,5%)	7	(15,91%)	9	(20,5%)	8	(18,2%)	**44**
2022	7	(50,0%)	3	(21,43%)	1	(7,1%)	3	(21,4%)	**14**
2021	4	(50,0%)	1	(12,50%)	3	(37,5%)	0		**8**
Total	**31**	**(47,0%)**	**11**	**(16,67%)**	**13**	**(19,7%)**	**11**	**(16,7%)**	**66**

Electronic registration started during 2021. Currently registered classified 66

Tablle 54: Tibia Classification

Year	Type 1		Type 2A		Type 2B		Type 3		Total
2023	23	(54,8%)	6	(14,29%)	3	(7,1%)	10	(23,8%)	**42**
2022	5	(38,5%)	6	(46,15%)	2	(15,4%)	0		**13**
2021	3	(37,5%)	3	(37,50%)	1	(12,5%)	1	(12,5%)	**8**
Total	**31**	**(49,2%)**	**15**	**(23,81%)**	**6**	**(9,5%)**	**11**	**(17,5%)**	**63**

Electronic registration started during 2021. Currently registered classified 63

Fracture of bone (near the prosthesis) of reoperated knee prostheses *

Table 55: Femur Classification (Rorabeck and Lewis)

Year	Yes	Femur - I		Femur - II		Femur - III		Total
2023	30	2	(6,9%)	19	(65,52%)	8	(27,6%)	**29**
2022	7	0		5	(71,43%)	2	(28,6%)	**7**
Total	**37**	**2**	**(5,6%)**	**24**	**(66,67%)**	**10**	**(27,8%)**	**36**

Electronic registration started during 2021. Currently registered 37 (36 classified).

Table 56: Tibia Classification

Year	Ja	Tibia- I			Tibia- II			Tibia- III			Tibia-IV			Total
		a	b	c	a	b	c	a	b	c	a	b	c	
2023	8	3	2	0	0	2	0	0	1	0	0	0	0	**8**
Total	**8**	**3**	**2**	**0**	**0**	**2**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**8**

Electronic registration started during 2022. Currently registered 8 (8 classified).

Table 57: Patella Classification (Mayo)

Year	Yes	Patella - I	Patella - II	Patella - III		Total
				a	b	
2023	2	0	1	1	0	**2**
Total	**2**	**0**	**1**	**1**	**0**	**2**

Electronic registration started during 2021. Currently registered 2 (2 classified).

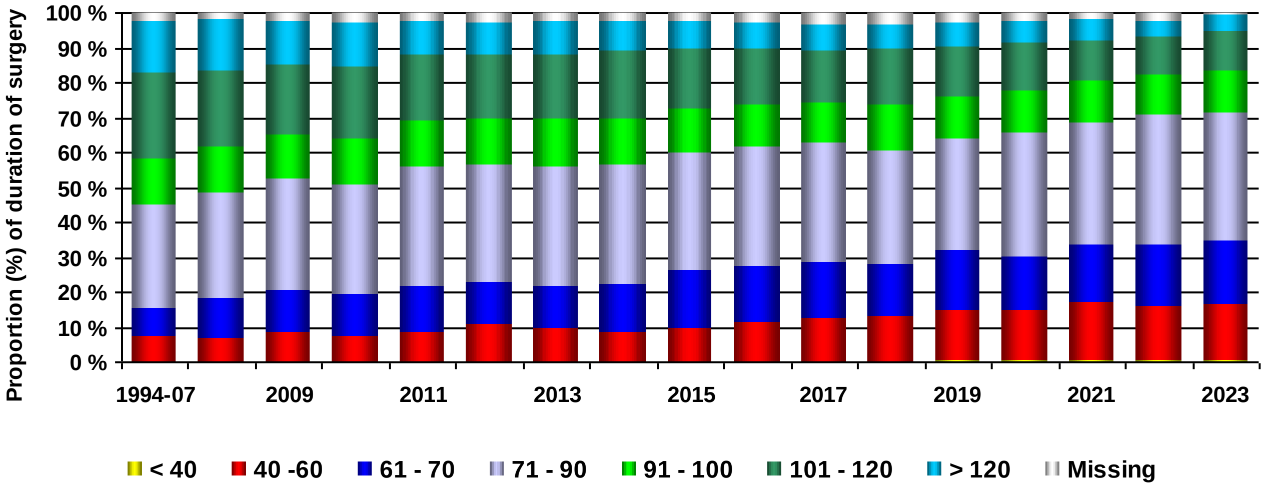
* More than one reason for reoperation is possible. Only the first reoperation is counted.

Duration of surgery

Table 58: Duration of surgery for the primary total prostheses TKA (min)

Year	< 40	40 - 60	61 - 70	71 - 90	91 - 100	101 - 120	> 120	Missing	Total
2023	60	1 146	1 287	2 637	862	816	333	40	**7 181**
2022	33	1 029	1 147	2 471	742	726	302	138	**6 588**
2021	45	1 058	1 070	2 283	776	752	390	119	**6 493**
2020	26	839	891	2 038	685	810	344	142	**5 775**
2019	43	871	1 047	2 008	730	868	437	171	**6 175**
2018	14	764	845	1 917	761	931	419	191	**5 842**
2017	8	684	919	1 905	636	855	414	185	**5 606**
2016	1	635	876	1 918	661	875	416	168	**5 550**
2015	2	527	854	1 800	654	919	415	123	**5 294**
2014	0	431	668	1 726	641	963	427	117	**4 973**
2013	3	432	556	1 530	626	833	433	104	**4 517**
2012	10	465	540	1 473	564	817	399	121	**4 389**
2011	1	357	531	1 385	535	754	407	92	**4 062**
2010	4	298	460	1 239	533	811	498	102	**3 945**
2009	3	334	485	1 266	516	797	491	94	**3 986**
2008	5	242	395	1 068	467	768	514	67	**3 526**
1994-07	25	1 909	2 059	7 666	3 527	6 295	3 855	637	**25 973**

Figure 31: Duration of surgery for the primary total prosthesesTKA (min)

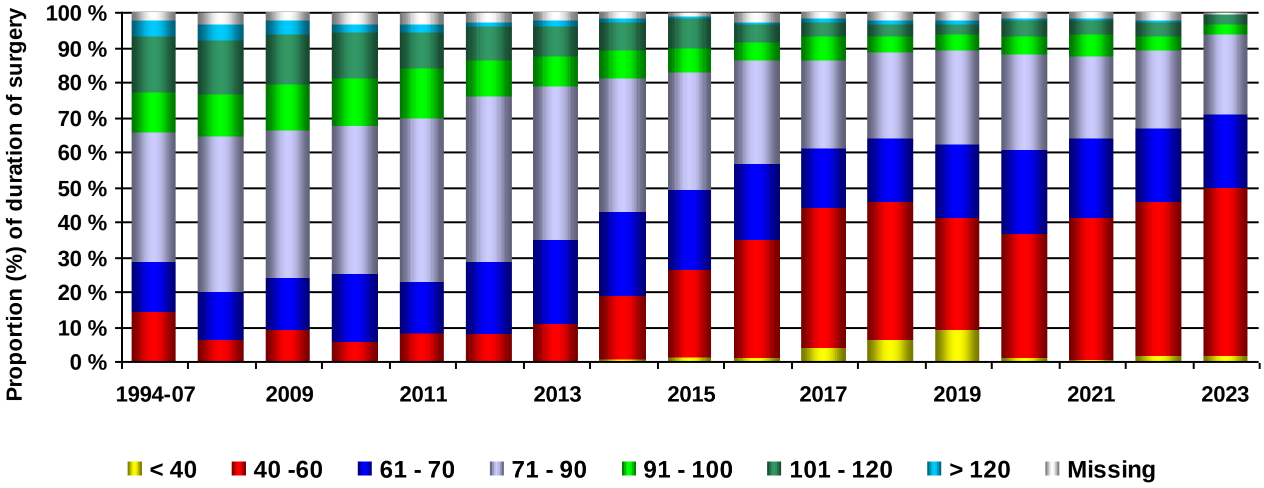


Duration of surgery

Table 59: Duration of surgery for the primary unicondylar prostheses TKA (min)

Year	< 40	40 - 60	61 - 70	71 - 90	91 - 100	101 - 120	> 120	Missing	Total
2023	26	646	277	308	44	32	6	5	**1 344**
2022	18	502	240	252	45	47	8	26	**1 138**
2021	8	408	230	235	64	39	6	17	**1 007**
2020	9	301	200	232	41	39	5	15	**842**
2019	93	317	211	268	41	31	9	25	**995**
2018	63	393	183	249	45	32	12	24	**1 001**
2017	34	348	149	219	60	33	9	16	**868**
2016	12	288	190	253	45	47	4	24	**863**
2015	8	188	176	253	52	62	4	10	**753**
2014	2	112	145	231	49	48	7	11	**605**
2013	0	51	115	209	42	42	6	12	**477**
2012	0	39	98	225	49	45	6	13	**475**
2011	0	35	65	205	63	46	10	15	**439**
2010	1	23	81	174	58	54	8	15	**414**
2009	0	42	70	194	63	64	19	11	**463**
2008	0	27	62	195	54	66	22	14	**440**
1994-07	5	504	527	1 345	420	559	180	78	**3 618**

Figure 32: Duration of surgery for the primary unicondylar prostheses TKA (min)



PROM in the knee prosthesis register

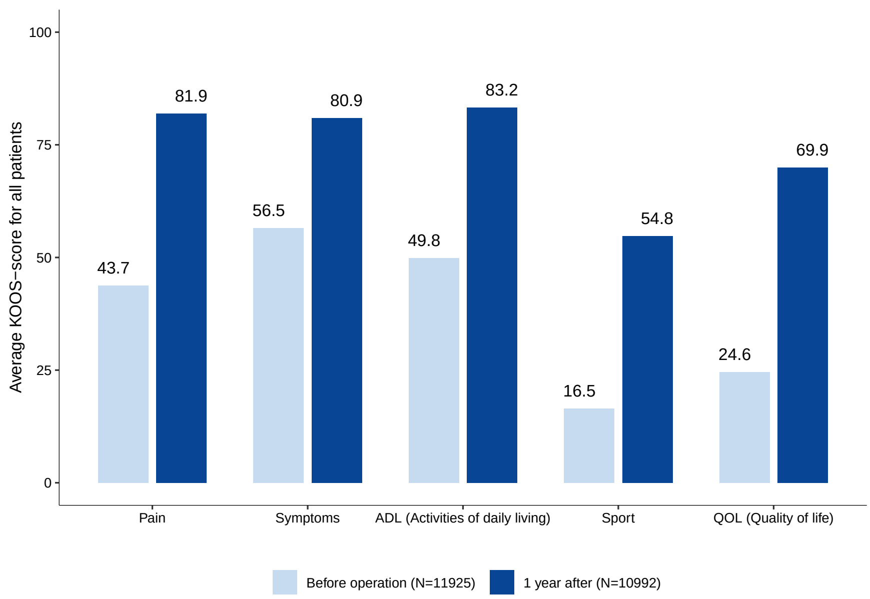
The Knee Prosthesis Register has had electronic collection of patient-reported data (Patient Reported Outcome Measures (PROM)) since 2019. The register aims to place more focus on patients' self-perceived quality of life and joint function before and after operation. Patients fill out an electronic questionnaire before operation and 1, 6, and 10 years after operation. The data we collect from the patients will be compiled with the data reported by the surgeon for the same patient group. This will give us the opportunity to focus on function and quality of life in addition to any potential revision of the prosthesis.

A total of 11,925 forms have been filled out before primary knee prosthesis operation and 10,992 one year after operation (These are the figures for all primary uni and total knee prostheses from 2019 onwards). To date, 44 hospitals have started reporting preoperative PROM forms, but many hospitals have low reporting of preoperative PROM. The goal is to increase that percentage to >80%. A total of 1,267 paper forms have been submitted from 30 hospitals; the rest have been registered digitally. All hospitals will receive their own results in the hospital report. Please feel free to contact our consultant Mikal Solberg at mikal.solberg@helse-bergen.no if you have questions about electronic registration of PROM.

Patient demographics	Before operation	1 year after
Number of forms (n)	11925	10992
Men (%)	44.4	45.7
Median Age (min-max)	68.7 (25.8-98.8)	67.9 (25.8-93.3)
Body Mass Index mean (SD)	30.3 (31.4)	29.1 (4.8)
Drinking alcohol n (%)	9089 (76.2)	9041 (82.3)
Smoking n (%)	733 (6.1)	732 (6.7)
Diabetes n (%)	575 (4.8)	976 (8.9)
Education upper secondary school or higher n (%)	5936 (49.8)	5766 (52.5)
Working n (%)	3132 (26.3)	3275 (29.8)
Living alone n (%)	2627 (22)	2491 (22.7)
Activity score UCLA activity* mean (SD)	5 (1.9)	5.8 (1.9)
State of health** (VAS) mean (SD)	63.3 (44.6)	73.7 (29.3)
Charnley (Category) Class A	5907 (49.5)	6071 (55.2)
Charnley (Category) Class B	4787 (40.1)	3396 (30.9)
Charnley (Category) Class C	1215 (10.2)	1525 (13.9)

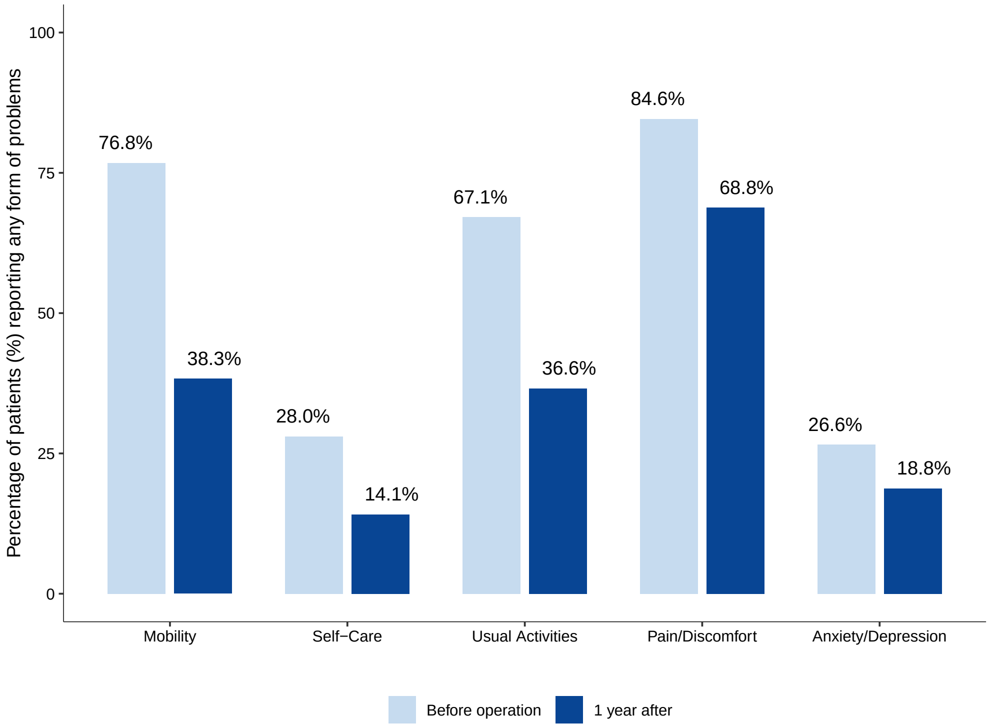
*Beste mulige skår er 10, **100 er best mulig helse

Figure B.37 Average KOOS score before/after the primary operation*



*100 is the best possible score

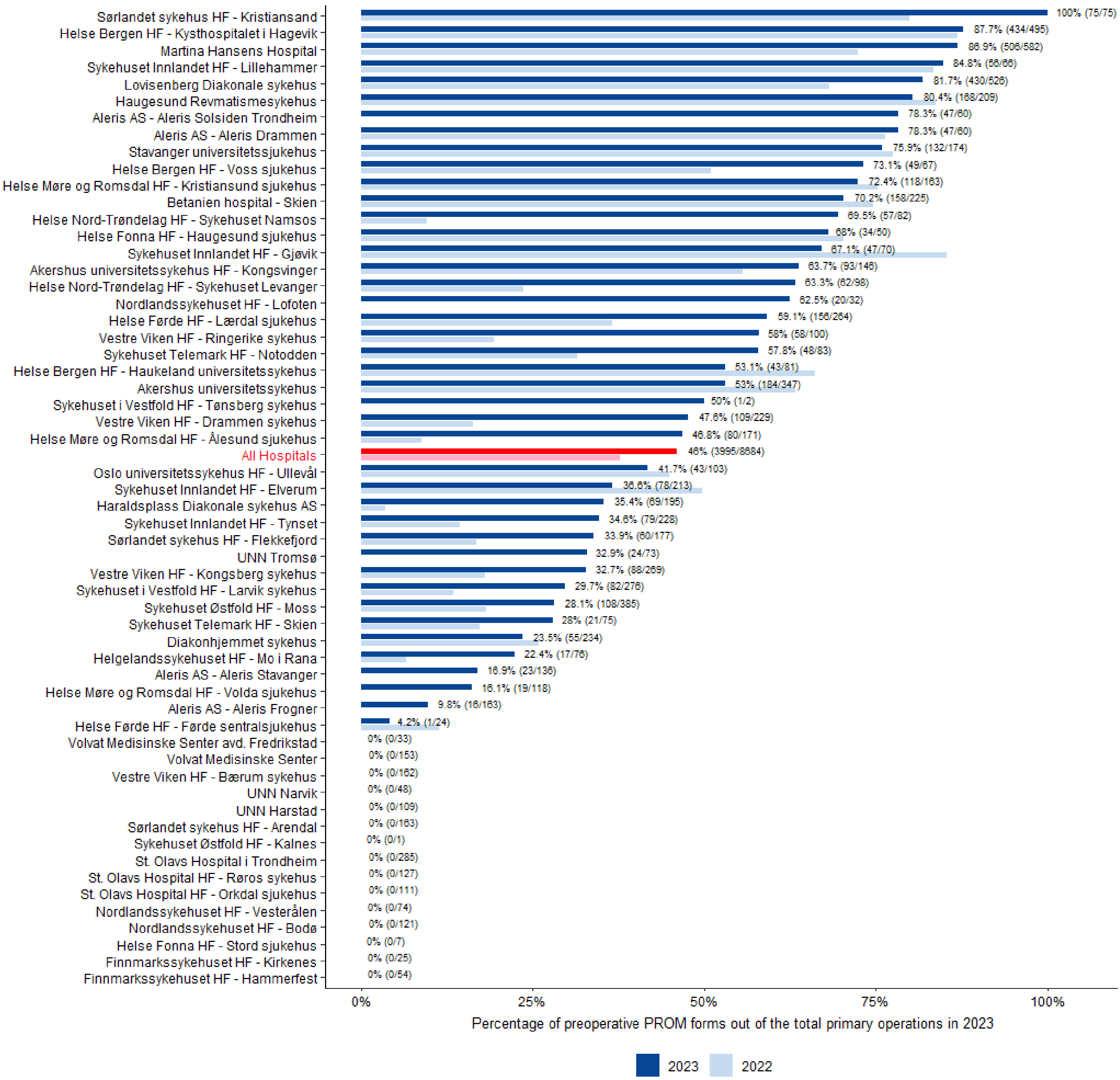
Figure B.38 Percentage reporting problems with mobility, self-care, usual activities, or reporting pain or anxiety before/after the primary operation (EQ-5D-5L)



Health Authority	Reporting Hospital (2022)	Number of Preoperative Forms (2022)
Central Norway	4/9	182
Northern Norway	1/9	6
South-Eastern Norway	19/24	1826
Western Norway	8/10	868
Private	5/7	112

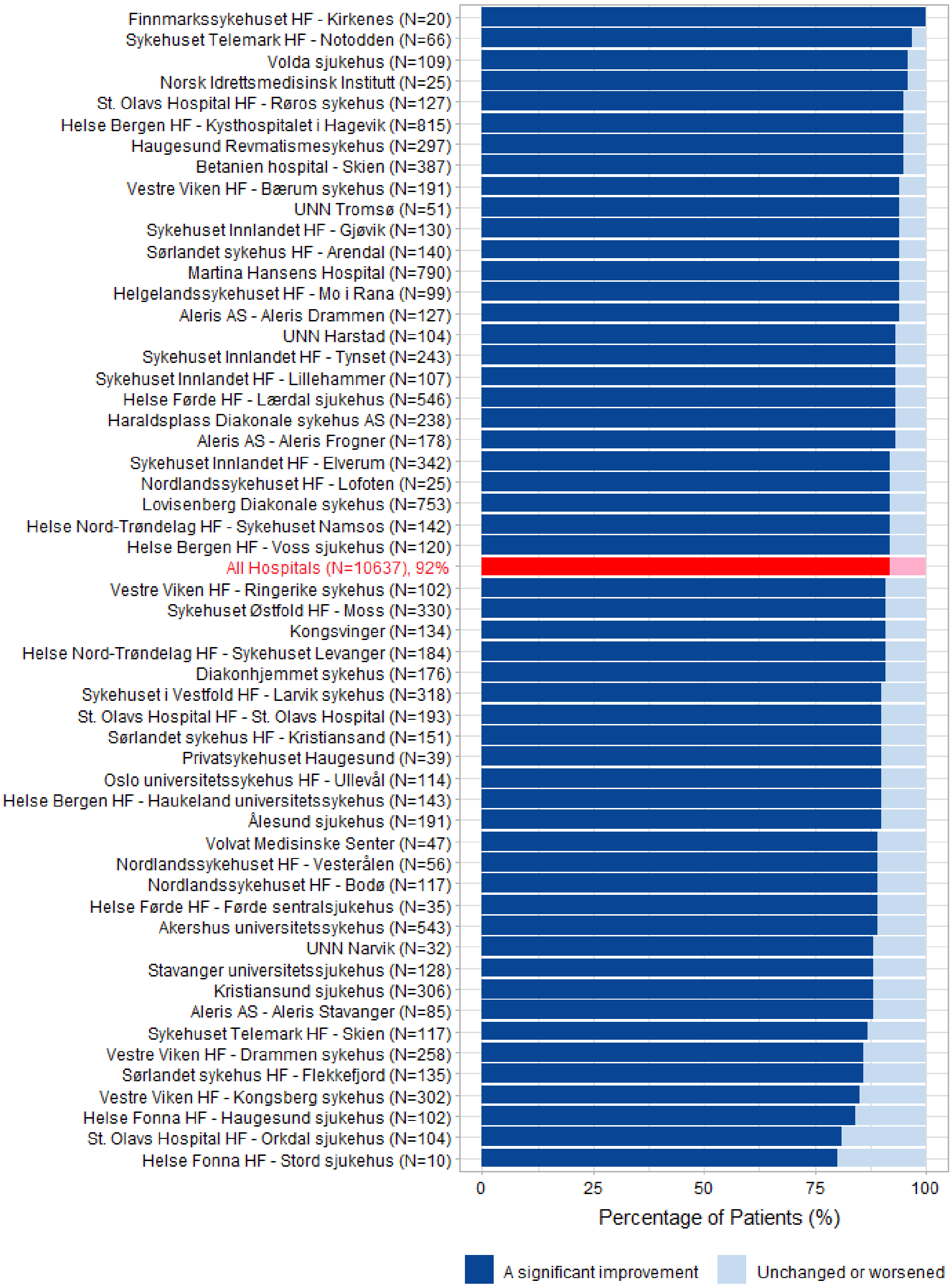
Health Authority	Reporting Hospital (2023)	Number of Preoperative Forms (2023)
Central Norway	5/9	336
Northern Norway	3/9	61
South-Eastern Norway	20/24	2324
Western Norway	8/10	1017
Private	6/7	257

Figure B.39 Proportion of primary knee prosthesis operations where a preoperative PROM form is completed



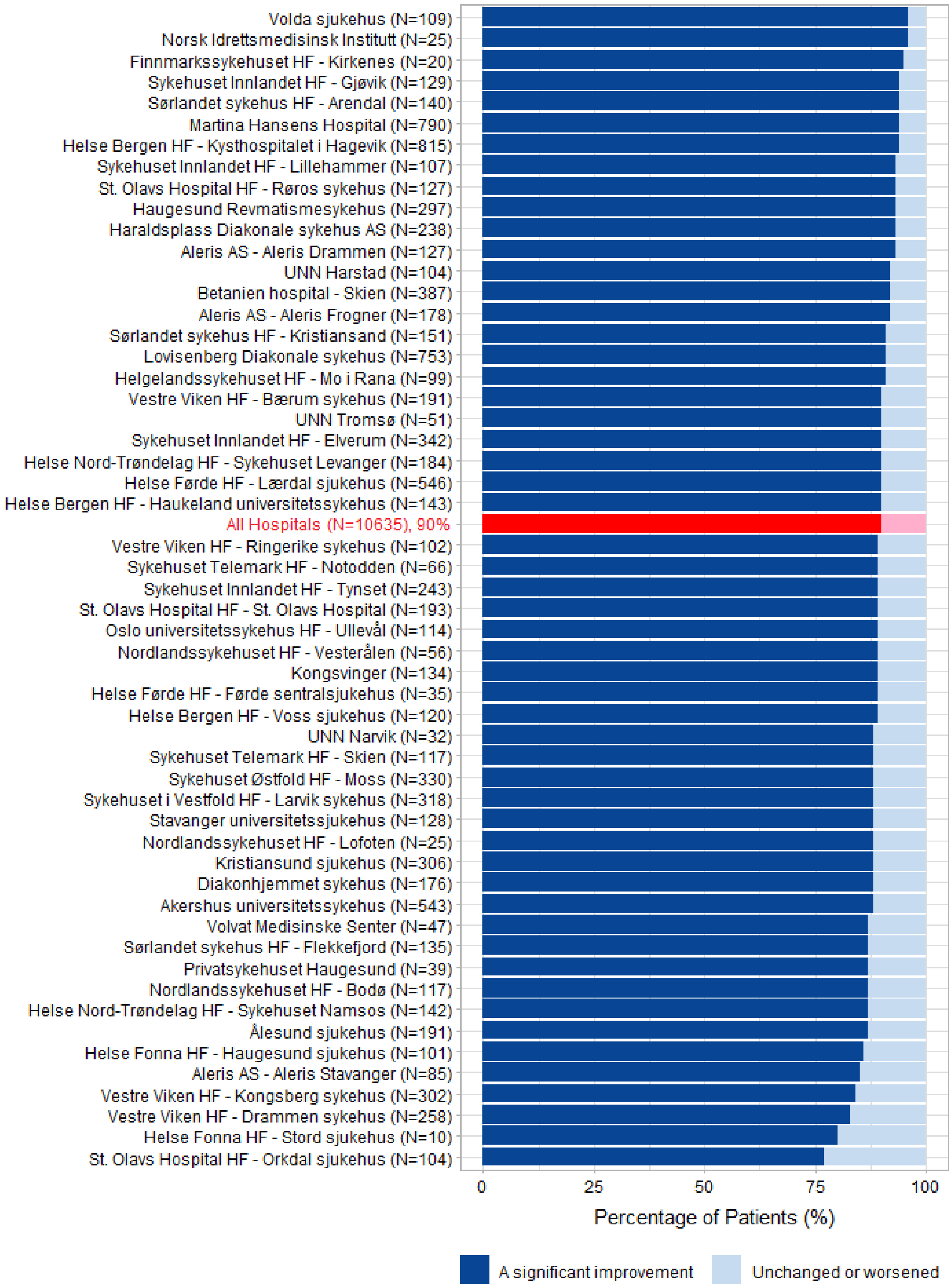
The diagram above shows the hospitals that have submitted preoperative PROM forms either on paper, digitally via the web solution in MRS, or through their own solution. Reporting is still low, but some hospitals seem to have taken steps to improve reporting. We would like to remind you that any questions regarding reporting in MRS can be sent to the registry.

Figure B.40: Anchor questions for KOOS-PAIN 1 year after the primary operation, 2019-2023



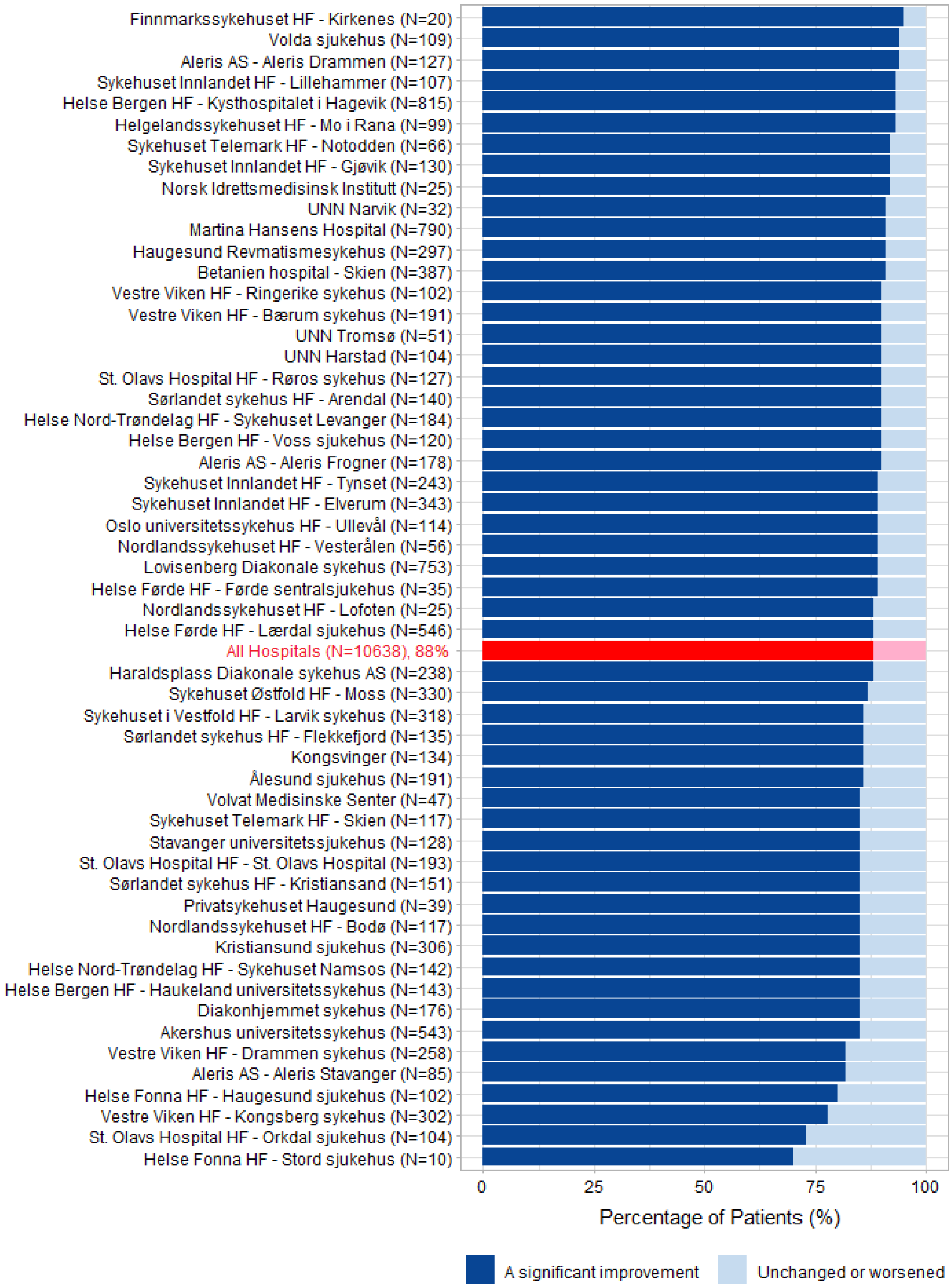
The patients have responded to the question ”How do you experience knee pain now compared to before the operation?”. The options ”Less, a significant improvement” and ”Slightly less, enough to be a significant improvement” are included in the dark blue category in the figure as ”a significant improvement”. The other options ”Very slight change, not enough to be a significant improvement”, ”Unchanged”, ”Very slight change, not enough to be a significant worsening”, ”Slightly worse, enough to be a significant worsening”, and ”Worse, a significant worsening” are included in the light blue category ”Unchanged or worsening”. Only hospitals with at least 10 responses are shown in the figure.

Figure B.41: Anchor questions for KOOS-SYMPTOMS 1 year after the primary operation, 2019-2023



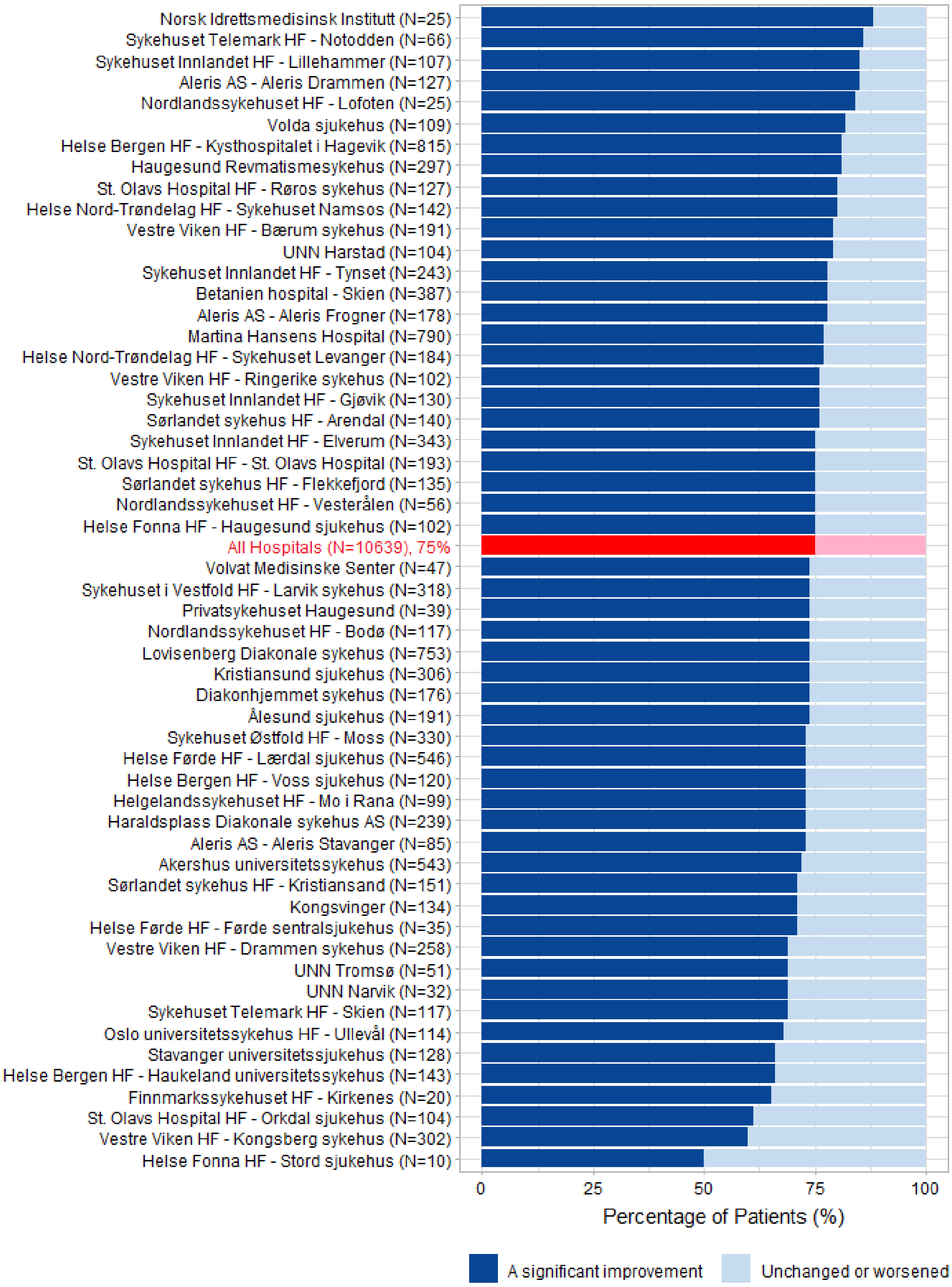
The patients have answered the question ”How do you experience other symptoms in the knee now compared to before the operation (stiffness, clicking, and reduced mobility)?”. The options ”Less, a significant improvement” and ”Slightly less, enough to be a significant improvement” are included in the dark blue category in the figure as ”a significant improvement”. The other options ”Very slight change, not enough to be a significant improvement”, ”Unchanged”, ”Very slight change, not enough to be a significant worsening”, ”Slightly worse, enough to be a significant worsening”, and ”Worse, a significant worsening” are included in the light blue category ”Unchanged or worsening”. Only hospitals with at least 10 responses are shown in the figure.

Figure B.42: Anchor questions for KOOS-ADL 1 year after the primary operation, 2019-2023



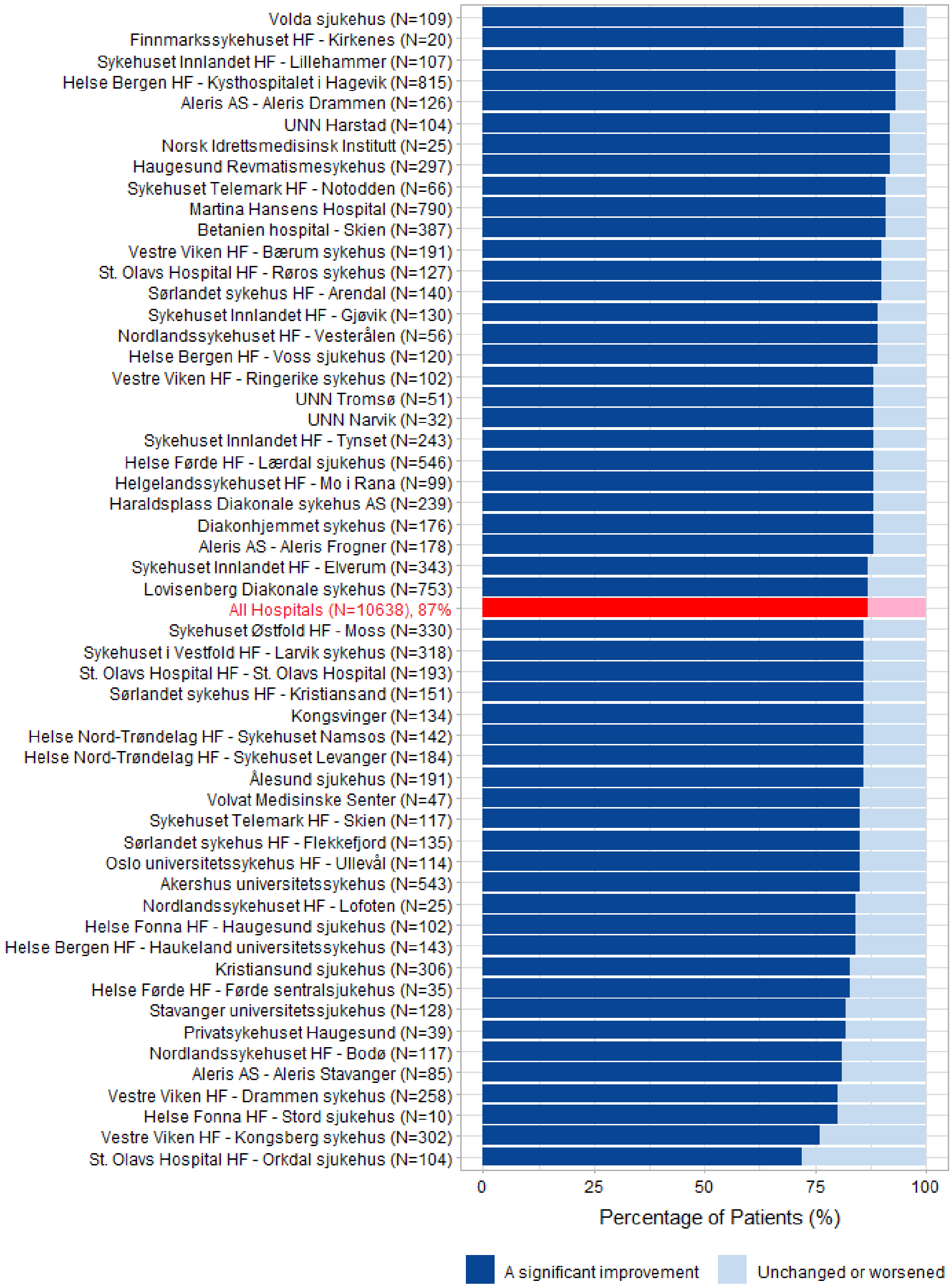
The patients have answered the question ”How is your ability to perform daily activities now compared to before the operation (sitting, standing, walking, stair climbing, putting on/taking off socks, household chores, etc.)?”. The options ”Better, a significant improvement” and ”Slightly better, enough to be a significant improvement” are included in the dark blue category in the figure as ”a significant improvement”. The other options ”Very slight change, not enough to be a significant improvement”, ”Unchanged”, ”Very slight change, not enough to be a significant worsening”, ”Slightly worse, enough to be a significant worsening”, and ”Worse, a significant worsening” are included in the light blue category ”Unchanged or worsening”. Only hospitals with at least 10 responses are shown in the figure.

Figure B.43: Anchor questions for KOOS- SPORT 1 year after primary operation, 2019-2023



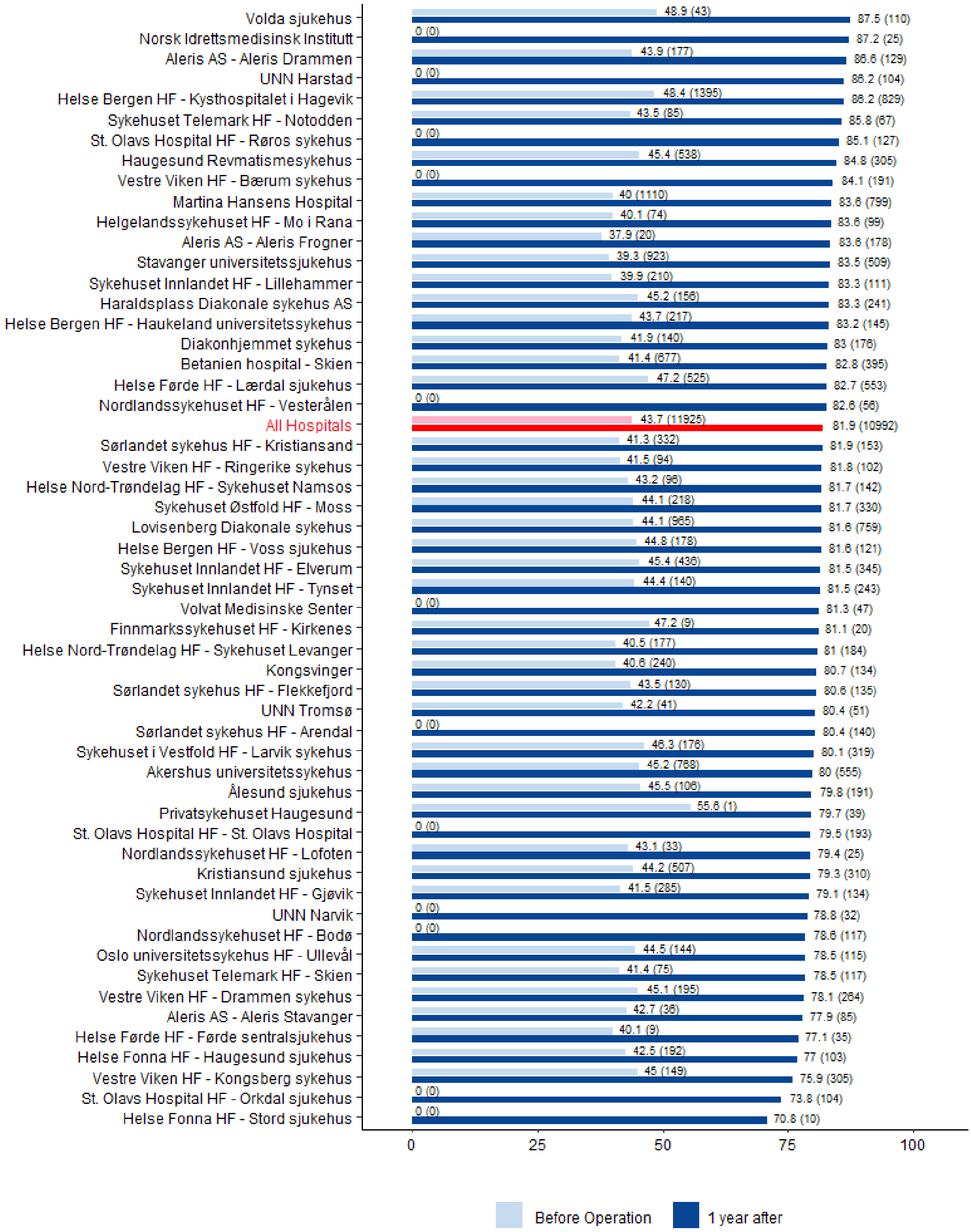
Patients have responded to the question ”How is your ability to perform sports and leisure activities now compared to before the operation (running, squatting, twisting and turning on the affected leg)?”. The options ”Better, a significant improvement” and ”Slightly better, enough to be a significant improvement” are included in the dark blue category in the figure as ”a significant improvement”. The other options ”Very slight change, not enough to be a significant improvement”, ”Unchanged”, ”Very slight change, not enough to be a significant worsening”, ”Slightly worse, enough to be a significant worsening”, and ”Worse, a significant worsening” are included in the light blue category ”Unchanged or worsening”. Only hospitals with at least 10 responses are shown in the figure.

Figure B.44: Anchor questions for KOOS-QOL 1 year after the primary operation, 2019-2023



Patients have responded to the question ”How is your quality of life related to your knee now compared to before the operation (in terms of how much you trust your knee, lifestyle changes, how often you are reminded of knee problems)?”. The options ”Better, a significant improvement” and ”Slightly better, enough to be a significant improvement” are included in the dark blue category in the figure as ”a significant improvement”. The other options ”Very slight change, not enough to be a significant improvement”, ”Unchanged”, ”Very slight change, not enough to be a significant worsening”, ”Slightly worse, enough to be a significant worsening”, and ”Worse, a significant worsening” are included in the light blue category ”Unchanged or worsening”. Only hospitals with at least 10 responses are shown in the figure.

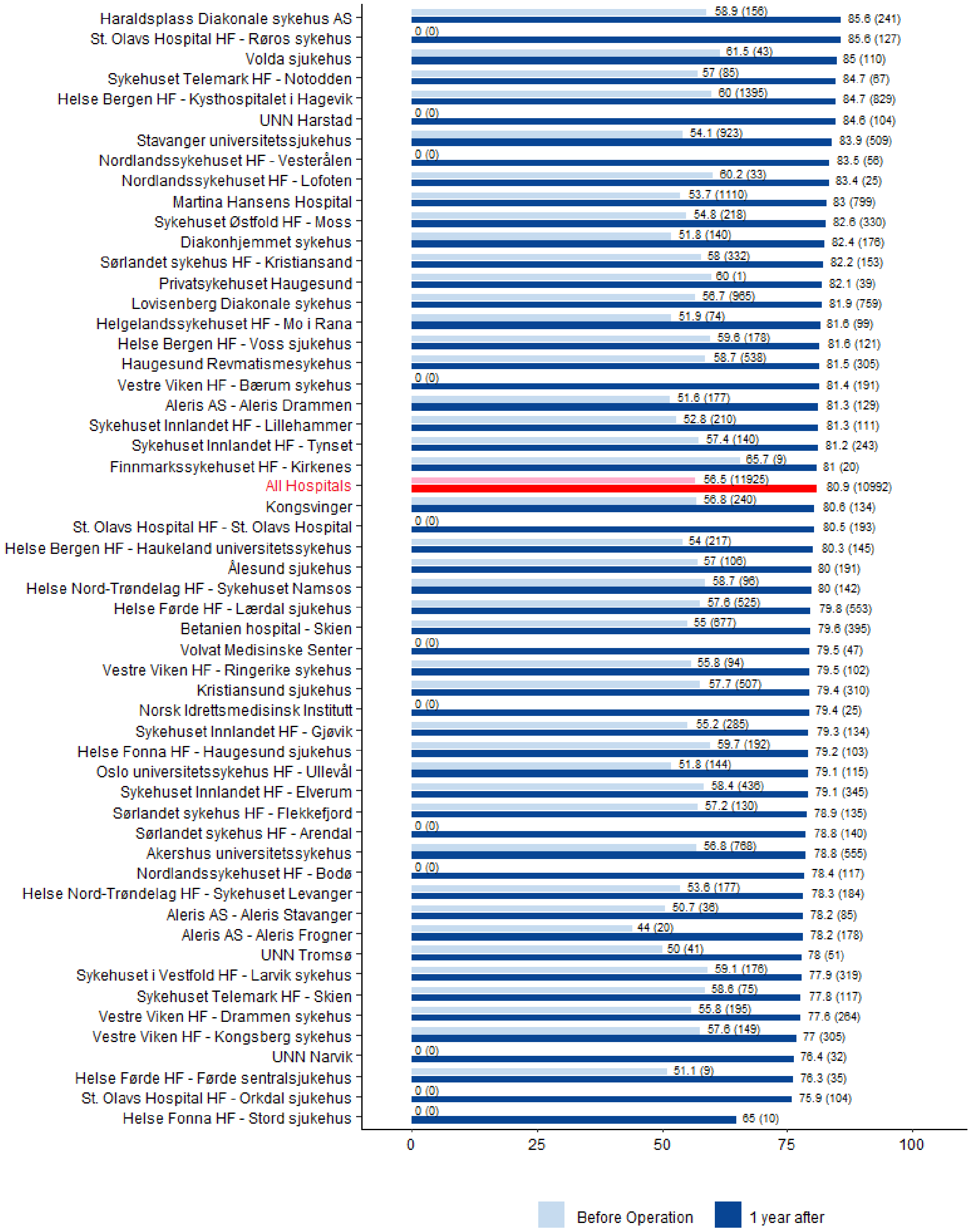
Figure B.45: Average KOOS-PAIN score for all primary operations before and 1 year after operation * (Number of completed forms)



* 100 is the best possible score

Only hospitals with more than 10 responses are shown in the figure.

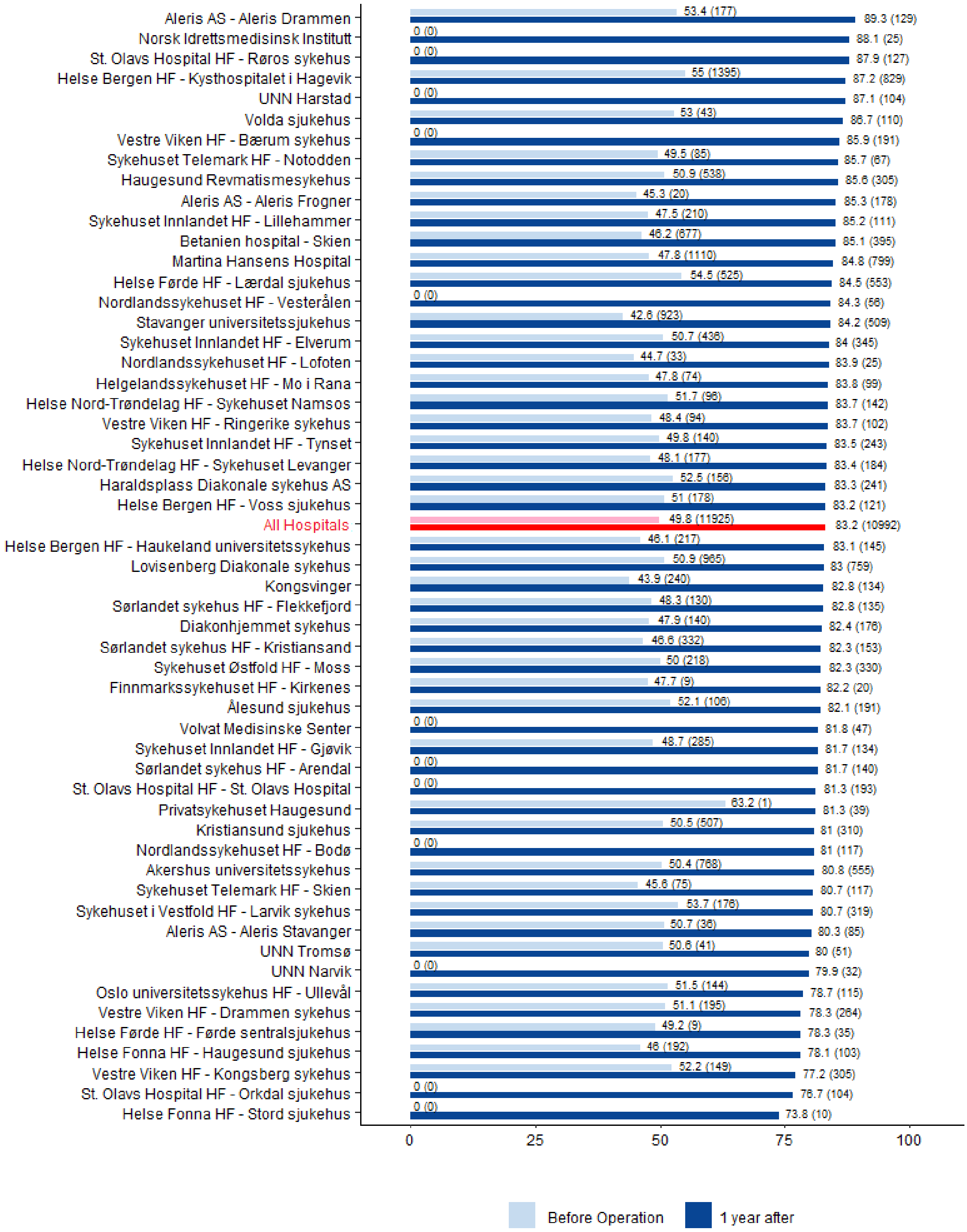
Figure B.46: Average KOOS-SYMPTOMS score for all primary operations before and 1 year after operation * (Number of completed forms)



* 100 is the best possible score

Only hospitals with more than 10 responses are shown in the figure.

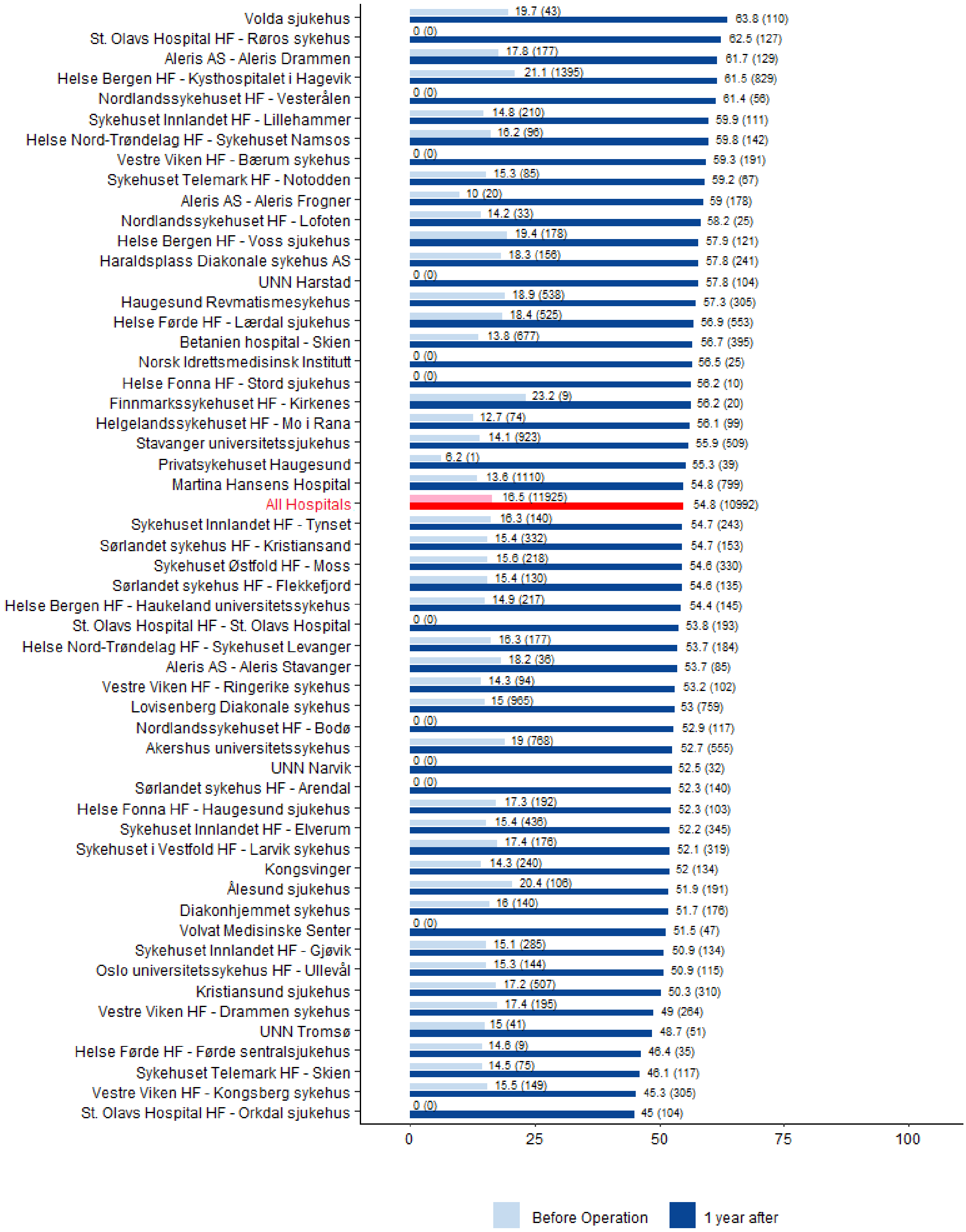
Figure B.47: Average KOOS-ADL score for all primary operations before and 1 year after operation * (Number of completed forms)



* 100 is the best possible score

Only hospitals with more than 10 responses are shown in the figure.

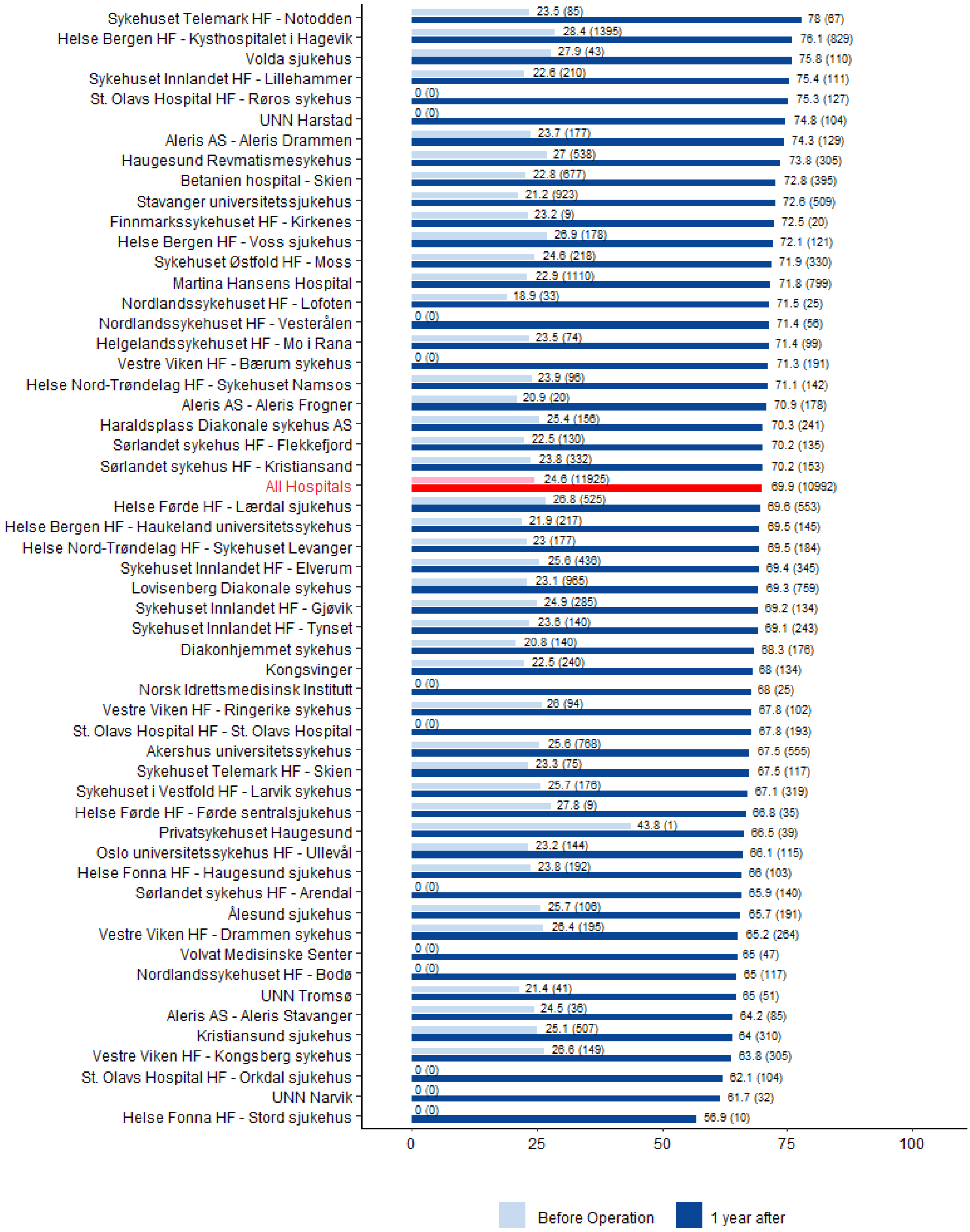
Figure B.48: Average KOOS-SPORT score for all primary operations before and 1 year after operation * (Number of completed forms)



* 100 is the best possible score

Only hospitals with more than 10 responses are shown in the figure.

Figure B.49: Average KOOS-QOL score for all primary operations before and 1 year after operation * (Number of completed forms)



* 100 is the best possible score

Only hospitals with more than 10 responses are shown in the figure.

Completeness of reporting analysis for the Knee Arthroplasty Register, 2021-2023

A completeness of reporting analysis for the Knee Arthroplasty Register has been conducted by combining the data in the Register with data from the Norwegian Patient Register (NPR). The report and analysis were prepared by the NPR in collaboration with the Knee Arthroplasty Register (NAR). There are separate statistics on primary operations and revisions.

NCSP codes for combining data from NPR hospital stays and the Knee Arthroplasty Register

Type	Code	Description
Primary operation	NGB 0y	Primary partial prosthetic replacement of knee joint not using cement
	NGB 1y	Primary partial prosthetic replacement of knee joint using cement
	NGB 20	Primary total prosthetic replacement of knee joint not using cement
	NGB 30	Primary total prosthetic replacement of knee joint using hybrid technique
	NGB 40	Primary total prosthetic replacement of knee joint using cement
	NGB 7y	Primary implantation of reconstruction prosthesis
With or without	NGB 99	Other Primary prosthetic replacement in knee joint
Revision (level 1)	NGC 0y	Secondary implantation of partial prosthesis in knee joint not using cement
	NGC 1y	Secondary implantation of partial prosthesis in knee joint using cement
	NGC 2y	Secondary implantation of total prosthesis in knee joint not using cement
	NGC 3y	Secondary implantation of total prosthesis in knee joint using hybrid technique
	NGC 4y	Secondary implantation of total prosthesis in knee joint using cement
	NGC 7y	Secondary implantation of reconstruction prosthesis
	NGC 99	Other secondary prosthetic replacement in knee joint
	NGU 0y	Removal of partial prosthesis from knee joint
	NGU 1y	Removal of total prosthesis from knee joint

Formulas for completeness of reporting

$$\text{Completeness rate NAR} = \frac{\text{only NAR} + \text{both registers}}{\text{only NPR} + \text{only NAR} + \text{both registers}}$$

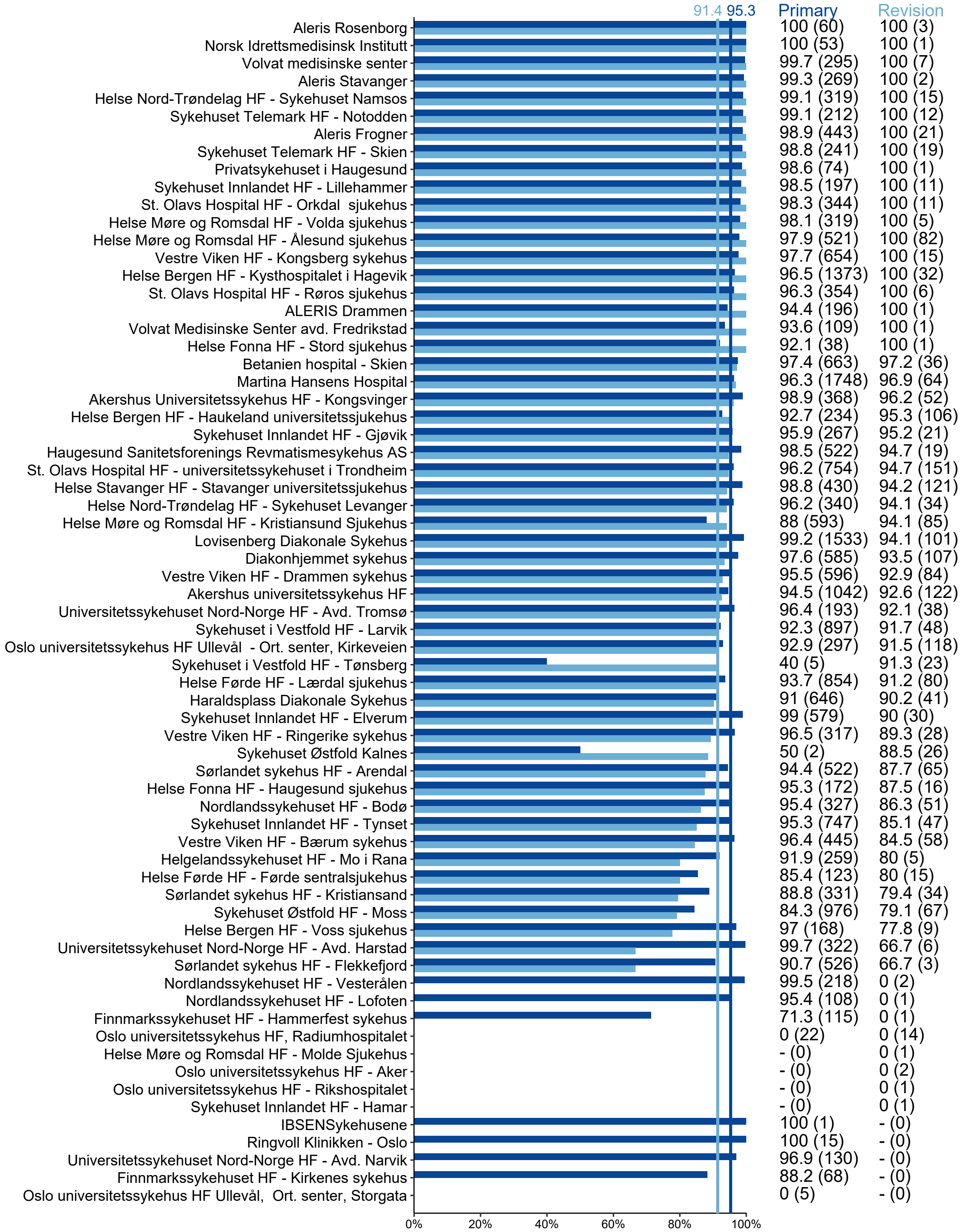
$$\text{Completeness rate NPR} = \frac{\text{only NPR} + \text{both registers}}{\text{only NPR} + \text{only NAR} + \text{both registers}}$$

Primary operations. In 2021-2023, 16751 primary knee replacements were reported to one or both of the registers. 95.7% of these were reported to the NAR while 93.4% were reported to the NPR. Completeness of reporting varies much between the different hospitals. For hospitals with a low completeness of reporting rate for the Knee Arthroplasty Register, either the form was not sent to the NAR or other interventions than knee arthroplasties were incorrectly coded with NGB 0*/NGB 1*/NGB 20/NGB 30/NGB 40.
Procedure codes to be used for primary operations:
NGB 0* - NGB 1* - NGB 20 - NGB 30 - NGB 40 - NGB 7*

Revision operations. In 2021-2023, 1483 revisions were reported to one or both of the registers. 91.6% of these were reported to the NAR while 80.7% were reported to the NPR (revision level 1). Completeness of reporting varies much between the different hospitals. A low completeness of reporting rate may mean that the revision form was not sent to the NAR. The analysis shows that a number of revision forms are missing in cases where the prosthesis was removed without a new one being inserted in the same operation; in such cases, a form should be submitted both when the prosthesis is removed and when any new insertion is performed.
Procedure codes to be used for revision operations:
NGC 0* - NGC 1* - NGC 2* - NGC 3* - NGC 4* - NGC 7* **- NGC 99 - NGU 0* - NGU 1***

New: From 2012, revisions due to infection, even where parts of the prosthesis are not removed or replaced, are to be reported on the form to the NAR. These must be coded NGS 19 or NGS 49 with the additional code NGW 69.

Completeness of reporting for Knee Arthroplasty Register, 2021-2023



Dark blue bars and first number to the right of the bars gives completeness of reporting for primary operations. Light blue bars and second number to the right of the bars gives completeness of reporting for revision operations. The numbers in brackets gives the number of operations registered at both NAR and NPR. Vertical lines shows the national averages.

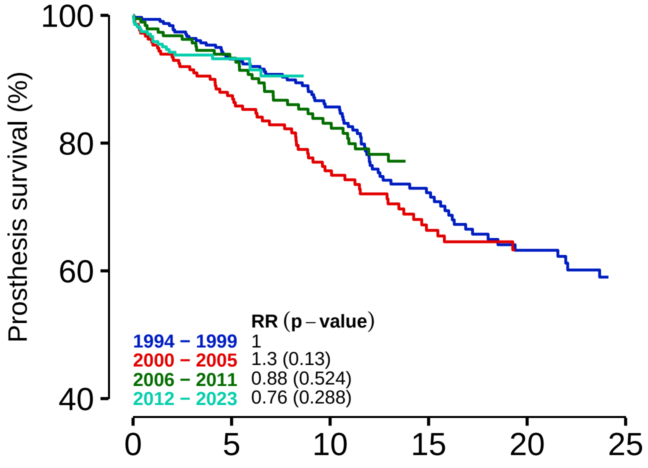
CONTENTS

Survival curves for joint prosthesis

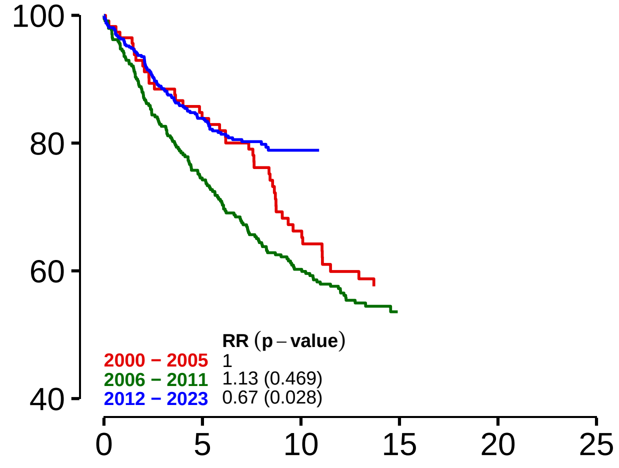
1994−2023

Norwegian Arthroplasty Register

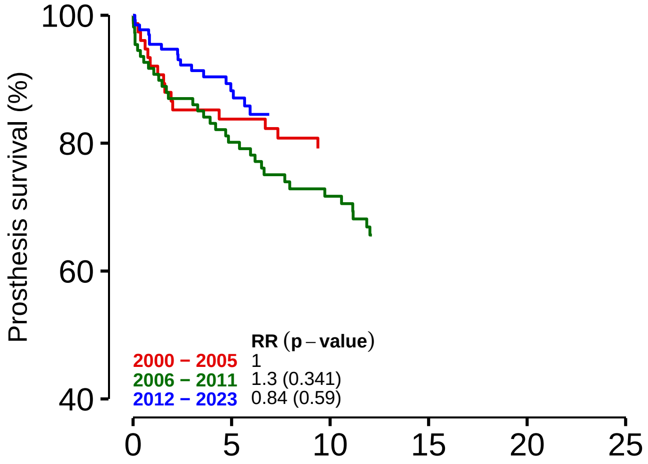
C.1) Total prosthesis in elbow*



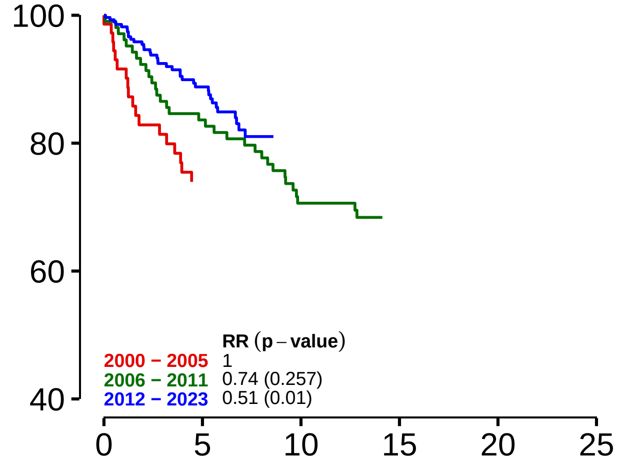
C.2) Ankle, without rheumatoid arthritis



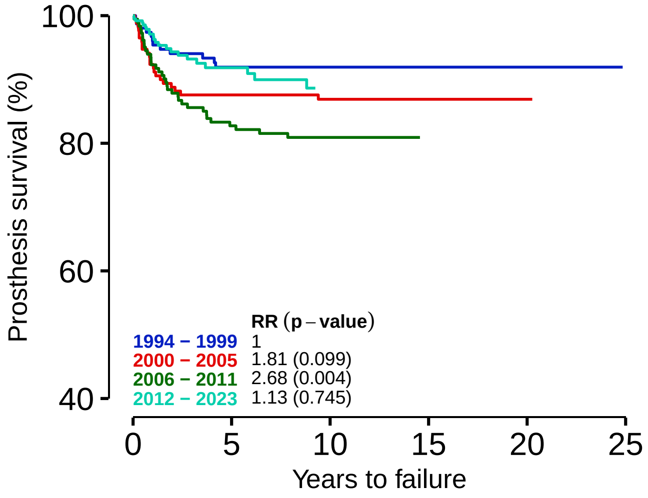
C.3) Ankle, only rheumatoid arthritis



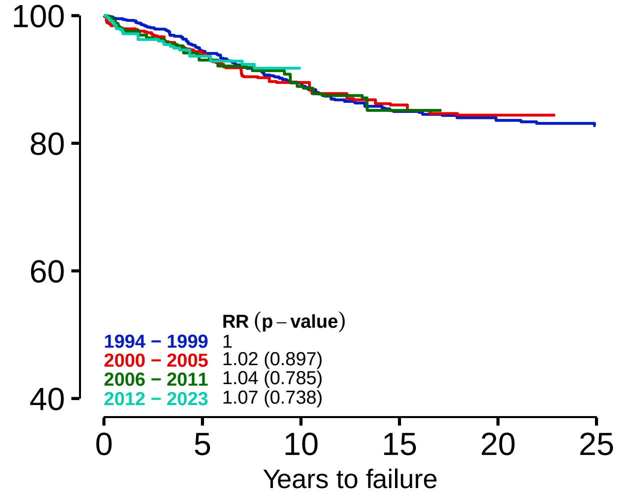
C.4) Wrist



C.5) Carpometacarpal (CMC I)



C.6) Finger (MCP)



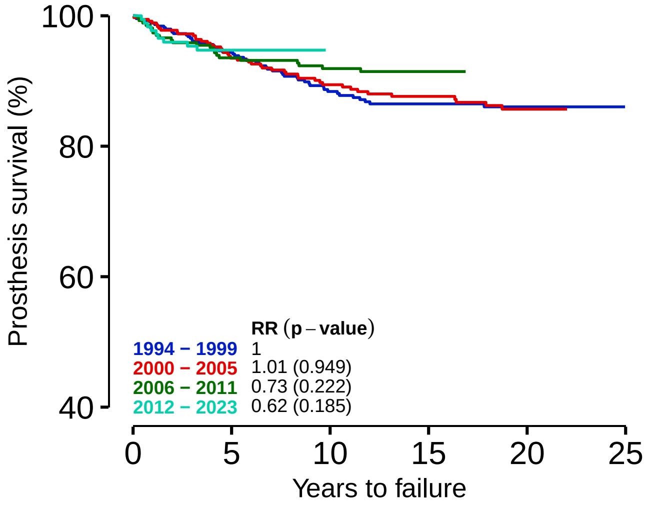
*Caput radii prosthesis for acute fracture is not included.

Kaplan−Meier survival curves. Survival estimate is given as long as > 50 prostheses are at risk.

Risk Ratio (RR) is adjusted for age and gender.

Survival curves for joint prosthesis 1994−2023

C.7) Toes



Kaplan−Meier survival curves. Survival estimate is given as long as > 50 prostheses are at risk.
Risk Ratio (RR) is adjusted for age and gender.

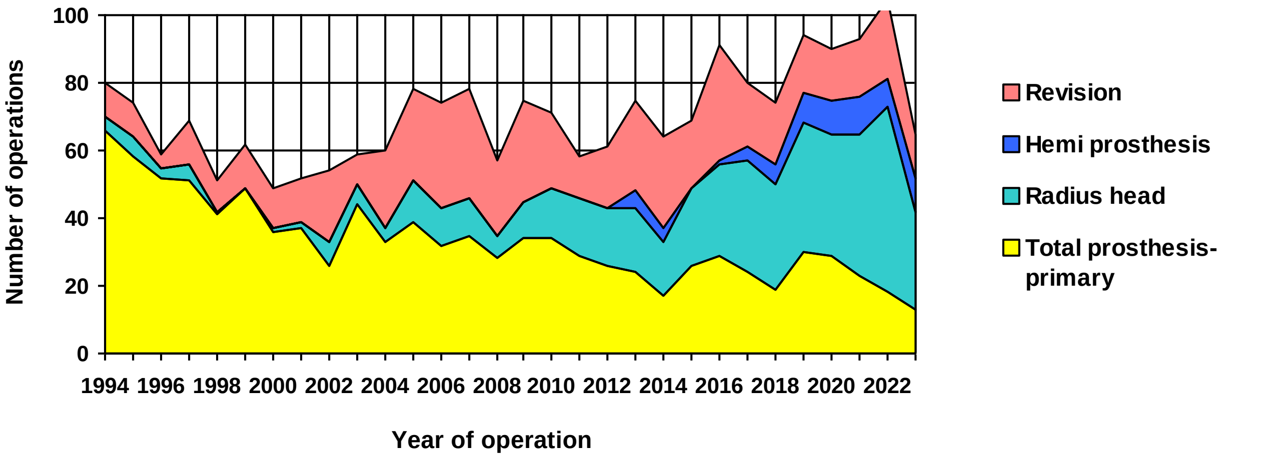
ELBOW PROSTHESES

Table 1: Annual number of prostheses

			Primary operations								
Year	**Hemi prosthesis**		**Total prosthesis**		**Radius head**		**Reoperations ***		**Revisions**		**Total**
2023	10	(15,4%)	13	(20,0%)	29	(44,6%)			13	(20,0%)	**65**
2022	8	(7,6%)	18	(17,1%)	55	(52,4%)	2	(1,9%)	22	(21,0%)	**105**
2021	11	(11,8%)	23	(24,7%)	42	(45,2%)			17	(18,3%)	**93**
2020	10	(11,1%)	29	(32,2%)	36	(40,0%)			15	(16,7%)	**90**
2019	9	(9,6%)	30	(31,9%)	38	(40,4%)	1	(1,1%)	16	(17,0%)	**94**
2018	6	(8,1%)	19	(25,7%)	31	(41,9%)	1	(1,4%)	17	(23,0%)	**74**
2017	4	(5,0%)	24	(30,0%)	33	(41,3%)			19	(23,8%)	**80**
2016	1	(1,1%)	29	(31,9%)	27	(29,7%)	1	(1,1%)	33	(36,3%)	**91**
2015			26	(37,7%)	23	(33,3%)			20	(29,0%)	**69**
2014	4	(6,3%)	17	(26,6%)	16	(25,0%)			27	(42,2%)	**64**
2013	5	(6,7%)	24	(32,0%)	19	(25,3%)			27	(36,0%)	**75**
2012			26	(42,6%)	17	(27,9%)			18	(29,5%)	**61**
2011			29	(50,0%)	17	(29,3%)	1	(1,7%)	11	(19,0%)	**58**
2010			34	(47,9%)	15	(21,1%)			22	(31,0%)	**71**
2009			34	(45,3%)	11	(14,7%)			30	(40,0%)	**75**
2008			28	(49,1%)	7	(12,3%)			22	(38,6%)	**57**
1994-07			599	(66,6%)	73	(8,1%)			227	(25,3%)	**899**
Total	**68**	**0**	**1002**	**(47,2%)**	**489**	**(23,1%)**	**6**	**(0,3%)**	556	(26,2%)	**2 121**

* Reoperation where prosthetic parts were not changed or removed (soft tissue debridements for infected prosthesis, prosthetic parts were not changed)

Figure 1: Annual numbers of operations



51,7 % of all operations were performed on the right side. 72,9 % performed in women. Mean age: 62,3 years.

Table 2: Elbow disease in primary operations - Total prostheses

Year	Idiopathic osteo-arthritis	Rheumatoid arthritis	Sequelae after fracture	Mb. Bechte-rew	Sequelae ligament tear	Acute fracture	Sequelae after infection	Other	Missing
2023	2	6	5		1	4	1	1	
2022	3	6	4		1	5			
2021	2	9	6			6	2		
2020	3	9	9			9	1	3	
2019	1	12	6		1	12		2	
2018	1	9	5			3		2	
2017	1	9	10			6		1	
2016	3	18	4			6			
2015	1	13	4			8		2	
2014		13	4			2			
2013	2	9	6		1	7		3	
2012	1	16	5			4		1	
2011	4	18	6			3		1	
2010	6	19	5			2		4	
2009	1	18	6		1	7	1	6	
2008	1	19	1			6	1	1	
1994-07	32	506	43	6	1	13	1	26	7
Total	**64**	**709**	**129**	**6**	**6**	**103**	**7**	**53**	**7**

Diseases are not mutually exclusive. More than one reason for operation is possible.

Table 3: Elbow disease in primary operations - Hemiprostheses

Year	Idiopathic osteo-arthritis	Rheumatoid arthritis	Sequelae after fracture	Mb. Bechte-rew	Sequelae ligament tear	Acute fracture	Sequelae after infection	Other	Missing
2023						10			
2022						8			
2021			1			10			
2020			1			9			
2019						9			
2018	1		1			5			
2017						4			
2016						1			
2014		1	1			3			
2013			1			4			
Total	**1**	**1**	**5**	**0**	**0**	**63**	**0**	**0**	**0**

Diseases are not mutually exclusive. More than one reason for operation is possible.

Table 4: Elbow disease in primary operations - Radius head prostheses (Caput radii)

Year	Idiopathic osteo-arthritis	Rheumatoid arthritis	Sequelae after fracture	Mb. Bechte-rew	Sequelae ligament tear	Acute fracture	Sequelae after infection	Other	Missing
2023	1		3			24		1	
2022	2		5			48			
2021			3			39			
2020	1		3			32		1	
2019			6		2	32			
2018			1			29		1	
2017		1	4			29			
2016			3			23		1	
2015			5			20		1	
2014	1		3			12			
2013	1					19			
2012	1		3			13			
2011	2		2			13			
2010			2			13			
2009						11			
2008			2			5			
1994-07	4	13	17			37		6	1
Total	**13**	**14**	**62**	**0**	**2**	**399**	**0**	**11**	**1**

Diseases are not mutually exclusive. More than one reason for operation is possible.

Use of cement in elbow prostheses

Table 5: Primary operations - Humerus

Year	Cement with antibiotics	Cement without antibiotics	Uncemented	Missing	Total
2023	23 (100,0%)				**23**
2022	24 (88,9%)		2 (7,4%)	1 (3,7%)	**27**
2021	33 (94,3%)		2 (5,7%)		**35**
2020	39 (97,5%)		1 (2,5%)		**40**
2019	38 (97,4%)		1 (2,6%)		**39**
2018	25 (100,0%)				**25**
2017	28 (96,6%)		1 (3,4%)		**29**
2016	30 (100,0%)				**30**
2015	25 (96,2%)		1 (3,8%)		**26**
2014	19 (90,5%)			2 (9,5%)	**21**
2013	27 (93,1%)		2 (6,9%)		**29**
2012	23 (88,5%)		3 (11,5%)		**26**
2011	26 (89,7%)		1 (3,4%)	2 (6,9%)	**29**
2010	30 (88,2%)		4 (11,8%)		**34**
2009	29 (85,3%)		4 (11,8%)	1 (2,9%)	**34**
2008	24 (85,7%)		2 (7,1%)	2 (7,1%)	**28**
1994-07	339 (56,6%)	95 (15,9%)	162 (27,0%)	3 (0,5%)	**599**
Total	**782 (72,8%)**	**95 (8,8%)**	**186 (17,3%)**	**11 (1,0%)**	**1 074**

Table 6: Primary operations - Ulna/radius

Year	Cement with antibiotics	Cement without antibiotics	Uncemented	Missing	Total
2023	14 (33,3%)		28 (66,7%)		**42**
2022	23 (31,1%)		51 (68,9%)		**74**
2021	29 (42,6%)		39 (57,4%)		**68**
2020	34 (51,5%)		32 (48,5%)		**66**
2019	39 (57,4%)		29 (42,6%)		**68**
2018	22 (44,0%)		28 (56,0%)		**50**
2017	29 (50,0%)		29 (50,0%)		**58**
2016	36 (64,3%)		20 (35,7%)		**56**
2015	31 (63,3%)		18 (36,7%)		**49**
2014	22 (66,7%)	1 (3,0%)	8 (24,2%)	2 (6,1%)	**33**
2013	23 (53,5%)		20 (46,5%)		**43**
2012	24 (55,8%)		19 (44,2%)		**43**
2011	40 (87,0%)		4 (8,7%)	2 (4,3%)	**46**
2010	44 (89,8%)		1 (2,0%)	4 (8,2%)	**49**
2009	37 (82,2%)		6 (13,3%)	2 (4,4%)	**45**
2008	29 (82,9%)		4 (11,4%)	2 (5,7%)	**35**
1994-07	505 (75,0%)	96 (14,3%)	68 (10,1%)	4 (0,6%)	**673**
Total	**981 (65,5%)**	**97 (6,5%)**	**404 (27,0%)**	**16 (1,1%)**	**1 498**

Prostheses used in elbow prostheses - Total prostheses

Table 7: Primary operations - Humerus

Prostheses	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Discovery	161	18	16	5	1	1		2	9	10	**223**
Norway	180										**180**
Kudo	162										**162**
IBP	136										**136**
Nexel		4	13	19	17	28	22	21	7	1	**132**
GSB III	76	1									**77**
NES	54										**54**
Mutars	6	2			1	1	1		1		**12**
Latitude EV	2						6		1	2	**11**
IBP Reconstruction	5										**5**
Coonrad/Morrey	4	1									**5**
Other (n < 5)	5										**5**
Total	**791**	**26**	**29**	**24**	**19**	**30**	**29**	**23**	**18**	**13**	**1002**

Table 8: Primary operations - Ulna/radius

Prostheses	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Discovery	161	18	16	5	1	1		2	9	10	**223**
Norway	179										**179**
Kudo	162										**162**
IBP	136										**136**
Nexel		4	13	19	17	28	22	21	7	1	**132**
GSB III	76	1									**77**
NES	55										**55**
Mutars	6	2			1	1	1		1		**12**
Latitude EV	2						6		1	2	**11**
IBP Reconstruction	5										**5**
Coonrad/Morrey	4	1									**5**
Other (n < 5)	5										**5**
Total	**791**	**26**	**29**	**24**	**19**	**30**	**29**	**23**	**18**	**13**	**1 002**

Prostheses used in elbow prostheses - Hemiprostheses

Table 9: Primary operations - Humerus

Prostheses	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Latitude EV	1					4	10	11	8	10	**44**
Latitude Anatomic hemi	8		1	4	6	5					**24**
Total	**9**		**1**	**4**	**6**	**9**	**10**	**11**	**8**	**10**	**68**

Prostheses used in elbow prostheses - Radius head prostheses

Table 10: Primary operations - Radius

Prostheses	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Acumed anatomic radial head	37	13	13	12	17	20	17	24	34	9	**196**
Explor	12	7	10	17	14	16	15	5			**96**
rHead	62		1	1							**64**
EVOLVE (Proline)	5			3		2	1	12	21	20	**64**
Radial Head	29										**29**
Silastic H.P. 100	20										**20**
Link radius	7	3									**10**
Other (n < 5)	3		3				3	1			**10**
Total	**175**	**23**	**27**	**33**	**31**	**38**	**36**	**42**	**55**	**29**	**489**

Reasons for revisions in elbow prostheses

Table 11:

Year of revision	Loose proximal comp.	Loose distal comp.	Dislocation	Instability	Malalignment	Deep infection	Fracture (near implant)	Pain	Defect polyethylene	Progression of osteoarthritis	Other	Missing
2023	2	7	1		1							
2022	2	2		2		3		3	3	2	4	
2021	1	1				2	3	3		1	6	
2020	1			2		2	1	2	3	3	5	
2019	2	4		2		1	1	2	3		3	
2018	2	2	2	3		1	2	2	6		4	
2017	3	3		2		3	5	1	5		3	
2016	2	5	1		1	3		1	2	1	3	
2015	3	4	1	1		2		1	6		1	
2014	4	4		1	1	1	1	2	4		4	
2013	2	2	1	2		2	2	1	7		3	
2012		1		1		3			3		6	
2011	3	5	1	1			2	2	3		3	1
2010	2	6	2	2			6	2	2		2	
2009	6	5		1	1	1	2	3	4		5	
2008	5	5		1	4	1	4	3	2		3	
1994-07	64	63	16	16	8	11	22	29	12		22	1
Total	**104**	**119**	**25**	**37**	**16**	**36**	**51**	**57**	**65**	**7**	**77**	**2**

More than one reason for revision is possible. Only the first reoperation is counted.

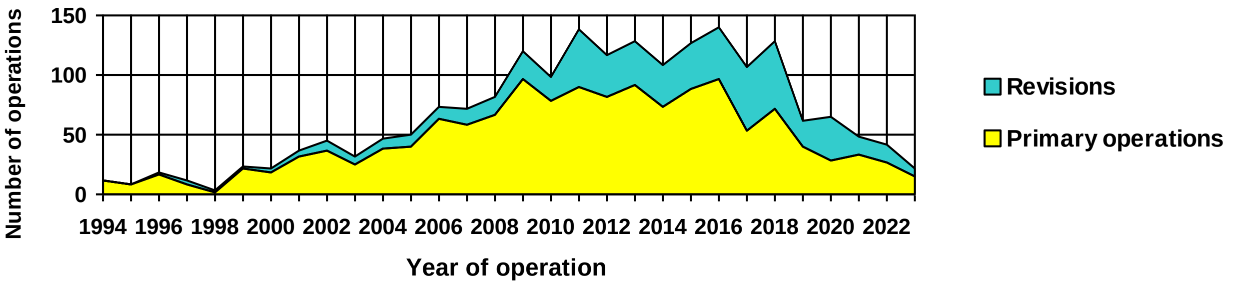
ANKLE PROSTHESES

Table 1: Annual number of operations

Year	Primary operations		Reoperations *		Revisions		Total
2023	15	(68,2%)			7	(31,8%)	**22**
2022	27	(65,9%)			14	(34,1%)	**41**
2021	33	(68,8%)			15	(31,3%)	**48**
2020	29	(44,6%)			36	(55,4%)	**65**
2019	40	(64,5%)	1	(1,6%)	21	(33,9%)	**62**
2018	71	(55,0%)	1	(0,8%)	57	(44,2%)	**129**
2017	54	(50,5%)			53	(49,5%)	**107**
2016	97	(69,3%)			43	(30,7%)	**140**
2015	89	(70,1%)			38	(29,9%)	**127**
2014	74	(68,5%)			34	(31,5%)	**108**
2013	92	(71,9%)			36	(28,1%)	**128**
2012	82	(70,7%)			34	(29,3%)	**116**
2011	90	(65,2%)			48	(34,8%)	**138**
2010	79	(79,8%)			20	(20,2%)	**99**
2009	96	(80,0%)			24	(20,0%)	**120**
2008	66	(80,5%)			16	(19,5%)	**82**
1994-07	380	(83,7%)			74	(16,3%)	**454**
Total	**1 414**	**(71,2%)**	**2**	**(0,1%)**	**570**	**(28,7%)**	**1 986**

* Reoperation where prosthetic parts were not changed or removed (soft tissue debridements for infected prosthesis, prosthetic parts were not changed)

Figure 1: Annual numbers of operations



57 % of all operations were performed on the right side. 53,3 % performed in women. Mean age: 60,5 years.

Table 2: Ankle disease in primary operations

Year	Idiopathic osteoarthritis	Rheumatoid arthritis	Sequelae after fracture	Mb. Bechterew	Sequelae ligament tear	Acute fracture	Sequelae of infection	Other	Missing
2023	4	1	4		5			1	
2022	9	7	5		5			3	
2021	3	9	12		7		1	1	
2020	7	8	2		8		1	4	
2019	4	9	13		10			6	
2018	20	15	17	1	18	1	1	6	
2017	14	12	17	1	8		1	5	
2016	24	14	28	1	31			6	
2015	22	18	25	2	18			11	
2014	21	11	27	1	10			5	
2013	36	20	25	1	16			2	1
2012	21	8	44		9			2	
2011	32	18	35		5		1	3	
2010	22	20	29		9			5	
2009	31	26	28		13		1	1	
2008	20	15	24		7		2	2	
1994-07	87	159	101	6	16			32	1
Total	**377**	**370**	**436**	**13**	**195**	**1**	**8**	**95**	**2**

Diseases are not mutually exclusive. More than one reason for operation is possible.

Use of cement in ankle prostheses

Table 3: Primary operations - Tibia

Year	Cement with antibiotics		Cement without antibiotics		Uncemented		Missing		Total
2023					15	(100,0%)			**15**
2022					27	(100,0%)			**27**
2021					33	(100,0%)			**33**
2020					29	(100,0%)			**29**
2019					39	(100,0%)			**39**
2018					69	(97,2%)	2	(2,8%)	**71**
2017					54	(100,0%)			**54**
2016					97	(100,0%)			**97**
2015					89	(100,0%)			**89**
2014					74	(100,0%)			**74**
2013					91	(100,0%)			**91**
2012					82	(100,0%)			**82**
2011					90	(100,0%)			**90**
2010					79	(100,0%)			**79**
2009	5	(5,2%)			89	(92,7%)	2	(2,1%)	**96**
2008	1	(1,5%)			62	(93,9%)	3	(4,5%)	**66**
1994-07	23	(6,1%)	10	(2,6%)	346	(91,1%)	1	(0,3%)	**380**
Total	**29**	**(2,1%)**	**10**	**(0,7%)**	**1 365**	**(96,7%)**	**8**	**(0,6%)**	**1 412**

Table 4: Primary operations - Talus

Year	Cement with antibiotics		Cement without antibiotics		Uncemented		Missing		Total
2023					15	(100,0%)			**15**
2022					27	(100,0%)			**27**
2021					33	(100,0%)			**33**
2020					29	(100,0%)			**29**
2019					40	(100,0%)			**40**
2018					70	(98,6%)	1	(1,4%)	**71**
2017					54	(100,0%)			**54**
2016					97	(100,0%)			**97**
2015					89	(100,0%)			**89**
2014					74	(100,0%)			**74**
2013					91	(100,0%)			**91**
2012					82	(100,0%)			**82**
2011					90	(100,0%)			**90**
2010					79	(100,0%)			**79**
2009	5	(5,2%)			89	(92,7%)	2	(2,1%)	**96**
2008	1	(1,5%)			62	(93,9%)	3	(4,5%)	**66**
1994-07	25	(6,6%)	11	(2,9%)	344	(90,5%)			**380**
Total	**31**	**(2,2%)**	**11**	**(0,8%)**	**1 365**	**(96,6%)**	**6**	**(0,4%)**	**1 413**

Prostheses used in ankle prostheses

Table 5: Primary operations - Tibia

Prostheses	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
STAR	615	1									**616**
Salto Talaris	88	85	81	28	35						**317**
INFINITY				2	11	29	28	28	25	13	**136**
Mobility	101										**101**
TM Total Ankle	3	3	16	22	20	8	1	5	2	2	**82**
CCI	78										**78**
Norwegian TPR	32										**32**
Rebalance	15										**15**
Salto Mobile	12										**12**
Hintegra	11										**11**
Integra Cadence				2	4	2					**8**
AES	3										**3**
Total	**958**	**89**	**97**	**54**	**70**	**39**	**29**	**33**	**27**	**15**	**1 411**

Table 6: Primary operations - Talus

Prostheses	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
STAR	615	1									**616**
Salto Talaris	83	84	80	27	35						**309**
INFINITY				2	11	29	25	25	23	13	**128**
Mobility	101										**101**
TM Total Ankle	3	3	16	22	20	8	1	5	2	2	**82**
CCI	78										**78**
Norwegian TPR	32										**32**
Rebalance	15										**15**
Salto Mobile	12										**12**
Hintegra	11										**11**
Integra Cadence				2	4	2					**8**
Salto XT	5	1	1	1							**8**
INVISION							3	3	1		**7**
AES	3										**3**
INBONE II									1		**1**
Talus Hemicap						1					**1**
Total	**958**	**89**	**97**	**54**	**70**	**40**	**29**	**33**	**27**	**15**	**1 412**

In 2019, 1 form was registered with another type of prosthesis (partial resurfacing)

Prostheses used in ankle total prostheses

Table 7: Primary operations - Foring Tibia Insert in total prostheses

Prostheses	Materiale	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Totalt
STAR	Uhmwpe	615	1									**616**
Salto Talaris	Uhmwpe	87	85	81	28	35						**316**
INFINITY	Uhmwpe				2	11	29	28	28	25	13	**136**
Mobility	Uhmwpe	101										**101**
TM Total Ankle	HXLPE	3	3	16	22	20	8	1	5	2	2	**82**
CCI	Uhmwpe	77										**77**
Rebalance	Uhmwpe	15										**15**
Salto Mobile	Uhmwpe	12										**12**
Hintegra	Uhmwpe	11										**11**
Integra Cadence	HXLPE				2	4	2					**8**
AES	Uhmwpe	3										**3**
Salto XT	Uhmwpe	1										**1**
Totalt		**925**	**89**	**97**	**54**	**70**	**39**	**29**	**33**	**27**	**15**	**1 378**

Reasons for revisions in ankle prostheses

Table 8:

Year of revision	Loose proximal comp.	Loose distal comp.	Dislocation	Instability	Malalignment	Deep infection	Fracture (near implant)	Pain	Defect polyethylene	Osteolysis	Poor mobility	Other	Missing
2023	2	2					2	3	2	1			
2022	1	1				2		2	4			3	
2021	2			1	1	2	2	2	4	1			
2020	7	8	1	1	3	1	2	11	4	1		2	
2019		2		1		2	1	6	4	2		3	
2018	9	8		1	7	4	3	19	14	1			
2017	8	8		2	8		1	23	8	7		5	
2016	10	10		2	1	1	2	13	4	2	1		
2015	5	5			6	1		13	9	6			
2014	11	9		1	3	1		9	8				
2013	5	2	1	3	8	2	1	14	16	3			
2012	6	3		2	1	2	1	12	9	1		1	
2011	6	6	1	5	4	1	1	16	8		1	2	
2010	2	1		2	3	1	2	10	3		3		
2009	5	2	1	4	7	3	1	8	3				
2008	3	4	1	1	5			4	1			2	
1994-07	28	21		8	12	5	2	22	7		1	4	
Total	**110**	**92**	**5**	**34**	**69**	**28**	**21**	**187**	**108**	**25**	**6**	**22**	**0**

More than one reason for revision is possible. Only the first reoperation is counted.

FINGER JOINT PROSTHESES

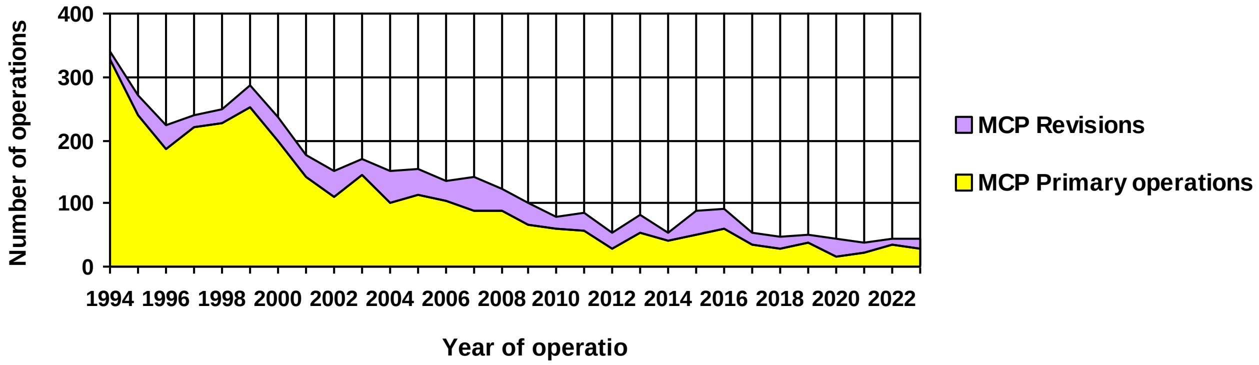
Table 1: Annual number of operations - MCP

Year	Primary operations		Revisions		Total
2023	27	(62,8%)	16	(37,2%)	**43**
2022	36	(81,8%)	8	(18,2%)	**44**
2021	22	(56,4%)	17	(43,6%)	**39**
2020	16	(35,6%)	29	(64,4%)	**45**
2019	37	(75,5%)	12	(24,5%)	**49**
2018	28	(59,6%)	19	(40,4%)	**47**
2017	34	(61,8%)	21	(38,2%)	**55**
2016	61	(67,0%)	30	(33,0%)	**91**
2015	50	(56,8%)	38	(43,2%)	**88**
2014	40	(74,1%)	14	(25,9%)	**54**
2013	55	(67,9%)	26	(32,1%)	**81**
2012	27	(50,9%)	26	(49,1%)	**53**
2011	57	(66,3%)	29	(33,7%)	**86**
2010	60	(76,9%)	18	(23,1%)	**78**
2009	66	(66,0%)	34	(34,0%)	**100**
2008	88	(71,0%)	36	(29,0%)	**124**
1994-07	2 446	(83,7%)	477	(16,3%)	**2 923**
Total	**3 150**	**(78,8%)**	**850**	**(21,3%)**	**4 000**

Table 2: Annual number of operations - PIP

Year	Primary operations		Revisions		Total
2023	23	(92,0%)	2	(8,0%)	**25**
2022	12	(85,7%)	2	(14,3%)	**14**
2021	15	(93,8%)	1	(6,3%)	**16**
2020	16	(100,0%)			**16**
2019	14	(93,3%)	1	(6,7%)	**15**
2018	10	(83,3%)	2	(16,7%)	**12**
2017	6	(100,0%)			**6**
2016	3	(75,0%)	1	(25,0%)	**4**
2015	5	(100,0%)			**5**
2014	4	(100,0%)			**4**
2013	6	(100,0%)			**6**
2011	3	(100,0%)			**3**
2010	6	(100,0%)			**6**
2009	3	(100,0%)			**3**
2008	4	(57,1%)	3	(42,9%)	**7**
1994-07	58	(84,1%)	11	(15,9%)	**69**
Total	**188**	**(89,1%)**	**23**	**(10,9%)**	**211**

Figure 1: Annual number of operations



61,7 % of all operations were performed on the right side   87,4 % performed in women.   Mean age: 61,4 years.

Reasons for primary operations

Table 3: MCP prostheses - Finger disease

Year	Idiopathic osteoarthritis	Rheumatoid arthritis	Sequelae after fracture	Mb. Bechterew	Sequelae ligament tear	Acute fracture	Sequelae of infection	Other	Missing
2023	2	23						2	
2022	5	30				1	1	1	
2021	5	16		1					
2020	1	15							
2019	4	28					1	4	
2018	4	22		1			1	1	
2017	5	27						2	
2016	4	57						2	
2015	4	43		1				2	
2014		31					1	8	
2013		53	1					3	
2012		25	1					1	
2011	1	50						6	
2010	3	54	1					2	
2009	2	62						2	
2008	2	85						1	
1994-07	58	2 322	13	9	1	1	2	64	3
Total	**100**	**2 943**	**16**	**12**	**1**	**2**	**6**	**101**	**3**

More than one reason for primary operation is possible

Table 4: PIP prostheses - Finger disease

Year	Idiopathic osteoarthritis	Rheumatoid arthritis	Sequelae after fracture	Mb. Bechterew	Sequelae ligament tear	Acute fracture	Sequelae of infection	Other	Missing
2023	18		5						
2022	11		1						
2021	13	2							
2020	14	3	1						
2019	10	2	2					1	
2018	7	1	2						
2017	6								
2016	1						2		
2015	3		2						
2014	3		2						
2013	1	5							
2011		2	1						
2010	1	2	2		1			1	
2009	2						1		
2008	3		1					1	
1994-07	24	27	4		1	3		5	1
Total	**117**	**44**	**23**	**0**	**2**	**3**	**3**	**8**	**1**

More than one reason for primary operation is possible

Use of cement in MCP prostheses

Table 5: Primary operations - Proximal

Year	Cement with antibiotics		Cement without antibiotics		Uncemented		Missing		Total
2023					18	(100,0%)			**18**
2022					25	(100,0%)			**25**
2021					12	(100,0%)			**12**
2020					11	(100,0%)			**11**
2019					24	(100,0%)			**24**
2018					16	(100,0%)			**16**
2017					21	(100,0%)			**21**
2016	1	(2,2%)			44	(97,8%)			**45**
2015	1	(3,0%)			31	(93,9%)	1	(3,0%)	**33**
2014					33	(97,1%)	1	(2,9%)	**34**
2013					52	(98,1%)	1	(1,9%)	**53**
2012					27	(100,0%)			**27**
2011					57	(100,0%)			**57**
2010					59	(100,0%)			**59**
2009					66	(100,0%)			**66**
2008	1	(1,2%)			85	(98,8%)			**86**
1994-07	2	(0,1%)	2	(0,1%)	2 429	(99,5%)	8	(0,3%)	**2 441**
Total	**5**	**(0,2%)**	**2**	**(0,1%)**	**3 010**	**(99,4%)**	**11**	**(0,4%)**	**3 028**

Table 6: Primary operations - Distal

Year	Cement with antibiotics	Cement without antibiotics	Uncemented		Missing	Total
2022			2	(100,0%)		**2**
2019			1	(100,0%)		**1**
2016			2	(100,0%)		**2**
2014			1	(100,0%)		**1**
2011			2	(100,0%)		**2**
2010			1	(100,0%)		**1**
2009			1	(100,0%)		**1**
2008			2	(100,0%)		**2**
1994-07			28	(100,0%)		**28**
Total			**40**	**(100,0%)**		**40**

Use of cement in PIP prostheses

Table 7: Primary operations - Proximal

Year	Cement with antibiotics	Cement without antibiotics	Uncemented	Missing	Total
2023			22 (100,0%)		**22**
2022			11 (100,0%)		**11**
2021			13 (100,0%)		**13**
2020			10 (100,0%)		**10**
2019			12 (100,0%)		**12**
2018			8 (100,0%)		**8**
2017			5 (100,0%)		**5**
2016			3 (100,0%)		**3**
2015			3 (100,0%)		**3**
2014			4 (100,0%)		**4**
2013			5 (83,3%)	1 (16,7%)	**6**
2011			2 (66,7%)	1 (33,3%)	**3**
2010			6 (100,0%)		**6**
2009			3 (100,0%)		**3**
2008			4 (100,0%)		**4**
2007			5 (83,3%)	1 (16,7%)	**6**
2006			7 (100,0%)		**7**
2005			6 (100,0%)		**6**
2004			7 (100,0%)		**7**
2002			6 (100,0%)		**6**
2001			2 (100,0%)		**2**
2000			4 (100,0%)		**4**
1999			7 (100,0%)		**7**
1998			4 (100,0%)		**4**
1996			5 (100,0%)		**5**
1995			2 (100,0%)		**2**
1994			1 (100,0%)		**1**
Total			**167 (98,2%)**	**3 (1,8%)**	**170**

Table 8: Primary operations - Distal

Year	Cement with antibiotics	Cement without antibiotics	Uncemented	Missing	Total
2023			17 (100,0%)		**17**
2022			11 (100,0%)		**11**
2021			13 (100,0%)		**13**
2020			9 (100,0%)		**9**
2019			10 (100,0%)		**10**
2018			8 (100,0%)		**8**
2017			5 (100,0%)		**5**
2016			2 (100,0%)		**2**
2014			1 (100,0%)		**1**
2011			2 (100,0%)		**2**
2010			2 (100,0%)		**2**
2008			1 (100,0%)		**1**
2007			2 (100,0%)		**2**
2006			4 (80,0%)	1 (20,0%)	**5**
2005			5 (100,0%)		**5**
2004			5 (100,0%)		**5**
2002			1 (100,0%)		**1**
1996			3 (100,0%)		**3**
1995			1 (100,0%)		**1**
Total			**102 (99,0%)**	**1 (1,0%)**	**103**

Finger prostheses

Table 9: MCP prostheses in primary operations - Proximal

Prostheses	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Silastic HP 100	1 957	4	1	2		2					**1 966**
Avanta	554	1		3							**558**
Silastic HP 100 II	77	28	41	16	16	19	11	12	22	15	**257**
NeuFlex	198										**198**
Ascension MCP	30		2						1		**33**
MCS	6										**6**
KeriFlex									1	3	**4**
TACTYS						1			1		**2**
HAPY						2					**2**
SR Avanta			1								**1**
Moje	1										**1**
Total	**2 823**	**33**	**45**	**21**	**16**	**24**	**11**	**12**	**25**	**18**	**3 028**

Table 10: MCP prostheses in primary operations - Distal

Prostheses	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Ascension MCP	28		2						1		**31**
MCS	6										**6**
TACTYS						1			1		**2**
Moje	1										**1**
Total	**35**		**2**			**1**			**2**		**40**

Table 11: PIP prostheses in primary operations - Proximal

Prostheses	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
TACTYS			2	5	7	5	6	12	8	9	**54**
Silastic HP 100	27						1				**28**
Ascension PIP PyroCarbon	23				1	1	2				**27**
SR Avanta	17	3	1			2					**23**
CapFlex PIP						4	1	1	3	8	**17**
NeuFlex	7										**7**
KeriFlex										5	**5**
MCS	4										**4**
Avanta	4										**4**
Moje	1										**1**
Total	**83**	**3**	**3**	**5**	**8**	**12**	**10**	**13**	**11**	**22**	**170**

Table 12: PIP prostheses in primary operations - Distal

Prostheses	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
TACTYS			2	5	7	5	7	12	8	9	**55**
Ascension PIP PyroCarbon	23				1	1	1				**26**
CapFlex PIP						4	1	1	3	8	**17**
MCS	4										**4**
Moje	1										**1**
Total	**28**		**2**	**5**	**8**	**10**	**9**	**13**	**11**	**17**	**103**

Finger prostheses - Reasons for revisions

Table 13: MCP prostheses - Reasons for revisions

Year of revision	Loose proximal comp.	Loose distal comp.	Dislocation	Instability	Malalignment	Deep infection	Fracture (near implant)	Pain	Defect polyethylene	Fractured/defect component	Other	Missing
2023		1		1						1		
2022								1		1	2	
2021	4				1					9	3	
2020									4	10	3	
2019			2	2	2		2	5		4		
2018				3	1		3	4		2		
2017			1	1			1	2		4	4	
2016			5	1	4		2	6	5		9	
2015	5	2		4		1		15	8	4	9	
2014		1		1					2		4	
2013				4	12			8		6	4	
2012				2				10	3	6	7	
2011					4	2		8		5	7	
2010	1	1	1				2	3		2	5	
2009	1	2	3	1	1	3		5	3	13	5	
2008		1	2	4	11	1		9	1	5	3	
1994-07	5	18	24	58	58	7	20	108	9	103	152	17
Total	**16**	**26**	**38**	**82**	**94**	**14**	**30**	**184**	**35**	**175**	**217**	**17**

Revision reasons are not mutually exclusive. More than one reason for revision is possible. Only the first reoperation is counted.

Table 14: PIP prostheses - Reasons for revisions

Year of revision	Loose proximal comp.	Loose distal comp.	Dislocation	Instability	Malalignment	Deep infection	Fracture (near implant)	Pain	Defect polyethylene	Fractured/defect component	Other	Missing
2023								1			1	
2022								1		1		
2021								1				
2019											1	
2018	1								1			
2016	1											
2008	1	1	1	1	1			2				
1994-07	3	2		1	1			1		1	6	
Total	**6**	**3**	**1**	**2**	**2**	**0**	**0**	**6**	**1**	**2**	**8**	**0**

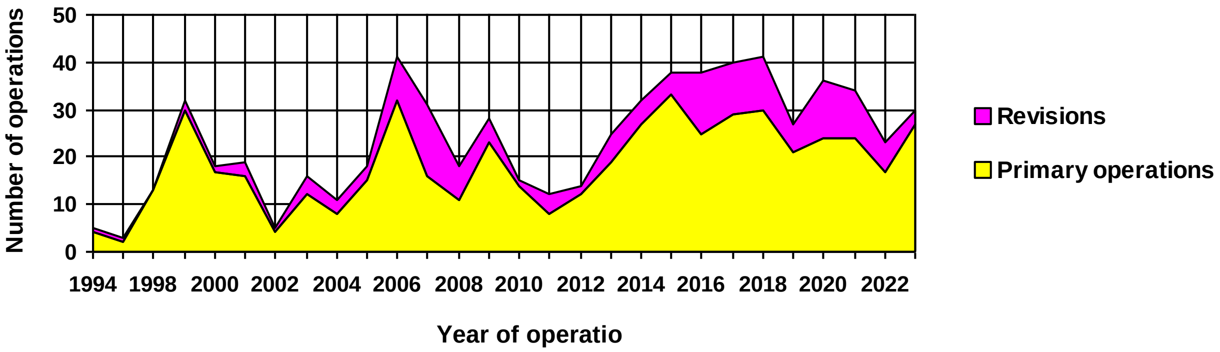
Revision reasons are not mutually exclusive. More than one reason for revision is possible. Only the first reoperation is counted.

WRIST PROSTHESES

Table 1: Annual number of operations

Year	Primary operations		Revisions		Total
2023	27	(90,0%)	3	(10,0%)	**30**
2022	17	(73,9%)	6	(26,1%)	**23**
2021	24	(70,6%)	10	(29,4%)	**34**
2020	24	(66,7%)	12	(33,3%)	**36**
2019	21	(77,8%)	6	(22,2%)	**27**
2018	30	(73,2%)	11	(26,8%)	**41**
2017	29	(72,5%)	11	(27,5%)	**40**
2016	25	(65,8%)	13	(34,2%)	**38**
2015	33	(86,8%)	5	(13,2%)	**38**
2014	27	(84,4%)	5	(15,6%)	**32**
2013	19	(76,0%)	6	(24,0%)	**25**
2012	12	(85,7%)	2	(14,3%)	**14**
2011	8	(66,7%)	4	(33,3%)	**12**
2010	14	(93,3%)	1	(6,7%)	**15**
2009	23	(82,1%)	5	(17,9%)	**28**
2008	11	(61,1%)	7	(38,9%)	**18**
1994-07	169	(79,7%)	43	(20,3%)	**212**
Total	**513**	**(77,4%)**	**150**	**(22,6%)**	**663**

Figure 1: Annual number of operations



57,9 % of all operations were performed on the right side. 57,6 % performed in women. Mean age: 57,1 years.

Table 2: Wrist disease in primary operations

Year	Idiopathic osteo-arthritis	Rheumatoid arthritis	Sequelae after fracture	Mb. Bechte-rew	Sequelae ligament tear	Acute fracture	Sequelae after infection	Other	Missing
2023	10	7	5		6			1	
2022	4	1	5		6			1	
2021	3	3	10		8			2	
2020	3	2	8		8			4	
2019	4	3	9		3			2	
2018	5	3	7		10			7	
2017	2	3	11		12	1	1	4	
2016	5		10		10	1		1	
2015	4	2	13		10			7	
2014	7	1	11		9			3	
2013	4	3	5		3		1	3	
2012	3	5	2		2			1	
2011	1	3	4					2	
2010		4	4		4			2	
2009	4	5	9		4		1	1	
2008	4	2	2		2				1
1994-07	14	115	21	1	2			18	
Total	**77**	**162**	**136**	**1**	**99**	**2**	**3**	**59**	**1**

Diseases are not mutually exclusive. More than one reason for operation is possible.

Use of cement in wrist prostheses

Table 3: Primary operations - Proximal

Year	Cement with antibiotics		Cement without antibiotics		Uncemented		Missing		Total
2023					23	(100,0%)			**23**
2022					17	(100,0%)			**17**
2021					20	(100,0%)			**20**
2020					18	(100,0%)			**18**
2019					6	(100,0%)			**6**
2018					21	(100,0%)			**21**
2017					27	(100,0%)			**27**
2016					25	(100,0%)			**25**
2015					31	(96,9%)	1	(3,1%)	**32**
2014					27	(100,0%)			**27**
2013					19	(100,0%)			**19**
2012					11	(91,7%)	1	(8,3%)	**12**
2011					8	(100,0%)			**8**
2010					14	(100,0%)			**14**
2009					21	(91,3%)	2	(8,7%)	**23**
2008					10	(100,0%)			**10**
1994-07	7	(4,1%)	1	(0,6%)	160	(94,7%)	1	(0,6%)	**169**
Total	**7**	**(1,5%)**	**1**	**(0,2%)**	**458**	**(97,2%)**	**5**	**(1,1%)**	**471**

Table 4: Primary operations - Distal

Year	Cement with antibiotics		Cement without antibiotics		Uncemented		Missing		Total
2023					27	(100,0%)			**27**
2022					17	(100,0%)			**17**
2021					24	(100,0%)			**24**
2020					24	(100,0%)			**24**
2019					21	(100,0%)			**21**
2018					30	(100,0%)			**30**
2017					29	(100,0%)			**29**
2016					25	(100,0%)			**25**
2015					33	(100,0%)			**33**
2014					27	(100,0%)			**27**
2013					19	(100,0%)			**19**
2012					12	(100,0%)			**12**
2011					8	(100,0%)			**8**
2010					14	(100,0%)			**14**
2009					20	(95,2%)	1	(4,8%)	**21**
2008					9	(100,0%)			**9**
1994-07	9	(5,6%)			151	(94,4%)			**160**
Total	**9**	**(1,8%)**			**490**	**(98,0%)**	**1**	**(0,2%)**	**500**

Wrist prostheses

Table 5: Primary operations - Proximal

Prostheses	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Motec Wrist	114	17	12	9	19	1	17	17	13	18	**237**
Biax	90										**90**
Remotion Wrist	29	13	8	6		2	1	2	2		**63**
Scheker Radio-ulnar	9	1	3	8	2	3		1	2	5	**34**
Elos[1]	23										**23**
Uhead (Druj)	7	1	2	4							**14**
Silastic ulnar head	7										**7**
Eclypse radio-ulnar	2										**2**
TMW	1										**1**
Total	**282**	**32**	**25**	**27**	**21**	**6**	**18**	**20**	**17**	**23**	**471**

Table 6: Primary operations - Distal

Prostheses	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Motec Wrist	114	17	12	9	19	1	17	17	13	18	**237**
Biax	89										**89**
Remotion Wrist	29	14	8	6		2	1	2	2		**64**
Scheker Radio-ulnar	7	1	3	8	2	3		1	2	5	**32**
Herbert UHP					6	7	5	3		2	**23**
Elos[1]	23										**23**
RCPI				2	3	8	1	1		2	**17**
Uhead (Druj)	7	1	2	4							**14**
TMW	1										**1**
Total	**270**	**33**	**25**	**29**	**30**	**21**	**24**	**24**	**17**	**27**	**500**

Table 7: Reasons for revisions

Year of revision	Loose proximal comp.	Loose distal comp.	Dislocation	Instability	Malalignment	Deep infection	Fracture (near implant)	Pain	Defect polyethylene	Other	Missing	Total
2023		1		1				1		1		4
2022	1	1		1				3		2		8
2021	1	5			1			3	1	1		12
2020	3	1						4		1		9
2019	2				1			2	1	1		7
2018	2	4					1	3		2		12
2017	3	5			1			3		1		13
2016		4	2	1		2		3	1			13
2015		2		1		1		1	1			6
2014		1						1		2		4
2013		1			1			2	1	1		6
2012					1			1				2
2011		2			1	1		2				6
2010										1		1
2009		2		1	1			2				6
2008		4	1			1		2		1		9
1994-07	5	17	1	3	7	4		10	1	2		50
Total	**17**	**50**	**4**	**8**	**14**	**9**	**1**	**43**	**6**	**16**	**0**	**168**

Revision reasons are not mutually exclusive. More than one reason for revision is possible. Only the first reoperation is counted.

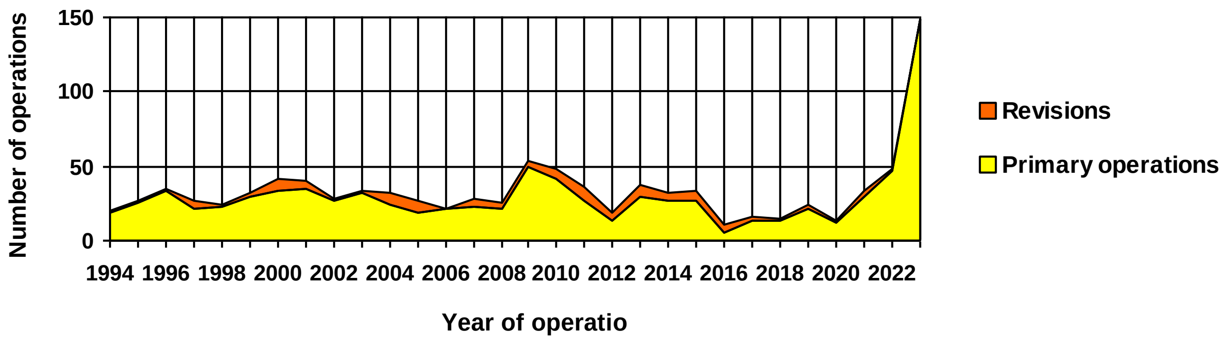
[1]Elos are 3 different development models of Motec Wrist. Motec Wrist was previously sold under the name Gibbon.

CARPOMETACARPAL PROSTHESES (CMC I)

Table 1: Annual number of operations

Year	Primary operations		Revisions		Total
2023	148	(99,3%)	1	(0,7%)	**149**
2022	47	(97,9%)	1	(2,1%)	**48**
2021	30	(90,9%)	3	(9,1%)	**33**
2020	12	(85,7%)	2	(14,3%)	**14**
2019	21	(87,5%)	3	(12,5%)	**24**
2018	13	(86,7%)	2	(13,3%)	**15**
2017	14	(87,5%)	2	(12,5%)	**16**
2016	5	(45,5%)	6	(54,5%)	**11**
2015	27	(81,8%)	6	(18,2%)	**33**
2014	27	(84,4%)	5	(15,6%)	**32**
2013	30	(81,1%)	7	(18,9%)	**37**
2012	14	(73,7%)	5	(26,3%)	**19**
2011	27	(75,0%)	9	(25,0%)	**36**
2010	41	(85,4%)	7	(14,6%)	**48**
2009	49	(92,5%)	4	(7,5%)	**53**
2008	21	(80,8%)	5	(19,2%)	**26**
1994-07	368	(88,2%)	49	(11,8%)	**417**
Total	**894**	**(88,4%)**	**117**	**(11,6%)**	**1 011**

Figure 1: Annual number of operations



48,1 % of all operations were performed on the right side. 79 % performed in women. Mean age: 62,2 years.

Table 2: Carpometacarpal disease in primary operations

Year	Idiopathic osteoarthritis	Rheumatoid arthritis	Sequelae after fracture	Mb. Bechterew	Sequelae ligament tear	Acute fracture	Sequelae of infection	Other	Missing
2023	147			1	1	1			
2022	46		1						
2021	28	2							
2020	12								
2019	19				2				
2018	13								
2017	14								
2016	3	2							
2015	25	1				1			
2014	24	2						1	
2013	23	5		1				1	
2012	13	1							
2011	26		1						
2010	37	4							
2009	47	2						1	
2008	18	3							
1994-07	261	90	2	4				18	
Total	**756**	**112**	**4**	**6**	**3**	**2**	**0**	**21**	**0**

Diseases are not mutually exclusive. More than one reason for operation is possible.

Use of cement in carpometacarpal prostheses

Table 3: Primary operations - Proximal (Single-component)

Year	Cement with antibiotics		Cement without	Uncemented		Missing		Total
2023				148	(100,0%)			**148**
2022				47	(100,0%)			**47**
2021	1	(3,3%)		29	(96,7%)			**30**
2020				12	(100,0%)			**12**
2019				21	(100,0%)			**21**
2018				13	(100,0%)			**13**
2017				14	(100,0%)			**14**
2016				5	(100,0%)			**5**
2015				27	(100,0%)			**27**
2010-14				137	(98,6%)	2	(1,4%)	**139**
2004-09				152	(97,4%)	4	(2,6%)	**156**
1994-03	3	(1,1%)		277	(98,6%)	1	(0,4%)	**281**
Total	**4**	**(0,4%)**		**882**	**(98,8%)**	**7**	**(0,8%)**	**893**

Carpometacarpal prostheses - Prosthesis brand

Table 4: Primary operations - Proximal (Single-component)

Prostheses	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Swanson Silastic Trapezium	359	5	2	1	1						**368**
TOUCH									19	111	**130**
Moovis					4	7	8	27	28	36	**110**
Swanson Titanium Basal	72										**72**
Motec	55									1	**56**
Elektra	45	8	2								**55**
Motec II	33	14									**47**
ARPE			1	9	8	10	4	2			**34**
Avanta Trapezium	7										**7**
Pyrocardan						4		1			**5**
Custom made	5										**5**
IVORY				4							**4**
Total	**576**	**27**	**5**	**14**	**13**	**21**	**12**	**30**	**47**	**148**	**893**

Reasons for revisions

Table 5:

Year of revision	Loose proximal comp.	Loose distal comp.	Dislocation	Instability	Malalignment	Deep infection	Fracture (near implant)	Pain	Defect polyethylene	Other	Missing
2023					1				1		
2021	1			1							
2020									1		
2019			1	1					1		
2018	2					1					
2017			1								
2016	3							1			
2015	4		1	1		1		3			
2014	2		2							1	
2013	3		4					1			
2012	4		1					1			
2011	7		2				1	5			
2010	4		2	1		1		3			
2009	1		2					1		1	
2008			2					4			
1994-07	2		21	6				27	1	8	1
Total	**33**	**0**	**39**	**10**	**1**	**3**	**1**	**46**	**4**	**10**	**1**

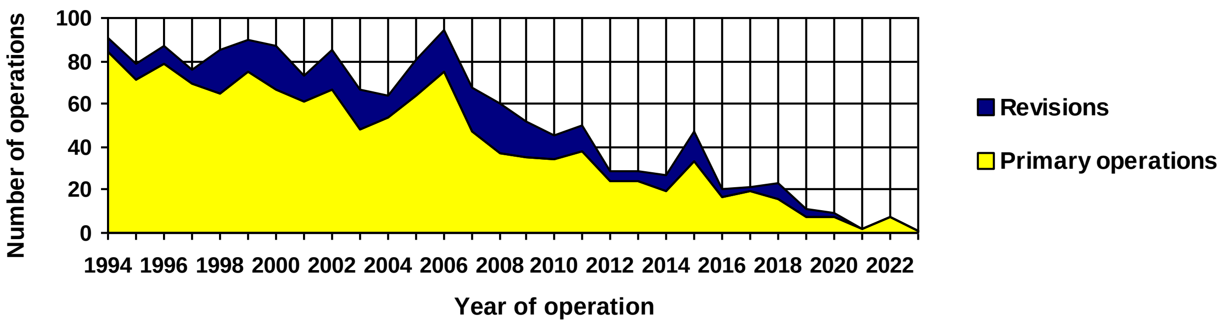
Revision reasons are not mutually exclusive. More than one reason for revision is possible. Only the first reoperation is counted.

TOE JOINT PROSTHESES

Table 1: Annual number of operations

Year	Primary operations		Revisions		Total
2023	1	(100,0%)			**1**
2022	7	(100,0%)			**7**
2021	2	(100,0%)			**2**
2020	7	(77,8%)	2	(22,2%)	**9**
2019	7	(63,6%)	4	(36,4%)	**11**
2018	16	(69,6%)	7	(30,4%)	**23**
2017	19	(90,5%)	2	(9,5%)	**21**
2016	17	(85,0%)	3	(15,0%)	**20**
2015	33	(70,2%)	14	(29,8%)	**47**
2014	19	(70,4%)	8	(29,6%)	**27**
2013	24	(82,8%)	5	(17,2%)	**29**
2012	24	(82,8%)	5	(17,2%)	**29**
2011	38	(76,0%)	12	(24,0%)	**50**
2010	34	(75,6%)	11	(24,4%)	**45**
2009	35	(67,3%)	17	(32,7%)	**52**
2008	37	(61,7%)	23	(38,3%)	**60**
1994-07	926	(82,2%)	201	(17,8%)	**1 127**
Total	**1 246**	**(79,9%)**	**314**	**(20,1%)**	**1 560**

Figure 1: Annual number of operations



52,5 % of all operations were performed on the right side. 82,9 % performed in women. Mean age: 60,2 years.

Table 2: Toe disease in primary operations

Year	Idiopathic osteoarthritis	Rheumatoid arthritis	Sequelae after fracture	Mb. Bechterew	Sequelae ligament tear	Acute fracture	Sequelae of infection	Other	Missing
2023	1		1						
2022	6	1							
2021	2								
2020	6							1	
2019	7								
2018	11	3	1					1	
2017	14	3						2	
2016	14	3						1	
2015	22	5	2					4	
2014	10	9							
2013	11	11	1					1	
2012	15	9							
2011	18	16						4	
2010	13	20	1	1	1	1	1	8	
2009	12	20		1				2	
2008	6	29						2	
1994-07	138	714	15	8	1		1	62	4
Total	**306**	**843**	**21**	**10**	**2**	**1**	**2**	**88**	**4**

Diseases are not mutually exclusive. More than one reason for operation is possible.

Use of cement in toe joint prostheses

Table 3: Primary operations - Proximal

Year	Cement with antibiotics		Cement without antibiotics	Uncemented		Missing		Total
2023				1	(100,0%)			**1**
2022				7	(100,0%)			**7**
2021				2	(100,0%)			**2**
2020				7	(100,0%)			**7**
2019				7	(100,0%)			**7**
2018				16	(100,0%)			**16**
2017				19	(100,0%)			**19**
2016				16	(100,0%)			**16**
2015				31	(96,9%)	1	(3,1%)	**32**
2014				19	(100,0%)			**19**
2013				24	(100,0%)			**24**
2012				24	(100,0%)			**24**
2011				35	(92,1%)	3	(7,9%)	**38**
2010				34	(100,0%)			**34**
2009				35	(100,0%)			**35**
2008				37	(100,0%)			**37**
2007				46	(100,0%)			**46**
2006				74	(98,7%)	1	(1,3%)	**75**
2005				64	(100,0%)			**64**
2004	1	(1,9%)		53	(98,1%)			**54**
2003	1	(2,1%)		47	(97,9%)			**48**
2002	1	(1,5%)		65	(97,0%)	1	(1,5%)	**67**
2001	1	(1,6%)		60	(98,4%)			**61**
2000	2	(3,0%)		65	(97,0%)			**67**
1999				75	(100,0%)			**75**
1998				65	(100,0%)			**65**
1997				69	(100,0%)			**69**
1996				79	(100,0%)			**79**
1995				71	(100,0%)			**71**
1994				82	(97,6%)	2	(2,4%)	**84**
Total	**6**	**(0,5%)**		**1 229**	**(98,9%)**	**8**	**(0,6%)**	**1 243**

Table 4: Primary operations - Distal

Year	Cement with antibiotics		Cement without antibiotics	Uncemented		Missing	Total
2015				1	(100,0%)		**1**
2013				1	(100,0%)		**1**
2012				1	(100,0%)		**1**
2011				2	(100,0%)		**2**
2010				5	(100,0%)		**5**
2009				7	(100,0%)		**7**
2008				4	(100,0%)		**4**
2007				5	(100,0%)		**5**
2006				13	(100,0%)		**13**
2005				6	(100,0%)		**6**
2004				7	(100,0%)		**7**
2002				4	(100,0%)		**4**
2001	1	(9,1%)		10	(90,9%)		**11**
2000	1	(6,7%)		14	(93,3%)		**15**
1999	1	(9,1%)		10	(90,9%)		**11**
1998				2	(100,0%)		**2**
Total	**3**	**(3,2%)**		**92**	**(96,8%)**		**95**

Toe joint prostheses

Table 5: Primary operations - Proximal

Prostheses	2002-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Silastic HP 100	915	10	4	6	4				7	1	**947**
LPT	82	20	12		6	6	2				**128**
Toefit-plus	51	1									**52**
Sutter	26										**26**
Biomet Total Toe	25										**25**
Moje	18										**18**
LaPorta	14										**14**
Epyc		1		10							**11**
HAPY				3	6						**9**
CARTIVA						1	5	2			**8**
Swanson Titanium	5										**5**
Total	**1 136**	**32**	**16**	**19**	**16**	**7**	**7**	**7**	**7**	**1**	**1 243**

Table 6: Primary operations - Distal

Prostheses	2002-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Toefit-plus	51	1									**52**
Biomet Total Toe	25										**25**
Moje	18										**18**
Total	**94**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**95**

Reasons for revisions

Table 7:

Year of revision	Loose proximal comp.	Loose distal comp.	Dislocation	Instability	Malalignment	Deep infection	Fracture (near implant)	Pain	Defect polyethylene	Progression of osteoarthritis	Other	Missing
2020						1		1			1	
2019		1						3		2	1	
2018					3	1	1	3	3		3	
2017	1							1			1	
2016								1		1		
2015				1	3			2	5		1	
2014		1		1	2			1	2	1		
2013					1			3	2			
2012								2			3	
2011					1			2	1		2	
2010		2			1	2		3	2		3	
2009					2	2		6	2		3	
2008				2	9			13	1		6	
1994-07	4	17	5	11	47	21	3	83	4	1	61	8
Total	**5**	**21**	**5**	**15**	**69**	**27**	**4**	**124**	**22**	**5**	**85**	**8**

Revision reasons are not mutually exclusive. More than one reason for revision is possible. Only the first reoperation is counted.

An error was discovered in the completeness analyses for elbow prostheses, and updated analyses have not yet been conducted.

Therefore, this section has been removed from the report.

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Therefore, this section has been removed from the report.

Completeness of reporting analysis for the Ankle Arthroplasty Register, 2021-2023

A completeness of reporting analysis for the Ankle Arthroplasty Register has been conducted by combining the data in the Register with data from the Norwegian Patient Register (NPR). The report and analysis were prepared by the NPR in collaboration with the Ankle Arthroplasty Register (NAR). There are separate statistics on primary operations and revisions.

NCSP codes for combining data from NPR hospital stays and the Ankle Arthroplasty Register

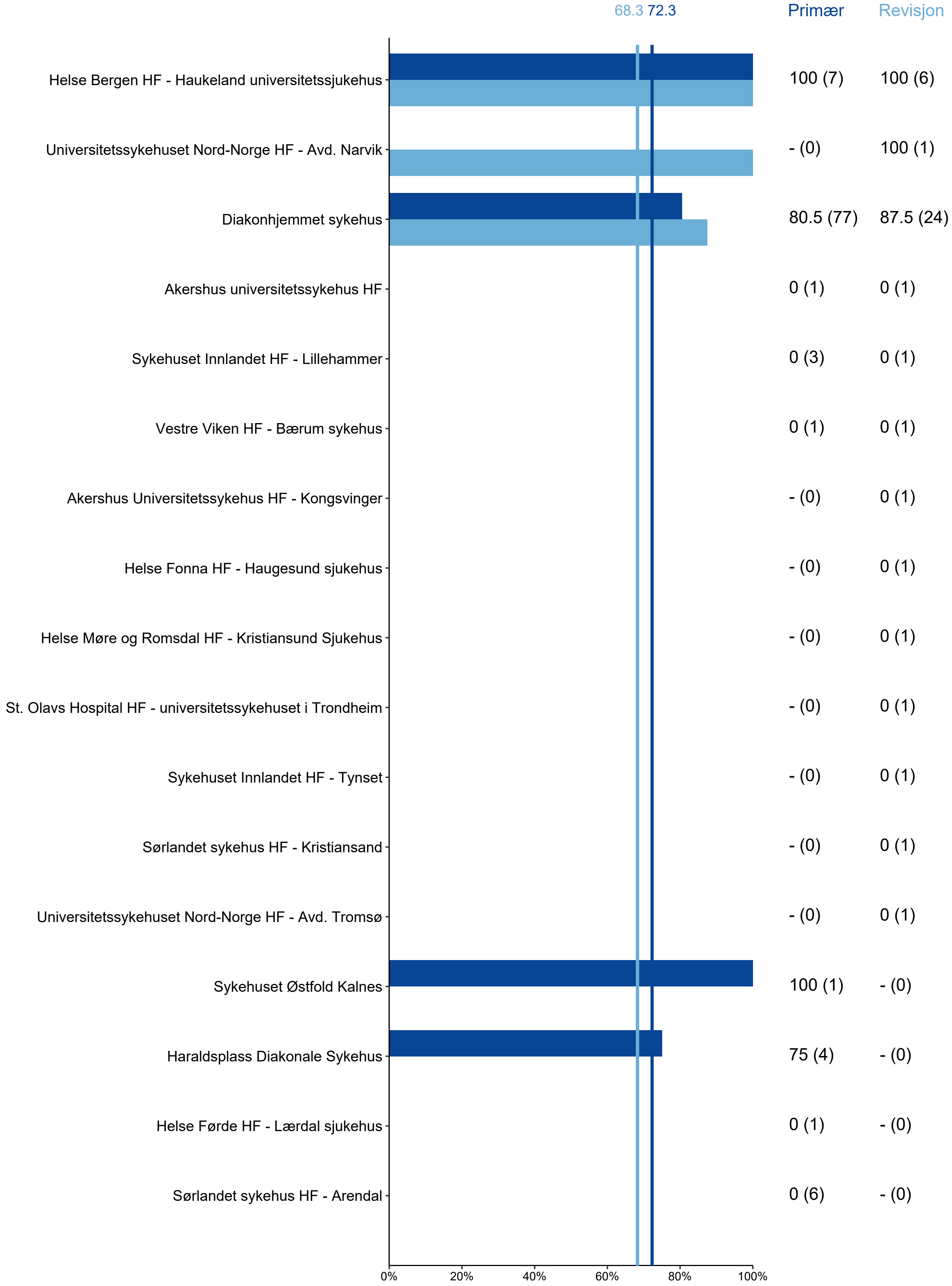
Type	Code	Description
Primary operation	NHB 0y	Primary partial prosthetic replacement of ankle joint not using cement
	NHB 1y	Primary partial prosthetic replacement of ankle joint using cement
	NHB 20	Primary total prosthetic replacement of ankle joint not using cement
	NHB 30	Primary total prosthetic replacement of ankle joint using hybrid technique
	NHB 40	Primary total prosthetic replacement of ankle joint using cemen
	NHB 99	Other primary prosthetic replacement in ankle joint or foot
Revision (level 1)	NHC 0y	Secondary implantation of partial prosthesis in ankle joint not using cement Excludes: Of component of total prosthesis
	NHC 1y	Secondary implantation of partial prosthesis in ankle joint using cement Excludes: Of component of total prosthesis
	NHC 2y	Secondary implantation of total prosthesis in ankle joint not using cement Includes: Of component of total prosthesis
	NHC 3y	Secondary implantation of total prosthesis in ankle joint using hybrid technique Includes: Of component of total prosthesis
	NHC 4y	Secondary implantation of total prosthesis in ankle joint using cement
	NHU 0y	Removal of partial prosthesis from ankle joint
	NHU 1y	Removal of total prosthesis from ankle joint

Primary operations. From 2021-2023, 101 primary total ankle arthroplasties were reported to one or both of the registers. 72.3% were reported to the NAR while 94.1% were reported to the NPR. Completeness of reporting varies much between the different hospitals. For hospitals with a low completeness of reporting rate for the NAR, either the form was not sent, or other interventions than ankle arthroplasties were incorrectly coded with NHB 0*/NHB 1*/NHB 20/NHB 30/NHB 40.
Procedure codes to be used for primary operations:
NHB 0* - NHB 1* - NHB 20 - NHB 30 - NHB 40

Revision operations. From 2021-2023, 41 revisions were reported to one or both of the registers. 68.3% of these were reported to the NAR, while 92.7% were reported to the NPR (revision level 1). Completeness of reporting varies much between the different hospitals. A low completeness of reporting rate may mean that the form was not sent in. It appears that a number of revision forms are missing in cases where the prosthesis was removed without a new one being inserted in the same operation; in such cases, a form should be submitted both when the prosthesis is removed and when any new insertion is performed or an arthrodesis is performed.

Procedure codes to be used for revision operations, level 1:
NHC 0* - NHC 1* - NHC 2* - NHC 3* - NHC 4* - NHC 99 - NHU 0* - NHU 1*

Completeness of reporting for primary operations and revisions, Ankle prosthesis, 2021-2023



Dark blue bars and first number to the right of the bars gives completeness of reporting for primary operations. Light blue bars and second number to the right of the bars gives completeness of reporting for revision operations (level 1). The numbers in brackets gives the number of operations registered at both NAR and NPR. Vertical lines shows the national averages.

Completeness of reporting analysis for the Finger Arthroplasty Register, 2021-2023

A completeness of reporting analysis for the Finger Arthroplasty Register has been conducted by combining the data in the Register with data from the Norwegian Patient Register (NPR). The report and analysis were prepared by the NPR in collaboration with the Finger Arthroplasty Register (NAR). There are separate statistics on primary operations and revisions.

NCSP codes for combining data from NPR hospital stays and the Finger Arthroplasty Register

Type	Code	Description
Primary operation	NDB 8y	Primary prosthetic replacement of joint of finger or metacarpal
	NDB 99	Other primary prosthetic replacement in other joint of hand
Revision (level 1)	NDC 8y	Secondary prosthetic replacement in joint of finger or metacarpal
	NDU 2y	Removal of prosthesis from other joint of hand

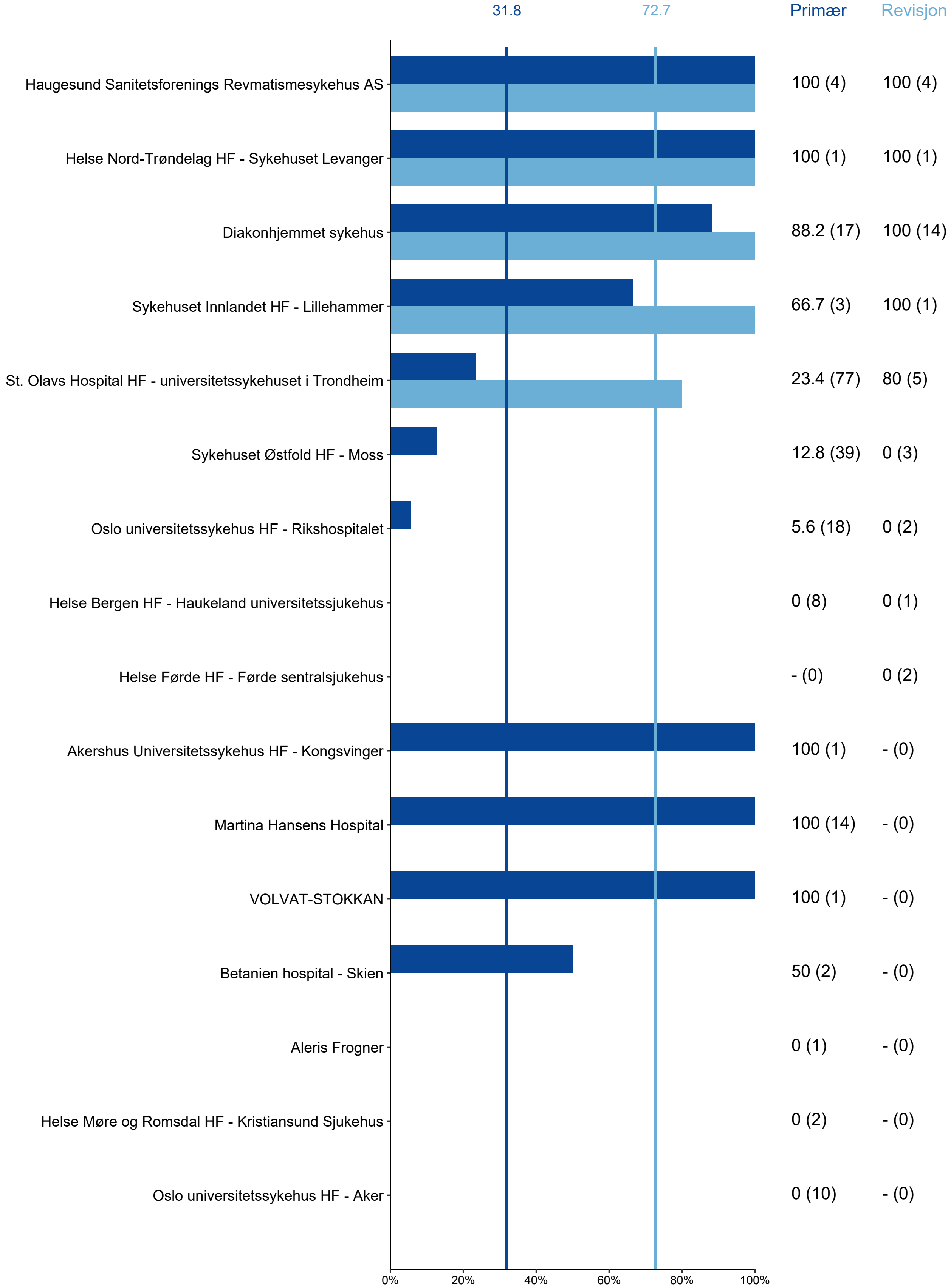
Primary operations. From 2021-2023, 198 primary total finger arthroplasties were reported to one or both of the registers. 31.8% were reported to the NAR while 99% were reported to the NPR. Completeness of reporting varies much between the different hospitals. For hospitals with a low completeness of reporting rate for the NAR, either the form was not sent, or other interventions than finger arthroplasties were incorrectly coded with NDB 8y.

Procedure codes to be used for primary operations:
NDB 8y

Revision operations. From 2021-2023, 33 revisions were reported to one or both of the registers. 72.7% of these were reported to the NAR, while 87.9% were reported to the NPR (revision level 1). Completeness of reporting varies much between the different hospitals. A low completeness of reporting rate may mean that the form was not sent in. It appears that a number of revision forms are missing in cases where the prosthesis was removed without a new one being inserted in the same operation; in such cases, a form should be submitted both when the prosthesis is removed and when any new insertion is performed or an arthrodesis is performed.

Procedure codes to be used for revision operations, level 1:
NDC 8y – NDU 2y

Completeness of reporting for primary operations and revisions, Finger prosthesis, 2021-2023



Dark blue bars and first number to the right of the bars gives completeness of reporting for primary operations. Light blue bars and second number to the right of the bars gives completeness of reporting for revision operations (level 1). The numbers in brackets gives the number of operations registered at both NAR and NPR. Vertical lines shows the national averages.

Completeness of reporting analysis for the Wrist/Carpus/Distal radioulnar joint Arthroplasty Register, 2021-2023

A completeness of reporting analysis for the Wrist/Carpus/Distal radioulnar joint Arthroplasty Register has been conducted by combining the data in the Register with data from the Norwegian Patient Register (NPR). The report and analysis were prepared by the NPR in collaboration with the Wrist/Carpus/Distal radioulnar joint Arthroplasty Register (NAR). There are separate statistics on primary operations and revisions.

NCSP codes for combining data from NPR hospital stays and the Wrist/Carpus/Distal radioulnar Joint Arthroplasty Register

Type	Code	Description
Primary operation	NDB 0y	Primary partial prosthetic replacement of joint of wrist not using cement
	NDB 1y	Primary partial prosthetic replacement of joint of wrist using cement
	NDB 2y	Primary total prosthetic replacement of joint of wrist not using cement
	NDB 3y	Primary total prosthetic replacement of joint of wrist using hybrid technique
	NDB 4y	Primary total prosthetic replacement of joint of wrist using cement
	NDB 5y	Primary interposition prosthesis in joint of wrist
	NDB 99	Other primary prosthetic replacement in other joint of hand
Revision (level 1)	NDC 0y	Secondary implantation of partial prosthesis in joint of wrist not using cement Excludes: Of component of total prosthesis
	NDC 1y	Secondary implantation of partial prosthesis in joint of wrist using cement Excludes: Of component of total prosthesis
	NDC 2y	Secondary implantation of total prosthesis in joint of wrist not using cement Includes: Of component of total prosthesis
	NDC 3y	Secondary implantation of total prosthesis in joint of wrist using hybrid technique Includes: Of component of total prosthesis
	NDC 4y	Secondary implantation of total prosthesis in joint of wrist using cement
	NDC 5y	Secondary implantation of interposition prosthesis in joint of wrist
	NDU 0y	Removal of partial prosthesis from joint of wrist
	NDU 1y	Removal of total prosthesis from joint of wrist
	NDU 2y	Removal of prosthesis from other joint of hand
	NDC 99	Other secondary prosthetic replacement in other joint of hand

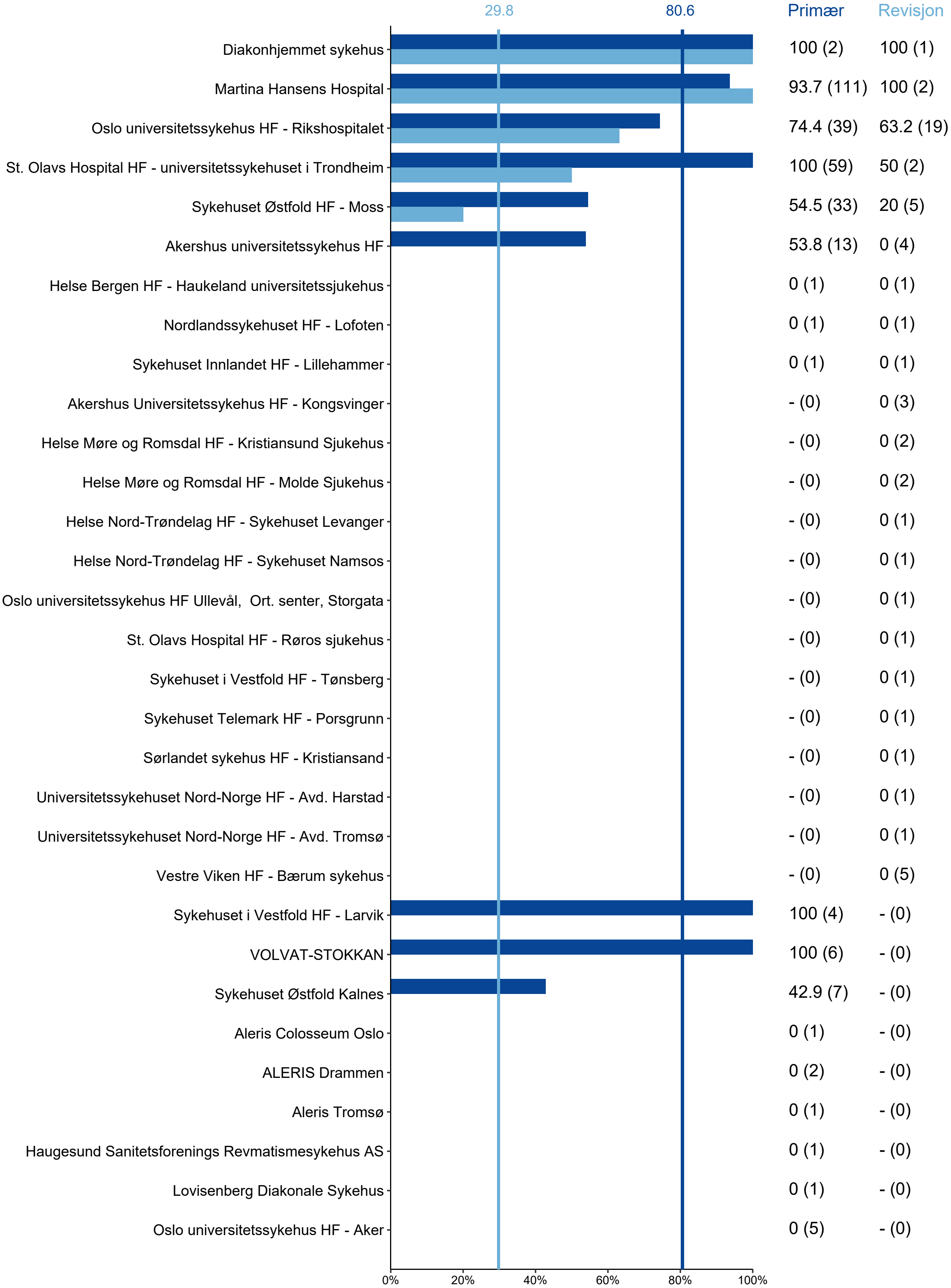
Primary operations. From 2021-2023, 288 primary total wrist/carpus/distal radioulnar joint arthroplasties were reported to one or both of the registers. 80.6% were reported to the NAR while 68.8% were reported to the NPR. Completeness of reporting varies much between the different hospitals.

Procedure codes to be used for primary operations:
NDB 0* - NDB 1* - NDB 2* - NDB 3* - NDB 4*

Revision operations. From 2021-2023, 57 revisions were reported to one or both of the registers. 29.8% of these were reported to the NAR, while 87.7% were reported to the NPR (revision level 1). Completeness of reporting varies much between the different hospitals. A low completeness of reporting rate may mean that the form was not sent in. It appears that a number of revision forms are missing in cases where the prosthesis was removed without a new one being inserted in the same operation; in such cases, a form should be submitted both when the prosthesis is removed and when any new insertion is performed or an arthrodesis was performed.

Procedure codes to be used for revision operations, level 1:
NDC 0* – NDC 1* - NDC 2* - NDC 3* - NDC 4* - NDC 5*

Completeness of reporting for primary operations and revisions, Wrist/Carpus/Distal radioulnar joint prosthesis, 2021-2023



Dark blue bars and first number to the right of the bars gives completeness of reporting for primary operations. Light blue bars and second number to the right of the bars gives completeness of reporting for revision operations (level 1). The numbers in brackets gives the number of operations registered at both NAR and NPR. Vertical lines shows the national averages.

Completeness of reporting analysis for the Toe Arthroplasty Register, 2021-2023

A completeness of reporting analysis for the Toe Arthroplasty Register has been conducted by combining the data in the Register with data from the Norwegian Patient Register (NPR). The report and analysis were prepared by the NPR in collaboration with the Toe Arthroplasty Register (NAR). There are separate statistics on primary operations and revisions.

NCSP codes for combining data from NPR hospital stays and the Toe Arthroplasty Register

Type	Code	Description
Primary operation	NHB 6y	Primary prosthetic replacement of first metatarsophalangeal joint
	NHB 7y	Primary prosthetic replacement of other metatarsophalangeal joint
	NHB 8y	Primary prosthetic replacement of other joint of foot
	NHB 99	Other primary prosthetic replacement in joint of ankle or foot
Revision (level 1)	NHC 6y	Secondary prosthetic replacement of first metatarsophalangeal joint
	NHC 7y	Secondary prosthetic replacement of other metatarsophalangeal joint
	NHC 8y	Secondary prosthetic replacement in other joint of foot
	NHC 99	Other secondary prosthetic replacement in joint of ankle or foot
	NHU 2y	Removal of prosthesis from other joint of foot

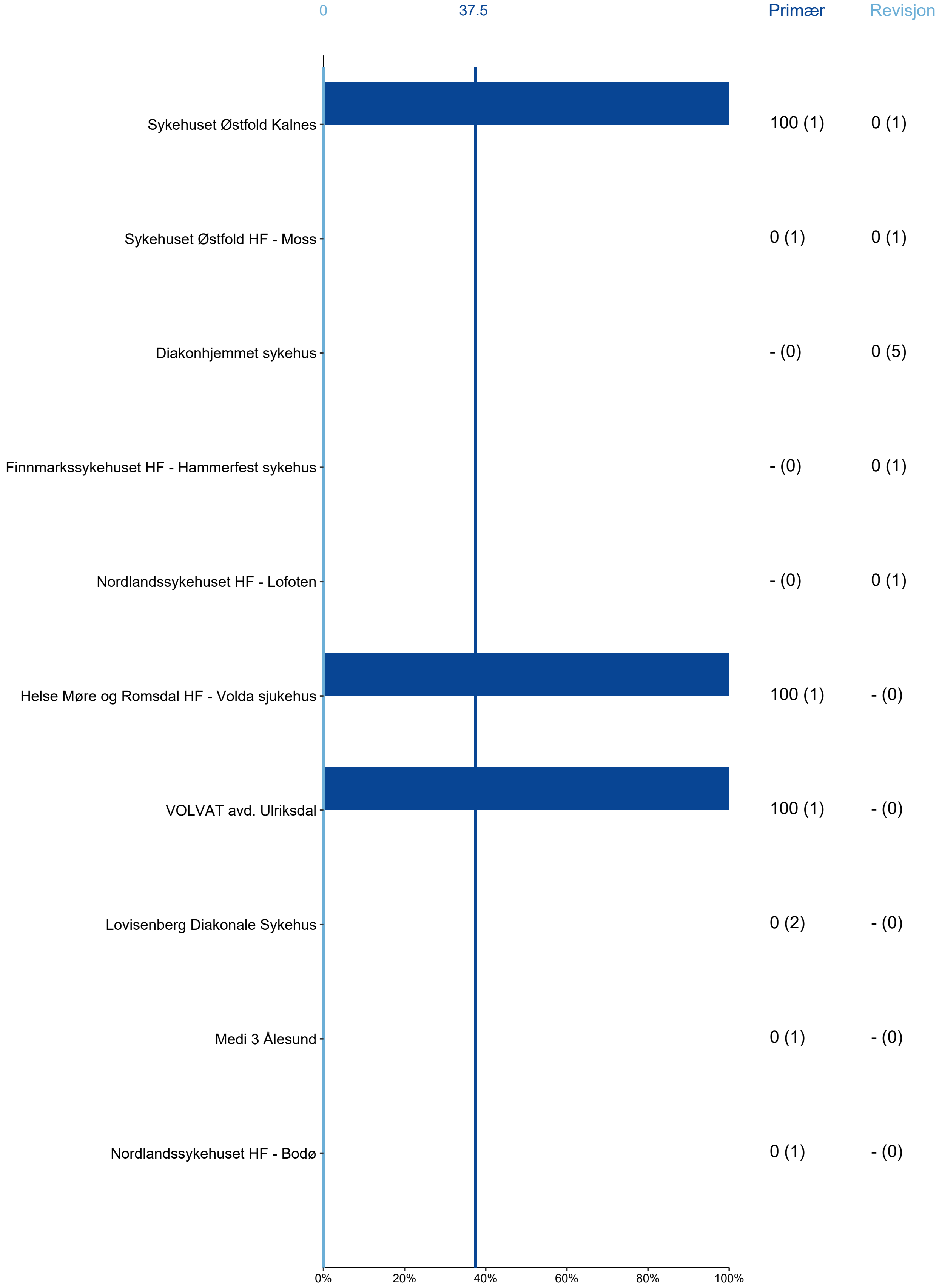
Primary operations. From 2021-2023, 8 primary total toe arthroplasties were reported to one or both of the registers. 37.5% were reported to the NAR while 75% were reported to the NPR. Completeness of reporting varies much between the different hospitals. For hospitals with a low completeness of reporting rate for the NAR, either the form was not sent, or other interventions than toe arthroplasties were incorrectly coded with NHB 6y/NHB 7y/NHB 8y.

Procedure codes to be used for primary operations:
NHB 6y - NHB 7y - NHB 8y

Revision operations. From 2021-2023, 9 revisions were reported to one or both of the registers. 0% of these were reported to the NAR, while 100% were reported to the NPR (revision level 1). Completeness of reporting varies much between the different hospitals. A low completeness of reporting rate may mean that the form was not sent in. It appears that a number of revision forms are missing in cases where the prosthesis was removed without a new one being inserted in the same operation; in such cases, a form should be submitted both when the prosthesis is removed and when any new insertion is performed or an arthrodesis was performed.

Procedure codes to be used for revision operations, level 1:
NHC 6y - NHC 7y - NHC 8y - NHU 2y

Completeness of reporting for primary operations and revisions, Toe prosthesis, 2021-2023



Dark blue bars and first number to the right of the bars gives completeness of reporting for primary operations. Light blue bars and second number to the right of the bars gives completeness of reporting for revision operations (level 1). The numbers in brackets gives the number of operations registered at both NAR and NPR. Vertical lines shows the national averages.

CONTENTS

Shoulder prostheses

Report 2024
Nasjonalt Register for Leddproteser

Highlights from 2023

Shoulder prostheses

	Reported 1987-2023	Reported in 2023
Primary operations	13,584	1,217
Revisions	1,253	89

37 hospitals reported to the register

98% Of the hospitals

Completeness

97.0% Primaries

93.0% Revisions

2 Published papers

0 Phds

1 Podium Presentations

Research

Focus on results for reverse prostheses with a stem, which increased most in use (75% of primary operations in 2023).

Find us:
https://helse-bergen.no/nrl
https://www.facebook.com/leddregisteret
Nasjonalt servicemiljø for medisinske kvalitetsregistre

Initiated activities

Important findings and projects

- 90.4% survival at 10 years (all prostheses)
- The most common reason for revision is infection and dislocation
- 24% are operated due to acute fracture
- 98% receives antibiotics prophylaxis by the guidelines

ePROM
Electronic patient reported data

584 pre-op ePROM

19 participating hospitals

797 post-op ePROM

35.7% fill out pre-op PROM

HELSE VEST HELSE NORD HELSE SØR-ØST HELSE MIDT-NORGE

ANNUAL REPORT SHOULDER ARTHROPLASTY REGISTER

During the period 1994-2023, a total of 14,849 shoulder arthroplasties have been registered.

The increase in the number of shoulder arthroplasties continues, and in 2023, 1,217 primary arthroplasties were implanted, in addition to 89 revisions (6.8%).

The coverage rate for primary operations in 2019-2020 is 90.8%, and for revisions, it is 84.6%. New coverage rates for the period 2021-2023 will be calculated before next year's report.

The electronic registration in the Norwegian Arthroplasty Register (NAR) is well established, and throughout 2023, the proportion of prostheses reported electronically increased. In December, we reached 98%, which is the best among all the registers!

Collection of PROM is also established, and as of December 31, 2023, over 1,000 one-year forms have been received. Preoperative registration is well underway at many hospitals, with just over 600 forms filled out preoperatively. We hope hospitals will establish good routines for collecting preoperative PROM. We are working on achieving retrospective registration of PROM data for shoulder fractures, similar to hip fractures. One-year PROM is sent directly to the patient as long as the operation form is registered in MRS.

The increase in the proportion of reverse arthroplasties continues, with 75% of all primary shoulder arthroplasties in Norway now being a reverse total, while 96% of patients with acute fractures receive a reverse arthroplasty. The use of hemiarthroplasty in the shoulder is very limited, in line with recent literature and international trends. The use of stemless anatomical arthroplasties is increasing, also in line with literature where the results of stemless arthroplasties appear to be comparable with stemmed. Survival curves for reverse and anatomical total arthroplasties show significant improvement in recent time periods, and 10-year survival is now over 90% for both anatomical and reverse total arthroplasties.

We see an increasing tendency to use reverse prostheses also for primary osteoarthritis in the shoulder. This is supported, among other, by a new study from the English register (Valsamis 2024), where revision risk, reoperations, complications, and costs were compared. However, orthopedic surgeons should be aware that there is an increased risk of revision of reverse arthroplasties in men and in the youngest age group (<60 years). The Swedish register also demonstrates that the best functional outcome in osteoarthritis patients is achieved with anatomical total prostheses.

In 2023, we published the results of the most used reverse shoulder arthroplasties in Norway (Hole 2023), showing that the risk of revision with the Delta Xtend prosthesis is lower than with the previously used Delta III prosthesis. Instability and dislocation are the most common reasons for revisions.

We thank you for excellent reporting. We welcome suggestions for research projects and are always interested in research collaboration.

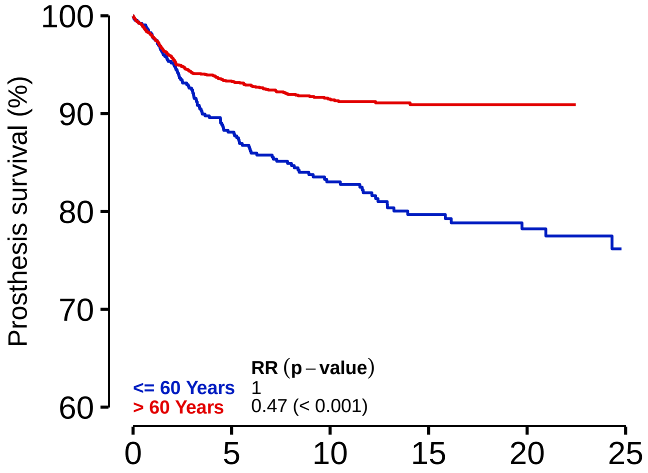
Bergen, June 2024

Randi M. Hole | Anne Marie Fenstad | Sigurd Stenvik | Kalyana Srujana Mulpuri | Irina Kvinnesland

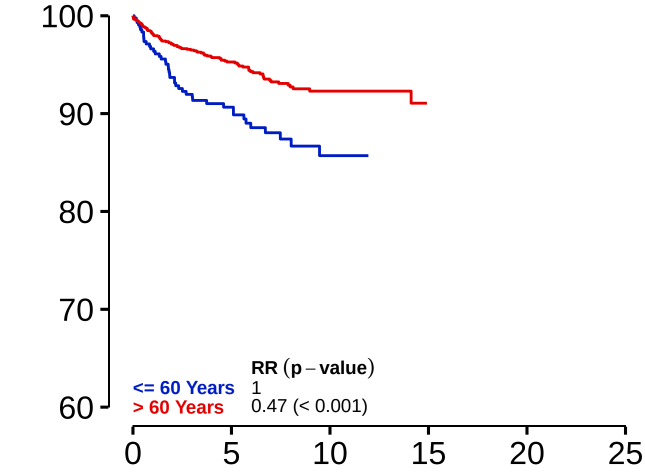
Randi Hole Senior Consultant Ortho Surgeon Shoulder arthroplasty	Anne Marie Fenstad Biostatistician	Sigurd Stenvik Biostatistician	Kalyana Srujana Mulpuri IT consultant	Irina Kvinnesland IT consultant

Survival curves of shoulders prosthesis 1994−2023

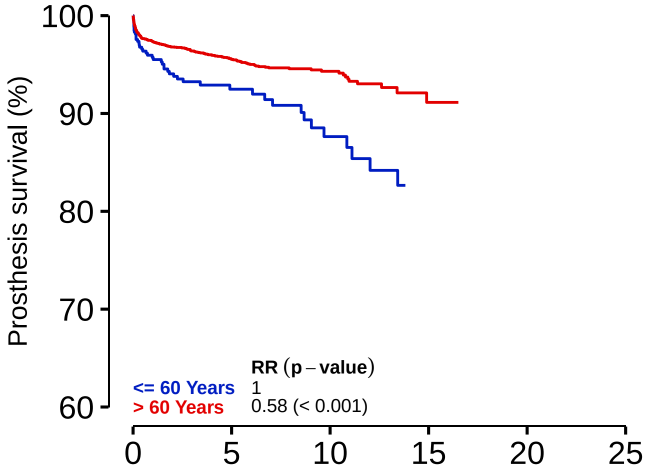
C.8) Hemi prosthesis, stemmed



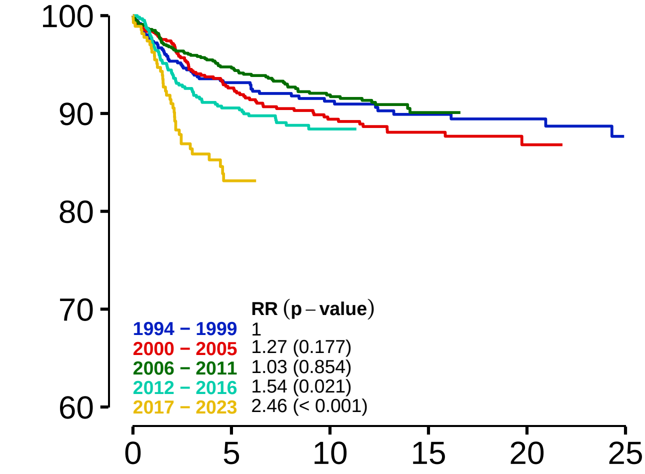
C.9) Anatomical total prosthesis, stemmed



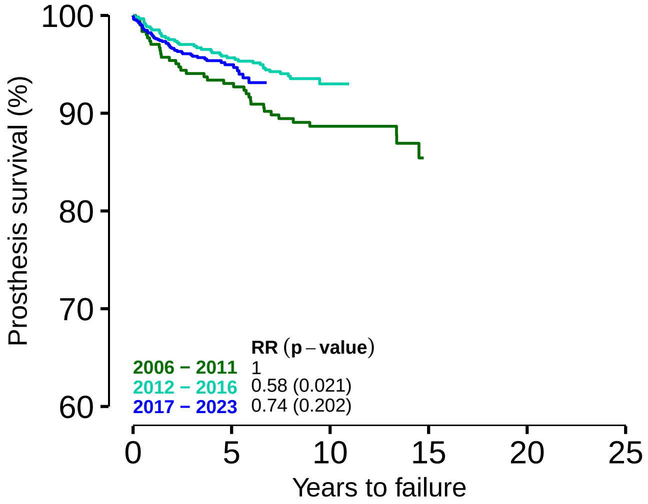
C.10) Reversed total prosthesis, stemmed



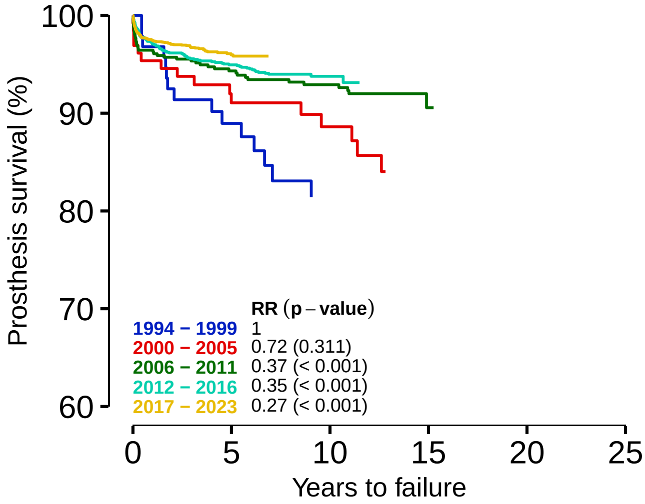
C.11) Hemi prosthesis, stemmed



C.12) Anatomical total prosthesis, stemmed

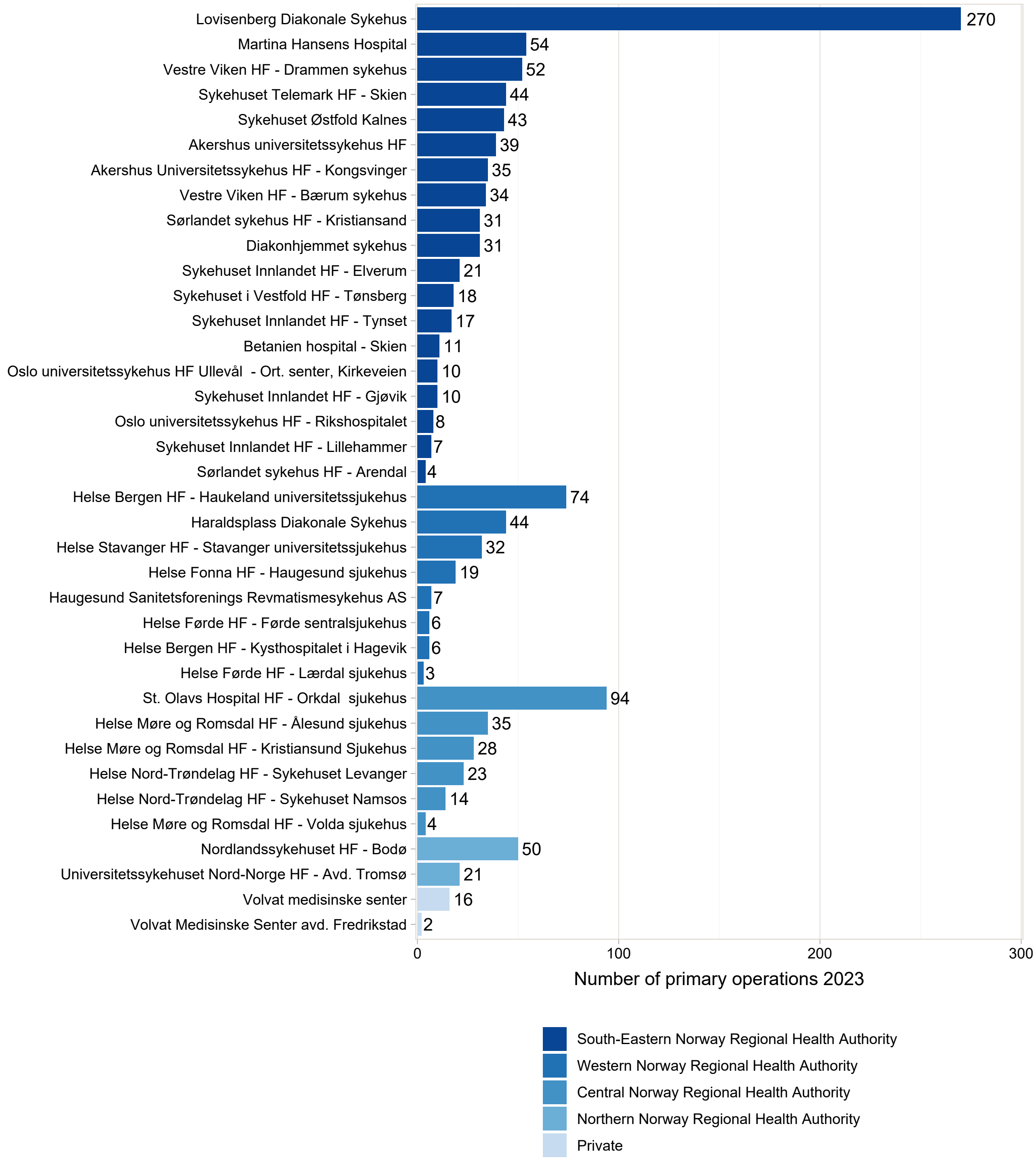


C.13) Reversed total prosthesis, stemmed

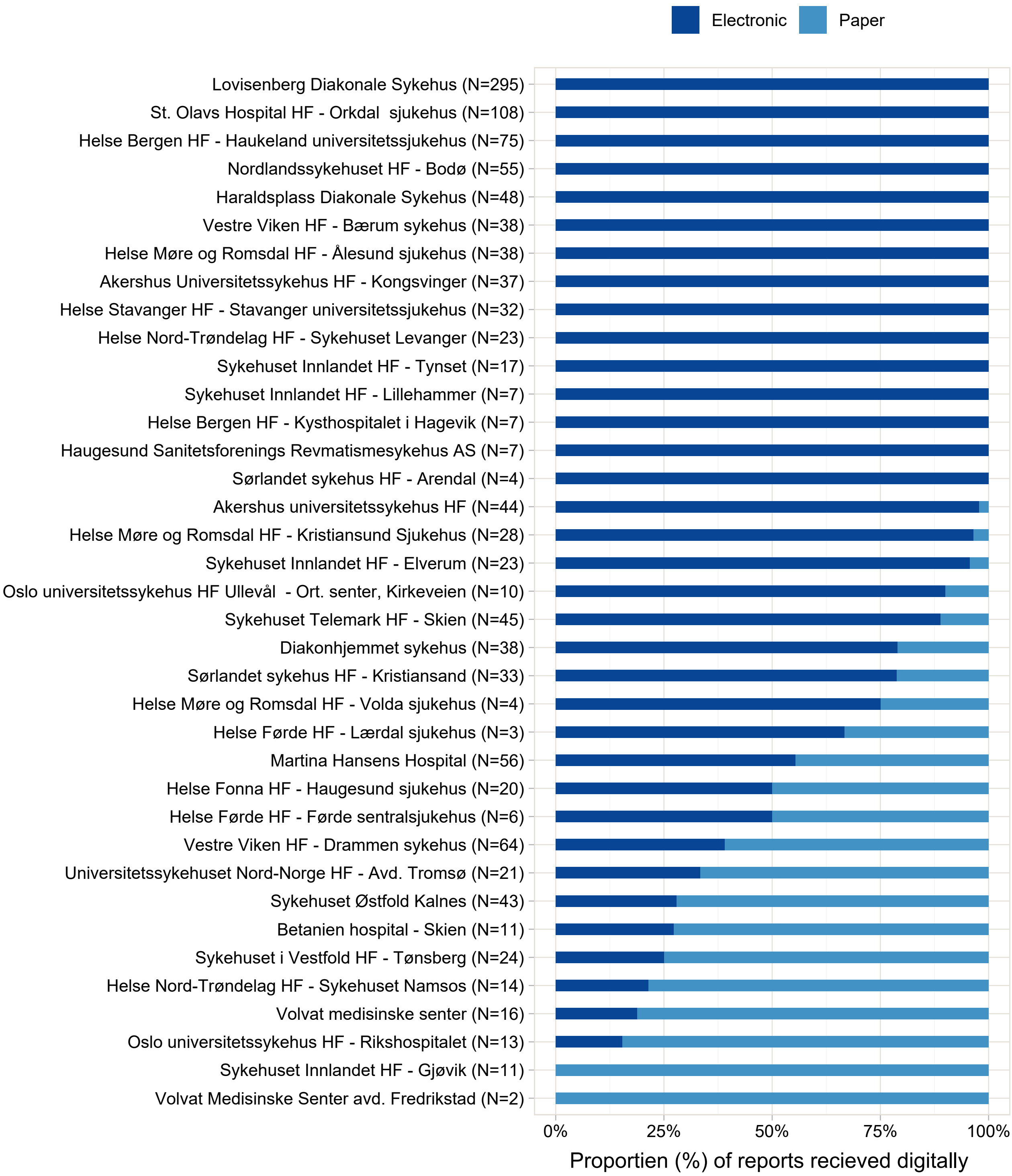


Kaplan−Meier survival curves. Survival estimate is given as long as > 50 prostheses are at risk.
Risk Ratio (RR) is adjusted for age and gender.

FIGUR C.14: Number of primary operations in shoulder, 2023



FIGUR C.15: Form registration by format in 2023, all shoulder operations



National average for electronic form registration in 2023 is 83.2%. 1098 was registred electonically and in total was 1098 registered in 2023.

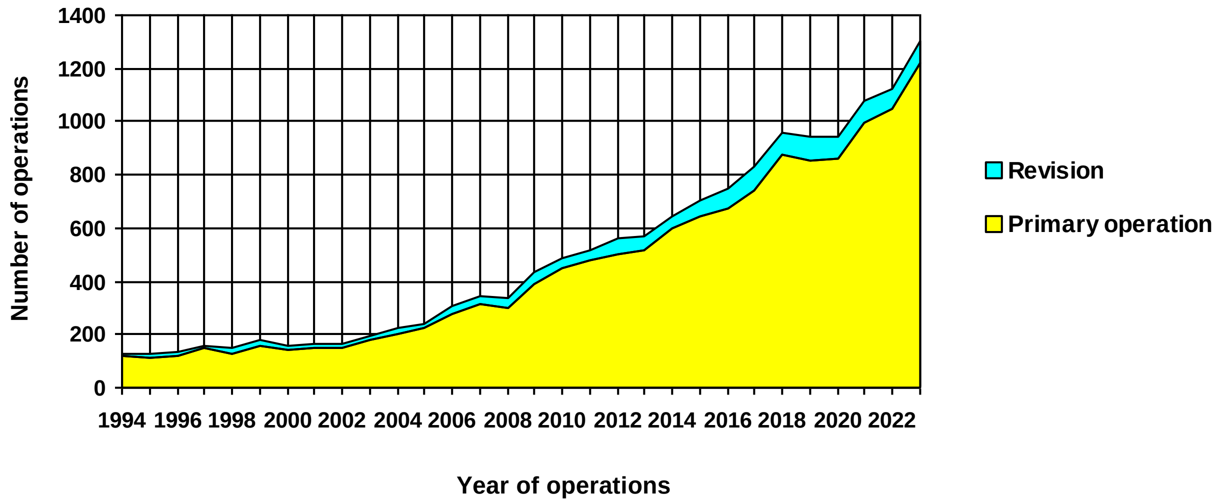
SHOULDER PROSTHESES

Table 1: Annual number of shoulder prosthesis operations

Year	Primary operations		Reoperations *		Revisions		Total
2023	1 217	(93,1%)	1	(0,1%)	89	(6,8%)	**1 307**
2022	1 050	(93,3%)	2	(0,2%)	74	(6,6%)	**1 126**
2021	999	(92,4%)			82	(7,6%)	**1 081**
2020	861	(90,5%)	4	(0,4%)	86	(9,0%)	**951**
2019	854	(90,5%)	1	(0,1%)	89	(9,4%)	**944**
2018	878	(91,8%)			78	(8,2%)	**956**
2017	743	(89,6%)	1	(0,1%)	85	(10,3%)	**829**
2016	673	(90,3%)			72	(9,7%)	**745**
2015	644	(91,7%)			58	(8,3%)	**702**
1994-14	5 665	(91,3%)	3	(0,0%)	540	(8,7%)	**6 208**
Total	**13 584**	**(91,5%)**	**12**	**(0,1%)**	**1 253**	**(8,4%)**	**14 849**

* Reoperation where prosthetic parts were not changed or removed (soft tissue debridements for infected prosthesis, prosthetic parts were not changed)

Figure 1: Annual number of operations - All prostheses



53,7 % of all operations were performed on the right sid 68,2 % performed in women Mean age: 70,3 years.

Figure 2a: Prostheses - all operations

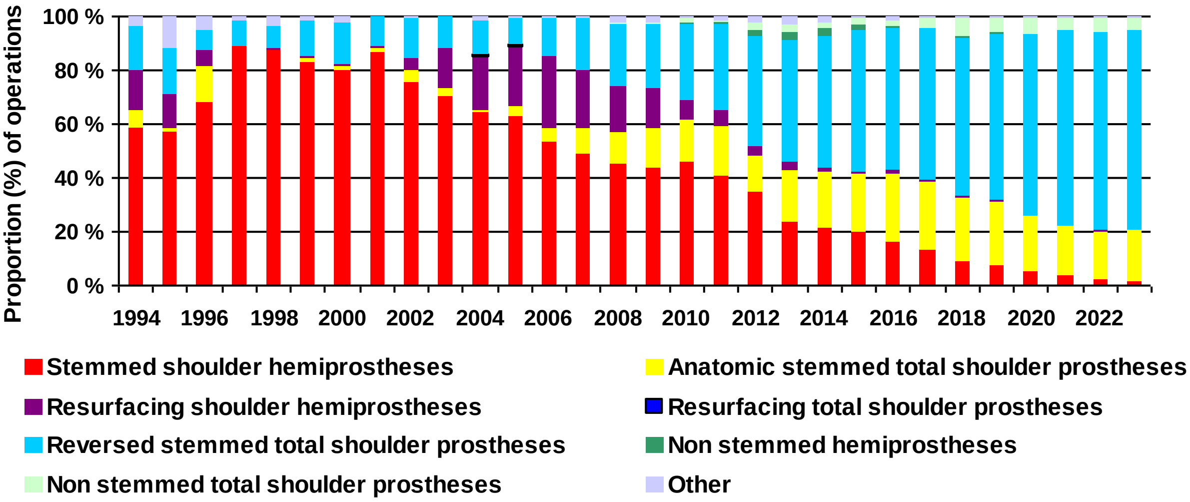


Figure 2b: Prostheses - Idiopathic osteoarthritis

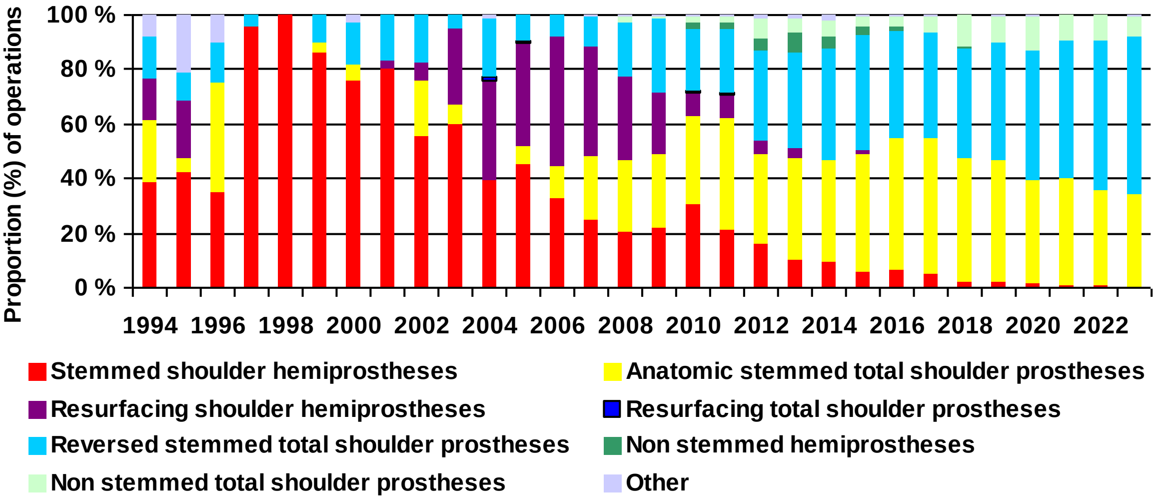


Figure 2c: Prostheses - Acute fracture

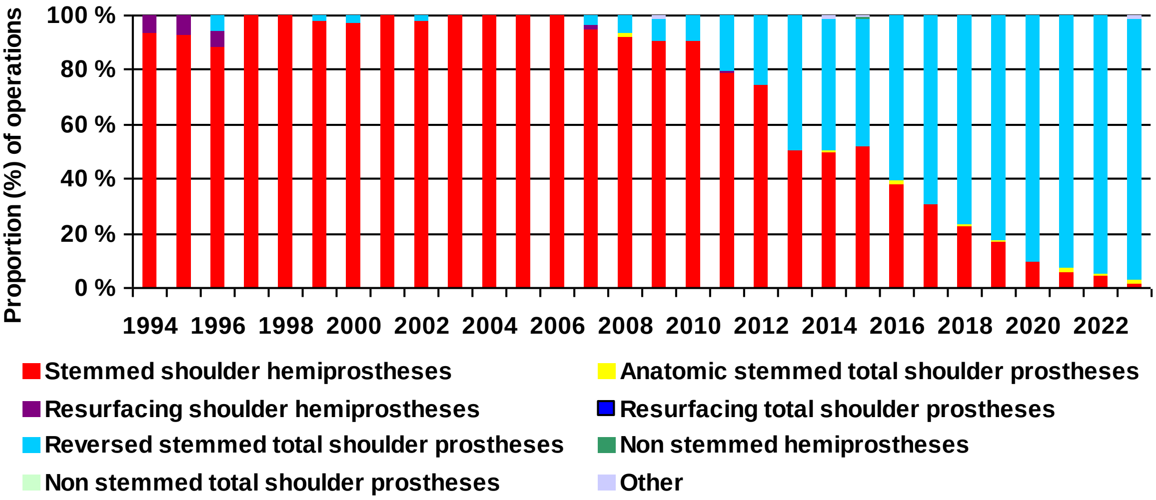


Figure 3: Age at the insertion of primary anatomic total prostheses

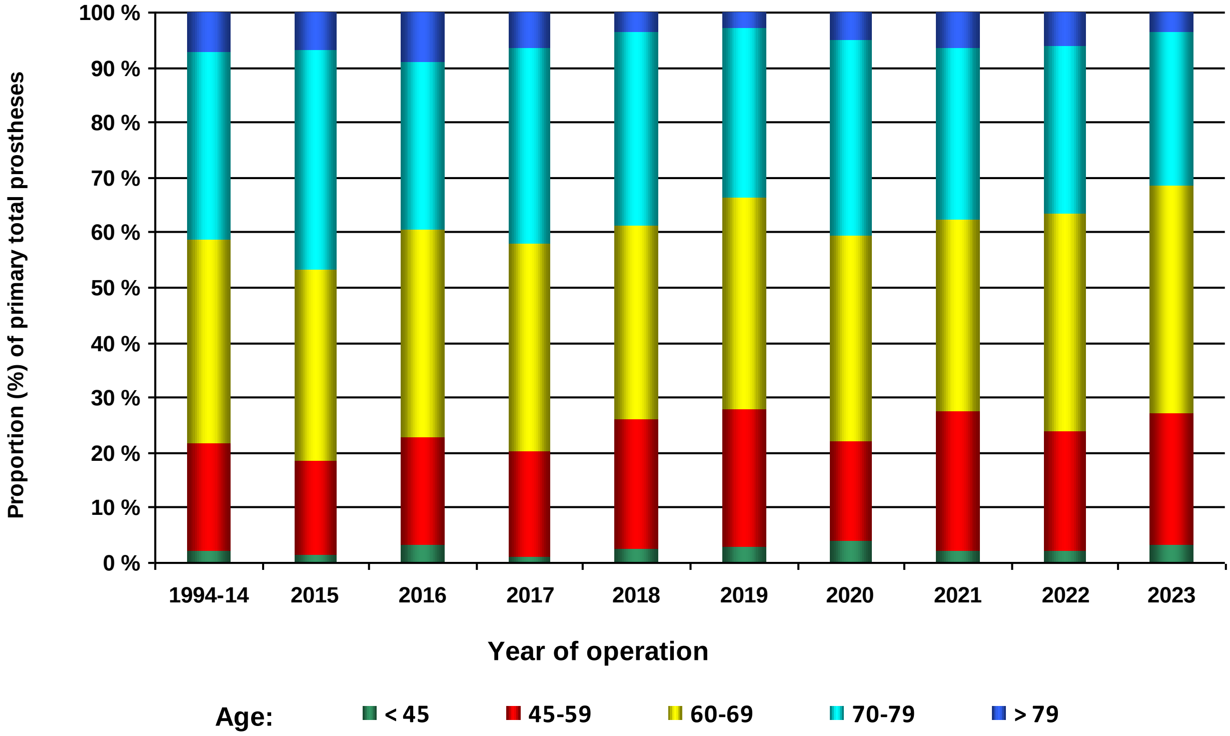


Figure 4: Age at the insertion of primary reversed total prostheses

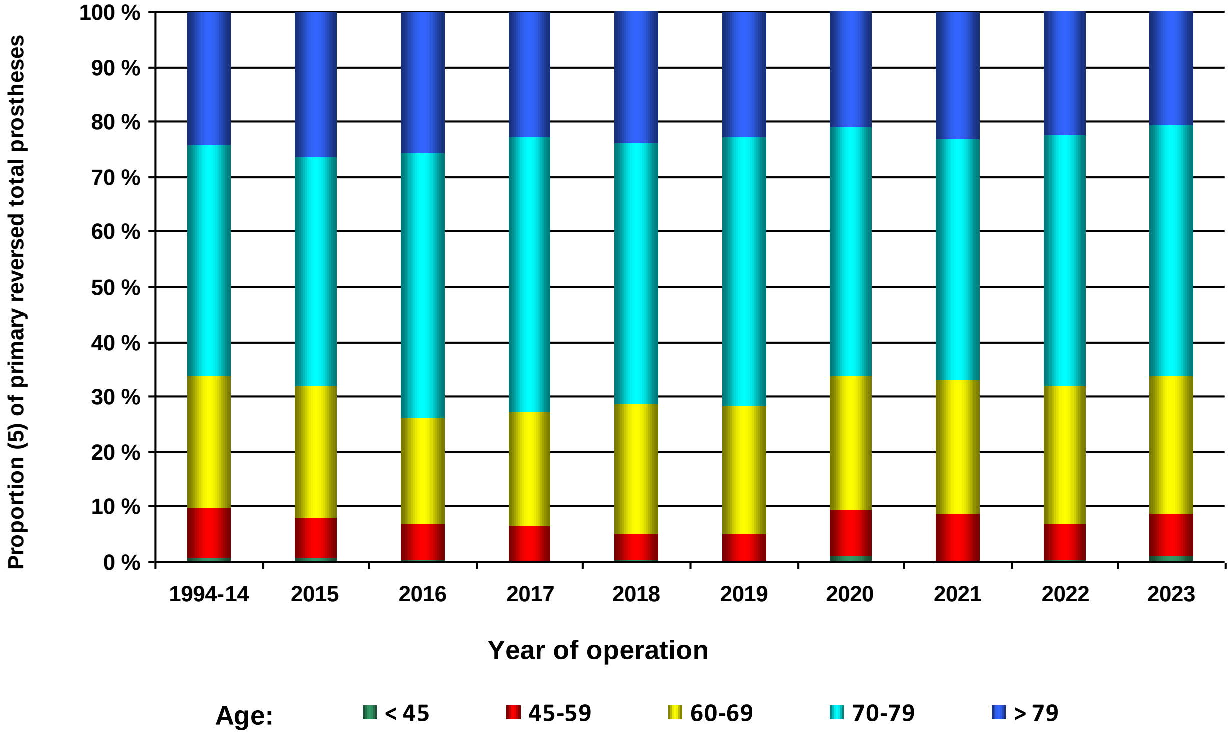


Figure 5: Age at the insertion of primary hemiprostheses

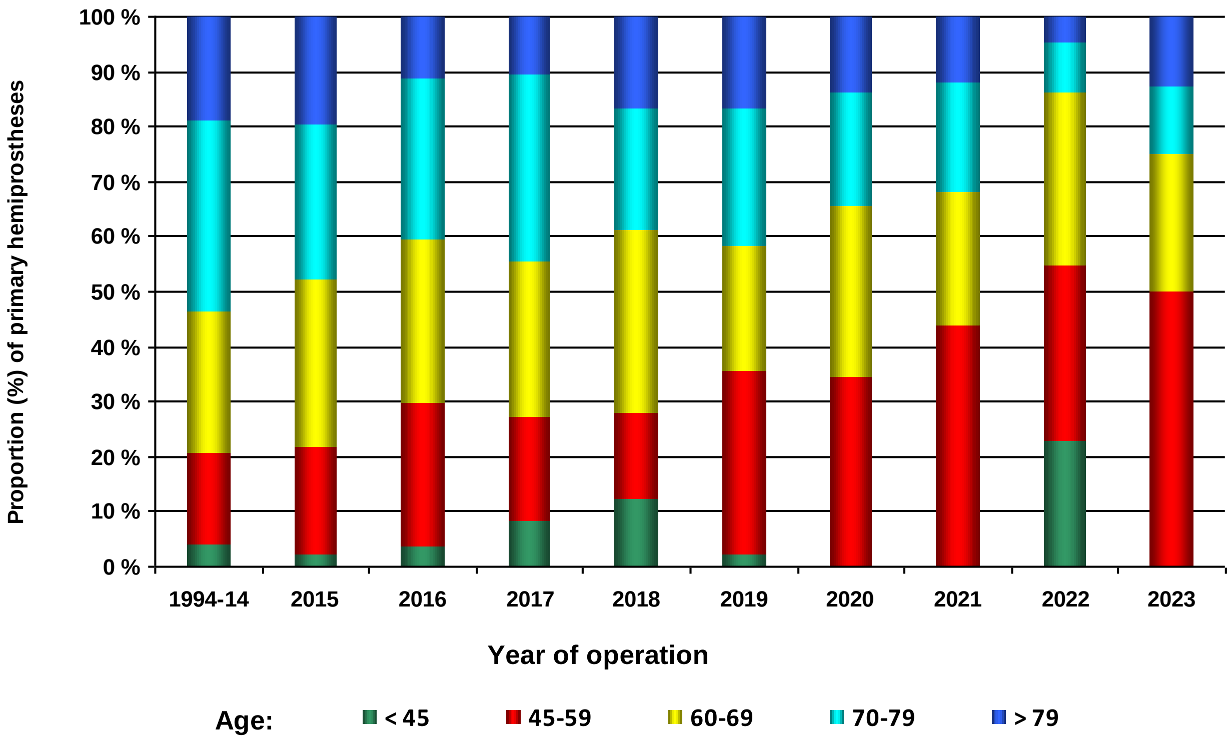


Table 2: Annual number of operations - Stemmed shoulder hemiprostheses

Year	Primary operations		Reoperations *		Revisions		Total
2023	8	(36,4%)	2	(9,1%)	12	(54,5%)	**22**
2022	20	(64,5%)	1	(3,2%)	10	(32,3%)	**31**
2021	24	(63,2%)			14	(36,8%)	**38**
2020	29	(59,2%)	2	(4,1%)	18	(36,7%)	**49**
2019	46	(63,9%)			26	(36,1%)	**72**
2018	65	(73,9%)			23	(26,1%)	**88**
2017	84	(75,7%)	1	(0,9%)	26	(23,4%)	**111**
2016	100	(80,6%)			24	(19,4%)	**124**
2015	118	(84,9%)			21	(15,1%)	**139**
1994-14	2 817	(92,4%)	1	(0,0%)	230	(7,5%)	**3 048**
Total	**3 311**	**(89,0%)**	**7**	**(0,2%)**	**404**	**(10,9%)**	**3 722**

* Reoperation where prosthetic parts were not changed or removed (soft tissue debridements for infected prosthesis, prosthetic parts were not changed)

Figure 6: Annual number of operations - Stemmed hemiprostheses

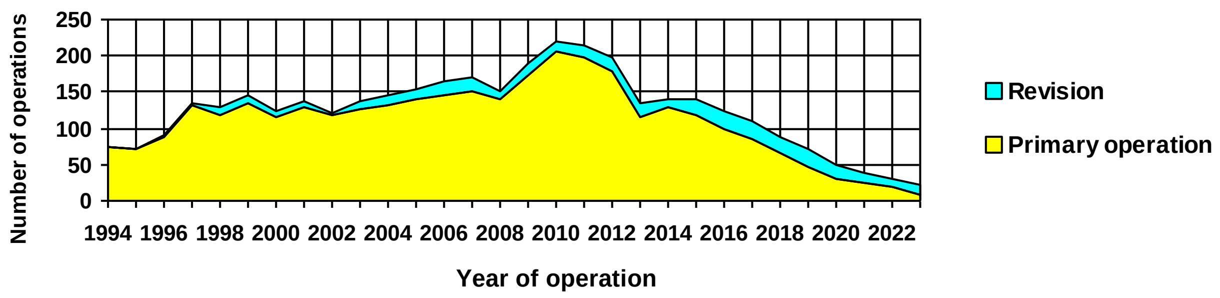


Table 3: Annual number of operations - Anatomic stemmed total shoulder prostheses

Year	Primary operations		Revisions		Total
2023	222	(91,0%)	22	(9,0%)	**244**
2022	183	(91,5%)	17	(8,5%)	**200**
2021	181	(91,9%)	16	(8,1%)	**197**
2020	183	(94,3%)	10	(5,2%)	**194**
2019	202	(91,0%)	20	(9,0%)	**222**
2018	210	(94,6%)	12	(5,4%)	**222**
2017	191	(91,8%)	17	(8,2%)	**208**
2016	173	(92,0%)	15	(8,0%)	**188**
2015	144	(93,5%)	10	(6,5%)	**154**
1994-14	653	(90,7%)	67	(9,3%)	**720**
Total	**2 342**	**(91,9%)**	**206**	**(8,1%)**	**2 549**

Figure 7: Annual number of operations - Anatomic stemmed total shoulder prostheses

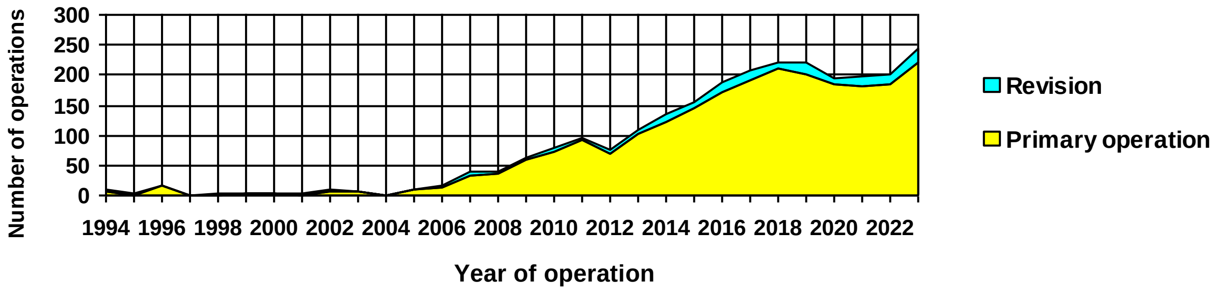


Table 4: Annual number of operations - Resurfacing shoulder hemiprostheses

Year	Primary operations		Revisions		Total
2023			3	(100,0%)	**3**
2022			1	(100,0%)	**1**
2021			6	(100,0%)	**6**
2020			4	(100,0%)	**4**
2019			3	(100,0%)	**3**
2018			9	(100,0%)	**9**
2017			10	(100,0%)	**10**
2016			11	(100,0%)	**11**
2015	3	(37,5%)	5	(62,5%)	**8**
1994-14	477	(84,9%)	85	(15,1%)	**562**
Total	**480**	**(77,8%)**	**137**	**(22,2%)**	**617**

Table 5: Annual number of operations - Resurfacing total shoulder prostheses

Year	Primary operations		Revisions		Total
1994-14	4	(80,0%)	1	(20,0%)	**5**
Total	**4**	**(80,0%)**	**1**	**(20,0%)**	**5**

Table 6: Annual number of operations - Reversed stemmed total shoulder prostheses

Year	Primary operations		Reoperations *		Revisions		Total
2023	915	(95,6%)	1	(0,1%)	41	(4,3%)	**957**
2022	785	(95,7%)	1	(0,1%)	34	(4,1%)	**820**
2021	741	(94,4%)			44	(5,6%)	**785**
2020	586	(91,8%)	5	(0,8%)	47	(7,4%)	**638**
2019	545	(93,5%)	1	(0,2%)	37	(6,3%)	**583**
2018	524	(92,1%)	2	(0,4%)	43	(7,6%)	**569**
2017	438	(94,0%)			28	(6,0%)	**466**
2016	377	(95,0%)	1	(0,3%)	19	(4,8%)	**397**
2015	348	(92,3%)			29	(7,7%)	**377**
1994-14	1 544	(92,6%)	1	(0,1%)	122	(7,3%)	**1 667**
Total	**6 803**	**(93,7%)**	**12**	**(0,2%)**	**444**	**(6,1%)**	**7 259**

Figure 8: Annual number of operations - Reversed stemmed total shoulder prostheses

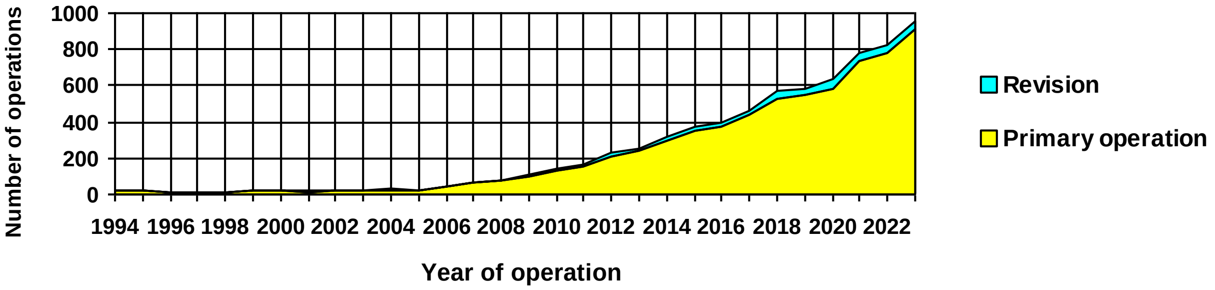


Table 7: Annual number of operations - Non stemmed hemiprostheses

Year	Primary operations		Revisions		Total
2023			2	(100,0%)	**2**
2022	2	(100,0%)			**2**
2021	1	(33,3%)	2	(66,7%)	**3**
2020			2	(100,0%)	**2**
2019	2	(33,3%)	4	(66,7%)	**6**
2018	7	(77,8%)	2	(22,2%)	**9**
2017	1	(33,3%)	2	(66,7%)	**3**
2016	8	(100,0%)			**8**
2015	13	(76,5%)	4	(23,5%)	**17**
1994-14	57	(93,4%)	4	(6,6%)	**61**
Total	**91**	**(80,5%)**	**22**	**(19,5%)**	**113**

Table 8: Annual number of operations - Non stemmed total shoulder prostheses

Year	Primary operations		Revisions		Total
2023	50	(87,7%)	7	(12,3%)	**57**
2022	46	(85,2%)	8	(14,8%)	**54**
2021	44	(89,8%)	5	(10,2%)	**49**
2020	53	(98,1%)	1	(1,9%)	**54**
2019	46	(92,0%)	4	(8,0%)	**50**
2018	60	(89,6%)	7	(10,4%)	**67**
2017	26	(92,9%)	2	(7,1%)	**28**
2016	14	(82,4%)	3	(17,6%)	**17**
2015	12	(92,3%)	1	(7,7%)	**13**
1994-14	60	(96,8%)	2	(3,2%)	**62**
Total	**411**	**(91,1%)**	**40**	**(8,9%)**	**451**

Reasons for primary operations

Table 9: Shoulder disease in primary operations

Year	Idiopathic osteo-arthritis	Rheumatoid arthritis	Sequelae after fracture	Osteo-necrosis	Instability/seq-uelae after dislocation	Acute fracture	Sequelae after infection	Rotarcuff arthr-opathy	Other	Missing
2023	638	19	70	2	40	312	10	211	113	3
2022	485	24	106	3	19	300	6	186	74	0
2021	414	24	101	1	31	295	4	182	38	2
2020	392	23	95	2	33	228	6	121	35	0
2019	396	26	109	0	34	209	4	129	21	0
2018	408	45	102	1	41	212	5	131	22	0
2017	332	40	104	0	29	167	4	124	22	0
2016	294	39	97	3	23	168	3	85	12	0
2015	294	36	89	1	26	164	6	61	18	0
1994-14	1 957	915	930	30	133	1 528	33	219	208	16
Total	**5 610**	**1 191**	**1 803**	**43**	**409**	**3 583**	**81**	**1 449**	**563**	**21**

Diseases are not mutually exclusive. More than one reason for operation is possible.

Table 10: Shoulder disease in primary operations - Stemmed shoulder hemiprostheses

Year	Idiopathic osteo-arthritis	Rheumatoid arthritis	Sequelae after fracture	Osteo-necrosis	Instability/seq-uelae after dislocation	Acute fracture	Sequelae after infection	Rotarcuff arthr-opathy	Other	Missing
2023	2	0	1	0	0	5	0	0	0	0
2022	2	0	2	0	1	13	0	0	3	0
2021	4	0	0	0	1	18	0	1	2	0
2020	5	0	1	0	1	21	1	0	0	0
2019	8	0	2	0	0	36	0	0	2	0
2018	8	0	7	0	0	48	0	3	6	0
2017	17	3	10	0	1	52	1	1	5	0
2016	18	1	11	1	1	64	0	2	3	0
2015	17	2	15	0	2	85	1	0	2	0
1994-14	548	448	518	18	14	1 250	9	9	112	10
Total	**629**	**454**	**567**	**19**	**21**	**1 592**	**12**	**16**	**135**	**10**

Diseases are not mutually exclusive. More than one reason for operation is possible.

Figure 9: Shoulder disease in primary operations - Stemmed shoulder hemiprostheses

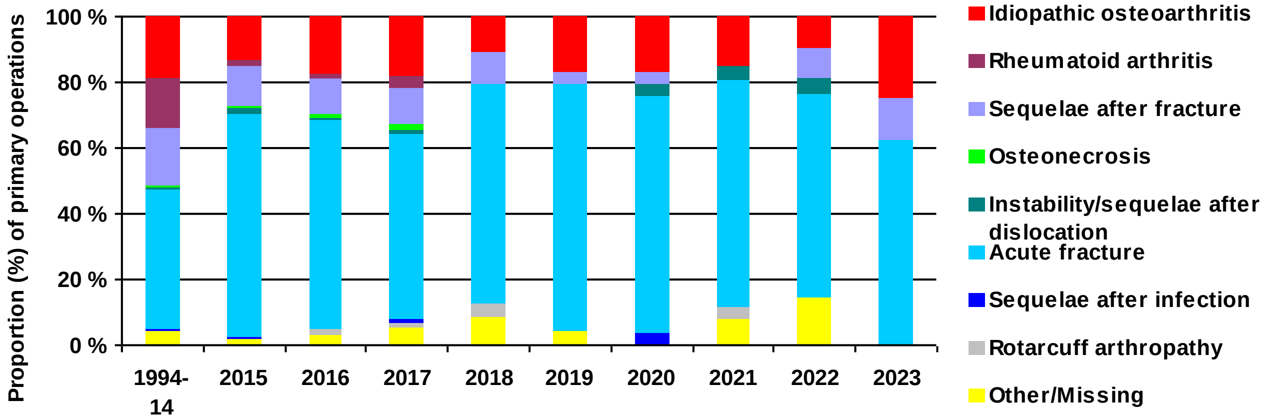


Table 11: Shoulder disease in primary operations - Anatomic stemmed total shoulder prostheses

Year	Idiopathic osteo-arthritis	Rheumatoid arthritis	Sequelae after fracture	Osteo-necrosis	Instability/seq-uelae after dislocation	Acute fracture	Sequelae after infection	Rotarcuff arthr-opathy	Other	Missing
2023	212	2	0	0	6	4	0	0	8	0
2022	170	3	9	1	4	2	0	1	8	0
2021	158	4	9	0	4	3	0	0	8	0
2020	152	5	12	0	7	1	1	1	4	0
2019	175	7	16	0	8	1	1	0	4	0
2018	185	13	9	0	7	1	0	2	2	0
2017	162	3	16	0	8	0	0	0	5	0
2016	143	8	20	0	1	2	1	0	2	0
2015	128	4	7	0	2	0	1	0	2	0
1994-14	519	34	71	2	12	1	4	0	14	1
Total	**2 004**	**83**	**169**	**3**	**59**	**15**	**8**	**4**	**57**	**1**

Diseases are not mutually exclusive. More than one reason for operation is possible.

Figure 10: Shoulder disease in primary operations - Anatomic stemmed total shoulder prostheses

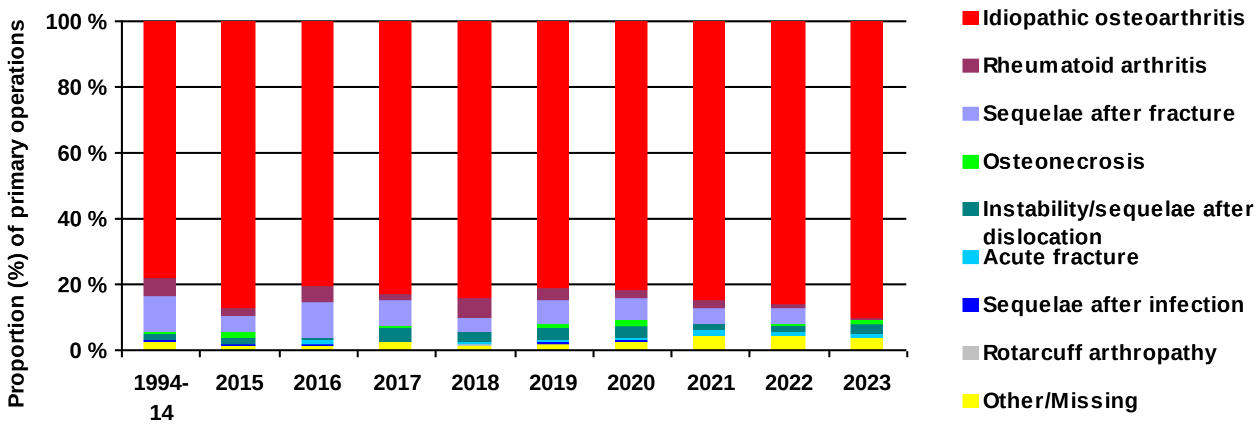


Table 12: Shoulder disease in primary operations - Resurfacing shoulder hemiprostheses

Year	Idiopathic osteo-arthritis	Rheumatoid arthritis	Sequelae after fracture	Osteo-necrosis	Instability/seq-uelae after dislocation	Acute fracture	Sequelae after infection	Rotarcuff arthr-opathy	Other	Missing
2015	3	0	0	0	0	0	0	0	0	0
1994-14	296	124	36	4	11	4	3	5	16	3
Total	**299**	**124**	**36**	**4**	**11**	**4**	**3**	**5**	**16**	**3**

Diseases are not mutually exclusive. More than one reason for operation is possible.

Table 13: Shoulder disease in primary operations - Resurfacing total shoulder prostheses

Year	Idiopathic osteo-arthritis	Rheumatoid arthritis	Sequelae after fracture	Osteo-necrosis	Instability/seq-uelae after dislocation	Acute fracture	Sequelae after infection	Rotarcuff arthr-opathy	Other	Missing
1994-14	4	0	0	0	0	0	0	0	1	0
Total	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**

Diseases are not mutually exclusive. More than one reason for operation is possible.

Table 14: Shoulder disease in primary operations - Reversed stemmed total shoulder prosthes

Year	Idiopathic osteo-arthritis	Rheumatoid arthritis	Sequelae after fracture	Osteo-necrosis	Instability/seq-uelae after dislocation	Acute fracture	Sequelae after infection	Rotarcuff arthr-opathy	Other	Missing
2023	367	17	68	2	30	298	9	205	97	3
2022	258	17	95	1	12	284	6	182	59	0
2021	206	17	90	1	25	274	4	180	28	2
2020	183	17	80	1	22	206	4	114	26	0
2019	169	16	87	0	21	172	2	121	11	0
2018	160	31	78	0	24	163	4	123	9	0
2017	132	33	74	0	17	115	2	123	10	0
2016	119	28	62	2	19	102	2	82	7	0
2015	122	29	63	1	21	78	4	59	13	0
1994-14	465	296	289	6	87	271	17	205	61	1
Total	**2 181**	**501**	**986**	**14**	**278**	**1 963**	**54**	**1 394**	**321**	**6**

Diseases are not mutually exclusive. More than one reason for operation is possible.

Figure 11: Shoulder disease in primary operations - Reversed stemmed total shoulder prostheses

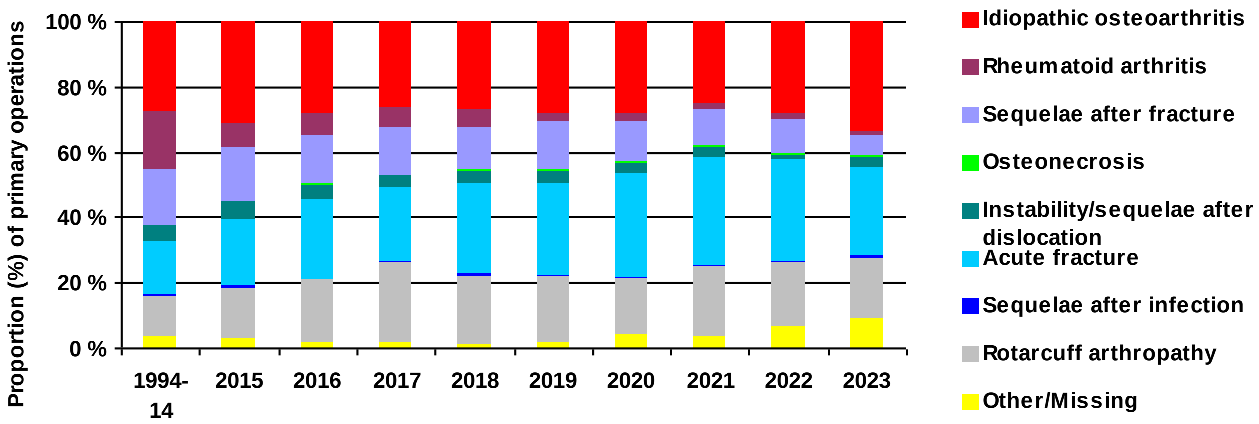


Table 15: Shoulder disease in primary operations - Non stemmed shoulder hemiprostheses

Year	Idiopathic osteo-arthritis	Rheumatoid arthritis	Sequelae after fracture	Osteo-necrosis	Instability/seq-uelae after dislocation	Acute fracture	Sequelae after infection	Rotarcuff arthr-opathy	Other	Missing
2022	1	0	0	0	0	0	0	0	1	0
2021	1	0	0	0	0	0	0	0	0	0
2019	1	0	0	0	0	0	0	1	0	0
2018	3	0	0	0	2	0	0	1	0	0
2017	0	0	0	0	0	0	1	0	0	0
2016	5	0	3	0	0	0	0	0	0	0
2015	10	0	3	0	0	1	0	1	0	0
1994-14	45	1	7	0	2	0	0	0	0	0
Total	**66**	**1**	**13**	**0**	**4**	**1**	**1**	**3**	**1**	**0**

Diseases are not mutually exclusive. More than one reason for operation is possible.

Figure 12: Shoulder disease in primary operations - Non stemmed shoulder hemiprostheses

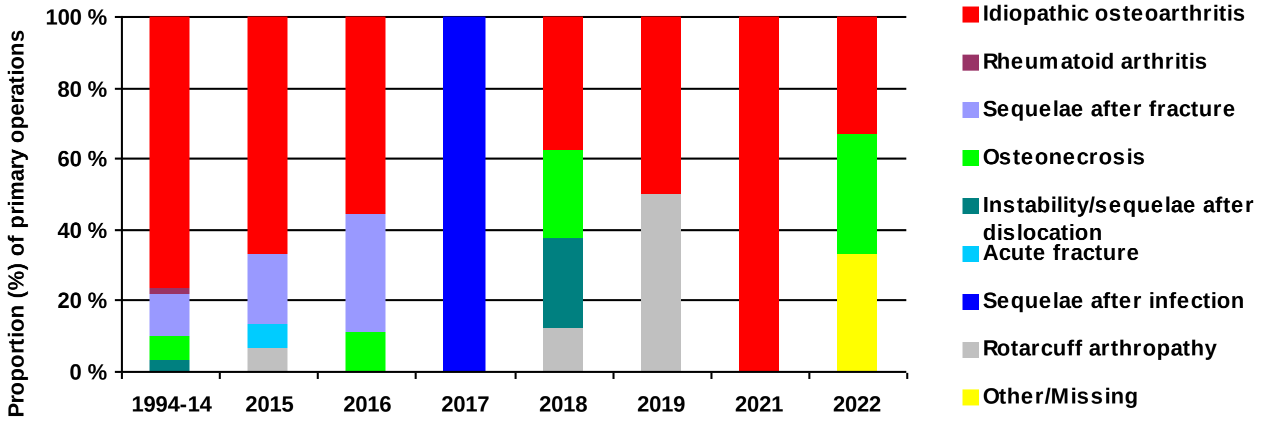
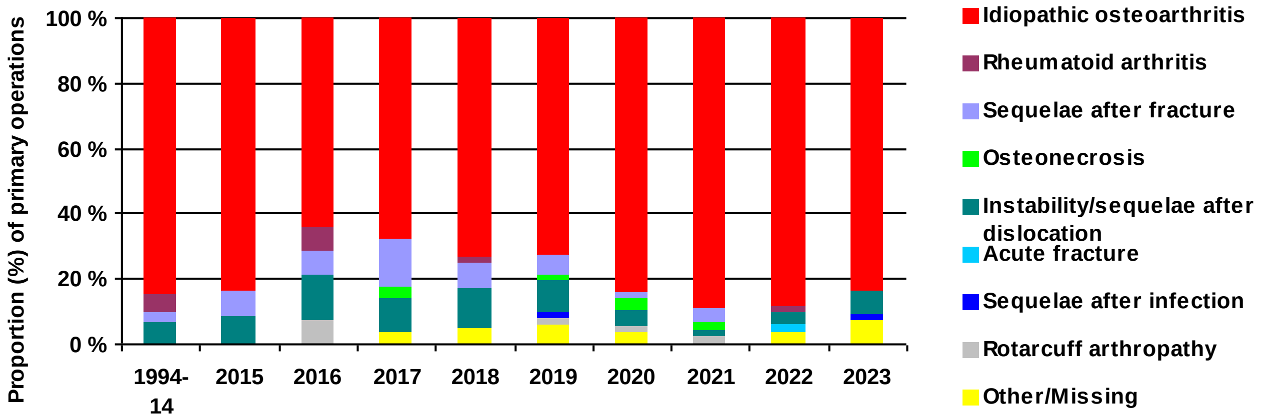


Table 16: Shoulder disease in primary operations - Non stemmed total shoulder prostheses

Year	Idiopathic osteo-arthritis	Rheumatoid arthritis	Sequelae after fracture	Osteo-necrosis	Instability/seq-uelae after dislocation	Acute fracture	Sequelae after infection	Rotarcuff arthr-opathy	Other	Missing
2023	46	0	0	0	4	0	1	0	4	0
2022	45	1	0	0	2	1	0	0	2	0
2021	40	0	2	0	1	0	0	1	0	0
2020	48	0	1	0	3	0	0	1	2	0
2019	37	0	3	0	5	0	1	1	3	0
2018	47	1	5	1	8	0	0	0	3	0
2017	19	0	4	0	3	0	0	0	1	0
2016	9	1	1	0	2	0	0	1	0	0
2015	10	0	1	0	1	0	0	0	0	0
1994-14	51	3	2	0	4	0	0	0	0	0
Total	**352**	**6**	**19**	**1**	**33**	**1**	**2**	**4**	**15**	**0**

Diseases are not mutually exclusive. More than one reason for operation is possible.

Figure 13: Shoulder disease in primary operations - Non stemmed total shoulder prostheses



Use of cement in shoulder prostheses

Figure 14: Stemmed shoulder hemiprostheses - Primary operations - Humerus

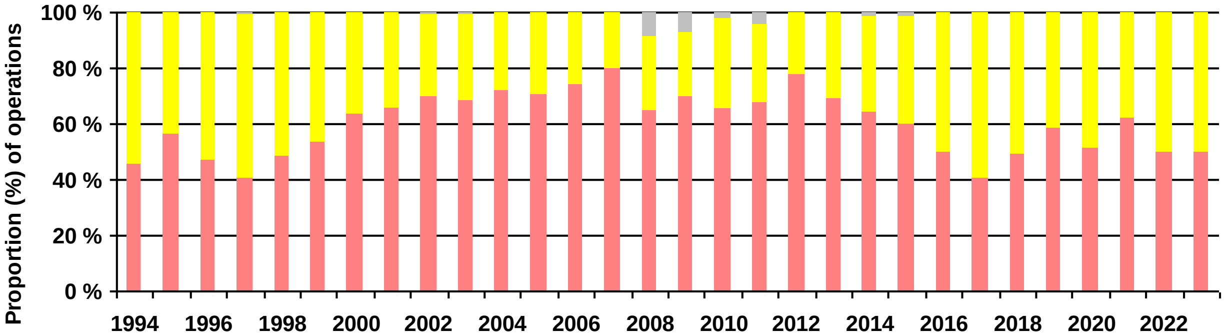


Figure 15: Anatomic stemmed total shoulder prostheses - Primary operations - Glenoid

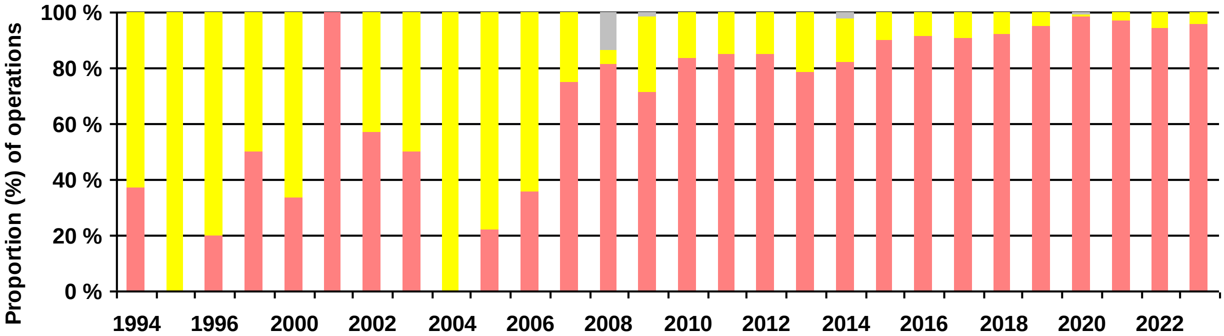


Figure 16: Anatomic stemmed total shoulder prostheses - Primary operations - Humerus

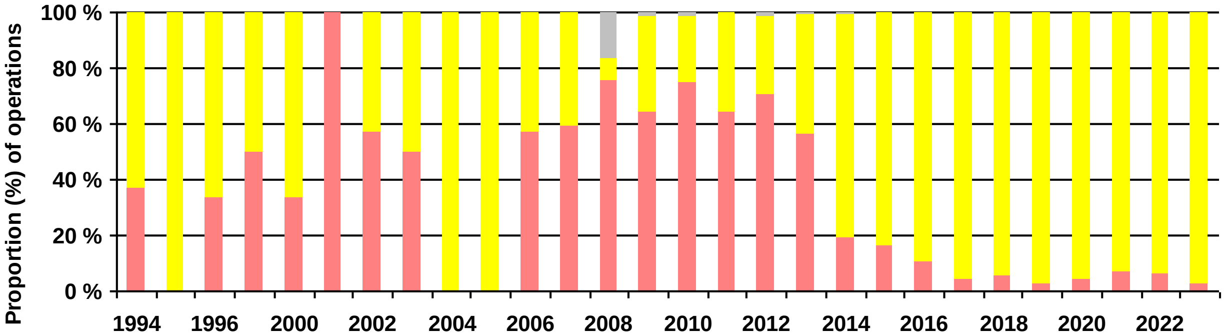


Figure 17: Resurfacing shoulder hemiprostheses - Primary operations - Humerus

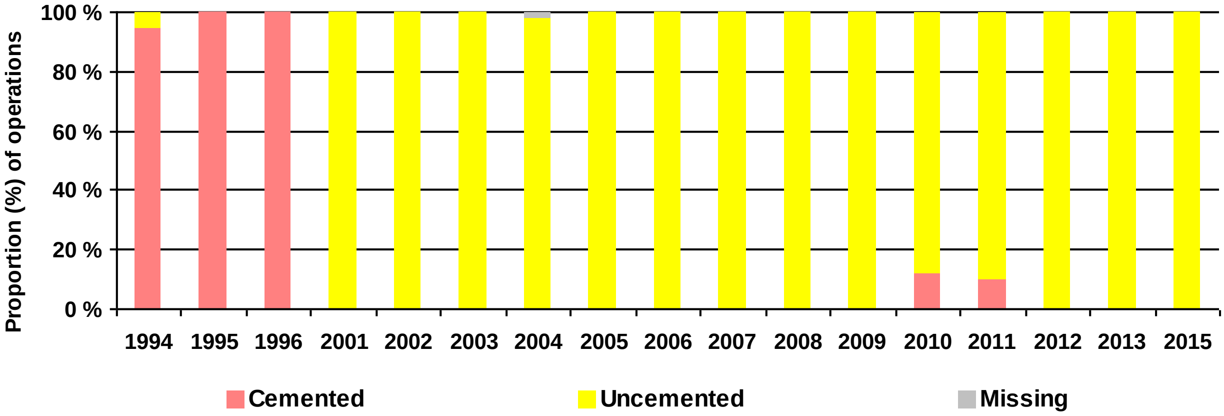


Figure 18: Reversed stemmed total shoulder prostheses - Primary operations - Glenoid

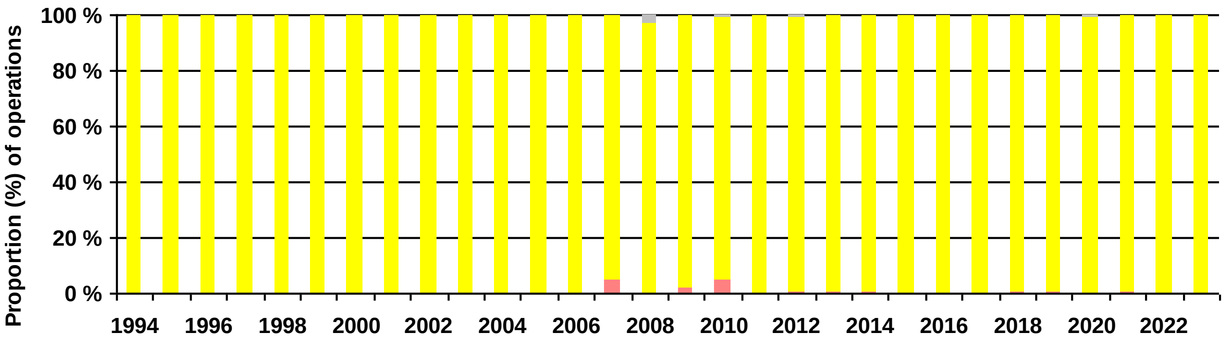


Figure 19: Reversed stemmed total shoulder prostheses - Primary operations - Humerus

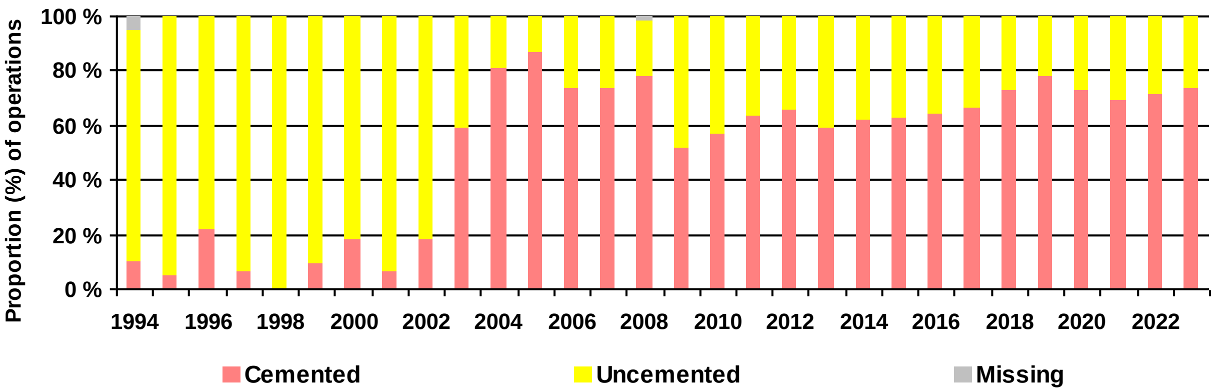


Figure 20: Non stemmed shoulder hemiprostheses - Primary operations - Humerus

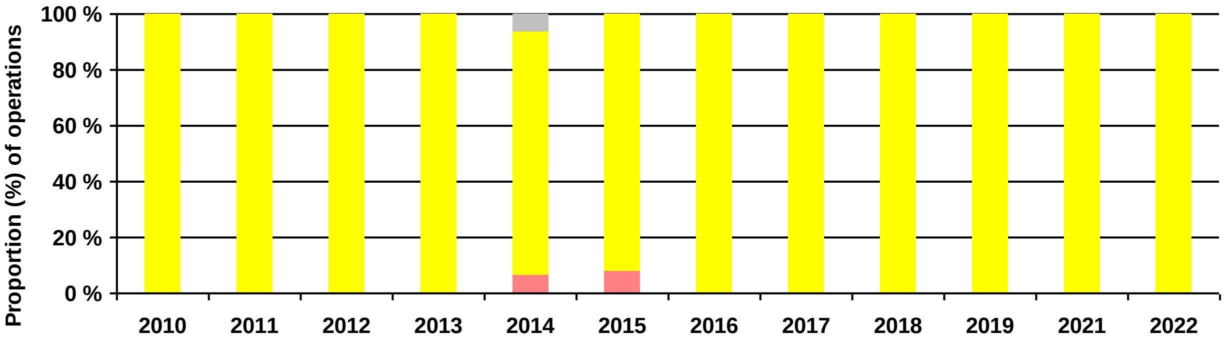


Figure 21: Non stemmed total shoulder prostheses - Primary operations - Glenoid

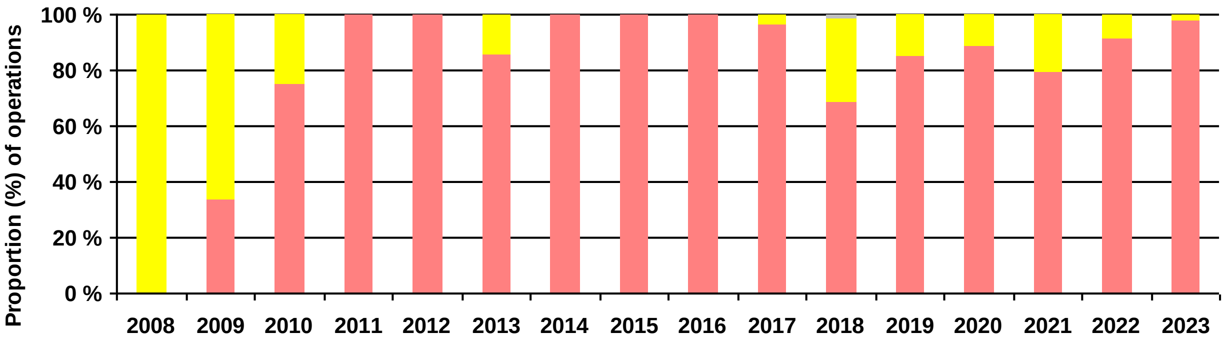
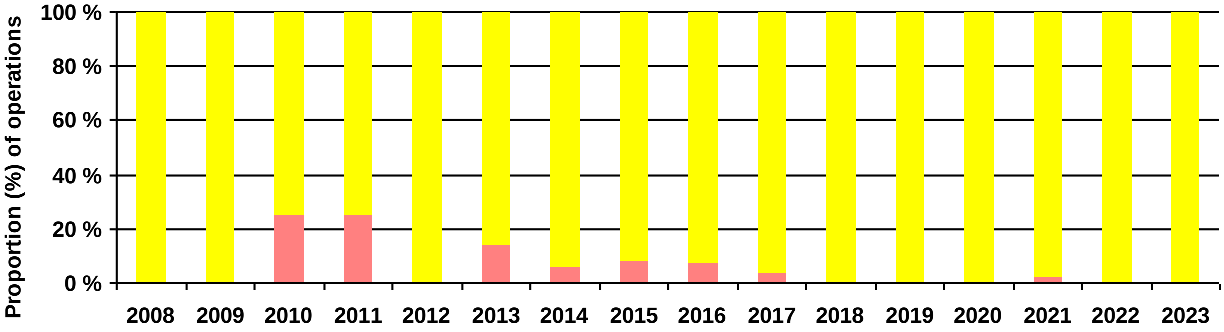


Figure 22: Non stemmed total shoulder prostheses - Primary operations - Humerus



Prosthesis brand

Stemmed hemiprostheses shoulder

Table 17: Primary operations- Caput humeri

Prostheses	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Bio - Modular	765	2			2						**769**
Global Advantage	681	34	15	1							**731**
Global Fx	254	13	11			1					**279**
Global	248										**248**
Nottingham	204										**204**
Global Unite	15	23	34	31	37	26	13	8	11	4	**202**
EPOCA	140	5									**145**
Tess-Anatomic	78	3	5								**86**
Comprehensive	12	5	13	16	4	5	7	7	2	3	**74**
Delta I	63										**63**
SMR- anatomic	1	2	7	13	10	8	4	4	4	1	**54**
Promos standard	34	11	6	2							**53**
Aequalis Ascend Flex Anatomic	3	8	2	11	6	4	5	5	3		**47**
Aequalis	44										**44**
Aequalis-Fracture	34	1	1	3	2						**41**
Nottingham 1	38										**38**
Modular	33										**33**
Bigliani/Flatow	29	1			1	1					**32**
JR-Vaios Anatomic	8	9	3	6	2	1					**29**
Other (n < 15)	26	1	3	1	1						**32**
Total	**2 710**	**118**	**100**	**84**	**65**	**46**	**29**	**24**	**20**	**8**	**3 204**

Table 18: Primary operations - Humerus

Prostheses	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Bio - Modular	774	2			2						**778**
Global Advantage	484	33	15	1							**533**
Global Fx	451	14	11			1					**477**
Global	261										**261**
Nottingham	210										**210**
Global Unite	15	23	34	31	37	26	13	8	11	3	**201**
EPOCA	141	5									**146**
Tess-Anatomic	77	3	5								**85**
Delta I	64										**64**
SMR- anatomic	1	2	7	13	10	8	4	4	4	1	**54**
Promos standard	33	11	6	2							**52**
Neer II	47										**47**
Aequalis Ascend Flex Anatomic	3	8	2	11	6	4	5	5	3		**47**
Aequalis-Fracture	38	1	1	3	2						**45**
Comprehensive Fracture	13	5	3	3	2	3	3	4	2	2	**40**
Aequalis	39										**39**
Comprehensive			10	13	2	2	4	3		1	**35**
Modular	33										**33**
Nottingham 1	32										**32**
Bigliani/Flatow	29	1			1	1					**32**
JR-Vaios Anatomic	8	9	3	6	2	1					**29**
Other (n < 15)	64	1	3	1	1					1	**71**
Total	**2 817**	**118**	**100**	**84**	**65**	**46**	**29**	**24**	**20**	**8**	**3 311**

Anatomic stemmed total shoulder prostheses

Table 19: Primary operations - Glenoid

Prostheses	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Global unite anatomic	3	82	100	130	137	142	153	135	140	179	**1 201**
Aequalis	248										**248**
Aequalis Ascend Flex Anatomic	80	15	30	25	25	10	8	13	14	9	**229**
Comprehensive	7	1		10	24	41	16	31	20	24	**174**
Global	123	1									**124**
Global Advantage	24	27	19	1							**71**
SMR- anatomic	1		4	11	9	7	2	2	8	9	**53**
JR-Vaios Anatomic	12	8	11	8	8	1					**48**
Tess-Anatomic	36	3	4	1	3						**47**
Bio - Modular	37										**37**
Promos standard	11	6	4	3	3						**27**
Bigliani/Flatow	20		1	2	1						**24**
Anatomical shoulder	14	1									**15**
Other (n < 15)	37					1	4		1	1	**44**
Total	**653**	**144**	**173**	**191**	**210**	**202**	**183**	**181**	**183**	**222**	**2 342**

Table 20: Primary operations - Caput humeri

Prostheses	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Global unite anatomic	3	82	100	130	136	141	151	133	141	179	**1 196**
Aequalis	250										**250**
Aequalis Ascend Flex Anatomic	78	14	30	25	25	10	11	13	14	9	**229**
Global Advantage	144	28	18	1							**191**
Comprehensive	7	1		10	24	41	16	31	20	24	**174**
SMR- anatomic	1		4	11	9	7	2	2	8	9	**53**
JR-Vaios Anatomic	12	8	11	8	8	1					**48**
Tess-Anatomic	36	3	4	1	3						**47**
Bio - Modular	47										**47**
Promos standard	11	6	4	3	3						**27**
Bigliani/Flatow	20		1	2	1						**24**
Anatomical shoulder	14	2									**16**
Nottingham	15										**15**
Other (n < 15)	13		1		1	2	3	2		1	**23**
Total	**651**	**144**	**173**	**191**	**210**	**202**	**183**	**181**	**183**	**222**	**2 340**

Table 21: Primary operations - Humerus

Prostheses	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Global unite anatomic	3	82	100	130	136	141	151	133	140	179	**1 195**
Aequalis	250										**250**
Aequalis Ascend Flex Anatomic	76	14	30	25	25	10	11	13	14	9	**227**
Global Advantage	142	27	17	1							**187**
Comprehensive	7	1		10	24	41	16	31	20	24	**174**
SMR- anatomic	1		4	11	9	7	2	2	8	9	**53**
Bio - Modular	48										**48**
Tess-Anatomic	36	3	4	1	3						**47**
JR-Vaios Anatomic	11	8	11	8	8	1					**47**
Promos standard	11	6	4	3	3						**27**
Bigliani/Flatow	20		1	2	1						**24**
Anatomical shoulder	14	2									**16**
Nottingham	15										**15**
Other (n < 15)	19	1	2		1	2	3	2	1	1	**32**
Total	**653**	**144**	**173**	**191**	**210**	**202**	**183**	**181**	**183**	**222**	**2 342**

Resurfacing shoulder hemiprostheses

Table 22: Primary operations - Humerus

Prostheses	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Copeland	304										**304**
Global C.A.P.	97	2									**99**
Scan Shoulder	42										**42**
EPOCA Resurfacing	18	1									**19**
Aequalis Resurfacing	16										**16**
Total	**477**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**480**

Resurfacing total shoulder prostheses

Table 23: Primary operations - Glenoid

Prostheses	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Copeland	2										**2**
Aequalis Resurfacing	2										**2**
Total	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**

Table 24: Primary operations - Humerus

Prostheses	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Copeland	2										**2**
Aequalis Resurfacing	2										**2**
Total	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**

Reversed stemmed total shoulder prostheses

Table 25: Primary operations - Glenoid

Prostheses	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Delta Xtend	803	222	245	305	394	420	427	529	564	712	**4 621**
Aequalis Reversed II	120	60	45	40	52	38	58	71	77	45	**606**
Comprehensive Reverse	7	8	29	22	20	43	64	103	97	109	**502**
Delta III	315										**315**
SMR-reverse	2	3	11	31	41	36	35	38	45	38	**280**
Tess Reversed	176	34	27	22	3						**262**
Promos Reverse	55	14	17	11	9						**106**
JRI-Vaios Inverse	14	4	3	5	5	6					**37**
Aequalis-Reversed	32										**32**
Trebecular Metal Reverse Shoul	9	2		2							**13**
Aequalis Perform Reversed						1	2		1	7	**11**
Anatomical shoulder Reversed	10										**10**
Other (n < 10)	1	1				1			1	4	**8**
Total	**1 544**	**348**	**377**	**438**	**524**	**545**	**586**	**741**	**785**	**915**	**6 803**

Table 26: Primary operations - Caput humeri

Prostheses	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Delta Xtend	804	222	245	305	394	420	427	529	565	713	**4 624**
Comprehensive Reverse	7	8	29	22	20	43	64	103	97	109	**502**
Aequalis Ascend Flex Reversed	57	44	34	32	31	27	47	51	51	35	**409**
Delta III	309										**309**
SMR-reverse	2	4	11	31	41	37	35	38	45	40	**284**
Tess Reversed	174	34	27	22	3						**260**
Aequalis Reversed Fracture	27	16	11	8	21	12	13	20	27	16	**171**
Promos Reverse	55	14	17	11	9						**106**
Aequalis-Reversed	50										**50**
JRI-Vaios Inverse	14	4	3	5	5	6					**37**
Aequalis Reversed II	14										**14**
Trebecular Metal Reverse Shoul	8	2		2							**12**
Anatomical shoulder Reversed	10										**10**
Other (n < 10)	1									2	**3**
Total	**1 532**	**348**	**377**	**438**	**524**	**545**	**586**	**741**	**785**	**915**	**6 791**

Table 27: Primary operations - Humerus

Prostheses	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Delta Xtend	804	222	245	305	394	420	427	528	556	682	**4 583**
Aequalis Ascend Flex Reversed	57	44	34	32	31	27	47	51	50	35	**408**
Comprehensive Reverse	7	8	27	21	19	33	44	74	64	63	**360**
Delta III	315										**315**
SMR-reverse	2	4	11	31	41	37	35	38	45	39	**283**
Tess Reversed	175	34	27	22	3						**261**
Aequalis Reversed Fracture	27	16	11	8	21	12	13	20	27	15	**170**
Promos Reverse	55	14	17	11	9						**106**
Comprehensive Fracture			2	1	1	9	20	28	23	18	**102**
Aequalis-Reversed	61										**61**
Comprehensive									10	28	**38**
JRI-Vaios Inverse	14	4	3	5	5	6					**37**
Global unite anatomic									5	18	**23**
Global Unite Reverse Fracture									4	12	**16**
Trebecular Metal Reverse Shoul	9	2		2							**13**
Anatomical shoulder Reversed	10										**10**
Other (n < 10)	8					1		2	1	5	**17**
Total	**1 544**	**348**	**377**	**438**	**524**	**545**	**586**	**741**	**785**	**915**	**6 803**

Non stemmed shoulder hemiprostheses

Table 28: Primary operations - Caput humeri

Prostheses	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
ECLIPSE TM	45	11	3								**59**
Global Icon				1	5	2		1	2		**11**
Simpliciti	8		1		1						**10**
Other (n < 10)	4	2	4		1						**11**
Total	**57**	**13**	**8**	**1**	**7**	**2**	**0**	**1**	**2**	**0**	**91**

Table 29: Primary operations - Humerus

Prostheses	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
ECLIPSE TM	45	11	3								**59**
Global Icon				1	5	2		1	2		**11**
Simpliciti	8		1		1						**10**
Other (n < 10)	4	2	4		1						**11**
Total	**57**	**13**	**8**	**1**	**7**	**2**	**0**	**1**	**2**	**0**	**91**

Non stemmed total shoulder prostheses

Table 30: Primary operations - Glenoid

Prostheses	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Global unite anatomic				9	16	24	34	20	35	37	**175**
Aequalis Ascend Flex Anatomic	13	7	12	13	24	12	8	15	5	12	**121**
SMR- anatomic					18	8	7	8	3	1	**45**
ECLIPSE TM	14	5		2	1	2	4	1			**29**
Simpliciti	20										**20**
Tess-Anatomic	10			1							**11**
Other (n < 10)	3		2	1	1				3		**10**
Total	**60**	**12**	**14**	**26**	**60**	**46**	**53**	**44**	**46**	**50**	**411**

Table 31: Primary operations - Caput humeri

Prostheses	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Global Icon				9	16	24	34	20	37	37	**177**
Simpliciti	35	7	12	13	24	12	8	15	5	12	**143**
SMR- anatomic					18	8	7	8	4	1	**46**
ECLIPSE TM	14	5		2	1	2	4	1			**29**
Tess-Anatomic	10			1							**11**
Other (n < 10)	1		2	1	1						**5**
Total	**60**	**12**	**14**	**26**	**60**	**46**	**53**	**44**	**46**	**50**	**411**

Table 32: Primary operations - Humerus

Prostheses	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Global Icon				9	16	24	34	20	37	37	**177**
Simpliciti	36	7	12	13	24	11	8	15	5	12	**143**
SMR- anatomic					18	8	7	8	4	1	**46**
ECLIPSE TM	14	5		2	1	2	4	1			**29**
Tess-Anatomic	10			1							**11**
Other (n < 10)			2	1	1	1					**5**
Total	**60**	**12**	**14**	**26**	**60**	**46**	**53**	**44**	**46**	**50**	**411**

Reasons for revisions

Table 33: Stemmed shoulder hemiprostheses

Year of revision	Loose proximal	Loose distal comp	Dislocation	Instability	Malalignment	Deep infection	Fracture (near implant)	Pain	Defect polyethylene	Progression of osteoarthritis	Rotator cuff rupture	Other	Missing
2023						1		1		1	2	2	
2022									1	1	1	2	
2021				4			1	3		1	3	5	
2020				2		2	3	6	1	3	1	9	
2019		2	1	1		1	2	10		4		9	
2018		1		2		2		8		2		6	
2017			2	2		2	2	12		3		10	
2016		2	1	1			1	10		6		8	
2015			1	3		1		8		1		7	
2014			2	1				8				2	
2013		1	2	5		2	1	10				2	
2012		2	4	1		1	2	5				4	1
2011			2	2		1		5		2		3	
2010		3	2	1		1	1	8				5	
2009				1		2	1	6				1	
2008				2		1		5				2	1
1994-07		9	12	12	1	7	3	61				26	3
Total	**0**	**20**	**29**	**40**	**1**	**24**	**17**	**166**	**2**	**24**	**7**	**103**	**5**

Revision reasons are not mutually exclusive. More than one reason for revision is possible. Only the first reoperation is counted.

Table 34: Anatomic stemmed total shoulder prostheses

Year of revision	Loose proximal	Loose distal comp	Dislocation	Instability	Malalignment	Deep infection	Fracture (near implant)	Pain	Defect polyethylene	Progression of osteoarthritis	Other	Missing
2023			3			2	2			1	9	1
2022		3					2	1	3	1	6	
2021	4		1	1				2	3		3	
2020	2					1		4	2		5	
2019	3	1	1	5		1	1	3	2		7	
2018	1		2	2	1			2	1		5	
2017	5		2	4			1	2			5	
2016	3	1		1		2		2			1	
2015	2					2		3			1	
2014	3			4	1		1	4			3	
2013	1					1		1	1			
2012	1			1		1		2	1			
2011	1	1	2					1				
2010			1	2							1	
2009			1									
2008								1	3			
1994-07	4		7					4	2		2	
Total	**30**	**6**	**20**	**20**	**2**	**10**	**7**	**32**	**18**	**2**	**48**	**1**

Revision reasons are not mutually exclusive. More than one reason for revision is possible. Only the first reoperation is counted.

Table 35: Resurfacing shoulder hemiprostheses

Year of revision	Loose proximal	Loose distal comp	Dislocation	Instability	Malalignment	Deep infection	Fracture (near implant)	Pain	Defect polyethylene	Progression of osteoarthritis	Other	Missing
2023		1				1				1		
2022										1		
2021		1		1			1	1		2	1	
2020								1				
2019		1					1	2		2		
2018							1	5		2	3	
2017				1				6		4		
2016		3		1				7		3	2	
2015		2						1			1	
2014		1		1			1	9		1	2	
2013		1						7		1	1	
2012		1	1	2		1		5		2	3	
2011					1			5			5	
2010								8		1	1	
2009								9			2	
2008		2		1				11			2	
1994-07		4	1	1		2	1	9	1		2	
Total	**0**	**17**	**2**	**8**	**1**	**4**	**5**	**86**	**1**	**20**	**25**	**0**

Revision reasons are not mutually exclusive. More than one reason for revision is possible. Only the first reoperation is counted.

Table 36: Resurfacing total shoulder prostheses

Year of revision	Loose proximal	Loose distal comp	Dislocation	Instability	Malalignment	Deep infection	Fracture (near implant)	Pain	Defect polyethylene	Progression of osteoarthritis	Other	Missing
1994-07			1	1								
Total	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Revision reasons are not mutually exclusive. More than one reason for revision is possible. Only the first reoperation is counted.

Table 37: Reversed stemmed total shoulder prostheses

Year of revision	Loose proximal	Loose distal comp	Dislocation	Instability	Malalignment	Deep infection	Fracture (near implant)	Pain	Defect polyethylene	Progression of osteoarthritis	Other	Missing
2023	1	1	7			7	6			1	4	1
2022	2	1	5	1		10	5	1			4	
2021	4	5	5			14	4	2	2		4	
2020	3		13	1		9	7		1		1	
2019	1	1	7	1	1	5		1			2	
2018	1	3	11	2		5	5	3	1		2	
2017	2	2	6	2	1	7	2	6	2			
2016	2	3	3	1		5	4	2	1			
2015	4	1	4	1	1	5	2	2	3		1	
2014	1	2	2	1		4	1	1				
2013	3	2	3	1		3		1			1	
2012	4	4	6	1		5			2		2	
2011	1		2	1			2					
2010	3	1	2	1		1	1				2	
2009	1					2					1	
2008			3		1							
1994-07	14	6	7	5		9	1	4	1		3	
Total	**47**	**32**	**86**	**19**	**4**	**91**	**40**	**23**	**13**	**1**	**27**	**1**

Revision reasons are not mutually exclusive. More than one reason for revision is possible. Only the first reoperation is counted.

Table 38: Non stemmed shoulder hemiprostheses

Year of revision	Loose proximal	Loose distal comp	Dislocation	Instability	Malalignment	Deep infection	Fracture (near implant)	Pain	Defect polyethylene	Progression of osteoarthritis	Other	Missing
2023				1							1	
2021						1						
2020										1		
2019		1		1							1	
2018		1									1	
2017								1		1		
2015								3		2		
2014		1						2			1	
2012						1						
Total	**0**	**3**	**0**	**2**	**0**	**2**	**0**	**6**	**0**	**4**	**4**	**0**

Revision reasons are not mutually exclusive. More than one reason for revision is possible. Only the first reoperation is counted.

Table 39: Non stemmed total shoulder prostheses

Year of revision	Loose proximal	Loose distal comp	Dislocation	Instability	Malalignment	Deep infection	Fracture (near implant)	Pain	Defect polyethylene	Progression of osteoarthritis	Other	Missing
2023				1		1					5	1
2022	1		1	1		2		2			4	
2021	1	1		1		2		1			2	
2020	1											
2019	1	1				1		1	1			
2018	2			2		1			1		3	
2017			1								1	
2016						1		1			1	
2015				1								
2012	1											
Total	**7**	**2**	**2**	**6**	**0**	**8**	**0**	**5**	**2**	**0**	**16**	**1**

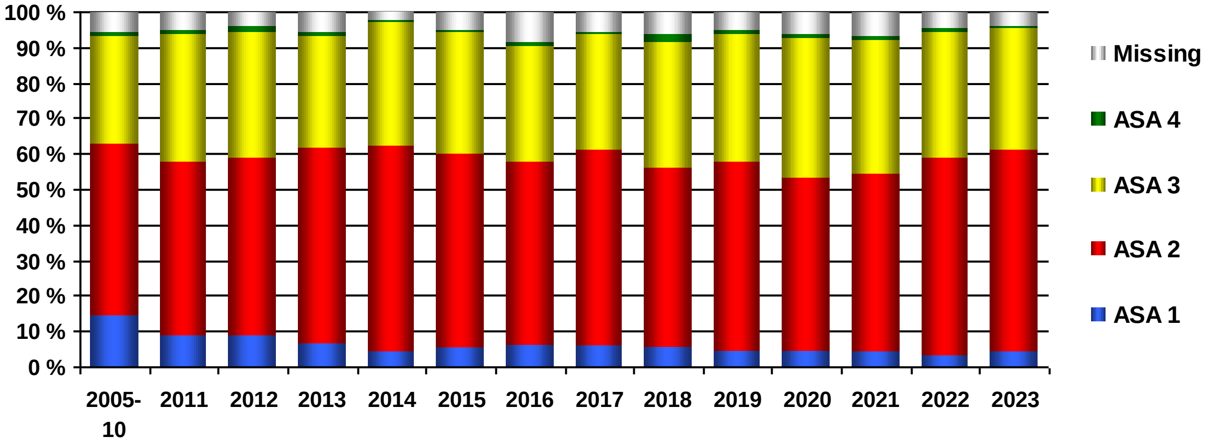
Revision reasons are not mutually exclusive. More than one reason for revision is possible. Only the first reoperation is counted.

ASA classification all shoulder prostheses

Table 40: Primary operations

Year	ASA 1	ASA 2	ASA 3	ASA 4	ASA 5	Missing	Total
2023	57	691	413	7		49	**1 217**
2022	36	583	374	8		49	**1 050**
2021	45	499	377	11		67	**999**
2020	39	420	337	13		52	**861**
2019	37	459	307	6		45	**854**
2018	49	443	313	20		53	**878**
2017	45	410	243	4		41	**743**
2016	41	347	220	7		58	**673**
2015	37	349	223	3		32	**644**
2014	28	343	207	4		14	**596**
2013	36	283	163	5		30	**517**
2012	44	252	177	8		19	**500**
2011	42	236	174	6		23	**481**
2005-10	286	944	594	22		110	**1 956**

Figure 23: Primary operations



ASA 1 = Healthy patients who smoke less than 5 cigarettes a day.
ASA 2 = Patients with an asymptomatic condition who are kept under medical control (f.ex. hypertension), or with diet (f. ex. diabetes mellitus type 2), and otherwise healthy patients who smoke five cigarettes or more daily.
ASA 3 = Patients having a condition that can cause symptoms. However, patients are kept under medical control (f. ex. moderate angina pectoris and mild asthma).
ASA 4 = Patients with a condition that is out of control (f. ex. heart failure and asthma).
ASA 5 = A moribund patient who is not expected to survive the operation.

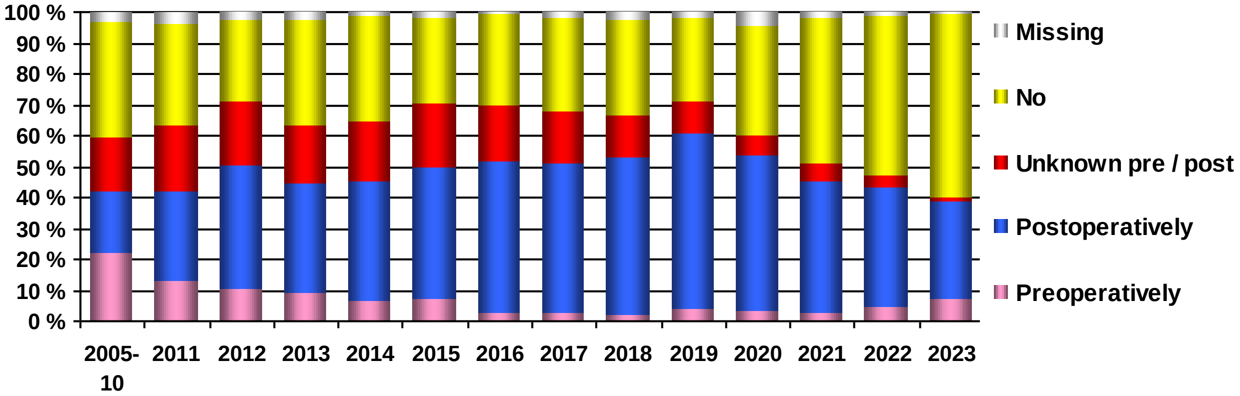
Registration of ASA classification started in 2005

Thromboprophylaxis

Table 41: Primary operations

Year	Preoperatively	Postoperatively	Unknown* pre / post	No	Missing	Total
2023	85	389	12	720	11	**1 217**
2022	49	406	37	543	15	**1 050**
2021	26	426	59	466	22	**999**
2020	27	434	58	304	38	**861**
2019	35	484	88	233	14	**854**
2018	18	445	122	273	20	**878**
2017	18	360	123	229	13	**743**
2016	18	329	123	198	5	**673**
2015	46	276	129	180	13	**644**
2014	40	230	113	205	8	**596**
2013	46	183	99	176	13	**517**
2012	52	201	101	134	12	**500**
2011	62	141	100	160	18	**481**
2005-10	426	389	349	727	65	**1 956**

Figure 24: Primary operations



Registration of thrombosis prophylaxis started in 2005

Previous operation in relevant joint

Table 42: For primary total prostheses

Type	1994-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Osteosynthesis of intraarticular fracture	365	45	48	54	49	51	50	47	48	50	807
Rotator cuff reconstruction	83	17	24	29	29	30	24	44	66	55	401
Synovectomy	147	5	5	6	9	4	6	9	7	2	200
Diagnostic arthroscopy	68	10	11	9	28	10	7	11	19	19	192
Biceps tenotomy / tenodesis	19	6	8	11	29	14	2	20	27	35	171
Subacromial decompression								14	19	35	68
Stabilizing interventions							1	2	17	25	45
Soft tissue procedure (eg Bankart)							1	2	14	23	40
Surgery for purulent arthritis	13	2	1		2		2	1	4	6	31
"Shaving"/Cleanup (Debridement)	14		1	5	3		2	1	1	1	28
Osteotomy	11	1	4	1	3	1	2	1		1	25
Ligament	2	1		6				1			10
Artrodesis	3		1	1		1		2			8
Other bone block procedure									2	2	4
Latarjet									2	1	3
Other previous op.	181	20	24	36	58	40	40	25	29	31	484

Table 43: Surgical approach for all primary prostheses

Year	Delto-pectoral	Antero-superior / deltoid split	Lateral	Sabel	Saddle	Supero-lateral	Other	Missing	Total
2023	920	62	0	0	0	0	0	33	**1 015**
2022	453	32	3	0	4	3	1	0	**496**
2021	149	16	0	1	0	0	0	0	**166**
2020	6	5	0	1	0	0	0	0	**12**
Total	**1 528**	**115**	**3**	**2**	**4**	**3**	**1**	**33**	**1 689**

Electronic registration started during 2020

Table 44: Glenoid type for all primary prostheses

Year	Normal	A1	A2	B1	B2	B3	C	D	Unknown/not classifiable	Missing	Total
2023	409	216	110	53	57	30	34	14	43	49	**1 015**
2022	172	156	48	29	41	23	14	1	6	6	**496**
2021	89	22	17	11	14	10	1	2	0	0	**166**
2020	7	3	1	0	0	0	1	0	0	0	**12**
Total	**677**	**397**	**176**	**93**	**112**	**63**	**50**	**17**	**49**	**55**	**1 689**

Electronic registration started during 2020

PROM in the shoulder prosthesis register for patients

The Shoulder Prosthesis Register has been collecting electronic patient-reported data (Patient Reported Outcome Measures (PROM)) since 2020. The register aims to focus more on patients' perceived quality of life and joint function before and after operation. Patients complete an electronic questionnaire before operation and 1, 6, and 10 years after operation. The data we collect from patients will be compiled with the data reported by surgeons for the same patient group. This will allow us to focus on function and quality of life in addition to any potential revision of the prosthesis.

We have separated the figures into patients with acute fractures and those without fractures since the procedures for collecting preoperative PROM for fracture patients are not yet in place, and because we expect different results in these groups.
A total of 584 forms have been completed before primary shoulder prosthesis operation, and 797 forms one year after operation (these numbers are for all primary operations from 2020 onwards). For fracture patients, 240 PROM forms have been completed one year postoperatively. So far, 19 hospitals have started reporting preoperative PROM forms, but many hospitals have low reporting rates for preoperative PROM. The goal is to increase this proportion to over 80%. All hospitals will receive their own results in the hospital report. Please feel free to contact our consultant, Mikal Solberg, at mikal.solberg@helse-bergen.no if you have any questions regarding the electronic registration of PROM.

Patient Demographics Before/After All Primary Operations Without Acute Fracture

Patient demographics	Before operation	1 year after
Number of forms (n)	584	797
Men (%)	45.9	41.4
Median Age (min-max)	69.1 (28.2-89)	70 (22.4-89.6)
Body Mass Index mean (SD)	28.7 (5.9)	27.8 (5.2)
Drinking alcohol n (%)	467 (80)	651 (81.7)
Smoking n (%)	38 (6.5)	71 (8.9)
Diabetes n (%)	15 (8.2)	82 (10.3)
Education upper secondary school or higher n (%)	233 (39.9)	397 (49.8)
Working n (%)	144 (24.7)	176 (22.1)
Living alone n (%)	150 (25.7)	252 (31.6)
Activity score UCLA activity* mean (SD)	4.7 (2)	5.3 (1.9)
State of health** (VAS) mean (SD)	56.5 (20.5)	69.2 (18.9)
Charnley (Category) Class A	103 (17.1)	437 (45.2)

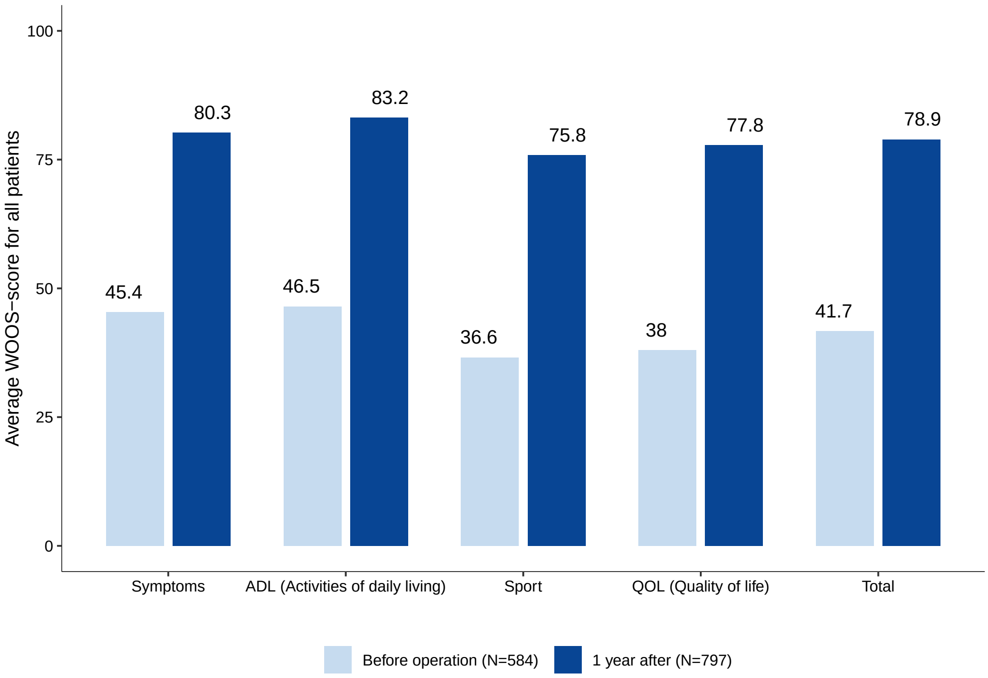
*Best possible score is 10, **100 is the best possible health

Patient Demographics After All Primary Operations With Acute Fracture

Patient demographics	1 year after
Number of forms (n)	240
Men (%)	23.8
Median Age (min-max)	71.9 (38.5-92.4)
Body Mass Index mean (SD)	27.3 (4.9)
Drinking alcohol n (%)	200 (83.3)
Smoking n (%)	35 (14.6)
Diabetes n (%)	37 (15.4)
Education upper secondary school or higher n (%)	121 (50.4)
Working n (%)	37 (15.4)
Living alone n (%)	89 (37.1)
Activity score UCLA activity* mean (SD)	4.8 (1.8)
State of health** (VAS) mean (SD)	67.4 (21.6)
Charnley (Category) Class A	204 (15)

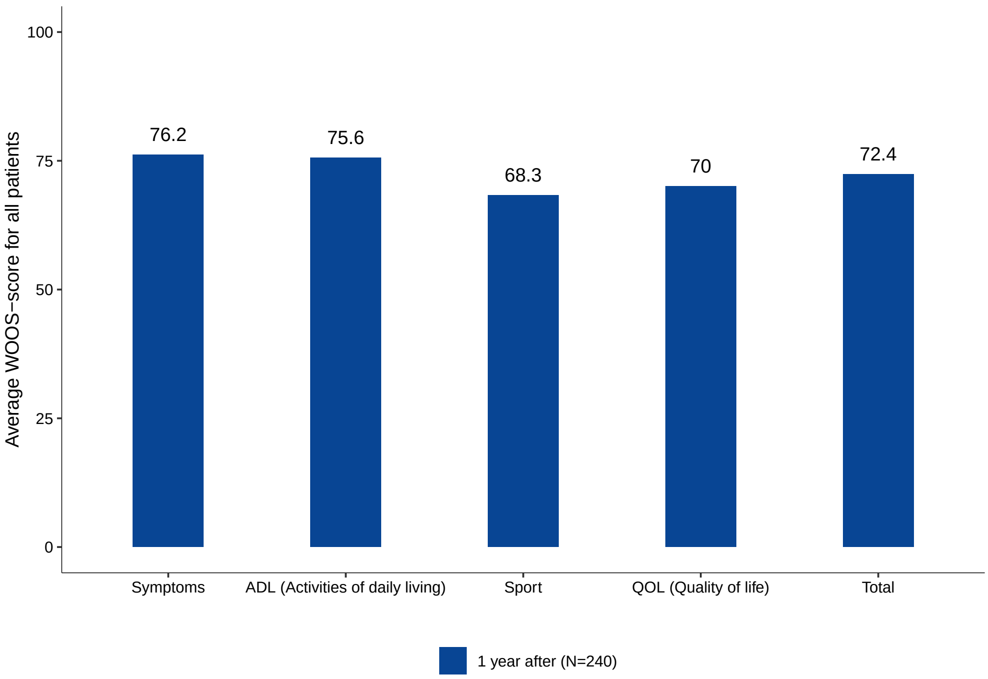
*Best possible score is 10, **100 is the best possible health

Figure C.16 (a) Average WOOS Score Before/After Primary Operation Without Acute Fracture*



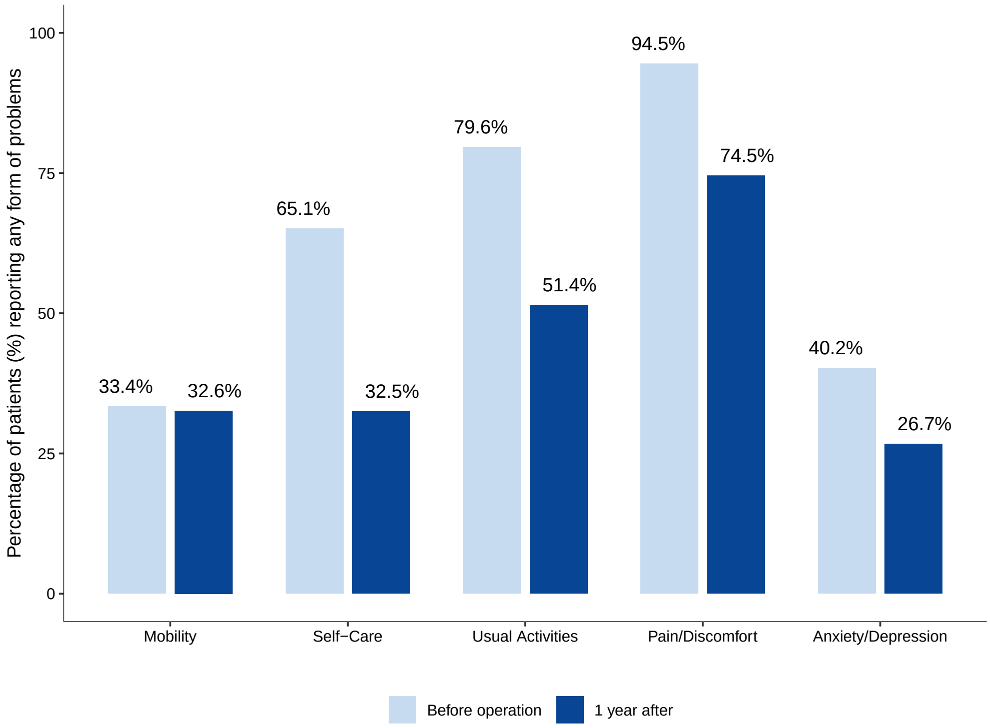
*100 is the best possible score

Figure C.16 (b) Average WOOS Score After Primary Operation With Acute Fracture*



*100 er best mulige skår

Figure C.17 (a) Percentage reporting problems with mobility, self-care, usual activities, or reporting pain or anxiety before/after the primary operation without Acute Fracture (EQ-5D-5L)



Health Authority	Reporting Hospital (2022)	Number of Preoperative Forms (2022)
Central Norway	2/8	6
Northern Norway	0/2	0
South-Eastern Norway	5/19	118
Western Norway	2/7	17
Private	2/7	8

Health Authority	Reporting Hospital (2022)	Number of Preoperative Forms (2023)
Central Norway	4/8	29
Northern Norway	1/2	2
South-Eastern Norway	8/19	258
Western Norway	4/7	21
Private	2/7	15

Figure C.17 (b) Percentage reporting problems with mobility, self-care, usual activities, or reporting pain or anxiety after the primary operation with Acute Fracture (EQ-5D-5L)

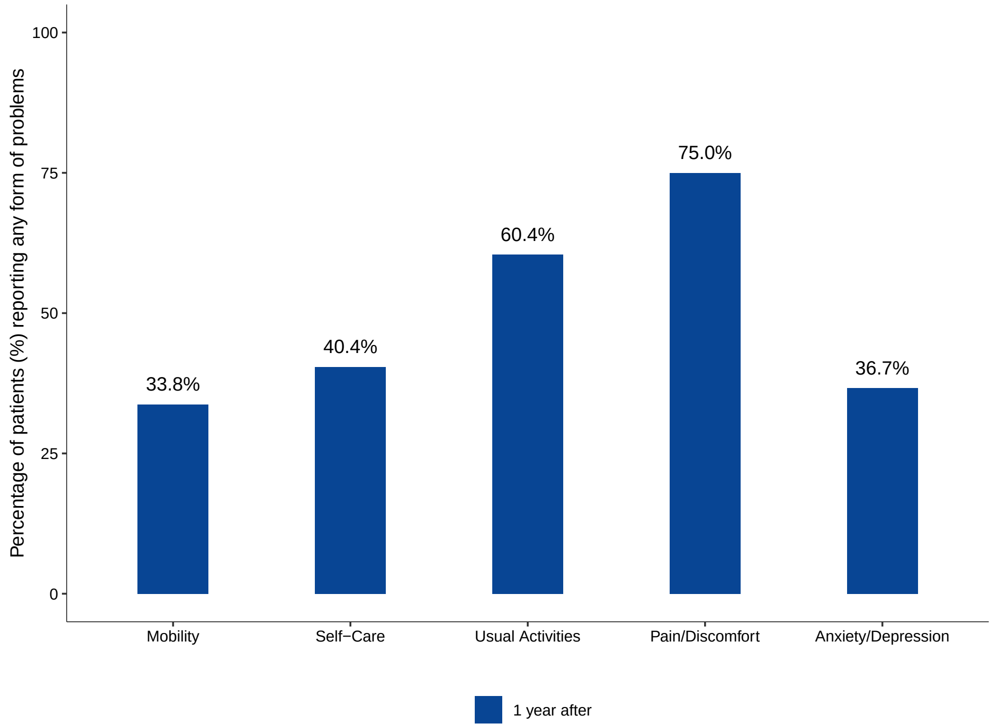
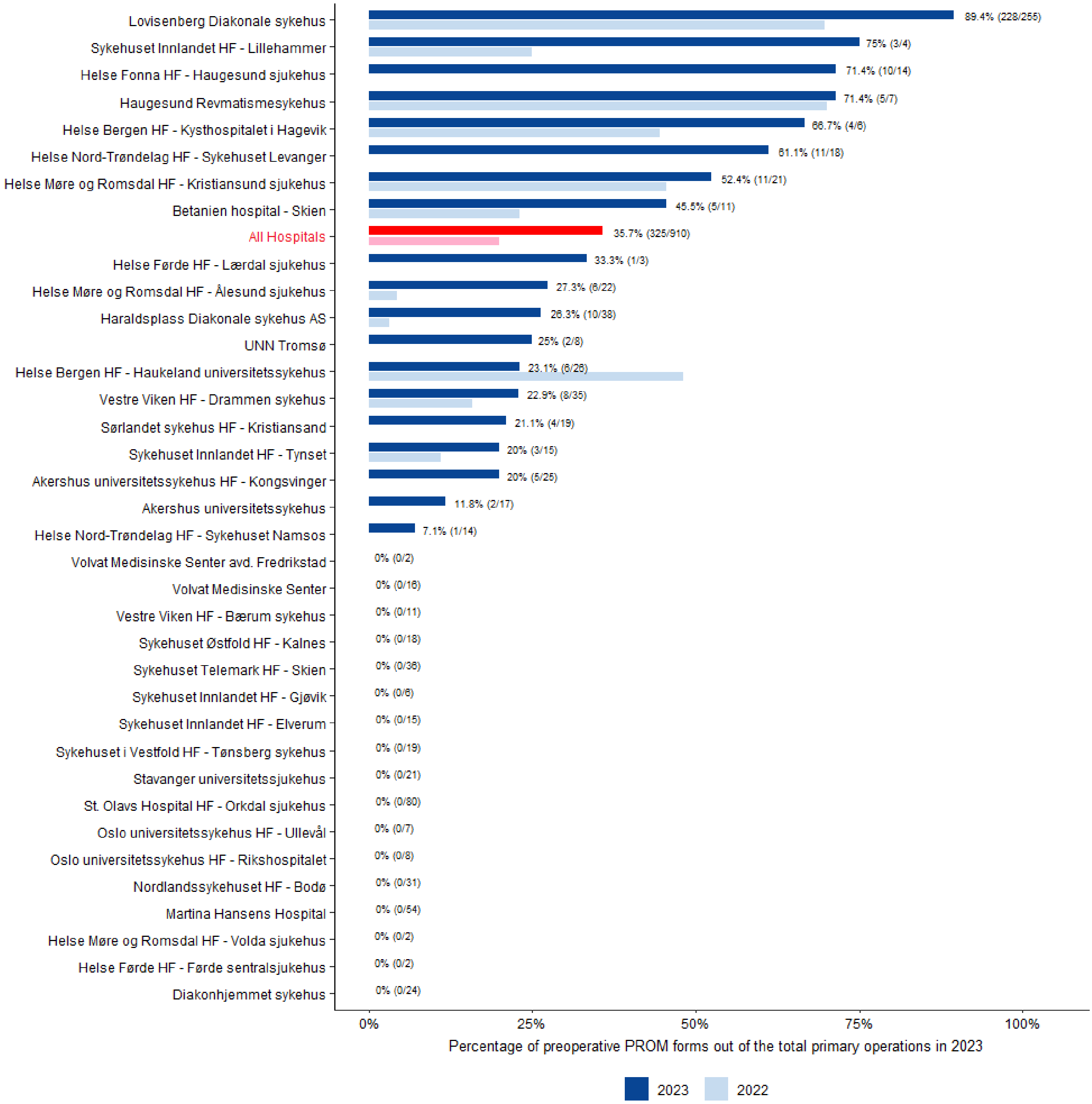
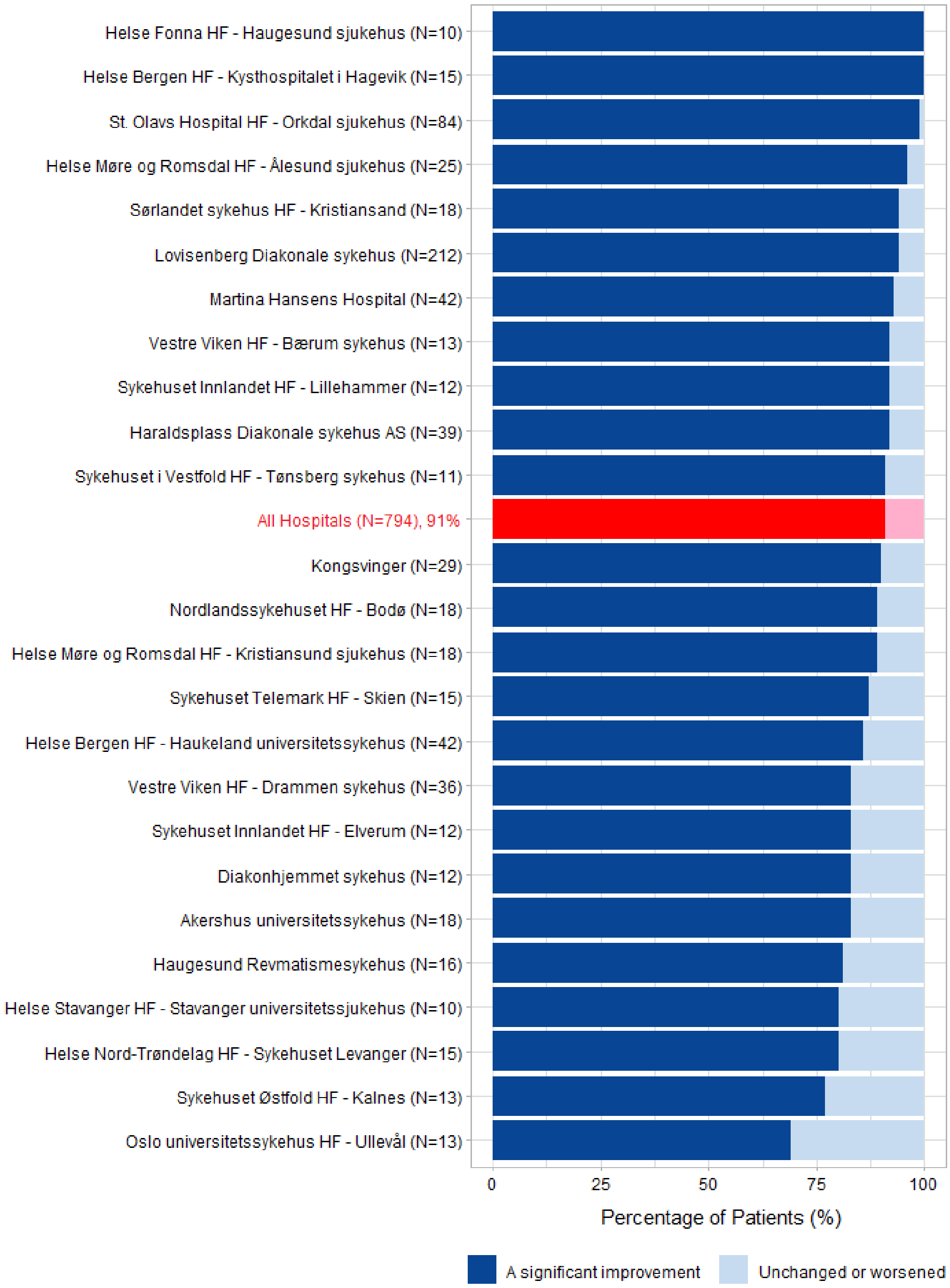


Figure C.18 Proportion of primary shoulder prosthesis operations without acute fracture where preoperative PROM form is completed



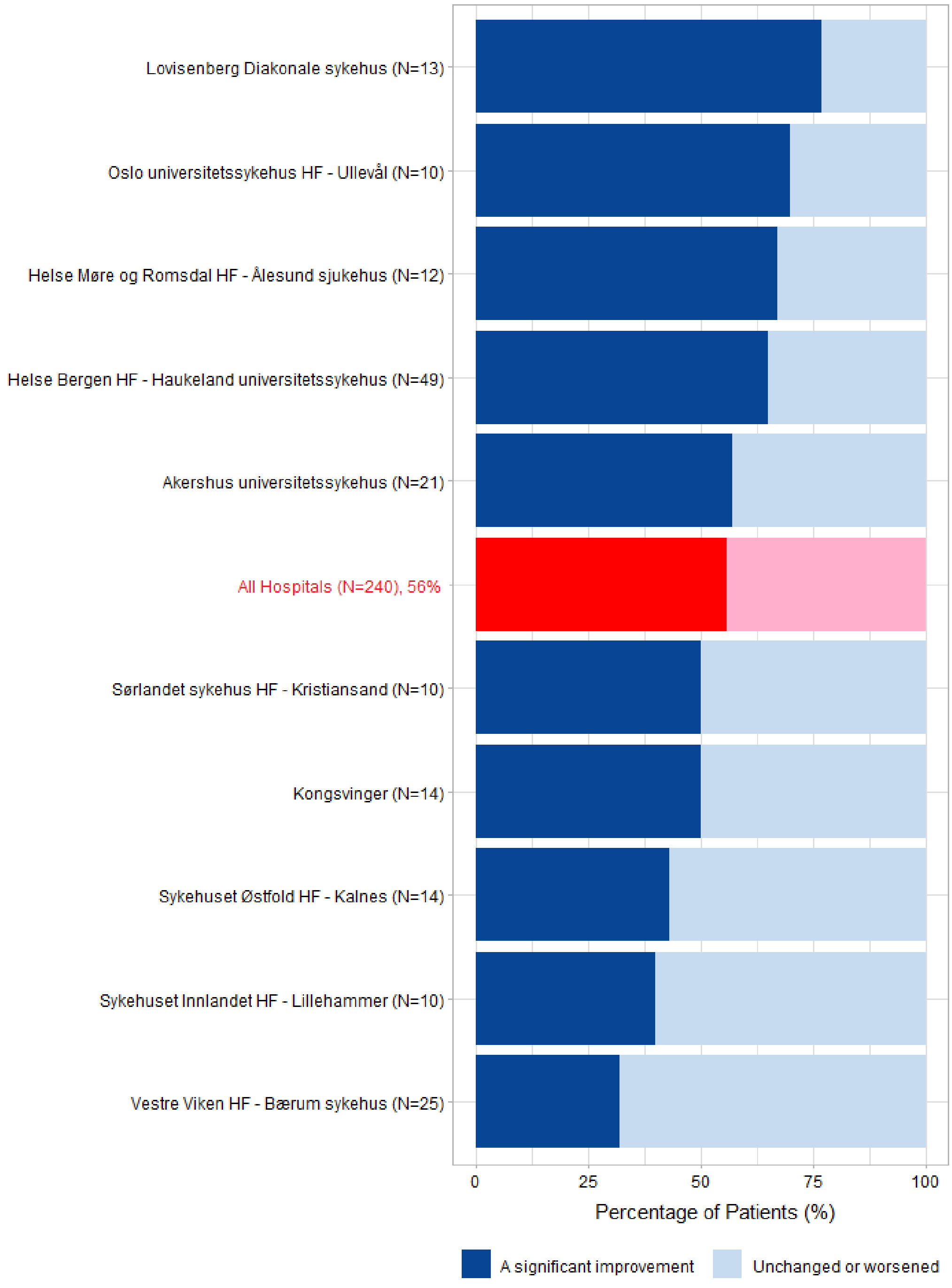
The diagram above shows the hospitals that have submitted preoperative PROM forms digitally through the MRS web solution. Reporting remains low, but some hospitals appear to have taken steps to improve their reporting. We remind you that any questions regarding reporting in MRS can be sent to the registry.

Figure C.19 (a): Anchor questions for WOOS-PAIN AND SYMPTOMS 1 year after primary operation without acute fracture, 2020-2023



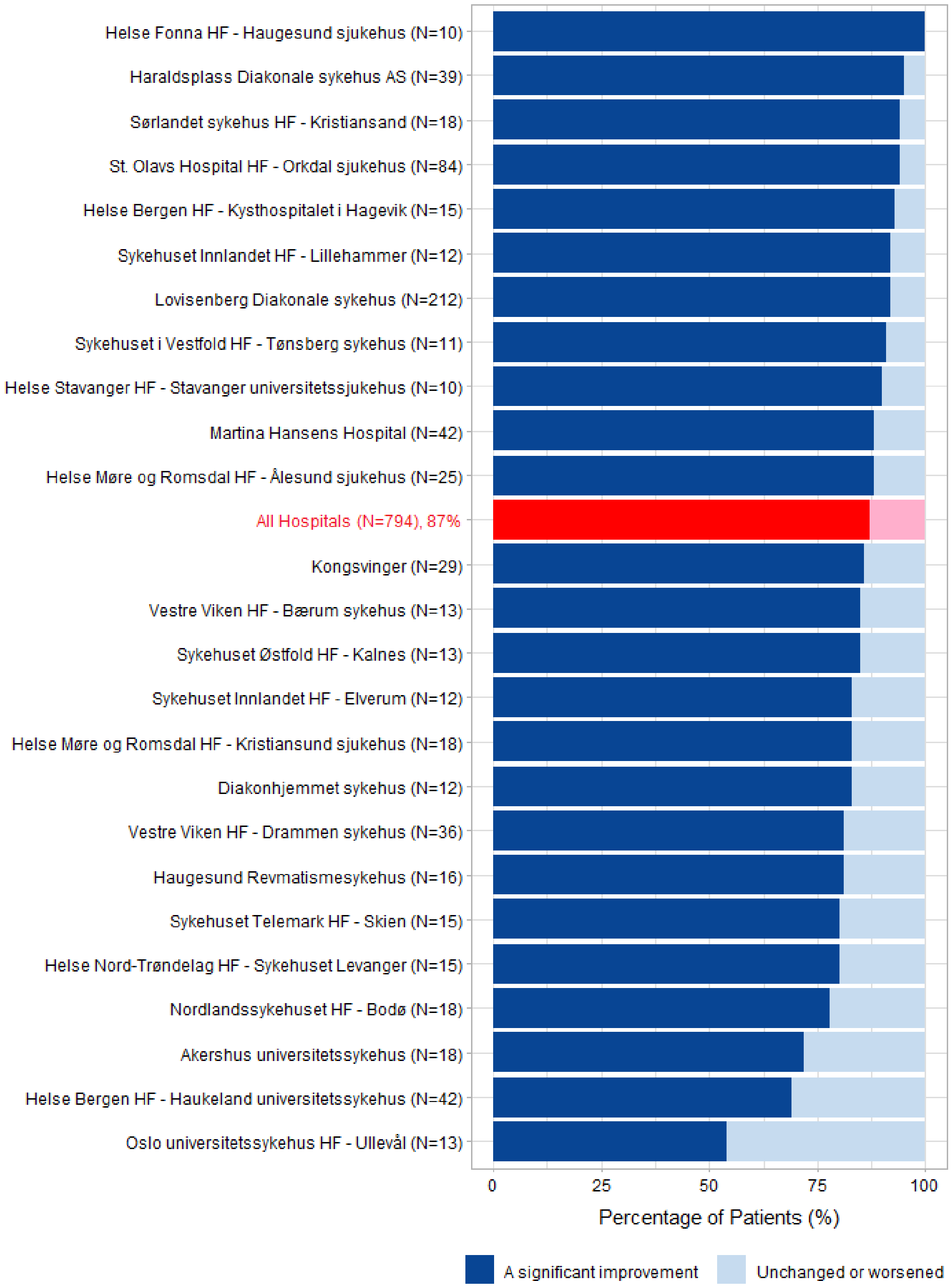
The patients have responded to the question ”How do you experience shoulder pain and symptoms now compared to before the operation (pain, weakness, stiffness, cracking)?” The options ”Less, a significant improvement” and ”Slightly less, enough to be a significant improvement” are categorized in dark blue as ”a significant improvement” in the figure. The other options ”Very little change, not enough to be a significant improvement”, ”Unchanged”, ”Very little change, not enough to be a significant worsening”, ”Slightly more, enough to be a significant worsening”, and ”More, a significant worsening” are categorized in light blue as ”Unchanged or worsening”. Only hospitals with at least 10 responses are shown in the figure.

Figure C.19 (b): Anchor questions for WOOS-PAIN AND SYMPTOMS 1 year after primary operation with acute fracture, 2020-2023



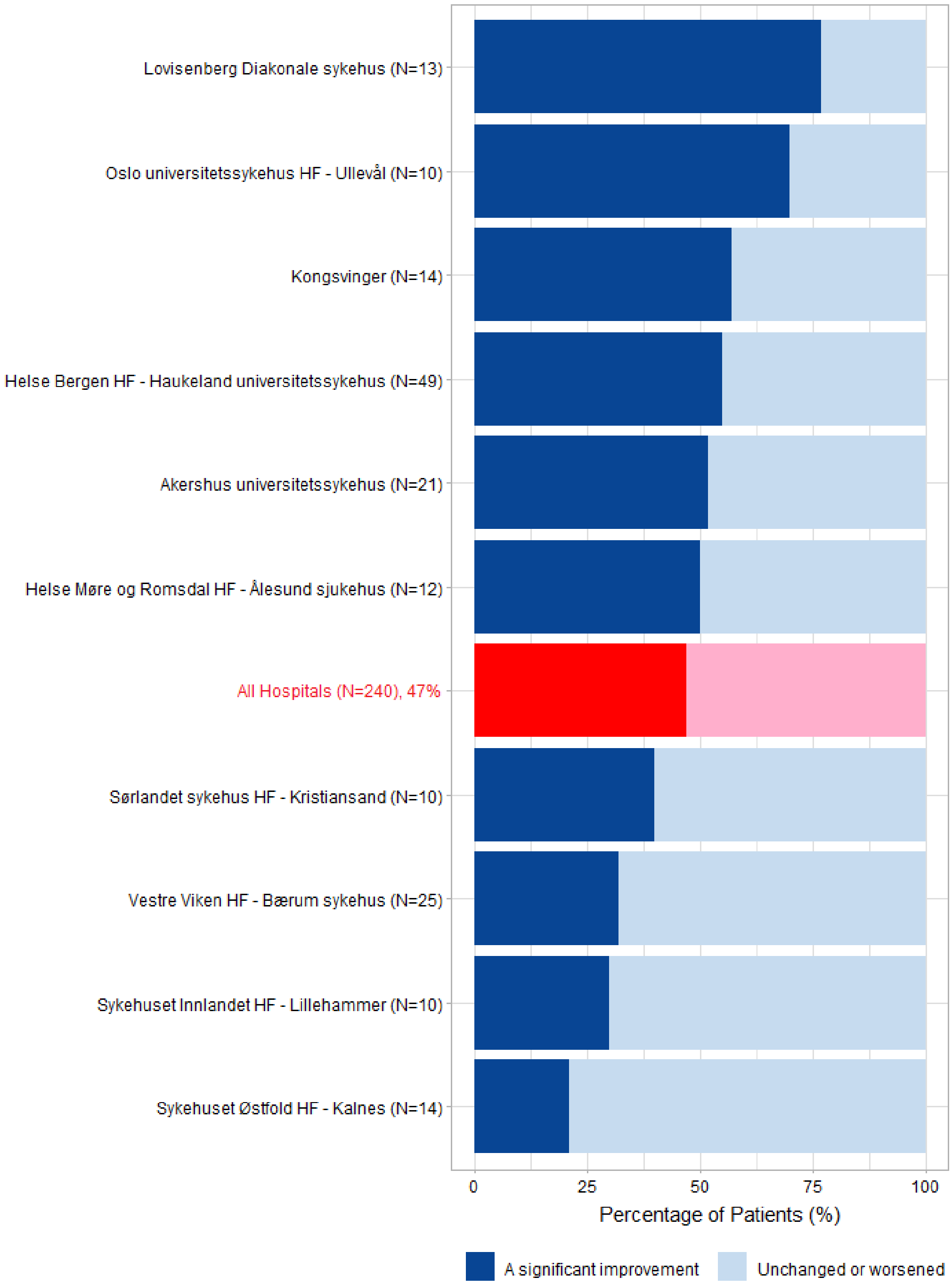
Patients have responded to the question "How do you experience shoulder pain and symptoms now, compared to before the operation (pain, weakness, stiffness, cracking)?" The options "Less, a significant improvement" and "Slightly less, enough to be a significant improvement" are categorized in dark blue in the figure as "a significant improvement." The other options "Very little change, not enough to be a significant improvement", "Unchanged", "Very little change, not enough to be a significant worsening", "Slightly more, enough to be a significant worsening", and "More, a significant worsening" are categorized in light blue as "Unchanged or worsening." Only hospitals with at least 10 responses are included in the figure.

Figure C.20 (a): Anchor questions for WOOS-ADL 1 year after primary operation without acute fracture, 2020-2023



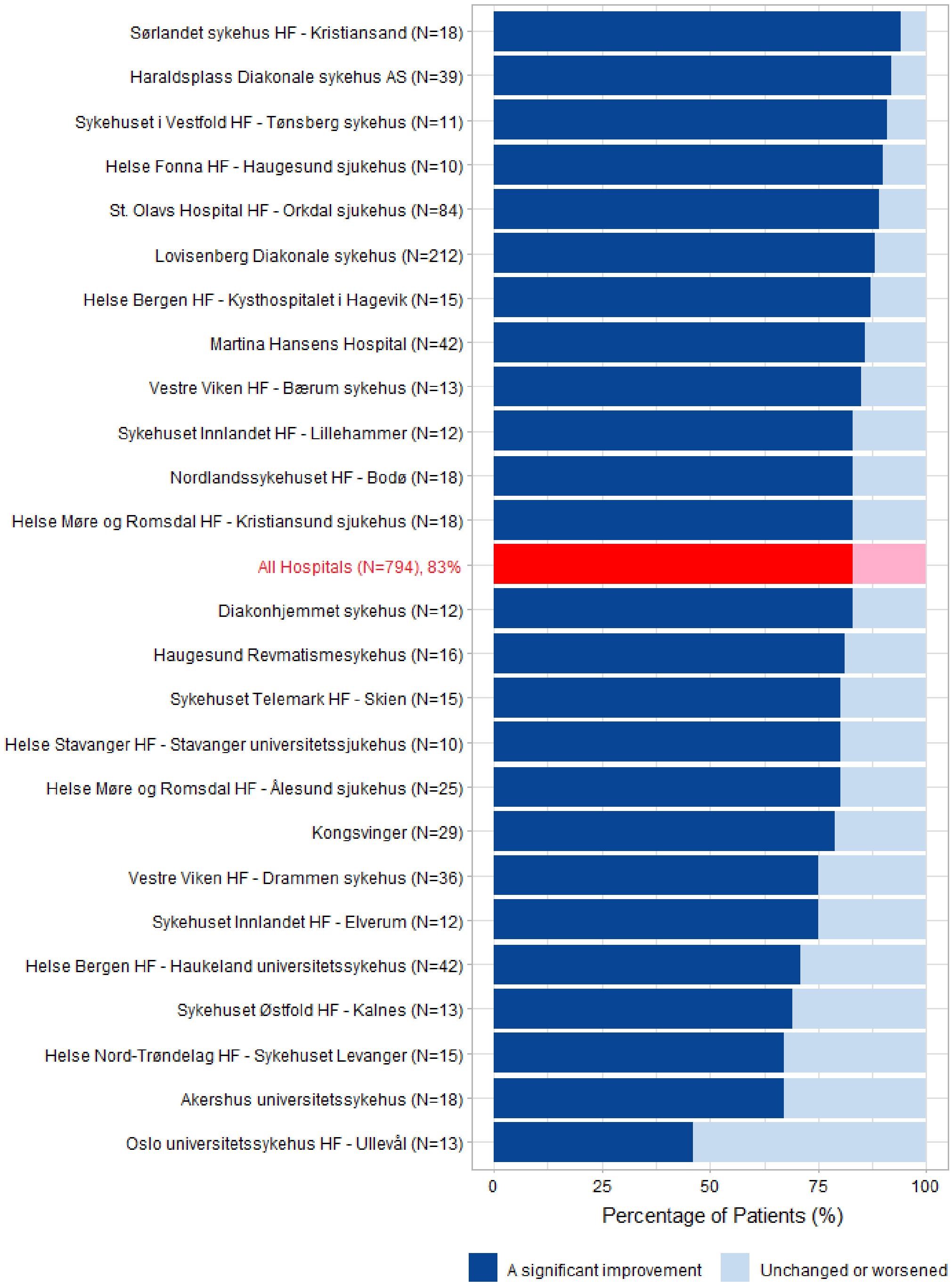
Patients have responded to the question ”How is your ability to perform daily activities now compared to before the operation (sleep, comb hair, exercise, dress yourself, how often are you reminded of shoulder problems)?” The options ”Less, a significant improvement” and ”Slightly less, enough to be a significant improvement” are categorized in dark blue in the figure as ”a significant improvement.” The other options ”Very little change, not enough to be a significant improvement”, ”Unchanged”, ”Very little change, not enough to be a significant worsening”, ”Slightly more, enough to be a significant worsening”, and ”More, a significant worsening” are categorized in light blue as ”Unchanged or worsening.” Only hospitals with at least 10 responses are shown in the figure.

Figure C.20 (b): Anchor questions for WOOS-ADL 1 year after primary operation with acute fracture, 2020-2023



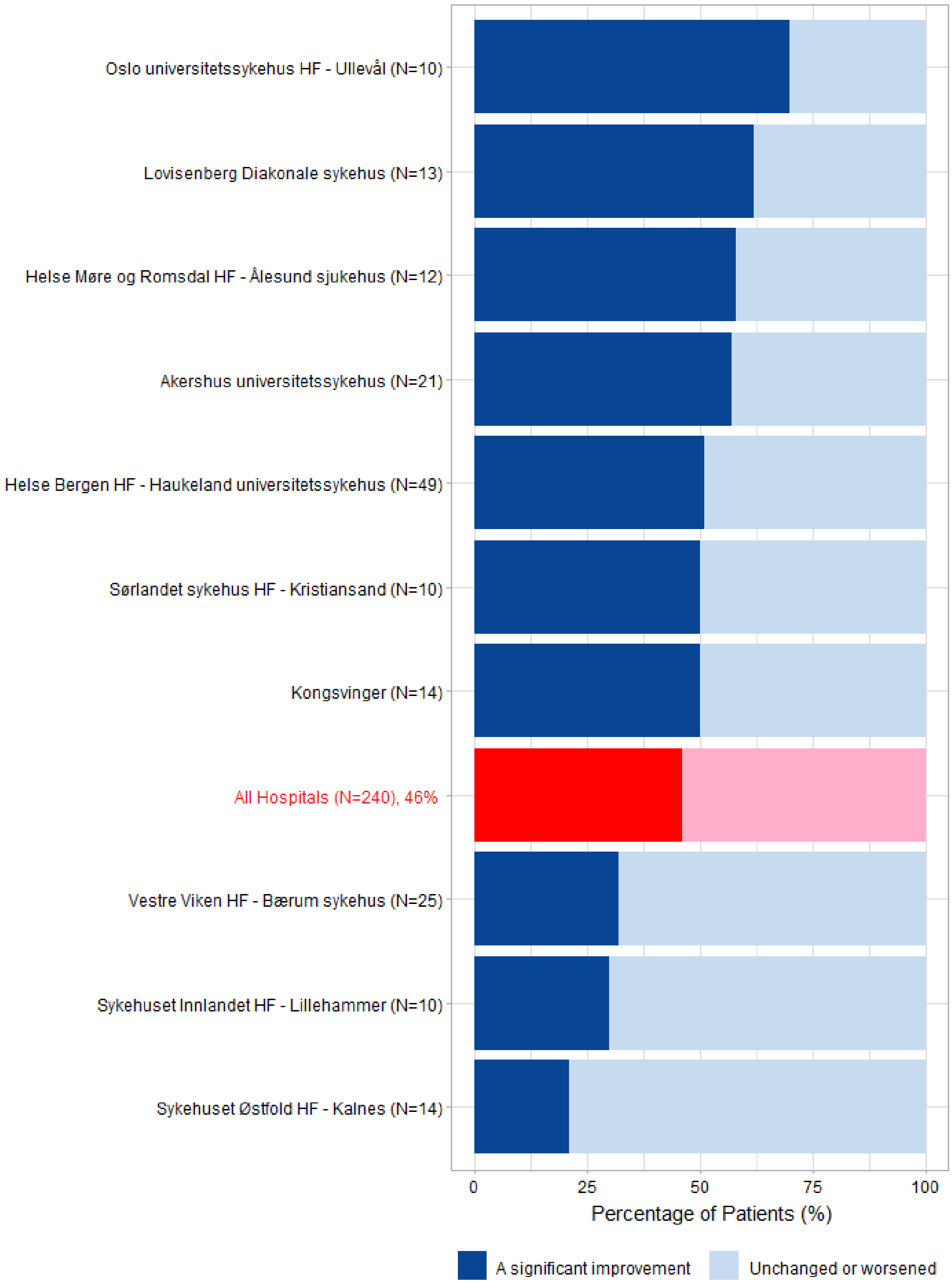
Patients have responded to the question ”How is your ability to perform daily activities now compared to before the operation (sleep, comb hair, exercise, dress yourself, how often are you reminded of shoulder problems)?” The options ”Less, a significant improvement” and ”Slightly less, enough to be a significant improvement” are categorized in dark blue in the figure as ”a significant improvement.” The other options ”Very little change, not enough to be a significant improvement”, ”Unchanged”, ”Very little change, not enough to be a significant worsening”, ”Slightly more, enough to be a significant worsening”, and ”More, a significant worsening” are categorized in light blue as ”Unchanged or worsening.” Only hospitals with at least 10 responses are included in the figure.

Figure C.21 (a): Anchor questions for WOOS-SPORT 1 year after primary operation without acute fracture, 2020-2023



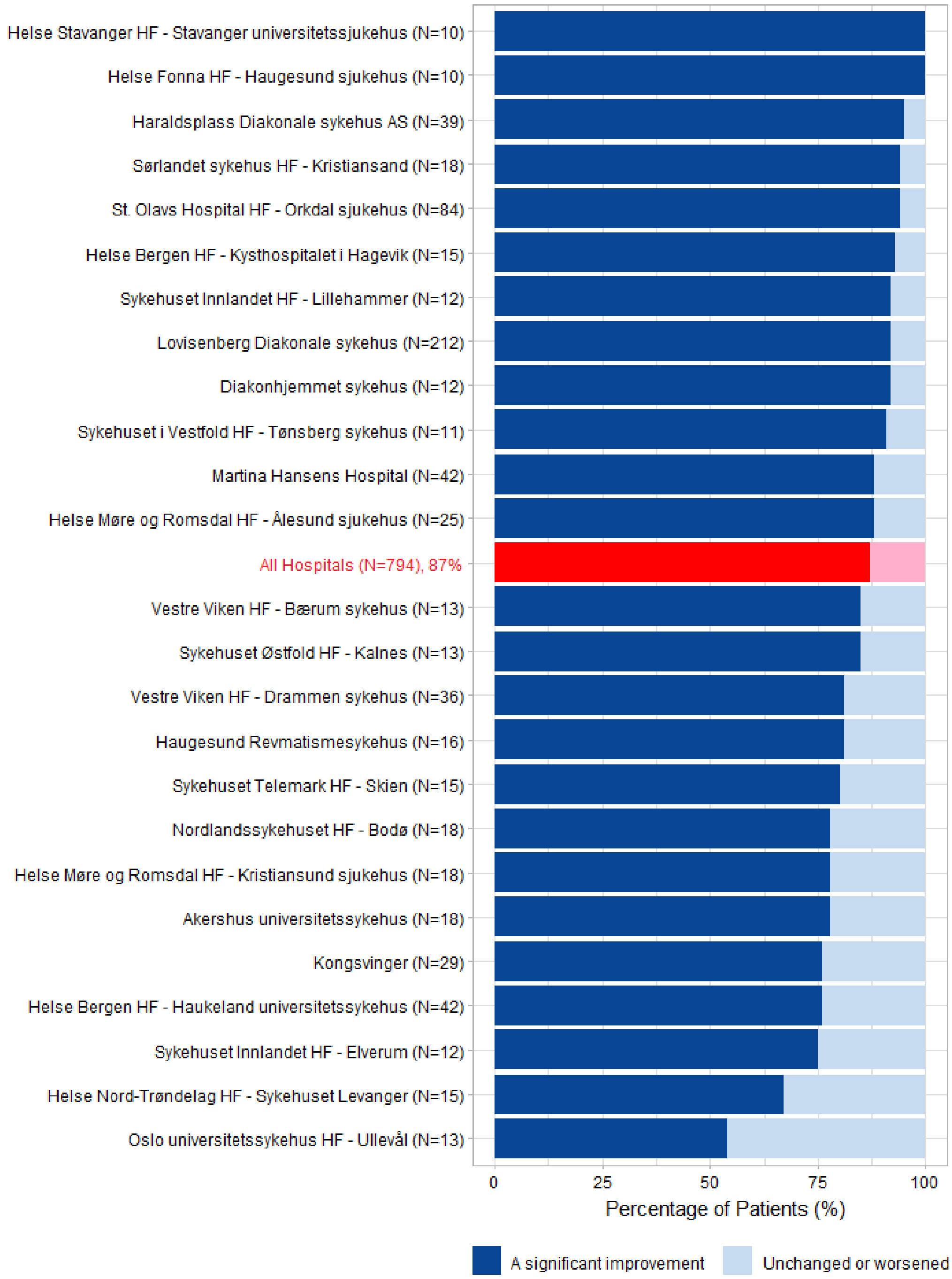
Patients have responded to the question ”How is your ability to perform sports and leisure activities now compared to before the operation (lifting/carrying/pushing/throwing)?” The options ”Better, a significant improvement” and ”Slightly better, enough to be a significant improvement” are categorized in dark blue in the figure as ”a significant improvement.” The other options ”Very little change, not enough to be a significant improvement”, ”Unchanged”, ”Very little change, not enough to be a significant worsening”, ”Slightly more, enough to be a significant worsening”, and ”More, a significant worsening” are categorized in light blue as ”Unchanged or worsening.” Only hospitals with at least 10 responses are shown in the figure.

Figure C.21 (b): Anchor questions for WOOS-SPORT 1 year after primary operation with acute fracture, 2020-2023



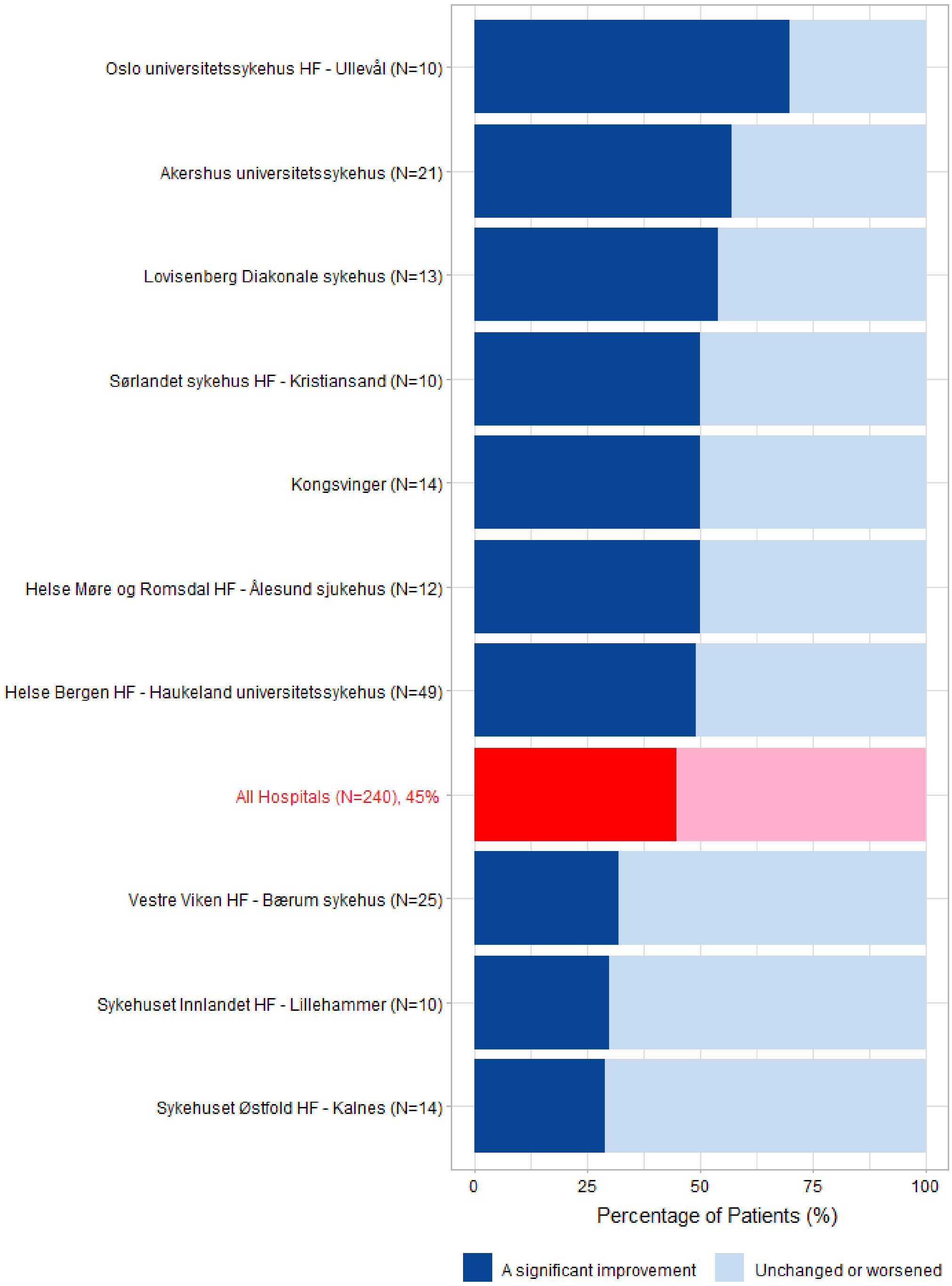
Patients have responded to the question "How is your ability to perform sports and leisure activities now compared to before the operation (lifting/carrying/pushing/throwing)?" The options "Better, a significant improvement" and "Slightly better, enough to be a significant improvement" are categorized in dark blue in the figure as "a significant improvement." The other options "Very little change, not enough to be a significant improvement", "Unchanged", "Very little change, not enough to be a significant worsening", "Slightly more, enough to be a significant worsening", and "More, a significant worsening" are categorized in light blue as "Unchanged or worsening." Only hospitals with at least 10 responses are shown in the figure.

Figure C.22 (a): Anchor questions for WOOS-CONCERN and FRUSTRATION 1 year after primary operation without acute fracture, 2020-2023



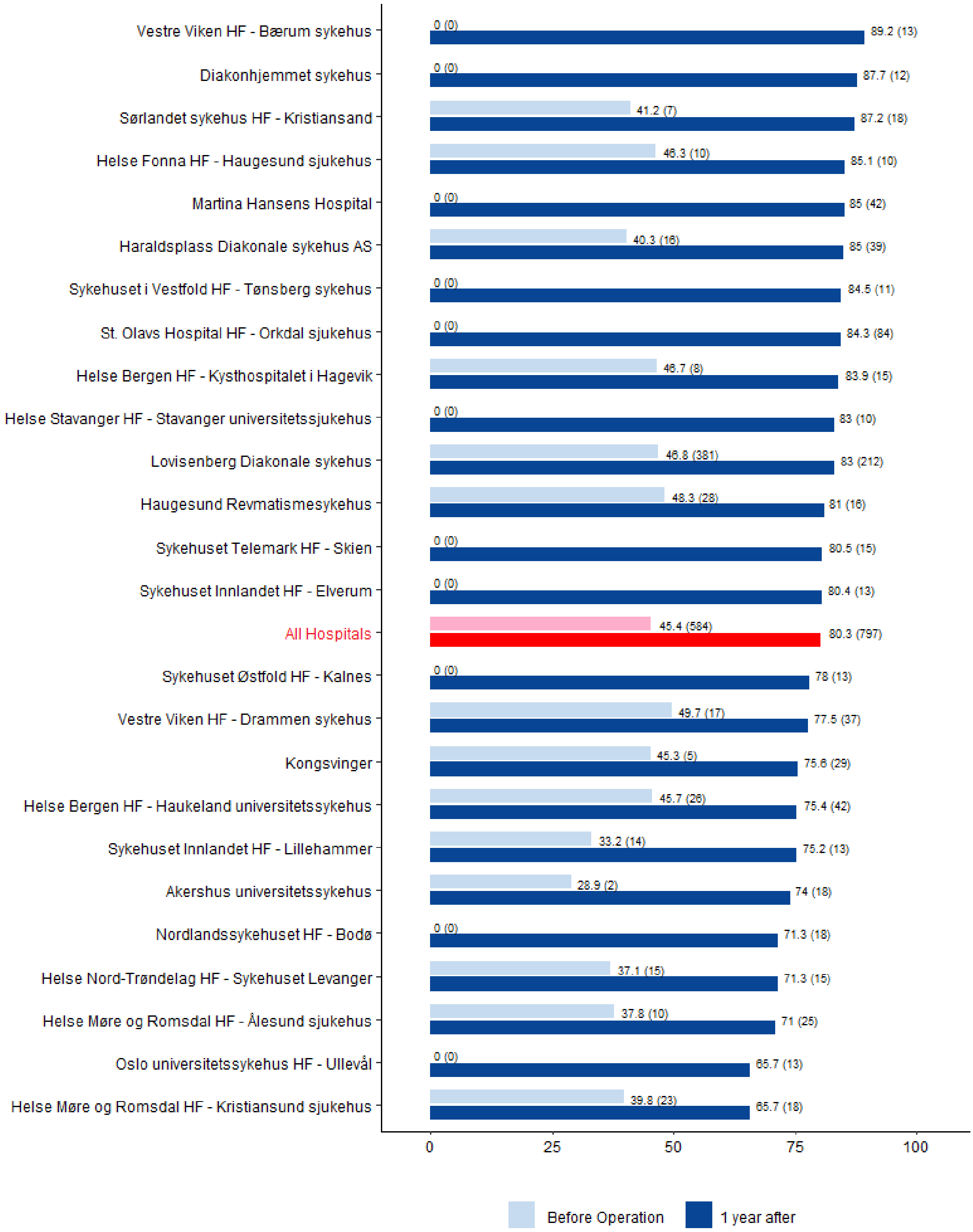
Patients have responded to the question ”How much do you worry and feel frustrated about your shoulder function now compared to before the operation?” The options ”Less, a significant improvement” and ”Slightly less, enough to be a significant improvement” are categorized in dark blue in the figure as ”a significant improvement.” The other options ”Very little change, not enough to be a significant improvement”, ”Unchanged”, ”Very little change, not enough to be a significant worsening”, ”Slightly more, enough to be a significant worsening”, and ”More, a significant worsening” are categorized in light blue as ”Unchanged or worsening.” Only hospitals with at least 10 responses are shown in the figure.

Figure C.22 (b): Anchor questions for WOOS-CONCERN and FRUSTRATION 1 year after primary operation with acute fracture, 2020-2023



Patients have responded to the question ”How much do you worry and feel frustrated about your shoulder function now compared to before the operation?” The options ”Less, a significant improvement” and ”Slightly less, enough to be a significant improvement” are categorized in dark blue in the figure as ”a significant improvement.” The other options ”Very little change, not enough to be a significant improvement”, ”Unchanged”, ”Very little change, not enough to be a significant worsening”, ”Slightly more, enough to be a significant worsening”, and ”More, a significant worsening” are categorized in light blue as ”Unchanged or worsening.” Only hospitals with at least 10 responses are shown in the figure.

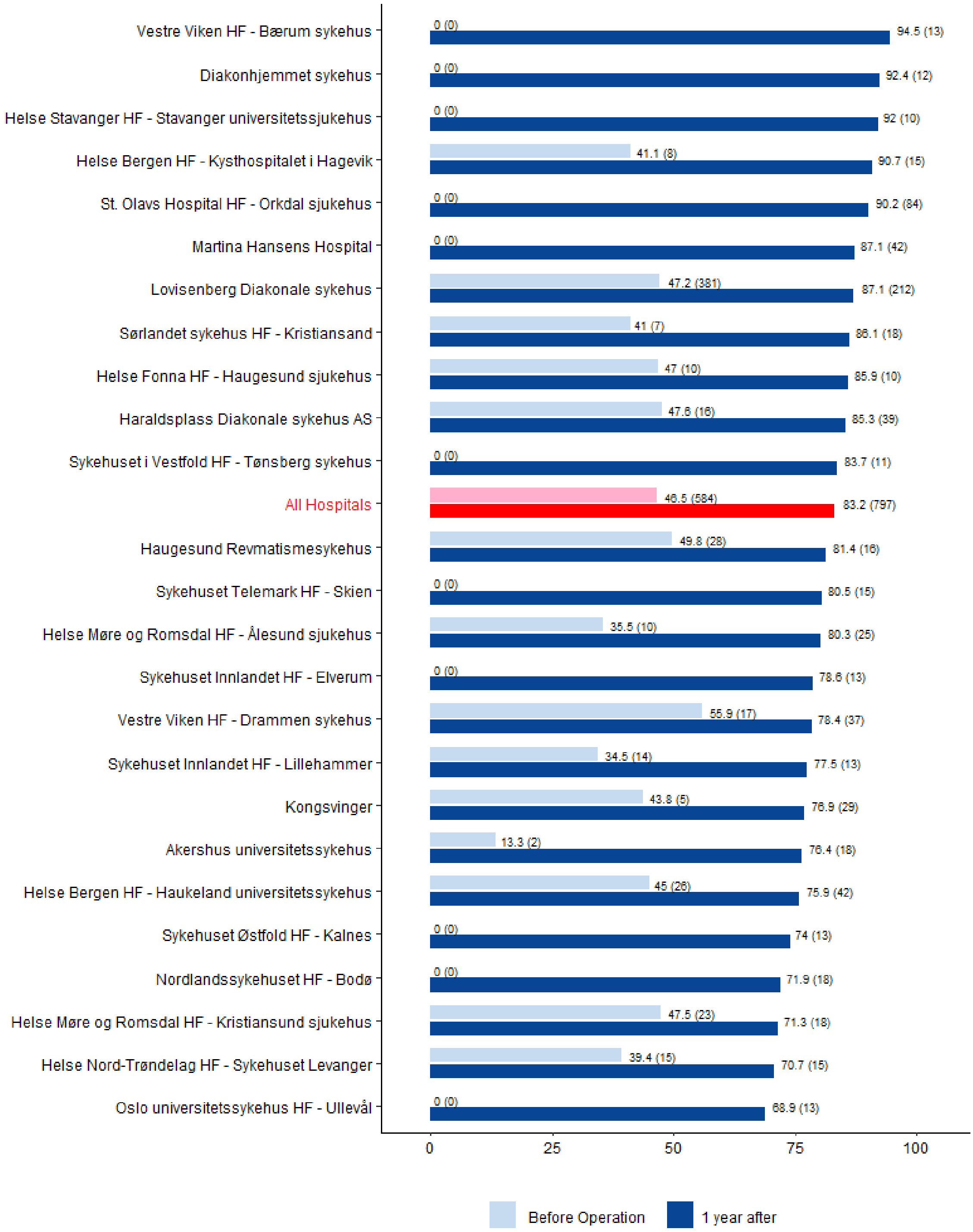
Figure C.23: Average WOOS-SYMPTOMS score for all primary operations before and 1 year after operation without acute fracture * (Number of completed forms)



* 100 is the best possible score

Only hospitals with more than 10 responses are shown in the figure.

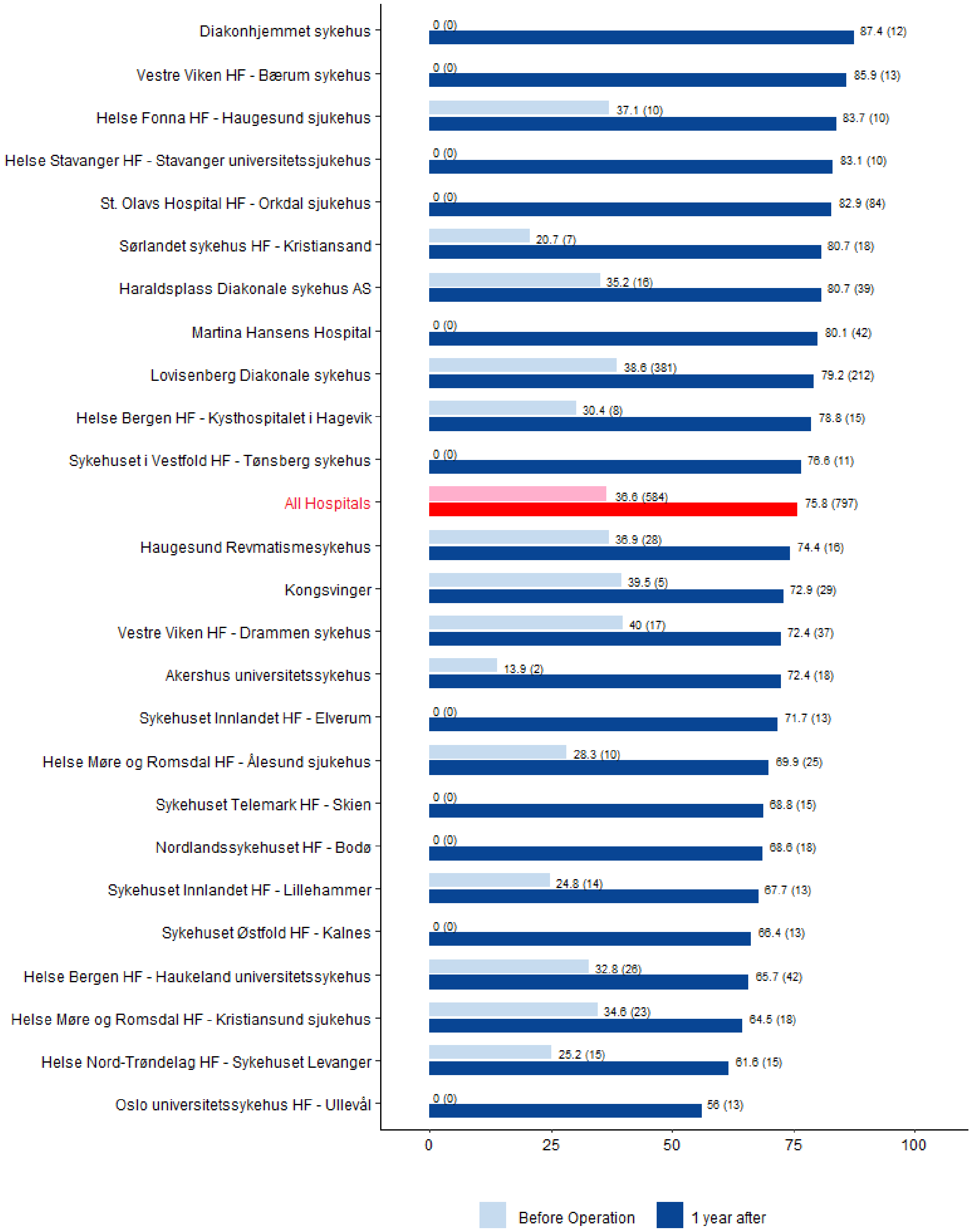
Figure C.24: Average WOOS-ADL score for all primary operations before and 1 year after operation without acute fracture * (Number of completed forms)



* 100 is the best possible score

Only hospitals with more than 10 responses are shown in the figure.

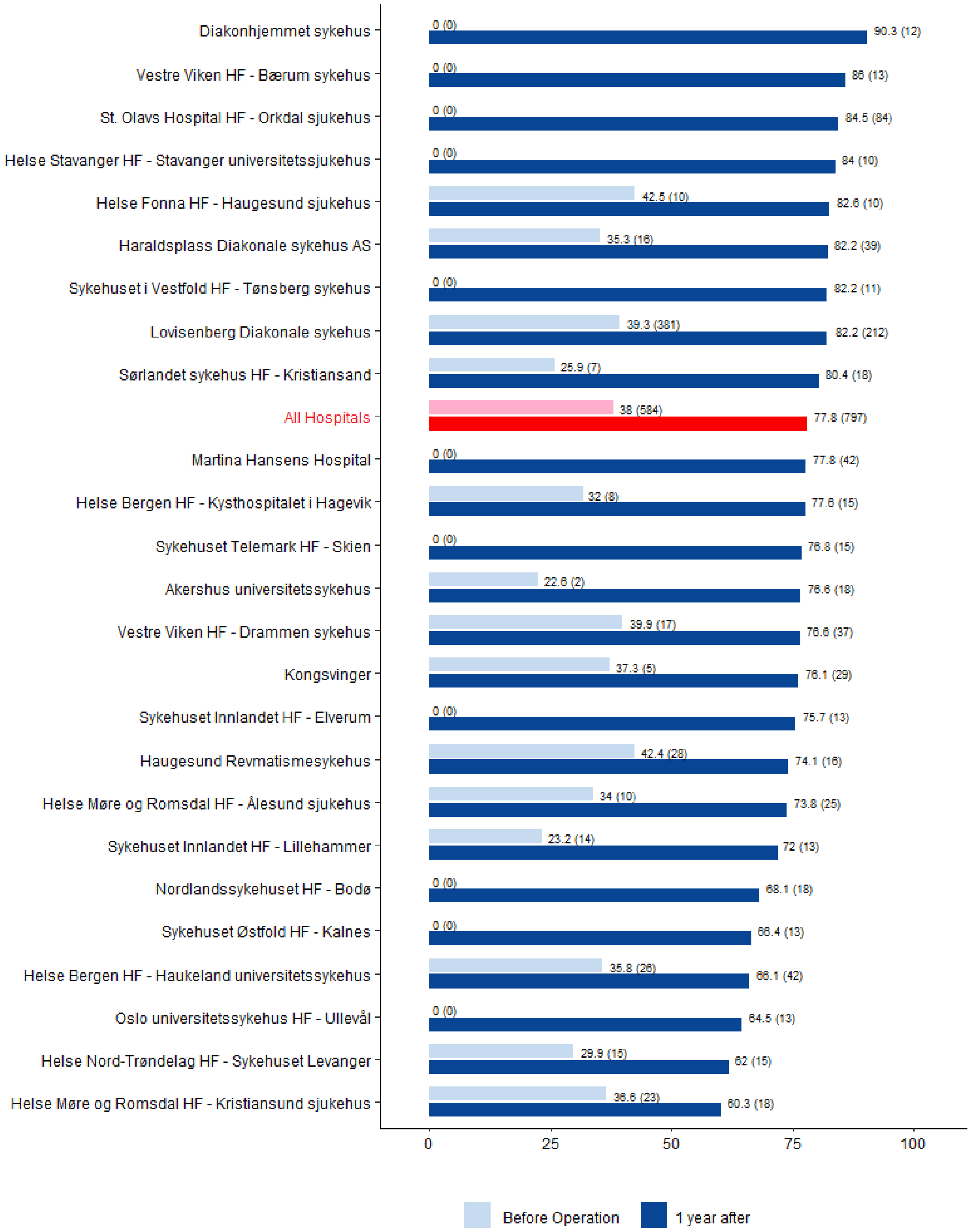
Figure C.25: Average WOOS-SPORT score for all primary operations before and 1 year after operation without acute fracture * (Number of completed forms)



* 100 is the best possible score

Only hospitals with more than 10 responses are shown in the figure.

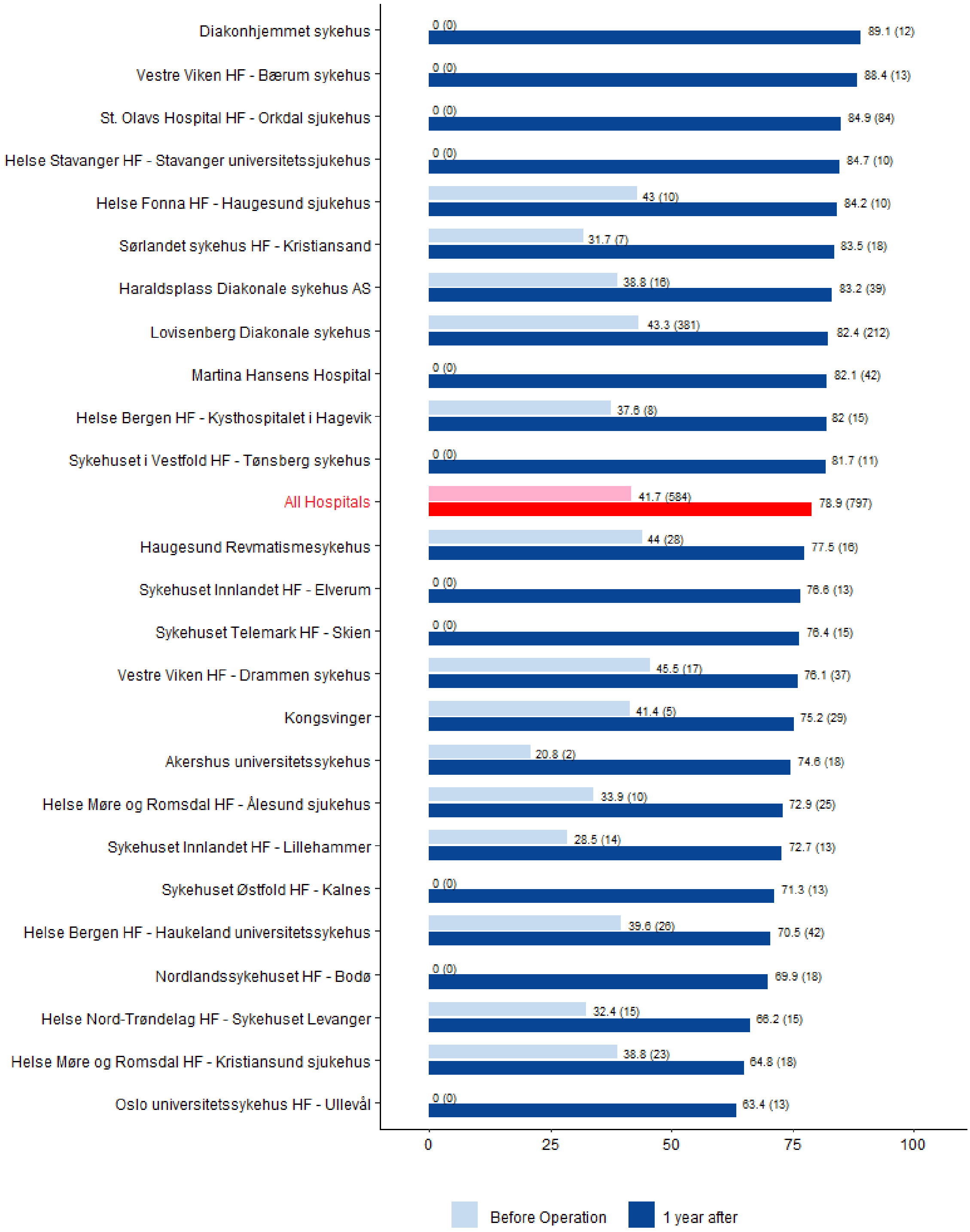
Figure C.26: Average WOOS-QOL score for all primary operations before and 1 year after operation without acute fracture * (Number of completed forms)



* 100 is the best possible score

Only hospitals with more than 10 responses are shown in the figure.

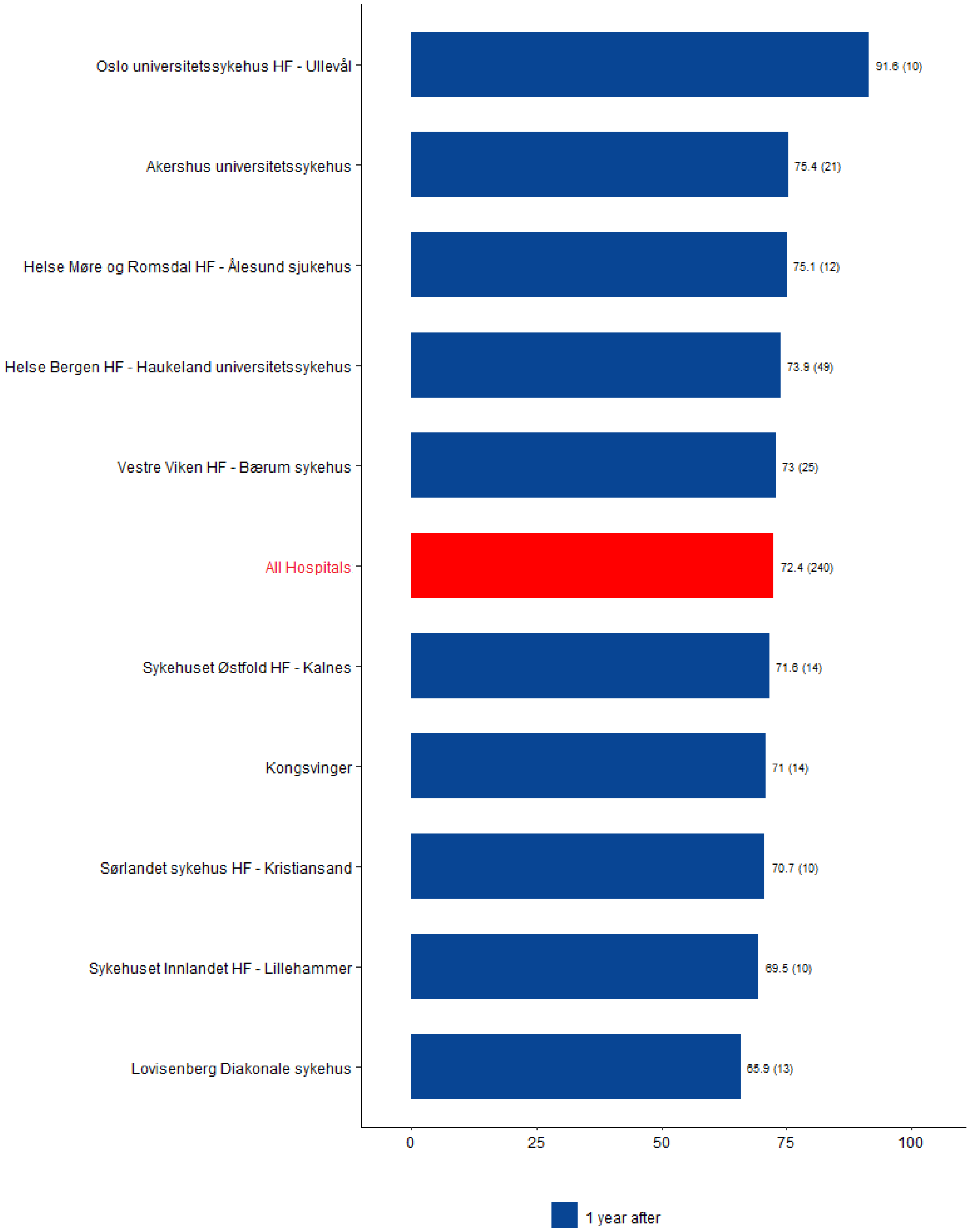
Figure C.27 (a): Average WOOS-TOTAL score for all primary operations before and 1 year after operation without acute fracture * (Number of completed forms)



* 100 is the best possible score

Only hospitals with more than 10 responses are shown in the figure.

Figure C.27 (b): Average WOOS-TOTAL score for all primary operations 1 year after operation with acute fracture * (Number of completed forms)



* 100 is the best possible score

Only hospitals with more than 10 responses are shown in the figure.

Completeness of reporting analysis for the Shoulder Arthroplasty Register, 2021-2023

A completeness of reporting analysis for the Shoulder Arthroplasty Register has been conducted by combining the data in the Register with data from the Norwegian Patient Register (NPR). The report and analysis were prepared by the NPR in collaboration with the Shoulder Arthroplasty Register (NAR). There are separate statistics on primary operations and revisions.

NCSP codes for combining data from NPR hospital stays and the Shoulder Arthroplasty Register

Type	Code	Description
Primæroperasjon	NBB 0y	Primary partial prosthetic replacement of humero-scapular joint not using cement
	NBB 1y	Primary partial prosthetic replacement of humero-scapular joint using cement
	NBB 20	Primary total prosthetic replacement of humero-scapular joint not using cement
	NBB 30	Primary total prosthetic replacement of humero-scapular joint using hybrid technique
	NBB 40	Primary total prosthetic replacement of humero-scapular joint using cement
	NBB 70	Primary total reconstruction prosthesis replacement of humero-scapular joint
	NBB 72	Primary total reconstruction prosthesis replacement of proximal humero-scapular joint, includes partial prosthesis
	NBB 76	Primary distal humero-scapular reconstruction prosthesis, combined with elbow-joint
	NBB 99	Other primary prosthetic replacement in joint of shoulder
Revision (level 1)	NBC 0y	Secondary implantation of partial prosthesis in humero-scapular joint not using cement Excludes: Of component of total prosthesis
	NBC 1y	Secondary implantation of partial prosthesis in humero-scapular joint using cement Excludes: Of component of total prosthesis
	NBC 2y	Secondary implantation of total prosthesis in humero-scapular joint not using cement Includes: Of component of total prosthesis
	NBC 3y	Secondary implantation of total prosthesis in humero-scapular joint using hybrid technique Includes: Of component of total prosthesis
	NBC 4y	Secondary implantation of total prosthesis in humero-scapular joint using cement
	NBC 70	Secondary total reconstruction prosthesis replacement of humero-scapular joint
	NBC 72	Secondary total reconstruction prosthesis replacement of proximal humero-scapular joint, includes partial prosthesis
	NBC 76	Secondary distal humero-scapular reconstruction prosthesis, combined with elbow-joint
	NBC 99	Other secondary prosthetic replacement in joint of shoulder
	NBU 0y	Removal of partial prosthesis from humero-scapular joint
	NBU 1y	Removal of total prosthesis from humero-scapular joint

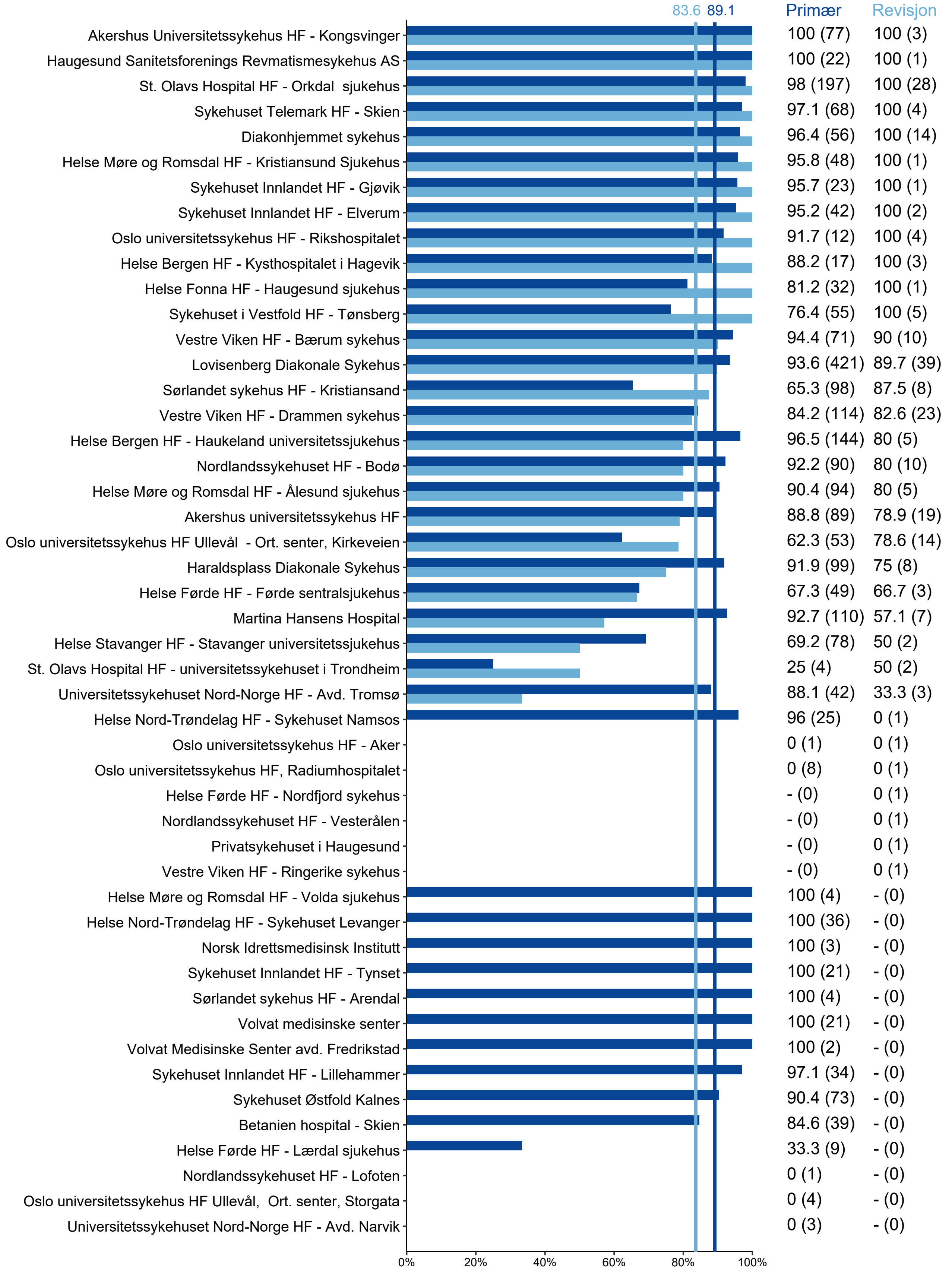
Primary operations. From 2021-2023, 2493 primary total shoulder arthroplasties were reported to one or both of the registers. 89.1% were reported to the NAR while 97% were reported to the NPR. Completeness of reporting varies much between the different hospitals. For hospitals with a low completeness of reporting rate for the NAR, either the form was not sent, or other interventions than elbow arthroplasties were incorrectly coded with NBB0*/NBB 1*/NBB 20/NBB 30/NBB 40.

Procedure codes to be used for primary operations:
NBB 0* - NBB 1* - NBB 20 - NBB 30 - NBB 40

Revision operations. From 2021-2023, 232 revisions were reported to one or both of the registers. 83.6% of these were reported to the NAR, while 81.9% were reported to the NPR (revision level 1). Completeness of reporting varies much between the different hospitals. A low completeness of reporting rate may mean that the form was not sent in. It appears that a number of revision forms are missing in cases where the prosthesis was removed without a new one being inserted in the same operation; in such cases, a form should be submitted both when the prosthesis is removed and when any new insertion is performed.

Procedure codes to be used for revision operations, level 1:
NBC 0* - NBC 1* - NBC 2* - NBC 3* - NBC 4* - NBC 99 - NBU 0* - NBU 1*

Completeness of reporting for primary operations and revisions, Shoulder prosthesis, 2021-2023



Dark blue bars and first number to the right of the bars gives completeness of reporting for primary operations. Light blue bars and second number to the right of the bars gives completeness of reporting for revision operations (level 1). The numbers in brackets gives the number of operations registered at both NAR and NPR. Vertical lines shows the national averages.

CONTENTS

Norwegian Hip Fracture Register

Report 2024

Nasjonalt Hoftebruddregister

Highlights from 2023

Reporting

	Reported 2005-2023	Reported In 2023
Primary operations	154,442	8,143
Reoperations	16,575	807

45 Reporting hospitals

100% Of hospitals

56% Electronic reporting of operations

Completeness

85.6% Of primary osteosyntheses

91.6% of primary hemi arthroplasties

93.8% of primary total arthroplasties

PROM

Patient reported data

Time after operation	Reported 2005-2023	Reported In 2023
4 months	61,846	2,732
12 months	52,122	2,916
36 months	32,811	2,005

Results and activities

Quality indicators

99 %	Prosthesis used in patients > 70 years with displaced femoral neck fracture
97 %	Cemented hemiprostheses in patients > 70 years
95 %	Non-reoperated hip fractures within1 year
92 %	30-days survival
51 %	Operated within 24 hours
84 %	Operated within 48 hours

Quality projects

- Reduce rate of infection after hemi arthroplasty
- Increase proportion cemented hemi arthroplasties

6 Published papers

1 Finished PhD

4 Podium presentations

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HELSE VEST HELSE NORD HELSE SØR-ØST HELSE MIDT-NORGE

ANNUAL REPORT HIP FRACTURE REGISTER

The Norwegian Hip Fracture Register now contains data from 154,442 primary operations and 16,575 reoperations. In 2023, 8,143 primary operations and 807 reoperations were reported to the register. This means that there were fewer reported primary operations in 2023 than in the two preceding years. This is mainly due to significantly fewer reported operations from some particular hospitals. We will contact these hospitals to try to improve reporting. We also ask all hospitals to verify whether the number of reported operations to the Hip Fracture Register in 2023 matches their own records when the hospital-specific annual reports are sent out later this year.

The electronic registration solution available in MRS (Medical Registration System in the Norwegian Health Network) is now in use at most hospitals and seems to be working well. The proportion of electronic forms is increasing month by month. The advantage of electronic registration is both more accurate reporting and that hospitals immediately have access to their own data. Data from the Hip Fracture Register can therefore be used to a greater extent for local quality improvement. Hospitals that need assistance in transitioning to the electronic reporting solution can contact the register (nrl-support@helse-bergen.no or tel. 905 83 174). Instructions for electronic reporting are available at www.helse-bergen.no/nrl.

The Norwegian Advisory Unit for Medical Quality Registries evaluates all medical quality registries in Norway every year. In 2023, the Norwegian Hip Fracture Register was assessed as a Stage 4B register. To reach Stage 4A, there is a requirement to demonstrate results from quality improvement projects. Therefore, it is important that hospitals using data from the Hip Fracture Register in local quality improvement projects submit a brief report to the registry on the project and the results achieved. Since 2017, the Hip Fracture Register has presented online interactive results. Hospital-specific results are available at www.kvalitetsregistre.no. We hope that these interactive results will be used in local quality improvement efforts.

At the end of 2023, the new discharge form for the Hip Fracture Register was made available for use. So far, 14 hospitals have started reporting discharge data to the registry in MRS. The discharge form includes variables on preoperative walking function, preoperative nerve block, orthogeriatrics, the timing of first postoperative mobilization, fall prevention, nutritional interventions, osteoporosis treatment, medical complications during the hospital stay, and the level of care after discharge.

As a result, in addition to data from the operation itself, the Hip Fracture Register will now also include data from the perioperative course. These variables will form the basis for new quality indicators. Hospitals will have immediate access to their own data, and the results will be a useful tool for monitoring that patients with hip fractures are treated in accordance with the Norwegian multidisciplinary guidelines. The form does not necessarily need to be completed by a physician. Some hospitals have delegated this task to clinical development and research nurses or secretaries. This approach seems to be working well. We hope that hospitals that have not yet started using the new electronic form begin reporting as soon as possible.

During 2024, we will introduce three new quality indicators based on data from the new discharge form:

- The proportion of hip fracture patients over 65 years who were assessed by a geriatrician during their hospital stay.
- The proportion of hip fracture patients who were mobilized no later than the first postoperative day.

- The proportion of hip fracture patients over 50 years who were on anti-osteoporosis treatment at discharge.

These quality indicators are well-grounded in the Norwegian multidisciplinary guidelines for the treatment of hip fractures. Unfortunately, many hospitals currently do not have geriatric specialists available, which means these hospitals will likely achieve low compliance with the quality indicator measuring geriatric assessment. For these hospitals, the quality indicator can be used to highlight the need for orthogeriatrics at the hospital. Later this year, the registry will send out a detailed information letter about the new quality indicators.

In 2023, one PhD was completed using data from the Norwegian Hip Fracture Register.

Kirsten Marie Larsen Grønhaug defended her PhD on September 15, 2023, at the University of Bergen with her dissertation titled “Intramedullary Nails in the Treatment of Trochanteric and Subtrochanteric Fractures.”

The Hip Fracture Register congratulates Kirsten Marie on her important publications and, above all, on an outstanding defense!

PUBLICATIONS SINCE JANUARY 1, 2023

Anders Sund has published a paper examining the ability of orthopedic surgeons to identify pathological fractures. He validated all pathological fractures reported to the register between 2005 and 2019. The validation was conducted by reviewing X-rays, patient records, and biopsy results. Approximately one-third of the fractures reported as pathological (malignancy) turned out not to be so. After validation, 0.8% of the fractures in the Hip Fracture Register are pathological. Prostate, breast, and lung cancer were the most common causes of pathological fractures.

Jan-Erik Gjertsen has published a paper presenting the results of a quality improvement project aimed at increasing the proportion of cemented stems. The proportion of cemented hemiarthroplasties increased from 27% to 91% at the participating hospitals. The proportion of reoperations decreased from 5.9% in 2015-2017 to 3.3% in 2019-2021.

Cato Kjærvik investigated quality of life after hip fracture in a study linking data from the Norwegian Hip Fracture Register with data from the Norwegian Patient Registry and Statistics Norway. The study showed that quality of life is significantly reduced after a hip fracture. It also revealed that there is a significantly selected group of patients who respond to PROM (Patient-Reported Outcome Measures) questionnaires. Patients' health status and socioeconomic status affect both the response rate to the questionnaires and the patients' quality of life. This selection is important to be aware of when interpreting PROM data.

For more information, please refer to the publication list at the back of this year's report and on the register's website www.helse-bergen.no/nrl.

The Norwegian Hip Fracture Register is currently collaborating with several hospitals on studies on both national and local results. It is excellent that the register's extensive data is being used for research, and we encourage all researchers interested in using data from the Hip Fracture Register to get in touch.

Thank you to everyone for the excellent reporting, and we look forward to continuing the good collaboration!

Bergen, June 2024

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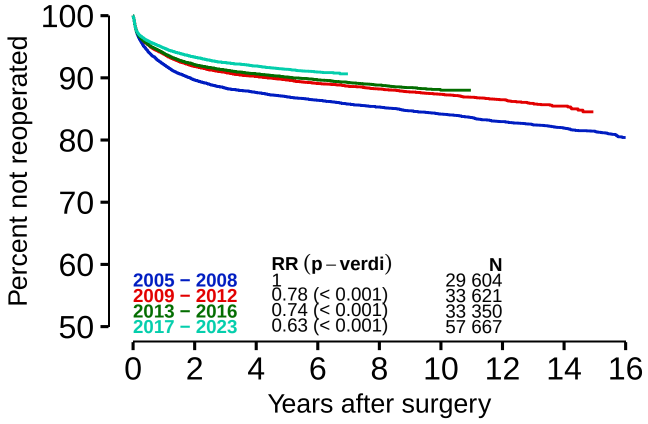
Consultant

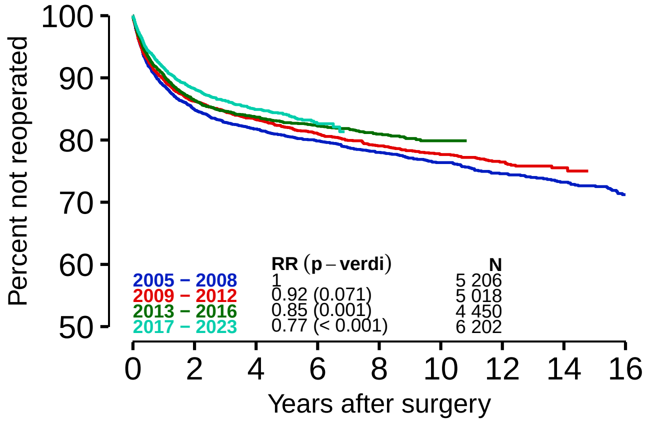
Irina Kvinnesland
IT consultant

Survival of hip fracture implants 2005−2023
Endpoint: All reoperations

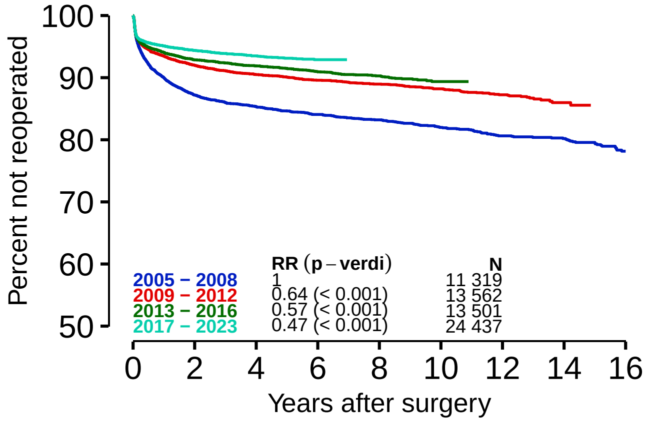
D.1) All hip fractures



D.2) Undisplaced femoral neck fractures

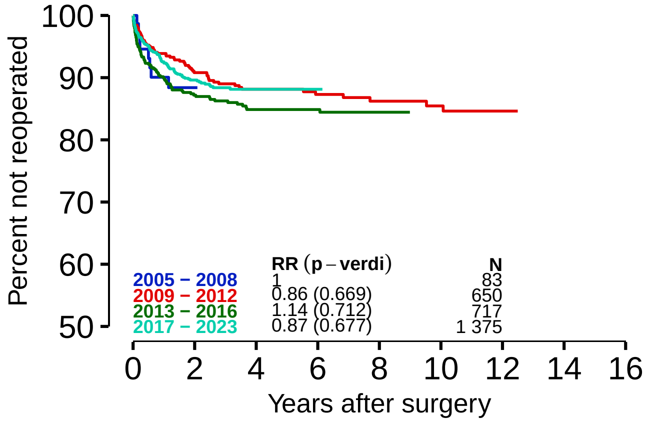


D.3) Displaced femoral neck fractures

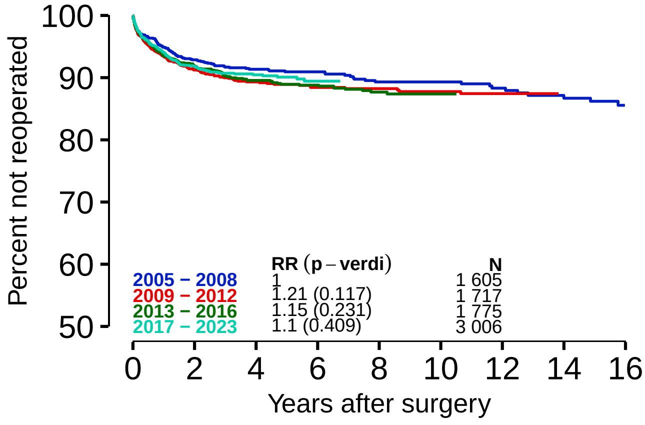


D.4) Trochanteric fractures (AO/OTA A1+A2)

D.5) Intertrochanteric fractures (AO/OTA A3)



D.6) Subtrochanteric fractures

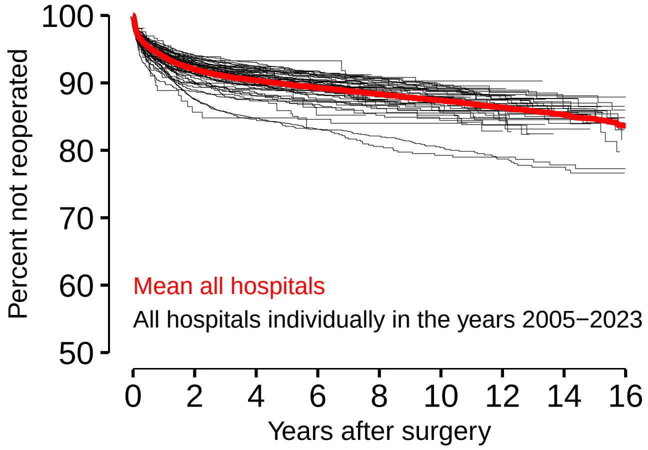


Kaplan−Meier estimated survival curves (unadjusted). Survival is calculated as long as the number of implants at risk of reoperation is greater than 50.

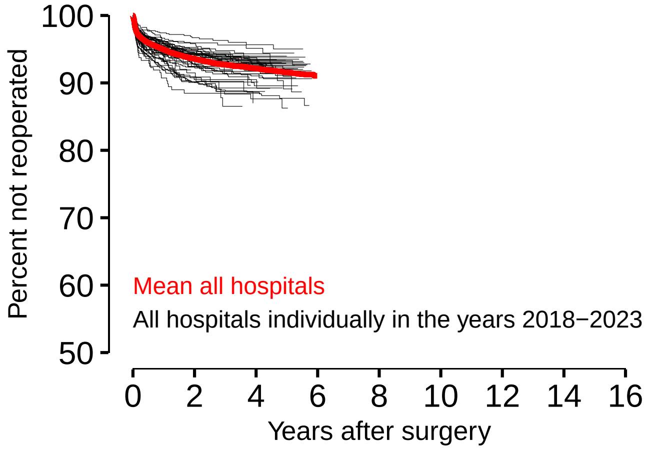
Rate Ratio (RR) is adjusted for age and gender.

Hospital results after hip fractures
Endpoint: All reoperations

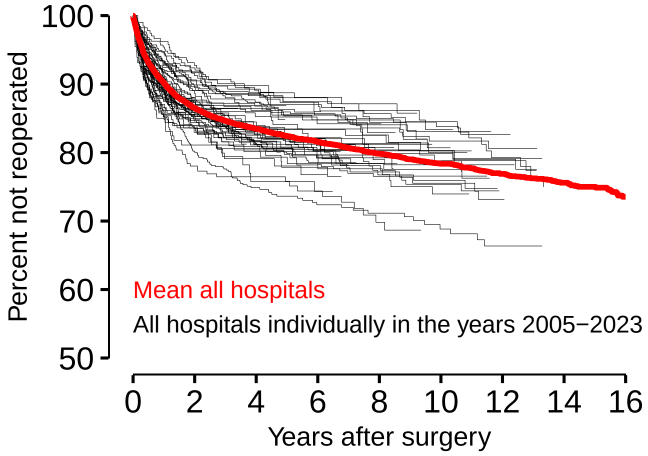
D.7) All hip fractures − 2005−2023



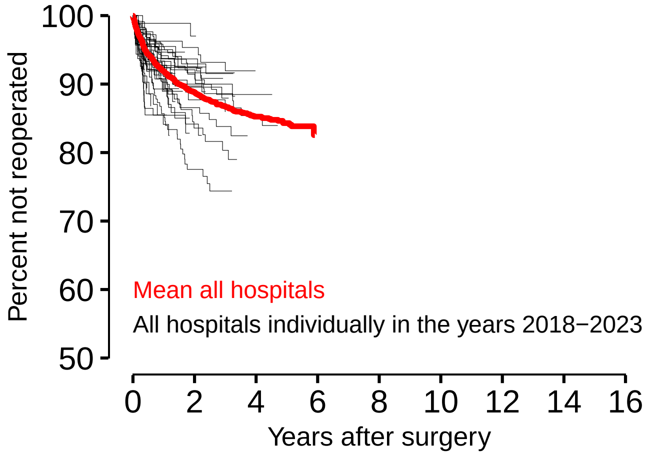
D.8) All hip fractures − 2018−2023



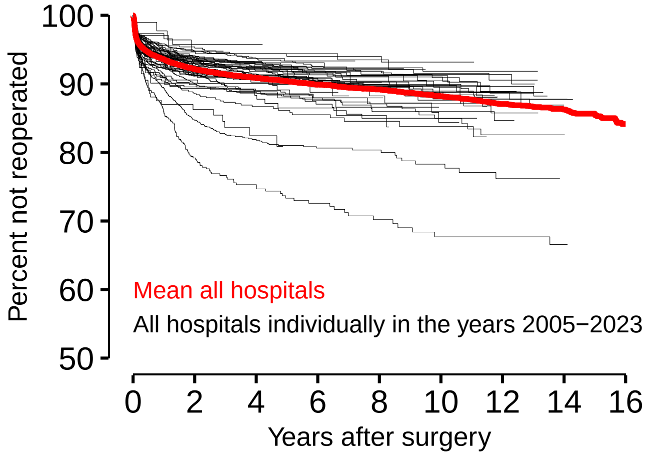
D.9) Undisplaced femoral neck fractures − 2005−2023



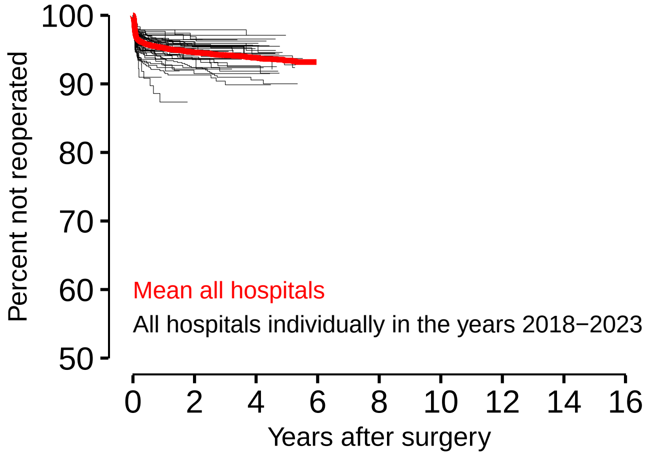
D.10) Undisplaced femoral neck fractures − 2018−2023



D.11) Displaced femoral neck fractures − 2005−2023

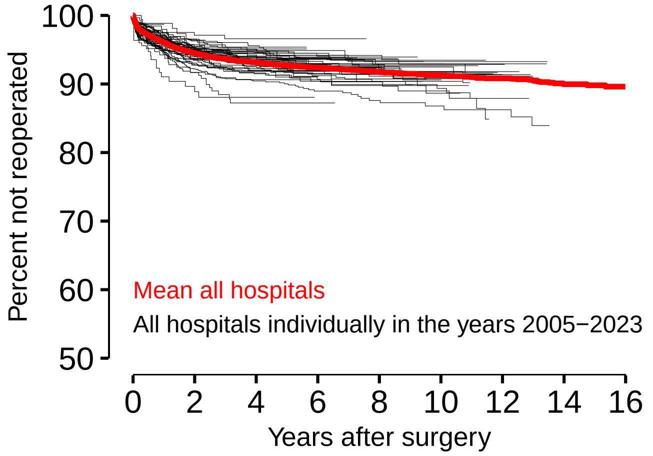


D.12) Displaced femoral neck fractures − 2018−2023

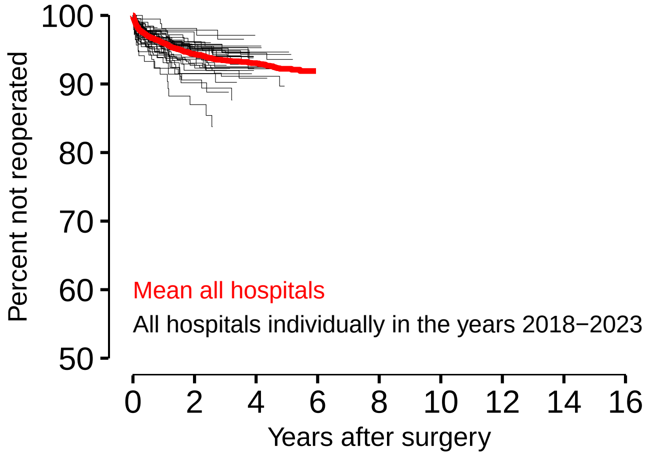


Hospital results after hip fractures
Endpoint: All reoperations

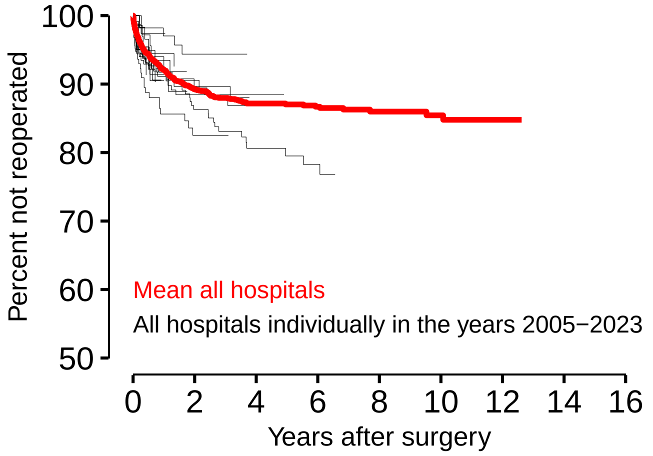
D.13) Trochanteric fractures (AO/OTA A1+A2) 2005−2023



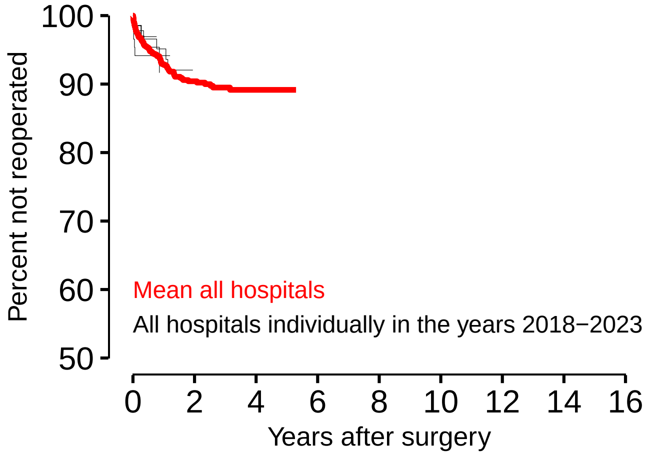
D.14) Trochanteric fractures (AO/OTA A1+A2) 2018−2023



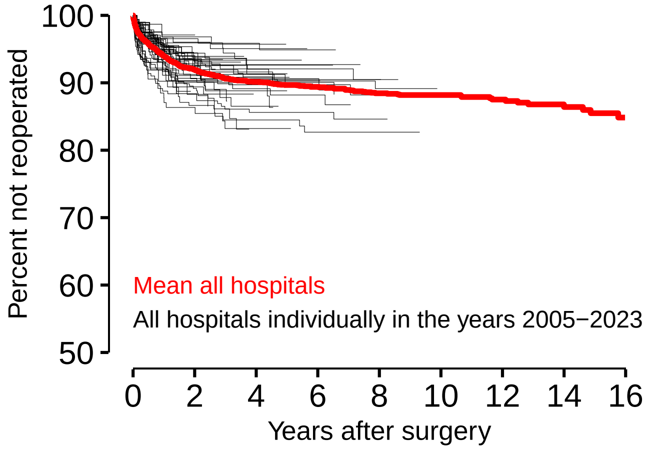
D.15) Intertrochanteric fractures (AO/OTA A3) 2005−2023



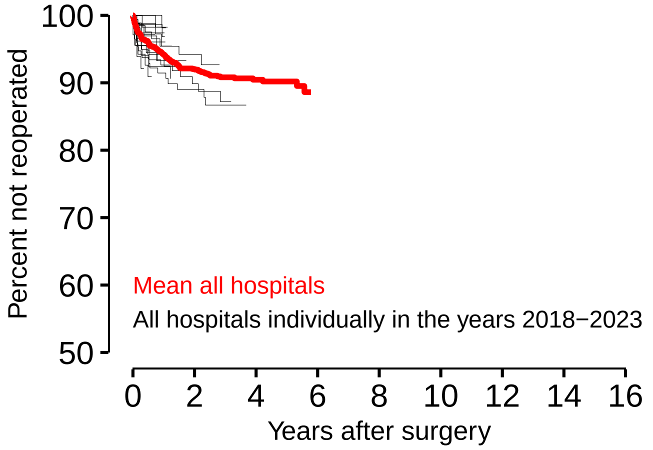
D.16) Intertrochanteric fractures (AO/OTA A3) 2018−2023



D.17) Subtrochanteric fractures − 2005−2023

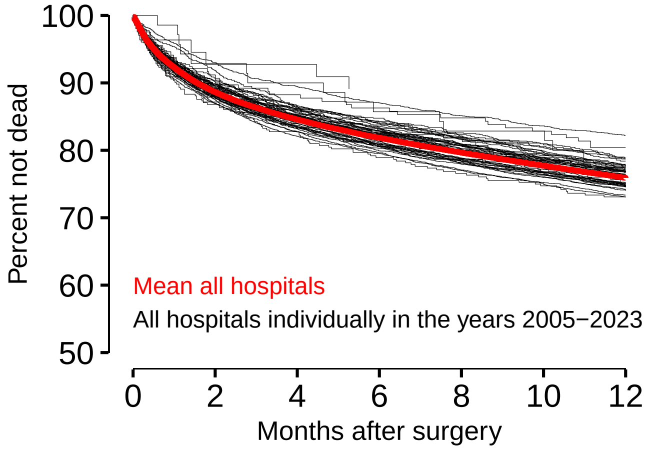


D.18) Subtrochanteric fractures − 2018−2023

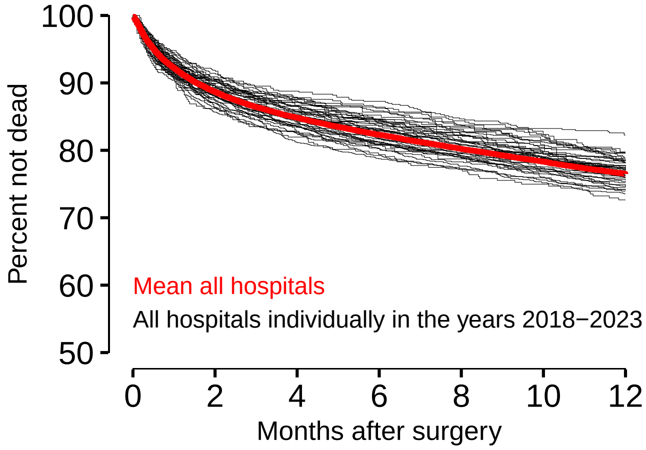


Hospital results after hip fractures
Endpoint: 1−year mortality

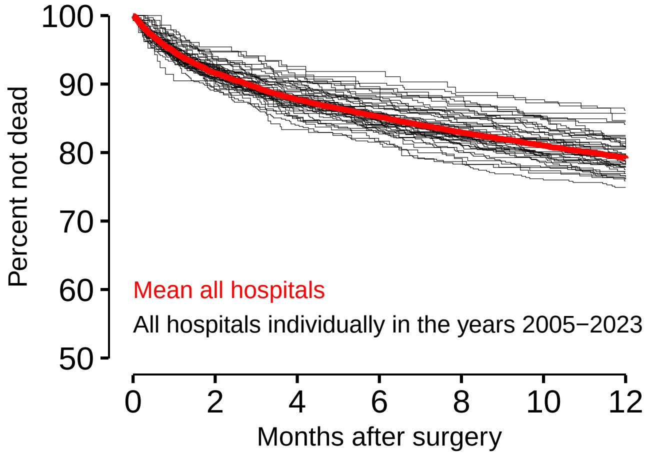
D.19) All hip fractures − 2005−2023



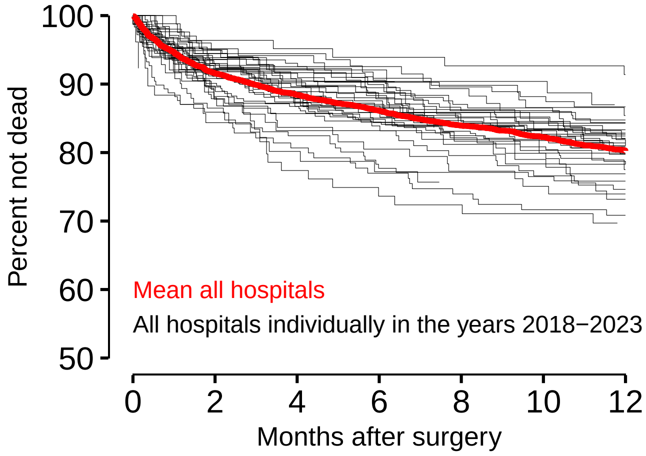
D.20) All hip fractures − 2018−2023



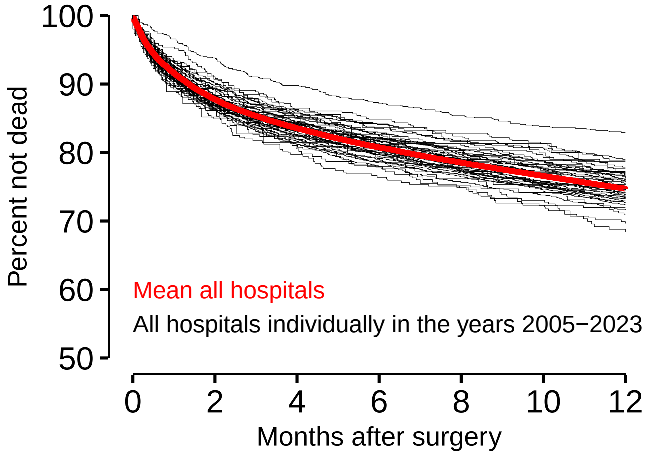
D.21) Undisplaced femoral neck fractures − 2005−2023



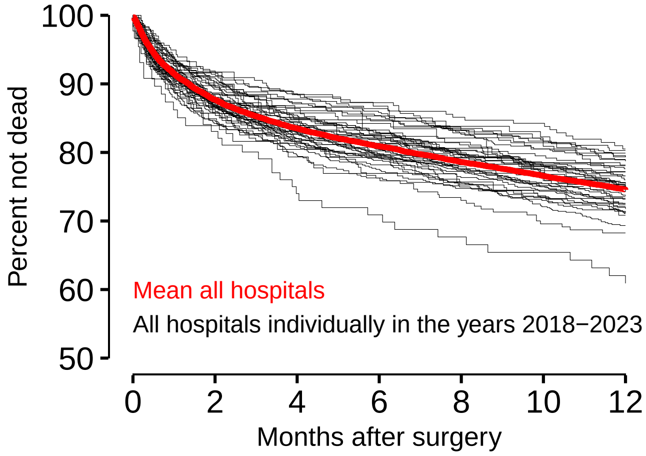
D.22) Undisplaced femoral neck fractures − 2018−2023



D.23) Displaced femoral neck fractures − 2005−2023

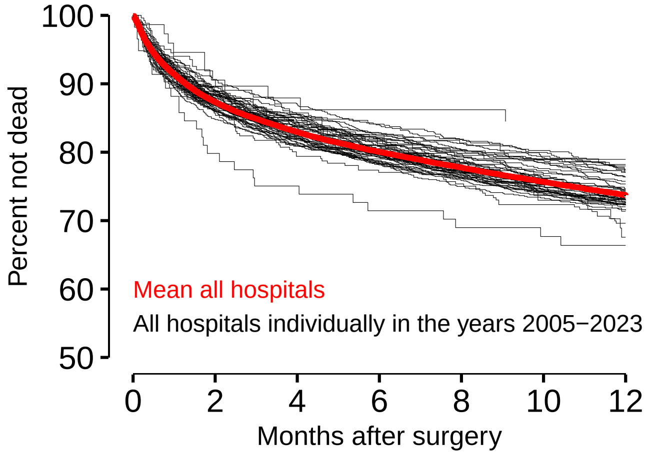


D.24) Displaced femoral neck fractures − 2018−2023

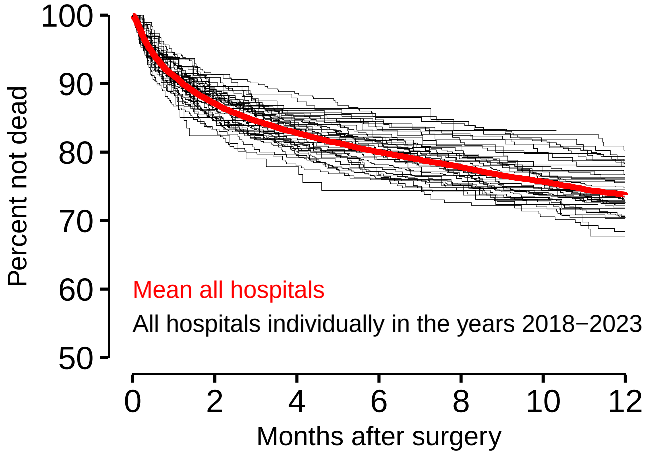


Hospital results after hip fractures
Endpoint: 1−year mortality

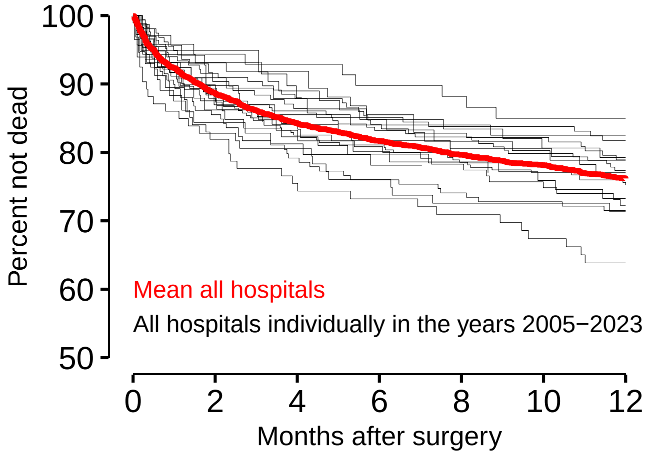
D.25) Trochanteric fractures (AO/OTA A1+A2) 2005−2023



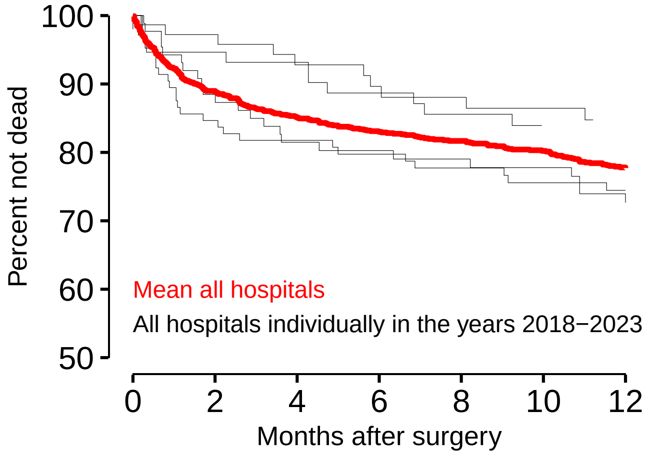
D.26) Trochanteric fractures (AO/OTA A1+A2) 2018−2023



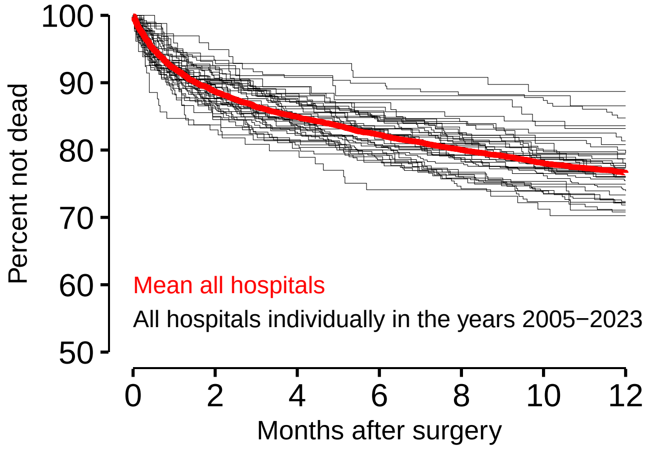
D.27) Intertrochanteric fractures (AO/OTA A3) 2005−2023



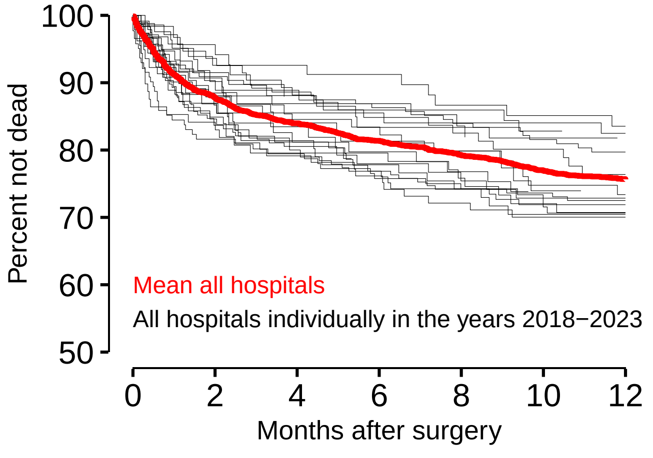
D.28) Intertrochanteric fractures (AO/OTA A3) 2018−2023



D.29) Subtrochanteric fractures 2005−2023



D.30) Subtrochanteric fractures 2018−2023



Hospital data

The Norwegian Hip Fracture Register is required to publish hospital data. These data are presented in the annual report to SKDE which is available at `www.kvalitetsregistre.no`. Figures D.32 to D.36 present updated results for the different hospitals for operations performed in the period 2021-2023.

Figure D.31: Number of primary operations in 2023 at each hospital

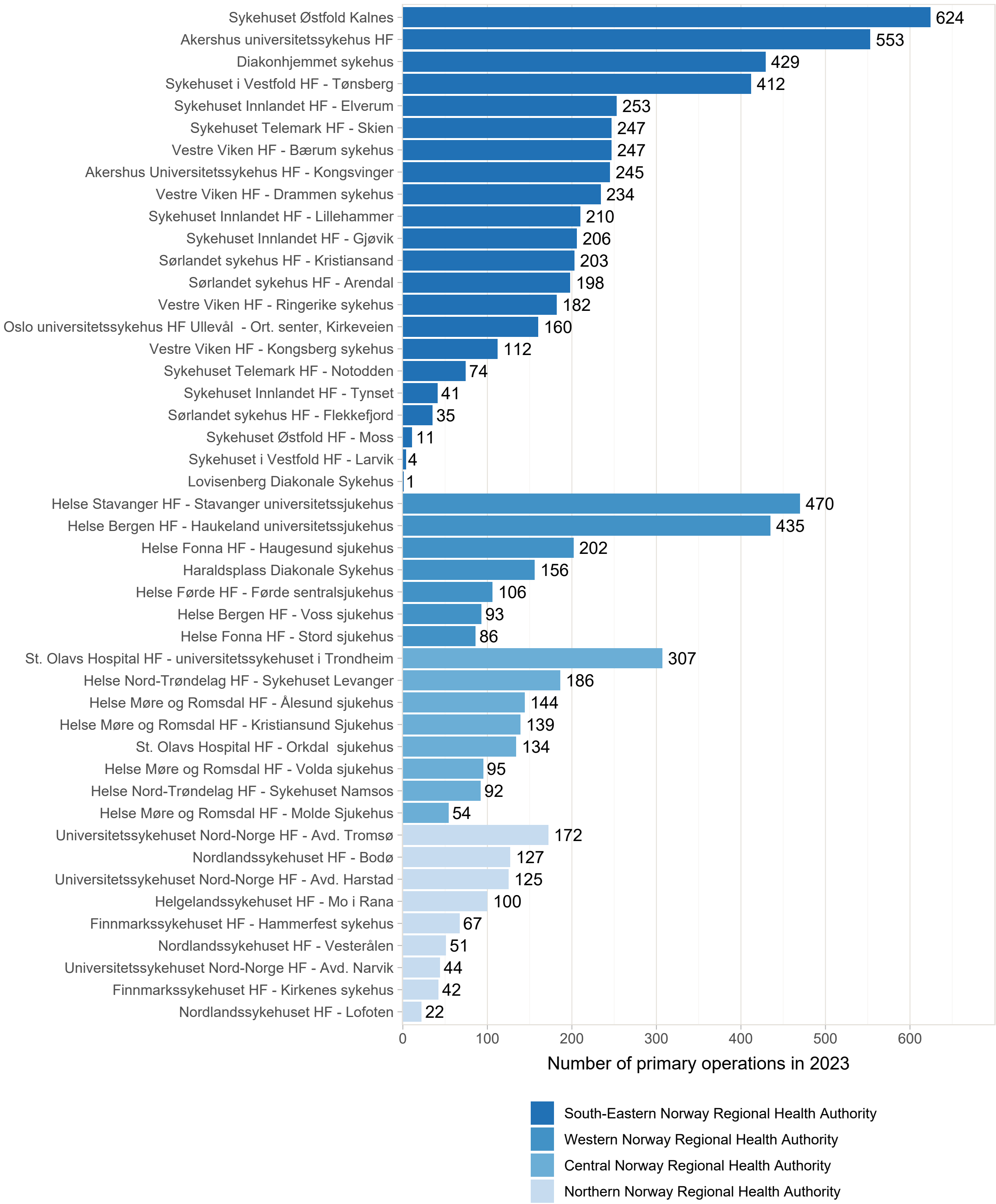


Figure D.32: Treatment of displaced femoral neck fractures in patients over 70 years of age

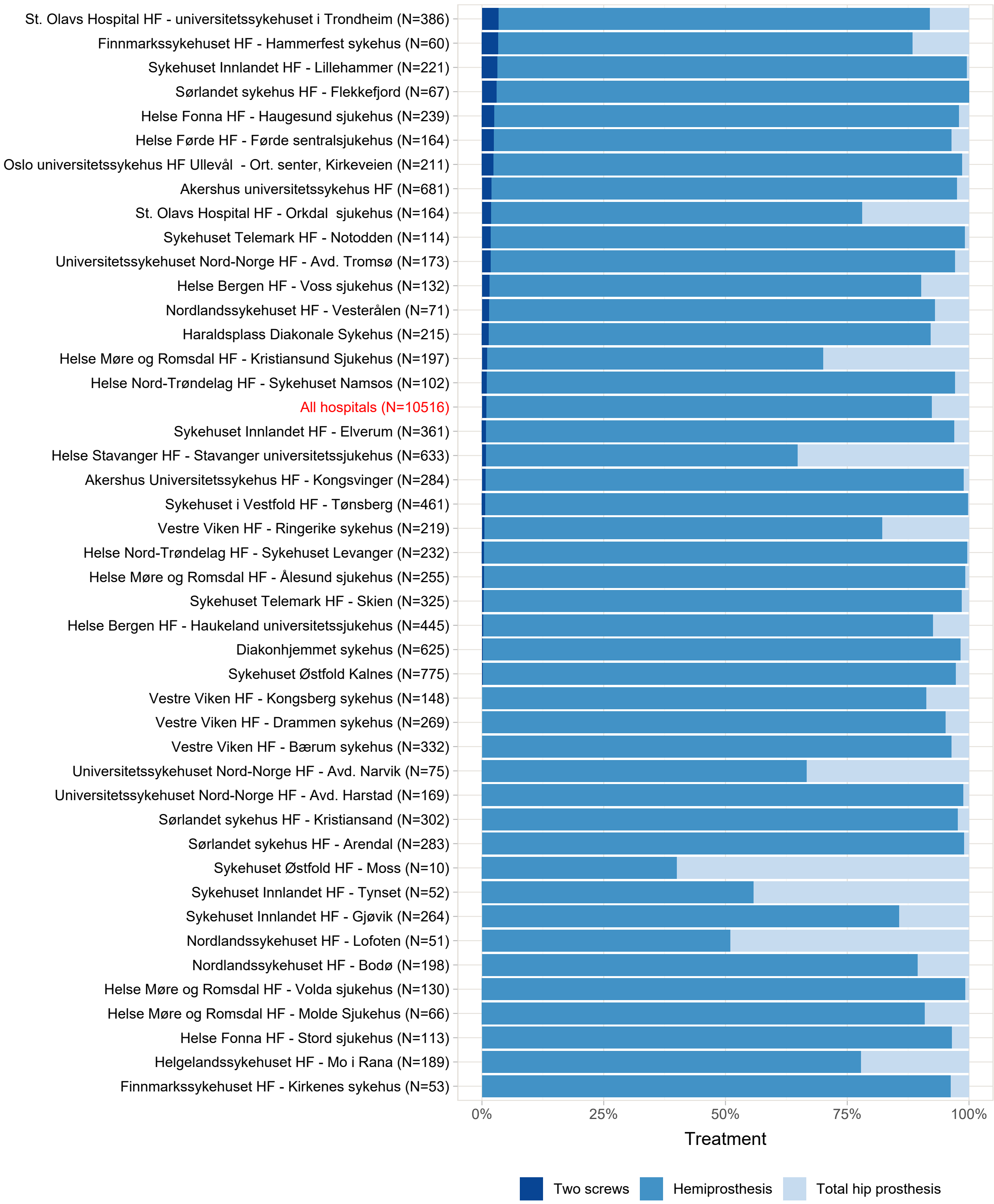


Figure D.32 shows the proportion of patients treated with screw osteosynthesis/hemiprosthesis/total hip prosthesis at each hospital in the period 2021-2023. Hospitals with n<10 have been excluded.

Figure D.33: Fixation of hemiprosthesis in patients over 70 years of age

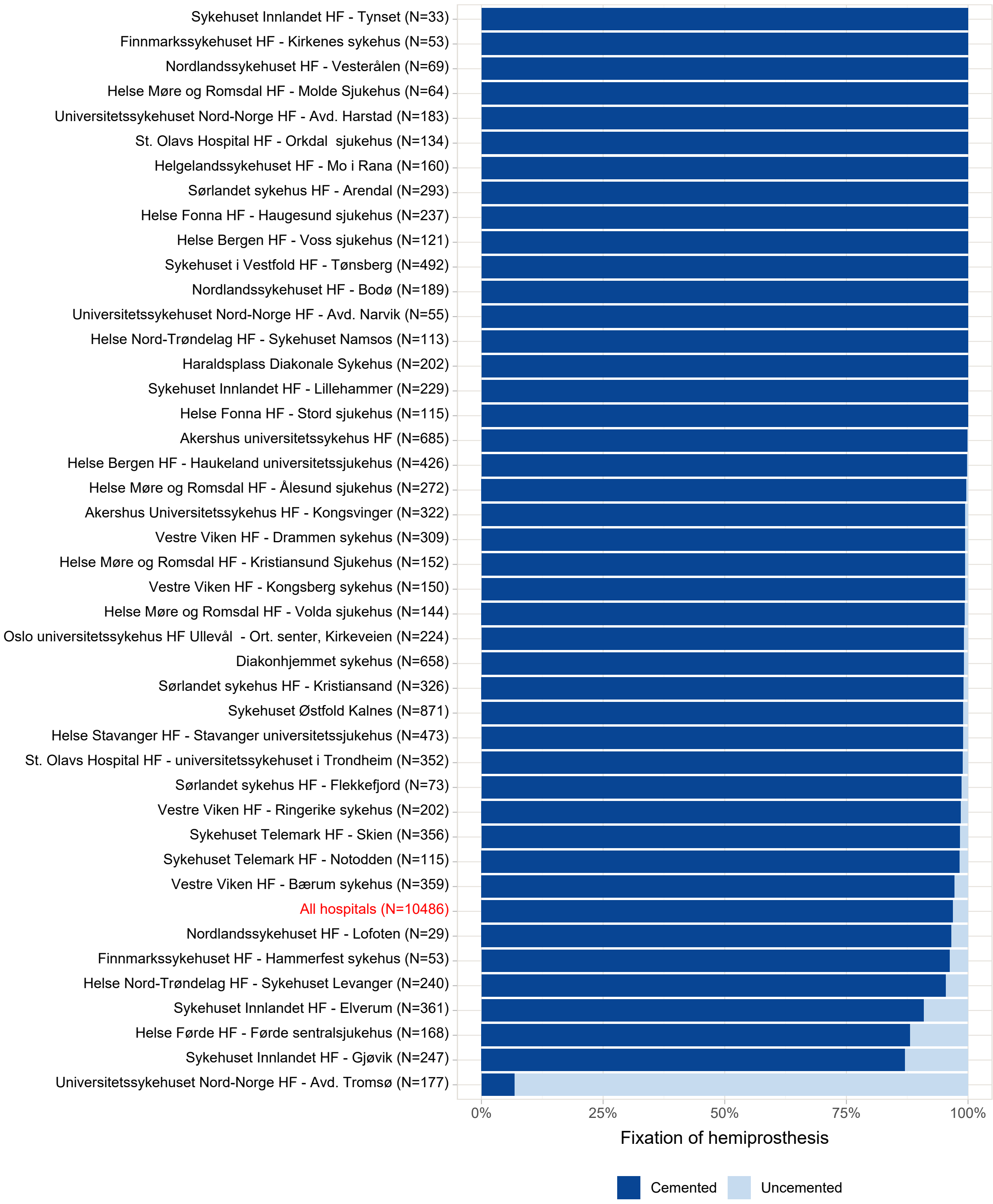


Figure D.33 shows the proportion of patients treated with cemented/uncemented hemiprosthesis, sorted by proportion of cemented hemiarthroplasties at each hospital in the period 2021-2023. Hospitals with n<10 have been excluded.

Figure D.34: Waiting time from fracture to surgery

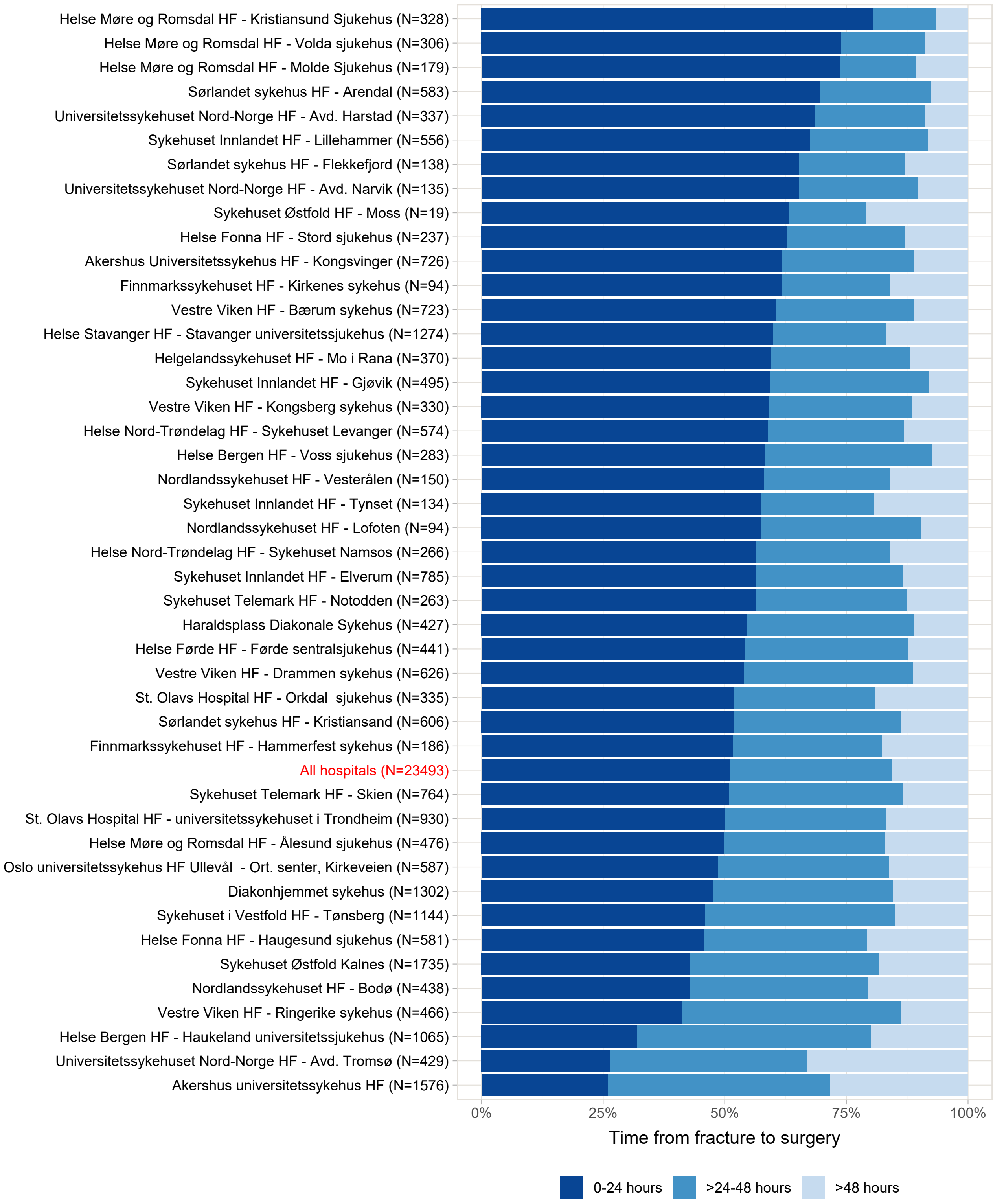


Figure D.34 shows waiting time, sorted by proportion of fractures treated within 24 hours after the fracture at the different hospitals in the period 2021-2023. Hospitals with n<10 have been excluded.

Figure D.35: Reoperations in the period 2021-2023. All hip fractures.

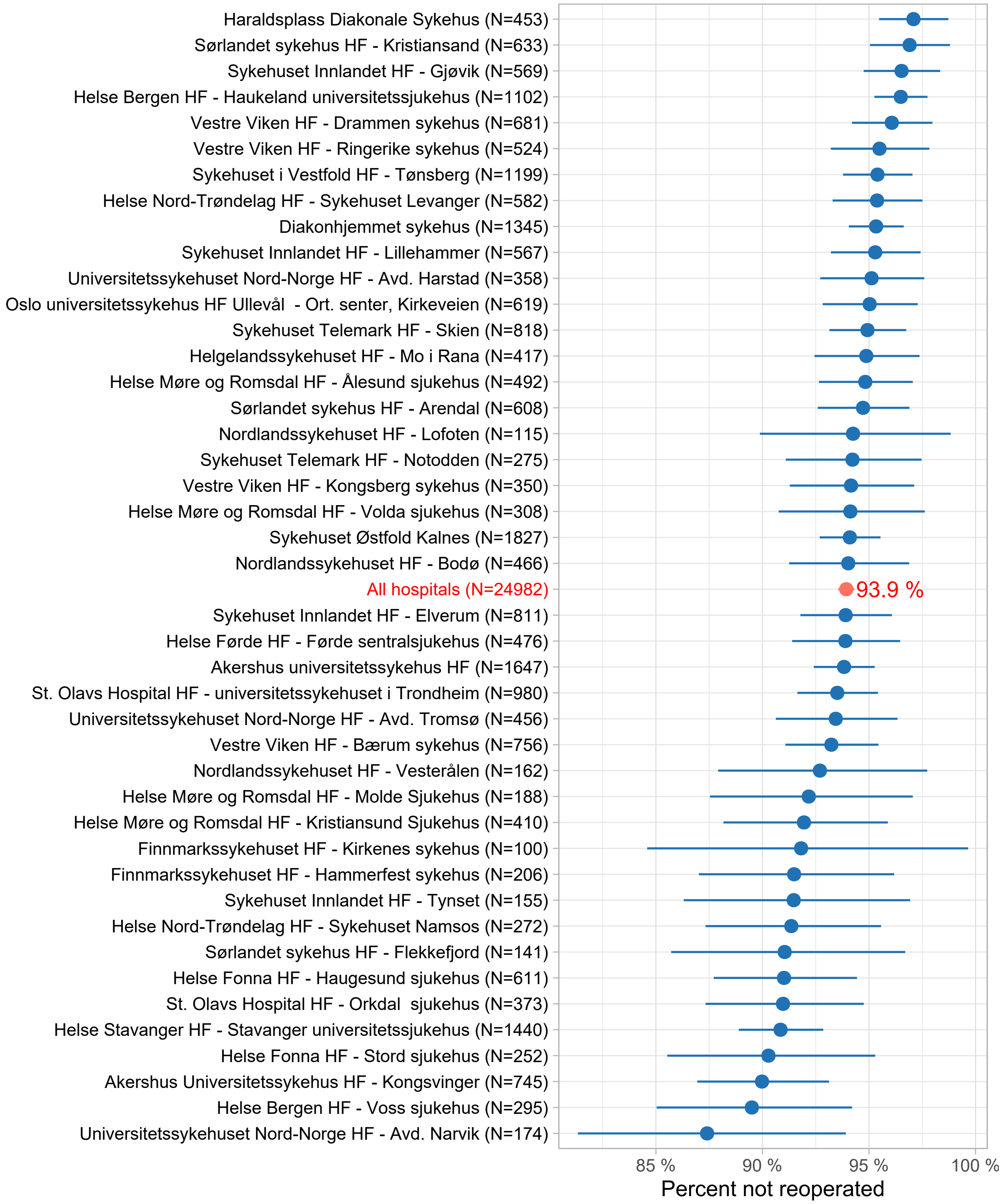


Figure D.35 shows proportion of patients not reoperated at each hospital. Hospitals with n<10 have been excluded.

Figure D.36: Reoperations in the period 2021-2023. Displaced femoral neck fractures in patients over 70 years of age, regardless of type of primary operation.

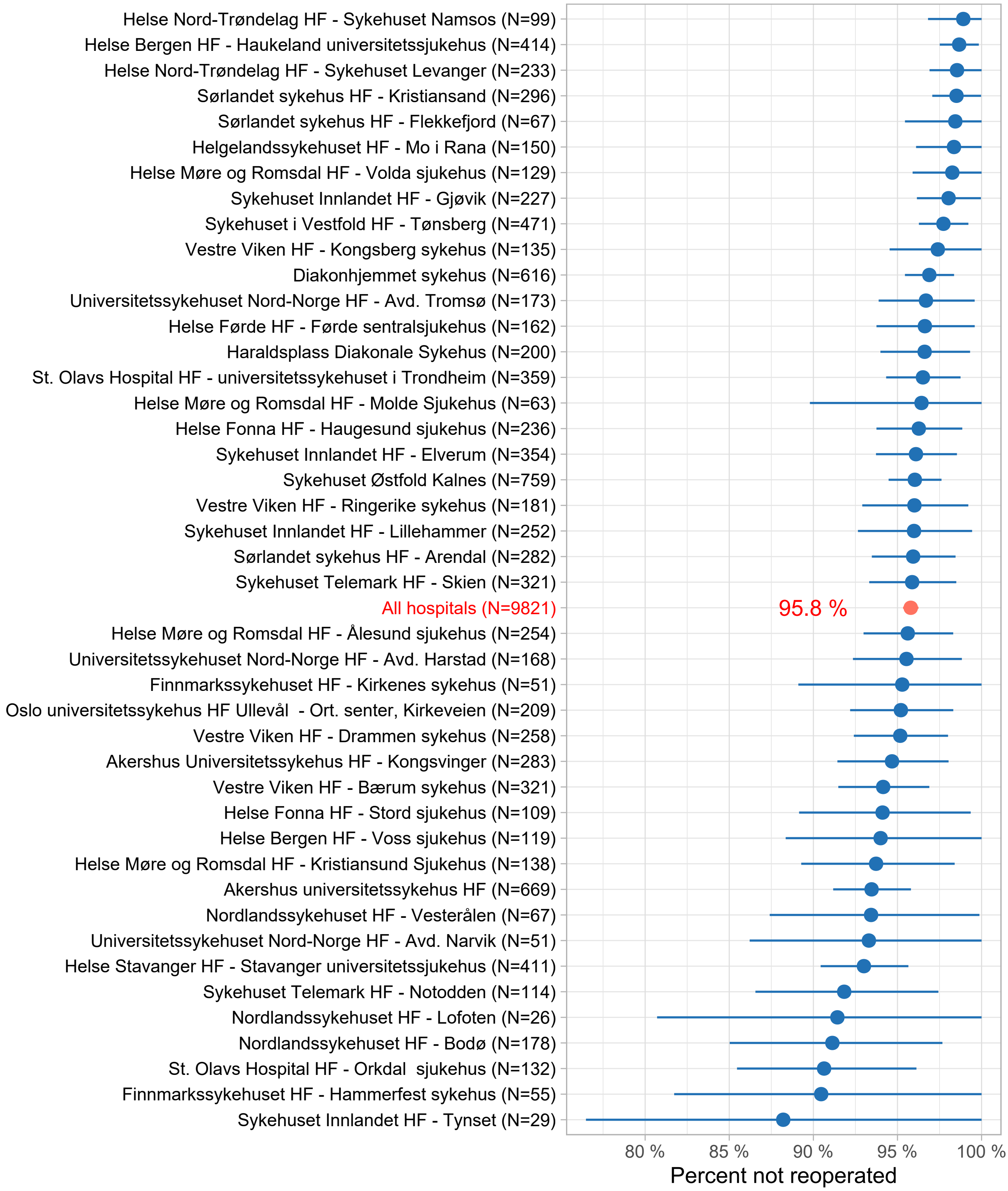


Figure D.36 shows proportion of patients not reoperated at each hospital. Hospitals with n<10 have been excluded.

Figure D.37: Proportion of fractures treated within 24 hours after the fracture

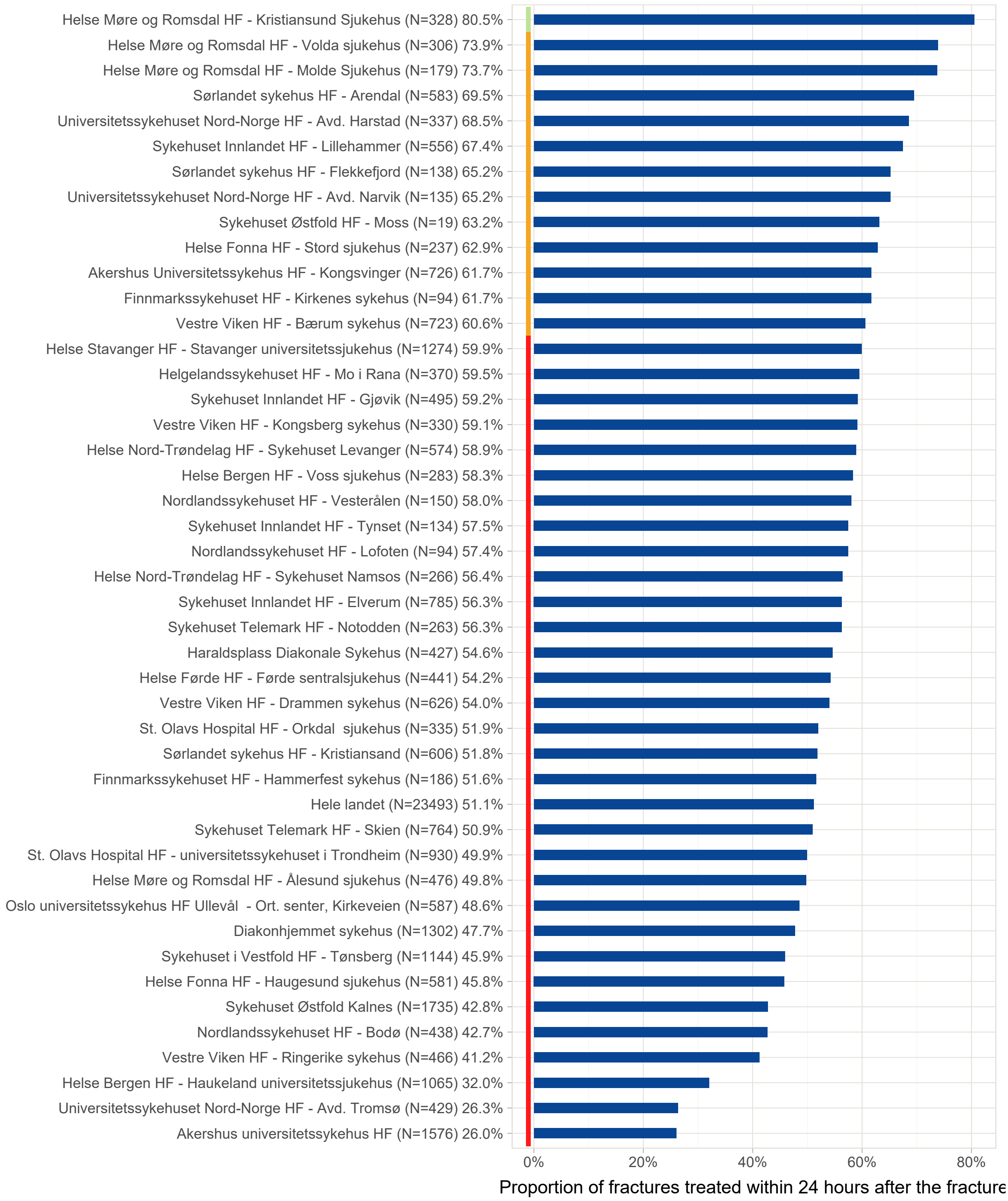


Figure D.38: Proportion of fractures treated within 48 hours after the fracture

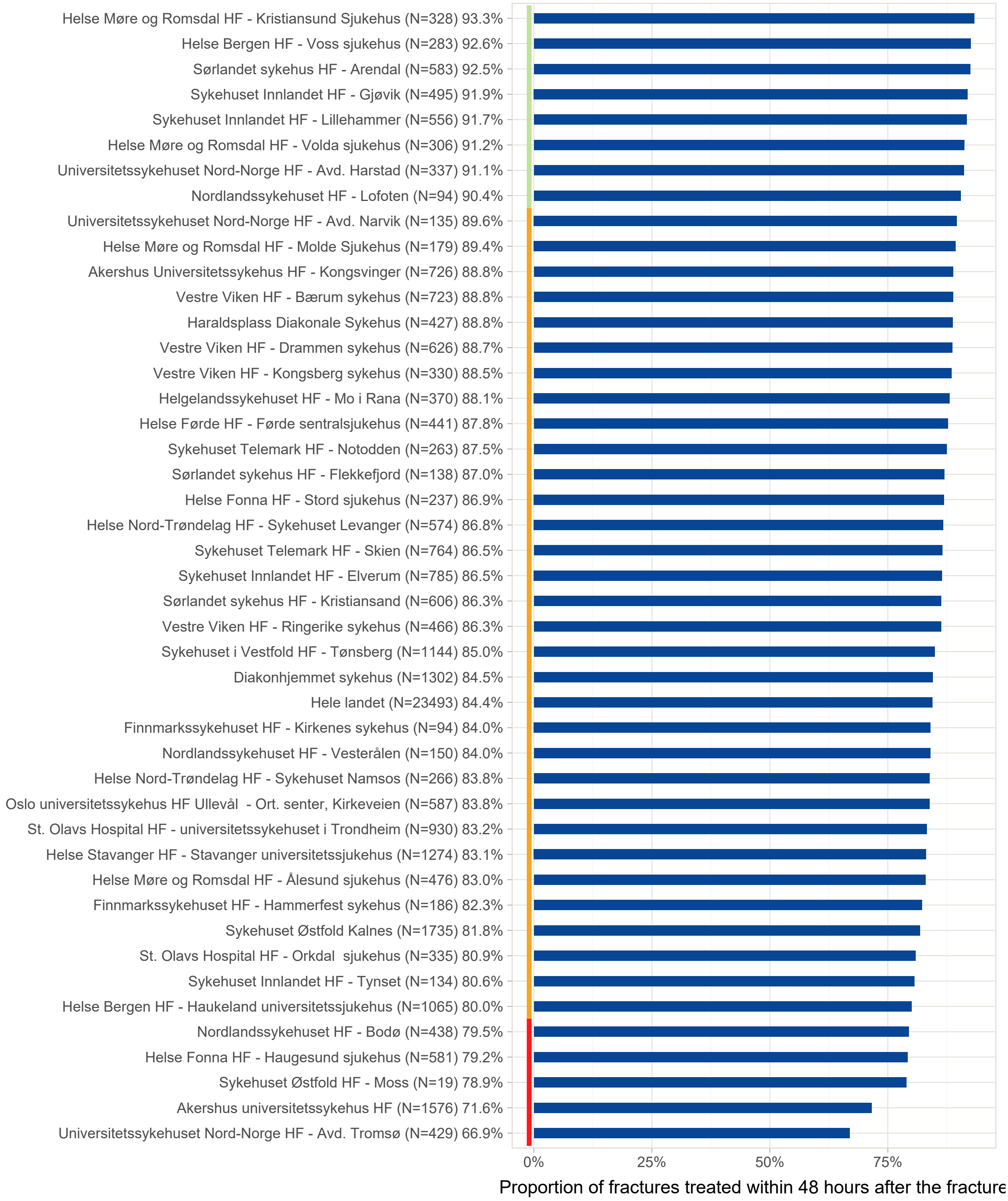
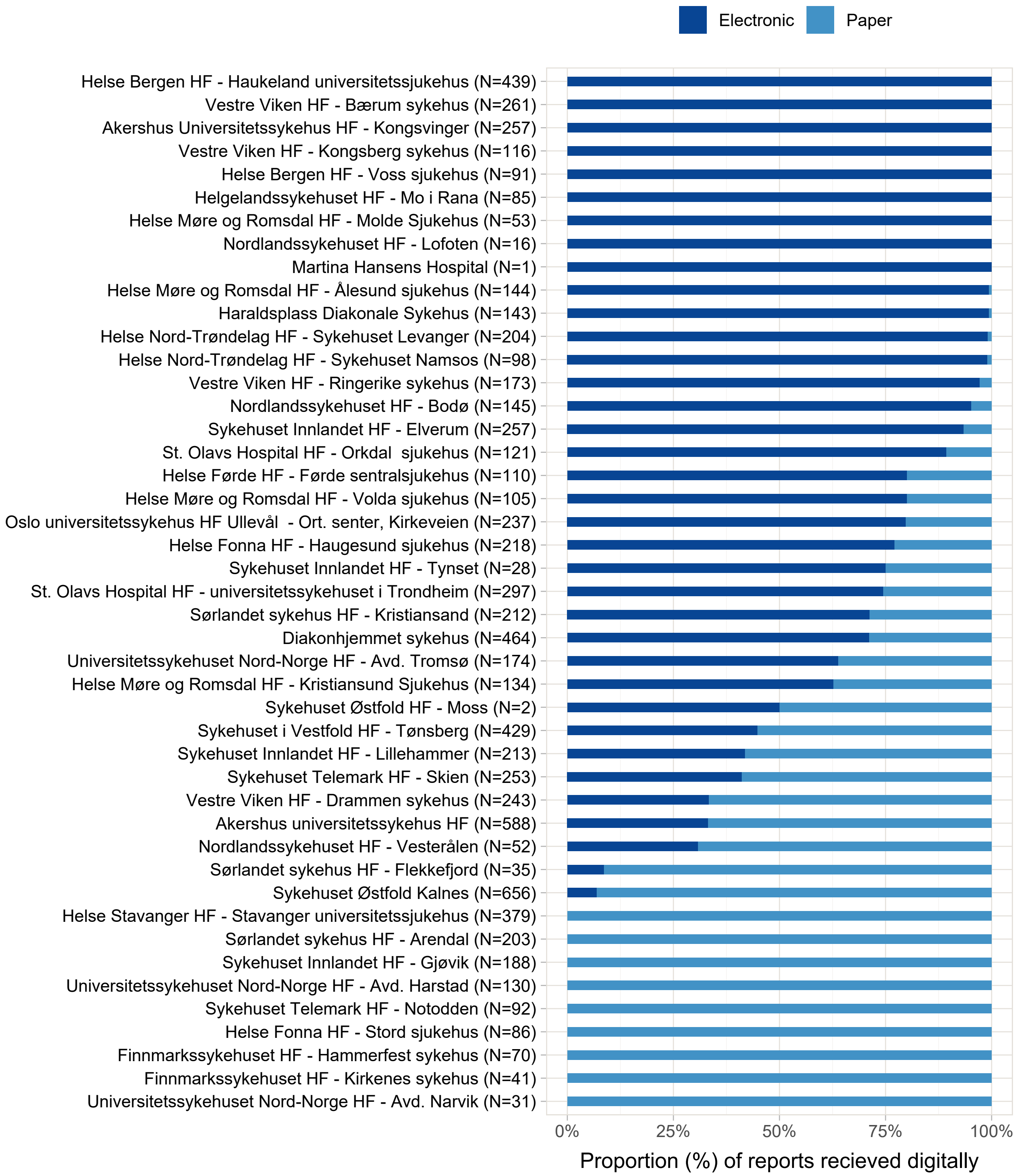


Figure D.39: Registration of operation forms by format in 2023, all operations



National average for reporting on electronic forms in 2023 is 57%

HIP FRACTURES

Numbers of operations

Table 1: Annual numbers of operations

Year	Primary operation		Reoperation		Total
2023	8 142	(91,0%)	807	(9,0%)	**8 949**
2022	8 581	(91,5%)	795	(8,5%)	**9 376**
2021	8 303	(91,4%)	780	(8,6%)	**9 083**
2020	7 768	(91,4%)	731	(8,6%)	**8 499**
2019	8 169	(89,9%)	919	(10,1%)	**9 088**
2018	8 427	(90,0%)	939	(10,0%)	**9 366**
2017	8 352	(90,3%)	901	(9,7%)	**9 253**
2016	8 504	(89,6%)	987	(10,4%)	**9 491**
2015	8 410	(90,0%)	939	(10,0%)	**9 349**
2014	8 183	(91,2%)	793	(8,8%)	**8 976**
2013	8 309	(90,2%)	899	(9,8%)	**9 208**
2012	8 437	(90,4%)	896	(9,6%)	**9 333**
2011	8 604	(90,3%)	925	(9,7%)	**9 529**
2010	8 364	(90,7%)	862	(9,3%)	**9 226**
2005-09	37 888	(89,6%)	4 402	(10,4%)	**42 290**
Total	**154 441**	**(90,3%)** *	**16 575**	**(9,7%)** **	**171 016**

49% of primary operations were on the right side. 68% of primary operations were performed on women. Mean age at primary surgery was 80 years: 81 years for women and 77 years for men.

* 6 356 (4%) were primary operations with total hip prostheses from the Norwegian Arthroplasty Register.

** 6 313 (38%) were reoperations with total hip prostheses from the Norwegian Arthroplasty Register.

Figure 1: Annual numbers of operations

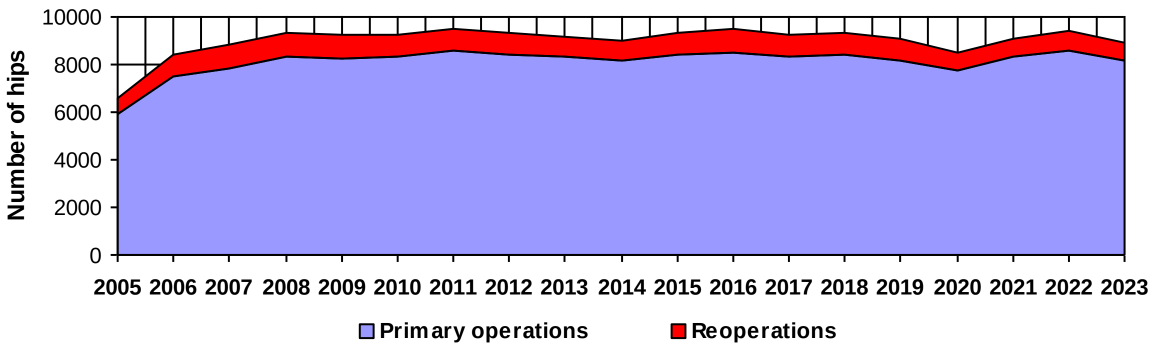
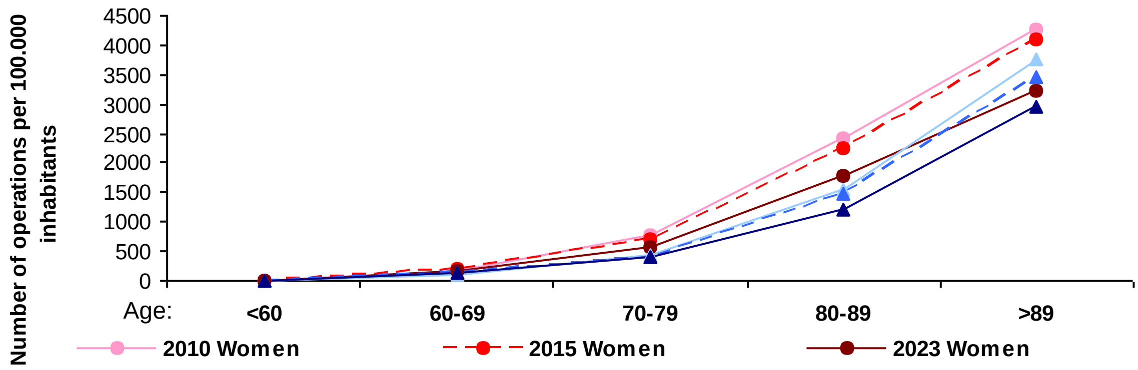


Figure 2: Incidence of primary operation (in 2010, 2015 and 2023)



Time from fracture to operation in hours - primary operations

Table 2a: Time from fracture to operation in hours*

	0 - 6		>6 - 12		>12 - 24		>24 - 48		>48		Missing		Total
2023	185	(2,4%)	798	(10,5%)	2 684	(35,4%)	2 584	(34,1%)	1 253	(16,5%)	79	(1,0%)	**7 583**
2022	227	(2,8%)	917	(11,5%)	2 810	(35,1%)	2 666	(33,3%)	1 258	(15,7%)	128	(1,6%)	**8 006**
2021	264	(3,4%)	979	(12,6%)	2 901	(37,3%)	2 427	(31,2%)	1 055	(13,6%)	142	(1,8%)	**7 768**
2020	242	(3,3%)	976	(13,5%)	2 776	(38,4%)	2 137	(29,6%)	954	(13,2%)	142	(2,0%)	**7 227**
2019	225	(3,0%)	892	(11,8%)	2 699	(35,8%)	2 513	(33,3%)	1 071	(14,2%)	139	(1,8%)	**7 539**
2018	279	(3,6%)	957	(12,2%)	2 719	(34,7%)	2 418	(30,8%)	1 289	(16,4%)	184	(2,3%)	**7 846**
2017	298	(3,8%)	1 113	(14,0%)	2 775	(34,9%)	2 378	(29,9%)	1 207	(15,2%)	169	(2,1%)	**7 940**
2016	299	(3,7%)	1 107	(13,6%)	2 897	(35,5%)	2 426	(29,7%)	1 235	(15,1%)	192	(2,4%)	**8 156**
2015	309	(3,8%)	1 086	(13,4%)	3 054	(37,8%)	2 330	(28,8%)	1 105	(13,7%)	203	(2,5%)	**8 087**
2014	326	(4,1%)	1 157	(14,7%)	2 996	(38,0%)	2 189	(27,7%)	1 045	(13,2%)	181	(2,3%)	**7 894**
2013	314	(3,9%)	1 129	(14,1%)	2 932	(36,6%)	2 261	(28,2%)	1 198	(15,0%)	179	(2,2%)	**8 013**
2012	316	(3,8%)	1 167	(14,2%)	2 936	(35,7%)	2 309	(28,1%)	1 326	(16,1%)	175	(2,1%)	**8 229**
2011	313	(3,7%)	1 207	(14,3%)	2 845	(33,8%)	2 420	(28,8%)	1 421	(16,9%)	208	(2,5%)	**8 414**
2010	355	(4,3%)	1 218	(14,9%)	2 882	(35,1%)	2 216	(27,0%)	1 340	(16,3%)	191	(2,3%)	**8 202**
2005-0	2 101	(5,7%)	6 827	(18,4%)	12 923	(34,8%)	9 031	(24,3%)	5 578	(15,0%)	721	(1,9%)	**37 181**
Total	**6 053**	**(4,1%)**	**21 530**	**(14,5%)**	**52 829**	**(35,7%)**	**42 305**	**(28,6%)**	**22 335**	**(15,1%)**	**3 033**	**(2,0%)**	**148 085**

* Total hip prostheses are not counted

Figure 3: Time from fracture to operation - grouped in hours (n=148 085)

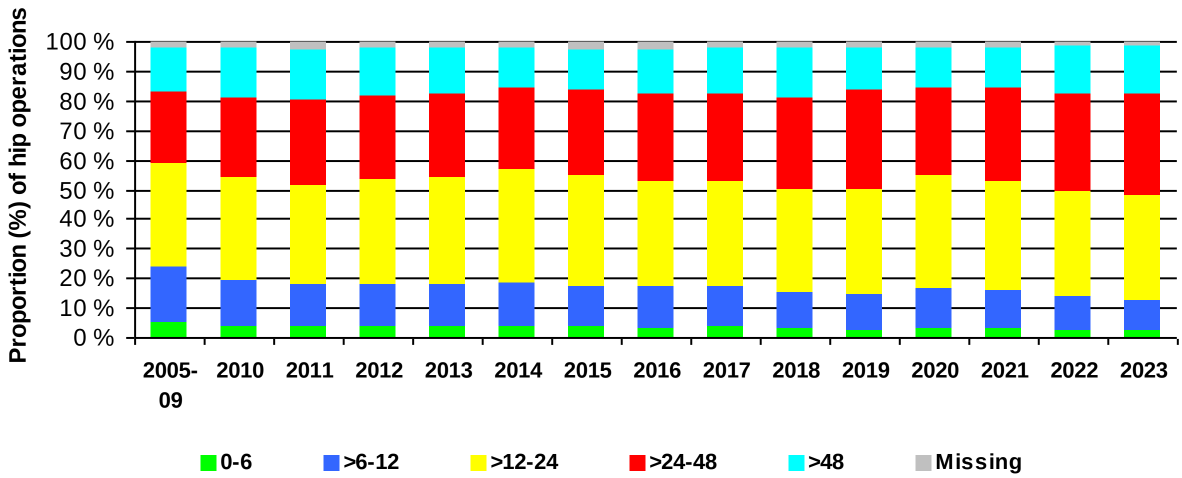


Table 2b: Reasons for delayed surgery (>48 hours)*

Reasons	2021	2022	2023	Total
Use of anticoagulants		4	45	**49**
Medical reasons	5	15	60	**80**
Lack of surgical capacity	3	42	205	**250**
Delayed medical examination	2	6	41	**49**
Patient delay	8	57	287	**352**
Other	2	7	46	**55**
Total	**20**	**131**	**684**	**835**

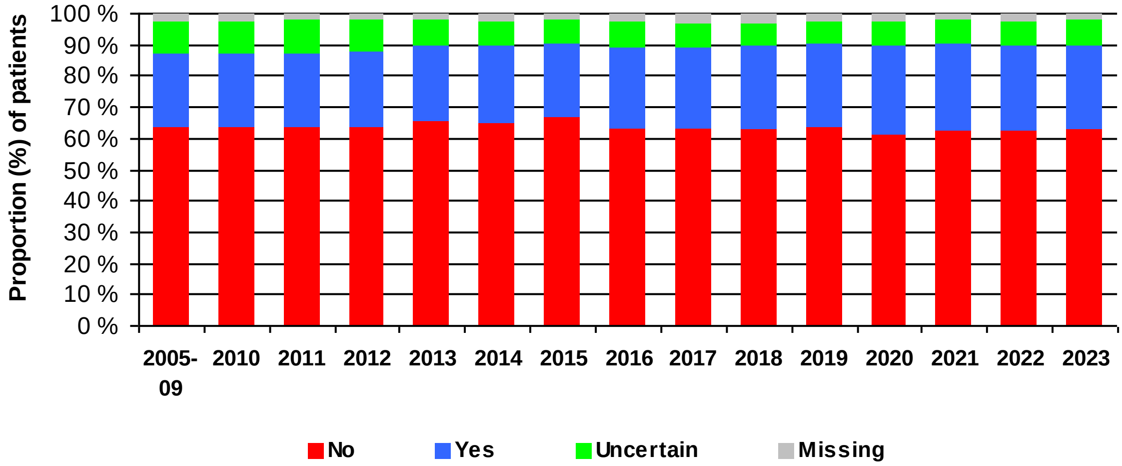
*Electronic registration started during 2021

Chronic cognitive impairment

Table 3: Chronic cognitive impairment - primary operations*

	No		Yes		Uncertain		Missing		Total
2023	4 768	(62,9%)	2 063	(27,2%)	613	(8,1%)	139	(1,8%)	**7 583**
2022	5 008	(62,6%)	2 201	(27,5%)	604	(7,5%)	193	(2,4%)	**8 006**
2021	4 849	(62,4%)	2 172	(28,0%)	576	(7,4%)	171	(2,2%)	**7 768**
2020	4 416	(61,1%)	2 060	(28,5%)	566	(7,8%)	185	(2,6%)	**7 227**
2019	4 810	(63,8%)	2 021	(26,8%)	528	(7,0%)	180	(2,4%)	**7 539**
2018	4 970	(63,3%)	2 072	(26,4%)	561	(7,2%)	243	(3,1%)	**7 846**
2017	4 983	(62,8%)	2 084	(26,2%)	637	(8,0%)	236	(3,0%)	**7 940**
2016	5 159	(63,3%)	2 139	(26,2%)	636	(7,8%)	222	(2,7%)	**8 156**
2015	5 387	(66,6%)	1 919	(23,7%)	601	(7,4%)	180	(2,2%)	**8 087**
2014	5 136	(65,1%)	1 933	(24,5%)	642	(8,1%)	183	(2,3%)	**7 894**
2013	5 236	(65,3%)	1 938	(24,2%)	675	(8,4%)	164	(2,0%)	**8 013**
2012	5 222	(63,5%)	2 007	(24,4%)	821	(10,0%)	179	(2,2%)	**8 229**
2011	5 350	(63,6%)	1 991	(23,7%)	901	(10,7%)	172	(2,0%)	**8 414**
2010	5 220	(63,6%)	1 917	(23,4%)	834	(10,2%)	231	(2,8%)	**8 202**
2005-09	23 633	(63,6%)	8 849	(23,8%)	3 831	(10,3%)	868	(2,3%)	**37 181**
Total	**94 147**	**(63,6%)**	**37 366**	**(25,2%)**	**13 026**	**(8,8%)**	**3 546**	**(2,4%)**	**148 085**

Figure 4: Chronic cognitive impairment - primary operations*



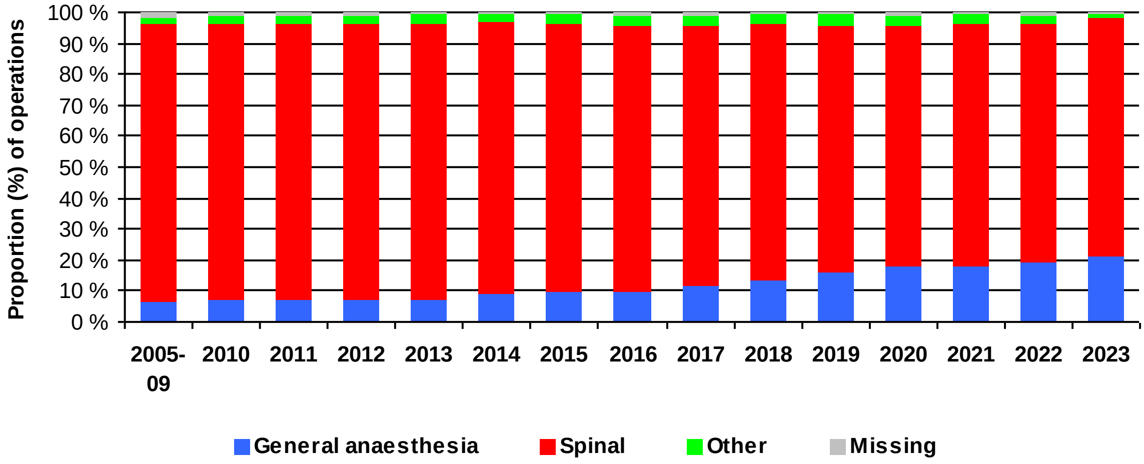
* Total hip prostheses are not counted

Type of anaesthesia

Table 4: Type of anaesthesia - primary operations*

	General anaesthesia		Spinal		Other		Missing		Total
2023	1 585	(20,9%)	5 830	(76,9%)	132	(1,7%)	36	(0,5%)	**7 583**
2022	1 546	(19,3%)	6 165	(77,0%)	214	(2,7%)	81	(1,0%)	**8 006**
2021	1 409	(18,1%)	6 078	(78,2%)	226	(2,9%)	55	(0,7%)	**7 768**
2020	1 297	(17,9%)	5 619	(77,8%)	238	(3,3%)	73	(1,0%)	**7 227**
2019	1 185	(15,7%)	6 025	(79,9%)	263	(3,5%)	66	(0,9%)	**7 539**
2018	1 062	(13,5%)	6 483	(82,6%)	230	(2,9%)	71	(0,9%)	**7 846**
2017	929	(11,7%)	6 671	(84,0%)	259	(3,3%)	81	(1,0%)	**7 940**
2016	810	(9,9%)	6 977	(85,5%)	282	(3,5%)	87	(1,1%)	**8 156**
2015	758	(9,4%)	7 040	(87,1%)	226	(2,8%)	63	(0,8%)	**8 087**
2014	732	(9,3%)	6 890	(87,3%)	203	(2,6%)	69	(0,9%)	**7 894**
2013	588	(7,3%)	7 095	(88,5%)	256	(3,2%)	74	(0,9%)	**8 013**
2012	560	(6,8%)	7 364	(89,5%)	219	(2,7%)	86	(1,0%)	**8 229**
2011	586	(7,0%)	7 509	(89,2%)	219	(2,6%)	100	(1,2%)	**8 414**
2010	565	(6,9%)	7 321	(89,3%)	194	(2,4%)	122	(1,5%)	**8 202**
2005-09	2 456	(6,6%)	33 251	(89,4%)	817	(2,2%)	657	(1,8%)	**37 181**
Total	**16 068**	**(10,9%)**	**126 318**	**(85,3%)**	**3 978**	**(2,7%)**	**1 721**	**(1,2%)**	**148 085**

Figure 5: Type of anaesthesia in primary operations*



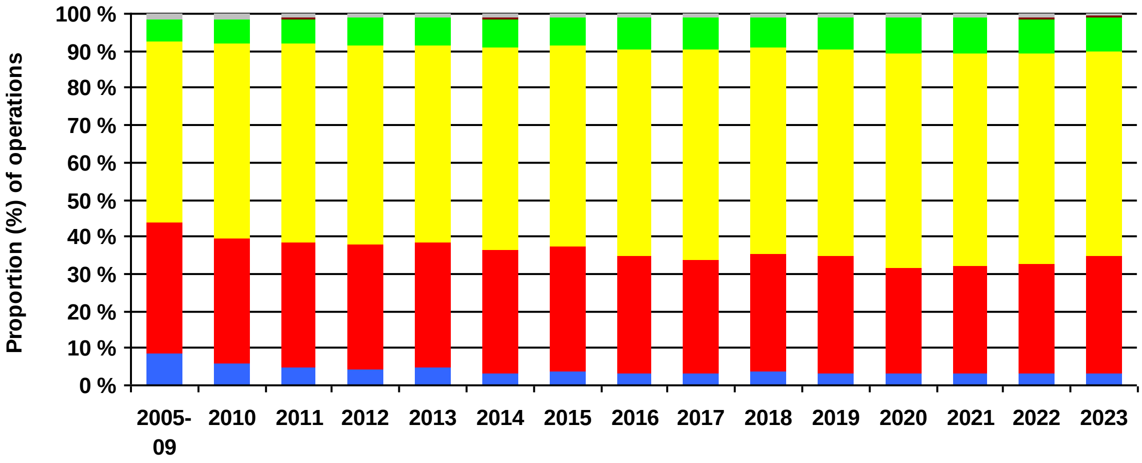
* Total hip prostheses are not counted

ASA classification

Table 5: ASA classification - primary operations

	ASA 1		ASA 2		ASA 3		ASA 4		ASA 5		Missing		Total
2023	258	(3,2%)	2 558	(31,4%)	4 502	(55,3%)	748	(9,2%)	11	(0,1%)	65	(0,8%)	**8 142**
2022	264	(3,1%)	2 514	(29,3%)	4 896	(57,1%)	783	(9,1%)	21	(0,2%)	103	(1,2%)	**8 581**
2021	273	(3,3%)	2 411	(29,0%)	4 723	(56,9%)	798	(9,6%)	7	(0,1%)	91	(1,1%)	**8 303**
2020	239	(3,1%)	2 221	(28,6%)	4 477	(57,6%)	742	(9,6%)	11	(0,1%)	78	(1,0%)	**7 768**
2019	283	(3,5%)	2 566	(31,4%)	4 540	(55,6%)	689	(8,4%)	6	(0,1%)	85	(1,0%)	**8 169**
2018	319	(3,8%)	2 654	(31,5%)	4 698	(55,7%)	646	(7,7%)	13	(0,2%)	97	(1,2%)	**8 427**
2017	282	(3,4%)	2 553	(30,6%)	4 731	(56,6%)	679	(8,1%)	15	(0,2%)	92	(1,1%)	**8 352**
2016	264	(3,1%)	2 694	(31,7%)	4 733	(55,7%)	708	(8,3%)	10	(0,1%)	95	(1,1%)	**8 504**
2015	303	(3,6%)	2 850	(33,9%)	4 525	(53,8%)	624	(7,4%)	12	(0,1%)	96	(1,1%)	**8 410**
2014	256	(3,1%)	2 732	(33,4%)	4 471	(54,6%)	608	(7,4%)	14	(0,2%)	102	(1,2%)	**8 183**
2013	378	(4,5%)	2 839	(34,2%)	4 382	(52,7%)	609	(7,3%)	17	(0,2%)	84	(1,0%)	**8 309**
2012	356	(4,2%)	2 833	(33,6%)	4 548	(53,9%)	595	(7,1%)	8	(0,1%)	97	(1,1%)	**8 437**
2011	437	(5,1%)	2 879	(33,5%)	4 613	(53,6%)	558	(6,5%)	6	(0,1%)	111	(1,3%)	**8 604**
2010	493	(5,9%)	2 806	(33,5%)	4 411	(52,7%)	498	(6,0%)	16	(0,2%)	140	(1,7%)	**8 364**
2005-09	3 313	(8,7%)	13 259	(35,0%)	18 417	(48,6%)	2 230	(5,9%)	52	(0,1%)	617	(1,6%)	**37 888**
Total	**7 718**	(5,0%)	**50 369**	(32,6%)	**82 667**	(53,5%)	**11 515**	(7,5%)	**219**	(0,1%)	**1 953**	(1,3%)	**154 441**

Figure 6: ASA classification - primary operations



ASA = American Society of Anesthesiologists

- **ASA 1**: Healthy patients who smoke less than 5 cigarettes a day..
- **ASA 2**: Patients with an asymptomatic condition who are kept under medical control (f.ex. hypertension), or with diet (f. ex. diabetes mellitus type 2), and otherwise healthy patients who smoke five cigarettes or more daily.
- **ASA 3**: Patients having a condition that can cause symptoms. However, patients are kept under medical control (f. ex. moderate angina pectoris and mild asthma).
- **ASA 4**: Patients with a condition that is out of control (f. ex. heart failure and asthma).
- **ASA 5**: A moribund patient who is not expected to survive the operation.
- **Missing**

Primary operations

Table 6: Fracture type (reason for primary operation)

	Type 1	Type 2	Type 3	Type 4	Type 5	Type 9	Type 6	Type 7	Type 8	Annet	Missing	Total
2023	797	3 627	176	1 060	1 303	193	372	552	7	56	1	**8 142**
	9,8%	44,5%	2,2%	13,0%	16,0%	2,4%	4,6%	6,8%	0,1%	0,7%	0,0%	
2022	873	3 684	223	1 097	1 385	193	434	547	28	101	16	**8 581**
	10,2%	42,9%	2,6%	12,8%	16,1%	2,2%	5,1%	6,4%	0,3%	1,2%	0,2%	
2021	835	3 544	195	1 094	1 401	193	404	523	12	83	19	**8 303**
	10,1%	42,7%	2,3%	13,2%	16,9%	2,3%	4,9%	6,3%	0,1%	1,0%	0,2%	
2020	814	3 284	153	1 012	1 283	182	407	529	12	86	6	**7 768**
	10,5%	42,3%	2,0%	13,0%	16,5%	2,3%	5,2%	6,8%	0,2%	1,1%	0,1%	
2019	888	3 437	196	1 062	1 268	181	414	621	9	83	10	**8 169**
	10,9%	42,1%	2,4%	13,0%	15,5%	2,2%	5,1%	7,6%	0,1%	1,0%	0,1%	
2018	972	3 443	199	1 112	1 295	227	502	576	5	93	3	**8 427**
	11,5%	40,9%	2,4%	13,2%	15,4%	2,7%	6,0%	6,8%	0,1%	1,1%	0,0%	
2017	1 037	3 436	217	1 153	1 317	206	476	405	7	98	0	**8 352**
	12,4%	41,1%	2,6%	13,8%	15,8%	2,5%	5,7%	4,8%	0,1%	1,2%	0,0%	
2016	1 086	3 545	234	1 245	1 321	162	467	344	4	94	2	**8 504**
	12,8%	41,7%	2,8%	14,6%	15,5%	1,9%	5,5%	4,0%	0,0%	1,1%	0,0%	
2015	1 153	3 350	243	1 336	1 255	228	442	321	2	79	1	**8 410**
	13,7%	39,8%	2,9%	15,9%	14,9%	2,7%	5,3%	3,8%	0,0%	0,9%	0,0%	
2014	1 050	3 331	287	1 333	1 244	161	422	287	2	64	2	**8 183**
	12,8%	40,7%	3,5%	16,3%	15,2%	2,0%	5,2%	3,5%	0,0%	0,8%	0,0%	
2013	1 171	3 296	259	1 302	1 277	167	449	292	4	91	1	**8 309**
	14,1%	39,7%	3,1%	15,7%	15,4%	2,0%	5,4%	3,5%	0,0%	1,1%	0,0%	
2012	1 226	3 471	262	1 277	1 271	173	467	205	3	79	3	**8 437**
	14,5%	41,1%	3,1%	15,1%	15,1%	2,1%	5,5%	2,4%	0,0%	0,9%	0,0%	
2011	1 317	3 445	276	1 347	1 395	162	398	186	4	74	0	**8 604**
	15,3%	40,0%	3,2%	15,7%	16,2%	1,9%	4,6%	2,2%	0,0%	0,9%	0,0%	
2010	1 249	3 287	321	1 314	1 364	167	431	160	2	67	2	**8 364**
	14,9%	39,3%	3,8%	15,7%	16,3%	2,0%	5,2%	1,9%	0,0%	0,8%	0,0%	
2005-09	6 448	14 695	1 689	6 456	5 270	232	2 033	689	18	327	31	**37 888**
	17,0%	38,8%	4,5%	17,0%	13,9%	0,6%	5,4%	1,8%	0,0%	0,9%	0,1%	
Total	**20 916**	**62 875**	**4 930**	**23 200**	**23 649**	**2 827**	**8 118**	**6 237**	**119**	**1 475**	**97**	**154 441**
	13,5%	**40,7%**	**3,2%**	**15,0%**	**15,3%**	**1,8%**	**5,3%**	**4,0%**	**0,1%**	**1,0%**	**0,1%**	

Type 1: Intracapsular fracture, undisplaced
Type 2: Intracapsular fracture, displaced
Type 3: Basocervical fracture
Type 4: Trochanteric fracture (2 fragments) (AO / OTA A1)
Type 5: Trochanteric fracture (multifragment) (AO / OTA A2)
Type 9: Intertrochanteric fracture (AO / OTA A3) (The registration started in 2008)
Type 6: Subtrochanteric fracture
Type 7: Intracapsular fracture unspecified (from the Norwegian Arthroplasty Register)
Type 8: Trochanteric fracture unspecified (from the Norwegian Arthroplasty Register)

Table 7: Type of primary operations - all fractures

	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	Total
2023	512	66	3 861	10	586	62	48	5	1 226	13	1 124	559	22	50	0	**8 142**
	6,3%	0,8%	47,4%	0,1%	7,2%	0,8%	0,6%	0,1%	15,1%	0,2%	13,8%	6,9%	0,3%	0,6%	0,0%	
2022	654	76	3 831	1	685	116	59	12	1 257	14	1 166	575	22	112	0	**8 581**
	7,6%	0,9%	44,6%	0,0%	8,0%	1,4%	0,7%	0,1%	14,6%	0,2%	13,6%	6,7%	0,3%	1,3%	0,0%	
2021	692	54	3 688	0	865	125	58	11	1 166	6	1 046	535	2	53	0	**8 303**
	8,3%	0,7%	44,4%	0,0%	10,4%	1,5%	0,7%	0,1%	14,0%	0,1%	12,6%	6,4%	0,0%	0,6%	0,0%	
2020	655	58	3 425	0	852	173	62	4	1 064	9	893	541	0	30	0	**7 768**
	8,4%	0,7%	44,1%	0,0%	11,0%	2,2%	0,8%	0,1%	13,7%	0,1%	11,5%	7,0%	0,0%	0,4%	0,0%	
2019	853	75	3 430	0	940	252	77	21	1 029	4	835	630	2	20	0	**8 169**
	10,4%	0,9%	42,0%	0,0%	11,5%	3,1%	0,9%	0,3%	12,6%	0,0%	10,2%	7,7%	0,0%	0,2%	0,0%	
2018	970	63	3 418	1	1 120	316	79	13	967	18	862	581	0	19	0	**8 427**
	11,5%	0,7%	40,6%	0,0%	13,3%	3,7%	0,9%	0,2%	11,5%	0,2%	10,2%	6,9%	0,0%	0,2%	0,0%	
2017	1 080	46	3 336	1	1 262	403	104	19	828	24	802	412	0	35	0	**8 352**
	12,9%	0,6%	39,9%	0,0%	15,1%	4,8%	1,2%	0,2%	9,9%	0,3%	9,6%	4,9%	0,0%	0,4%	0,0%	
2016	1 160	39	3 447	2	1 386	520	97	21	818	11	616	348	0	39	0	**8 504**
	13,6%	0,5%	40,5%	0,0%	16,3%	6,1%	1,1%	0,2%	9,6%	0,1%	7,2%	4,1%	0,0%	0,5%	0,0%	
2015	1 241	36	3 234	2	1 499	664	96	14	764	8	504	323	0	25	0	**8 410**
	14,8%	0,4%	38,5%	0,0%	17,8%	7,9%	1,1%	0,2%	9,1%	0,1%	6,0%	3,8%	0,0%	0,3%	0,0%	
2014	1 127	31	3 190	1	1 551	689	102	18	744	7	408	289	0	26	0	**8 183**
	13,8%	0,4%	39,0%	0,0%	19,0%	8,4%	1,2%	0,2%	9,1%	0,1%	5,0%	3,5%	0,0%	0,3%	0,0%	
2013	1 289	32	3 100	3	1 496	749	109	20	756	4	422	296	0	33	0	**8 309**
	15,5%	0,4%	37,3%	0,0%	18,0%	9,0%	1,3%	0,2%	9,1%	0,0%	5,1%	3,6%	0,0%	0,4%	0,0%	
2012	1 455	27	3 142	5	1 632	848	97	19	635	8	332	208	0	28	0	**8 437**
	17,2%	0,3%	37,2%	0,1%	19,3%	10,1%	1,1%	0,2%	7,5%	0,1%	3,9%	2,5%	0,0%	0,3%	0,0%	
2011	1 650	50	3 006	19	1 699	871	112	13	659	13	280	190	0	42	0	**8 604**
	19,2%	0,6%	34,9%	0,2%	19,7%	10,1%	1,3%	0,2%	7,7%	0,2%	3,3%	2,2%	0,0%	0,5%	0,0%	
2010	1 616	83	2 782	29	1 733	899	127	17	572	4	280	162	0	60	0	**8 364**
	19,3%	1,0%	33,3%	0,3%	20,7%	10,7%	1,5%	0,2%	6,8%	0,0%	3,3%	1,9%	0,0%	0,7%	0,0%	
2005-09	10 433	307	10 067	258	8 801	3 219	607	222	2 093	30	828	707	0	308	4	**37 888**
	27,5%	0,8%	26,6%	0,7%	23,2%	8,5%	1,6%	0,6%	5,5%	0,1%	2,2%	1,9%	0,0%	0,8%	0,0%	
Totalt	**25 387**	**1 043**	**56 957**	**332**	**26 107**	**9 906**	**1 834**	**429**	**14 578**	**173**	**10 398**	**6 356**	**48**	**880**	**4**	**154 441**
	16,4%	**0,7%**	**36,9%**	**0,2%**	**16,9%**	**6,4%**	**1,2%**	**0,3%**	**9,4%**	**0,1%**	**6,7%**	**4,1%**	**0,0%**	**0,6%**	**0,0%**	

T1: Two screws or pins
T2: Three screws or pins
T3: Bipolar hemiprosthesis
T4: Unipolar hemiprosthesis
T5: Hip compression screw
T6: Hip compression screw with lateral support plate
T7: Hip compression screw system and additional anti-rotational screw
T8: Short intramedullary nail without distal locking
T9: Short intramedullary nail with distal locking
T10: Long intramedullary nail without distal locking
T11: Long intramedullary nail with distal locking
T12: Total hip prosthesis
T13: FNS (Femoral Neck System)
T14: Other
T15: Missing

Figure 7: Type of primary operations - all fractures

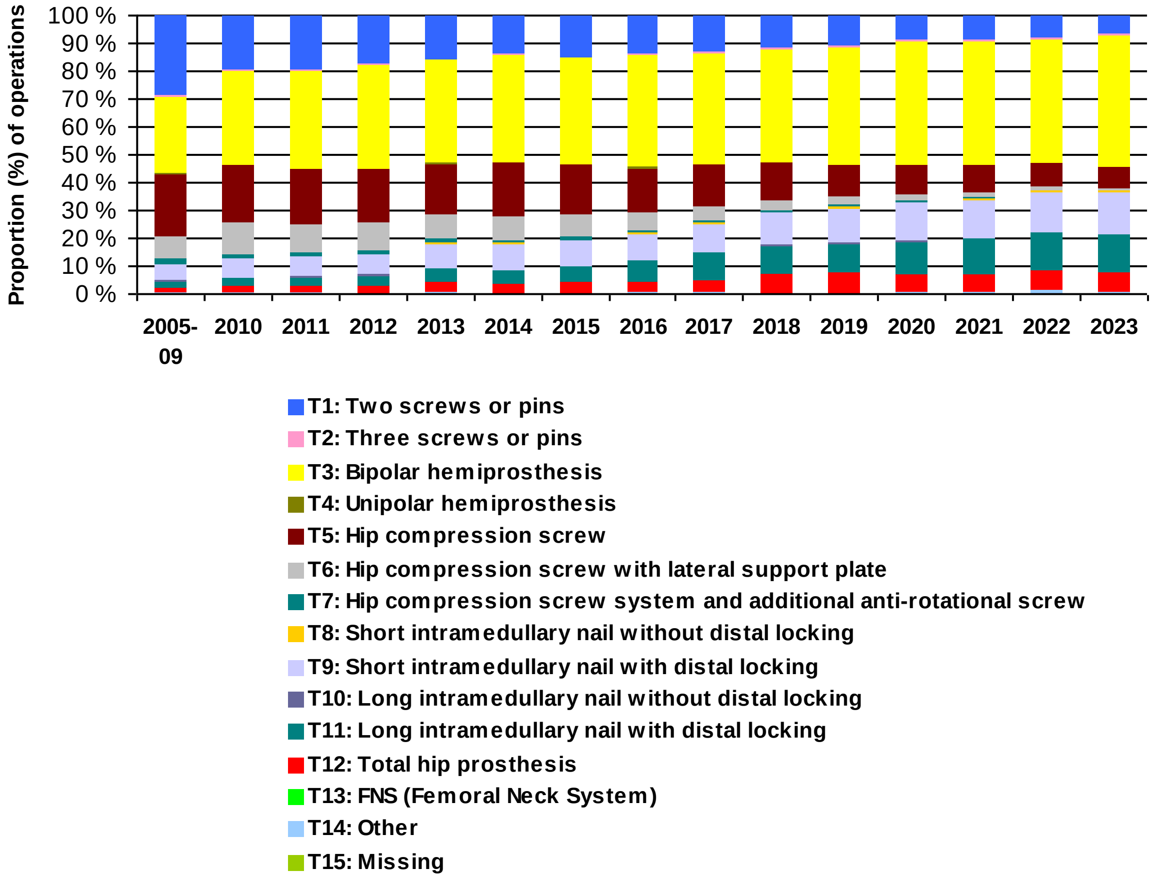


Table 8: Type of primary operation per fracture type

Fracture type	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	Total
Intracapsular fracture, undisplaced	17 794 84,5%	457 2,2%	1 943 9,2%	4 0,0%	437 2,1%	4 0,0%	136 0,6%	8 0,0%	50 0,2%	0 0,0%	7 0,0%	0 0,0%	44 0,2%	29 0,1%	0 0,0%	**21 050**
Intracapsular fracture, displaced	7 391 11,7%	576 0,9%	53 612 85,0%	313 0,5%	420 0,7%	13 0,0%	211 0,3%	5 0,0%	70 0,1%	0 0,0%	24 0,0%	0 0,0%	2 0,0%	237 0,4%	1 0,0%	**63 086**
Basocervical fracture	150 2,6%	4 0,1%	656 11,4%	12 0,2%	2 536 44,1%	89 1,5%	820 14,3%	30 0,5%	542 9,4%	1 0,0%	36 0,6%	0 0,0%	2 0,0%	51 0,9%	0 0,0%	**5 750**
Trochanteric fracture (2 fragments)	13 0,1%	2 0,0%	85 0,4%	0 0,0%	14 777 62,6%	1 060 4,5%	389 1,6%	284 1,2%	5 836 24,7%	16 0,1%	677 2,9%	0 0,0%	0 0,0%	54 0,2%	2 0,0%	**23 588**
Trochanteric fracture (multifragment)	4 0,0%	1 0,0%	199 0,8%	0 0,0%	6 584 27,6%	6 132 25,7%	187 0,8%	88 0,4%	6 785 28,5%	49 0,2%	3 355 14,1%	0 0,0%	0 0,0%	263 1,1%	0 0,0%	**23 836**
Intertrochanteric fracture *	0 0,0%	0 0,0%	30 1,1%	0 0,0%	192 6,8%	816 28,7%	12 0,4%	5 0,2%	536 18,9%	18 0,6%	1 173 41,3%	0 0,0%	0 0,0%	45 1,6%	0 0,0%	**2 839**
Subtrochanteric fracture	5 0,1%	1 0,0%	58 0,7%	0 0,0%	968 11,9%	1 558 19,2%	18 0,2%	6 0,1%	626 7,7%	82 1,0%	4 706 57,8%	0 0,0%	0 0,0%	89 1,1%	0 0,0%	**8 135**
Intracapsular fracture, unspecified **	0 0,0%	0 0,0%	0 0,0%	0 0,0%	0 0,0%	0 0,0%	0 0,0%	0 0,0%	0 0,0%	0 0,0%	0 0,0%	6 237 100,0%	0 0,0%	0 0,0%	0 0,0%	**6 237**
Trochanteric fracture unspecified ***	0 0,0%	0 0,0%	0 0,0%	0 0,0%	0 0,0%	0 0,0%	0 0,0%	0 0,0%	0 0,0%	0 0,0%	0 0,0%	119 100,0%	0 0,0%	0 0,0%	0 0,0%	**119**
Other	24 1,6%	1 0,1%	321 21,0%	2 0,1%	178 11,6%	229 14,9%	58 3,8%	3 0,2%	125 8,2%	7 0,5%	414 27,0%	0 0,0%	0 0,0%	112 7,3%	0 0,0%	**1 532**
Missing	6 6,0%	1 1,0%	53 53,0%	1 1,0%	14 14,0%	5 5,0%	3 3,0%	0 0,0%	8 8,0%	0 0,0%	5 5,0%	0 0,0%	0 0,0%	0 0,0%	1 1,0%	**100**
Total	**25 387** **16,2%**	**1 043** **0,7%**	**56 957** **36,4%**	**332** **0,2%**	**26 106** **16,7%**	**9 906** **6,3%**	**1 834** **1,2%**	**429** **0,3%**	**14 578** **9,3%**	**173** **0,1%**	**10 397** **6,7%**	**6 356** **4,1%**	**48** **0,0%**	**880** **0,6%**	**4** **0,0%**	**156 272**

T1: Two screws or pins
T2: Three screws or pins
T3: Bipolar hemiprosthesis
T4: Unipolar hemiprosthesis
T5: Hip compression screw
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T12: Total hip prosthesis
T13: FNS (Femoral Neck System)
T14: Other
T15: Missing

* The registration started in 2008

** Total hip prostheses reported to the Norwegian Arthroplasty Register

Figure 8a: Time trend for treatment of undisplaced femoral neck fractures

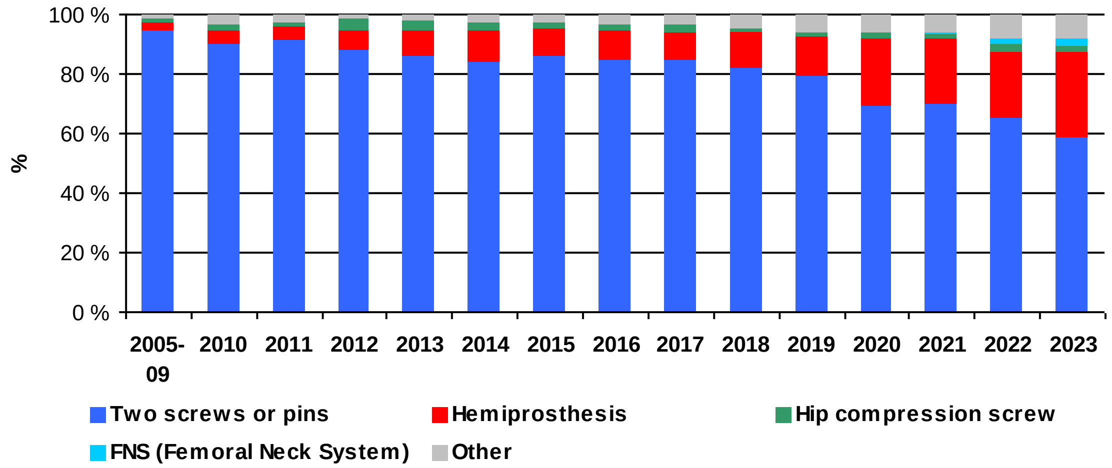
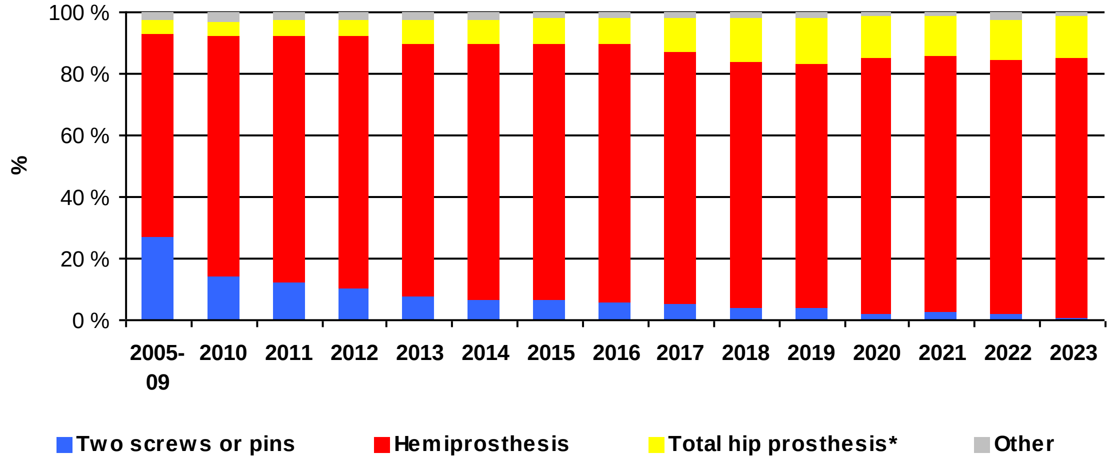


Figure 8b: Time trend for treatment of displaced femoral neck fractures



* Total hip prostheses for femoral neck fracture were reported to the Norwegian Arthroplasty Register without information about dislocation fracture

Figure 8c: Time trend for treatment of basocervical fracture

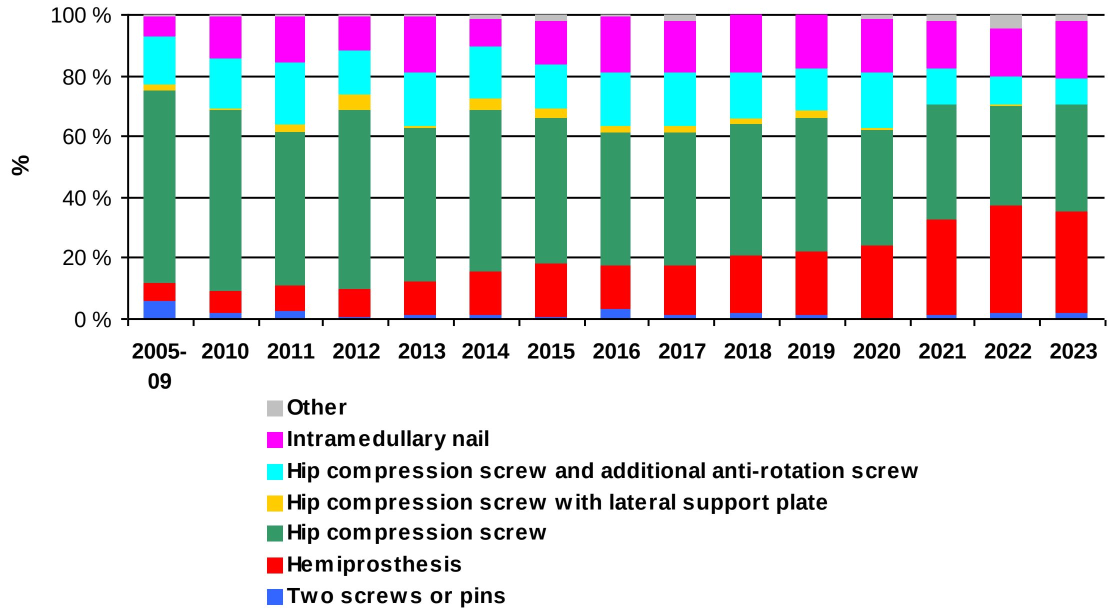


Figure 8d: Time trend for treatment of trochanteric fractures (AO / OTA type A1)

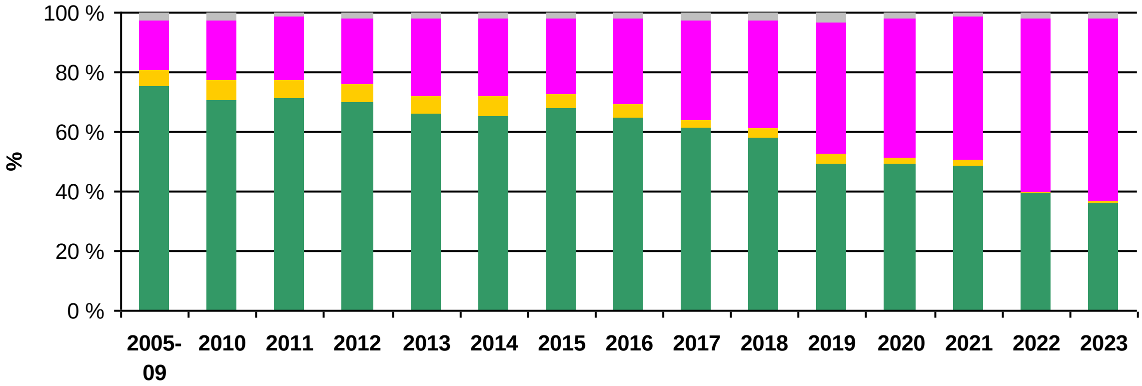


Figure 8e: Time trend for treatment of trochanteric fractures (AO / OTA type A2)

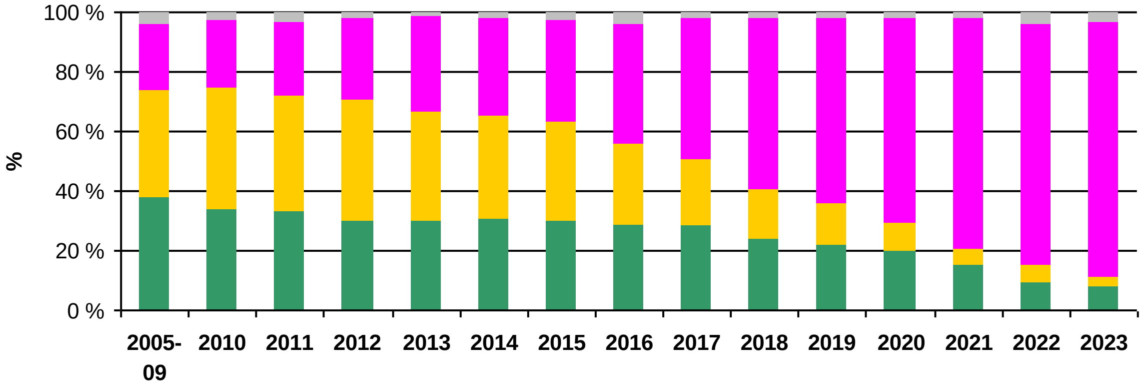


Figure 8f: Time trend for treatment of interochanteric fractures (AO / OTA type A3)

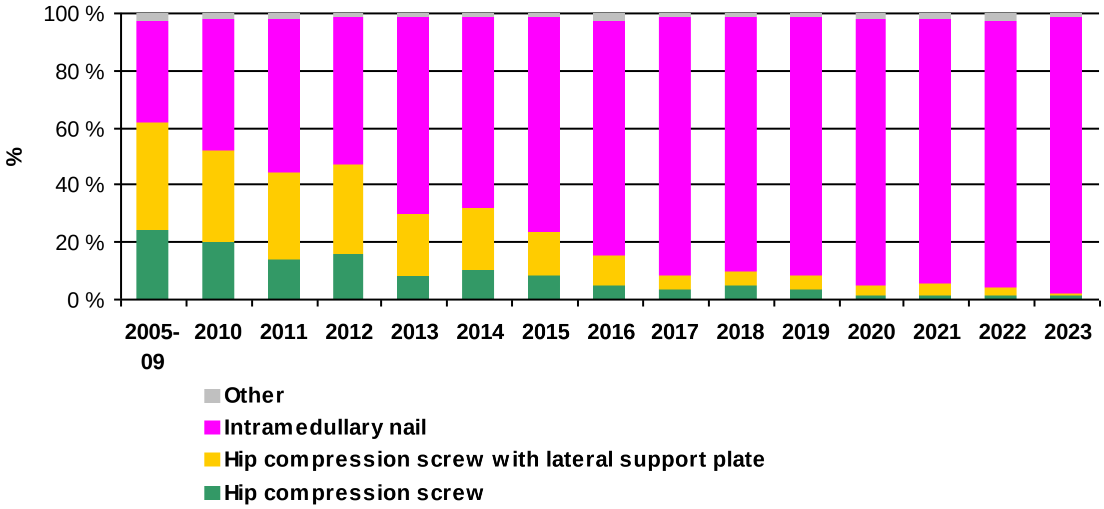
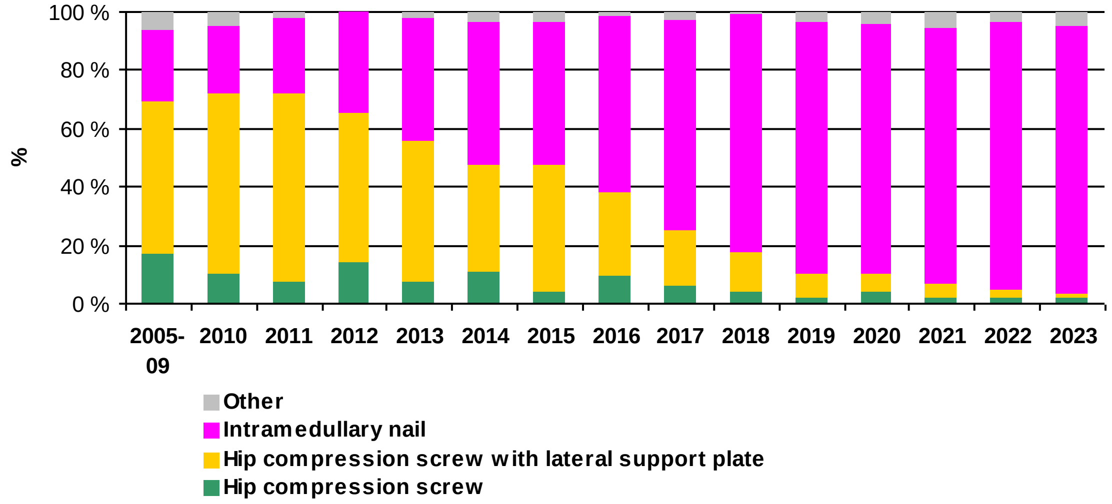


Figure 8g: Time trend for treatment of subtrochanteric fractures



Reoperations

Table 9: Cause of reoperation - all fractures (more than one reason is possible)

	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	Total
2023	64	31	8	49	3	8	171	9	35	3	91	5	39	385	**901**
	7,1%	3,4%	0,9%	5,4%	0,3%	0,9%	19,0%	1,0%	3,9%	0,3%	10,1%	0,6%	4,3%	42,7%	
2022	96	39	14	40	3	8	141	3	34	17	80	5	36	389	**905**
	10,6%	4,3%	1,5%	4,4%	0,3%	0,9%	15,6%	0,3%	3,8%	1,9%	8,8%	0,6%	4,0%	43,0%	
2021	74	36	17	43	1	5	157	11	52	17	62	8	50	390	**923**
	8,0%	3,9%	1,8%	4,7%	0,1%	0,5%	17,0%	1,2%	5,6%	1,8%	6,7%	0,9%	5,4%	42,3%	
2020	62	31	16	38	4	9	154	9	26	13	85	2	24	353	**826**
	7,5%	3,8%	1,9%	4,6%	0,5%	1,1%	18,6%	1,1%	3,1%	1,6%	10,3%	0,2%	2,9%	42,7%	
2019	91	48	19	74	10	9	183	12	28	19	95	7	42	448	**1 085**
	8,4%	4,4%	1,8%	6,8%	0,9%	0,8%	16,9%	1,1%	2,6%	1,8%	8,8%	0,6%	3,9%	41,3%	
2018	98	46	17	70	3	8	219	10	35	24	75	9	44	418	**1 076**
	9,1%	4,3%	1,6%	6,5%	0,3%	0,7%	20,4%	0,9%	3,3%	2,2%	7,0%	0,8%	4,1%	38,8%	
2017	107	47	17	60	10	8	199	14	37	16	82	5	52	378	**1 032**
	10,4%	4,6%	1,6%	5,8%	1,0%	0,8%	19,3%	1,4%	3,6%	1,6%	7,9%	0,5%	5,0%	36,6%	
2016	141	49	17	86	11	9	200	17	32	36	74	13	43	437	**1 165**
	12,1%	4,2%	1,5%	7,4%	0,9%	0,8%	17,2%	1,5%	2,7%	3,1%	6,4%	1,1%	3,7%	37,5%	
2015	161	71	35	72	9	10	180	18	35	33	83	11	47	384	**1 149**
	14,0%	6,2%	3,0%	6,3%	0,8%	0,9%	15,7%	1,6%	3,0%	2,9%	7,2%	1,0%	4,1%	33,4%	
2014	111	58	31	52	7	4	156	14	20	21	67	18	23	367	**949**
	11,7%	6,1%	3,3%	5,5%	0,7%	0,4%	16,4%	1,5%	2,1%	2,2%	7,1%	1,9%	2,4%	38,7%	
2013	141	57	33	75	5	10	166	15	28	22	76	7	47	389	**1 071**
	13,2%	5,3%	3,1%	7,0%	0,5%	0,9%	15,5%	1,4%	2,6%	2,1%	7,1%	0,7%	4,4%	36,3%	
2012	153	65	38	75	19	9	187	15	34	22	63	4	43	350	**1 077**
	14,2%	6,0%	3,5%	7,0%	1,8%	0,8%	17,4%	1,4%	3,2%	2,0%	5,8%	0,4%	4,0%	32,5%	
2011	158	75	59	83	12	5	152	12	41	23	67	8	33	352	**1 080**
	14,6%	6,9%	5,5%	7,7%	1,1%	0,5%	14,1%	1,1%	3,8%	2,1%	6,2%	0,7%	3,1%	32,6%	
2010	177	79	48	79	11	11	132	14	44	26	58	10	37	294	**1 020**
	17,4%	7,7%	4,7%	7,7%	1,1%	1,1%	12,9%	1,4%	4,3%	2,5%	5,7%	1,0%	3,6%	28,8%	
2005-09	1 347	564	342	494	44	58	480	76	155	174	220	37	165	1 106	**5 262**
	25,6%	10,7%	6,5%	9,4%	0,8%	1,1%	9,1%	1,4%	2,9%	3,3%	4,2%	0,7%	3,1%	21,0%	
Total	**2 981**	**1 296**	**711**	**1 390**	**152**	**171**	**2 877**	**249**	**636**	**466**	**1 278**	**149**	**725**	**6 440**	**19 521**
	15,3%	**6,6%**	**3,6%**	**7,1%**	**0,8%**	**0,9%**	**14,7%**	**1,3%**	**3,3%**	**2,4%**	**6,5%**	**0,8%**	**3,7%**	**33,0%**	

R1: Osteosynthesis failure
R2: Nonunion
R3: Avascular necrosis (segmental collaps)
R4: Local pain due to osteosynthesis material
R5: Malunion
R6: Infection - superficial
R7: Infection - deep
R8: Haematoma
R9: Dislocation of hemiprosthesis
R10: Cut out of osteosynthesis material
R11: Peri-implant fracture
R12: Loosening of hemiprosthesis
R13: Other
R14: Reoperation reported to the Arthroplasty Register except ”Deep infection” which is included in R7: Infection – deep.

Table 10a: Causes of reoperation per fracture type (more than one reason is possible) *

Type of primary fracture	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	Total
Intracapsular fracture, undisplaced	701	271	236	368	36	7	173	18	31	71	259	7	142	**2 320**
	30,2%	11,7%	10,2%	15,9%	1,6%	0,3%	7,5%	0,8%	1,3%	3,1%	11,2%	0,3%	6,1%	
Intracapsular fracture, displaced	677	269	174	312	27	92	1 657	142	515	55	419	99	159	**4 597**
	14,7%	5,9%	3,8%	6,8%	0,6%	2,0%	36,0%	3,1%	11,2%	1,2%	9,1%	2,2%	3,5%	
Basocervical fracture	144	66	31	74	8	2	58	6	18	32	26	2	28	**495**
	29,1%	13,3%	6,3%	14,9%	1,6%	0,4%	11,7%	1,2%	3,6%	6,5%	5,3%	0,4%	5,7%	
Trochanteric fracture (2 fragments)	194	67	27	92	16	17	126	16	7	69	100	0	72	**803**
	24,2%	8,3%	3,4%	11,5%	2,0%	2,1%	15,7%	2,0%	0,9%	8,6%	12,5%	0,0%	9,0%	
Trochanteric fracture (multifragment)	437	194	39	169	26	21	311	35	11	119	130	5	115	**1 612**
	27,1%	12,0%	2,4%	10,5%	1,6%	1,3%	19,3%	2,2%	0,7%	7,4%	8,1%	0,3%	7,1%	
Intertrochanteric fracture**	82	39	7	35	5	2	52	8	5	18	12	0	25	**290**
	28,3%	13,4%	2,4%	12,1%	1,7%	0,7%	17,9%	2,8%	1,7%	6,2%	4,1%	0,0%	8,6%	
Subtrochanteric fracture	207	126	9	76	7	7	145	12	5	27	52	3	73	**749**
	27,6%	16,8%	1,2%	10,1%	0,9%	0,9%	19,4%	1,6%	0,7%	3,6%	6,9%	0,4%	9,7%	
Other	37	15	2	10	2	3	34	2	5	9	15	2	14	**150**
	24,7%	10,0%	1,3%	6,7%	1,3%	2,0%	22,7%	1,3%	3,3%	6,0%	10,0%	1,3%	9,3%	
Missing	3	1	0	1	0	0	4	0	0	1	0	0	0	**10**
	30,0%	10,0%	0,0%	10,0%	0,0%	0,0%	40,0%	0,0%	0,0%	10,0%	0,0%	0,0%	0,0%	
Total	**2 482**	**1 048**	**525**	**1 137**	**127**	**151**	**2 560**	**239**	**597**	**401**	**1 013**	**118**	**628**	**11 026**
	22,5%	**9,5%**	**4,8%**	**10,3%**	**1,2%**	**1,4%**	**23,2%**	**2,2%**	**5,4%**	**3,6%**	**9,2%**	**1,1%**	**5,7%**	

R1: Osteosynthesis failure
R2: Nonunion
R3: Avascular necrosis (segmental collaps)
R4: Local pain due to osteosynthesis material
R5: Malunion
R6: Infection - superficial
R7: Infection - deep
R8: Haematoma
R9: Dislocation of hemiprosthesis
R10: Cut out of osteosynthesis material
R11: Peri-implant fracture
R12: Loosening of hemiprosthesis
R13: Other

* Total hip prostheses are not counted

** The registration started in 2008

Table 10b: Causes of reoperation per type of primary operation (more than one reason is possible) *

Type of primary operation	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	Total
T1	1 290	489	388	656	54	18	178	22	33	116	319	9	179	**3 751**
	34,4%	13,0%	10,3%	17,5%	1,4%	0,5%	4,7%	0,6%	0,9%	3,1%	8,5%	0,2%	4,8%	
T2	50	22	11	18	2	1	10	1	2	4	12	1	3	**137**
	36,5%	16,1%	8,0%	13,1%	1,5%	0,7%	7,3%	0,7%	1,5%	2,9%	8,8%	0,7%	2,2%	
T3	12	6	4	8	4	79	1 667	138	529	1	361	98	114	**3 021**
	0,4%	0,2%	0,1%	0,3%	0,1%	2,6%	55,2%	4,6%	17,5%	0,0%	11,9%	3,2%	3,8%	
T4	0	0	0	0	0	5	13	1	9	0	1	1	0	**30**
	0,0%	0,0%	0,0%	0,0%	0,0%	16,7%	43,3%	3,3%	30,0%	0,0%	3,3%	3,3%	0,0%	
T5	451	180	52	150	25	23	211	23	12	101	94	3	93	**1 418**
	31,8%	12,7%	3,7%	10,6%	1,8%	1,6%	14,9%	1,6%	0,8%	7,1%	6,6%	0,2%	6,6%	
T6	245	96	16	109	10	8	258	20	4	61	41	3	59	**930**
	26,3%	10,3%	1,7%	11,7%	1,1%	0,9%	27,7%	2,2%	0,4%	6,6%	4,4%	0,3%	6,3%	
T7	59	28	17	24	6	0	25	1	1	7	7	0	12	**187**
	31,6%	15,0%	9,1%	12,8%	3,2%	0,0%	13,4%	0,5%	0,5%	3,7%	3,7%	0,0%	6,4%	
T8	4	3	3	1	3	0	2	0	0	2	8	0	3	**29**
	13,8%	10,3%	10,3%	3,4%	10,3%	0,0%	6,9%	0,0%	0,0%	6,9%	27,6%	0,0%	10,3%	
T9	174	87	21	84	14	7	61	13	4	62	114	2	63	**706**
	24,6%	12,3%	3,0%	11,9%	2,0%	1,0%	8,6%	1,8%	0,6%	8,8%	16,1%	0,3%	8,9%	
T10	3	1	1	4	0	1	2	0	0	0	1	0	3	**16**
	18,8%	6,3%	6,3%	25,0%	0,0%	6,3%	12,5%	0,0%	0,0%	0,0%	6,3%	0,0%	18,8%	
T11	178	128	10	77	9	9	127	20	3	44	53	1	67	**726**
	24,5%	17,6%	1,4%	10,6%	1,2%	1,2%	17,5%	2,8%	0,4%	6,1%	7,3%	0,1%	9,2%	
T13	15	8	2	6	0	0	6	0	0	3	2	0	32	**74**
	20,3%	10,8%	2,7%	8,1%	0,0%	0,0%	8,1%	0,0%	0,0%	4,1%	2,7%	0,0%	43,2%	
T14	1	0	0	0	0	0	0	0	0	0	0	0	0	**1**
	100,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	
Total	**2 482**	**1 048**	**525**	**1 137**	**127**	**151**	**2 560**	**239**	**597**	**401**	**1 013**	**118**	**628**	**11 026**
	22,5%	**9,5%**	**4,8%**	**10,3%**	**1,2%**	**1,4%**	**23,2%**	**2,2%**	**5,4%**	**3,6%**	**9,2%**	**1,1%**	**5,7%**	

R1: Osteosynthesis failure
R2: Nonunion
R3: Avascular necrosis (segmental collaps)
R4: Local pain due to osteosynthesis material
R5: Malunion
R6: Infection - superficial
R7: Infection - deep
R8: Haematoma
R9: Dislocation of hemiprosthesis
R10: Cut out of osteosynthesis material
R11: Peri-implant fracture
R12: Loosening of hemiprosthesis
R13: Other

T1: Two screws or pins
T2: Three screws or pins
T3: Bipolar hemiprosthesis
T4: Unipolar hemiprosthesis
T5: Hip compression screw
T6: Hip compression screw with lateral support plate
T7: Hip compression screw system and additional anti-rotational screw
T8: Short intramedullary nail without distal locking
T9: Short intramedullary nail with distal locking
T10: Long intramedullary nail without distal locking
T11: Long intramedullary nail with distal locking
T13: Other
T14: Missing

* Total hip prostheses are not counted

** The registration started in 2008

Table 11: Type of reoperation (more than one reason is possible)

	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	Total
2023	41	104	128	1	79	143	21	5	168	386	**1 076**
	3,8%	9,7%	11,9%	0,1%	7,3%	13,3%	2,0%	0,5%	15,6%	35,9%	
2022	35	25	108	0	100	123	22	5	158	384	**960**
	3,6%	2,6%	11,3%	0,0%	10,4%	12,8%	2,3%	0,5%	16,5%	40,0%	
2021	36	15	123	0	80	137	43	5	162	360	**961**
	3,7%	1,6%	12,8%	0,0%	8,3%	14,3%	4,5%	0,5%	16,9%	37,5%	
2020	34	17	87	0	77	122	12	3	155	360	**867**
	3,9%	2,0%	10,0%	0,0%	8,9%	14,1%	1,4%	0,3%	17,9%	41,5%	
2019	70	22	131	0	86	147	16	4	176	429	**1 081**
	6,5%	2,0%	12,1%	0,0%	8,0%	13,6%	1,5%	0,4%	16,3%	39,7%	
2018	71	27	114	0	108	167	16	7	189	422	**1 121**
	6,3%	2,4%	10,2%	0,0%	9,6%	14,9%	1,4%	0,6%	16,9%	37,6%	
2017	70	33	138	0	115	153	18	6	145	369	**1 047**
	6,7%	3,2%	13,2%	0,0%	11,0%	14,6%	1,7%	0,6%	13,8%	35,2%	
2016	90	36	151	0	100	151	14	7	161	422	**1 132**
	8,0%	3,2%	13,3%	0,0%	8,8%	13,3%	1,2%	0,6%	14,2%	37,3%	
2015	75	36	182	0	114	131	19	4	148	372	**1 081**
	6,9%	3,3%	16,8%	0,0%	10,5%	12,1%	1,8%	0,4%	13,7%	34,4%	
2014	48	26	159	0	81	112	7	4	99	352	**888**
	5,4%	2,9%	17,9%	0,0%	9,1%	12,6%	0,8%	0,5%	11,1%	39,6%	
2013	71	32	159	0	117	116	14	6	118	376	**1 009**
	7,0%	3,2%	15,8%	0,0%	11,6%	11,5%	1,4%	0,6%	11,7%	37,3%	
2012	73	42	189	0	91	137	14	9	109	341	**1 005**
	7,3%	4,2%	18,8%	0,0%	9,1%	13,6%	1,4%	0,9%	10,8%	33,9%	
2011	72	34	215	0	97	105	19	13	113	358	**1 026**
	7,0%	3,3%	21,0%	0,0%	9,5%	10,2%	1,9%	1,3%	11,0%	34,9%	
2010	86	40	221	2	89	106	15	11	104	289	**963**
	8,9%	4,2%	22,9%	0,2%	9,2%	11,0%	1,6%	1,1%	10,8%	30,0%	
2005-09	529	173	1 635	43	387	382	42	49	348	1 093	**4 681**
	11,3%	3,7%	34,9%	0,9%	8,3%	8,2%	0,9%	1,0%	7,4%	23,3%	
Total	**1 401**	**662**	**3 740**	**46**	**1 721**	**2 232**	**292**	**138**	**2 353**	**6 313**	**18 898**
	7,4%	**3,5%**	**19,8%**	**0,2%**	**9,1%**	**11,8%**	**1,5%**	**0,7%**	**12,5%**	**33,4%**	

R1: Removal of implant (when only procedure)
R2: Girdlestone (= Removal of implant/hemiprosthesis and caput)
R3: Bipolar hemiprosthesis
R4: Unipolar haemiprosthesis
R5: Re-osteosynthesis
R6: Debridement for haematoma or infection
R7: Closed reduction of dislocated hemiprosthesis
R8: Open reduction of dislocated hemiprosthesis
R9: Other
R10: Total hip prosthesis

Table 12: Reoperation after primary screw osteosynthesis (reasons are not mutually exclusive)

	R1	R2	R3	R4	R5	R6	R9	R10	Total
2023	16 11,5%	1 0,7%	20 14,4%	0 0,0%	19 13,7%	1 0,7%	3 2,2%	79 56,8%	**139**
2022	12 7,4%	1 0,6%	28 17,3%	0 0,0%	17 10,5%	3 1,9%	3 1,9%	98 60,5%	**162**
2021	13 8,3%	0 0,0%	32 20,5%	0 0,0%	19 12,2%	3 1,9%	5 3,2%	84 53,8%	**156**
2020	12 8,0%	0 0,0%	20 13,3%	0 0,0%	16 10,7%	1 0,7%	3 2,0%	98 65,3%	**150**
2019	32 16,2%	0 0,0%	42 21,3%	0 0,0%	10 5,1%	3 1,5%	6 3,0%	104 52,8%	**197**
2018	27 12,1%	1 0,4%	30 13,5%	0 0,0%	25 11,2%	3 1,3%	7 3,1%	130 58,3%	**223**
2017	24 11,2%	4 1,9%	37 17,3%	0 0,0%	21 9,8%	2 0,9%	2 0,9%	124 57,9%	**214**
2016	36 12,7%	3 1,1%	53 18,7%	0 0,0%	27 9,5%	3 1,1%	4 1,4%	157 55,5%	**283**
2015	29 11,3%	3 1,2%	66 25,7%	0 0,0%	22 8,6%	3 1,2%	6 2,3%	128 49,8%	**257**
2014	17 6,7%	0 0,0%	70 27,7%	0 0,0%	25 9,9%	3 1,2%	3 1,2%	135 53,4%	**253**
2013	35 12,2%	2 0,7%	72 25,2%	0 0,0%	35 12,2%	1 0,3%	2 0,7%	139 48,6%	**286**
2012	31 10,2%	10 3,3%	99 32,5%	0 0,0%	27 8,9%	4 1,3%	3 1,0%	131 43,0%	**305**
2011	38 11,5%	9 2,7%	113 34,1%	0 0,0%	23 6,9%	2 0,6%	7 2,1%	139 42,0%	**331**
2010	43 13,2%	11 3,4%	114 35,0%	1 0,3%	26 8,0%	2 0,6%	4 1,2%	125 38,3%	**326**
2005-09	221 12,4%	39 2,2%	802 45,1%	18 1,0%	78 4,4%	17 1,0%	19 1,1%	586 32,9%	**1 780**
Total	**586** **11,6%**	**84** **1,7%**	**1 598** **31,6%**	**19** **0,4%**	**390** **7,7%**	**51** **1,0%**	**77** **1,5%**	**2 257** **44,6%**	**5 062**

R1: Removal of implant (when only procedure)
R2: Girdlestone (= Removal of implant/hemiprosthesis and caput)
R3: Bipolar hemiprosthesis
R4: Unipolar hemiprosthesis
R5: Re-osteosynthesis
R6: Debridement for haematoma or infection
R9: Other
R10: Total hip prosthesis

Table 13: Reoperation after primary uni/bipolar hemiprosthesis (reasons are not mutually exclusive)

	R2	R3	R6	R7	R8	R9	R10	Total
2023	79 23,0%	40 11,6%	83 24,1%	11 3,2%	4 1,2%	90 26,2%	37 10,8%	**344**
2022	18 7,3%	23 9,3%	66 26,7%	12 4,9%	3 1,2%	89 36,0%	36 14,6%	**247**
2021	4 1,5%	27 10,4%	77 29,6%	25 9,6%	3 1,2%	91 35,0%	33 12,7%	**260**
2020	3 1,3%	21 9,1%	80 34,5%	5 2,2%	3 1,3%	93 40,1%	27 11,6%	**232**
2019	7 2,5%	33 11,8%	83 29,6%	10 3,6%	3 1,1%	97 34,6%	47 16,8%	**280**
2018	9 2,9%	28 8,9%	105 33,4%	10 3,2%	4 1,3%	113 36,0%	45 14,3%	**314**
2017	9 3,5%	28 10,8%	78 30,1%	8 3,1%	4 1,5%	84 32,4%	48 18,5%	**259**
2016	12 4,5%	20 7,5%	81 30,2%	9 3,4%	6 2,2%	98 36,6%	42 15,7%	**268**
2015	5 2,2%	18 7,9%	66 28,9%	16 7,0%	1 0,4%	74 32,5%	48 21,1%	**228**
2014	9 4,9%	20 10,9%	48 26,1%	5 2,7%	4 2,2%	61 33,2%	37 20,1%	**184**
2013	11 5,0%	15 6,8%	68 30,6%	9 4,1%	4 1,8%	78 35,1%	37 16,7%	**222**
2012	11 5,7%	23 11,9%	55 28,4%	10 5,2%	8 4,1%	56 28,9%	31 16,0%	**194**
2011	10 4,8%	14 6,7%	60 28,6%	16 7,6%	8 3,8%	70 33,3%	32 15,2%	**210**
2010	8 4,3%	17 9,0%	59 31,4%	10 5,3%	9 4,8%	69 36,7%	16 8,5%	**188**
2005-09	31 6,1%	29 5,7%	158 30,9%	22 4,3%	37 7,2%	172 33,7%	62 12,1%	**511**
Total	**226** **5,7%**	**356** **9,0%**	**1 167** **29,6%**	**178** **4,5%**	**101** **2,6%**	**1 335** **33,9%**	**578** **14,7%**	**3 941**

R2: Girdlestone (= Removal of implant/hemiprosthesis and caput)
R3: Bipolar hemiprosthesis
R6: Debridement for haematoma or infection
R7: Closed reduction of dislocated hemiprosthesis
R8: Open reduction of dislocated hemiprosthesis
R9: Other
R10: Total hip prosthesis

Table 14: Specification of R9 - Others

	2005 -14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Cable Ready plate + cerclage	5			1	1		2		1		**10**
Cerclage	12	3	2	2		4	5		7	7	**42**
Dall Miles plate + cerclage	12	4	3	2	2	1	2	1		1	**28**
DCP plate + cerclage			3	4	4	2		2	1	3	**19**
Drainage of haematoma	25		1	1				1			**28**
Fixation of trochanter (GTR)			1			1		1	1	1	**5**
Fixation of trochanter (Dall Miles)	3		1			1					**5**
NCB plate + cerclage					4	10	8	9	16	10	**57**
Cement spacer	11	4	4	3	1	2	1	3	2	3	**34**
Exchange of caput/bipolar head	399	55	77	67	95	71	74	70	56	58	**1 022**
Exchange of caput/bipolar head + osteosynthesis with plate/cerclage	4	1			1						**6**
Suture of muscle/fascie	6	1	2	1	1	2			1	1	**15**
Unspecified plate + cerclage	11	5	1	2	2	2				1	**24**
Other (n<5)	18	1	3	1	2	1	1	4	3	5	**39**
Total	**506**	**74**	**98**	**84**	**113**	**97**	**93**	**91**	**88**	**90**	**1 334**

Implants

Table 15: Cemented hemiprostheses - primary operations

Femur	Caput	Bipolar head	2005 -15	2016	2017	2018	2019	2020	2021	2022	2023	Total
Charnley		Hastings bipolar head	2 695									**2 695**
Charnley Modular	Elite	Hastings bipolar head	1 269									**1 269**
Charnley Modular	Elite	Landos bipolar cup	24									**24**
Charnley Modular	Elite	Self-centering bipolar	675	71	45							**791**
Corail	Articul/Eze CoCr	Self-centering bipolar	280	93	80	86	62				1	**602**
Corail	Articul/Eze CoCr	Vario-Cup	106	64	7							**177**
Corail	Cobalt chrome (DePuy)	Self-centering bipolar	49									**49**
CPS-PLUS	Metal Ball Head	Bipolar Ball Head	23									**23**
CPT	Protasul/Metasul	Multipolar			764	350	98					**1 212**
CPT	Protasul/Metasul	Self-centering bipolar			67	92	88					**247**
CPT	Protasul/Metasul	UHR			22	3						**25**
C-Stem	Articul/Eze CoCr	Self-centering bipolar	5	86	69	165	389	692	786	657	719	**3 568**
C-Stem	Articul/Eze CoCr	UHR								51	6	**57**
C-Stem	Articul/Eze Ultamet (M-Spec)	Self-centering bipolar	12	99	97			2			4	**214**
ETS			298	1								**299**
Exeter/V40	Exeter/V40	HIP Bipolar Cup	7	2	1	1	1	1	5	4		**22**
Exeter/V40	Exeter/V40	Multipolar			28	113	80	24				**245**
Exeter/V40	Exeter/V40	Self-centering bipolar	643	218	46						1	**908**
Exeter/V40	Exeter/V40	UHR	9 788	1568	884	1 347	1 542	1 391	1 264	1 297	1 251	**20 332**
Lubinus SPII	Articul/Eze CoCr	Self-centering bipolar	26		1							**27**
Lubinus SPII	CoCrMo (Link)	Multipolar						61	71	80	83	**295**
Lubinus SPII	CoCrMo (Link)	Self-centering bipolar	126	98	17							**241**
Lubinus SPII	CoCrMo (Link)	UHR	484	257	258	261	234	241	454	537	483	**3 209**
Lubinus SPII	CoCrMo (Link)	Vario-Cup	1 835	113	178	270	324	541	628	709	758	**5 356**
MS-30	CoCr (ZimmerBiomet)	Multipolar								16	131	**147**
MS-30	Protasul/Metasul	Multipolar			106	265	227	101	91	88	59	**937**
MS-30	Protasul/Metasul	Self-centering bipolar						33	55	50	30	**168**
MS-30	Protasul/Metasul	UHR	21									**21**
MS-30	Versys	Multipolar			2	1	63	95	147	111	23	**442**
MS-30	Versys	Self-centering bipolar	11	45	38	11						**105**
MS-30	Versys	UHR				21	35	41	48	40	68	**253**
MS-30	Zimmer hoder	Multipolar			6	4		7	6	6		**29**
Spectron EF Primary	Articul/Eze CoCr	HIP Bipolar Cup							13	14	17	**44**
Spectron EF Primary	Cobalt Chrom (S&N)	Biarticular cup	33									**33**
Spectron EF Primary	Cobalt Chrom (S&N)	HIP Bipolar Cup	104	15	15	13	10	8	3			**168**
Spectron EF Primary	Cobalt Chrom (S&N)	Landos bipolar cup	112									**112**
Spectron EF Primary	Cobalt Chrom (S&N)	Self-centering bipolar	20									**20**
Spectron EF Primary	Cobalt Chrom (S&N)	Tandem	1 067									**1 067**
Spectron EF Primary	Cobalt Chrom (S&N)	Vario-Cup	82									**82**
Titan	Cobalt chrome (DePuy)	Landos bipolar cup	648									**648**
Titan	Cobalt chrome (DePuy)	Self-centering bipolar	227									**227**
Other	(n < 20)		626	40	154	91	49	57	29	96	120	**1 262**
Unknown			33	1	1	2	1	2		3	2	**45**
Total			**21 329**	**2 771**	**2 886**	**3 096**	**3 203**	**3 297**	**3 600**	**3 759**	**3 756**	**47 697**

Table 16: Uncemented hemiprostheses - primary operations

Femur	Caput	Bipolar head	2005 -14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Accolade II	Exeter/V40	Vario-Cup	10	11	4	2		2	2		3	9	**43**
Corail	Articul/Eze CoCr	ic-head								1	9	8	**18**
Corail	Articul/Eze CoCr	Bipolar Ball Head	64										**64**
Corail	Articul/Eze CoCr	HIP Bipolar Cup								6	52	10	**68**
Corail	Articul/Eze CoCr	Landos bipolar cup	102										**102**
Corail	Articul/Eze CoCr	Multipolar						3	9	10	9	12	**43**
Corail	Articul/Eze CoCr	Self-centering bipolar	2 275	429	486	295	165	106	39	23	20	11	**3 849**
Corail	Articul/Eze CoCr	UHR	228	74	67	33	39	27	10	3	4	24	**509**
Corail	Articul/Eze CoCr	Vario-Cup	155	4	1								**160**
Corail	Articul/Eze Ultamet (M-Spec)	Self-centering bipolar	390	9	6	1							**406**
Corail	Cobalt Chrom (S&N)	Self-centering bipolar	37										**37**
Corail	Cobalt chrome (DePuy)	Landos bipolar cup	744										**744**
Corail	Cobalt chrome (DePuy)	Self-centering bipolar	1 127										**1 127**
Corail	Hipball Premium	UHR										18	**18**
Corail	Metal Ball Head	Bipolar Ball Head	25										**25**
Filler	Cobalt Chrom (S&N)	Biarticular cup	19										**19**
Filler	Hipball Premium	Biarticular cup	176										**176**
Filler	Hipball Premium	HIP Bipolar Cup	498	44	36	35	63	50	55	46	1		**828**
Filler	Hipball Premium	UHR	31	2									**33**
Furlong	Furlong	UHR		21	57	31							**109**
HACTIV	HACTIV head	Tandem	19										**19**
HACTIV	HACTIV head	UHR	41	22		1							**64**
Polarstem	Cobalt Chrom (S&N)	Tandem	211	2									**213**
Polarstem	Cobalt Chrom (S&N)	UHR	25	33	9	12	16	13	9	10	8	5	**140**
SL-PLUS/SLR PLUS	HACTIV head	Bipolar Ball Head	16										**16**
SL-PLUS/SLR PLUS	Metal Ball Head	Bipolar Ball Head	153										**153**
Other	(n < 15)		488	22	20	45	42	29	17	17	20	25	**725**
Unknown			5					1					**6**
Total			**6 839**	**673**	**686**	**455**	**325**	**231**	**141**	**116**	**126**	**122**	**9 714**

1 femoral stem is missing in Table 15 and 16 due to unknown brand name and unknown type of fixation

Table 17: Cemented hemiprostheses - reoperations

Femur	Caput	Bipolar head	2005 -14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Charnley		Hastings bipolar head	452										**452**
Charnley Modular	Elite	Hastings bipolar head	77										**77**
Charnley Modular	Elite	Self-centering bipolar	22	7									**29**
Corail	Articul/Eze CoCr	Self-centering bipolar	7	3	5	1	2	2					**20**
CPS-PLUS	Metal Ball Head	Bipolar Ball Head	15										**15**
CPT	Protasul/Metasul	Self-centering bipolar				2	4	4					**10**
C-Stem	Articul/Eze CoCr	Self-centering bipolar			4	2	2	3	3	5	7	5	**31**
ETS			22										**22**
Exeter/V40	Exeter/V40	Multipolar					6	1	2			1	**10**
Exeter/V40	Exeter/V40	Self-centering bipolar	23	11	6	1							**41**
Exeter/V40	Exeter/V40	UHR	650	70	42	31	37	49	26	32	41	41	**1 019**
Lubinus SPII	CoCrMo (Link)	UHR	14	15	12	11	7	2	2	6	7	5	**81**
Lubinus SPII	CoCrMo (Link)	Vario-Cup	141	4	6	11	2	10	7	10	8	15	**214**
MS-30	Protasul/Metasul	Multipolar				4	1	4	1	3	2	2	**17**
Restoration Modular	Exeter/V40	Self-centering bipolar	12	1									**13**
Restoration Modular	Exeter/V40	UHR		1	2	4	2		2				**11**
Spectron EF Primary	Cobalt Chrom (S&N)	Landos bipolar cup	11										**11**
Spectron EF Primary	Cobalt Chrom (S&N)	Tandem	120										**120**
Titan	Cobalt chrome (DePuy)	Landos bipolar cup	125										**125**
Other	(n <10)		260	21	35	35	25	27	19	33	24	32	**511**
Unknown			5	1		2							**8**
Total			**1 956**	**134**	**112**	**104**	**88**	**102**	**62**	**89**	**89**	**101**	**2 837**

Table 18: Uncemented hemiprostheses - reoperations

Femur	Caput	Bipolar head	2005 -14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Arcos	Modular Head (Biomet)	Multipolar				4	2	1	2	6	4	4	**23**
Arcos	Modular Head (Biomet)	Self-centering bipolar	2	3	5								**10**
Arcos	Modular Head (Biomet)	UHR				1	2	6	4	7	3	5	**28**
Corail	Articul/Eze CoCr	HIP Bipolar Cup									4	1	**5**
Corail	Articul/Eze CoCr	Landos bipolar cup	19										**19**
Corail	Articul/Eze CoCr	Self-centering bipolar	72	13	13	6	6	1	4	4	1	2	**122**
Corail	Articul/Eze CoCr	UHR			4	1							**5**
Corail	Articul/Eze Ultamet (M-Spec)	Self-centering bipolar	29										**29**
Corail	Cobalt chrome (DePuy)	Landos bipolar cup	81										**81**
Corail	Cobalt chrome (DePuy)	Self-centering bipolar	66										**66**
Corail Revisjon/KAR	Articul/Eze Ultamet (M-Spec)	Self-centering bipolar	7										**7**
Corail Revisjon/KAR	Cobalt chrome (DePuy)	Landos bipolar cup	9										**9**
Corail Revisjon/KAR	Cobalt chrome (DePuy)	Self-centering bipolar	6										**6**
Filler	Biotechni fem. head	Biarticular cup	18										**18**
Filler	Cobalt chrome (DePuy)	Biarticular cup	5										**5**
Filler	Hipball Premium	Biarticular cup	56										**56**
Filler	Hipball Premium	HIP Bipolar Cup	60	8	7	9	6	1	7	4			**102**
HACTIV	HACTIV head	Moonstone	5										**5**
Link MP Reconstruction	CoCrMo (Link)	UHR		1	1		1	2		2		2	**9**
Polarstem	Cobalt Chrom (S&N)	UHR	2	1	1	2	1	2		2	2		**13**
Reclaim	Articul/Eze CoCr	Self-centering bipolar	1					1	1		2		**5**
REEF	Cobalt chrome (DePuy)	Self-centering bipolar	5										**5**
Restoration-HA	C-Taper Head	Landos bipolar cup	7										**7**
Revitan	Versys	Multipolar				1	1	2	2				**6**
SL-PLUS/SLR PLUS	Metal Ball Head	Bipolar Ball Head	12										**12**
TTHR	Articul/Eze CoCr	UHR	4	1	1								**6**
TTHR	CoCrMo (Link)	UHR	1	4	2			1					**8**
TTHR	TETE Inox	Self-centering bipolar	5										**5**
Other	(n < 5)		193	19	5	9	8	13	5	3	3	8	**266**
Unknown			3			1							**4**
Total			**668**	**50**	**39**	**34**	**27**	**30**	**25**	**28**	**19**	**22**	**942**

2 femoral stems are missing in Table 17 and 18 due to unknown brand name and unknown type of fixation

Table 19: Screws - primary operations

Product	2005-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Asnis III	1 124	120	118	114	119	212	179	221	398	371	**2 976**
Cannulated screw (DePuySynthes)						4	6	4	4	1	**19**
Cannulated screw (S&N)	2				18	82	59	89	60	56	**366**
Cannulated Screw Zimmer Biomet					1			27	108	69	**205**
Hansson pin system (LIH)	1 953	60	49	79	62	55	37	12	10	7	**2 324**
LE-screw								16	19	22	**57**
Olmed screw	9 528	483	433	272	196	86	71	72	35	11	**11 187**
Richards CHP	5 509	614	596	658	635	486	359	303	86	41	**9 287**
Other (n<10)			3	1	2	1					**7**
Unknown	1			1	2	3	2	3	12	1	**25**
Total	**18 117**	**1 277**	**1 199**	**1 125**	**1 035**	**929**	**713**	**747**	**732**	**579**	**26 453**

Table 20: Hip compression screws - primary operations

Product	2005-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
DHS	4 210	25	25	29	11	5					**4 305**
LCP DHS	3 289	1 357	1 162	1 094	923	765	653	638	616	569	**11 066**
Omega	111								1	1	**113**
Omega 3	4		2	2			1	1	1		**11**
Richards CHS	16 570	773	712	534	493	409	369	351	183	77	**20 471**
Swemac CHS System		8	5	6	9	13	2				**43**
Other (n<10)	2										**2**
Total	**24 186**	**2 163**	**1 906**	**1 665**	**1 436**	**1 192**	**1 025**	**990**	**801**	**647**	**36 011**

Table 21: Intramedullary nails - primary operations

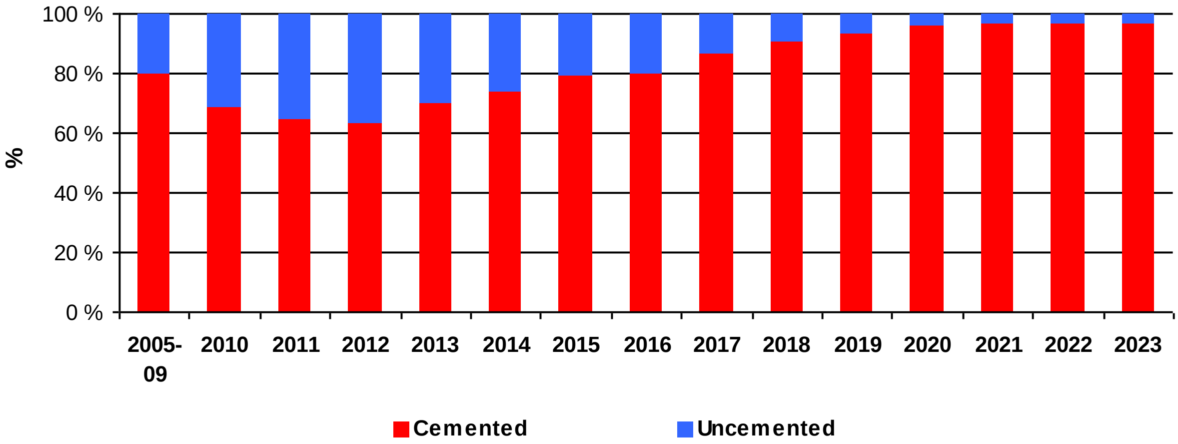
Product	2005-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
ACE	49										**49**
AFFIXUS				5	14	23	29	43	26	32	**172**
EXPert LFN	62	4	3	5	2	7	1	2	1		**87**
Gamma 3	4 992	467	429	369	512	1 053	1 220	1 476	1 691	1 622	**13 831**
IMHS	27										**27**
IMHS CP	10										**10**
PFN	26										**26**
PFNA	566	174	200	186	231	129	142	120	142	139	**2 029**
T2	13	1				1	1	1	1		**18**
T2 Alpha								3	5	13	**21**
T2 recon	182	24	28	34	31	39	72	75	21	14	**520**
TFNA femoral nail					1	171	137	146	188	204	**847**
T-Gamma	507										**507**
Trigen Intertan	1 697	561	744	990	994	415	351	366	385	362	**6 865**
Trigen Meta-Tan					2	1		2	3	5	**13**
Trigen TAN/FAN	248	62	65	88	76	49	20	8	14	4	**634**
Other (n<10)	5									1	**6**
Unknown	5	1				1	1	3	4	3	**18**
Total	**8 389**	**1 294**	**1 469**	**1 677**	**1 863**	**1 889**	**1 974**	**2 245**	**2 481**	**2 399**	**25 680**

Hemiprostheses

Table 22: Fixation of primary hemiprostheses

	Uncemented		Cement with antibiotics		Cement without antibiotics		Missing		Total
2023	124	(3,2%)	3 749	(96,6%)	7	(0,2%)	1	(0,0%)	**3 881**
2022	127	(3,3%)	3 758	(96,7%)	0	(0,0%)	1	(0,0%)	**3 886**
2021	117	(3,1%)	3 598	(96,8%)	1	(0,0%)	1	(0,0%)	**3 717**
2020	142	(4,1%)	3 296	(95,9%)	0	(0,0%)	0	(0,0%)	**3 438**
2019	231	(6,7%)	3 203	(93,3%)	0	(0,0%)	0	(0,0%)	**3 434**
2018	330	(9,6%)	3 087	(90,2%)	1	(0,0%)	3	(0,1%)	**3 421**
2017	455	(13,6%)	2 886	(86,4%)	0	(0,0%)	0	(0,0%)	**3 341**
2016	686	(19,8%)	2 770	(80,1%)	0	(0,0%)	1	(0,0%)	**3 457**
2015	673	(20,8%)	2 563	(79,2%)	1	(0,0%)	0	(0,0%)	**3 237**
2014	820	(25,7%)	2 365	(74,1%)	3	(0,1%)	4	(0,1%)	**3 192**
2013	939	(30,3%)	2 158	(69,5%)	0	(0,0%)	6	(0,2%)	**3 103**
2012	1 139	(36,2%)	1 966	(62,5%)	10	(0,3%)	33	(1,0%)	**3 148**
2011	1 060	(35,0%)	1 931	(63,8%)	6	(0,2%)	29	(1,0%)	**3 026**
2010	880	(31,3%)	1 898	(67,5%)	7	(0,2%)	27	(1,0%)	**2 812**
2005-09	2 001	(19,4%)	8 137	(78,8%)	24	(0,2%)	161	(1,6%)	**10 323**
Total	**9 724**	**(16,9%)**	**47 365**	**(82,5%)**	**60**	**(0,1%)**	**267**	**(0,5%)**	**57 416**

Figure 9: Time trend for fixation of primary hemiprostheses *



* 267 operations with missing information on type of fixation

Table 23: Type of cement - primary operations

Product	Manufacturer	2005-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Cemex System Genta FAST	Alere	610	29									**639**
Cemex system genta ID green	Alere	1		16	126	106	75	6	1			**331**
Cemex w/gentamicin	Alere	71	71	111			1					**254**
Copal G + C	Heraeus						1			102	86	**189**
Copal G + V	Heraeus	1	1	2	8	4	6	2	8	88	2	**122**
Optipac Refobacin Bonecement R	Biomet	3 934	1 248	1 040	949	770	44		1			**7 986**
Optipac Refobacin Bonecement R-3	Zimmer Bio						16					**16**
Optipac Refobacin Revision	Biomet	128										**128**
Palacos R + G	Heraeus	8 927	956	1 007	763	883	563	265	317	259	335	**14 275**
Palacos R+G pro	Heraeus	1	1	93	374	1 078	2 362	2 935	3 261	3 280	3 319	**16 704**
Palacos w/gentamicin	Heraeus/Sc	353										**353**
Refobacin Bone Cement R	Biomet	3 725	221	367	524	77						**4 914**
Refobacin-Palacos	Biomet	315										**315**
Simplex unknown	Stryker	75										**75**
Simplex w/Tobramycin	Stryker	2						10	1			**13**
SmartSet GHV Genta. Smartmix	Ortomedic	66	3	39	31	21	11	30	5			**206**
Other (n<10)			1	1	3				2		1	**8**
Missing information		246	32	94	108	148	124	48	2	29	6	**837**
Total		**18 455**	**2 563**	**2 770**	**2 886**	**3 087**	**3 203**	**3 296**	**3 598**	**3 758**	**3 749**	**47 365**

Table 24: Hydroxyapatite (HA) - uncemented prostheses

	With HA		Without HA		Missing		Total
2023	119	(96,0%)	4	(3,2%)	1	(0,8%)	**124**
2022	125	(98,4%)	2	(1,6%)	0	(0,0%)	**127**
2021	115	(98,3%)	2	(1,7%)	0	(0,0%)	**117**
2020	142	(100,0%)	0	(0,0%)	0	(0,0%)	**142**
2019	228	(98,7%)	3	(1,3%)	0	(0,0%)	**231**
2018	326	(98,8%)	4	(1,2%)	0	(0,0%)	**330**
2017	452	(99,3%)	3	(0,7%)	0	(0,0%)	**455**
2016	681	(99,3%)	5	(0,7%)	0	(0,0%)	**686**
2015	673	(100,0%)	0	(0,0%)	0	(0,0%)	**673**
2014	820	(100,0%)	0	(0,0%)	0	(0,0%)	**820**
2013	939	(100,0%)	0	(0,0%)	0	(0,0%)	**939**
2012	1 139	(100,0%)	0	(0,0%)	0	(0,0%)	**1 139**
2011	1 059	(99,9%)	1	(0,1%)	0	(0,0%)	**1 060**
2010	871	(99,0%)	9	(1,0%)	0	(0,0%)	**880**
2005-09	1 827	(91,3%)	174	(8,7%)	0	(0,0%)	**2 001**
Total	**9 516**	**(97,9%)**	**207**	**(2,1%)**	**1**	**(0,0%)**	**9 724**

Table 25: Stem design- primary operations

Stem design	2005-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Straight	5 975	279	95	70	17	10	19	19	17	17	**6 518**
Anatomic	2 094	389	479	476	537	575	861	1 160	1 346	1 340	**9 257**
Double-tapered	9 029	1 693	1 798	1 921	1 953	1 823	1 430	1 273	1 312	1 265	**23 497**
Triple-tapered	43	31	237	328	490	729	982	1 145	1 077	1 125	**6 187**
Uncemented	6 839	673	686	455	325	231	141	116	126	122	**9 714**
Total	**23 980**	**3 065**	**3 295**	**3 250**	**3 322**	**3 368**	**3 433**	**3 713**	**3 878**	**3 869**	**55 173**

Figure 10: Stem design

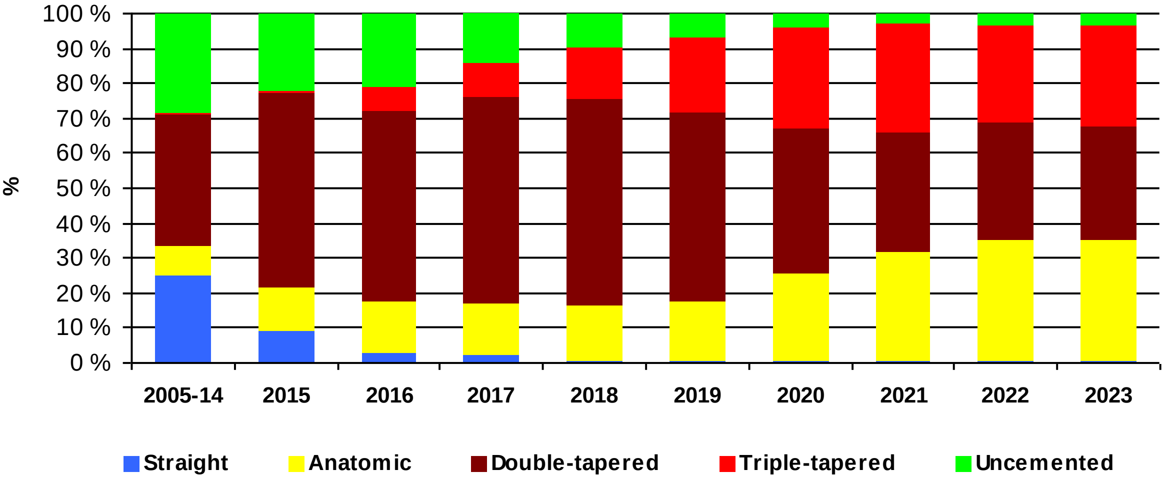
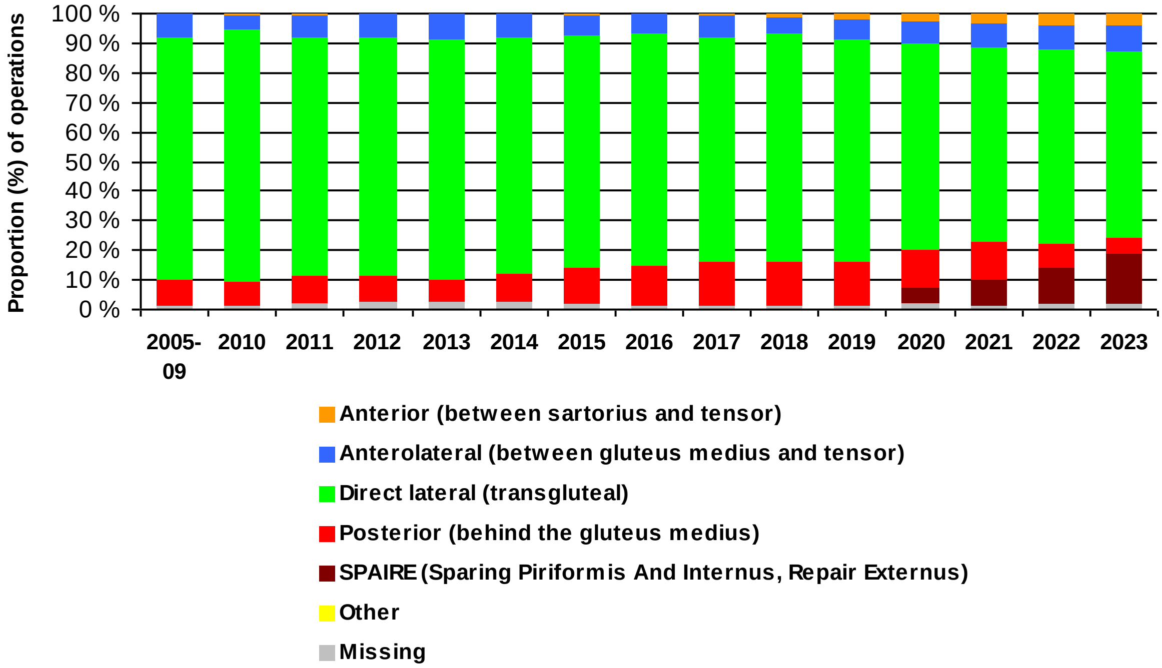


Table 26: Surgical approach used in hemiarthroplasty

	Anterior		Anterolateral		Direct lateral		Posterior		SPAIRE *		Other		Missing		Total
2023	155	(4,0%)	351	(9,0%)	2 425	(62,5%)	225	(5,8%)	647	(16,7%)	3	(0,1%)	75	(1,9%)	**3 881**
2022	157	(4,0%)	314	(8,1%)	2 547	(65,5%)	312	(8,0%)	486	(12,5%)	3	(0,1%)	67	(1,7%)	**3 886**
2021	136	(3,7%)	300	(8,1%)	2 424	(65,2%)	488	(13,1%)	307	(8,3%)	4	(0,1%)	58	(1,6%)	**3 717**
2020	102	(3,0%)	252	(7,3%)	2 392	(69,6%)	442	(12,9%)	186	(5,4%)	0	(0,0%)	64	(1,9%)	**3 438**
2019	67	(2,0%)	230	(6,7%)	2 577	(75,0%)	514	(15,0%)	4	(0,1%)	1	(0,0%)	41	(1,2%)	**3 434**
2018	45	(1,3%)	196	(5,7%)	2 632	(76,9%)	501	(14,6%)	0	(0,0%)	0	(0,0%)	47	(1,4%)	**3 421**
2017	24	(0,7%)	247	(7,4%)	2 541	(76,1%)	493	(14,8%)	0	(0,0%)	0	(0,0%)	36	(1,1%)	**3 341**
2016	11	(0,3%)	210	(6,1%)	2 714	(78,5%)	487	(14,1%)	0	(0,0%)	0	(0,0%)	35	(1,0%)	**3 457**
2015	14	(0,4%)	232	(7,2%)	2 544	(78,6%)	388	(12,0%)	0	(0,0%)	1	(0,0%)	58	(1,8%)	**3 237**
2014	3	(0,1%)	252	(7,9%)	2 562	(80,3%)	291	(9,1%)	0	(0,0%)	1	(0,0%)	83	(2,6%)	**3 192**
2013	8	(0,3%)	255	(8,2%)	2 538	(81,8%)	224	(7,2%)	0	(0,0%)	0	(0,0%)	78	(2,5%)	**3 103**
2012	6	(0,2%)	239	(7,6%)	2 538	(80,6%)	278	(8,8%)	0	(0,0%)	1	(0,0%)	86	(2,7%)	**3 148**
2011	11	(0,4%)	228	(7,5%)	2 446	(80,8%)	290	(9,6%)	0	(0,0%)	0	(0,0%)	51	(1,7%)	**3 026**
2010	14	(0,5%)	142	(5,0%)	2 391	(85,0%)	230	(8,2%)	0	(0,0%)	0	(0,0%)	35	(1,2%)	**2 812**
2005-09	16	(0,2%)	839	(8,1%)	8 452	(81,9%)	902	(8,7%)	0	(0,0%)	0	(0,0%)	116	(1,1%)	**10 325**
Total	**769**	**(1,3%)**	**4 287**	**(7,5%)**	**43 723**	**(76,1%)**	**6 065**	**(10,6%)**	**1 630**	**(2,8%)**	**14**	**(0,0%)**	**930**	**(1,6%)**	**57 418**

* SPAIRE (Sparing Piriformis And Internus, Repair Externus)

Figure 11: Surgical approach used in hemiarthroplasty



Pathological fractures

Table 27: Pathological fracture (osteoporotic fracture not included) - primary operations *

	No		Yes		Missing		Total
2023	7 421	(93,3%)	85	(1,1%)	447	(5,6%)	**7 953**
2022	6 915	(85,9%)	121	(1,5%)	1 017	(12,6%)	**8 053**
2021	6 749	(87,0%)	110	(1,4%)	900	(11,6%)	**7 759**
2020	6 251	(86,5%)	86	(1,2%)	890	(12,3%)	**7 227**
2019	6 509	(86,4%)	82	(1,1%)	946	(12,6%)	**7 537**
2018	6 812	(86,8%)	86	(1,1%)	948	(12,1%)	**7 846**
2017	6 875	(86,6%)	96	(1,2%)	969	(12,2%)	**7 940**
2016	7 098	(87,0%)	85	(1,0%)	973	(11,9%)	**8 156**
2015	7 106	(87,9%)	88	(1,1%)	893	(11,0%)	**8 087**
2014	6 944	(88,0%)	57	(0,7%)	893	(11,3%)	**7 894**
2013	7 031	(87,7%)	89	(1,1%)	893	(11,1%)	**8 013**
2012	7 233	(87,9%)	64	(0,8%)	932	(11,3%)	**8 229**
2011	7 548	(89,7%)	76	(0,9%)	790	(9,4%)	**8 414**
2010	7 637	(93,1%)	67	(0,8%)	498	(6,1%)	**8 202**
2005-09	33 601	(90,4%)	302	(0,8%)	3 278	(8,8%)	**37 181**
Total	**131 730**	**(88,7%)**	**1 494**	**(1,0%)**	**15 267**	**(10,3%)**	**148 491**

* Patients operated with total hip prosthesis were excluded

Intraoperative complications

Table 28: Intraoperative complications - primary operations

	Yes		No		Missing		Total
2023	223	(2,7%)	7 806	(95,9%)	113	(1,4%)	**8 142**
2022	208	(2,4%)	8 147	(94,9%)	226	(2,6%)	**8 581**
2021	216	(2,6%)	7 858	(94,6%)	229	(2,8%)	**8 303**
2020	212	(2,7%)	7 318	(94,2%)	238	(3,1%)	**7 768**
2019	226	(2,8%)	7 709	(94,4%)	234	(2,9%)	**8 169**
2018	268	(3,2%)	7 910	(93,9%)	249	(3,0%)	**8 427**
2017	268	(3,2%)	7 863	(94,2%)	221	(2,7%)	**8 352**
2016	335	(3,9%)	7 909	(93,0%)	260	(3,1%)	**8 504**
2015	305	(3,6%)	7 811	(92,9%)	294	(3,5%)	**8 410**
2014	308	(3,8%)	7 586	(92,7%)	289	(3,5%)	**8 183**
2013	306	(3,7%)	7 745	(93,2%)	258	(3,1%)	**8 309**
2012	340	(4,0%)	7 772	(92,1%)	325	(3,9%)	**8 437**
2011	354	(4,1%)	7 961	(92,5%)	289	(3,4%)	**8 604**
2010	322	(3,9%)	7 762	(92,8%)	280	(3,4%)	**8 364**
2005-09	1 372	(3,6%)	35 348	(93,3%)	1 168	(3,1%)	**37 888**
Total	**5 263**	**(3,4%)**	**144 505**	**(93,6%)**	**4 673**	**(3,0%)**	**154 441**

Antibiotic prophylaxis

Table 29: Antibiotic prophylaxis in primary screw fixation

	Yes		No		Missing		Total
2023	571	(98,8%)	6	(1,0%)	1	(0,2%)	**578**
2022	710	(97,3%)	17	(2,3%)	3	(0,4%)	**730**
2021	733	(98,3%)	8	(1,1%)	5	(0,7%)	**746**
2020	698	(97,9%)	12	(1,7%)	3	(0,4%)	**713**
2019	904	(97,4%)	16	(1,7%)	8	(0,9%)	**928**
2018	995	(96,3%)	30	(2,9%)	8	(0,8%)	**1 033**
2017	1 063	(94,4%)	54	(4,8%)	9	(0,8%)	**1 126**
2016	1 129	(94,2%)	63	(5,3%)	7	(0,6%)	**1 199**
2015	1 166	(91,3%)	102	(8,0%)	9	(0,7%)	**1 277**
2014	988	(85,3%)	162	(14,0%)	8	(0,7%)	**1 158**
2013	1 008	(76,3%)	307	(23,2%)	6	(0,5%)	**1 321**
2012	1 016	(68,6%)	455	(30,7%)	11	(0,7%)	**1 482**
2011	1 000	(58,8%)	682	(40,1%)	18	(1,1%)	**1 700**
2010	952	(56,0%)	721	(42,4%)	26	(1,5%)	**1 699**
2005-09	4 065	(37,8%)	6 499	(60,5%)	176	(1,6%)	**10 740**
Total	**16 998**	**(64,3%)**	**9 134**	**(34,6%)**	**298**	**(1,1%)**	**26 430**

Table 30: Antibiotic prophylaxis in primary hemiprosthesis operations

	Yes		No		Missing		Total
2023	3 869	(99,9%)	2	(0,1%)	0	(0,0%)	**3 871**
2022	3 821	(99,7%)	2	(0,1%)	9	(0,2%)	**3 832**
2021	3 680	(99,8%)	2	(0,1%)	6	(0,2%)	**3 688**
2020	3 404	(99,4%)	1	(0,0%)	20	(0,6%)	**3 425**
2019	3 415	(99,6%)	1	(0,0%)	14	(0,4%)	**3 430**
2018	3 400	(99,4%)	4	(0,1%)	15	(0,4%)	**3 419**
2017	3 321	(99,5%)	2	(0,1%)	14	(0,4%)	**3 337**
2016	3 431	(99,5%)	3	(0,1%)	15	(0,4%)	**3 449**
2015	3 229	(99,8%)	2	(0,1%)	5	(0,2%)	**3 236**
2014	3 184	(99,8%)	0	(0,0%)	7	(0,2%)	**3 191**
2013	3 090	(99,6%)	4	(0,1%)	9	(0,3%)	**3 103**
2012	3 138	(99,7%)	7	(0,2%)	2	(0,1%)	**3 147**
2011	3 012	(99,6%)	4	(0,1%)	9	(0,3%)	**3 025**
2010	2 803	(99,7%)	4	(0,1%)	4	(0,1%)	**2 811**
2005-09	10 260	(99,4%)	39	(0,4%)	26	(0,3%)	**10 325**
Total	**57 057**	**(99,6%)**	**77**	**(0,1%)**	**155**	**(0,3%)**	**57 289**

Table 31: Antibiotic prophylaxis in primary hip compression screw operations

	Yes		No		Missing		Total
2023	644	(99,5%)	0	(0,0%)	3	(0,5%)	**647**
2022	793	(99,0%)	0	(0,0%)	8	(1,0%)	**801**
2021	983	(99,3%)	0	(0,0%)	7	(0,7%)	**990**
2020	1 018	(99,3%)	0	(0,0%)	7	(0,7%)	**1 025**
2019	1 187	(99,6%)	0	(0,0%)	5	(0,4%)	**1 192**
2018	1 422	(99,0%)	2	(0,1%)	12	(0,8%)	**1 436**
2017	1 659	(99,6%)	2	(0,1%)	4	(0,2%)	**1 665**
2016	1 896	(99,5%)	1	(0,1%)	9	(0,5%)	**1 906**
2015	2 155	(99,6%)	3	(0,1%)	5	(0,2%)	**2 163**
2014	2 227	(99,4%)	7	(0,3%)	6	(0,3%)	**2 240**
2013	2 238	(99,7%)	4	(0,2%)	3	(0,1%)	**2 245**
2012	2 461	(99,2%)	14	(0,6%)	5	(0,2%)	**2 480**
2011	2 529	(98,4%)	28	(1,1%)	13	(0,5%)	**2 570**
2010	2 583	(98,1%)	37	(1,4%)	12	(0,5%)	**2 632**
2005-09	11 392	(94,8%)	555	(4,6%)	73	(0,6%)	**12 020**
Total	**35 187**	**(97,7%)**	**653**	**(1,8%)**	**172**	**(0,5%)**	**36 012**

Table 32: Antibiotic prophylaxis in primary Intramedullary nail operations

	Yes		No		Missing		Total
2023	2 358	(99,6%)	1	(0,0%)	8	(0,3%)	**2 367**
2022	2 440	(99,6%)	1	(0,0%)	8	(0,3%)	**2 449**
2021	2 222	(99,7%)	0	(0,0%)	7	(0,3%)	**2 229**
2020	1 958	(99,4%)	1	(0,1%)	11	(0,6%)	**1 970**
2019	1 873	(99,2%)	3	(0,2%)	13	(0,7%)	**1 889**
2018	1 846	(99,2%)	1	(0,1%)	13	(0,7%)	**1 860**
2017	1 667	(99,6%)	2	(0,1%)	4	(0,2%)	**1 673**
2016	1 458	(99,5%)	1	(0,1%)	7	(0,5%)	**1 466**
2015	1 280	(99,2%)	6	(0,5%)	4	(0,3%)	**1 290**
2014	1 160	(98,6%)	5	(0,4%)	12	(1,0%)	**1 177**
2013	1 182	(98,3%)	15	(1,2%)	5	(0,4%)	**1 202**
2012	935	(94,1%)	53	(5,3%)	6	(0,6%)	**994**
2011	864	(89,5%)	96	(9,9%)	5	(0,5%)	**965**
2010	796	(91,3%)	68	(7,8%)	8	(0,9%)	**872**
2005-09	2 832	(89,3%)	321	(10,1%)	20	(0,6%)	**3 173**
Total	**24 871**	**(97,2%)**	**574**	**(2,2%)**	**131**	**(0,5%)**	**25 576**

Table 33: Antibiotic prophylaxis in reoperation

	Yes		No		Missing		Total
2023	693	(85,9%)	101	(12,5%)	6	(0,7%)	**807**
2022	703	(88,4%)	84	(10,6%)	6	(0,8%)	**795**
2021	660	(84,6%)	108	(13,8%)	12	(1,5%)	**780**
2020	637	(87,1%)	85	(11,6%)	9	(1,2%)	**731**
2019	798	(86,8%)	111	(12,1%)	10	(1,1%)	**919**
2018	797	(84,9%)	126	(13,4%)	16	(1,7%)	**939**
2017	771	(85,6%)	121	(13,4%)	9	(1,0%)	**901**
2016	859	(87,0%)	115	(11,7%)	13	(1,3%)	**987**
2015	857	(91,3%)	65	(6,9%)	17	(1,8%)	**939**
2014	746	(94,1%)	45	(5,7%)	2	(0,3%)	**793**
2013	822	(91,4%)	67	(7,5%)	10	(1,1%)	**899**
2012	814	(90,8%)	76	(8,5%)	6	(0,7%)	**896**
2011	816	(88,2%)	95	(10,3%)	14	(1,5%)	**925**
2010	740	(85,8%)	110	(12,8%)	12	(1,4%)	**862**
2005	3 697	(84,0%)	637	(14,5%)	68	(1,5%)	**4 402**
Total	**14 410**	**(86,9%)**	**1 946**	**(11,7%)**	**210**	**(1,3%)**	**16 575**

Table 34: Type of antibiotics - primary operations

Antibiotics (generic name)	2005-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Cefalotin (Keflin)	58 621	7 305	7 838	7 032	5 831	828	850	1 268	1 669	1 778	93 020
	83,9%	87,1%	92,0%	84,5%	69,5%	10,1%	11,0%	15,3%	19,5%	21,8%	64,4%
Cefazolin (Cephazolin)	4		2	748	2 073	6 388	6 275	6 565	6 471	5 999	34 525
	0,0%		0,0%	9,0%	24,7%	78,2%	80,9%	79,0%	75,4%	73,5%	23,9%
Klindamycin (Dalacin, Clindamycin)	2 100	366	397	394	376	391	363	383	333	320	5 423
	3,0%	4,4%	4,7%	4,7%	4,5%	4,8%	4,7%	4,6%	3,9%	3,9%	3,8%
Kloksacillin (Ekvacillin)	2 694	510	80	15	9	445	181	13	11	15	3 973
	3,9%	6,1%	0,9%	0,2%	0,1%	5,4%	2,3%	0,2%	0,1%	0,2%	2,7%
Cefuroksim (Zinacef, Cefuroxim, Lifurox)	2 868	31	27	21	6	30	9	10	2	2	3 006
	4,1%	0,4%	0,3%	0,3%	0,1%	0,4%	0,1%	0,1%	0,0%	0,0%	2,1%
Dikloksacillin (Diclocil, Dicillin)	2 250	18	14	3	12	13	8	7	6	2	2 333
	3,2%	0,2%	0,2%	0,0%	0,1%	0,2%	0,1%	0,1%	0,1%	0,0%	1,6%
Other *	1 099	121	130	75	68	70	61	49	72	38	1 783
	1,6%	1,4%	1,5%	0,9%	0,8%	0,9%	0,8%	0,6%	0,8%	0,5%	1,2%
Missing information	274	34	28	30	12	3	10	13	13	8	425
	0,4%	0,4%	0,3%	0,4%	0,1%	0,0%	0,1%	0,2%	0,2%	0,1%	0,3%
Total	**69 910**	**8 385**	**8 516**	**8 318**	**8 387**	**8 168**	**7 757**	**8 308**	**8 577**	**8 162**	**144 488**

* Drugs used less than 1% of operations last year or less than 1% of total number of operations

Pharmacological antithrombotic prophylaxis

Table 35: Primary operation

	Yes		No		Missing		Total
2023	7 860	(96,5%)	267	(3,1%)	15	(0,3%)	**8 142**
2022	8 263	(96,3%)	292	(3,1%)	26	(0,7%)	**8 581**
2021	7 996	(96,3%)	278	(2,9%)	29	(0,8%)	**8 303**
2020	7 503	(96,6%)	239	(2,7%)	26	(0,7%)	**7 768**
2019	7 939	(97,2%)	194	(2,0%)	36	(0,8%)	**8 169**
2018	8 209	(97,4%)	190	(2,0%)	28	(0,6%)	**8 427**
2017	8 149	(97,6%)	182	(1,9%)	21	(0,5%)	**8 352**
2016	8 282	(97,4%)	186	(1,9%)	36	(0,7%)	**8 504**
2015	8 209	(97,6%)	168	(1,8%)	33	(0,6%)	**8 410**
2014	7 966	(97,3%)	191	(1,9%)	26	(0,7%)	**8 183**
2013	8 162	(98,2%)	139	(1,3%)	8	(0,4%)	**8 309**
2012	8 310	(98,5%)	125	(1,1%)	2	(0,4%)	**8 437**
2011	8 491	(98,7%)	92	(1,0%)	21	(0,3%)	**8 604**
2010	8 238	(98,5%)	94	(1,1%)	32	(0,4%)	**8 364**
2005-09	37 087	(97,9%)	639	(1,7%)	162	(0,4%)	**37 888**
Total	**150 664**	**(97,6%)**	**3 276**	**(2,1%)**	**501**	**(0,3%)**	**154 441**

Table 36: Number of drugs in antithrombotic prophylaxis

	One drug		Two drugs		Total
2023	7 531	(95,8%)	329	(4,2%)	**7 860**
2022	7 955	(96,3%)	308	(3,7%)	**8 263**
2021	7 694	(96,2%)	302	(3,8%)	**7 996**
2020	7 297	(97,3%)	206	(2,7%)	**7 503**
2019	7 716	(97,2%)	223	(2,8%)	**7 939**
2018	8 025	(97,8%)	184	(2,2%)	**8 209**
2017	7 965	(97,7%)	184	(2,3%)	**8 149**
2016	8 102	(97,8%)	180	(2,2%)	**8 282**
2015	7 962	(97,0%)	247	(3,0%)	**8 209**
2014	7 750	(97,3%)	216	(2,7%)	**7 966**
2013	7 904	(96,8%)	258	(3,2%)	**8 162**
2012	8 138	(97,9%)	172	(2,1%)	**8 310**
2011	8 405	(99,0%)	86	(1,0%)	**8 491**
2010	8 204	(99,6%)	34	(0,4%)	**8 238**
2005-09	37 007	(99,8%)	80	(0,2%)	**37 087**
Total	**147 655**	**(98,0%)**	**3 009**	**(2,0%)**	**150 664**

Table 37: Antithrombotic prophylaxis if one drug - primary operation (n=147 618)

	2005-14	2015	2016	2017	2018	2019	2020	2021	2022	2023
Dalteparin (Fragmin)	56,6%	59,8%	64,8%	70,5%	71,6%	59,3%	56,5%	57,8%	59,5%	59,6%
Enoksaparin (Klexane)	43,0%	39,1%	34,3%	28,2%	27,5%	39,7%	42,1%	40,8%	38,4%	38,1%
Other	0,2%	0,5%	0,4%	0,5%	0,5%	0,7%	1,1%	1,1%	1,5%	1,8%
Missing information	0,3%	0,6%	0,6%	0,7%	0,4%	0,3%	0,3%	0,4%	0,7%	0,5%
Totalt	**77 390**	**7 962**	**8 099**	**7 964**	**8 024**	**7 704**	**7 293**	**7 687**	**7 949**	**7 526**

Table 38: Time of first dose in antithrombotic prophylaxis - primary operation

	Preoperatively		Postoperatively		Missing		Total
2023	2 258	(28,7%)	5 179	(65,9%)	424	(5,4%)	**7 861**
2022	2 215	(26,9%)	5 104	(61,8%)	944	(11,4%)	**8 263**
2021	1 898	(23,8%)	5 133	(64,2%)	965	(12,0%)	**7 996**
2020	1 895	(25,3%)	4 740	(63,2%)	868	(11,5%)	**7 503**
2019	2 154	(27,1%)	4 954	(62,4%)	832	(10,4%)	**7 940**
2018	2 407	(29,3%)	4 937	(60,2%)	865	(10,5%)	**8 209**
2017	2 346	(28,9%)	4 847	(59,5%)	956	(11,7%)	**8 149**
2016	2 594	(31,4%)	4 762	(57,5%)	926	(11,2%)	**8 282**
2015	2 633	(32,1%)	4 697	(57,2%)	879	(10,7%)	**8 209**
2014	2 618	(32,9%)	4 477	(56,2%)	871	(11,0%)	**7 966**
2013	2 818	(34,6%)	4 352	(53,3%)	992	(12,1%)	**8 162**
2012	3 109	(37,4%)	4 133	(49,8%)	1 068	(12,9%)	**8 310**
2011	3 324	(39,2%)	4 060	(47,8%)	1 107	(9,8%)	**8 491**
2010	3 309	(40,2%)	3 585	(43,5%)	1 344	(10,5%)	**8 238**
2005-09	15 313	(41,4%)	11 089	(29,9%)	10 685	(17,9%)	**37 087**
Total	**50 891**	**(33,8%)**	**76 049**	**(50,5%)**	**23 726**	**(15,7%)**	**150 666**

Table 39: Regular anticoagulation if one drug - primary operations (n=39 069)

	2005-14	2015	2016	2017	2018	2019	2020	2021	2022	2023
Acetylsalicylsyre (Albyl-E, Globoid, Acetyratio, Magnyl E)	16,2%	64,5%	60,2%	51,7%	45,8%	42,2%	38,2%	35,4%	35,3%	35,5%
Apixaban (Eliquis)	0,2%	6,9%	14,3%	20,7%	27,1%	29,3%	36,3%	38,3%	38,9%	39,7%
Rivaroxaban (Xarelto)	0,8%	9,1%	8,5%	8,5%	9,8%	9,5%	8,7%	7,8%	7,0%	6,9%
Clopidogrel (Plavix, Klopidogrel)	0,8%	4,0%	4,4%	4,3%	5,2%	6,5%	6,8%	8,8%	8,6%	9,0%
Dabigatranetixalat (Re-Novate, Pradaxa)	0,8%	5,8%	3,9%	4,7%	4,4%	3,9%	3,2%	2,8%	3,1%	2,5%
Acetylsalicylsyre and dipyridamol (Asasantin retard, Diprasorin)	0,9%	3,0%	3,8%	3,3%	3,3%	3,3%	1,6%	1,6%	2,0%	1,8%
Dalteparin (Fragmin)	0,4%	1,7%	2,0%	2,5%	2,1%	2,1%	1,7%	1,0%	1,3%	1,1%
Enoxaparin (Klexane)	0,4%	1,7%	1,3%	2,0%	1,1%	1,3%	1,3%	1,3%	1,2%	0,7%
Other	0,2%	1,8%	1,1%	0,8%	1,0%	1,6%	1,9%	2,1%	1,2%	1,8%
Missing	79,4%	2,1%	1,4%	1,9%	0,6%	0,5%	0,5%	1,2%	1,5%	1,0%
Total	**17 341**	**1 903**	**2 128**	**2 167**	**2 266**	**2 295**	**2 418**	**2 689**	**2 895**	**2 871**

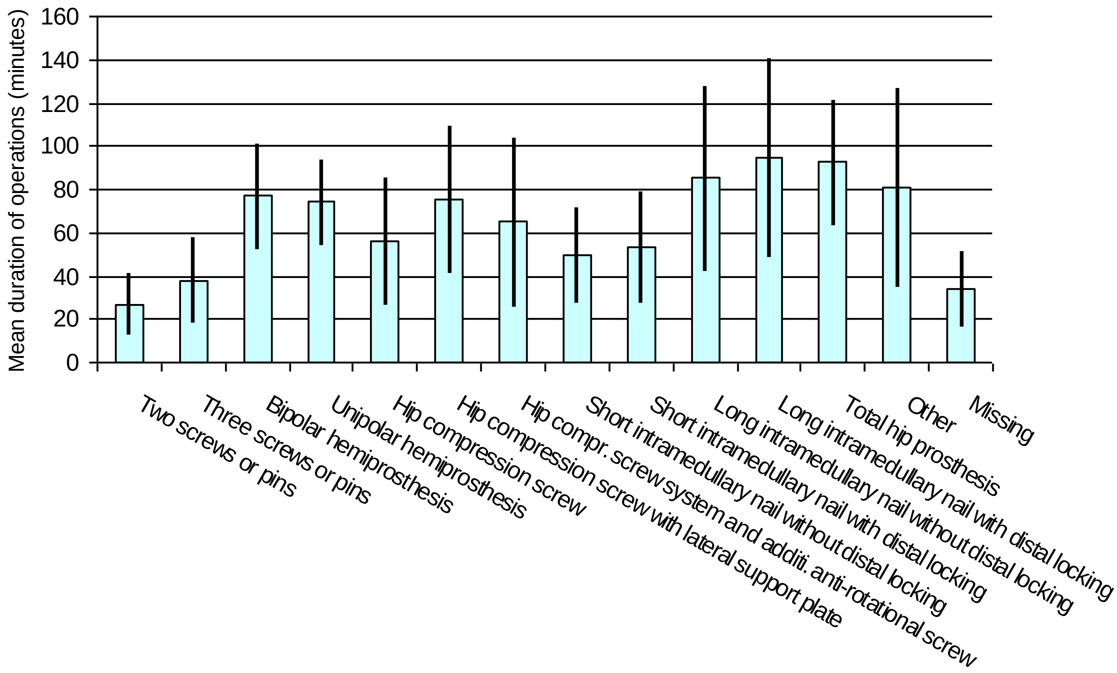
Table 40: Fibrinolysis inhibitor - primary operations* (n=99 315)

	2005-14	2015	2016	2017	2018	2019	2020	2021	2022	2023
No	76,8%	76,7%	74,3%	70,2%	66,8%	60,6%	54,2%	48,0%	42,4%	36,1%
No administration								0,8%	4,1%	0,2%
Systemic								0,0%	2,8%	31,0%
Local									0,1%	0,7%
Both systemic and local									0,2%	4,3%
Yes - paper form	11,6%	17,0%	20,8%	26,0%	29,1%	35,6%	41,2%	47,1%	46,6%	25,5%
Missing	11,6%	6,3%	4,9%	3,8%	4,1%	3,7%	4,6%	4,2%	4,0%	2,3%
Total	**29 172**	**8 087**	**8 155**	**7 940**	**7 843**	**7 539**	**14 452**	**23 295**	**24 015**	**22 749**

*Electronic registration started during 2020

DURATION OF SURGERY

Figure 12: Duration of surgery for the different types of operations



The vertical bars indicate the mean duration ± a standard deviation.

Table 41: Duration of surgery for the different types of operations

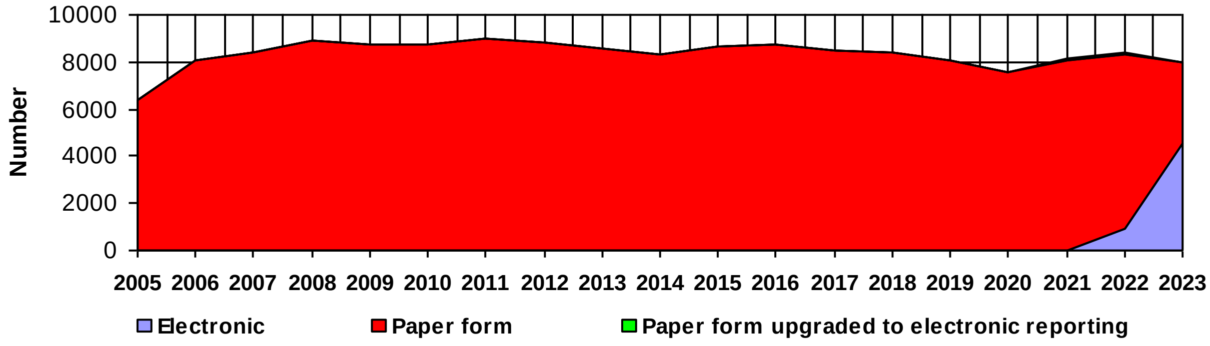
Type of operations	Total	Mean duration of operations (minutes)	Standard deviation
Two screws or pins	24 225	27	14
Three screws or pins	977	38	19
Bipolar hemiprosthesis	55 072	77	25
Unipolar hemiprosthesis	312	74	20
Hip compression screw	24 986	56	30
Hip compression screw with lateral support plate	9 510	75	34
Hip compression screw system and additional anti-rotational screw	1 754	65	39
Short intramedullary nail without distal locking	398	50	22
Short intramedullary nail with distal locking	13 957	53	25
Long intramedullary nail without distal locking	164	85	43
Long intramedullary nail with distal locking	10 015	95	46
Total hip prosthesis	6 220	92	29
Other	892	81	46
Missing	4	34	18

REPORTING METHOD

Table 42: Reporting method

Method	2005-14	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Paper form	83 901	8 654	8 721	8 472	8 363	8 029	7 596	8 071	7 433	3 500	**152 740**
Electronic							1	8	927	4 502	**5 438**
Paper form upgraded to electronic							1	109	57	2	**169**
Total	**83 901**	**8 654**	**8 721**	**8 472**	**8 363**	**8 029**	**7 598**	**8 188**	**8 417**	**8 004**	**158 347**

Figure 13:



PROM (Patient Reported Outcome Measures)

Table 43a: Number of issued and answered patient questionnaires - The Norwegian Hip Fracture Register

	4 months *			12 months *			36 months *			Total		
	Issued	Answered (%)		Issued	Answered (%)		Issued	Answered (%)		Issued	Answered (%)	
2023	6 270	2 644	(42,2%)	5 778	2 725	(47,2%)	3 739	1 721	(46,0%)	**15 787**	**7 090**	(44,9%)
2022	6 581	3 233	(49,1%)	5 498	2 946	(53,6%)	3 831	1 973	(51,5%)	**15 910**	**8 152**	(51,2%)
2021	6 054	3 220	(53,2%)	5 441	2 946	(54,1%)	4 248	2 143	(50,4%)	**15 743**	**8 309**	(52,8%)
2020	5 849	3 289	(56,2%)	5 418	3 078	(56,8%)	4 261	2 250	(52,8%)	**15 528**	**8 617**	(55,5%)
2019	6 224	3 333	(53,6%)	5 820	3 349	(57,5%)	4 233	2 221	(52,5%)	**16 277**	**8 903**	(54,7%)
2018	6 788	3 778	(55,7%)	5 973	3 435	(57,5%)	4 338	2 377	(54,8%)	**17 099**	**9 590**	(56,1%)
2017	6 662	3 800	(57,0%)	5 929	3 417	(57,6%)	4 082	2 251	(55,1%)	**16 673**	**9 468**	(56,8%)
2016	6 695	3 737	(55,8%)	6 067	3 518	(58,0%)	4 203	2 325	(55,3%)	**16 965**	**9 580**	(56,5%)
2015	6 614	3 752	(56,7%)	5 837	3 345	(57,3%)	4 380	2 391	(54,6%)	**16 831**	**9 488**	(56,4%)
2014	6 580	3 650	(55,5%)	5 991	3 265	(54,5%)	4 330	2 349	(54,2%)	**16 901**	**9 264**	(54,8%)
2013	6 680	3 778	(56,6%)	6 084	3 510	(57,7%)	4 383	2 395	(54,6%)	**17 147**	**9 683**	(56,5%)
2012	7 486	4 130	(55,2%)	6 774	3 807	(56,2%)	1 664	964	(57,9%)	**15 924**	**8 901**	(55,9%)
2011	6 323	3 462	(54,8%)	5 491	3 070	(55,9%)	1 303	728	(55,9%)	**13 117**	**7 260**	(55,3%)
2010	4 908	2 761	(56,3%)	2 139	1 213	(56,7%)	3 601	2 024	(56,2%)	**10 648**	**5 998**	(56,3%)
2009	2 420	1 389	(57,4%)	2 234	1 265	(56,6%)	4 023	2 156	(53,6%)	**8 677**	**4 810**	(55,4%)
2008	2 124	1 195	(56,3%)	1 789	1 000	(55,9%)	3 109	1 777	(57,2%)	**7 022**	**3 972**	(56,6%)
2007	3 405	1 895	(55,7%)	4 971	2 771	(55,7%)				**8 376**	**4 666**	(55,7%)
2006	6 036	3 515	(58,2%)	4 754	2 721	(57,2%)				**10 790**	**6 236**	(57,8%)
2005	2 770	1 612	(58,2%)							**2 770**	**1 612**	(58,2%)
Total	**106 469**	**58 173**	**(54,6%)**	**91 988**	**51 381**	**(55,9%)**	**59 728**	**32 045**	**(53,7%)**	**258 185**	**141 599**	**(54,8%)**

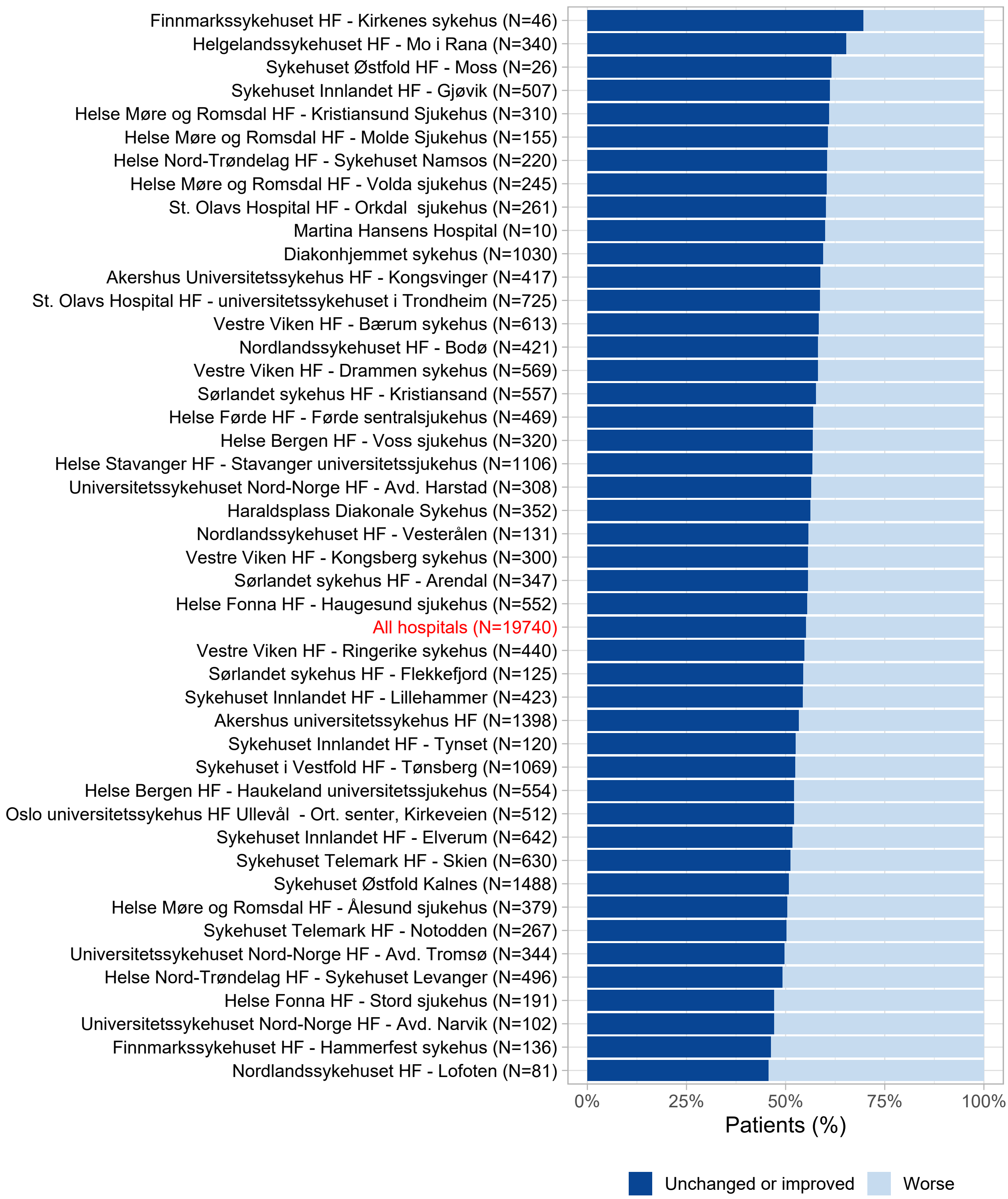
* The register sends questionnaires to patients 4, 12 and 36 months post-operatively

Table 43b: Number of issued and answered patient questionnaires - The Hip Prosthesis Register

	4 months *			12 months *			36 months *			Total		
	Issued	Answered (%)		Issued	Answered (%)		Issued	Answered (%)		Issued	Answered (%)	
2023	121	81	(66,9%)	357	198	(55,5%)	458	287	(62,7%)	**936**	**566**	(60,5%)
2022	500	345	(69,0%)	26	2	(7,7%)	7	4	(57,1%)	**533**	**351**	(65,9%)
2021	495	375	(75,8%)	24	2	(8,3%)	10	7	(70,0%)	**529**	**384**	(72,6%)
2020	524	365	(69,7%)	17	1	(5,9%)	46	28	(60,9%)	**587**	**394**	(67,1%)
2019	524	397	(75,8%)	19	4	(21,1%)	8	3	(37,5%)	**551**	**404**	(73,3%)
2018	542	393	(72,5%)	23	3	(13,0%)	8	3	(37,5%)	**573**	**399**	(69,6%)
2017	348	261	(75,0%)	25	3	(12,0%)	9	4	(44,4%)	**382**	**268**	(70,2%)
2016	319	228	(71,5%)	10	2	(20,0%)	3	1	(33,3%)	**332**	**231**	(69,6%)
2015	305	228	(74,8%)	7	1	(14,3%)	5	3	(60,0%)	**317**	**232**	(73,2%)
2014	238	175	(73,5%)	13	7	(53,8%)	2	1	(50,0%)	**253**	**183**	(72,3%)
2013	223	178	(79,8%)	14	7	(50,0%)	63	46	(73,0%)	**300**	**231**	(77,0%)
2012	90	73	(81,1%)	11	9	(81,8%)	132	88	(66,7%)	**233**	**170**	(73,0%)
2011	141	94	(66,7%)	128	98	(76,6%)	109	88	(80,7%)	**378**	**280**	(74,1%)
2010	80	67	(83,8%)	132	98	(74,2%)	153	111	(72,5%)	**365**	**276**	(75,6%)
2009	144	100	(69,4%)	135	102	(75,6%)	74	52	(70,3%)	**353**	**254**	(72,0%)
2008	151	111	(73,5%)	113	83	(73,5%)	76	43	(56,6%)	**340**	**237**	(69,7%)
2007	98	72	(73,5%)	97	63	(64,9%)				**195**	**135**	(69,2%)
2006	129	94	(72,9%)	98	65	(66,3%)				**227**	**159**	(70,0%)
2005	50	29	(58,0%)							**50**	**29**	(58,0%)
Total	**5 022**	**3 666**	**(73,0%)**	**1 249**	**748**	**(59,9%)**	**1 163**	**769**	**(66,1%)**	**7 434**	**5 183**	**(69,7%)**

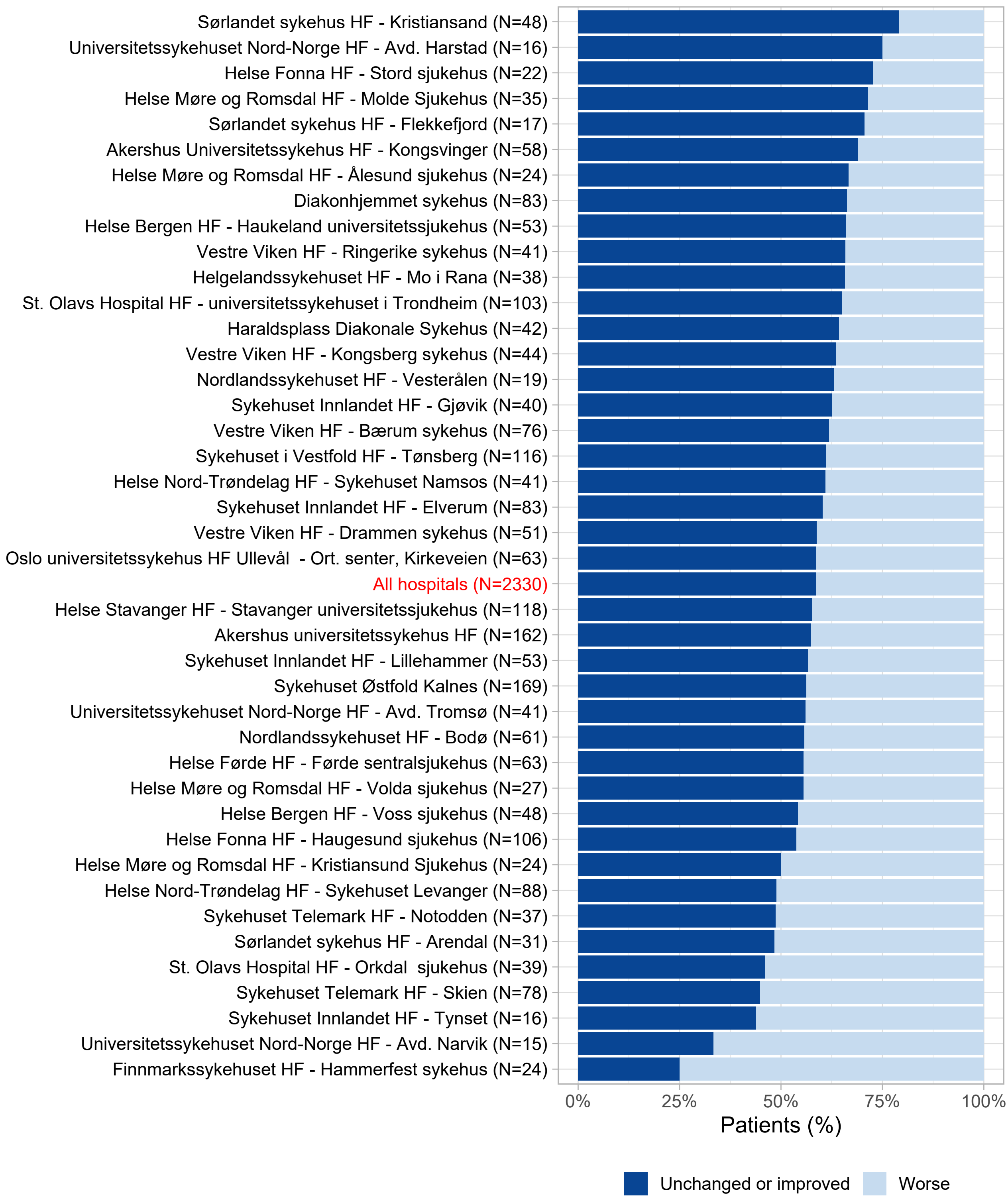
* The register sends questionnaires to patients 4, 12 and 36 months post-operatively with a total prosthesis from The Norwegian Hip Prosthesis Register

Figure D.40: Walking ability after hip fracture, 2018-2023 - all hip fractures



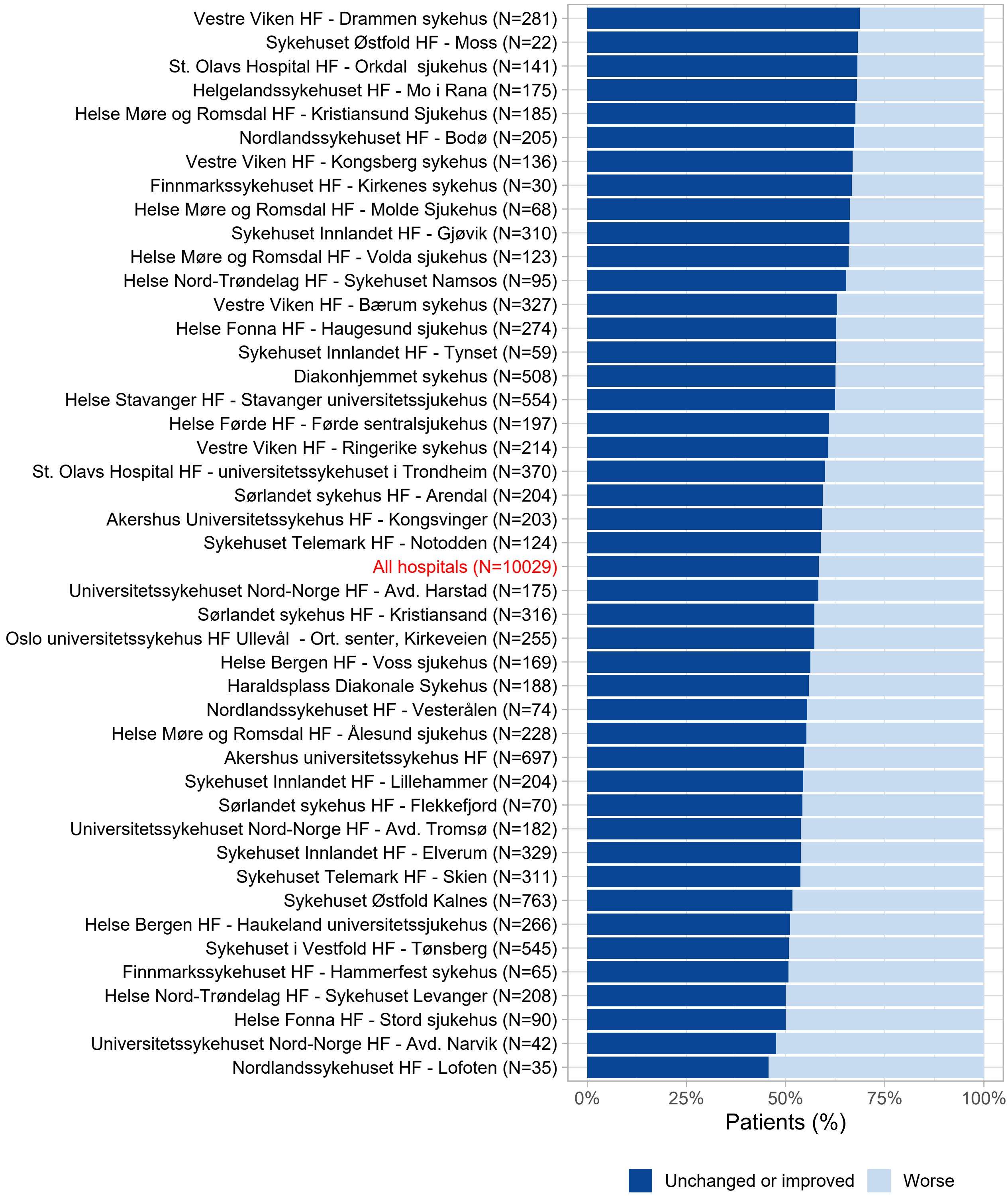
The figure shows the proportion of patients who report unchanged or improved walking ability from preoperatively to 4 months postoperatively assessed on the basis of the 1st dimension of EQ-5D-3L. Only hospitals with 10 or more patients are displayed.

Figure D.41: Walking ability after hip fracture, 2018-2023 - undisplaced femoral neck fractures



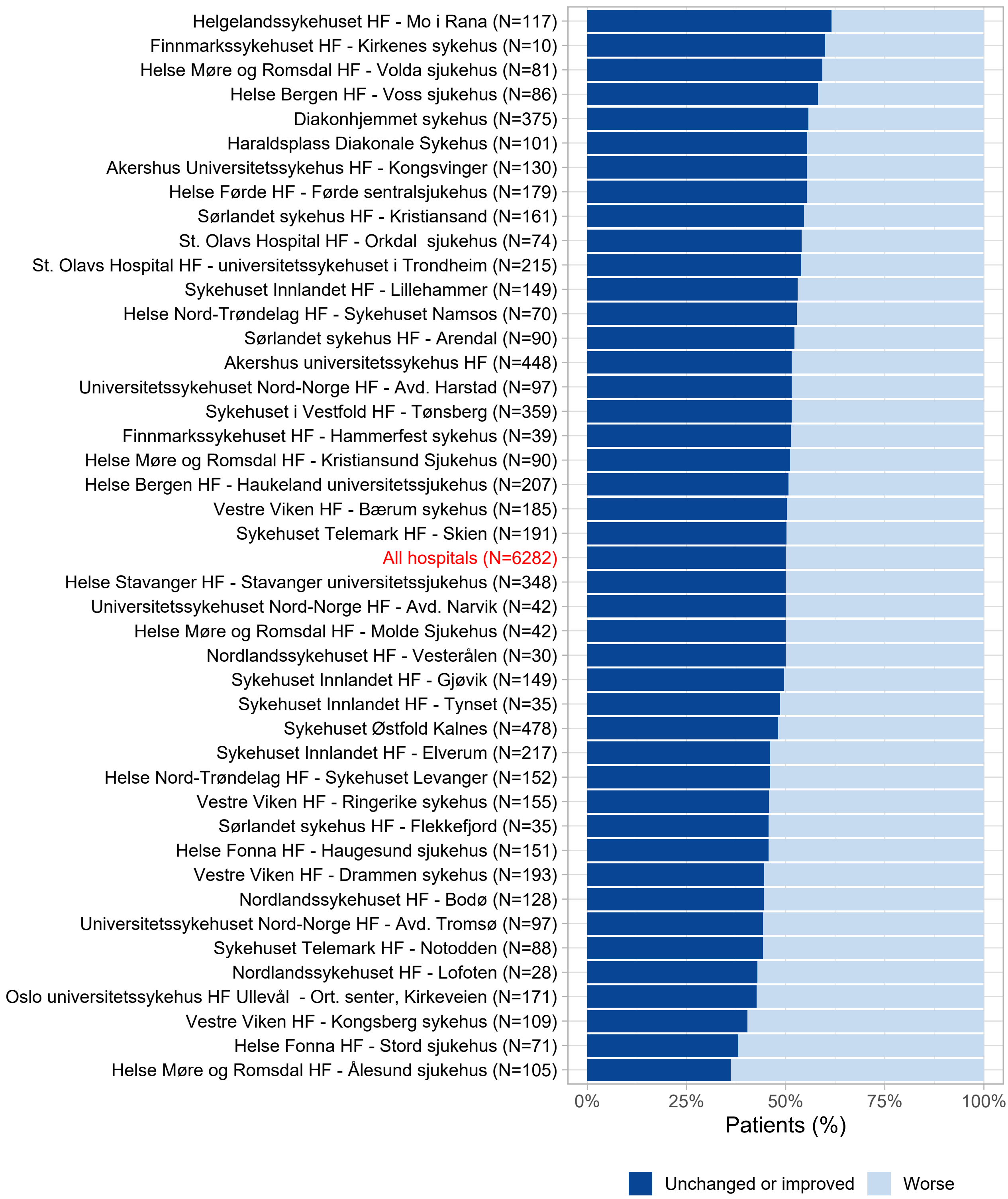
The figure shows the proportion of patients who report unchanged or improved walking ability from preoperatively to 4 months postoperatively assessed on the basis of the 1st dimension of EQ-5D-3L. Only hospitals with 10 or more patients are displayed.

Figure D.42: Walking ability after hip fracture, 2018-2023 - displaced femoral neck fractures



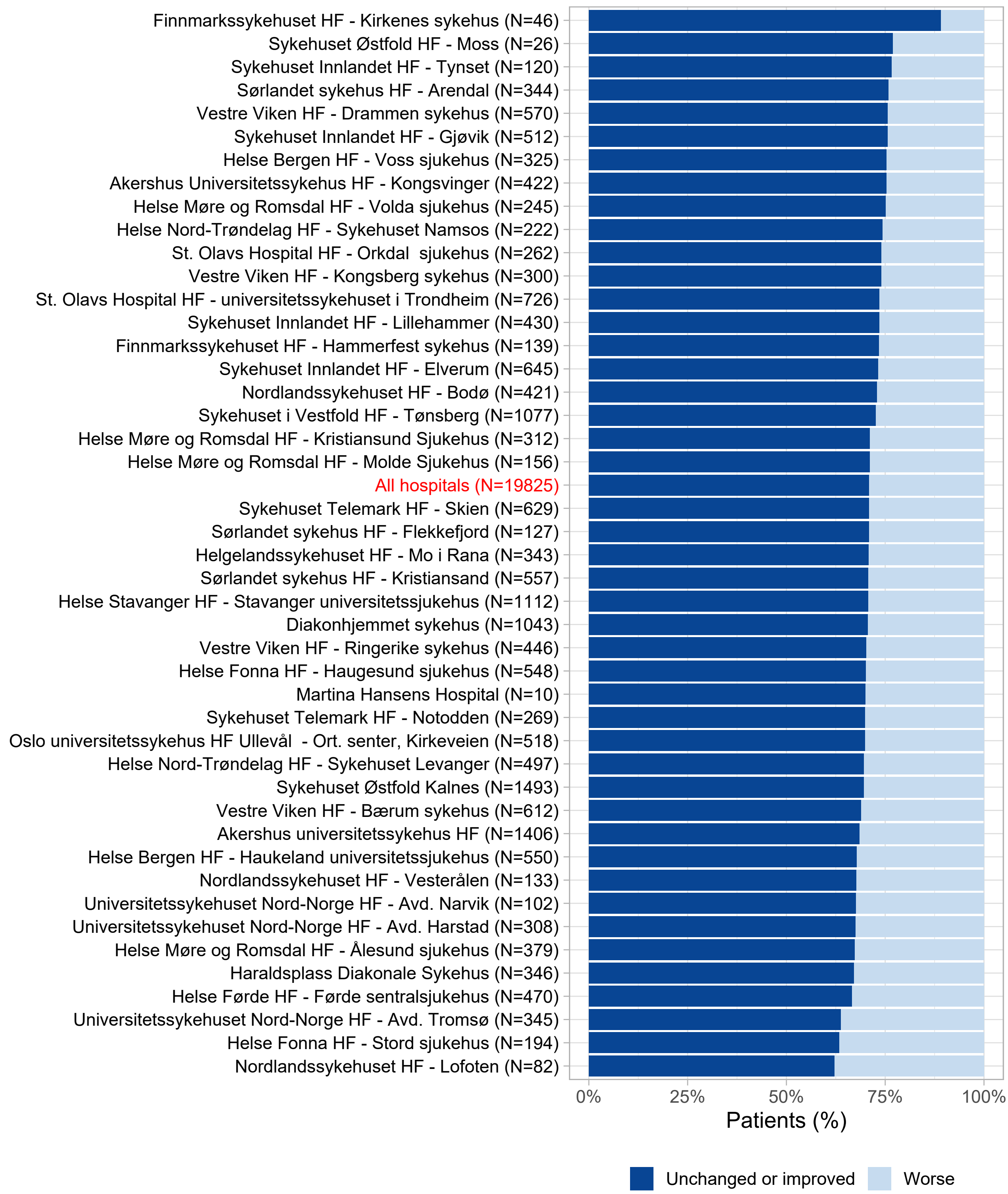
The figure shows the proportion of patients who report unchanged or improved walking ability from preoperatively to 4 months postoperatively assessed on the basis of the 1st dimension of EQ-5D-3L. Only hospitals with 10 or more patients are displayed.

Figure D.43: Walking ability after hip fracture, 2018-2023 - trochanteric/subtrochanteric fractures



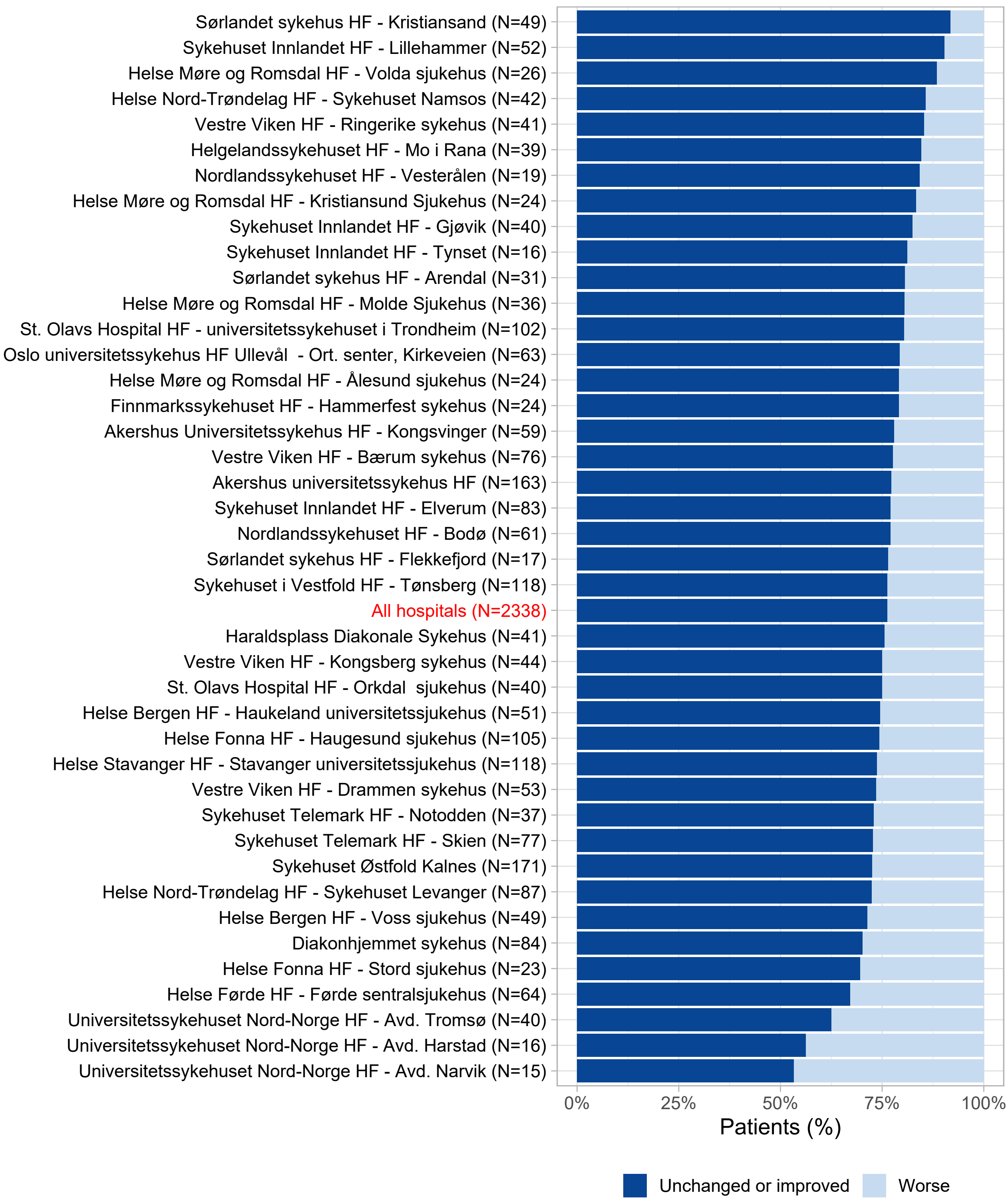
The figure shows the proportion of patients who report unchanged or improved walking ability from preoperatively to 4 months postoperatively assessed on the basis of the 1st dimension of EQ-5D-3L. Only hospitals with 10 or more patients are displayed.

Figure D.44: Self-care after hip fracture, 2018-2023 - all hip fractures



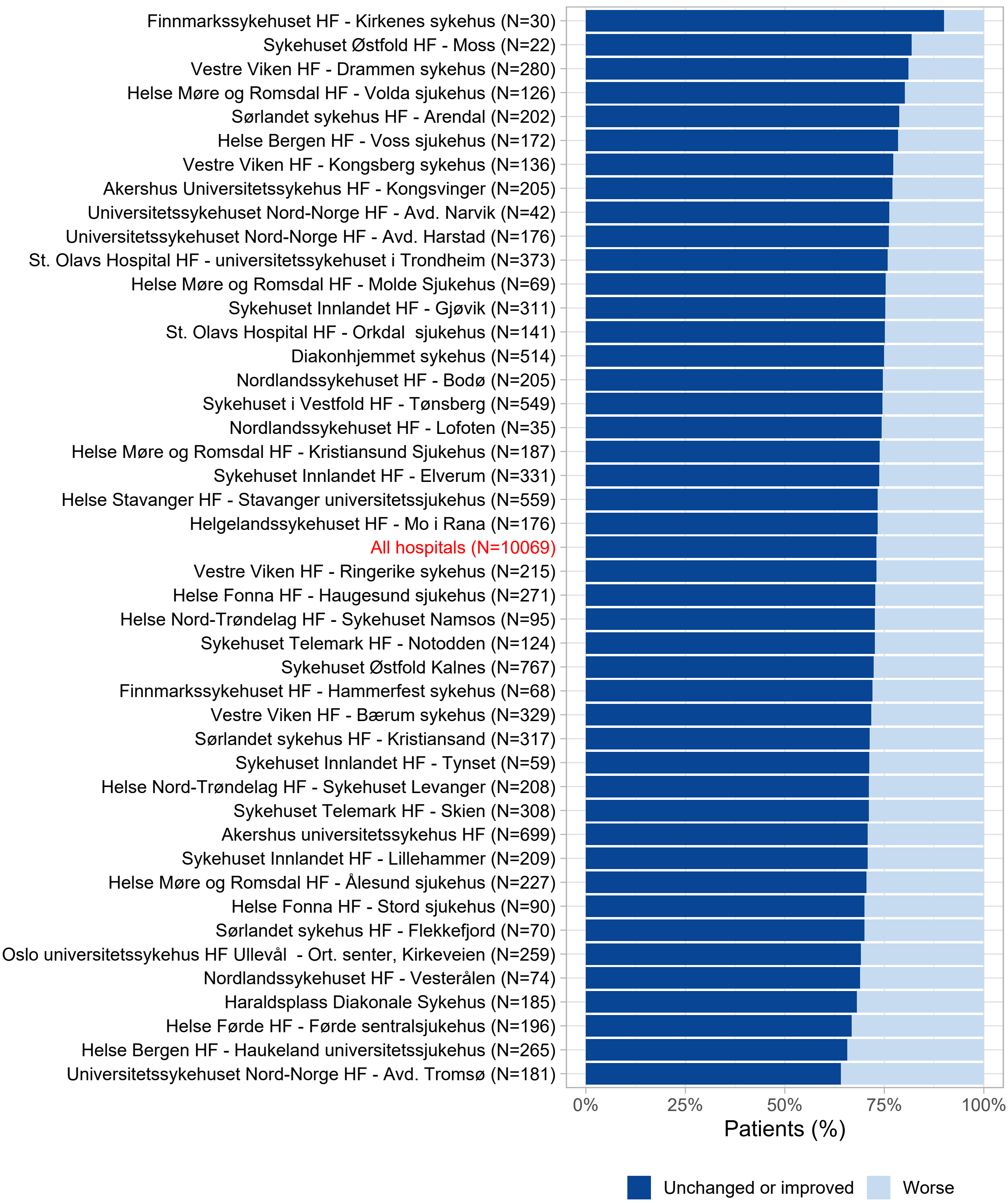
The figure shows the proportion of patients who report unchanged or improved ability to perform self-care from preoperatively to 4 months postoperatively assessed on the basis of the 2nd dimension of EQ-5D-3L. Only hospitals with 10 or more patients are displayed.

Figure D.45: Self-care after hip fracture, 2018-2023 - undisplaced femoral neck fractures



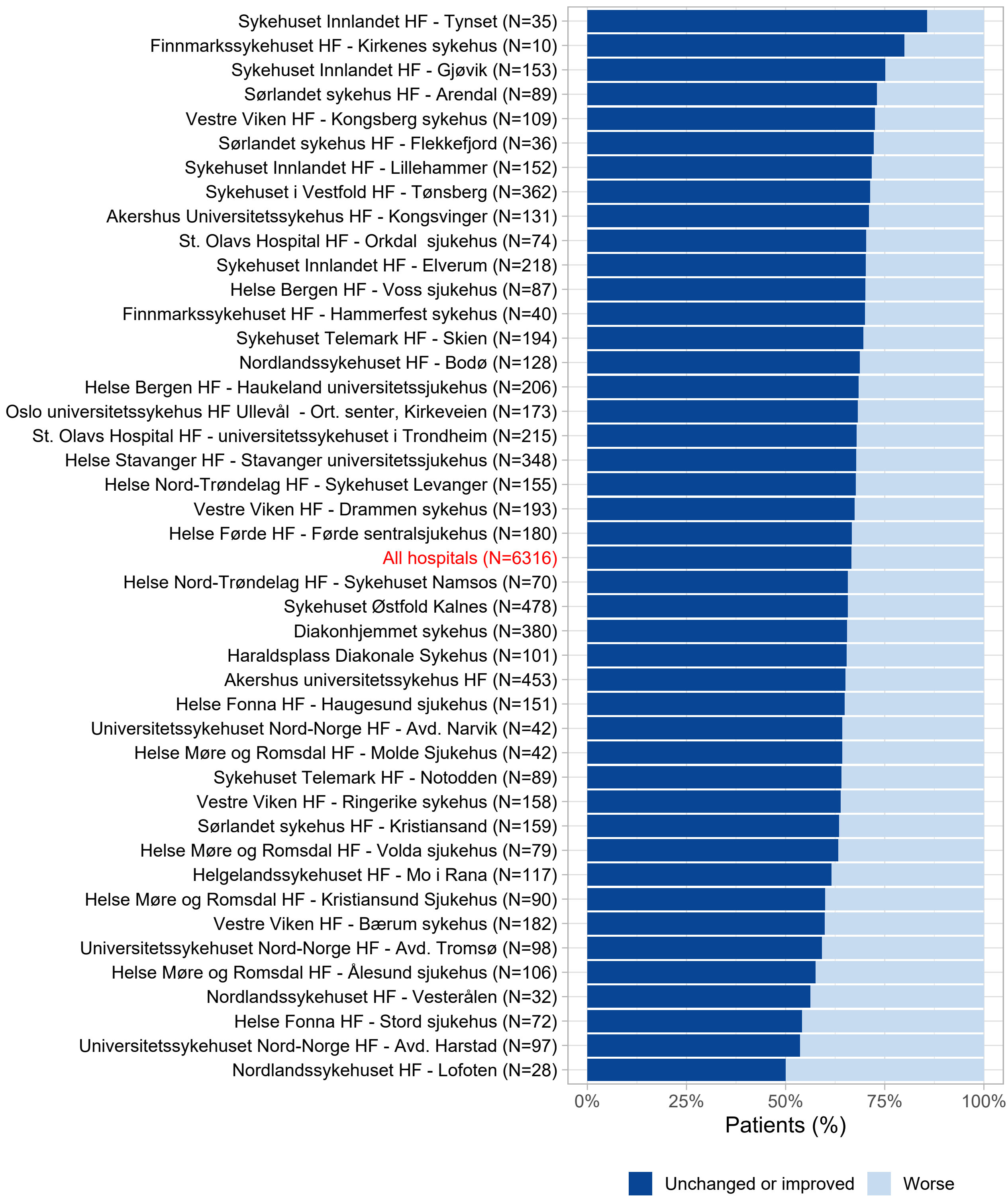
The figure shows the proportion of patients who report unchanged or improved ability to perform self-care from preoperatively to 4 months postoperatively assessed on the basis of the 2nd dimension of EQ-5D-3L. Only hospitals with 10 or more patients are displayed.

Figure D.46: Self-care after hip fracture, 2018-2023 - displaced femoral neck fractures



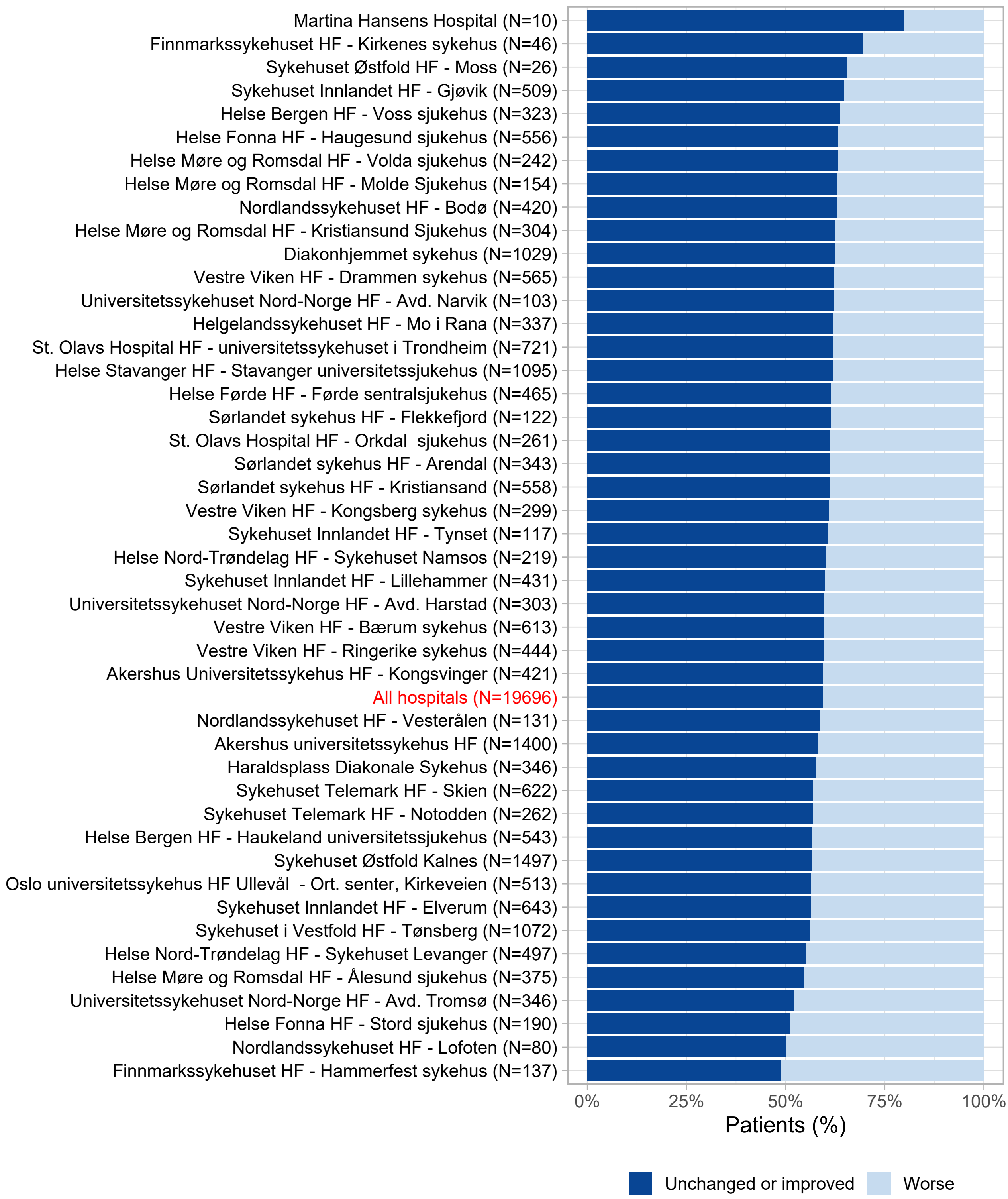
The figure shows the proportion of patients who report unchanged or improved ability to perform self-care from preoperatively to 4 months postoperatively assessed on the basis of the 2nd dimension of EQ-5D-3L. Only hospitals with 10 or more patients are displayed.

Figure D.47: Self-care after hip fracture, 2018-2023 - trochanteric/subtrochanteric fractures



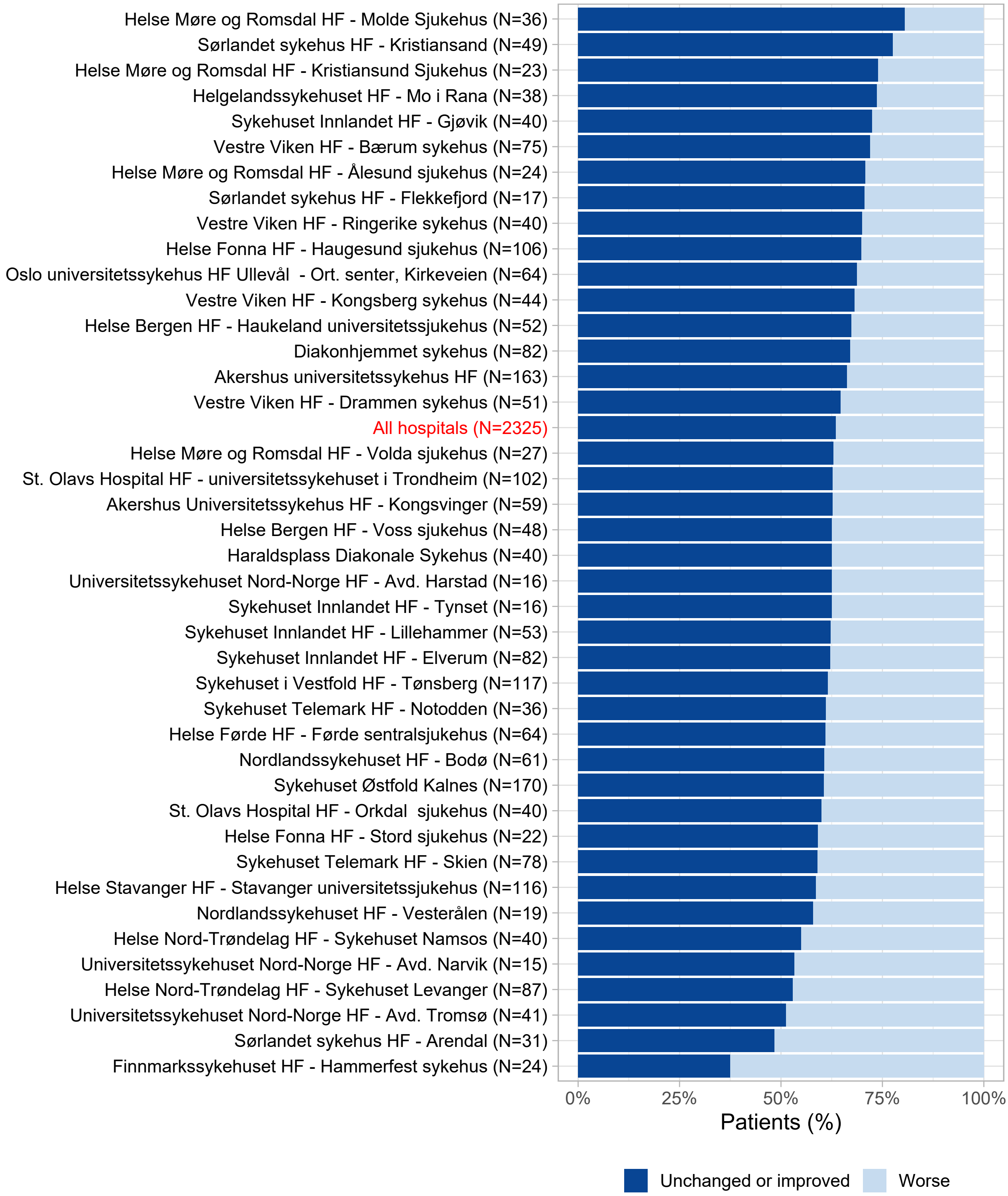
The figure shows the proportion of patients who report unchanged or improved ability to perform self-care from preoperatively to 4 months postoperatively assessed on the basis of the 2nd dimension of EQ-5D-3L. Only hospitals with 10 or more patients are displayed.

Figure D.48: Usual activities after hip fracture, 2018-2023 - all hip fractures



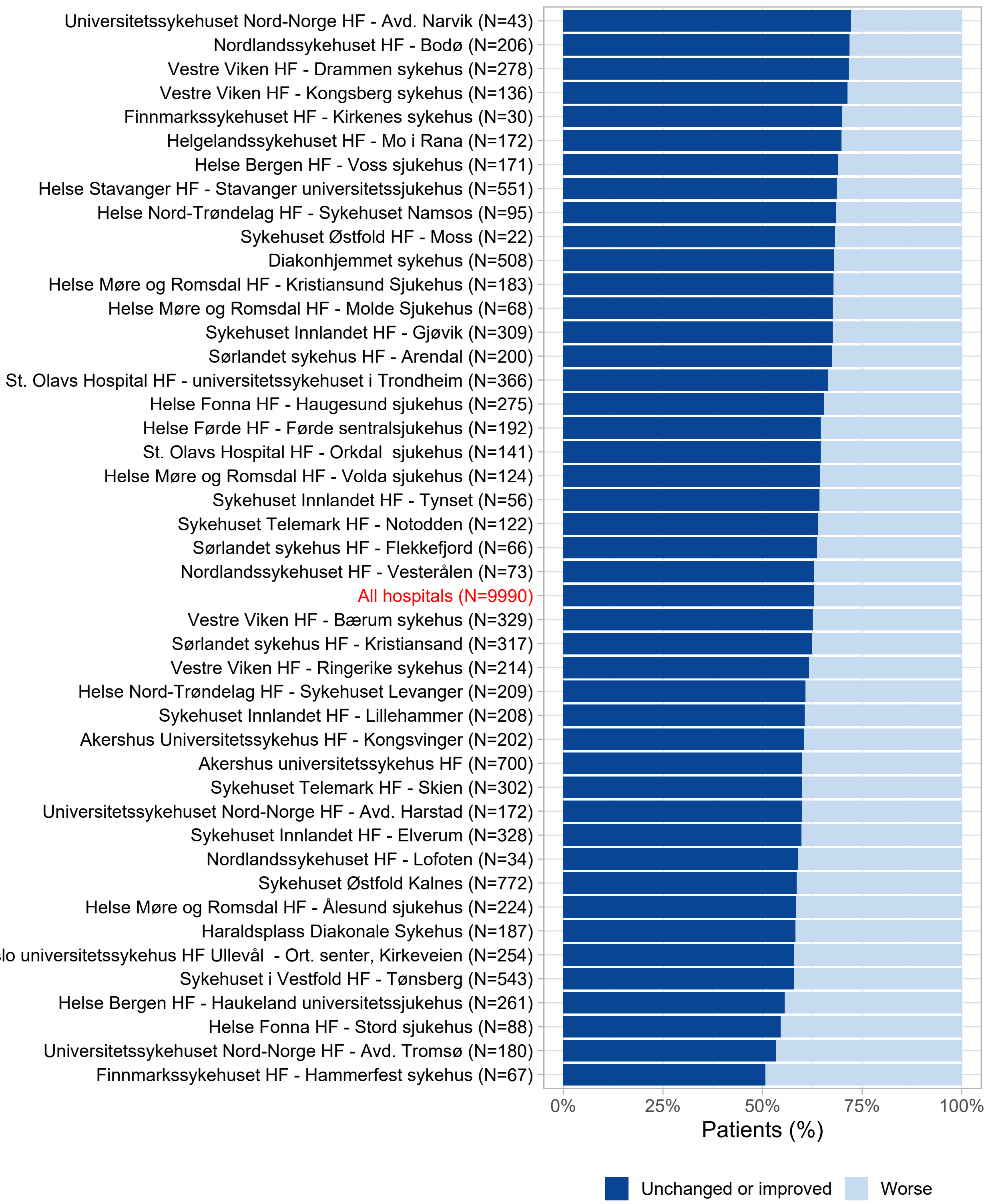
The figure shows the proportion of patients who report unchanged or improved ability to perform usual activities from preoperatively to 4 months postoperatively assessed on the basis of the 3rd dimension of EQ-5D-3L. Only hospitals with 10 or more patients are displayed.

Figure D.49: Usual activities after hip fracture, 2018-2023 - undisplaced femoral neck fractures



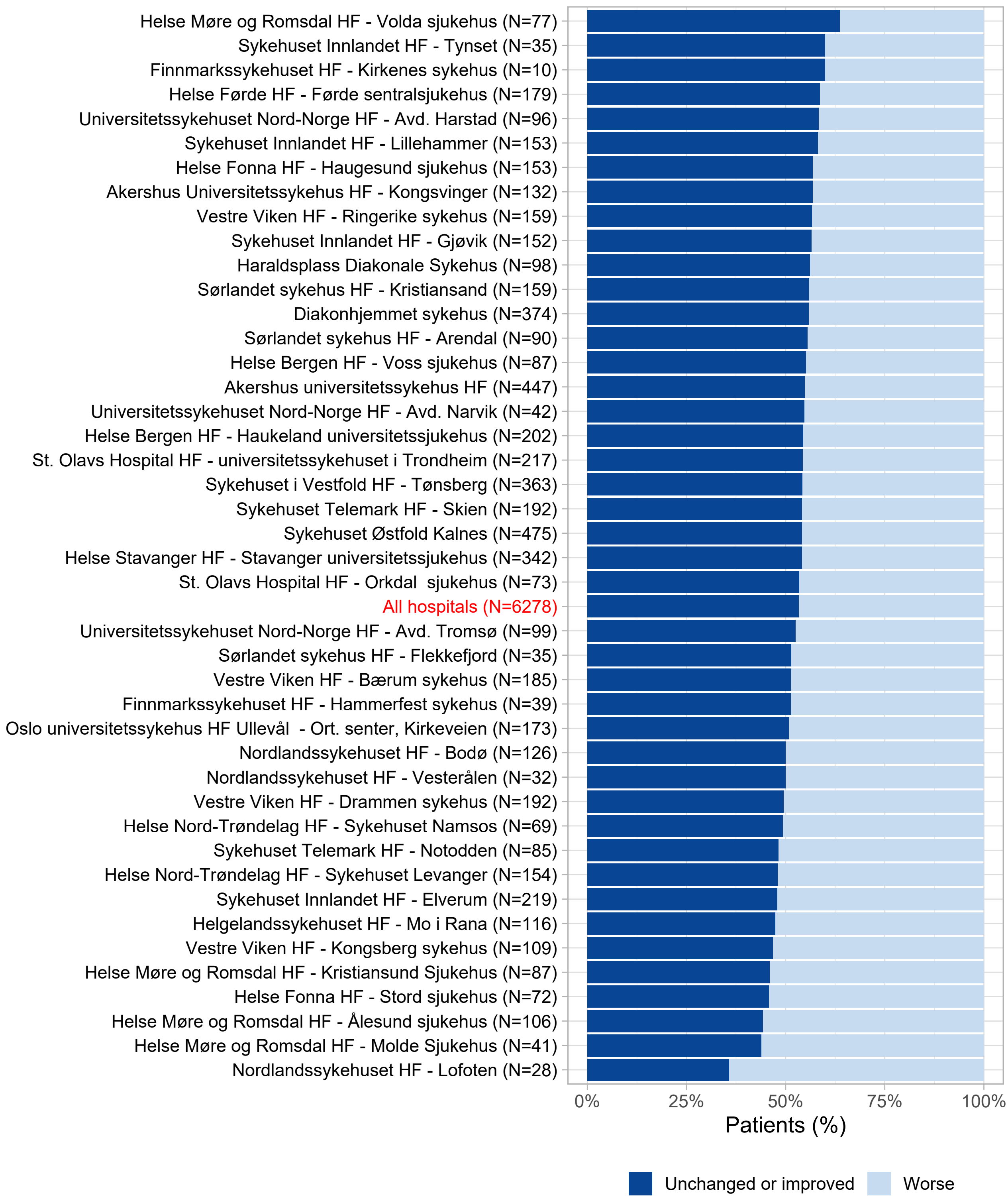
The figure shows the proportion of patients who report unchanged or improved ability to perform usual activities from preoperatively to 4 months postoperatively assessed on the basis of the 3rd dimension of EQ-5D-3L. Only hospitals with 10 or more patients are displayed.

Figure D.50: Usual activities after hip fracture, 2018-2023 - displaced femoral neck fractures



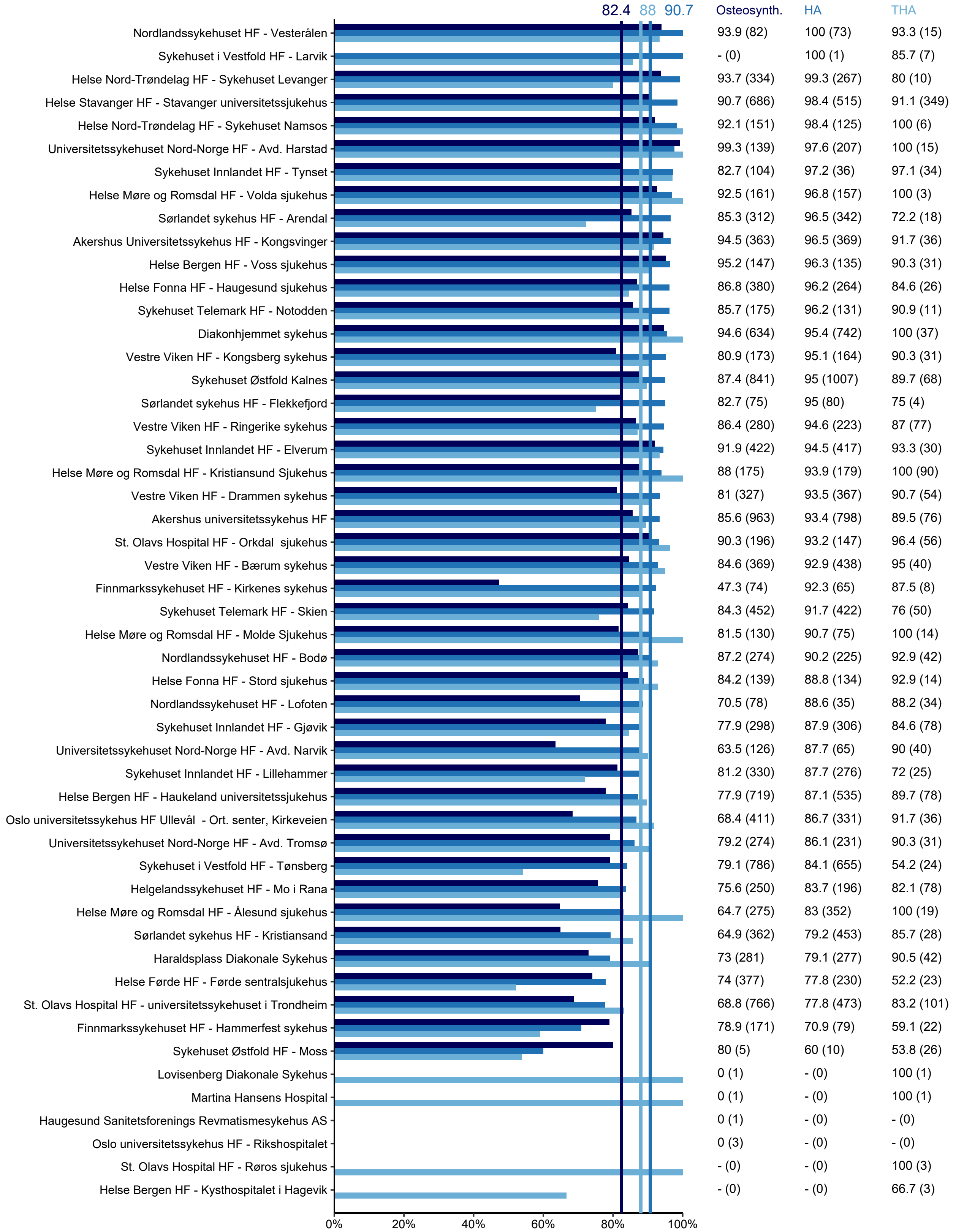
The figure shows the proportion of patients who report unchanged or improved ability to perform usual activities from preoperatively to 4 months postoperatively assessed on the basis of the 3rd dimension of EQ-5D-3L. Only hospitals with 10 or more patients are displayed.

Figure D.51: Usual activities after hip fracture, 2018-2023 - trochanteric/subtrochanteric fractures



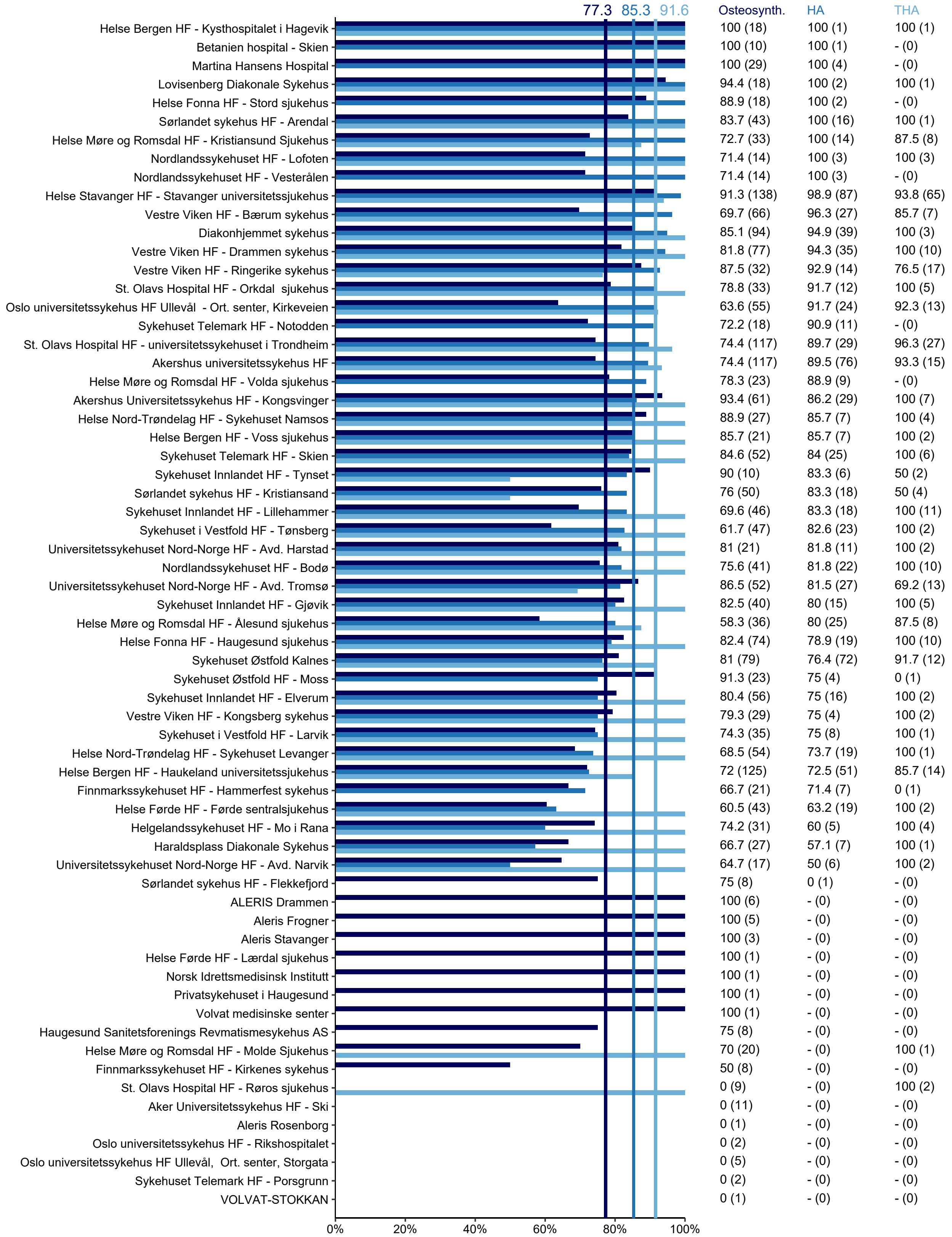
The figure shows the proportion of patients who report unchanged or improved ability to perform usual activities from preoperatively to 4 months postoperatively assessed on the basis of the 3rd dimension of EQ-5D-3L. Only hospitals with 10 or more patients are displayed.

Completeness of reporting, primary operations of hip fractures 2021-2023



Dark blue bars and first number to the right of the bars gives completensess of reporting for osteosynthesis. Medium blue bars and second number to the right of the bars gives completensess of reporting for hemiprosthesis. Light blue bars and third number to the right of the bars gives completensess of reporting for total prosthesis. The numbers in paranthesis gives the number of operations registered at both NHFR and NPR. Vertical lines shows the national averages.

Completeness of reporting, reoperations of hip fractures 2021-2023



Dark blue bars and first number to the right of the bars gives completensess of reporting for osteosynthesis. Medium blue bars and second number to the right of the bars gives completensess of reporting for hemiprosthesis. Light blue bars and third number to the right of the bars gives completensess of reporting for total prosthesis. The numbers in paranthesis gives the number of operations registered at both NHFR and NPR. Vertical lines shows the national averages.

CONTENTS

Norwegian Knee Ligament Register

Report 2024

Nasjonalt Korsbåndregister

Highlights from 2023

Reporting

	Reported 2004-2023	Reported In 2023
Primary reconstruction	34,683	2,178
Revision reconstructions	3,455	193

49
Hospitals reporting
100%
Of hospitals

87.4%
Completeness of primary reconstructions

4 Published Papers

0 PhDs

3 Podium Presentations

Quality project

Investigate if the quality of reporting has changed since all hospitals now report electronic to the register.

Find us:
https://www.helse-bergen.no/nrl#nasjonalt-korsbandregister
https://www.kvalitetsregistre.no/register/muskel-og-skjelett/nasjonalt-korsbandregister

Initiated activities

Machine learning

The Knee Ligament Register has participated in an international research project where we used data from the register to predict the result of the treatment by using a machine learning algorithm.

PROM

Time after operation	Reported 2005-2023	Reported in 2023
2 years	18,077	876 (61%)
5 years	13,566	857 (47%)
10 years	8,422	748 (44%)

HELSE VEST HELSE NORD HELSE SØR-ØST HELSE MIDT-NORGE

ANNUAL REPORT NORWEGIAN KNEE LIGAMENT REGISTER

The management and secretariat of the Norwegian Knee Ligament Register (NKLR) are responsible for the annual report. NKLR celebrates its 20th anniversary in June 2024. We were the first register of our kind and are proud to continue being a leading international register in knee ligament surgery.

After a significant reduction in the number of annual cruciate ligament surgeries due to the COVID-19 pandemic, the number of surgeries has returned to an expected level. For the reporting year 2023, we see a further increase in the total number of registered surgeries by 15% - to 2,178 procedures. This is the highest number of annually registered procedures since the register's inception in 2004. Part of the increase is due to a backlog from the reduction in elective surgery during the pandemic. We also see that an increasing proportion of surgeries are performed at private clinics. This can be partly due to increasing wait times in public hospitals but also due to a greater prevalence of health insurance.

Another important trend in the register is the continued increase in the proportion of meniscal injuries that are repaired simultaneously with ligament surgery. In 2023, approximately 71% of meniscal injuries found during cruciate ligament surgery were repaired, compared to 37% in 2013. Increased focus on how the loss of meniscal tissue can contribute to early development of osteoarthritis in the knee joint is a likely cause of this trend. A regional grant enables us to work on improving data quality in the registration of meniscal surgery in the coming year.

Most individuals undergoing a cruciate ligament reconstruction are young - in Norway, the average age for a primary reconstruction is 28 years. In 2023, men underwent surgery in 54% of the cases. Among women, the majority have surgery during ages 10-19, while most men have surgery between the age of 20 and 29. However, this gender difference fades among older patients undergoing surgery. Regarding graft choice, the use of patellar tendon remains consistently high – it was used in 66% of all surgeries in 2023. In 18% and 8% of surgeries, hamstring and quadriceps tendon grafts were used, respectively.

The results show that patients have an effect of the surgery – KOOS scores improve from before surgery to all follow-up points. We present aggregated data, but also data at the hospital level – for all sub-scores of KOOS. From 2023, we have also expanded reporting on patient activity levels. We now register the level of activity patients participate in, whether they return to their previous level, and any reasons they have not returned. Such registration, up to 10 years after the injury, will provide us with valuable new insights into the consequences of a severe knee injury.

We have initiated several new studies, including a comprehensive factor analysis of KOOS and a collaboration with the Norwegian School of Sport Sciences on risk factors for the development of post-traumatic osteoarthritis. Among publications, we would like to highlight a study where Kyle Martin and colleagues, in collaboration the Danish Knee Ligament register, have used AI to identify various risk profiles for failure after cruciate ligament surgery. The register's large registry-randomized study – comparing operative and non-operative treatment for an ACL tear - continues with a good inclusion rate.

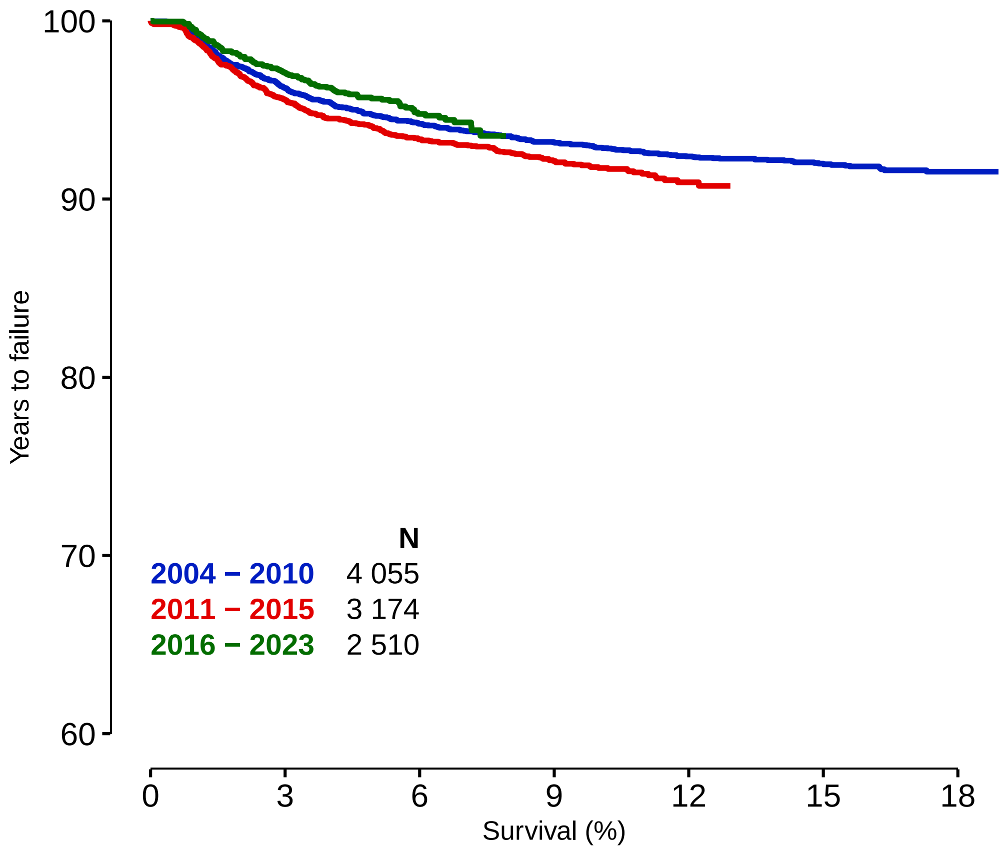
The steering committee for the NKLR works closely with the management and administration of the register. The group consists of chairman Jon Olav Drogset, Lars Engebretsen, Stig Heir, Ann Kristin Hansen, Ove Furnes, Jonas Meling Fevang and user representative Sigrun Marit Hansen.

Bergen, June 2024

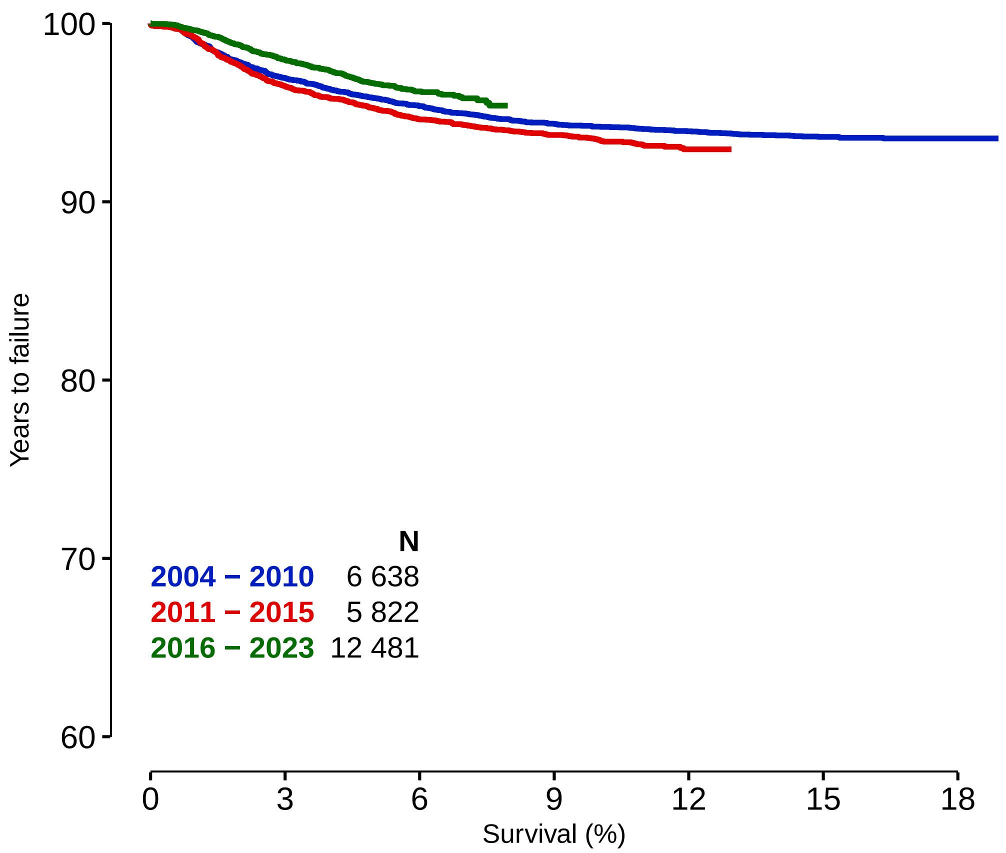
Sigurd Stenvik		Irina Kvinnesland
Eivind Inderhaug	Sigurd Stenvik	Irina Kvinnesland
Consultant Orthopaedic Surgeon/Professor	Biostatistician	IT consultant
Head of NKLR		

Survival of cruciate ligament operations 2004−2023

E.1) ACL reconstruction without additional injuries



E.2) ACL reconstruction with additional injuries



Survival estimate is given as long as >50 reconstructions remain at risk.

FIGURE E.3: Annual number of cruciate ligament primary reconstructions in 2023

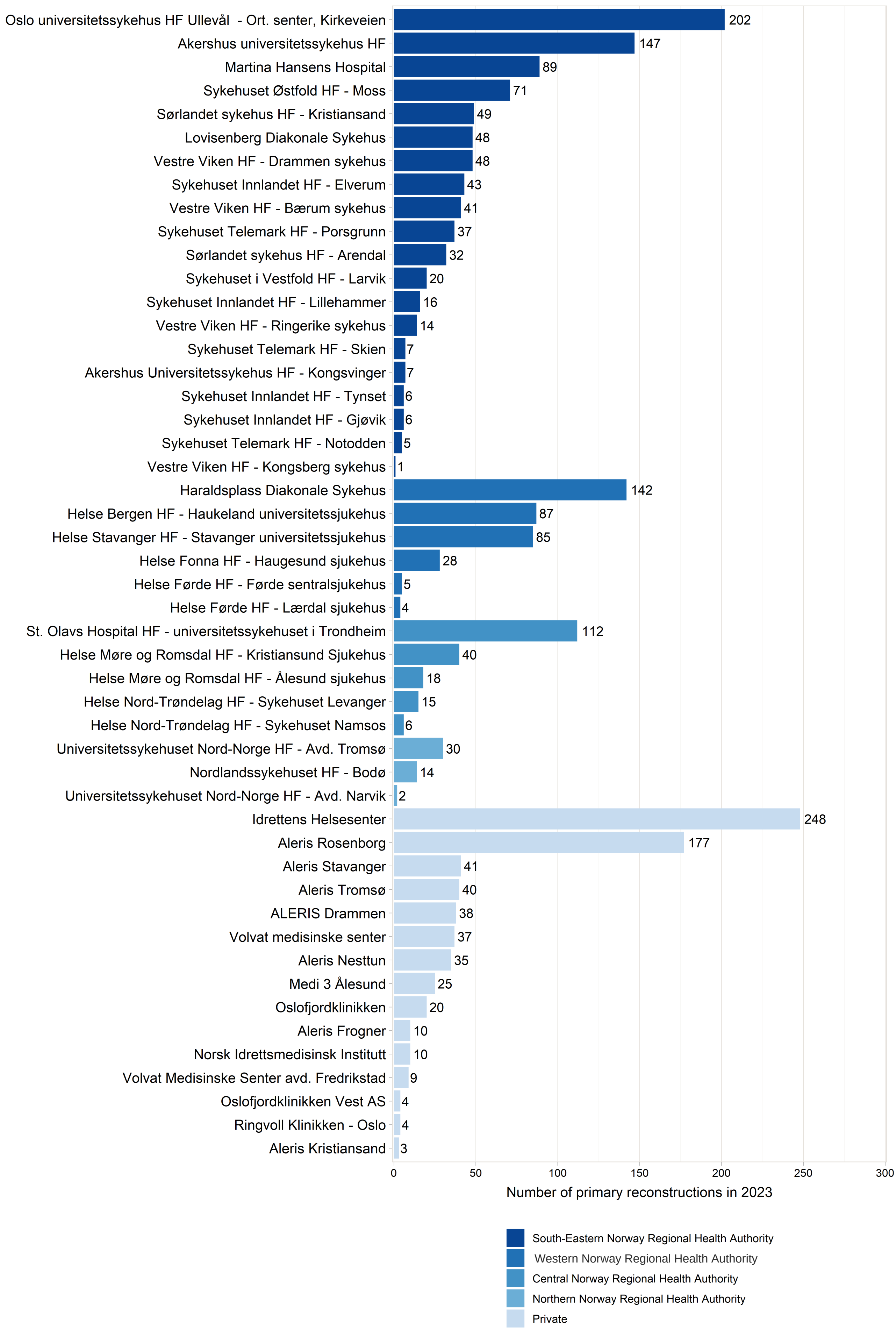


FIGURE E.4: Annual number of cruciate ligament primary and revision reconstructions for each hospital in 2023

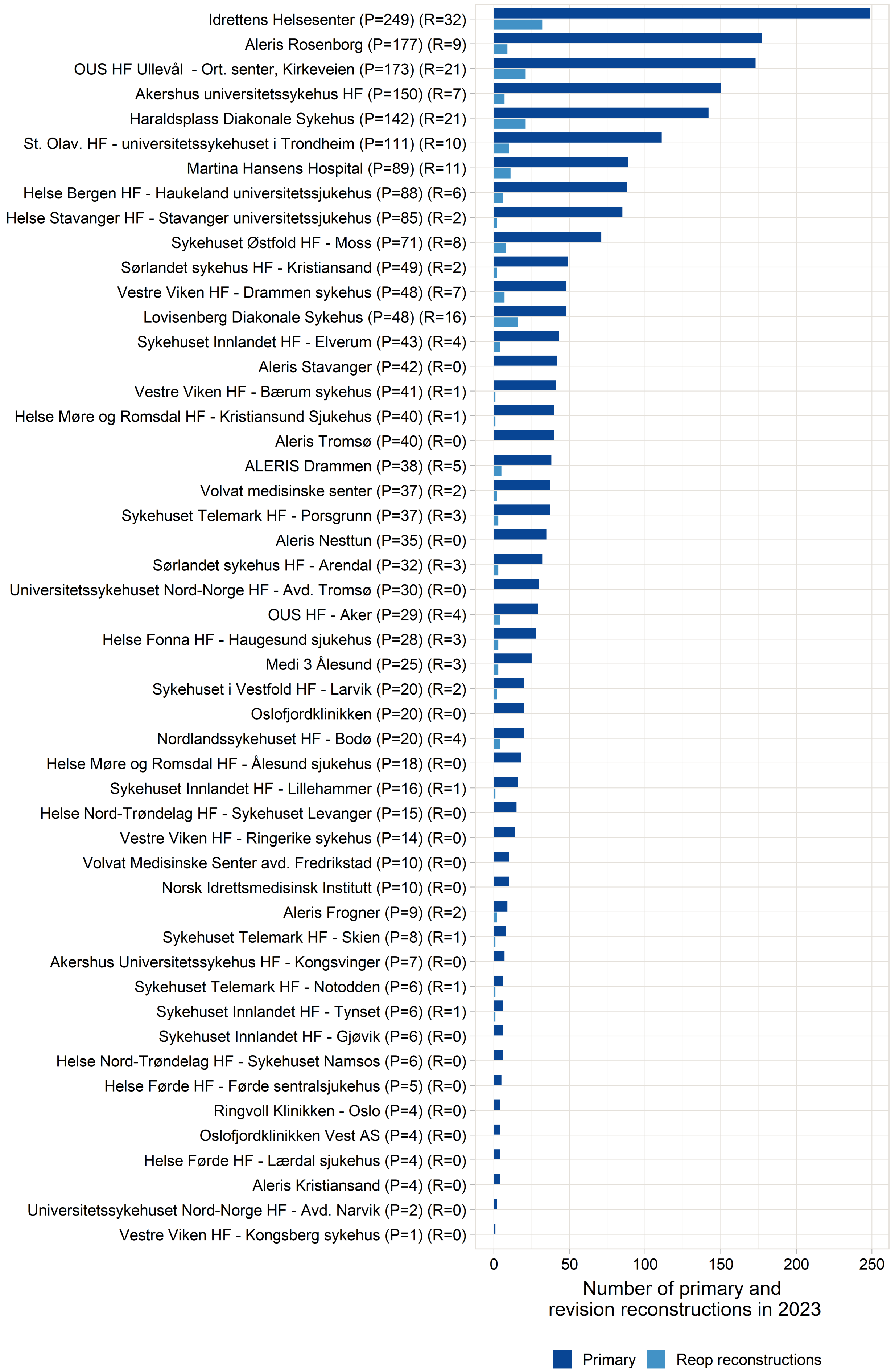
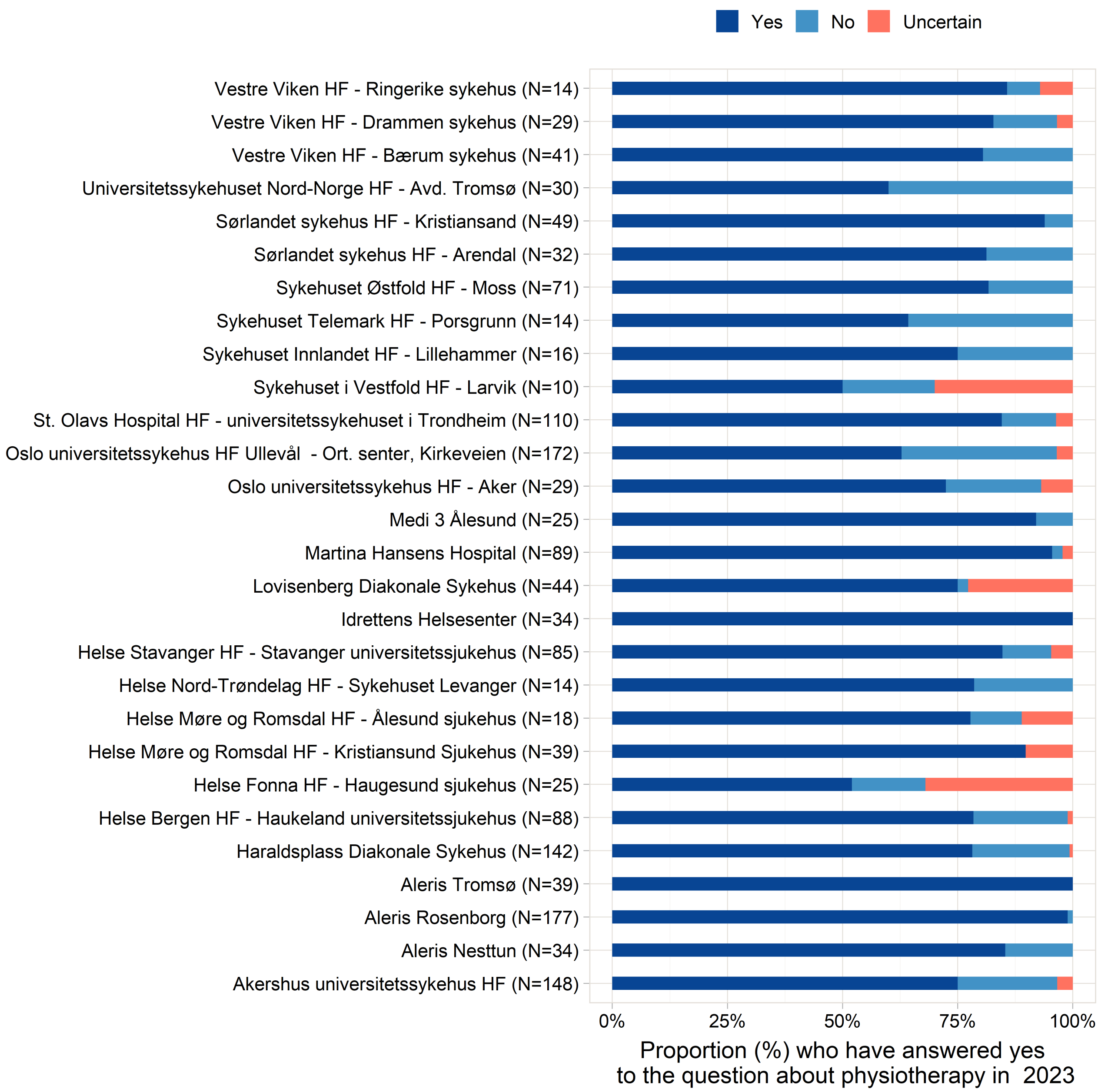
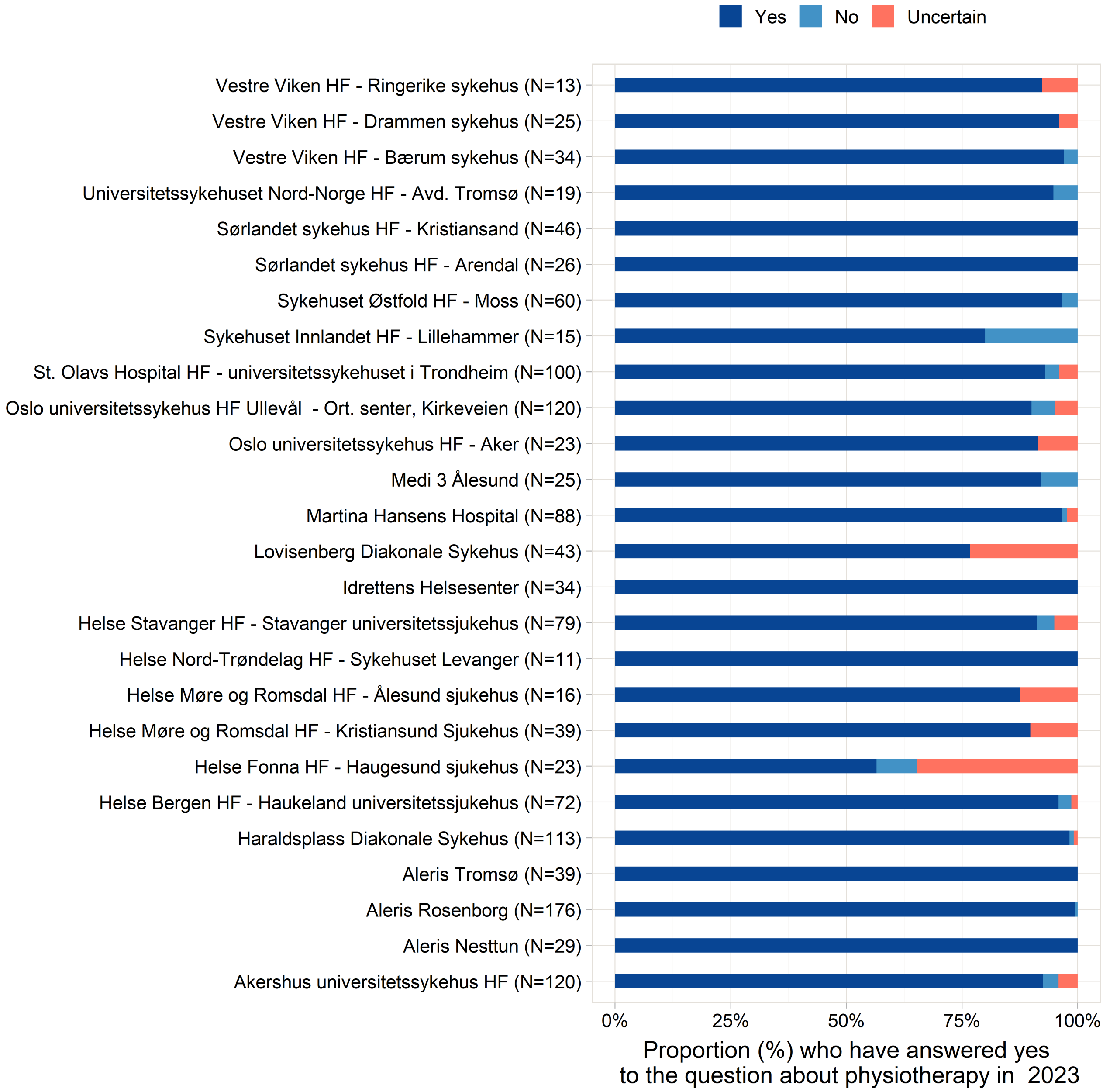


FIGURE E.5: Number of responses about physiotherapy in 2023



Since 2020, it has been reported whether patients have undergone physiotherapy before surgery. If the patient has not undergone physiotherapy,the reason is inquired. In cases of acute injury, physiotherapy is not relevant. The figure does not take into account why the patient has not undergone physiotherapy.

FIGURE E.6: Number of answers about physiotherapy in 2023 excluding acute patients



Since 2020, it has been reported whether patients have undergone physiotherapy before surgery. If the patient has not undergone physiotherapy, the reason is inquired. In cases of acute injury, physiotherapy is less relevant. Patients who did not undergo physiotherapy due to acute injury have been excluded from the figure.

FIGURE E.7: Number of patients with well documented grafts in 2023

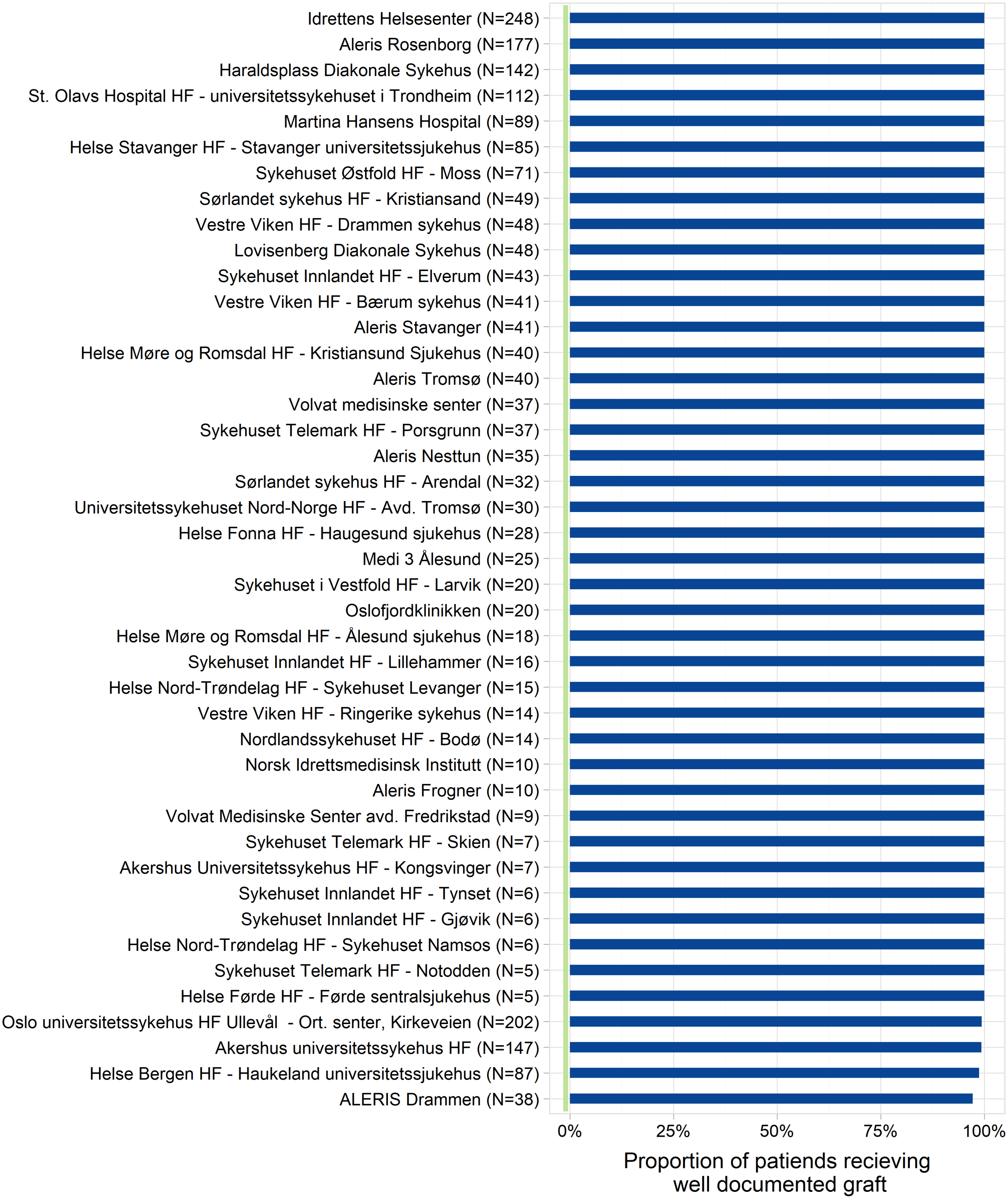
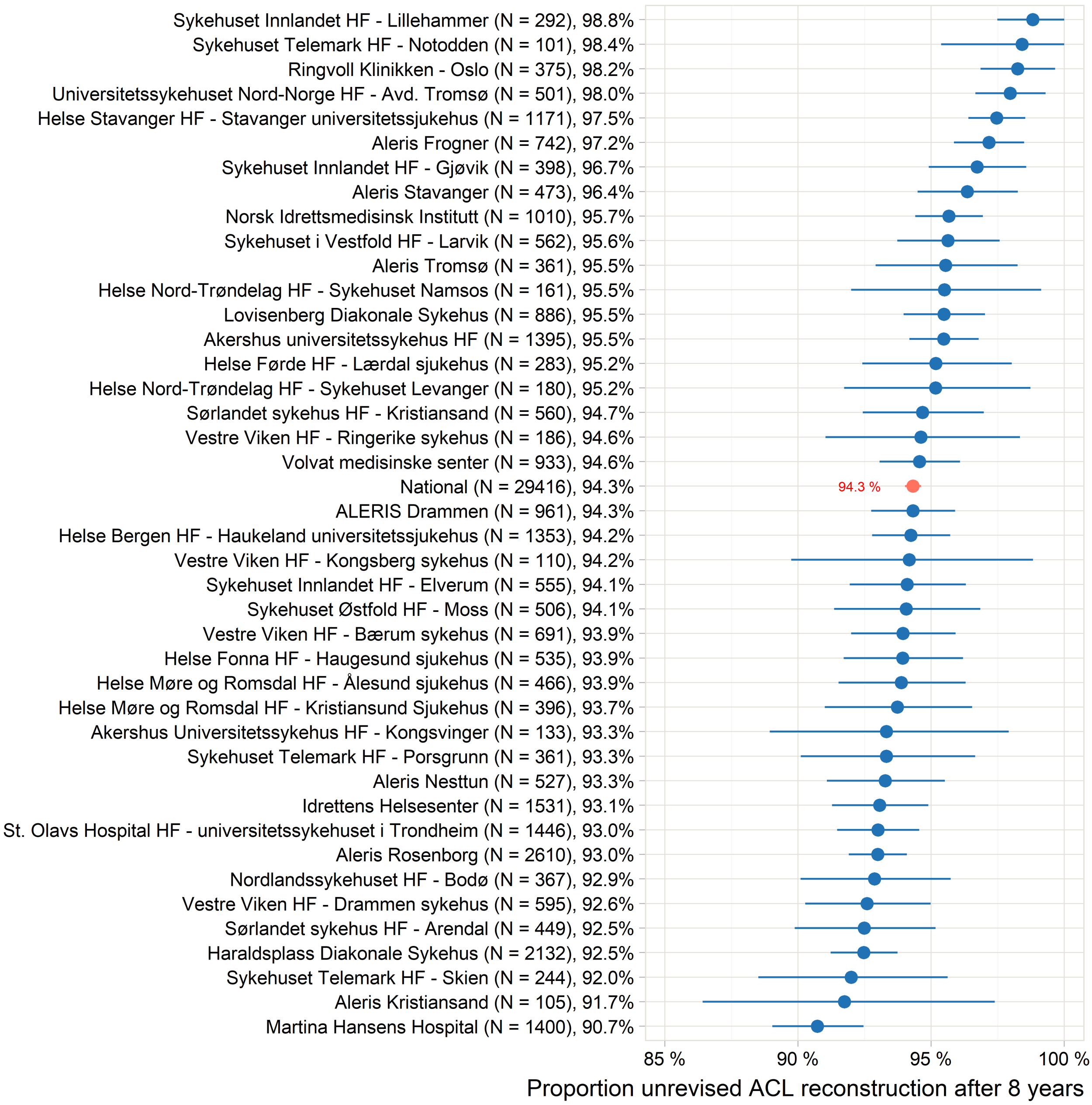


FIGURE E.8: The proportion of unrevised anterior cruciate ligament (ACL) reconstructions after 8 years in the period from 2004-2023

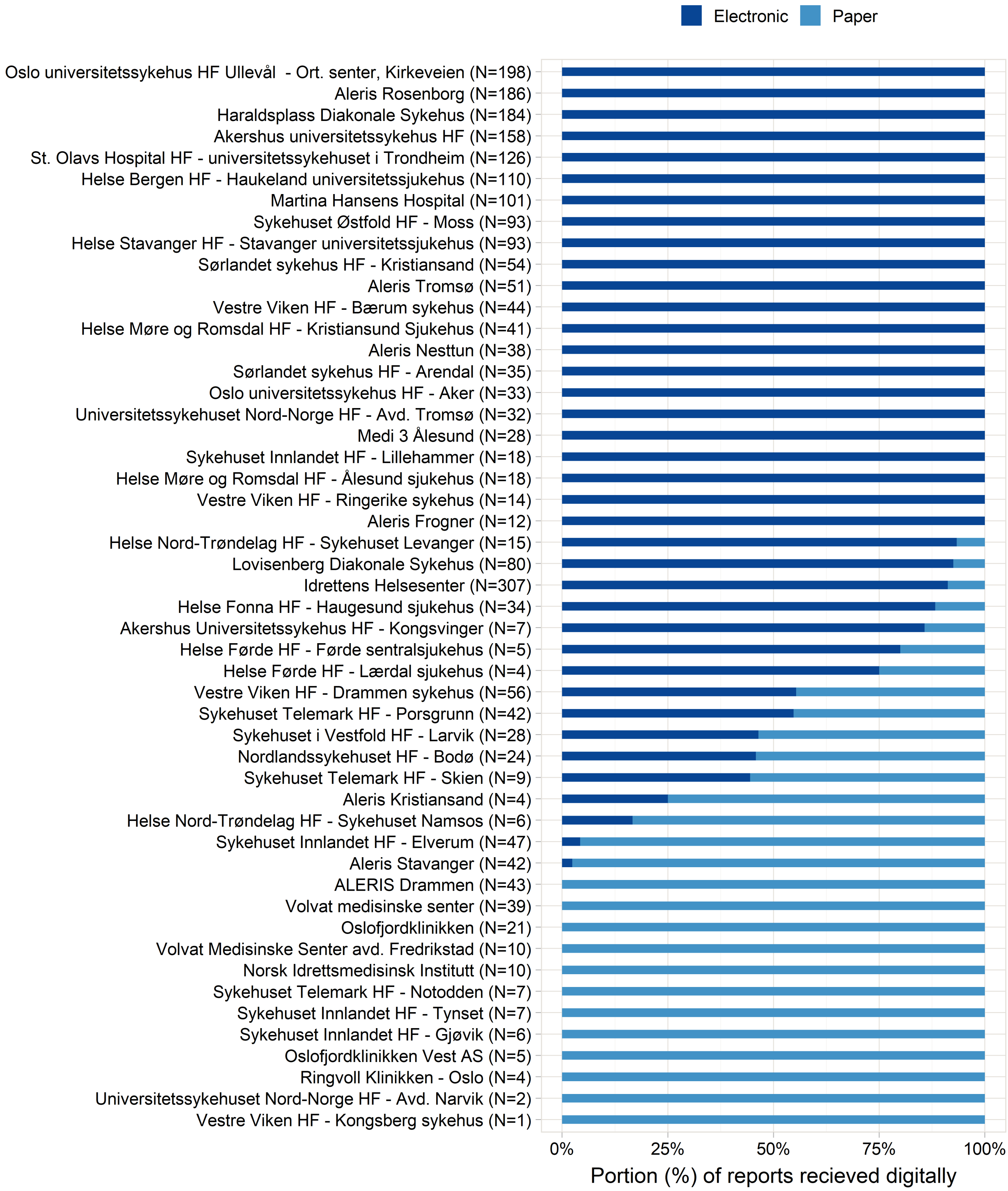


The figure shows the proportion of patients who have not undergone reoperation in the first 8 years after the primary surgery. In the national average, 94.3% of patients have avoided reoperations. In clinical practice, some hospitals may operate on patients with the lowest risk of complications and reoperations, while others, with better expertise in handling problems, may operate on patients with a higher risk of complications. In such cases, there is a chance that the latter hospitals may achieve less favorable results when attempting to compare hospital outcomes.

FIGURE E.9: The proportion of unrevised anterior cruciate ligament (ACL) reconstructions after 8 years in the period from 2013-2023

The figure depicts the proportion of patients who have not undergone reoperations in the first 8 years after primary surgeries during the period from 2013. We have done this to provide more current data and to see if the revision rate has changed in the latest period. 94.7% of the patients have avoided reoperations.

FIGURE E.10: Form registration by format in 2023



National average for electronic form registration in 2023 is 85.5%. 2165 was registered electronically and in total was 2532 registered in 2023.

Cruciate Ligament

All categories of operations

Table 1: Annual numbers of operations

	Primary reconstruction		Revision reconstruction		Only other procedures		Total
2023	2 178	(86,5%)	193	(7,7%)	147	(5,8%)	**2 518**
2022	1 901	(84,4%)	214	(9,5%)	138	(6,1%)	**2 253**
2021	1 541	(81,7%)	180	(9,6%)	165	(8,8%)	**1 886**
2020	1 689	(82,2%)	161	(7,8%)	205	(10,0%)	**2 055**
2019	1 977	(83,8%)	189	(8,0%)	193	(8,2%)	**2 359**
2004-18	25 397	(85,0%)	2 518	(8,4%)	1 981	(6,6%)	**29 896**
Total	**34 683**	**(84,7%)**	**3 455**	**(8,4%)**	**2 829**	**(6,9%)**	**40 967**

Registration complete from 2005. 49,2% of the operations were performed on the right side. 45,5% of the operations were performed on females. 7,7% of the patients had a previous ACL/PCL-injury in the opposite knee. (8,4% was missing). Mean age was 28,0 years, 26,7 years for women and 29,1 years for men. Standard deviation of age was 10,6 years, 11,3 years for women and 10,0 years for men.
Median value for duration of primary ACL reconstruction was 75 minutes.

Figure 1: Distribution of hospitals by surgery volume, primary ACL reconstructions

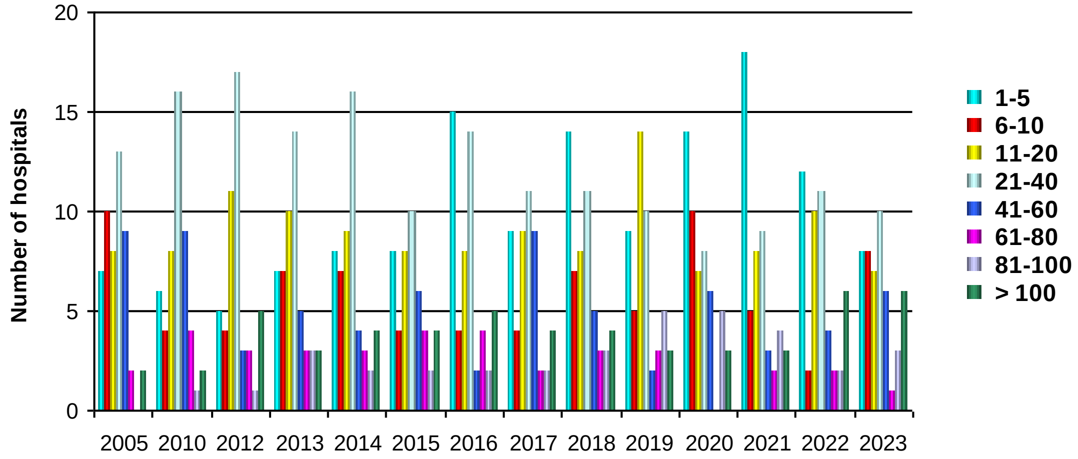
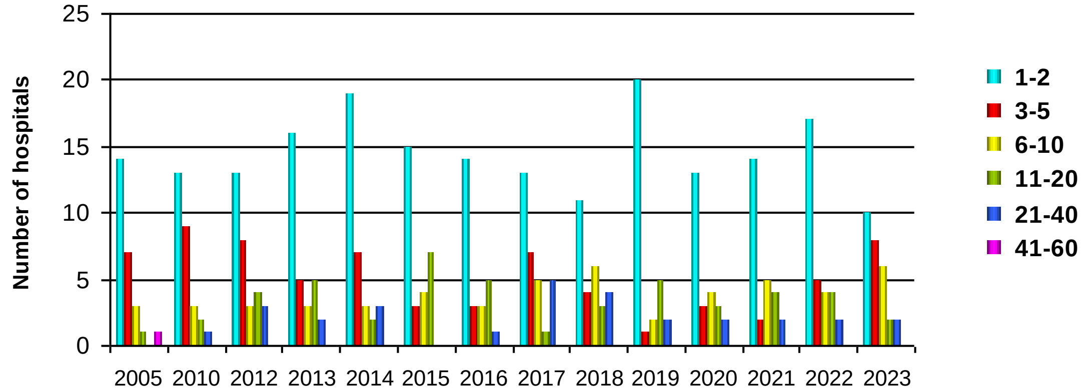


Figure 2: Distribution of hospitals by surgery volume, revision reconstructions ACL



Incidence of primary reconstruction of cruciate ligament for 2005, 2010, 2015, 2023

Figure 3a: For women

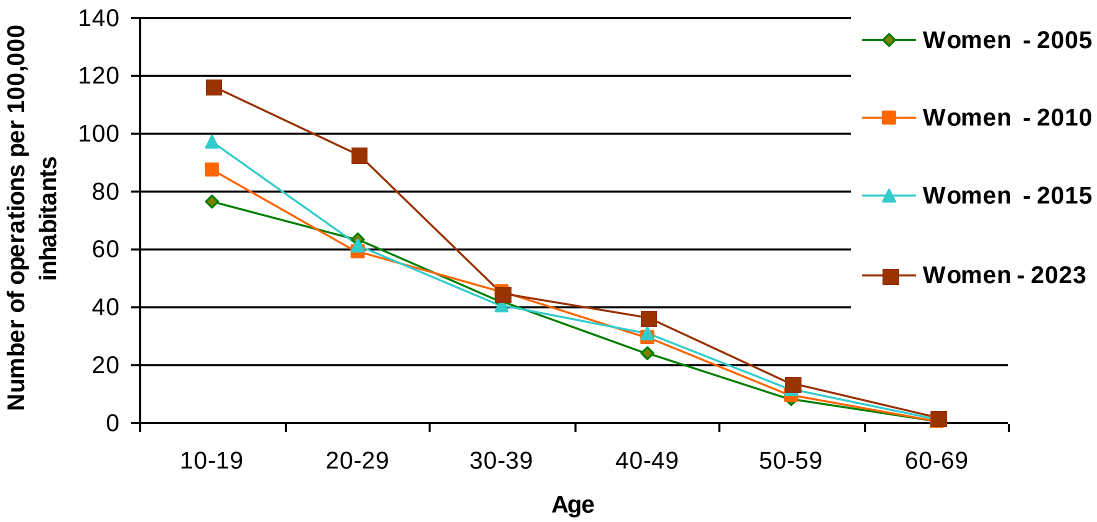
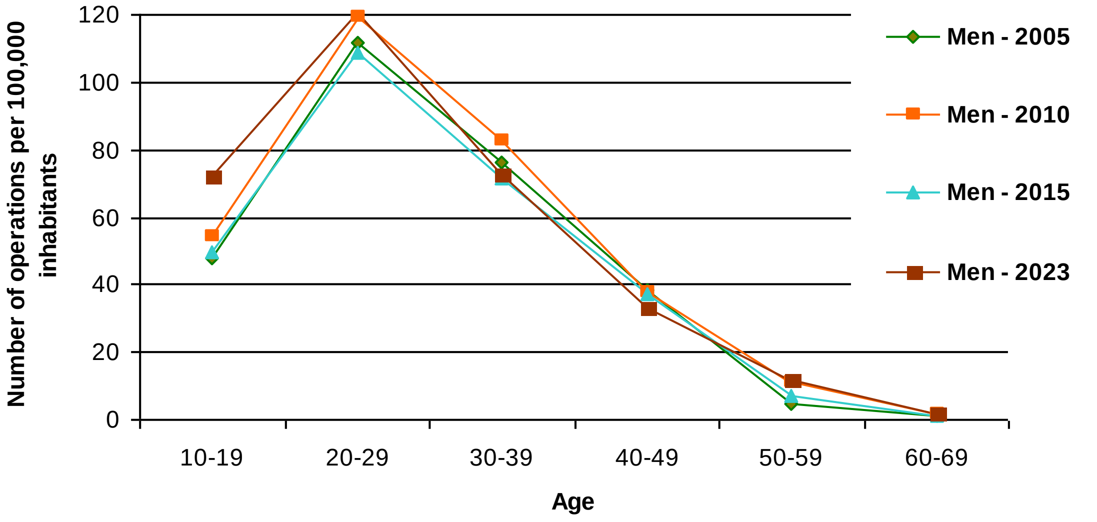


Figure 3b: For men



Distribution of other procedures

Table 2a: The number of other procedures for all categories of surgeries

	Meniscus surgery	Cartilage surgery	Synovectomy	Arthroscopic debridement	Mobilizing in narcosis	Surgery due to infection	Removal of implants	Bone transplantation	Osteotomy	Bone resection (Notch plasty)	Osteosynthesis	Artrodesis	Osteosynthesis patella fracture	Suture of the patellar or quadriceps tendons	Lateral extraarticular tenodesis
2023	446	26	17	40	12	3	45	19	6	49	0	0	1	1	185
2022	472	29	21	32	14	1	49	40	8	15	3	0	2	0	100
2021	434	22	26	37	6	11	43	26	17	21	3	0	1	4	60
2020	491	22	21	44	5	6	49	21	8	36	2	1	1	5	33
2019	848	31	32	52	4	4	51	20	8	114	2	0	0	1	15
2004-18	13 019	1 049	541	903	114	88	646	355	32	752	36	0	2	0	0
Total	**15 710**	**1 179**	**658**	**1 108**	**155**	**113**	**883**	**481**	**79**	**987**	**46**	**1**	**7**	**11**	**393**

PROM (Patient Reported Outcome Measures)

Table 2b: Number of issued and answered patient questionnaires

	2 years *			5 years *			10 years *			Total		
	Issued	**Answered (%)**		**Issued**	**Answered (%)**		**Issued**	**Answered (%)**		**Issued**	**Answered (%)**	
2023	1 439	875	(60,8%)	1 837	857	(46,7%)	1 716	745	(43,4%)	**4 992**	**2 477**	(49,6%)
2022	2 534	1 419	(56,0%)	1 919	930	(48,5%)	1 735	875	(50,4%)	**6 188**	**3 224**	(52,1%)
2021	841	756	(89,9%)	1 749	881	(50,4%)	1 795	932	(51,9%)	**4 385**	**2 569**	(58,6%)
2020	1 613	1 028	(63,7%)	1 741	933	(53,6%)	1 712	936	(54,7%)	**5 066**	**2 897**	(57,2%)
2019	1 770	944	(53,3%)	1 361	901	(66,2%)	1 800	1 016	(56,4%)	**4 931**	**2 861**	(58,0%)
2018	1 853	979	(52,8%)	1 685	864	(51,3%)	1 647	810	(49,2%)	**5 185**	**2 653**	(51,2%)
2017	1 766	1 025	(58,0%)	1 745	940	(53,9%)	1 602	910	(56,8%)	**5 113**	**2 875**	(56,2%)
2016	1 720	1 058	(61,5%)	1 818	1 055	(58,0%)	1 426	824	(57,8%)	**4 964**	**2 937**	(59,2%)
2015	1 749	1 055	(60,3%)	1 717	962	(56,0%)	1 515	933	(61,6%)	**4 981**	**2 950**	(59,2%)
2014	1 750	1 055	(60,3%)	1 823	1 105	(60,6%)	899	434	(48,3%)	**4 472**	**2 594**	(58,0%)
2013	1 852	1 186	(64,0%)	1 688	1 015	(60,1%)				**3 540**	**2 201**	(62,2%)
2012	1 917	1 146	(59,8%)	1 801	778	(43,2%)				**3 718**	**1 924**	(51,7%)
2011	1 674	1 131	(67,6%)	1 303	849	(65,2%)				**2 977**	**1 980**	(66,5%)
2010	1 866	1 175	(63,0%)	1 694	1 069	(63,1%)				**3 560**	**2 244**	(63,0%)
2009	1 635	1 118	(68,4%)	762	428	(56,2%)				**2 397**	**1 546**	(64,5%)
2008	1 556	889	(57,1%)							**1 556**	**889**	(57,1%)
2007	1 467	788	(53,7%)							**1 467**	**788**	(53,7%)
2006	956	450	(47,1%)							**956**	**450**	(47,1%)
Total	29 958	18 077	(60,3%)	24 643	13 567	(55,1%)	15 847	8 415	(53,1%)	**70 448**	**40 059**	(56,9%)

* The register sends questionnaires to patients 2, 5 and 10 years post-operatively

Table 3: Distribution of other procedures in combination with primary reconstruction of cruciate ligament

	Meniscus surgery	Cartilage surgery	Synovectomy	Arthroscopic debridement	Removal of implants	Bone resection (Notch plasty)	Lateral extraarticular tenodesis
13 340							
10 314	x						
6 741							
1 604	x						
425	x	x					
299	x						
255							x
253		x					
204						x	
197	x					x	
92				x			
87	x		x				
83			x				
73	x			x			
60	x					x	
50						x	
38						x	
35	x					x	
30	x	x					
29	x	x		x			
22				x		x	
22					x		
22	x			x		x	
16	x	x					
16		x		x			

X indicates applied procedure and each row gives the number of operations that is carried out with this combination of procedures. The table shows only combinations that have a number of ten or more.

Table 4: Distribution of other procedures in combination with primary reconstruction of cruciate ligament

	Meniscus surgery	Cartilage surgery	Removal of implants	Bone transplantation	Bone resection (Notch plasty)	Lateral extraarticular tenodesis
1 286						
629	x					
406						
147	x					
124			x			
110						x
86			x	x		
79				x		
65			x	x		
53	x		x			
49		x				
48				x		
37			x			
34	x			x		
31	x		x	x		
28	x	x				
27					x	
27	x					
19	x				x	
16					x	
15			x		x	

X indicates applied procedure and each row gives the number of operations that is carried out with this combination of procedures. The table shows only combinations that have a number of ten or more.

Table 5: Distribution of other procedures when this is the only procedure

	Meniscus surgery	Cartilage surgery	Synovectomy	Arthroscopic debridement	Mobilizing in narcosis	Surgery due to infection	Removal of implants	Bone transplantation
1 043	x							
385								
263				x				
173							x	
112	x			x				
110			x					
73		x						
63	x		x					
62						x		
50				x	x			
42	x	x						
37			x	x				
33				x			x	
28	x						x	
27			x		x			
24							x	x
24	x		x	x				
24		x		x				
22					x			
18			x	x	x			
18				x			x	x

X indicates applied procedure and each row gives the number of operations that is carried out with this combination of procedures. The table shows only combinations that have a number of 11 or more.

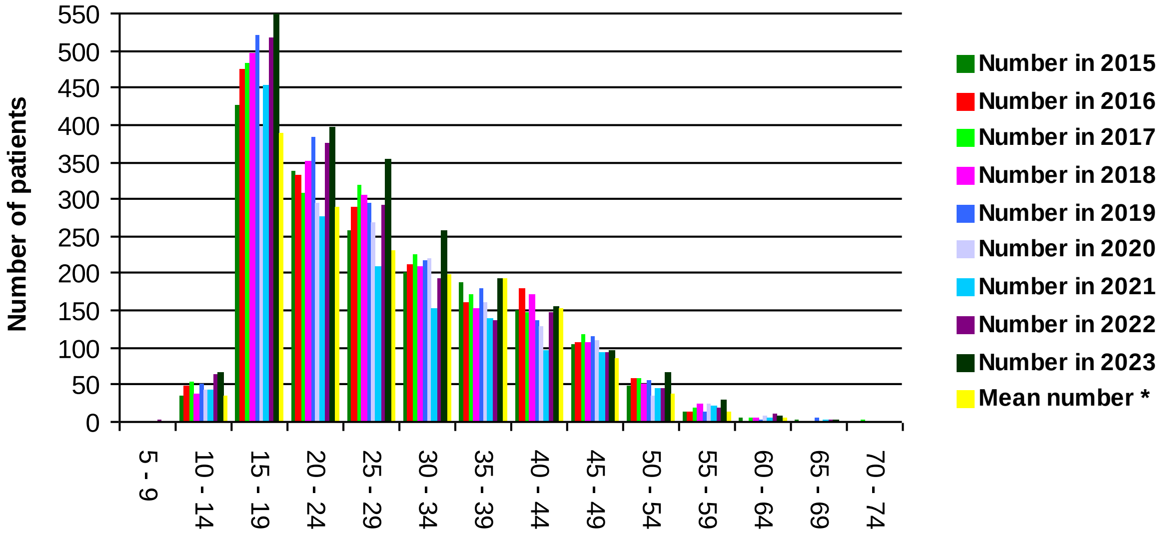
Intraoperative complications

Table 6: Intraoperative complications for all categories of surgeries

	Yes		No		Missing		Total
2023	63	(2,5%)	2 442	(97,0%)	13	(,5%)	**2 518**
2022	54	(2,4%)	2 171	(96,4%)	27	(1,2%)	**2 253**
2021	41	(2,2%)	1 815	(96,2%)	30	(1,6%)	**1 886**
2020	39	(1,9%)	1 993	(97,0%)	23	(1,1%)	**2 055**
2019	45	(1,9%)	2 276	(96,5%)	37	(1,6%)	**2 359**
2004-18	855	(2,9%)	28 327	(94,8%)	712	(2,4%)	**29 896**
Total	**1 097**	**(2,7%)**	**39 024**	**(95,3%)**	**842**	**(2,1%)**	**40 967**

Primary reconstruction of cruciate ligament

Figure 4: Age by primary operation



* Mean number of primary operations for 2004 - 2014

Figure 5a: Activity that lead to injury

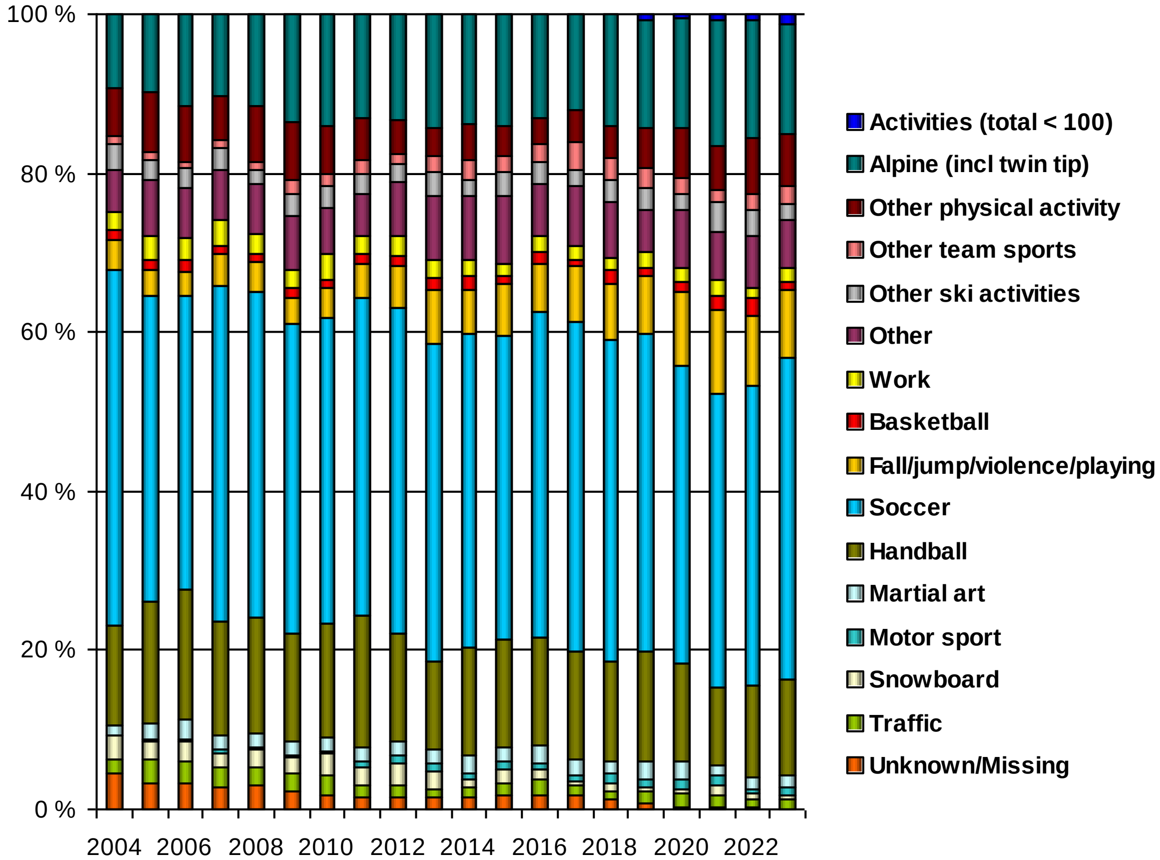
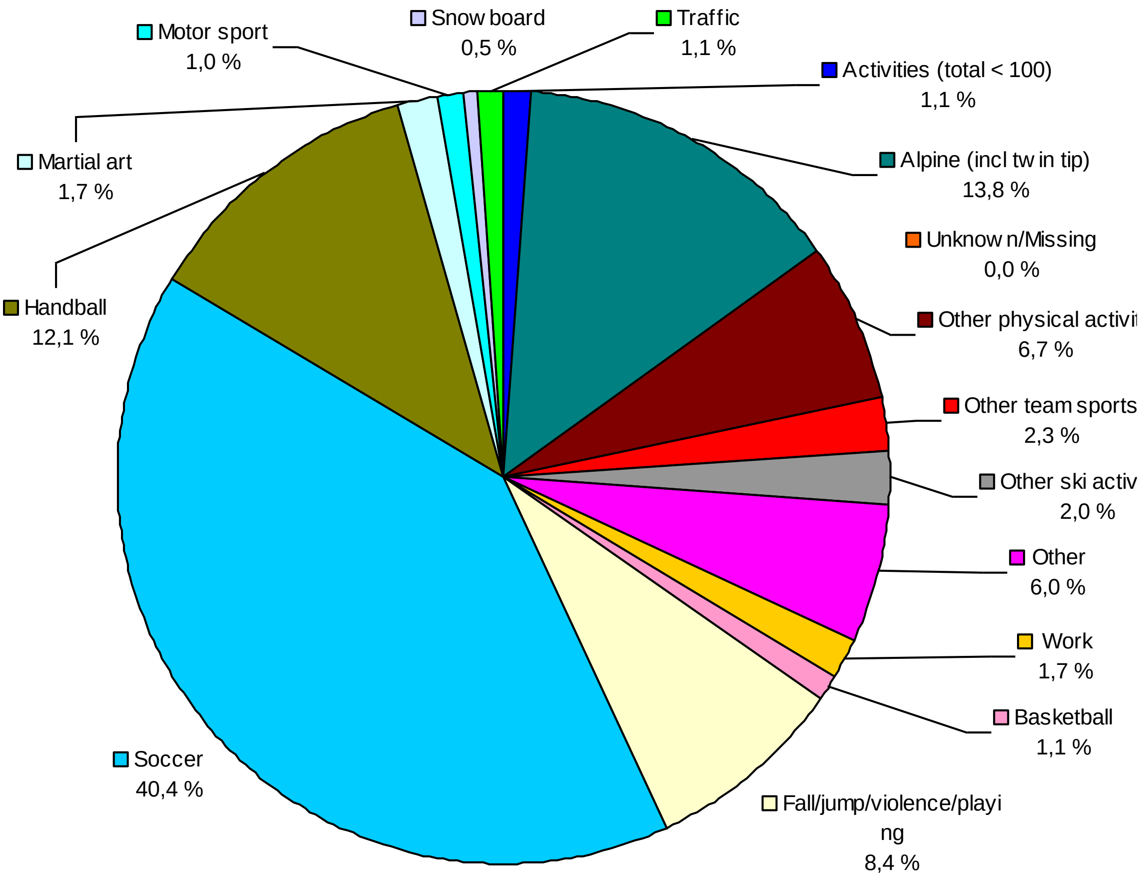


Figure 5b: Activity that lead to injury in 2023



Actual injury

Table 7: Actual injury*

	ACL	PCL	MCL	LCL	PLC	Cartilage	Meniscus
2023	2 160	57	178	53	19	525	1 464
2022	1 875	53	124	48	19	446	1 239
2021	1 523	46	111	40	17	422	999
2020	1 667	43	103	25	11	445	1 103
2019	1 946	62	203	52	27	486	1 279
2004-18	25 123	659	2 092	490	282	6 021	13 310
Total	**34 294**	**920**	**2 811**	**708**	**375**	**8 345**	**19 394**

* More than one type of injury can be given for each form

Additional injuries

Table 8: ACL with additional injuries

Number	ACL	PCL	MCL	LCL	PLC	Meniscus	Cartilage
12 470	x					x	
11 195	x						
5 081	x					x	x
2 082	x						x
804	x		x			x	
797	x		x				
478	x		x			x	x
230	x		x				x
148	x			x			
118	x	x	x				
80	x			x		x	
65	x			x	x		
59	x	x	x				x
42	x	x					
38	x			x			x
29	x	x		x	x		
28	x				x		
25	x		x	x			
20	x	x	x			x	
20	x		x	x		x	

x indicates registered injury and each row tell the number of incidences of different combination of injuries. The first row gives the number of records where ACL was the only injury. The table shows only combinations that have a number of 20 or more.

Table 9: PCL with additional injuries

Number	ACL	PCL	MCL	LCL	PLC	Meniscus	Cartilage
157		x					
118	x	x	x				
59	x	x	x				x
50	x	x	x			x	
49		x					x
43	x	x	x			x	x
42	x	x					
35		x	x				
30	x	x				x	
29	x	x		x	x		
22	x	x		x	x	x	
22		x				x	
20	x	x				x	x
17		x				x	x
16	x	x			x		
15	x	x		x	x		x
14		x	x				x
14		x		x	x		
14	x	x		x	x	x	x
13		x			x		
12	x	x		x			
12	x	x					x

x indicates registered injury and each row tell the number of incidences of different combination of injuries. The first row gives the number of records where PCL was the only injury. The table shows only combinations that have a number of 11 or more.

Choice of graft for injuries registered in primary reconstructions

Table 10: BPTB

	ACL	PCL	MCL	LCL	PLC	Total
2023	1 581	0	1	0	0	**1 582**
2022	1 406	0	0	0	0	**1 406**
2021	1 116	0	1	0	0	**1 117**
2020	1 232	0	0	1	0	**1 233**
2019	1 365	0	1	0	0	**1 366**
2004-18	10 013	31	2	1	0	**10 047**
Total	**16 713**	**31**	**5**	**2**	**0**	**16 751**

Table 11: HAMSTRING

	ACL	PCL	MCL	LCL	PLC	Total
2023	356	5	45	11	2	**419**
2022	292	10	47	18	3	**370**
2021	273	4	37	10	2	**326**
2020	331	10	31	3	0	**375**
2019	427	14	49	8	6	**504**
2004-18	14 540	336	236	65	35	**15 212**
Total	**16 219**	**379**	**445**	**115**	**48**	**17 206**

Table 12: ALLOGRAFT

	ACL	PCL	MCL	LCL	PLC	Total
2023	19	41	5	14	8	**87**
2022	15	36	5	12	6	**74**
2021	22	35	6	13	11	**87**
2020	10	25	5	6	8	**54**
2019	4	34	0	9	10	**57**
2004-18	59	144	32	75	98	**408**
Total	**129**	**315**	**53**	**129**	**141**	**767**

Table 13: Quadriceps Graft (QTC + QTB)

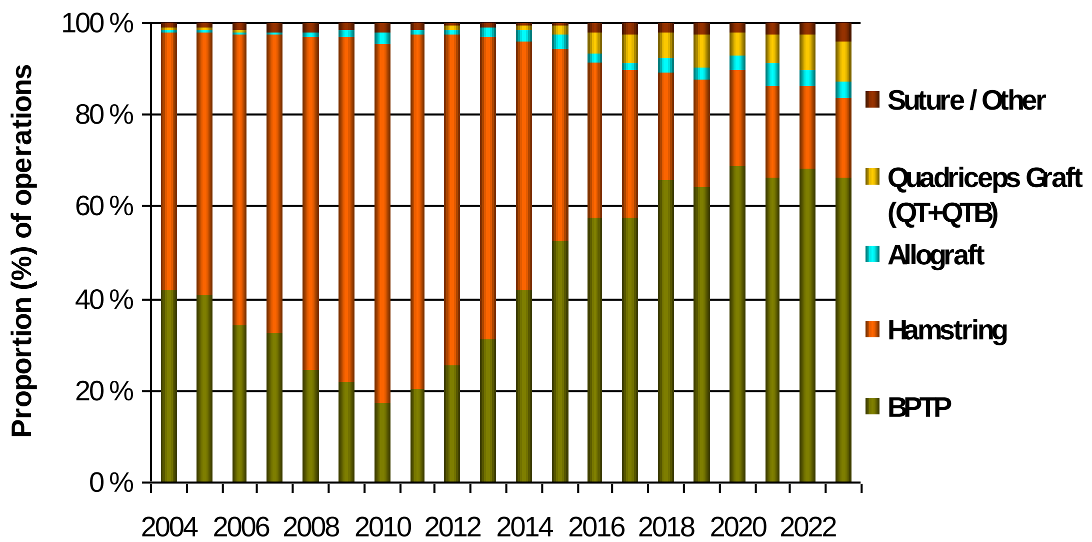
	ACL	PCL	MCL	LCL	PLC	Total
2023	200	0	1	0	0	**201**
2022	152	0	0	0	0	**152**
2021	107	0	1	0	0	**108**
2020	91	1	0	0	0	**92**
2019	142	2	0	0	0	**144**
2004-18	418	11	0	0	1	**430**
Totalt	**1 110**	**14**	**2**	**0**	**1**	**1 127**

Table 14: Suture / Other

	ACL	PCL	MCL	LCL	PLC	Total
2023	4	8	62	17	7	**98**
2022	8	4	26	10	5	**53**
2021	5	3	24	6	2	**40**
2020	3	4	20	9	0	**36**
2019	6	9	27	9	7	**58**
2004-18	68	54	143	83	65	**413**
Total	**94**	**82**	**302**	**134**	**86**	**698**

There were 22 forms where it was registered product for ACL og 23 forms where it was registered product for PCL but not checked for choice of graft.

Figure 6: Choice of graft for all injuries in primary reconstructions



Fixation

Table 15: Femur ACL (The 5 most common for the last 5 years)

Product	2004-18	2019	2020	2021	2022	2023	Total
Endobutton CL Ultra	7 258	254	197	120	136	168	**8 133**
SoftSilk	3 486	469	354	379	405	368	**5 461**
Endobutton CL BTB	1 289	348	271	164	171	139	**2 382**
Sheated Cannulated Int	650	173	127	112	158	137	**1 357**
ACL TightRope	407	94	67	125	157	226	**1 076**

Table 16: Tibia ACL (The 5 most common for the last 5 years)

Product	2004-18	2019	2020	2021	2022	2023	Total
SoftSilk	4 079	764	673	603	700	788	**7 607**
RCI Screw	4 519	171	155	75	88	143	**5 151**
Full Thread Interference	275	144	181	150	309	348	**1 407**
Peek Interference Scre	513	116	109	96	98	93	**1 025**
Tightrope ABS	171	53	42	169	188	267	**890**

Table 17: Femur PCL (The 5 most common for the last 5 years)

Product	2004-18	2019	2020	2021	2022	2023	Total
Endobutton CL Ultra	217	7	4	3	6	12	**249**
SoftSilk	95	27	17	17	11	15	**182**
Ultrabutton			10	9	8	12	**39**
ACL TightRope	8	7	5	5	6	5	**36**
Softsilk 1.5 screw (7m		5	4	6	2	4	**21**

Table 18: Tibia PCL (The 5 most common for the last 5 years)

Product	2004-18	2019	2020	2021	2022	2023	Total
RCI Screw	267	18	14	16	18	29	**362**
Biosure HA Interferenc	32	7	1	2	1		**43**
Peek Interference Scre	6	5	4	9	8	4	**36**
BioComposite SwiveLo	6	6	2	2	5	3	**24**
Biosure Regenesorb Int		2	3	7	2	4	**18**

Table 19: Femur and tibia ACL (The 5 most common for the last 5 years)

Femur	Tibia	2004-18	2019	2020	2021	2022	2023	Total
SoftSilk	SoftSilk	3 005	405	292	315	342	293	**4 652**
Endobutton CL BTB	SoftSilk	835	267	252	145	144	116	**1 759**
ACL TightRope	Tightrope ABS	121	42	41	156	171	247	**778**
Peek Interference Screw	Peek Interference Screw	331	80	83	84	82	84	**744**
Cannulated Interference Screw	Full Thread Interference screw	89	43	72	40	101	143	**488**

Meniscal lesion

Table 20: Treatment of meniscal lesion

		Resection				Synthetic	Meniscus			
		OLD *	Total	Partial	Suture	fixation	Transplant.	Trepanation	None	Total
2023	Lateral		1	225	470	1		2	59	**758**
2023	Medial		7	239	668			1	59	**974**
2022	Lateral			200	397			7	50	**654**
2022	Medial		6	208	527	2		1	39	**783**
2021	Lateral		2	159	321			5	46	**533**
2021	Medial		6	190	398	2			35	**631**
2020	Lateral			217	284			8	54	**563**
2020	Medial		5	245	438	1		1	48	**738**
2019	Lateral		1	243	365		1	3	62	**675**
2019	Medial		12	241	507	1	1	4	58	**824**
2004-18	Lateral	2 040	14	2 322	1 597	77	5	127	995	**7 177**
2004-18	Medial	2 371	49	2 446	2 760	255	6	105	919	**8 911**
Total		**4 411**	**103**	**6 935**	**8 732**	**339**	**13**	**264**	**2 424**	**23 221**

It became possible to register "Trepanation" and "None" from 01.01.2005. There have been forms where this has been an additional information. This information have been registered, but the registration is not complete before 2005.

In table 7: Actual injury has less. The reason for this is that we distinguish between the lateral and medial injury and some injuries are registreded in both groups.

*The value in OLD Resection are the forms that are registered before an updated form was introduced in autumn 2011. The Total and Partial Resection values are the updated form was introduced in autumn 2011.

Figure 7a: Treatment of meniscal lesions in primary reconstructions

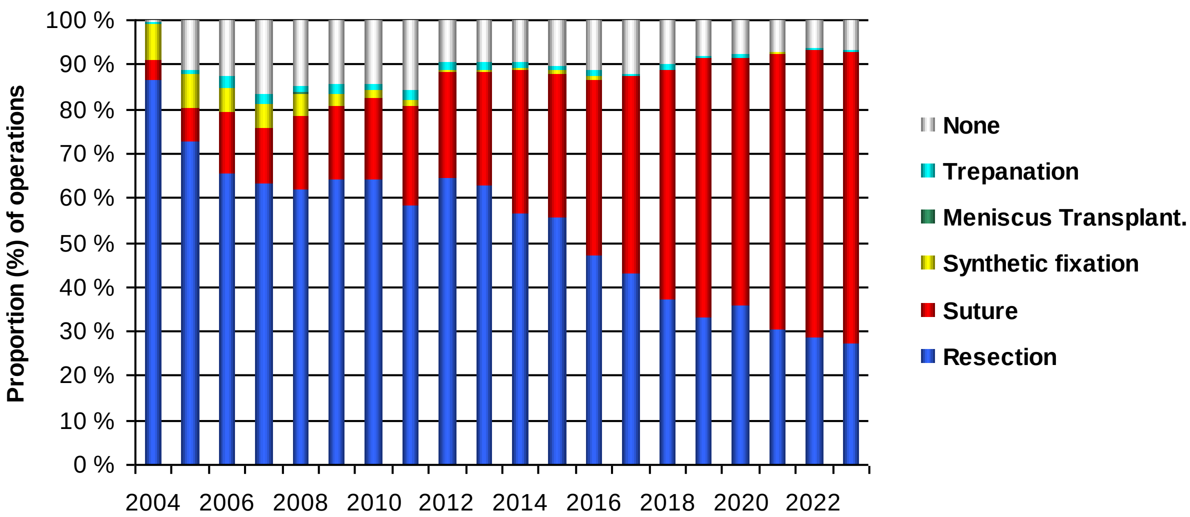


Figure 7b: Distribution of medial meniscal rupture types

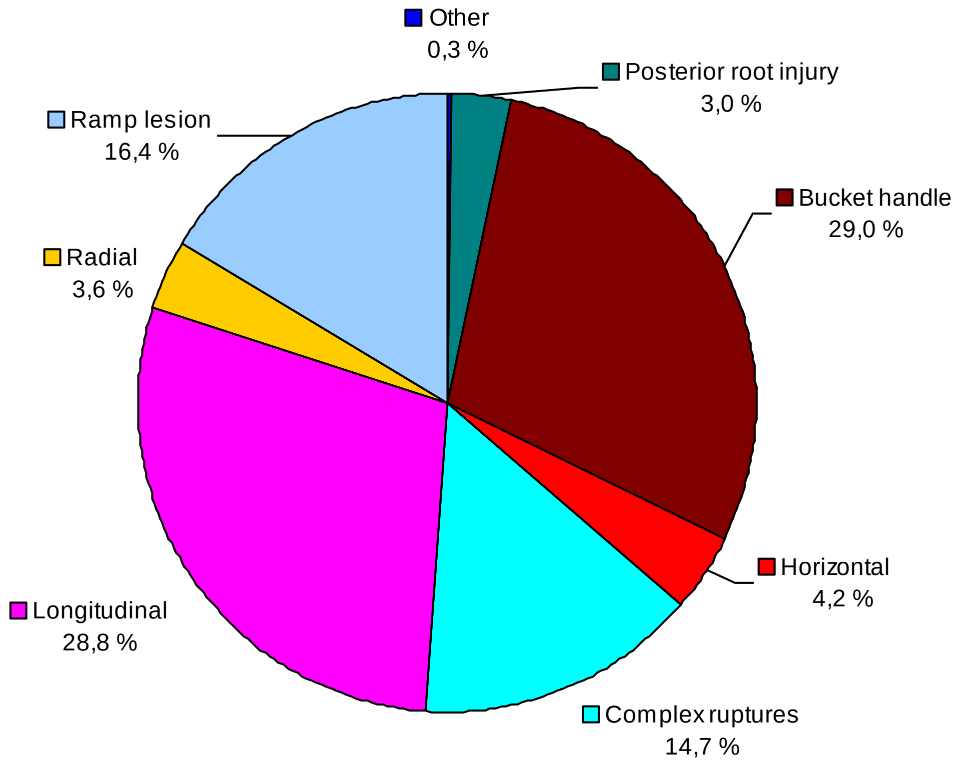
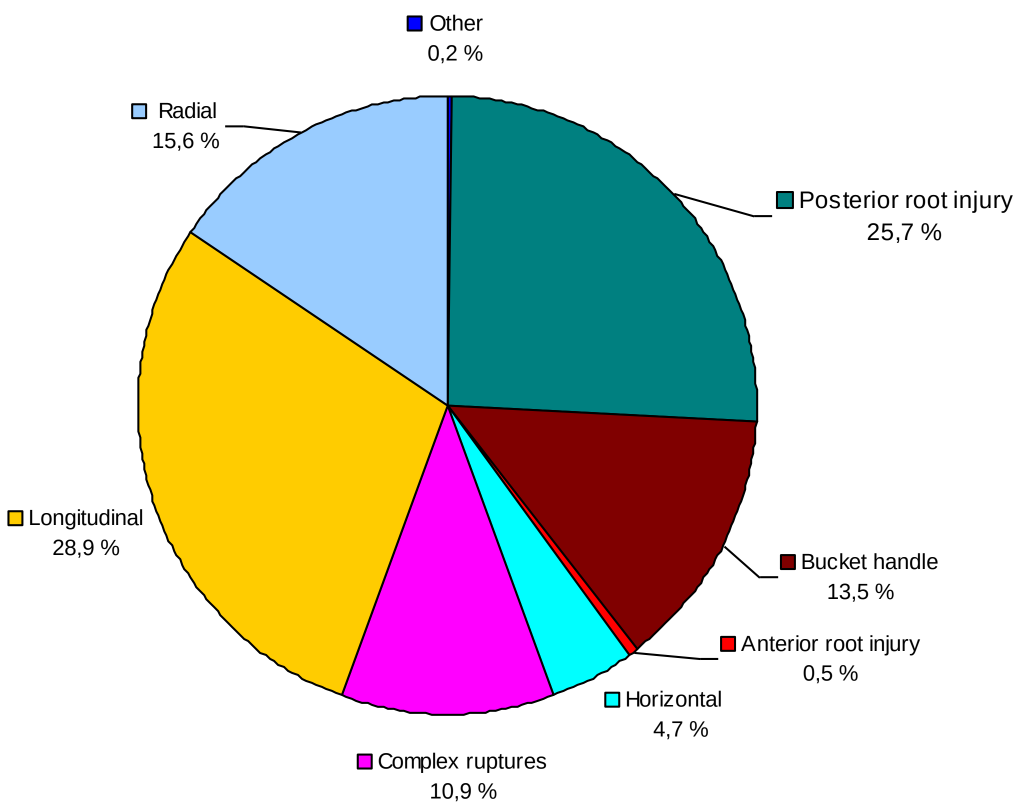


Figure 7c: Distribution of lateral meniscal rupture types



Meniscal fixation

Table 21: Suture

Product	2004-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
BioComposite SwiveLock C w/Fiber Tape							9	7	11	7	12	8	9	**63**
Bio-Tenodesis Screw System										1				**1**
Cannulated Screw													2	**2**
Coated Braided Polyester Ssuture	7										3	2	1	**13**
Endobutton (BOX OF 1) Str								1	14	5	14	12	30	**76**
Endobutton CL BTB												2	4	**6**
Endobutton CL Ultra									4	2	3	3	1	**13**
Endobutton Tape Polyester										1				**1**
FAST-FIX	678	211	203	284	319	412	461	538	625	530	517	615	644	**6 037**
FiberStitch Implant Suture										11	9	34	56	**110**
FiberTak System Implant												1		**1**
FiberTak w/TigerTail												1		**1**
Gastro-urological guidewire											1			**1**
JuggerKnot Soft Anchors												1	1	**2**
KnotlessFibertak soft anchor													1	**1**
Meniscal Cinch									7	5	1			**13**
Meniscal Dart Stick	1							1						**2**
Meniscal Root Repair System											2	1	3	**6**
Meniscus Ramp Lesion Knee													1	**1**
Orthocord w/Double-Armed Meniscal Needles						1		1	29	11	24	44	26	**136**
PDS II (polydioxanone) sutur							8			1		1	4	**14**
Rapidloc	72		2											**74**
Screw Cannulated													3	**3**
Screw Softsilk										1			1	**2**
SharpShoter												2	1	**3**
Super QuickAnchor Plus													1	**1**
Sutur Vicryl								1						**1**
Suture Buttons									12	6	1	6	7	**32**
Suture Washer Ster.								4	11	7	6	6	1	**35**
SutureTape									1	1	2	14	28	**46**
Tightrope ABS Button									2	2	5	7	13	**29**
Truespan Meniscal Repair System									22	29	17	72	161	**301**
Unknown	58	40	43	49	54	65	23	12	1	3	4	1	1	**354**
Ultrabraid													1	**1**
Ultratape Suture Blue													1	**1**
Xtendobutton Fixation Device											1			**1**
Total	**816**	**251**	**248**	**333**	**373**	**478**	**501**	**565**	**739**	**623**	**622**	**833**	**1 002**	**7 384**

Cartilage lesion all localizations

Table 22: ICRS Grade

Definition of ICRS Grade:

1. Nearly normal: Superficial lesions, soft indentation and/or superficial fissures and cracks.
2. Abnormal: Lesions extending down to <50% of cartilage depth.
3. Severely abnormal: Cartilage defects extending down >50% of cartilage depth as well as down to calcified layer.
4. Severely abnormal: Osteochondral injuries, lesions extending just through the subchondral boneplate or deeper defects down into trabecular bone.

	Code 1	Code 2	Code 3	Code 4	Missing
2023	31,6%	46,9%	18,3%	2,8%	0,3%
2022	29,0%	51,3%	16,3%	2,9%	0,5%
2021	30,5%	48,6%	16,6%	3,9%	0,5%
2020	40,4%	41,5%	14,9%	2,4%	0,7%
2019	42,6%	39,0%	15,0%	2,1%	1,2%
2004-18	36,9%	41,8%	16,0%	4,1%	1,3%

Table 23: Treatment codes for all localizations

	Debridement	Micro fracture	No treatment	Other	Missing
2023	11,6%	1,0%	84,9%	1,0%	1,6%
2022	13,5%	0,8%	83,8%	0,4%	1,5%
2021	7,8%	0,8%	86,6%	0,9%	3,9%
2020	6,3%	1,0%	86,8%	1,0%	5,0%
2019	5,3%	0,7%	87,9%	0,5%	5,7%
2004-18	11,1%	2,8%	68,8%	0,9%	16,4%

Cartilage injuries registered in primary reconstructions

Figure 8: All Cartilage injuries (total)

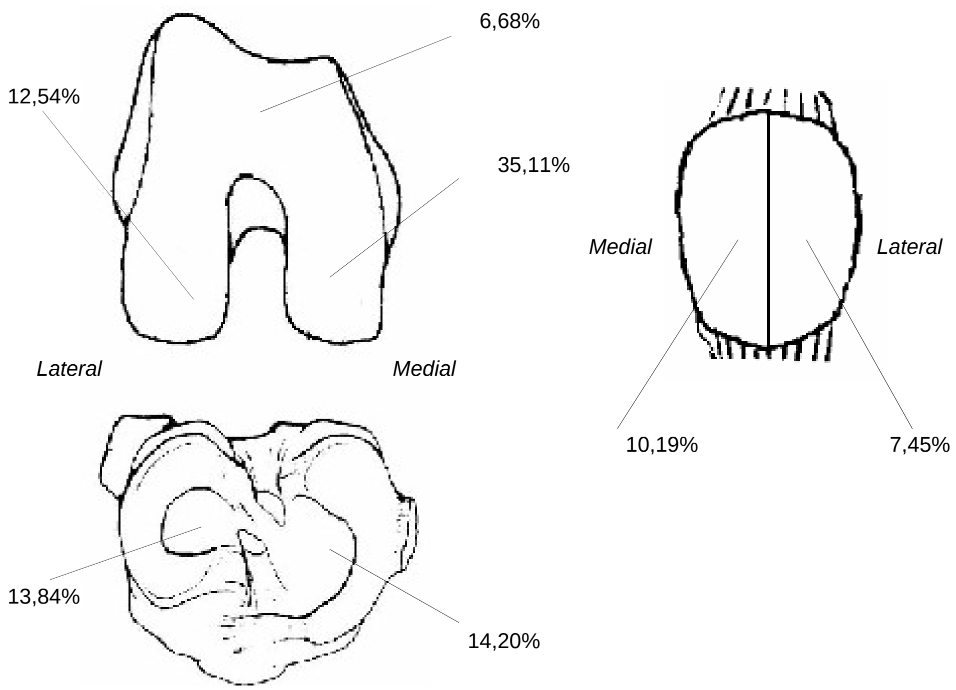
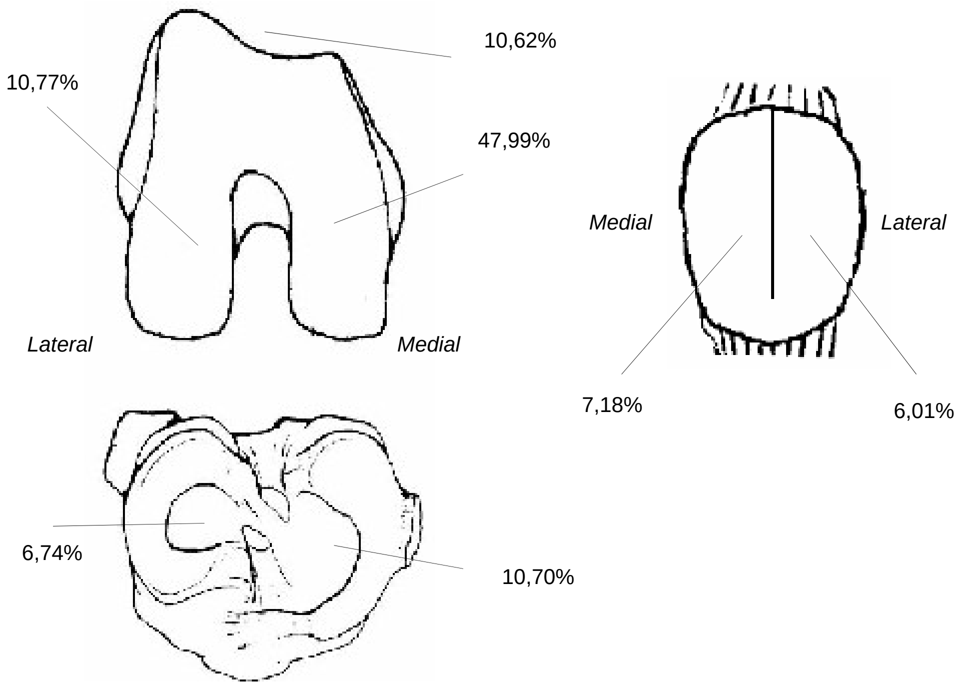


Figure 9: All Cartilage injuries with area greater than 2 cm² and ICRS equal 3 or 4 (total)



Outpatient surgery

Table 24: Outpatient surgery

	Yes		No		Missing		Total
2023	1 839	(84,4%)	339	(15,6%)			**2 178**
2022	1 563	(82,2%)	337	(17,7%)	1	(0,1%)	**1 901**
2021	1 275	(82,7%)	264	(17,1%)	1	(0,1%)	**1 541**
2020	1 397	(82,7%)	282	(16,7%)	10	(0,6%)	**1 689**
2019	1 456	(73,6%)	514	(26,0%)	7	(0,4%)	**1 977**
2004-18	14 845	(58,5%)	10 428	(41,1%)	124	(0,5%)	**25 397**
Total	**22 375**	**(64,5%)**	**12 164**	**(35,1%)**	**143**	**(0,4%)**	**34 683**

Intraoperative complications

Table 25: Intraoperative complications

	Yes		No		Missing		Total
2023	57	(2,6%)	2 112	(97,0%)	9	(0,4%)	**2 178**
2022	50	(2,6%)	1 828	(96,2%)	22	(1,2%)	**1 901**
2021	32	(2,1%)	1 485	(96,4%)	24	(1,6%)	**1 541**
2020	34	(2,0%)	1 633	(96,7%)	22	(1,3%)	**1 689**
2019	36	(1,8%)	1 910	(96,6%)	30	(1,5%)	**1 977**
2004-18	762	(3,0%)	24 078	(94,8%)	556	(2,2%)	**25 397**
Total	**971**	**(2,8%)**	**33 046**	**(95,3%)**	**663**	**(1,9%)**	**34 683**

Systemic antibiotic prophylaxis

Table 26: Systemic antibiotic prophylaxis

	Yes		No		Missing		Total
2023	2 164	(99,4%)	13	(0,6%)	1		**2 178**
2022	1 886	(99,2%)	15	(0,8%)			**1 901**
2021	1 531	(99,4%)	7	(0,5%)	3	(0,2%)	**1 541**
2020	1 680	(99,5%)	8	(0,5%)	1	(0,1%)	**1 689**
2019	1 971	(99,7%)	5	(0,3%)	1	(0,1%)	**1 977**
2004-18	25 227	(99,3%)	111	(0,4%)	59	(0,2%)	**25 397**
Total	**34 459**	**(99,4%)**	**159**	**(0,5%)**	**65**	**(0,2%)**	**34 683**

Table 27: Drug

	2004-18	2019	2020	2021	2022	2023
Benzylpenicillin (Penicillin G)	0,02%					
Cefaleksin (Keflex, Cefalexin)	0,01%				0,05%	
Cefalotin (Keflin)	90,00%	19,63%	12,38%	11,82%	13,41%	11,60%
Cefazolin (Cephazolin)	2,49%	69,91%	82,50%	86,09%	83,93%	86,37%
Cefotaksim (Claforan)	0,01%					
Cefuroksim (Zinacef, Cefuroxim, Lifurox)	1,10%	0,46%				0,18%
Ciprofloksasin (Ciproxin)	0,01%					
Dikloksacillin (Diclocil, Dicillin)	2,23%	0,05%	0,12%		0,27%	
Doksysyklin (Vibramycin, Dumoxin, Doxylin)	0,00%					
Erytromycin (Ery-max, Abboticin)	0,01%					
Gentamicin (Garamycin, Gensumycin)	0,03%					
Klindamycin (Dalacin, Clindamycin)	2,33%	1,98%	2,62%	1,44%	1,70%	1,39%
Kloksacillin (Ekvacillin)	1,44%	7,46%	2,26%	0,46%	0,27%	0,28%
Linkomycin (Lincocin)	0,00%	0,05%				0,05%
Oxacillin (Unspecified)	0,02%					
Piperacillin\Tazobactam (Tazocin)	0,00%					
Tobramycin (Nebcina, Nebcin, Tobi)	0,01%					
Missing	0,27%	0,46%	0,12%	0,20%	0,37%	0,14%

Thrombosis prophylaxis

Table 28: Thrombosis prophylaxis

	Yes		No		Missing		Total
2023	924	(42,4%)	1 248	(57,3%)	6	(0,3%)	**2 178**
2022	945	(49,7%)	951	(50,0%)	5	(0,3%)	**1 901**
2021	760	(49,3%)	776	(50,4%)	5	(0,3%)	**1 541**
2020	942	(55,8%)	744	(44,0%)	3	(0,2%)	**1 689**
2019	1 300	(65,8%)	672	(34,0%)	5	(0,3%)	**1 977**
2005-18	19 929	(81,0%)	4 435	(18,0%)	264	(1,1%)	**24 628**
Total	**24 800**	**(73,1%)**	**8 826**	**(26,0%)**	**288**	**(0,8%)**	**33 914**

There are 33 old forms that are filled out so that thrombosis prophylaxis can not be registered. These are added to missing.

Table 29: Use of drugs

	One drug		Two drugs		Total
2023	699	(75,6%)	225	(24,4%)	**924**
2022	765	(81,0%)	180	(19,0%)	**945**
2021	641	(84,3%)	119	(15,7%)	**760**
2020	743	(78,9%)	199	(21,1%)	**942**
2019	1 219	(93,8%)	81	(6,2%)	**1 300**
2005-18	19 775	(99,2%)	154	(0,8%)	**19 929**
Total	**23 842**	**(96,1%)**	**958**	**(3,9%)**	**24 800**

Table 30: Drug

	2004-18	2019	2020	2021	2022	2023
Acetylsalicylsyre (Albyl-E, Globoid, Acetyratio, Magnyl E)	0,01%	0,23%	0,42%	0,92%	0,53%	0,54%
Apixaban (Eliquis)	0,01%	0,23%	0,21%	0,53%	0,63%	0,65%
Dabigatranetixalat (Re-Novate, Pradaxa)	0,02%				0,11%	
Dalteparin (Fragmin)	60,11%	54,54%	49,36%	50,26%	49,10%	44,70%
Dextran (Macrodex, Dextran)	0,09%				0,11%	0,22%
Enoxaparin (Klexane)	36,60%	37,92%	28,45%	31,71%	28,57%	27,16%
Fondaparinux (Arixtra)						0,11%
Heparin (Heparin)	0,01%					
Rivaroxaban (Xarelto)	0,06%	0,15%	0,11%		1,27%	1,84%
Ticagrelor (Brilique)	0,01%				0,21%	
Warfarin (Marevan)	0,04%		0,11%	0,13%		
Ximelagatran (Exanta, Malagatran)	0,15%					
Unknown	0,01%					
No drugs	1,83%					
Missing	0,29%	0,69%	0,21%	0,79%	0,42%	0,43%
Two drugs	0,77%	6,23%	21,13%	15,66%	19,05%	24,35%

Physiotherapy *

Table 31: Physiotherapy

	Yes		No		Uncertain		Total
2023	1 344	(81,5%)	251	(15,2%)	54	(3,3%)	**1 649**
2022	1 035	(81,8%)	200	(15,8%)	31	(2,4%)	**1 266**
2021	828	(83,5%)	132	(13,3%)	32	(3,2%)	**992**
2020	73	(83,0%)	11	(12,5%)	4	(4,5%)	**88**
2019	8	(80,0%)	2	(20,0%)	0	(0,0%)	**10**
Total	**3 288**	**(82,1%)**	**596**	**(14,9%)**	**121**	**(3,0%)**	**4 005**

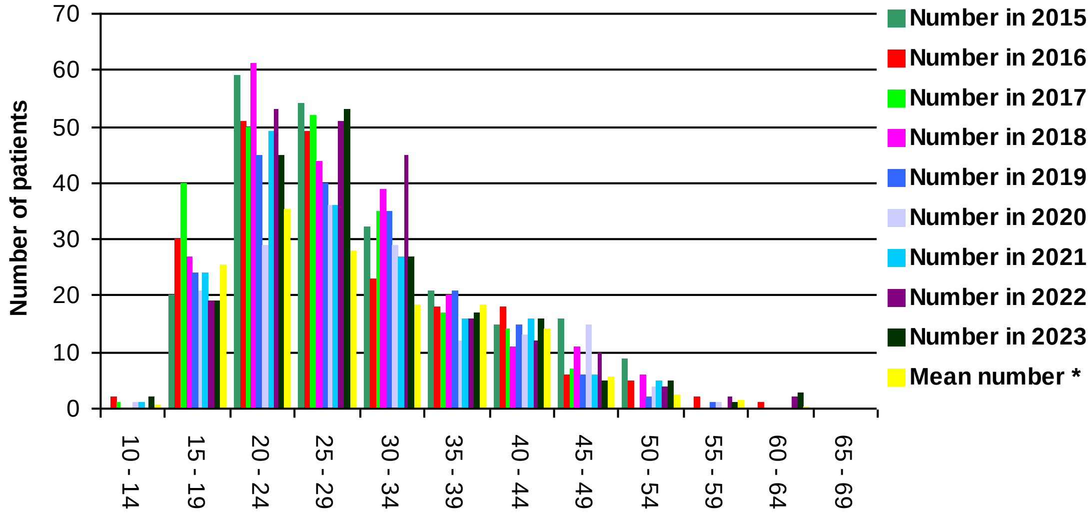
Table 32: Reason for physiotherapy not carried out

	Acute injury		Undesirable		Economy		Other		Missing		Total
2023	218	(86,9%)	6	(2,4%)	0	(0,0%)	25	(10,0%)	2	(0,8%)	**251**
2022	176	(88,0%)	3	(1,5%)	0	(0,0%)	16	(8,0%)	5	(2,5%)	**200**
2021	114	(86,4%)	4	(3,0%)	0	(0,0%)	13	(9,8%)	1	(0,8%)	**132**
2020	7	(63,6%)	2	(18,2%)	0	(0,0%)	1	(9,1%)	1	(9,1%)	**11**
2019	0	(,0%)	0	(0,0%)	0	(0,0%)	0	(0,0%)	2	(100,0%)	**2**
Total	**515**	**(86,4%)**	**15**	**(2,5%)**	**0**	**(0,0%)**	**55**	**(9,2%)**	**11**	**(1,8%)**	**596**

* Electronic registration started in 2019

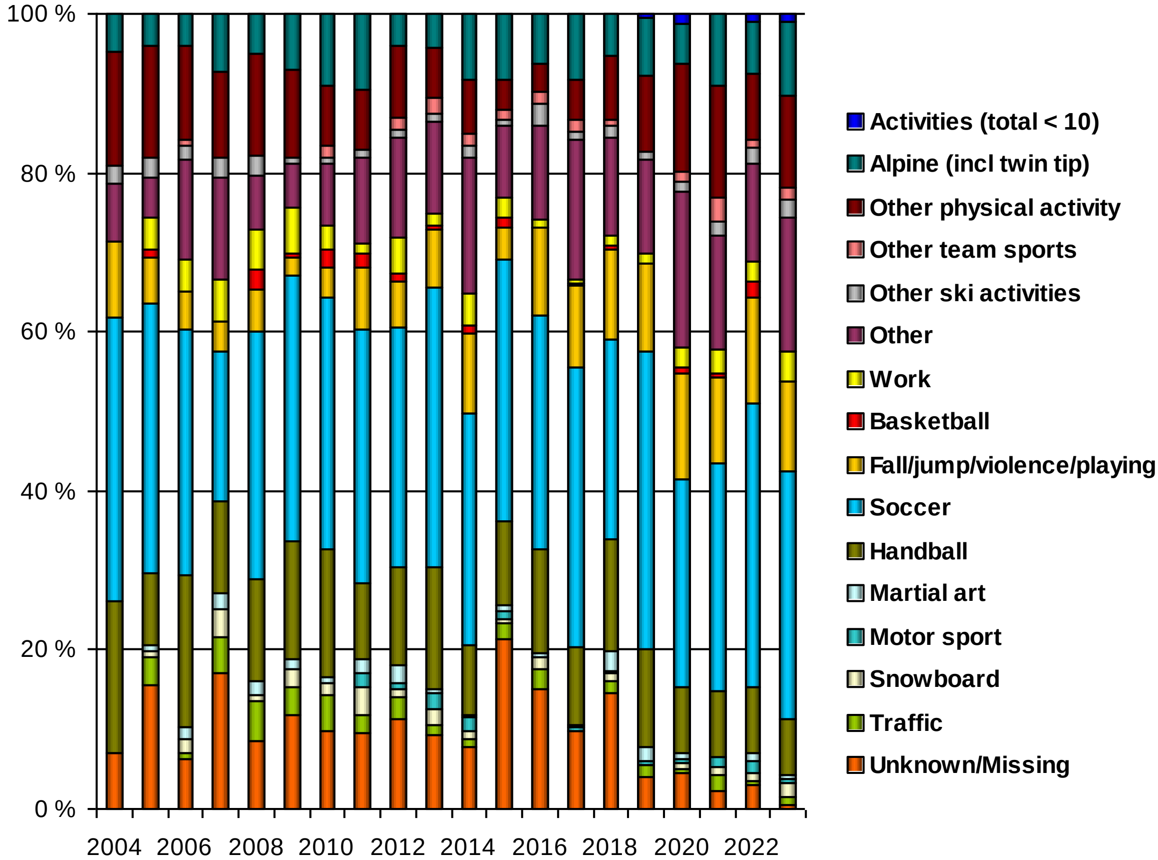
Revision reconstruction

Figure 10: Age at revision reconstruction



* Mean number of revision reconstructions for 2004 - 2014

Figure 11: Activity that lead to injury



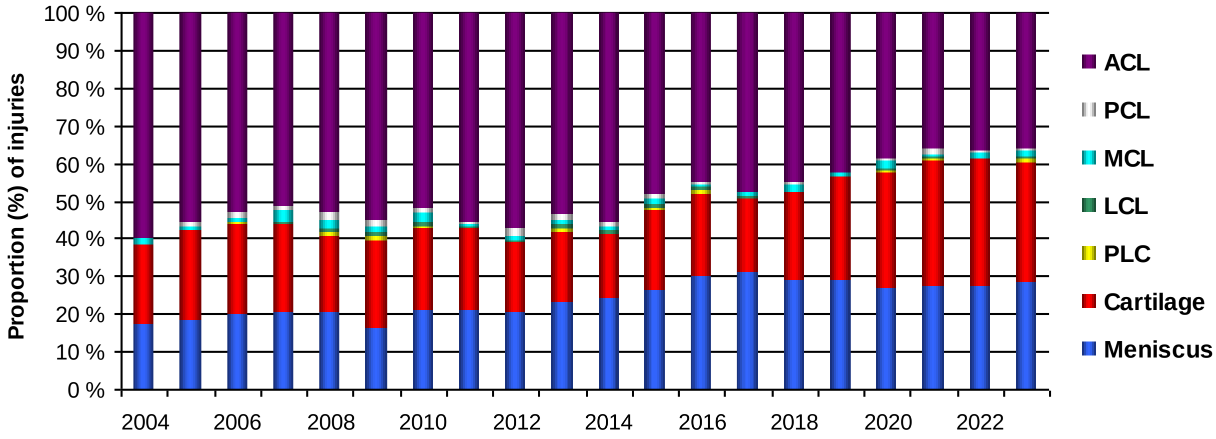
Actual injury

Table 33: Actual injury*

	ACL	PCL	MCL	LCL	PLC	Cartilage	Meniscus
2023	174	2	6	5	3	85	137
2022	194	4	7	2		104	146
2021	163	7	3	1	3	93	125
2020	154	3	9	2	1	67	107
2019	182	1	5			89	126
2004-18	2 239	46	64	23	24	889	1 044
Total	**3 106**	**63**	**94**	**33**	**31**	**1 327**	**1 685**

* More than one type of injury can be given for each form

Figure 12: Actual injury



Additional injuries

Table 34: ACL with additional injuries

Number	ACL	PCL	MCL	LCL	PLC	Meniscus	Cartilage
1 053	x						
776	x					x	
717	x					x	x
423	x						x
21	x		x			x	x
21	x		x				
9	x		x			x	
9	x		x				x
6	x			x			

x indicates registered injury and each row tell the number of incidences of different combination of injuries. The first row gives the number of records where ACL where the only injury. The total number will be identical to the total number of registered ACL injuries. The table shows only combinations that have a number of more than 5.

Table 35: PCL with additional injuries

Number	ACL	PCL	MCL	LCL	PLC	Meniscus	Cartilage
17		x					
9		x					x
5	x	x	x				x
5	x	x					x
5	x	x					
3	x	x				x	x

x indicates registered injury and each row tell the number of incidences of different combination of injuries. The first row gives the number of records where PCL where the only injury. The total number will be identical to the total number of registered PCL injuries. The table shows only combinations that have a number of more than 2.

Reason for revision reconstruction

Table 36: Reason for revision reconstruction

	Cause 1	Cause 2	Cause 3	Cause 4	Cause 5	Cause 6	Cause 7	Cause 8	Other	Total
2023	2	7	2	66	113	7	9	25		231
2022		18	1	84	115	2	17	37		274
2021		8	2	76	88	6	11	21		212
2020	1	6	1	55	85	2	7	13		170
2019	2	5	2	74	93	10	7	6		199
2004-18	36	94	25	994	894	38	6	3	35	2 125
Total	**41**	**138**	**33**	**1 349**	**1 388**	**65**	**57**	**105**	**35**	**3 211**

Cause 1: Infection
Cause 2: Fixation failure
Cause 3: Untreated ligament injury
Cause:4: Graft failure
Cause 5: New trauma
Cause 6: Pain
Cause 7: Tibial tunnel
Cause 8: Femoral tunnel

Choice of graft for injuries registered in revision reconstructions

Table 37: BPTB

	ACL	PCL	MCL	LCL	PLC	Total
2023	57	0	0	0	0	**57**
2022	81	0	0	0	0	**81**
2021	77	0	0	0	0	**77**
2020	71	0	0	0	0	**71**
2019	83	0	0	0	0	**83**
2004-18	1 048	2	0	0	0	**1 050**
Total	**1 417**	**2**	**0**	**0**	**0**	**1 419**

Table 38: HAMSTRING

	ACL	PCL	MCL	LCL	PLC	Total
2023	54	0	2	1	1	**56**
2022	51	0	2	0	0	**51**
2021	37	1	1	0	0	**38**
2020	42	1	4	0	0	**43**
2019	47	0	1	0	0	**47**
2004-18	822	9	19	4	3	**838**
Total	**1 053**	**11**	**29**	**5**	**1**	**1 099**

Table 39: ALLOGRAFT

	ACL	PCL	MCL	LCL	PLC	Total
2023	23	2	1	3	2	**30**
2022	16	4	4	0	0	**20**
2021	15	5	2	1	3	**24**
2020	7	2	0	0	0	**9**
2019	4	1	1	0	0	**5**
2004-18	77	25	12	10	14	**126**
Total	**142**	**39**	**20**	**14**	**19**	**234**

Tabell 40: Quadriceps Graft (QTC + QTB)

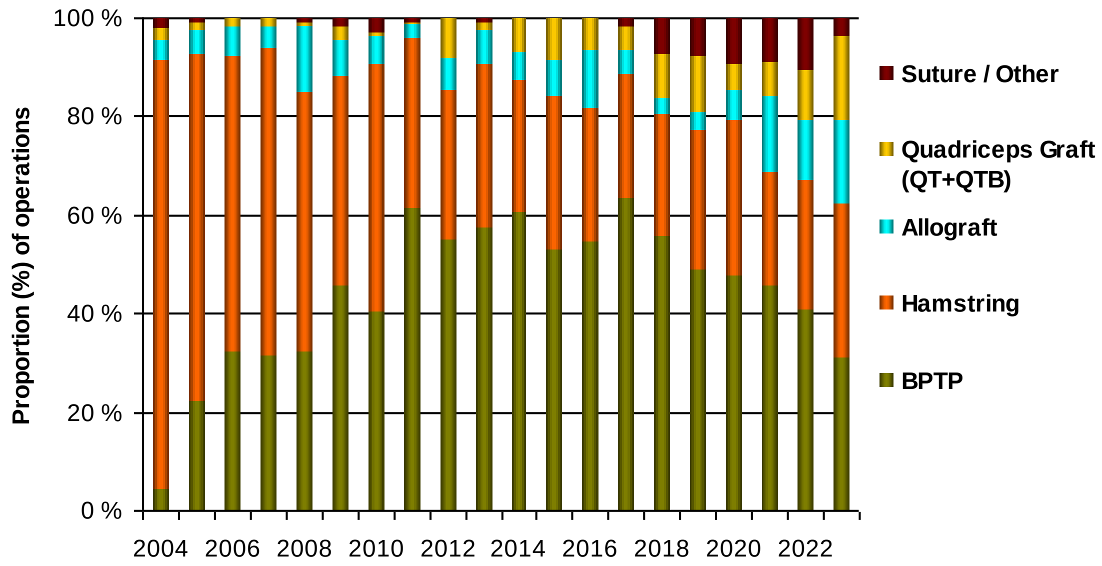
	ACL	PCL	MCL	LCL	PLC	Total
2023	200	0	1	0	0	**201**
2022	152	0	0	0	0	**152**
2021	107	0	1	0	0	**108**
2020	91	1	0	0	0	**92**
2019	142	2	0	0	0	**144**
2004-18	418	11	0	0	1	**430**
Total	**1 110**	**14**	**2**	**0**	**1**	**1 127**

Table 41: Suture / Other

	ACL	PCL	MCL	LCL	PLC	Total
2023	6	0	1	0	0	**7**
2022	19	0	1	1	0	**21**
2021	14	1	0	0	0	**15**
2020	12	0	1	1	0	**14**
2019	12	0	1	0	0	**13**
2004-18	21	5	4	0	1	**31**
Total	**84**	**6**	**8**	**2**	**1**	**101**

There was 1 forms where it was registered product for ACL but not checked for choice of graft. It was registered direct suture for two cases (PLC, MCL).

Figure 13: Choice of graft for all injuries in revision reconstruction



Fixation

Table 42: Femur ACL (The 5 most common for the last 5 years)

Product	2004-18	2019	2020	2021	2022	2023	Total
SoftSilk	519	47	40	40	44	28	**718**
Endobutton CL Ultra	450	34	33	22	26	26	**591**
ACL TightRope	9	5	6	14	26	37	**97**
Peek Interference Scre	39	13	7	17	16	4	**96**
Softsilk 1.5 screw (7m		7	6	7	12	16	**48**

Table 43: Femur PCL (The 5 most common for the last 5 years)

Product	2004-18	2019	2020	2021	2022	2023	Total
Endobutton CL Ultra	13		1	3			**17**
SoftSilk	8	1		4	3		**16**
RCI Screw	12				1		**13**
Ultrabutton				1	1	1	**3**
Peek Interference Scre	1				1		**2**

Table 44: Tibia ACL (The 5 most common for the last 5 years)

Product	2004-18	2019	2020	2021	2022	2023	Total
SoftSilk	484	60	54	47	44	43	**732**
RCI Screw	360	18	23	21	22	20	**464**
Biosure PK	46	11	10	15	18	22	**122**
Peek Interference Scre	43	15	9	13	19	7	**106**
Tightrope ABS	5	1	1	7	19	37	**70**

Table 45: Tibia PCL (The 5 most common for the last 5 years)

Product	2004-18	2019	2020	2021	2022	2023	Total
RCI Screw	25	1	1	2	1		**30**
AO Skrue	7					1	**8**
Biosure HA Interferenc	2		1				**3**
Biosure PK				2		1	**3**
Biosure Regenesorb Int						1	**1**
Peek Interference Scre					1		**1**
SUTURE WASHER ST				1			**1**

Table 46: Femur and tibia ACL (The 5 most common for the last 5 years)

Femur	Tibia	2004-18	2019	2020	2021	2022	2023	Total
SoftSilk	SoftSilk	425	43	30	28	25	13	**564**
Endobutton CL Ultra	RCI Screw	142	14	17	10	9	6	**198**
Peek Interference Screw	Peek Interference Screw	37	10	7	17	15	4	**90**
ACL TightRope	Tightrope ABS	2			7	17	35	**61**
Softsilk 1.5 screw (7mm x 25 mm)	SoftSilk		7	6	7	11	11	**42**

Meniscal lesion

Table 47: Treatment of meniscal lesion

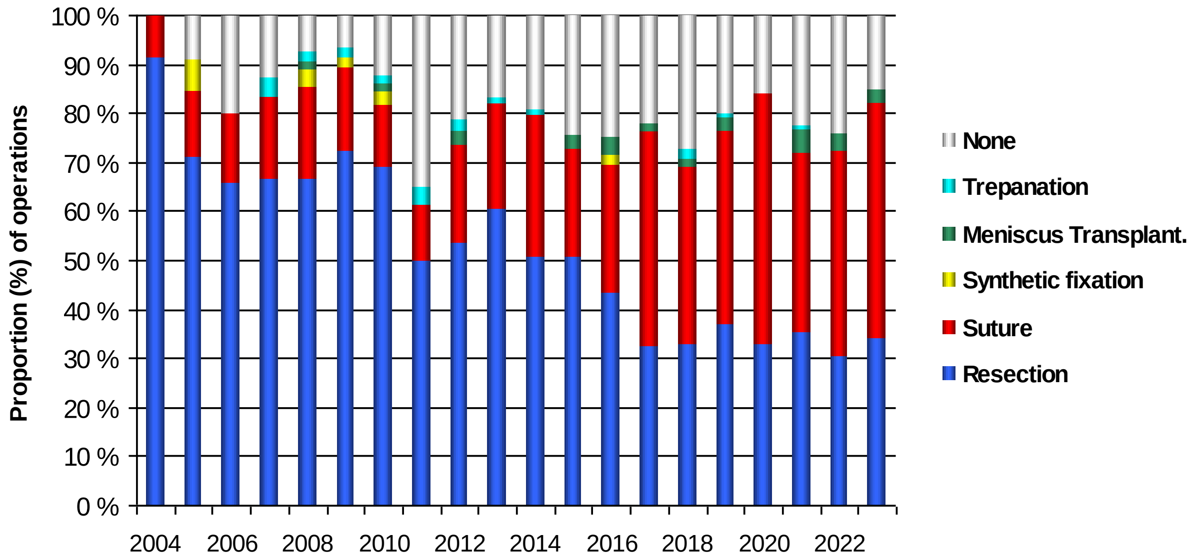
		Resection				Synthetic	Meniscus			
		OLD *	Total	Partial	Suture	fixation	Transplant.	Trepanation	None	Total
2023	Lateral			19	34				10	**63**
2023	Medial			35	42		4		14	**95**
2022	Lateral			19	27				18	**64**
2022	Medial		1	31	43		6		22	**103**
2021	Lateral			17	24			1	9	**51**
2021	Medial			32	27		7		22	**88**
2020	Lateral			14	26				8	**48**
2020	Medial		1	24	35				11	**71**
2019	Lateral			18	27		1	1	11	**58**
2019	Medial		1	33	29		3		17	**83**
2004-18	Lateral	85	2	159	127	5	3	9	108	**498**
2004-18	Medial	149	7	243	190	6	15	6	152	**768**
Total		**234**	**12**	**644**	**631**	**11**	**39**	**17**	**402**	**1 990**

It became possible to register "Trepanation" and "None" from 01.01.2005. There have been forms where this has been an additional information. This information have been registered, but the registration is not complete before 2005.

In table 34: Actual injury has less. The reason for this is that we distinguish between the lateral and medial injury and some injuries are registreded in both groups.

*The value in OLD Resection are the forms that are registered before an updated form was introduced in autumn 2011. The Total and Partial Resection values are the updated form was introduced in autumn 2011.

Figure 14: Treatment of meniscal lesions in revision reconstructions



Meniscal fixation

Table 48: Suture

Product	2004-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
BioComposite SwiveLock C w/Fiber Tape							3	1	4	1				**9**
Coated Braided Polyester Ssuture	1													**1**
Endobutton (BOX OF 1) Str									3	2	4	5	6	**20**
FAST-FIX	33	14	16	20	16	15	41	34	38	39	31	52	43	**392**
FiberStitch Implant Suture													2	**2**
JuggerKnot Soft Anchors												1		**1**
KnotlessFibertak soft anchor													1	**1**
Meniscal Root Repair System													1	**1**
Orthocord w/Double-Armed Meniscal Needles									1		6	4		**11**
PDS II (polydioxanone) sutur							1	1						**2**
Rapidloc	4													**4**
Super QuickAnchor Plus													1	**1**
Suture Buttons									2			1	2	**5**
Suture Washer Ster.								1	1	1	1	2	1	**7**
Tightrope ABS Button												3	3	**6**
Truespan Meniscal Repair System									1		2	3	12	**18**
Ultratape Suture Blue											1			**1**
Unknown	5	1	5	6	9	13	1	2	2					**44**
Total	**43**	**15**	**21**	**26**	**25**	**28**	**46**	**39**	**52**	**43**	**45**	**71**	**72**	**526**

Cartilage lesion all localizations

Table 49: ICRS Grade

Definitjon av ICRS Grade:

1. Nearly normal: Superficial lesions, soft indentation and/or superficial fissures and cracks.
2. Abnormal: Lesions extending down to <50% of cartilage depth.
3. Severely abnormal: Cartilage defects extending down >50% of cartilage depth as well as down to calcified layer.
4. Severely abnormal: Osteochondral injuries, lesions extending just through the subchondral boneplate or deeper defects down into trabecular bone.

	Code 1	Code 2	Code 3	Code 4	Missing
2023	34,9%	45,8%	18,1%	1,2%	
2022	27,7%	53,5%	17,7%	1,2%	
2021	34,7%	48,2%	14,3%	2,9%	
2020	40,6%	43,6%	12,9%	3,0%	
2019	31,3%	43,6%	17,4%	5,8%	1,9%
2004-18	26,6%	47,1%	20,0%	4,5%	1,8%

Table 50: Treatment codes for all localizations

	Debridement	Micro fracture	No treatment	Other	Missing
2023	2,6%		93,0%		4,4%
2022	5,1%		92,2%		2,7%
2021	6,1%	0,8%	91,4%		1,6%
2020	2,8%	0,5%	96,2%		0,5%
2019	5,4%		88,1%	0,8%	5,8%
2004-18	8,4%	2,1%	74,2%	1,1%	14,3%

Cartilage injuries registered in revision reconstructions

Figure 15: All Cartilage injuries (total)

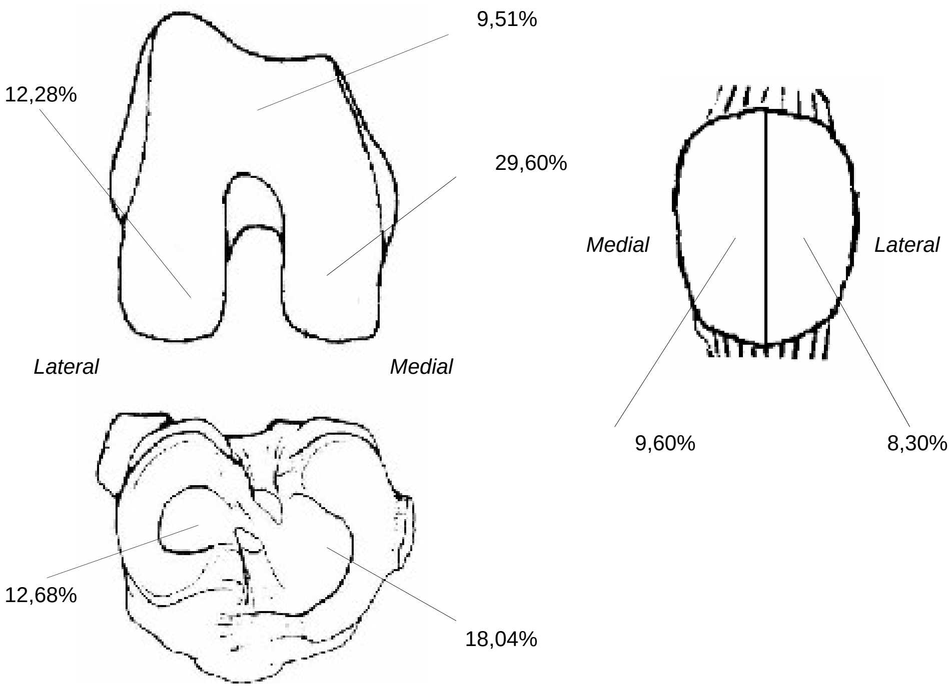


Figure 16: All Cartilage injuries with area greater than 2 cm² (total)

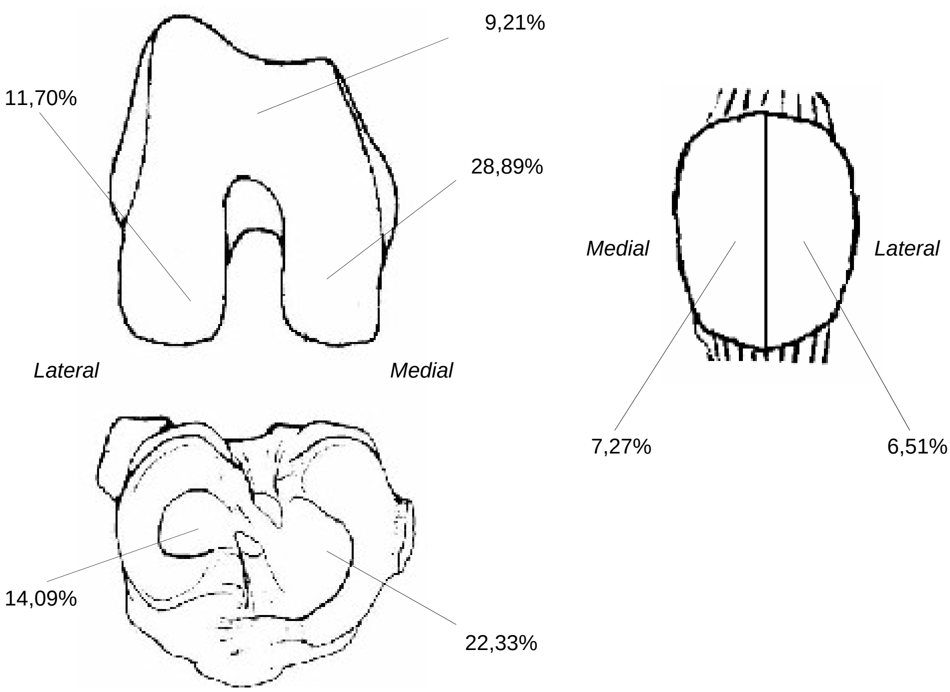
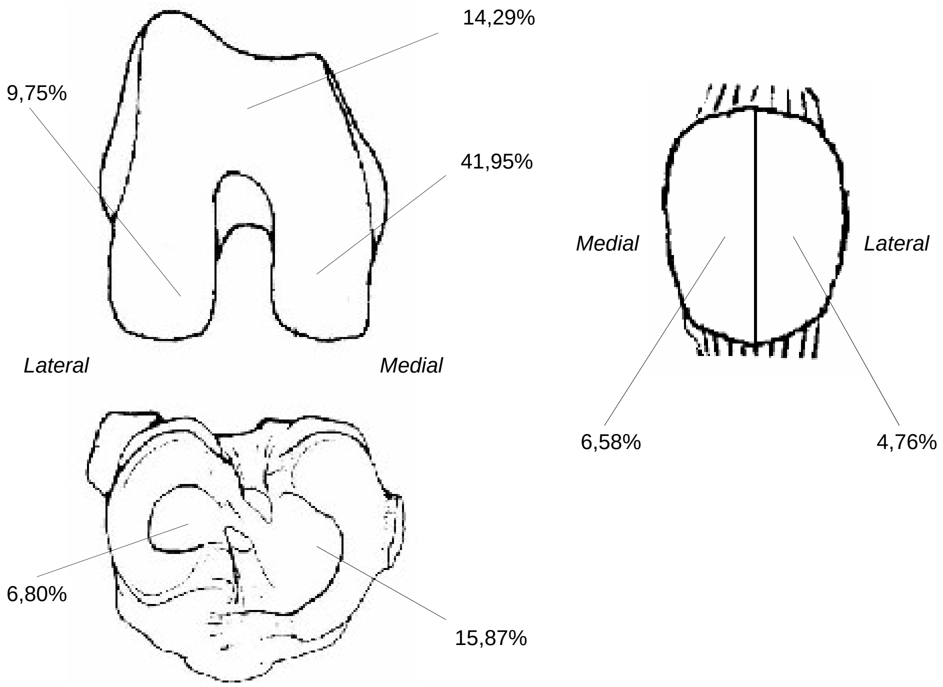


Figure 17: All Cartilage injuries with area greater than 2 cm² and ICRS equal 3 or 4 (total)



Outpatient surgery

Table 51: Outpatient surgery

	Yes		No		Missing		Total
2023	130	(67,4%)	63	(32,6%)			**193**
2022	120	(56,1%)	93	(43,5%)	1	(0,5%)	**214**
2021	104	(57,8%)	76	(42,2%)			**180**
2020	101	(62,7%)	60	(37,3%)			**161**
2019	94	(49,7%)	93	(49,2%)	2	(1,1%)	**189**
2004-18	1 126	(44,7%)	1 368	(54,3%)	24	(1,0%)	**2 518**
Total	**1 675**	**(48,5%)**	**1 753**	**(50,7%)**	**27**	**(0,8%)**	**3 455**

Intraoperative complications

Table 52 : Intraoperative complications

	Yes		No		Missing		Total
2023	6	(3,1%)	186	(96,4%)	1	(0,5%)	**193**
2022	3	(1,4%)	210	(98,1%)	1	(0,5%)	**214**
2021	8	(4,4%)	169	(93,9%)	3	(1,7%)	**180**
2020	4	(2,5%)	157	(97,5%)			**161**
2019	7	(3,7%)	180	(95,2%)	2	(1,1%)	**189**
2004-18	86	(3,4%)	2 349	(93,3%)	83	(3,3%)	**2 518**
Total	**114**	**(3,3%)**	**3 251**	**(94,1%)**	**90**	**(2,6%)**	**3 455**

Systemic antibiotic prophylaxis

Table 53: Systemic antibiotic prophylaxis

	Yes		No		Missing		Total
2023	191	(99,0%)	1	(0,5%)	1	(0,5%)	**193**
2022	211	(98,6%)	3	(1,4%)			**214**
2021	176	(97,8%)	3	(1,7%)	1	(0,6%)	**180**
2020	161	(100,0%)					**161**
2019	186	(98,4%)	2	(1,1%)	1	(0,5%)	**189**
2004-18	2 475	(98,3%)	33	(1,3%)	10	(0,4%)	**2 518**
Total	**3 400**	**(98,4%)**	**42**	**(1,2%)**	**13**	**(0,4%)**	**3 455**

Table 54: Drug

	2004-18	2019	2020	2021	2022	2023
Benzylpenicillin (Penicillin G)	0,04%					
Cefalotin (Keflin)	90,59%	14,52%	7,45%	7,95%	6,64%	4,71%
Cefazolin (Cephazolin)	2,87%	76,88%	88,20%	88,07%	92,42%	93,19%
Ceftriakson (Rocefalin)	0,04%					
Cefuroksim (Zinacef, Cefuroxim, Lifurox)	0,36%					
Ciprofloksasin (Ciproxin)	0,04%					
Dikloksacillin (Diclocil, Dicillin)	1,17%					
Gentamicin (Garamycin, Gensumycin)	0,04%					
Imipenem (Tienam)	0,04%					
Klindamycin (Dalacin, Clindamycin)	2,59%	3,23%	3,11%	3,41%	0,47%	1,57%
Kloksacillin (Ekvacillin)	1,66%	5,38%	0,62%			0,52%
Oxacillin (Unspecified)	0,04%					
Vankomycin (Vancomycin, Vancocin)	0,04%					
Missing	0,48%		0,62%	0,57%	0,47%	

Thrombosis prophylaxis

Table 55: Thrombosis prophylaxis

	Yes		No		Missing		Total
2023	75	(38,9%)	118	(61,1%)			**193**
2022	85	(39,7%)	127	(59,3%)	2	(0,9%)	**214**
2021	82	(45,6%)	98	(54,4%)			**180**
2020	94	(58,4%)	67	(41,6%)			**161**
2019	118	(62,4%)	70	(37,0%)	1	(0,5%)	**189**
2005-18	1 937	(78,4%)	509	(20,6%)	27	(1,1%)	**2 473**
Total	**2 391**	**(70,1%)**	**989**	**(29,0%)**	**30**	**(0,9%)**	**3 410**

There are 2 old forms that are filled out so that thrombosis prophylaxis can not be registered. These are added to missing.
There are 66 forms with two drugs and 2325 forms with one drug.

Table 56: Drug

	2004-18	2019	2020	2021	2022	2023
Apixaban (Eliquis)	0,05%		1,06%			
Dalteparin (Fragmin)	64,07%	63,56%	42,55%	54,88%	43,53%	54,67%
Dextran (Macrodex, Dextran)	0,10%					
Enoxaparin (Klexane)	33,97%	33,90%	34,04%	34,15%	41,18%	21,33%
Rivaroxaban (Xarelto)	0,05%					5,33%
Ticagrelor (Brilique)			1,06%			
Warfarin (Marevan)	0,05%					
Ximelagatran (Exanta, Malagatran)	0,15%					
No drugs	0,72%					
Missing	0,36%	0,85%				1,33%
Two drugs	0,10%	1,69%	21,28%	10,98%	15,29%	17,33%

FIGURE E.11: KOOS in primary ACL reconstruction without additional injury

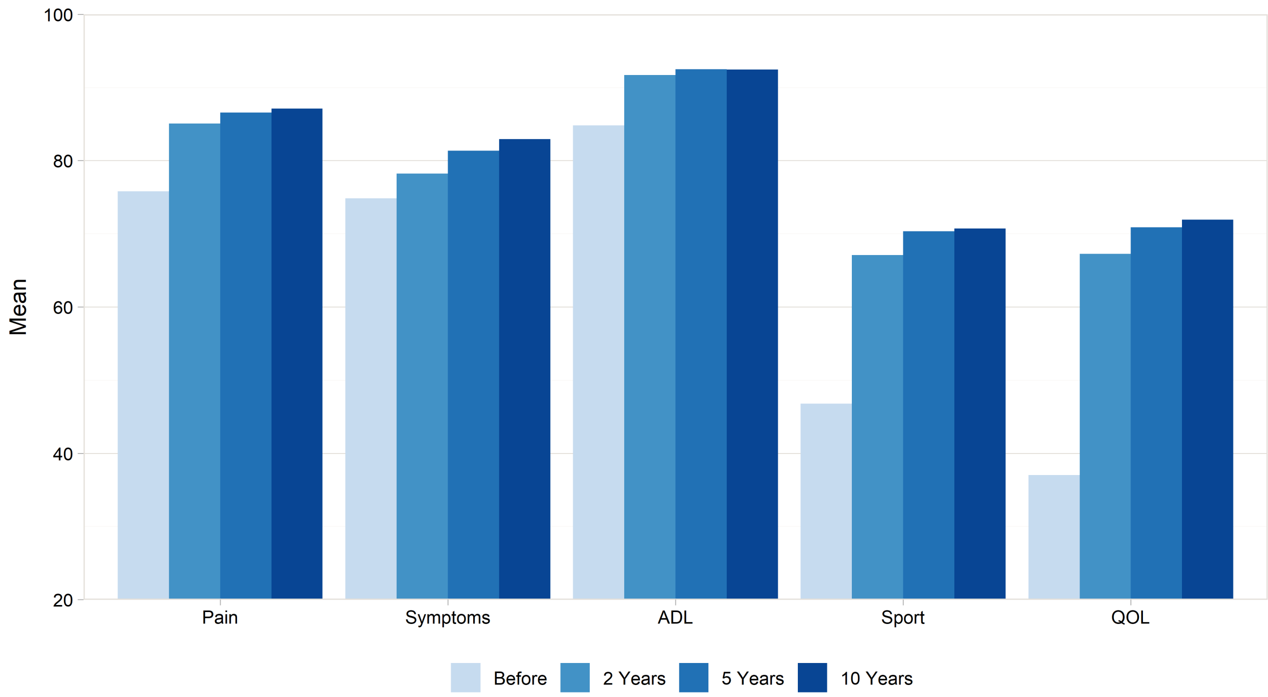


FIGURE E.12: KOOS in primary ACL reconstruction with additional injury

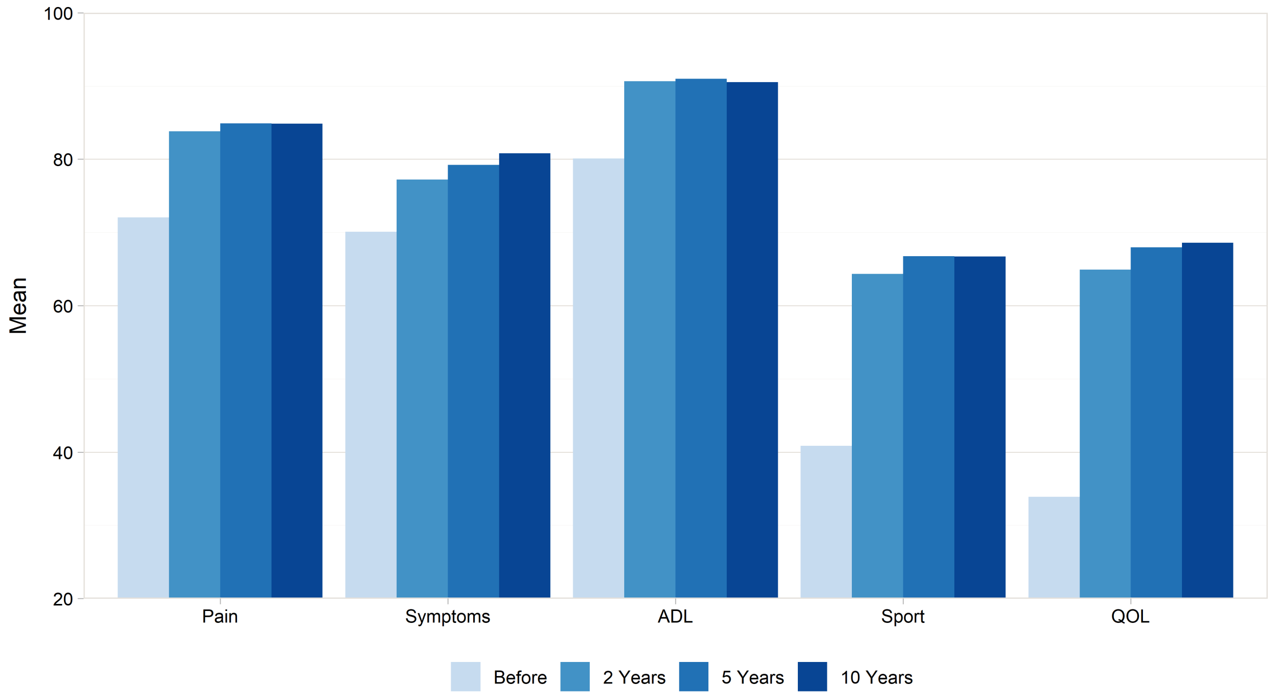


FIGURE E.13: Proportion two years KOOS QOL score over 44 for each hospital

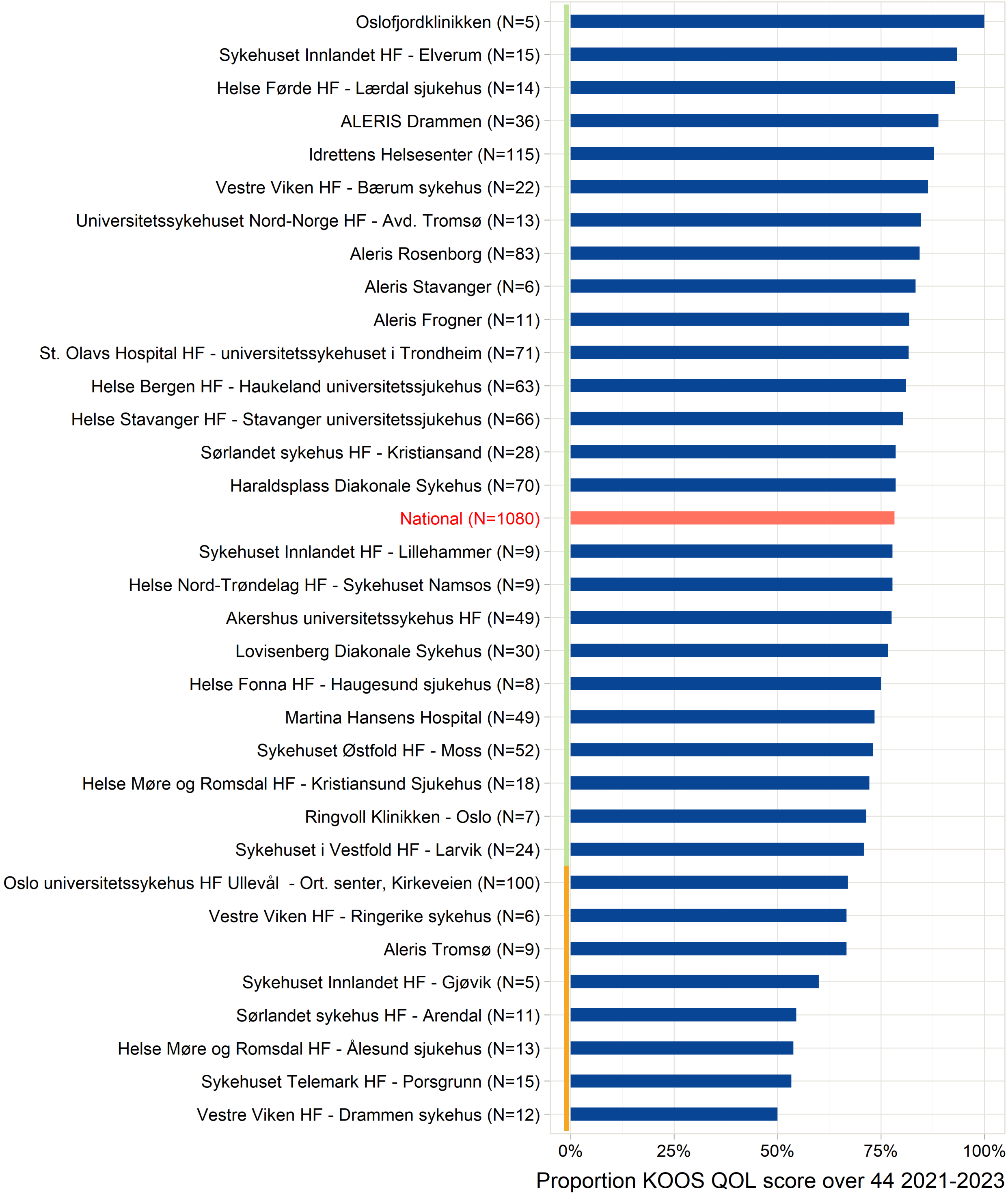
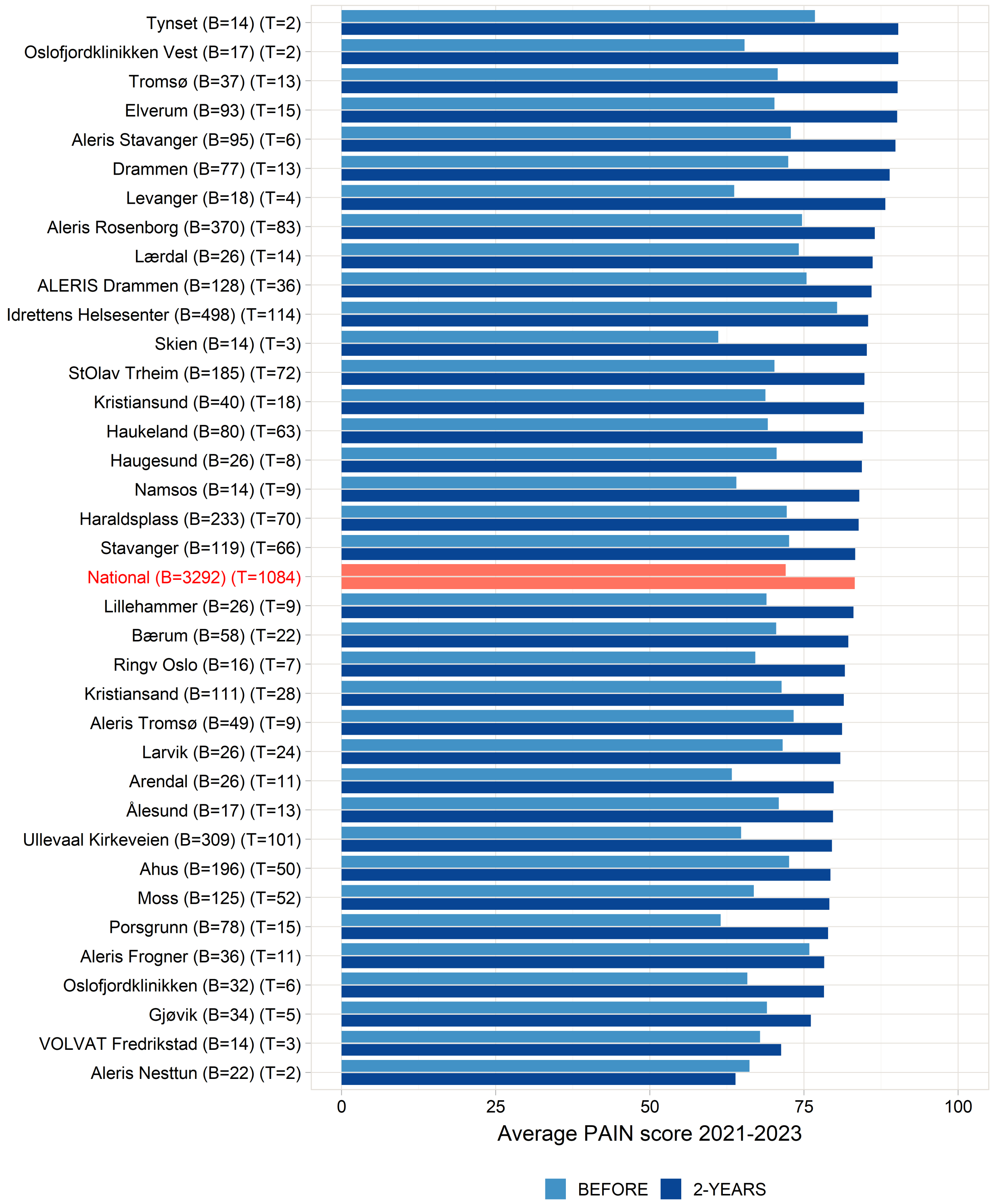
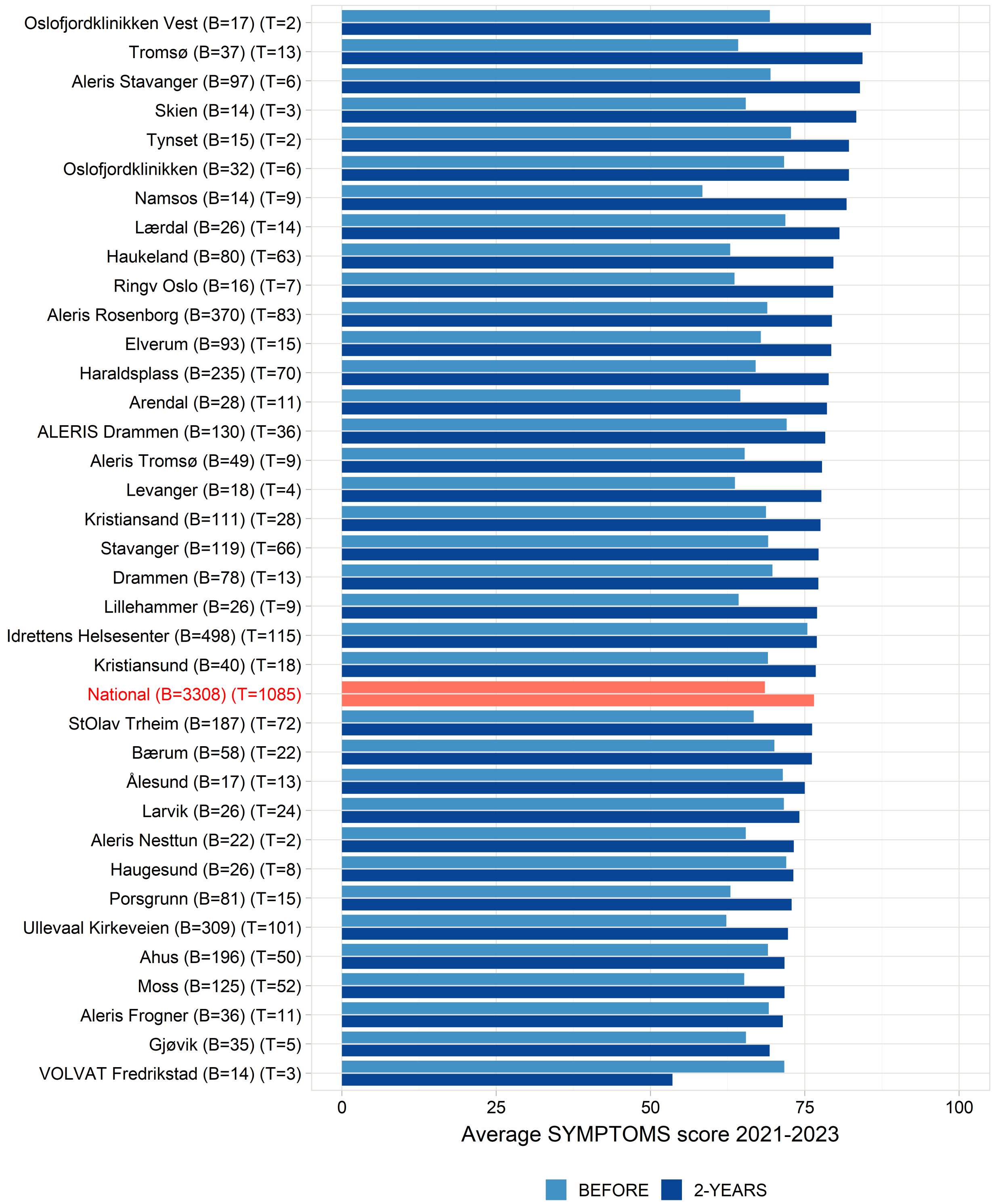


FIGURE E.14: KOOS score for PAIN for each hospital in 2021-2023



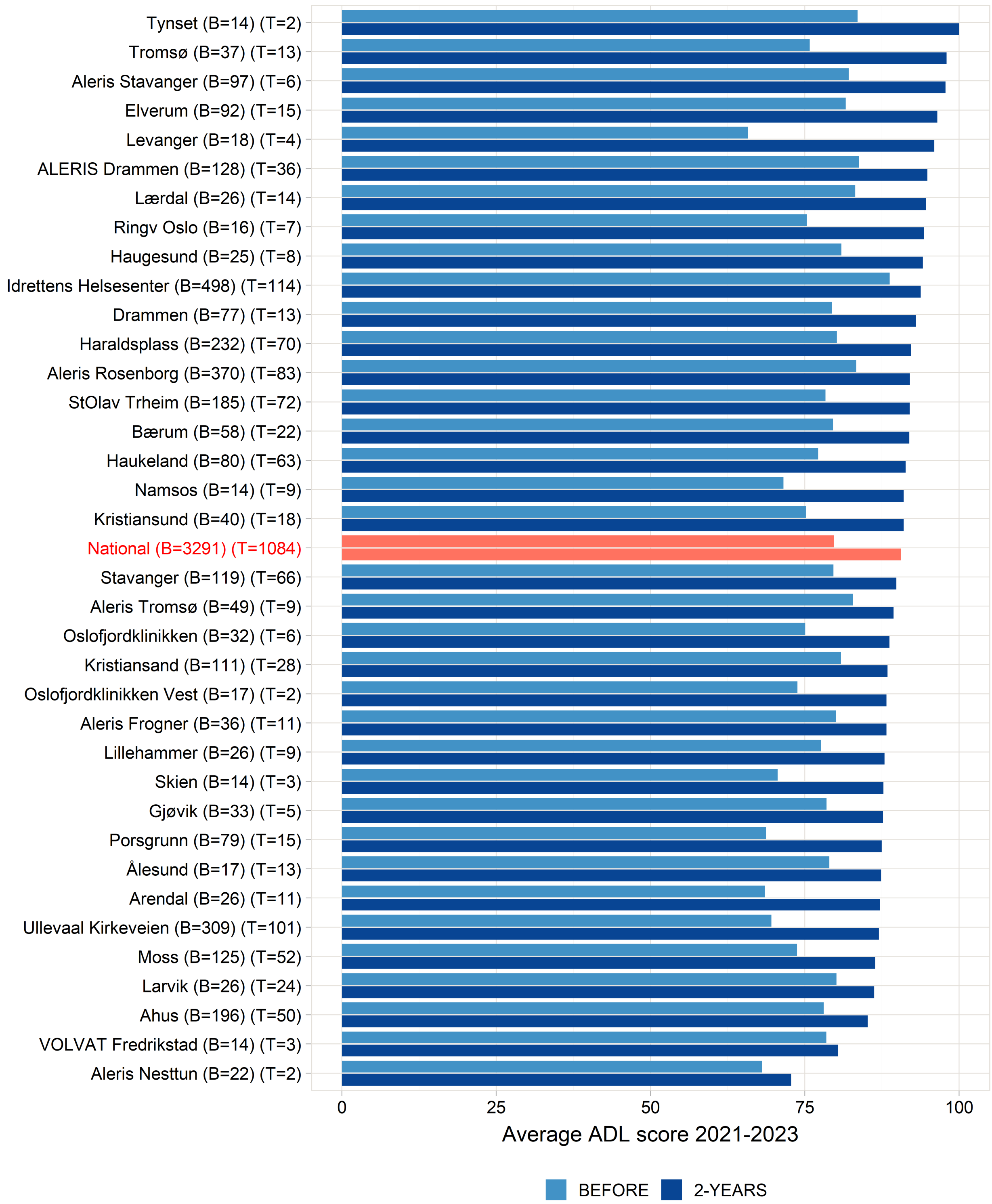
The national average for KOOS PAIN is 72 BEFORE and 83.2 at 2-YEARS.

FIGURE E.15: KOOS score for SYMPTOMS for each hospital in 2021-2023



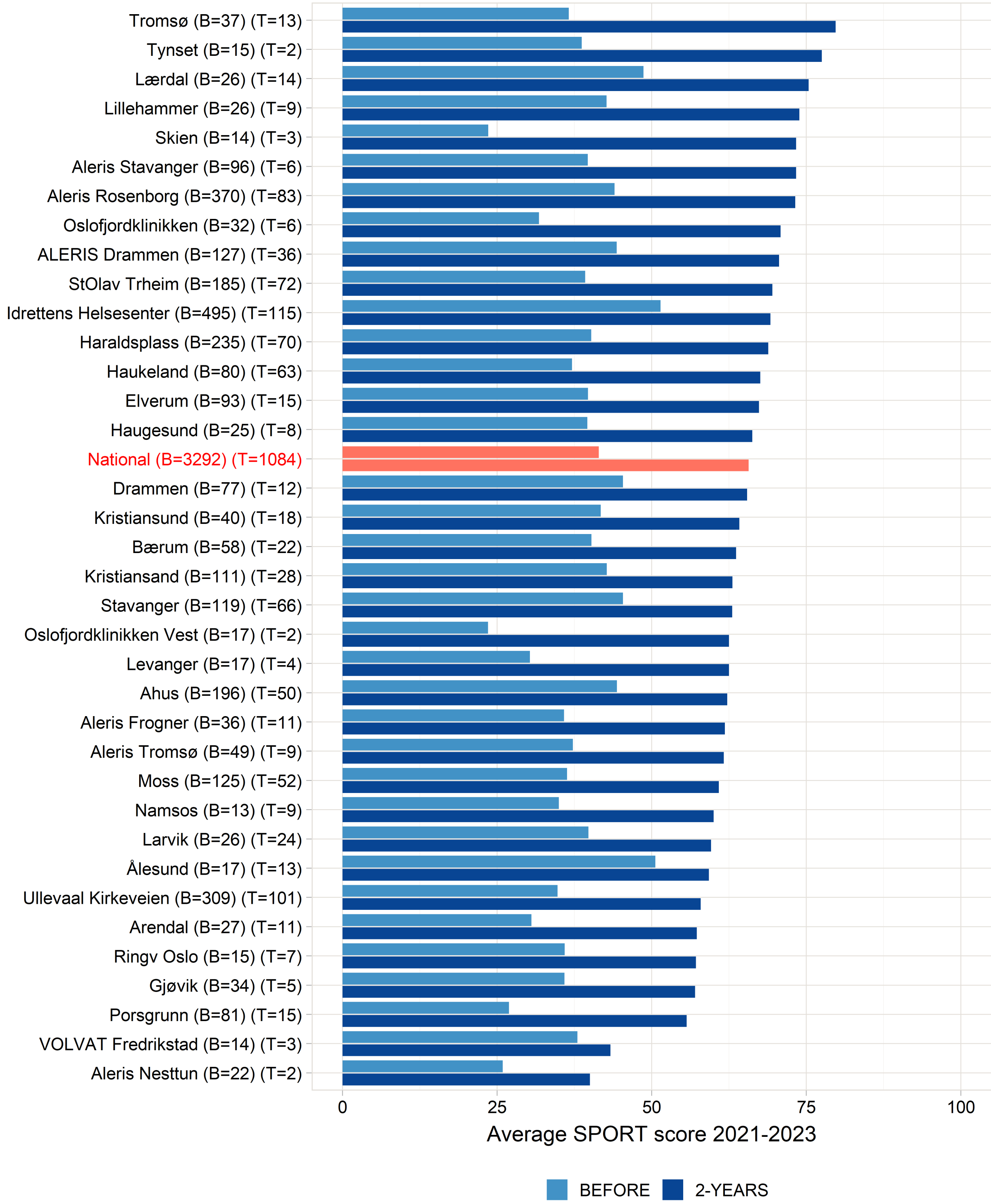
The national average for KOOS SYMPTOMS is 68.5 BEFORE and 76.5 at 2-YEARS.

FIGURE E.16: KOOS score for ADL for each hospital in 2021-2023



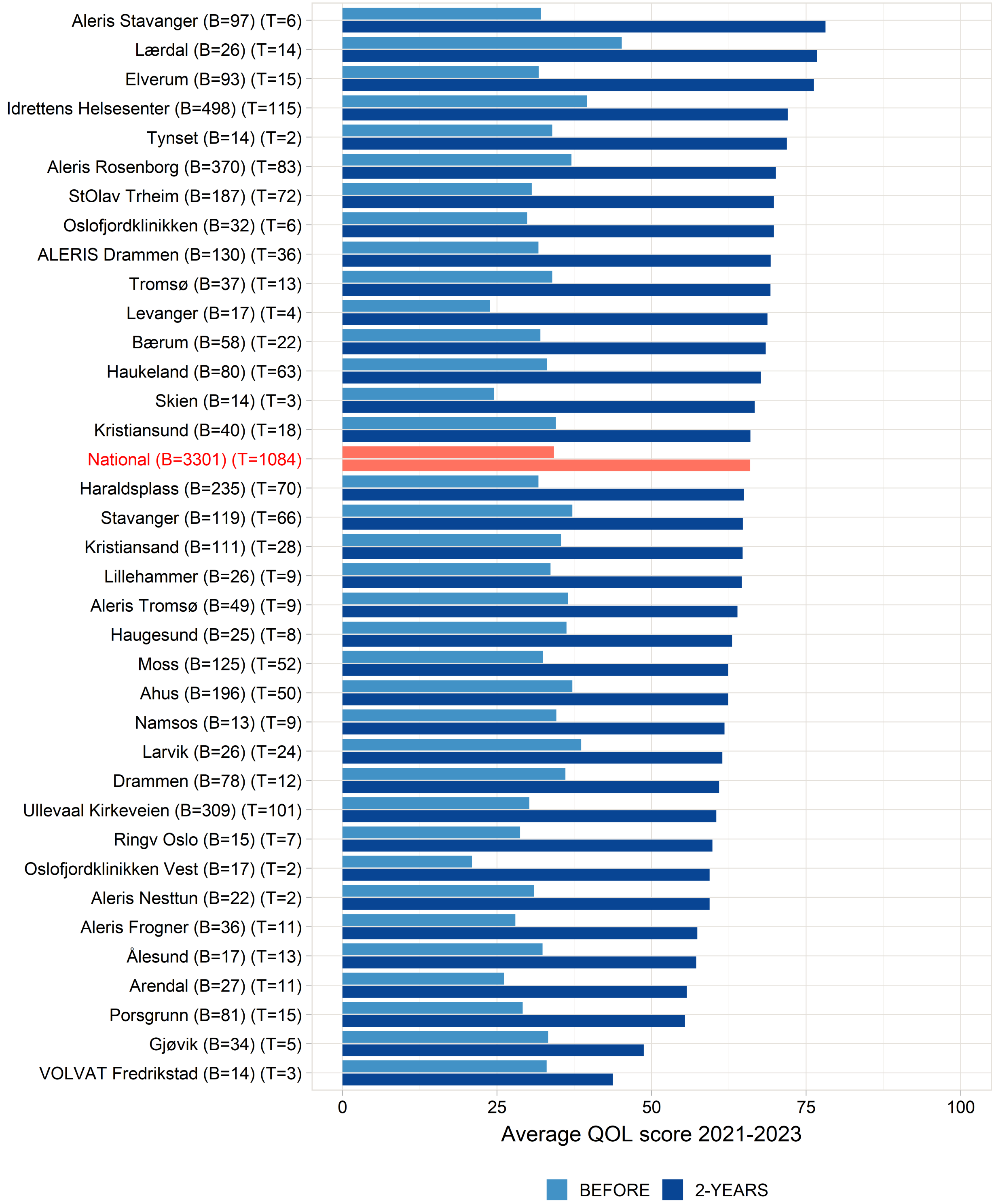
The national average for KOOS ADL is 79.7 BEFORE and 90.6 at 2-YEARS.

FIGURE E.17: KOOS score for SPORT for each hospital in 2021-2023



The national average for KOOS SPORT is 41.4 BEFORE and 65.7 at 2-YEARS.

FIGURE E.18: KOOS score for QOL for each hospital in 2021-2023



The national average for KOOS QOL is 34.2 BEFORE and 66 at 2-YEARS.

Completeness analysis for the Cruciate Ligament Register, 2021-2023

A completeness analysis for the Cruciate Ligament Register has been conducted by combining the data in the Register with data from the Norwegian Patient Register (NPR). The report and analysis were prepared by the NPR in collaboration with the Cruciate Ligament Register.

NCSP codes for combining data from NPR hospital stays and the Cruciate Ligament Register

Code	Description
NGE 11 and S83.5/M23.5	Transcision or excision of ligament of knee; anterior cruciate, open, in connection with sprain of cruciate ligament/chronic instability of knee
NGE 12 and S83.5/M23.5	Transcision or excision of ligament of knee; posterior cruciate, open, in connection with sprain of cruciate ligament/chronic instability of knee
NGE 15	Transcision or excision of ligament of knee; anterior cruciate, arthroscopic
NGE 16	Transcision or excision of ligament of knee; posterior cruciate, arthroscopic
NGE 21	Fixation of fragment of surface of knee; anterior cruciate, open
NGE 22	Fixation of fragment of surface of knee; posterior cruciate, open
NGE 25	Fixation of fragment of surface of knee; anterior cruciate, arthroscopic
NGE 26	Fixation of fragment of surface of knee; posterior cruciate, arthroscopic
NGE 31	Transposition of ligament of knee; anterior cruciate, open
NGE 32	Transposition of ligament of knee; posterior cruciate, open
NGE 35	Transposition of ligament of knee; anterior cruciate, arthroscopic
NGE 36	Transposition of ligament of knee; posterior cruciate, arthroscopic
NGE 41	Plastic repair of ligament of knee not using prosthetic material; anterior cruciate, open
NGE 42	Plastic repair of ligament of knee not using prosthetic material; posterior cruciate, open
NGE 45	Plastic repair of ligament of knee not using prosthetic material; anterior cruciate, arthroscopic
NGE 46	Plastic repair of ligament of knee not using prosthetic material; posterior cruciate, arthroscopic
NGE 51	Plastic repair of ligament of knee using prosthetic material; anterior cruciate, open
NGE 52	Plastic repair of ligament of knee using prosthetic material; posterior cruciate, open
NGE 55	Plastic repair of ligament of knee using prosthetic material; anterior cruciate, arthroscopic
NGE 56	Plastic repair of ligament of knee using prosthetic material; posterior cruciate, arthroscopic
NGT 19 and S83.5/M23.5	Forcible manipulation of knee joint, in connection with sprain of cruciate ligament/chronic instability of knee

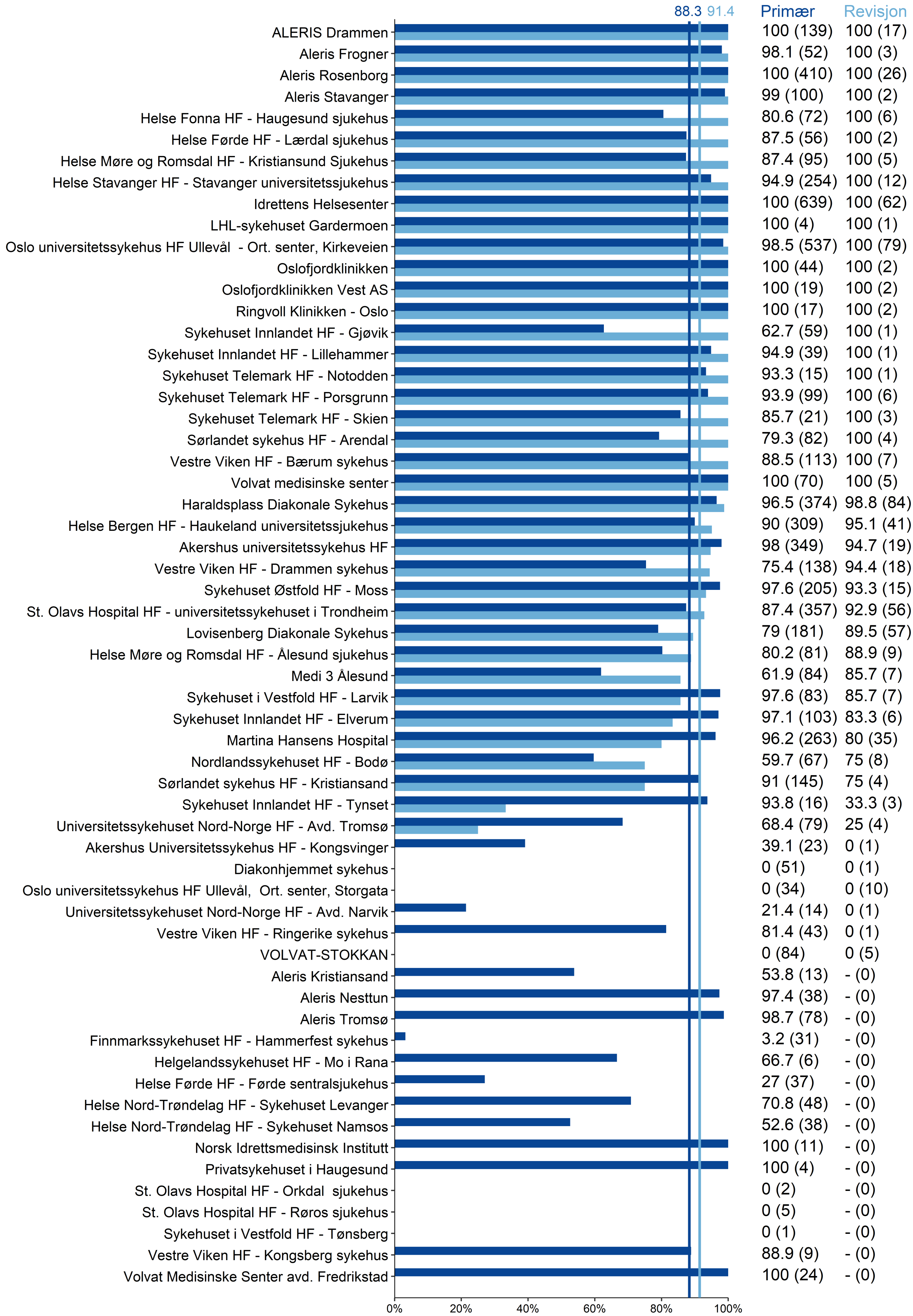
Formulae for completeness rates:

$$\text{Completeness rate NCLR} = \frac{\text{only NCLR} + \text{both registers}}{\text{only NPR} + \text{only NCLR} + \text{both registers}}$$

$$\text{Completeness rate NPR} = \frac{\text{only NPR} + \text{both registers}}{\text{only NPR} + \text{only NCLR} + \text{both registers}}$$

In 2021-2023, 7005 cruciate ligament operations were reported to one or both of the registers. 88.8% of these were reported to the Cruciate Ligament Register, while 69.7% were reported to the NPR. The coverage for the Cruciate Ligament Register shows considerable variation between hospitals. In the case of hospitals with a low coverage rate for the Cruciate Ligament Register, either the forms were not submitted or other interventions than cruciate ligament surgery were incorrectly coded.

Completeness of reporting for cruciate ligament operations 2021-2023



Dark blue bars and first number to the right of the bars gives completeness of reporting for primary operations. Light blue bars and second number to the right of the bars gives completeness of reporting for revision operations. The numbers in brackets gives the number of operations registered at both NAR and NPR. Vertical lines shows the national averages. Private clinics will often score better in primary and reconstructions. One reason for this is that private clinics are not obliged to report it's operations to NPR.

CONTENTS

Norwegian Paediatric Hip Register

Report 2024

Nasjonalt Barnehofteregister

Highlights from 2023

Norwegian Paediatric Hip Register

	Reported in 2010-2023	Reported in 2023
Hip dysplasia (DDH)	1301	52
Perthes disease	557	20
Slipped capital femoral epiphysis (SCFE)	486	46
Open procedure/arthroscopy	713	184

11/13
Hospitals reported to the register

85%
compliance

100%
Electronic

Completeness 2022

DDH	Perthes	SCFE	Arthroscopy
85.7%	92.9%	77.4%	78.5%

ePROM 2010-2023

DDH	Perthes	SCFE	Arthroscopy
106	76	102	219

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Results and activities

Quality indicator

0.08%	DDH Proportion late-diagnosed hip dysplasia
38.5%	DDH Proportion newborn ultrasound screened
35%	Perthes Duraiton of symptoms ≤ 2 months
76.9%	Perthes Operation children > 6 years Caterall III/IV
52.2%	SCFE Duraiton of symptoms ≤ 2 months
90%	SCFE Implantat allowing further growth

Quality project

We have identified that the reason for the delay from symptoms until the diagnose is established for Perthes and SCFE is that the patients wait before contacting the healthcare service, and that the primary care takes too long before referring them further. Hospitals are quick to assess the referrals and offer consultation and treatment.

ANNUAL REPORT NORWEGIAN PAEDIATRIC HIP REGISTER

The Paediatric Hip Register now has a fully electronic reporting solution for both registration forms and postoperative PROM registration. We are working on implementing an electronic solution for preoperative PROM in the adult hip section of the register.

In 2023, we had 11 hospitals reporting to the register. Paediatric hip disorders are primarily operated on at the large university hospitals, but some of the diagnosis and follow-up of conservatively treated hip dysplasia and Perthes disease occur at local hospitals. For the adult hip section, we see that open procedures are primarily performed at Oslo University Hospital (OUS) and Haukeland University Hospital (HUS-KIH), but arthroscopical procedures are done in several places, including private clinics. Therefore, we have been working with MRS to enable private clinics to report, and we see that the number of reported hip arthroscopies has nearly doubled from 2022.

Throughout the year, we have conducted a data quality project where we visited 4 hospitals and reviewed the records of all patients reported to the register since 2018. The purpose of this was to assess the accuracy of the reported data. Only 5 cases were reported that should not have been, and both diagnosis and side showed 100% accuracy. For the classification of Perthes disease and slipped capital femoral epiphysis (SCFE), accuracy falls to 93% and 80%, respectively. Data completeness in the register is also good, with 100% for mandatory variables and between 80-95% for non-mandatory variables.

We also observe that in 2023, the largest number of children reported with hip dysplasia received the diagnosis after 3 months of age. It is a national goal to keep the number of late-detected hip dysplasia as low as possible, and work has therefore started on creating a national guideline for the diagnosis, treatment, and follow-up of hip dysplasia. Data from the register and several representatives from the register are participating in this important work.

Somewhat surprisingly, we have the highest number of reported cases of SCFE ever, with 46 reported cases in 2023. All hospitals are now using screws for surgery, and most have changed to screw implants that allow for continued growth. We want to investigate this increase further to determine if we can identify the cause and see if there are any variations related to gender and age.

We want to thank all orthopedic surgeons who report to the register. Remember that you can use the hospital-specific annual reports for local quality improvement work.

Bergen, June 2024

Trude Gundersen	Jone Segadal	Eva Dybvik
Senior Consultant Ortho Surgeon	Senior Consultant Ortho Surgeon	Biostatistician/researcher
Head of Paediatric Hip Register	Responsible Adult hip	

Figure F.1: Number of treated patients registered in Norwegian Paediatric Hip Register

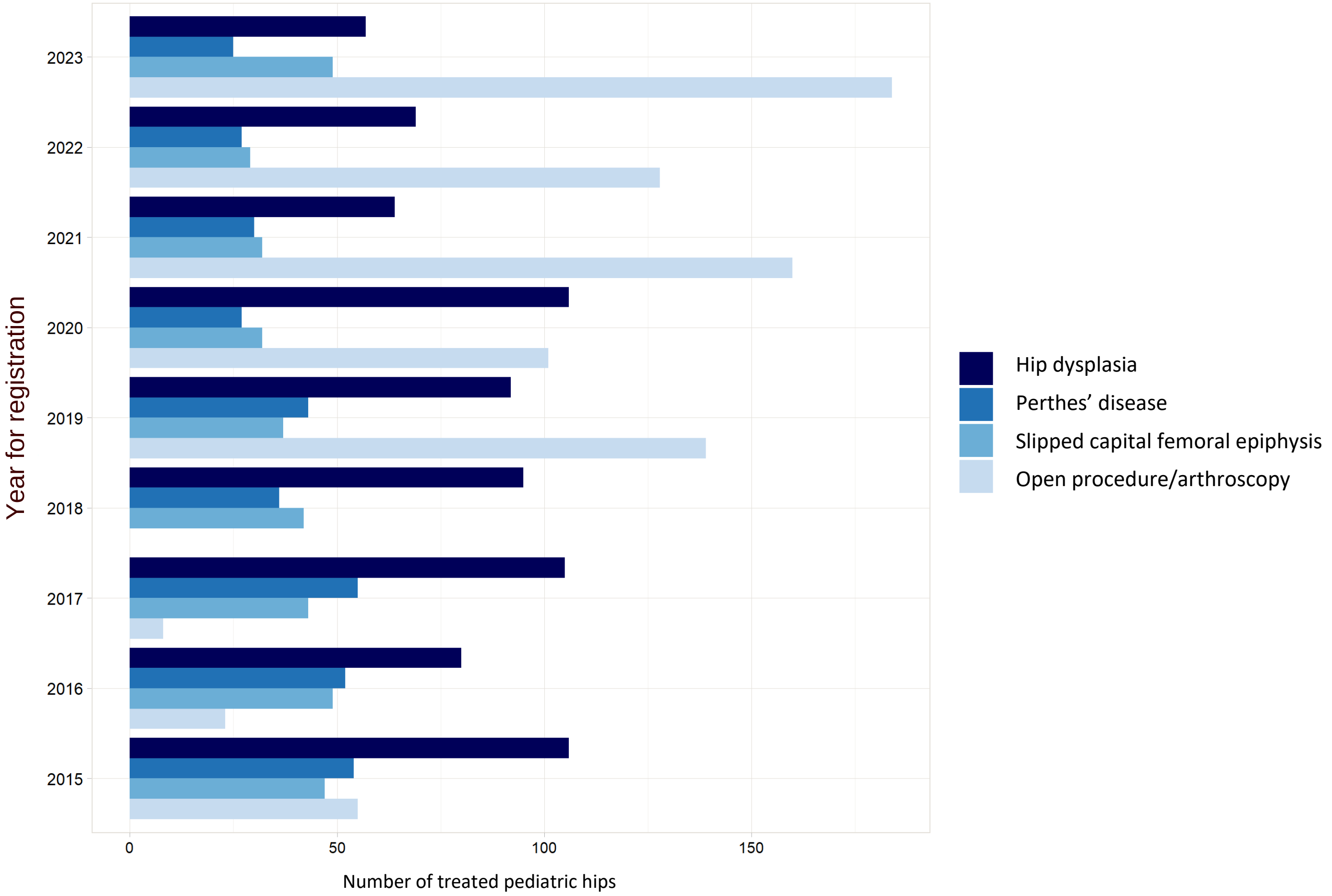


Figure F.2: Number of treated patients by diagnosis at each hospital

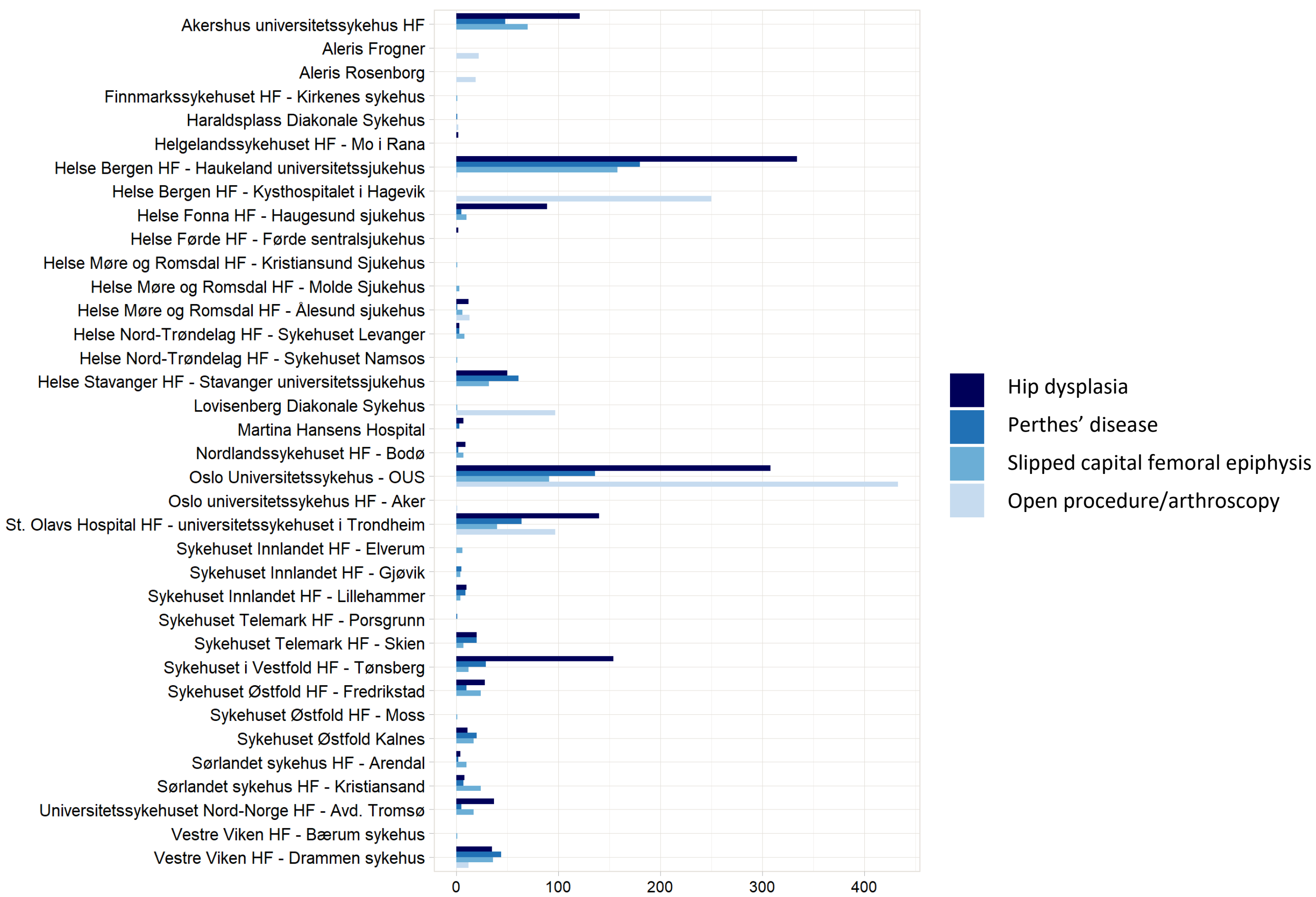


Figure F.3: Time trend for symptom duration before Perthes' disease

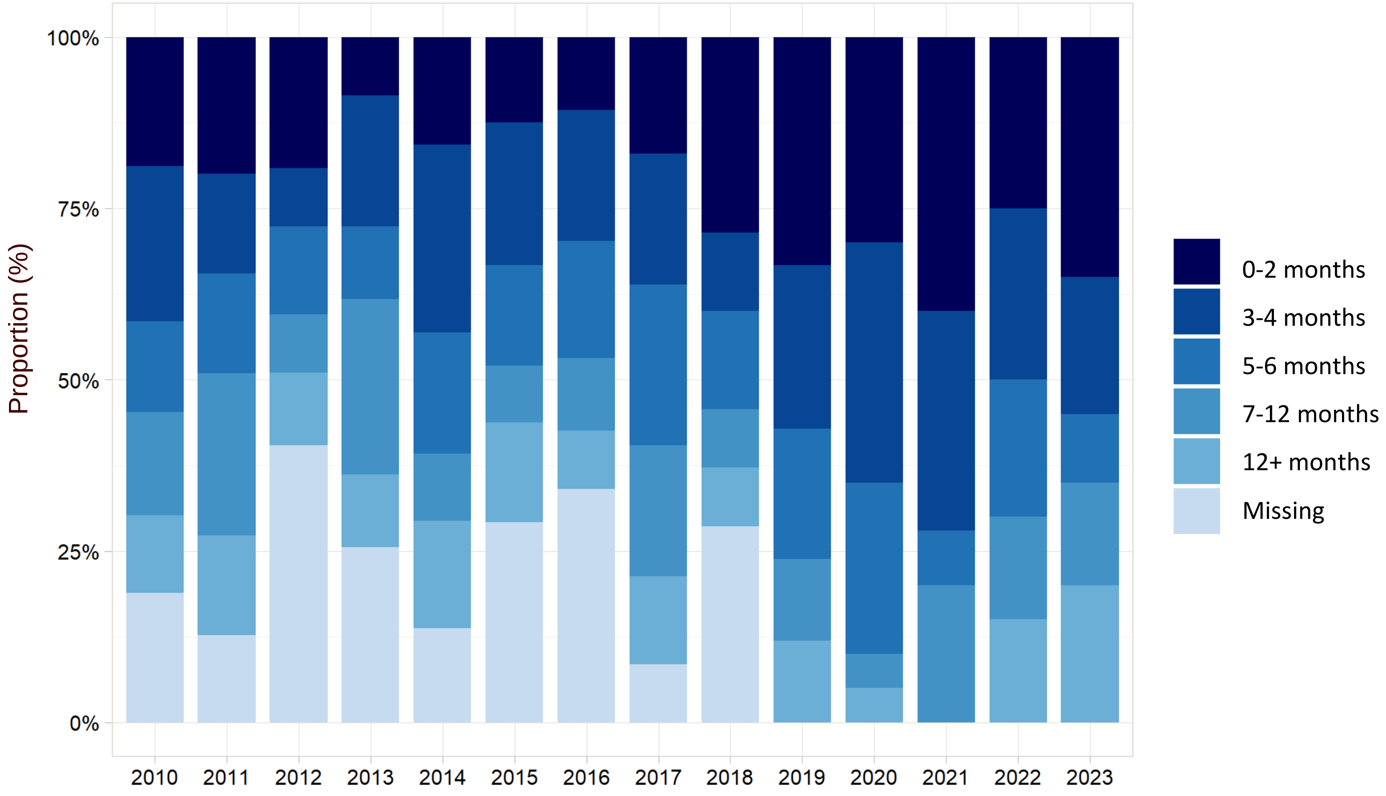
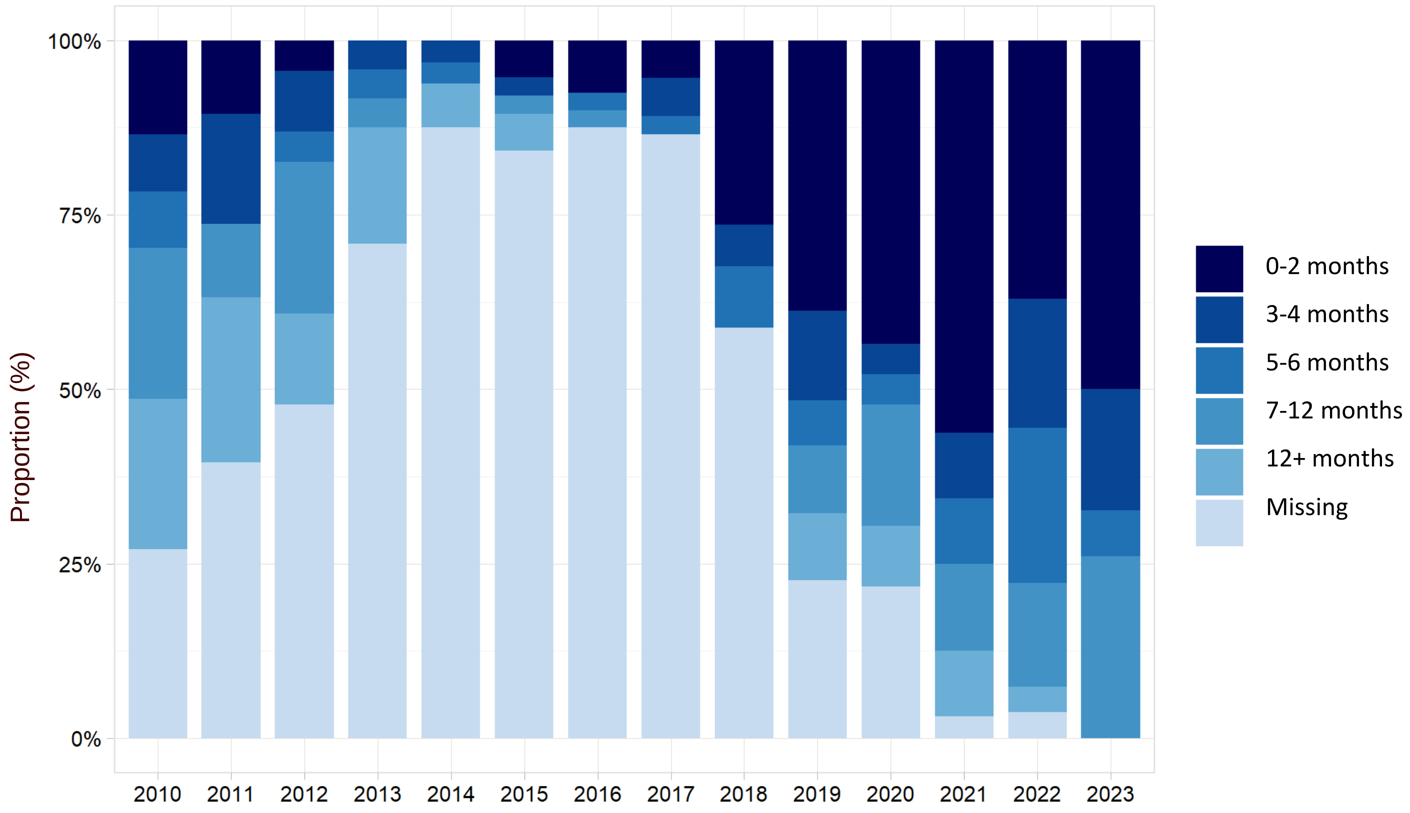


Figure F.4: Time trend for symptom duration before SCFE diagnosis



Annual report 2023

The National Pediatric Hip Registry collects data from all hospitals treating children with hip diseases such as hip dysplasia (HDD), Perthes' disease, and Slipped capital femoral epiphysis (SCFE). Additionally, open and arthroscopic hip joint surgeries in young adults are also registered. We will present the key findings from the data collected from all hospitals in the registry.

PEDIATRIC HIPS

Hip dysplasia

Nationally, we observe that the number of hip dysplasias reported to the registry in 2023 is somewhat reduced compared to previous years. There have been no changes in the inclusion criteria, and we have no reason to believe that fewer children with hip dysplasia are being born. Hospitals must have been attentive to registering all children with hip dysplasia, including those who do not undergo surgery.

Table 1: Number of reported children with hip dysplasia

Year	Number of cases
2023	57
2022	67
2021	60
2020	99
2019	88
2018	93
2017	103
2016	79
2015	100
2014	116
2013	91
2012	136
2011	94
2010	125
Total	1308

Table 2: The number of children diagnosed with hip dysplasia before and after 3 months

Year	<3 months	>3 months	Missing	Total
2023	14	43	0	57
2022	29	38	0	67
2021	30	30	0	60
2020	40	59	0	99
2019	35	51	2	88
2018	38	50	5	93
2017	45	54	4	103
2016	24	50	5	79
2015	37	56	7	100
2014	54	60	2	116
2013	31	59	1	91
2012	60	74	2	136
2011	36	57	1	94
2010	42	82	1	125

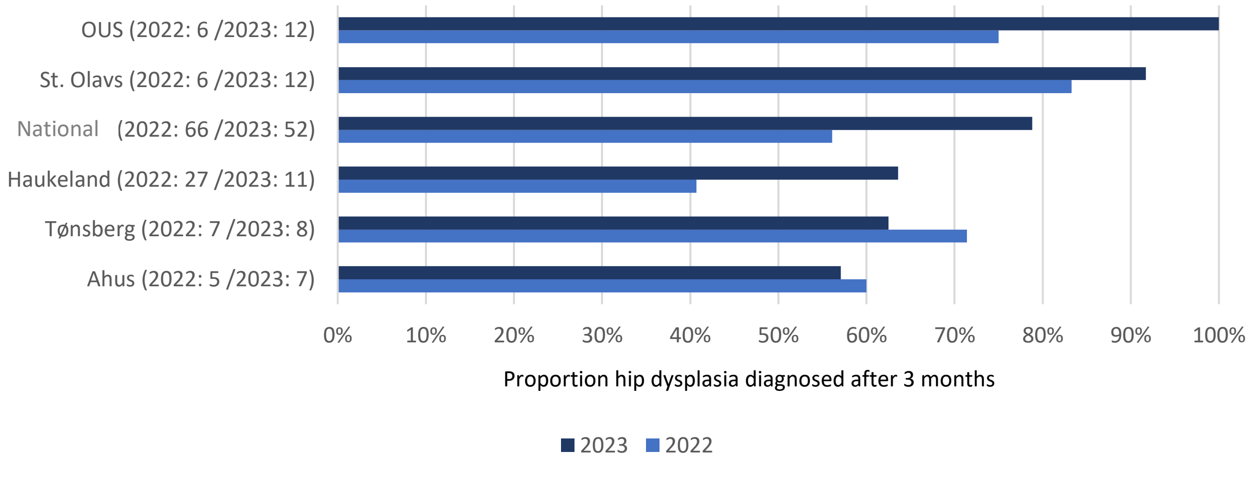
The proportion of late-detected hip dysplasias (after 3 months) diagnosed annually should be below 1/1000 (0.1%) of all newborns.

According to data from Statistics Norway (SSB), 51,980 children were born in Norway in 2023. The data from the registry shows that 41 children were diagnosed with hip dysplasia after the age of 3 months. **This results in an incidence of late-detected dysplasia of 0.08%.** Thus, we are below the target of less than 0.1%, but there are still 41 children who are diagnosed late, and who often have to undergo more prolonged and demanding treatment to achieve good hip function.

We do not have birth statistics per hospital per year, so we are unable to calculate the proportion of late-detected hip dysplasias relative to the total number of births per hospital. We also do not know if all hospitals where children are born have screening, treatment, and follow-up for children with hip dysplasia. Therefore, this indicator will always be presented at the national level only.

Table 2 and Figure F.5 show the number of late-detected hip dysplasias among all reported cases of hip dysplasia per hospital, but we have shown that the proportion of late-detected dysplasias is generally high in the registry. This likely reflects that all children who are diagnosed at birth and receive early treatment are largely normalized before the first X-ray is taken. They should therefore not be included in the registry. Among those reported in the registry (with findings of dysplasia on the first X-ray after 4 months of age), there is a large proportion of children who have been diagnosed later than 3 months.

Figure F.5: Hospital-specific proportion of hip dysplasia diagnosed after 3 months among those reported with hip dysplasia to the registry in 2022-2023.



Only hospitals with more than 5 reported cases in 2022 and 2023 are included in the figure.

For hip dysplasia, late-detected dysplasia is nationally defined as a diagnosis made after 3 months of age. All children are screened at the newborn examination, either clinically or additionally with ultrasound if they have risk factors for hip disease. The national goal is to keep the proportion of late-detected hip dysplasia as low as possible, aiming to be below 0.1 % of all newborns. Of course, the aim is for as many as possible to receive the diagnosis as early as possible, highlighting the importance of thorough newborn screening.

Table 3: Number of children screened for hip dysplasia with ultrasound

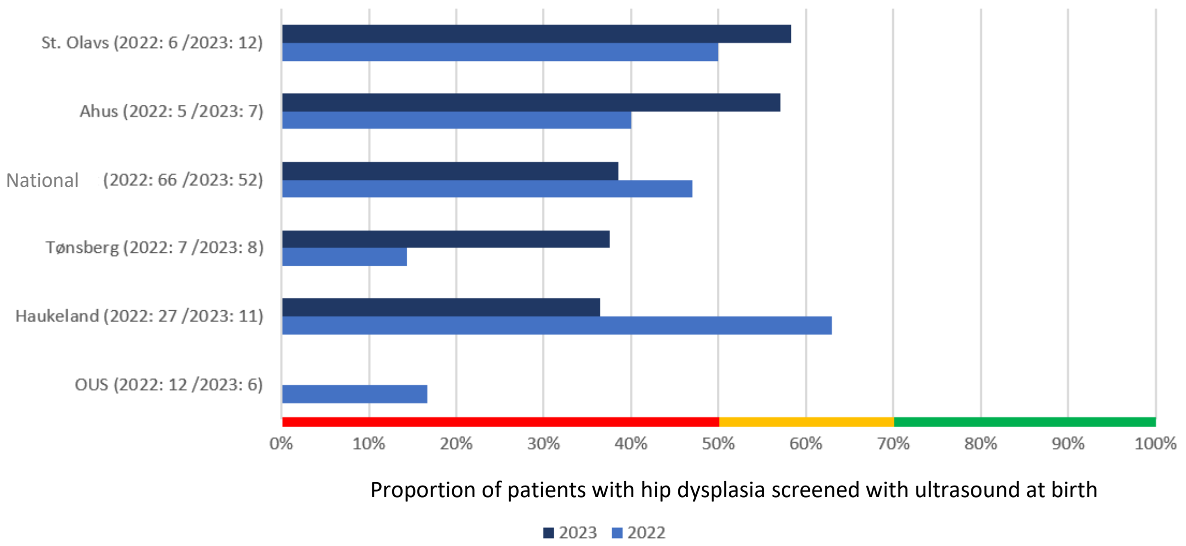
Year	No screening	Ultrasound screening	Missing	Total
2023	34	23	0	57
2022	33	31	3	67
2021	29	28	3	60
2020	41	48	10	99
2019	31	27	30	88
2018	10	6	77	93
2017	11	11	81	103

Table 4: Previous treatment of hip dysplasia

Year	None	Pillow / Abd. ort.	Other	Missing	Total
2023	29	25	3	0	57
2022	37	22	5	3	67
2021	26	26	4	4	60
2020	48	41	3	7	99
2019	49	33	4	2	88
2018	44	39	7	3	93
2017	41	44	14	4	103
2016	32	36	6	5	79
2015	38	24	14	24	100
2014	37	39	13	27	116
2013	30	16	5	40	91
2012	6	6	0	124	136
2011	1	1	0	92	94
2010	3	3	0	119	125
Total	421	355	78	454	1308

We can see from the data in Table 3 that only 20/52 reported cases of hip dysplasia were screened with ultrasound at birth. We know that those who are screened at birth and diagnosed with hip dysplasia start early treatment. The inclusions in the registry, which only include children with findings of dysplasia on the first X-ray examination at 4-6 months of age, mean that those who have received treatment and normalized before this X-ray are not included in the registry. Those who are not screened with ultrasound as newborns are those without clear clinical findings and without risk factors for hip dysplasia. These children are often diagnosed later, which is likely related to the fact that approximately 50% of the children reported to the registry are diagnosed after 3 months. These figures will be used in the work on new national, interdisciplinary recommendations for screening, treatment, and follow-up of hip dysplasia..

Figure F.6: Hospital-specific proportion of patients reported with hip dysplasia who were ultrasound-screened at birth



Only hospitals with more than 5 reported cases in 2022 and 2023 are included in the figure.

The screening program for hip dysplasia identifies most newborns with dysplasia. This is done through clinical examination and ultrasound for risk groups (breech position, family history, foot deformities, and clinical findings), selectively. Treatment is started early, and for most, this will result in the normalization of the hip joint before the first X-ray is taken at 4-6 months of age. These cases are not included in our registry.

We can see that the proportion of those not screened with ultrasound at birth correlates well with the figures we have for late-detected dysplasias. This highlights the importance of carrying out the screening program properly, especially with regard to the clinical examination, so that all those with risk factors undergo early ultrasound.

Even in countries where ultrasound screening is universal, late-detected hip dysplasia is still observed.

Table 5: Hip status at the time of diagnosis for hip dysplasia

Year	Normally located	Subluxated	Dislocated	Missing	Total
2023	34	17	3	3	57
2022	36	19	11	1	67
2021	29	23	8	0	60
2020	69	23	6	1	99
2019	59	15	13	1	88
2018	73	11	5	4	93
2017	68	15	18	2	103
2016	43	13	16	7	79
2015	51	24	17	8	100
2014	67	15	32	2	116
2013	49	16	17	9	91
2012	66	21	35	14	136
2011	55	14	21	4	94
2010	65	24	28	8	125
Total	764	250	230	64	1308

Table 6: Pelvic osteotomy performed for dysplasia

Year	Salter	Dega	Other	Total
2023	3	2	0	5
2022	4	2	0	6
2021	1	1	0	2
2020	2	3	0	5
2019	4	3	0	7
2018	1	9	0	10
2017	3	12	1	16
2016	2	8	1	11
2015	5	7	3	15
2014	7	2	0	9
2013	6	0	1	7
2012	2	0	0	2
2011	1	1	3	5
2010	1	1	0	2
Total	42	51	9	102

Table 7: Age and gender at the time of dysplasia

Sex	N	Mean age	Median age	Standard deviation
Boy	165	0.8 year	0.3 year	1.8 year
Girl	1103	0.6 year	0.4 year	1.4 year

Perthes' disease

Perthes' disease affects children aged 3-9 years. Without a known cause, they experience degeneration of the hip joint, leading to pain and limping. There is no effective treatment to halt or reverse the degeneration, but it is considered crucial to reduce load through activity restrictions. Activities that impact the hip, such as running and jumping, are especially limited to reduce stress on the hip joint. Most children become stiffer in the hip joint, especially during the degenerative phase, and it's essential for them to start targeted physiotherapy with an emphasis on stretching exercises. The stretching primarily aims to maintain mobility. Caterall's classification is used to assess the extent of degeneration. It indicates the percentage of the femoral head affected, with Grade 1 being less than 25 %, Grade 2 less than 50 %, Grade 3 less than 75 %, and Grade 4 affecting the entire femoral head. The degree of degeneration is crucial to classify, as treatment choices depend on it.

Table 8: Number reported per year with Perthes' disease

Year	Number
2023	21
2022	20
2021	25
2020	20
2019	42
2018	35
2017	47
2016	47
2015	48
2014	51
2013	47
2012	47
2011	55
2010	53
Total	558

Table 9: Duration of symptoms before diagnosis for Perthes'

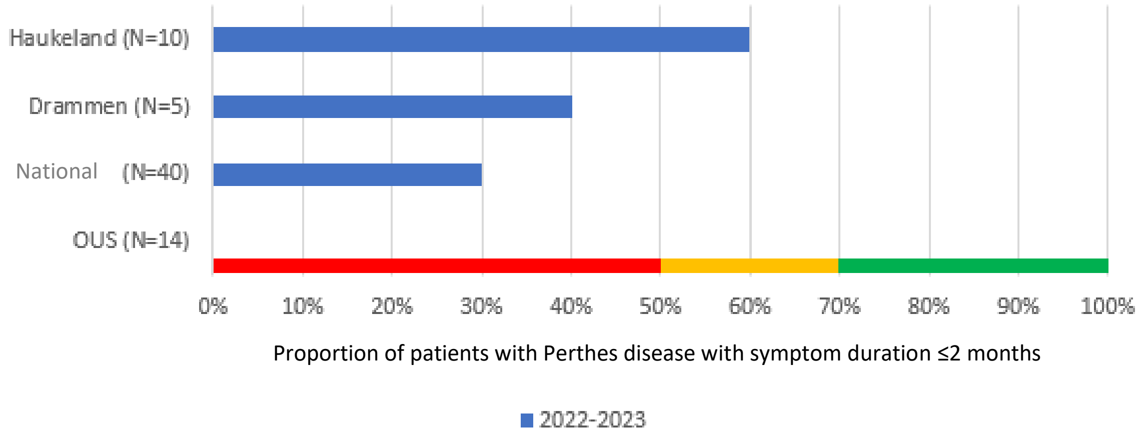
Year	<= 2 months	>2 months	Missing	Total
2023	7	14	0	21
2022	5	15	0	20
2021	10	15	0	25
2020	6	14	0	20
2019	14	28	0	42
2018	10	15	10	35
2017	8	35	4	47
2016	7	28	12	47
2015	8	28	12	48
2014	10	36	5	51
2013	4	31	12	47
2012	13	19	15	47
2011	12	38	5	55
2010	13	34	6	53

Table 10: Caterall classification at diagnosis for Perthes'

Year	Caterall I/II	Caterall III/IV	Missing	Total
2023	3	18	0	21
2022	1	19	0	20
2021	12	13	0	25
2020	5	15	0	20
2019	12	29	1	42
2018	9	24	2	35
2017	13	27	7	47
2016	8	23	16	47
2015	11	26	11	48
2014	10	32	9	51
2013	11	30	6	47
2012	15	27	5	47
2011	16	35	4	55
2010	20	32	1	53

In recent years, an important goal of the registry has been to provide information to reduce the time from when patients first experience symptoms of hip disease to when they receive a diagnosis. The aim has been for as many as possible to be diagnosed and begin treatment within 2 months. The data shows that over half of the patients still experience symptoms for longer than this, and the registry therefore has an important role in reaching out to the population with information, so that patients seek healthcare when they experience symptoms that could be indicative of Perthes disease.

Figure F.7: The hospital-specific proportion of patients with a symptom duration of ≤2 months before diagnosis for Perthes disease in 2022-2023



Only hospitals with more than 5 reported cases in 2022 and 2023 combined are included in the figure.

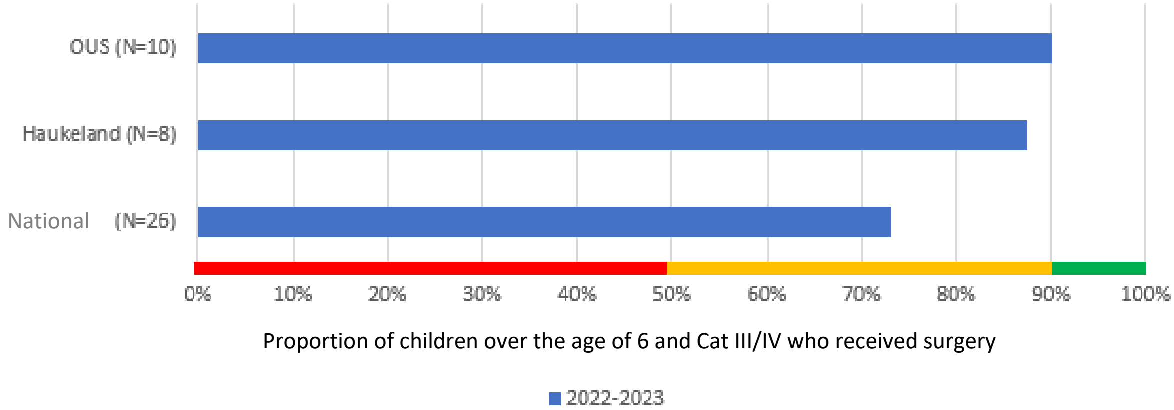
From Figure F.3, which shows trends in symptom duration over time, we observe that there is still some way to go before most patients are diagnosed within 2 months. However, it appears that there has been an increasing proportion over the last 3-4 years achieving this, and we hope to see this proportion continue to rise in the coming years. We also note that since the variable was made mandatory in 2018, there have been no missing data for this quality indicator from 2019 onwards.

Children diagnosed with Perthes disease (CLP) over the age of 6 and with more than 50% of the femoral head affected are recommended surgery with varus femoral osteotomy. The proportion of operated cases should be 90%.

National treatment recommendations for Perthes disease state that children under the age of 6, regardless of the degree of femoral head involvement, should be treated conservatively. For children over the age of 6 with more than 50% involvement of the femoral head, surgery is recommended to improve containment of the femoral head.

The data show that patients reported in 2023 follow these recommendations and that surgeries are performed at a limited number of hospitals with specialized expertise in pediatric orthopedics.

Figure F.8: The proportion of children over the age of 6 and classified as Cat III/IV who received surgery in 2022-2023



Only hospitals with more than 5 reported cases in 2022 and 2023 combined are included in the figure.

We observe that the hospitals in Norway (Tables 2.8 and 2.9) treating children with Perthes disease follow national and international treatment recommendations regarding surgery. Children under the age of 6 are treated conservatively regardless of the degree of femoral head deterioration, while children over the age of 6 with more than 50% deterioration undergo varus osteotomy.

Table 11: Number of children under and over 6 years of age who undergo surgery, divided by Caterall classification

Year	<6yr Cat I/II	<6yr Cat III/IV	<6yr Cat Missing	>6yr Cat I/II	>6yr Cat III/IV	>6yr Cat Missing
2023	0/2	0/5		0/1	10/13	
2022	0/1	1/8			9/11	
2021	0/7	0/7		1/5	4/6	
2020	0/3	0/8		0/2	6/7	
2019	0/5	0/10	0/1	1/7	16/19	
2018	0/4	1/10		0/5	6/14	0/2
2017	0/2	0/14	0/2	0/11	4/13	2/5
2016	0/2	0/7	1/3	0/6	7/16	7/13
2015	0/5	1/14		0/6	5/12	2/11
2014	0/2	1/16	1/2	0/8	6/16	3/7
2013	0/5	1/15	0/2	0/6	9/15	3/4
2012	0/8	0/13	0/1	0/7	3/14	0/4
2011	0/8	0/15		0/8	9/20	0/4
2010	0/13	3/16	0/1	0/7	6/16	

Table 12: Age and gender at the time of Perthes' disease

Sex	N	Mean age	Median age	Standard deviation
Gutt	413	6 year	6 year	2.3 year
Jente	110	6.5 year	6 year	2.7 year

Based on a large Norwegian study conducted between 1996-2000 on children with Perthes' disease, it has been concluded that children under 6 years of age, regardless of the degree of degeneration, achieve the best results with conservative treatment. For children over 6 years of age, those with over 50 % degeneration will have a better outcome if they undergo proximal varus femoral osteotomy. This is done to improve coverage of the affected femoral head. These principles also form the basis of the national treatment guidelines adopted by the Norwegian Pediatric Orthopedic Society.

Slipped Capital Femoral Epiphysis (SCFE)

SCFE is a condition that always requires surgery. Using data from the Norwegian Patient Register (NPR), it has been previously observed that the incidence is between 25-40 cases per year in Norway. The low number of new cases per year means that smaller hospitals may not have patients to report to the registry every year.

Table 13: Number reported per year with SCFE

Year	Number
2023	47
2022	27
2021	32
2020	23
2019	31
2018	34
2017	37
2016	40
2015	38
2014	32
2013	48
2012	23
2011	38
2010	37
Total	487

Table 14: Duration of symptoms before diagnosis for SCFE

Year	<=2 months	>2 months	Missing	Total
2023	25	22	0	47
2022	10	17	0	27
2021	18	14	0	32
2020	10	13	0	23
2019	14	16	1	31
2018	12	18	4	34
2017	7	29	1	37
2016	9	29	2	40
2015	11	27	0	38
2014	2	30	0	32
2013	4	39	5	48
2012	3	17	3	23
2011	9	27	2	38
2010	8	28	1	37

For SCFE it is essential to diagnose the condition as early as possible. However, many individuals have often experienced symptoms for a while before undergoing X-rays and receiving a diagnosis. Previous research indicates that the duration of symptoms is often linked to the severity of the slippage, with those experiencing longer durations typically having more severe forms of slippage, which in turn leads to a poorer long-term prognosis. Therefore, a national goal is for as many individuals as possible to receive a diagnosis within 2 months.

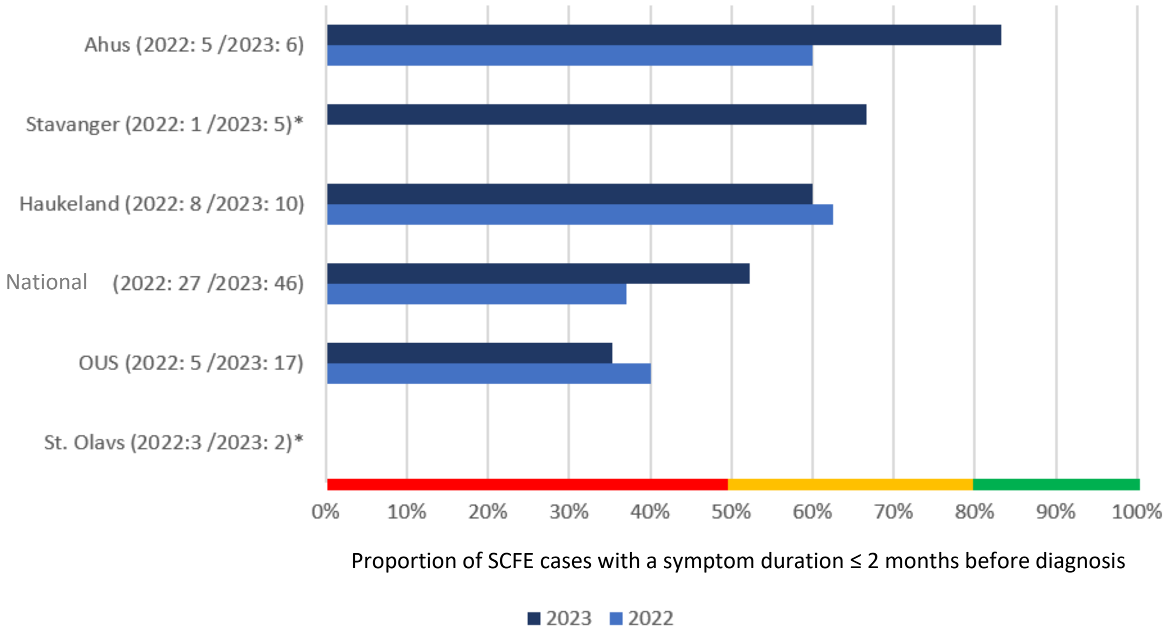
Time from symptom onset to diagnosis for slipped capital femoral epiphysis (SCFE). It is a goal to diagnose patients with SCFE as quickly as possible, and at the very least within 2 months from symptom onset.

Particularly for SCFE, it is crucial that patients receive treatment as soon as possible after the onset of symptoms. However, early symptoms are often nonspecific and typically only present during physical activity. Previous studies have shown that the longer the slip progresses, the more severe it becomes, leading to poorer long-term outcomes.

Through the quality improvement study conducted in the registry over the past years, we have identified that delays in diagnosis primarily occur at the patient level and due to the time taken from seeking care in primary healthcare to being referred to specialist care. Therefore, the registry has prioritized raising awareness of the diagnosis through various lectures, and we still see that too many cases are diagnosed late.

However, there is a positive trend showing an increasing proportion of diagnoses being made within 2 months of symptom onset. While this is encouraging, the registry sees it as its responsibility to continue these information efforts to further reduce delays.

Figure F.9: Proportion of SCFE cases with a symptom duration of less than 2 months before diagnosis in 2022-2023



* Stavanger and St. Olavs have been combined in 2022 and 2023 to reach N>5

Table 15: Degree of slippage at the time of diagnosis for SCFE

Year	< 30 degrees	30-50 degrees	> 50 degrees	Missing	Total
2023	18	16	11	2	47
2022	18	6	2	1	27
2021	11	8	13	0	32
2020	8	8	5	2	23
2019	15	11	4	1	31
2018	16	6	3	9	34
2017	16	8	9	4	37
2016	16	10	9	5	40
2015	17	11	6	4	38
2014	14	7	9	2	32
2013	30	12	5	1	48
2012	9	6	5	3	23
2011	14	10	8	6	38
2010	21	7	8	1	37
Total	223	126	97	41	487

Table 16: Choice of implants for SCFE

Year	Screw osteosynthesis	Pin osteosynthesis	Other	Missing	Total
2023	47	0	0	0	47
2022	26	0	0	1	27
2021	30	1	0	1	32
2020	21	0	1	1	23
2019	27	4	0	0	31
2018	31	2	0	1	34
2017	33	3	0	1	37
2016	33	5	1	1	40
2015	26	10	0	2	38
2014	27	3	1	1	32
2013	34	10	2	2	48
2012	15	8	0	0	23
2011	26	11	0	1	38
2010	25	12	0	0	37
Total	401	69	5	12	487

Table 17: Primary implants that allow for continued growth in SCFE

Year	Allow for continued growth	No	Missing	Total
2023	37	4	0	41
2022	19	3	1	23
2021	22	1	0	23
2020	13	4	5	22
2019	13	8	7	28
Total	104	20	13	137

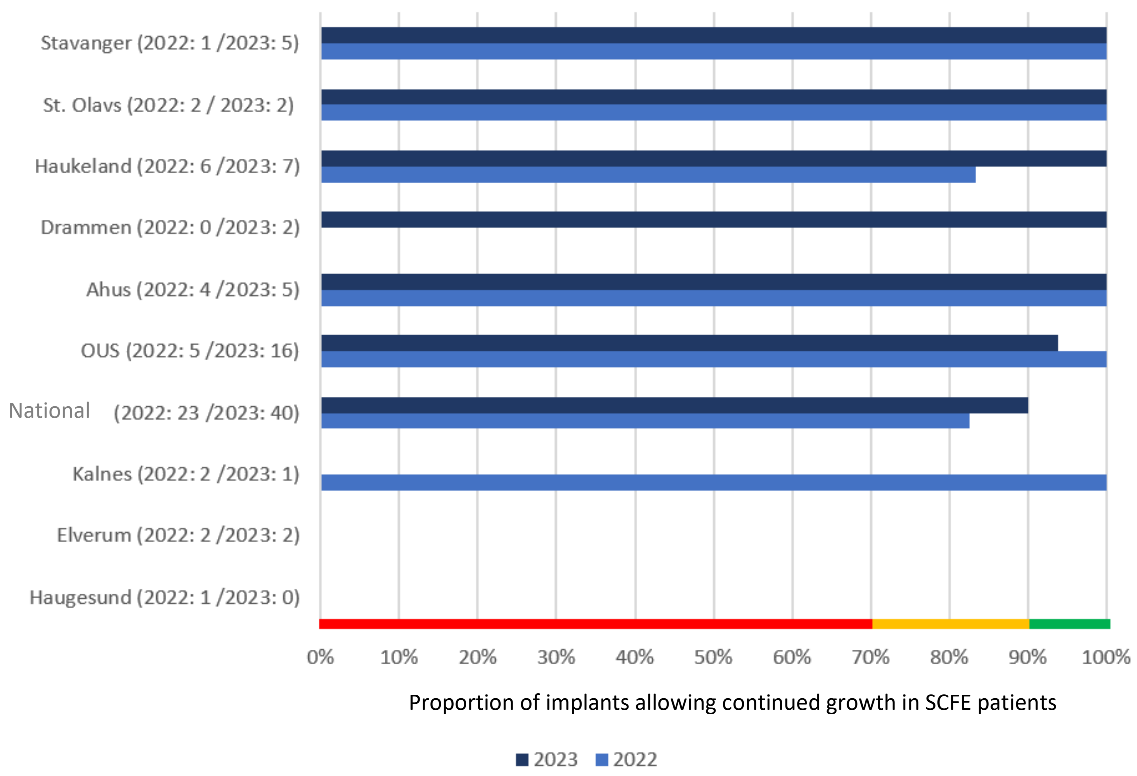
National recommendations for the treatment of slipped capital femoral epiphysis emphasize the use of implants that allow continued growth of the femoral neck. This approach is known to reduce the risk of leg length discrepancy and increase the potential for remodeling of the deformity caused by the slip.

The registry has previously contacted hospitals that did not use such implants. This applies only to patients with mild and moderate slips who undergo in situ fixation, as severe slips often require open surgery with reduction of the femoral head to an anatomical or near-anatomical position.

We now observe that most hospitals reporting patients in 2023 are using such implants. However, in some cases, alternative implants are chosen, with the reasons specified in the forms. These cases typically involve patients with little or no remaining growth potential.

There has been a trend for hospitals with a low volume of SCFE surgeries per year to transfer these patients to larger hospitals with access to such implants.

Figure F.10: Proportion of implants allowing continued growth used in SCFE patients treated with in situ fixation in 2022-2023



The Norwegian Pediatric Orthopedic Association has national recommendations stating that implants allowing continued growth should be used for in situ fixation of SCFE.

Data show that the larger hospitals, which perform the majority of these surgeries, consistently use such implants. However, some hospitals with lower surgical volumes still do not use them. Nevertheless, an increasing number of cases are now being referred to hospitals equipped with these implants.

We are likely to see a significant centralization of this type of surgery in the future.

In Table 17, which displays the number of patients operated on with implants allowing for continued growth, only patients who underwent in situ fixation are included.

Table 18: Reoperations after SCFE

Year	Number of reoperations
2023	2
2022	3
2020	10
2019	6
2018	4
2017	6
2016	9
2015	8
2014	9
2013	3
2012	7
2011	8
2010	12
Antall	87

Table 19: Reasons for reoperation following the primary procedure for SCFE

Year	Re-osteosynthesis	Soft tissue revision	Removal of screw	Other	Missing	Total
2023	1	0	1	0	0	2
2022	1	0	1	0	1	3
2020	1	0	7	1	1	10
2019	1	0	3	2	0	6
2018	1	0	1	2	0	4
2017	1	0	2	2	1	6
2016	0	0	8	0	1	9
2015	0	0	5	3	0	8
2014	2	0	4	2	1	9
2013	0	0	2	1	0	3
2012	1	0	6	0	0	7
2011	0	0	5	2	1	8
2010	1	0	8	3	0	12
Total	10	0	53	18	6	87

All reoperations should be reported to the registry. The most common reoperations have their own checkbox, but the more unusual ones are classified as 'other.' If you want information about reoperations reported on your own patients, you can contact the registry directly to obtain this information.

Table 20: Age and gender at the time of SCFE

Gender	N	Mean age	Median age	Standard deviation
Gutt	237	13 year	13 year	1.7 year
Jente	235	11.7 year	12 year	1.4 year

Patient-Reported Outcome Measures (PROM) for pediatric hip

When reporting PROM data for pediatric hip conditions, we use two different forms. The results are categorized by diagnosis, and for the hip-specific questionnaire, the maximum score is 72 points, with 0 being the lowest score. Nationally, we observe that patients generally score quite high. Children with hip dysplasia perform the best, while those with Perthes' score the lowest. This is not unexpected since hip dysplasia usually has fewer symptoms in children. Much of the treatment is also aimed at preventing the development of early osteoarthritis. The children for whom we currently have PROM data are only 10 years old and have not had time to develop degenerative changes. The results must be closely monitored and compared with data collected when they reach 18 years of age to determine if they continue to have good outcomes.

It is also expected that Perthes' scores the lowest. Ongoing disease is most common in the age range of 4-9 years and is associated with a lot of pain and stiffness, especially during the phase when the femoral head collapses. As the femoral head rebuilds, the pain usually decreases somewhat, and activity becomes easier. These patients will also only have a 10-year follow-up form, and for many, we hope to see an improvement in results by the age of 18. Children with poorer femoral head reconstruction may still experience some problems at the age of 18, and some may already be considered for hip replacement.

For PROMIS 25-Ped, we have chosen to provide each subscale score converted into T-scores. This makes it comparable to the average population. As a group, patients perform slightly better than the national average on function and peer relationships, and they have scores below 50 on pain, depression, pain impact, and fatigue. The translation of T-scores should be interpreted as them experiencing less of these parameters than the average population. Pain intensity scores are low, but even here, the Perthes' group scores higher than the other two, indicating that this patient group is more affected and may require greater adjustments in relation to pain issues.

Table 21: PROM

PROMs	The entire country	The entire country
Pediatric hip - 6 questions	Number of responses	Mean score (SD)
HD	104	66.8 (9.2)
SCFE	102	64.2 (11.4)
Perthes	76	59.6 (12.7)
	Number of responses	Mean Tscore
PROMIS Physical function - 4 questions		
HD	104	54.4
SCFE	101	52.2
Perthes	75	49.6
PROMIS Anxiety. - 4 questions		
HD	106	40.4
SCFE	102	40.7
Perthes	76	41.7
PROMIS Depression - 4 questions		
HD	106	43.4
SCFE	102	42.4
Perthes	76	45.9
PROMIS Fatigue - 4 questions		
HD	106	43.6
SCFE	100	45.2
Perthes	75	47
PROMIS Social function - 4 questions		
HD	105	56.4
SCFE	101	55.9
Perthes	76	53.6
PROMIS Pain interference - 4 questions		
HD	105	41.4
SCFE	100	42.8
Perthes	74	47.8
PROMIS Pain intencity - 1 questions		
HD	105	0.9
SCFE	101	1.4
Perthes	76	2.2

PROM scores are reported separately for each of the three pediatric hip diseases. National average scores are provided, as well as scores at hospital level.

The lines represent the range from the lowest to the highest values within hospitals, and the circle marks the average value. Only hospitals with n>5 are included. Hospitals with fewer than 5 cases can access their own PROM scores for their patients via the MRS system.

Figure F.11: Hip Dysplasia - Pediatric Hip PROM

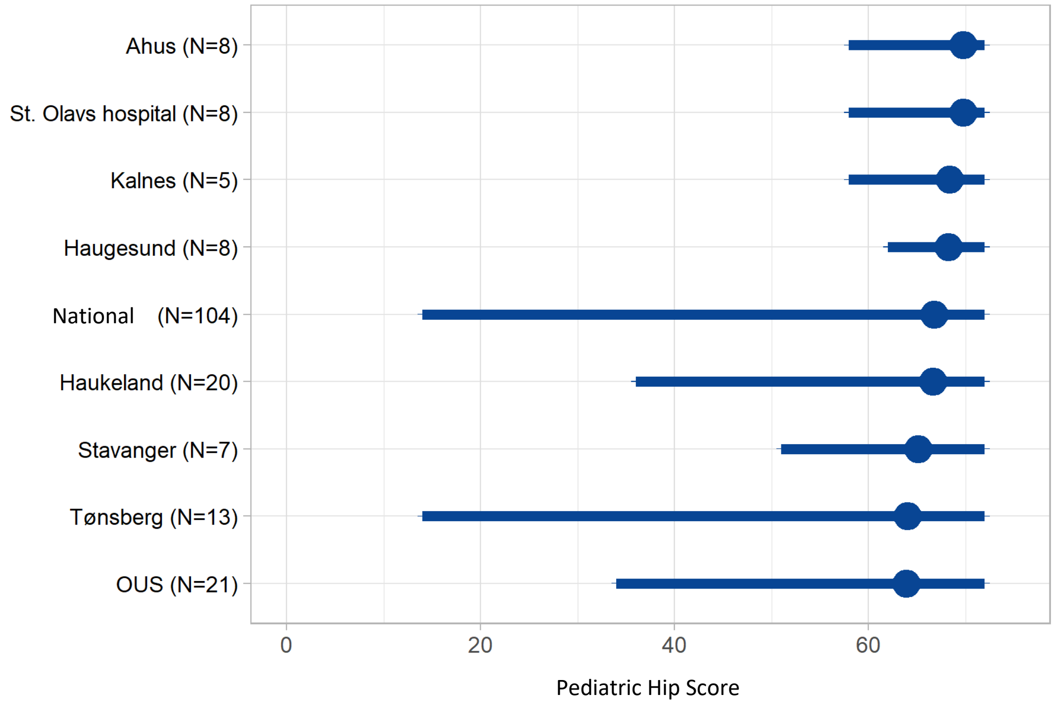


Figure F.12: Perthes disease - Pediatric Hip PROM

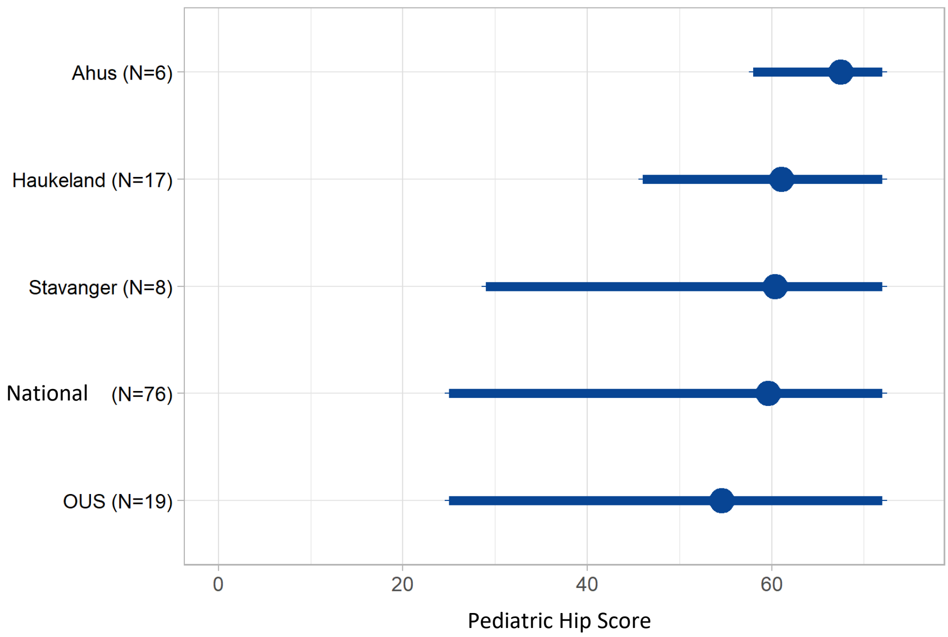
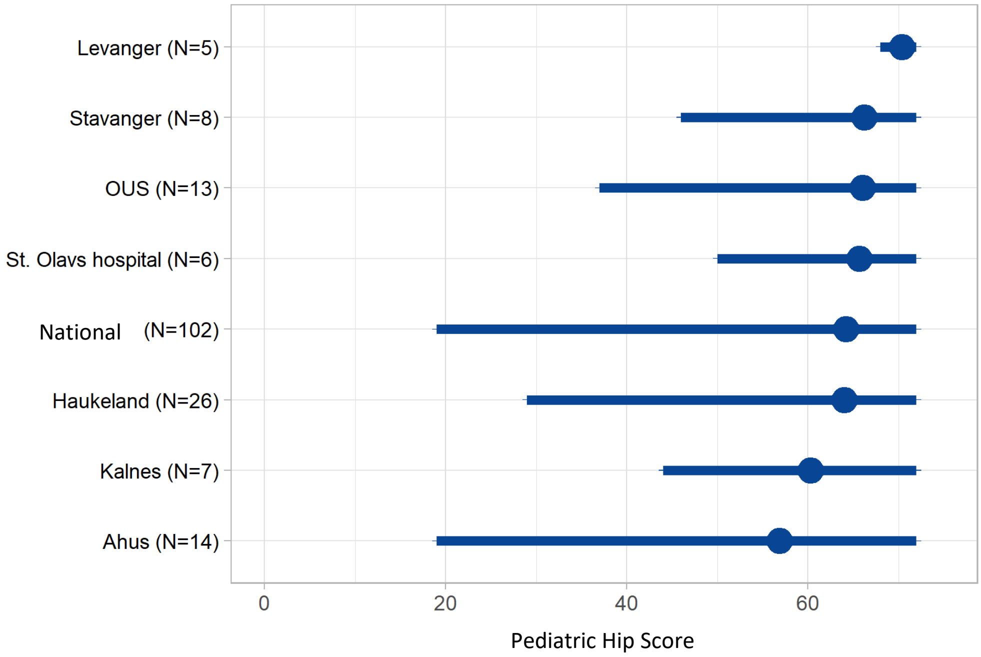


Figure F.13: SCFE - Pediatric Hip PROM



PROMIS-25-PED is a disease-unspecific questionnaire that evaluates various dimensions of daily functioning. It measures the dimensions of anxiety, depression, peer relationships, physical function, fatigue, and pain interference. A conversion model is used to calculate T-scores, where the average age-matched population has a score of 50.

For peer relationships and physical function, a score above 50 indicates better outcomes than the average. For anxiety, depression, fatigue, and pain interference, a score below 50 reflects lower levels of these dimensions compared to the average population.

We observe that despite having experienced a pediatric hip disease, patients generally score well on this disease-unspecific questionnaire. Their daily lives are minimally affected by their condition. There is also little variation in PROMIS-25-PED scores between hospitals, with none standing out as having significantly poorer scores.

PROMIS-25-PED scores are presented separately for each of the three pediatric hip diseases. National average scores and hospital-level averages are provided.

In the reports, each dimension is displayed individually for the three hip diseases. There is no composite score for PROMIS-25-PED. **The age-matched population average of 50 is indicated by a red line. For physical function and peer relationships, scores above 50 are considered good results, while for the other dimensions, scores below 50 are desirable outcomes.**

Figure F.14: Hip dysplasia – PROMIS Function

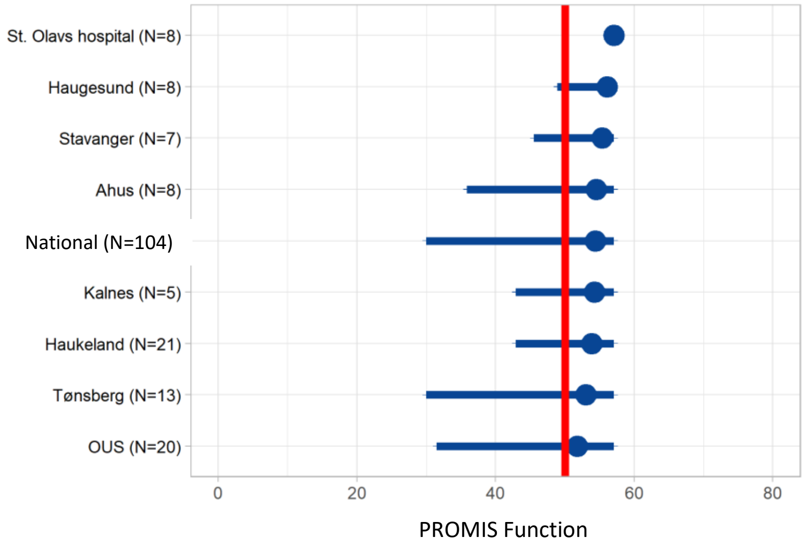


Figure F.15: Hip dysplasia – PROMIS Anxiety

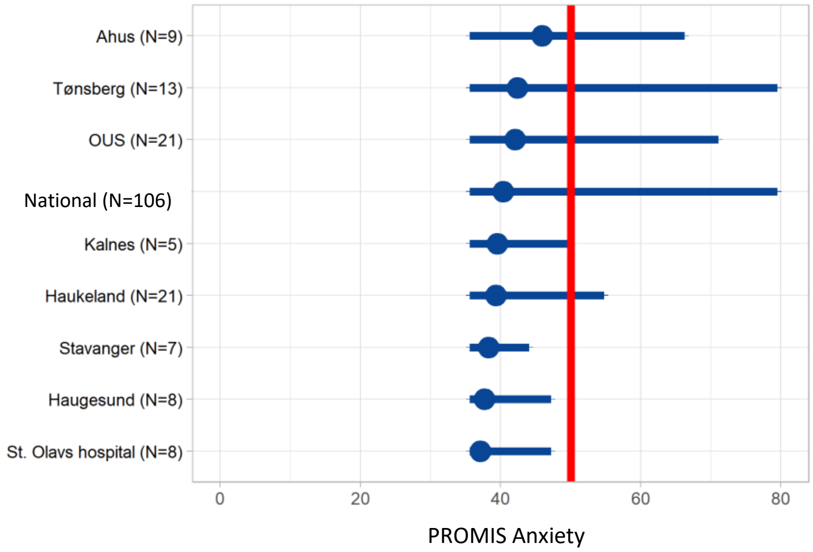


Figure F.16: Hip dysplasia – PROMIS Depression

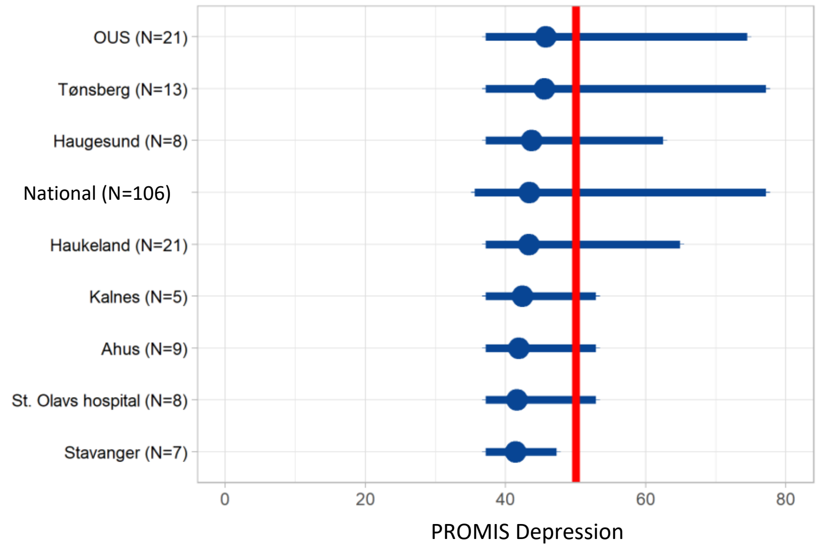


Figure F.17: Hip dysplasia – PROMIS 25-PED Fatigue

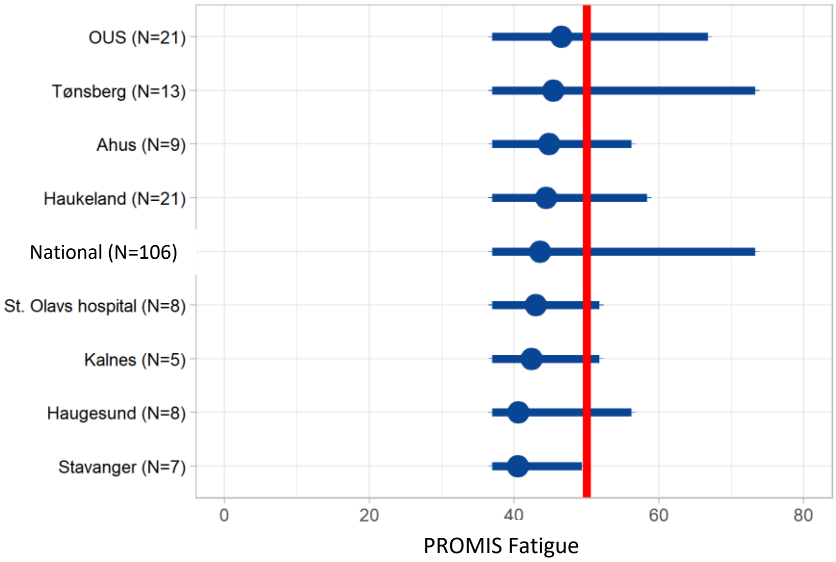


Figure F.18: Hip dysplasia – PROMIS 25-PED Peer relationship

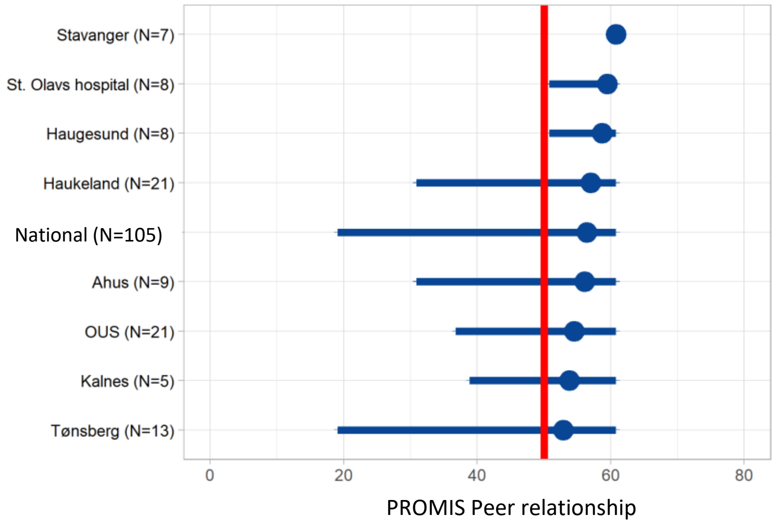


Figure F.19: Hip dysplasia – PROMIS 25-PED Pain interference

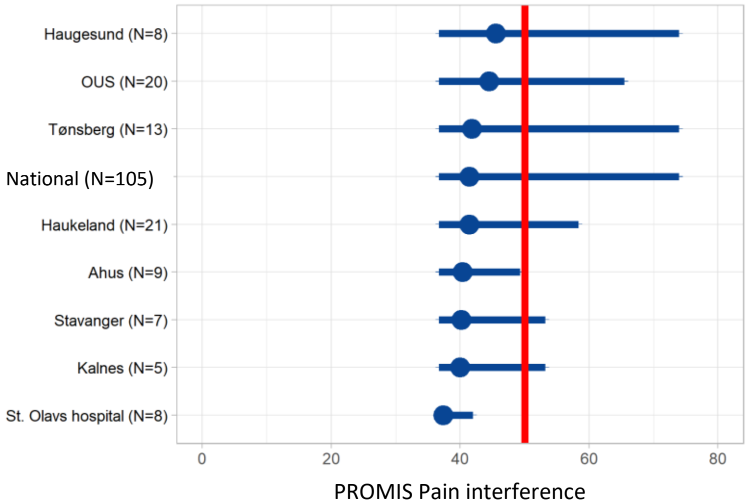


Figure F.20: Perthes disease – PROMIS 25-PED Function

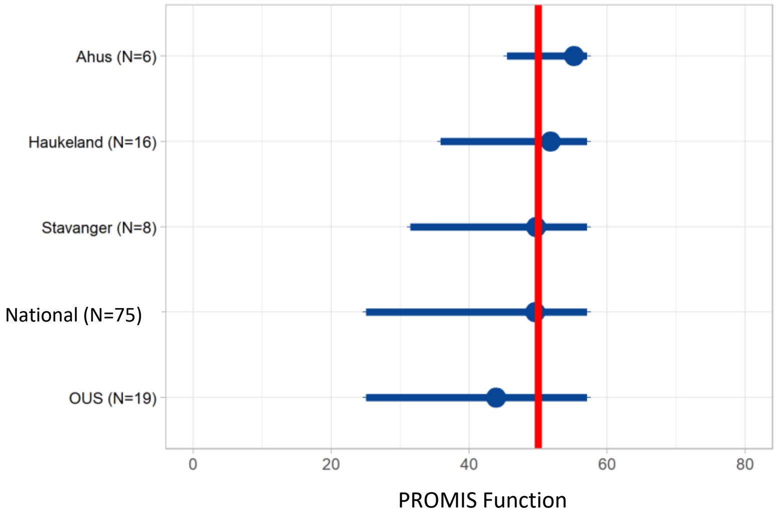


Figure F.21: Perthes disease – PROMIS 25-PED Anxiety

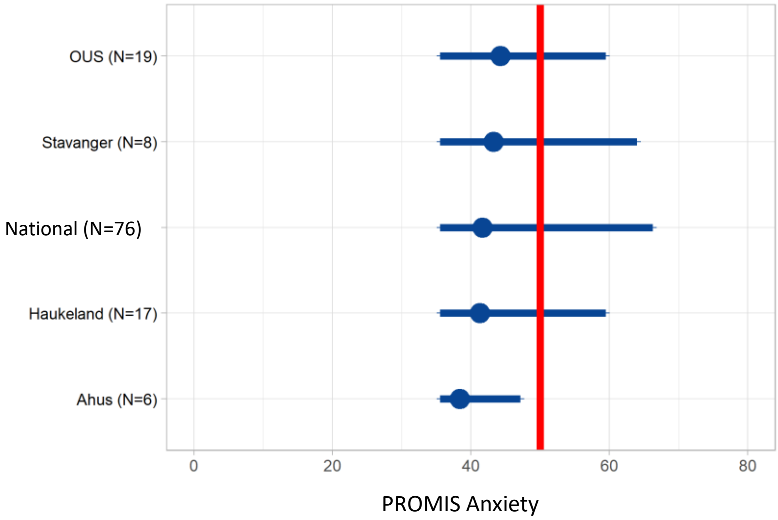


Figure F.22: Perthes disease – PROMIS 25-PED Depression

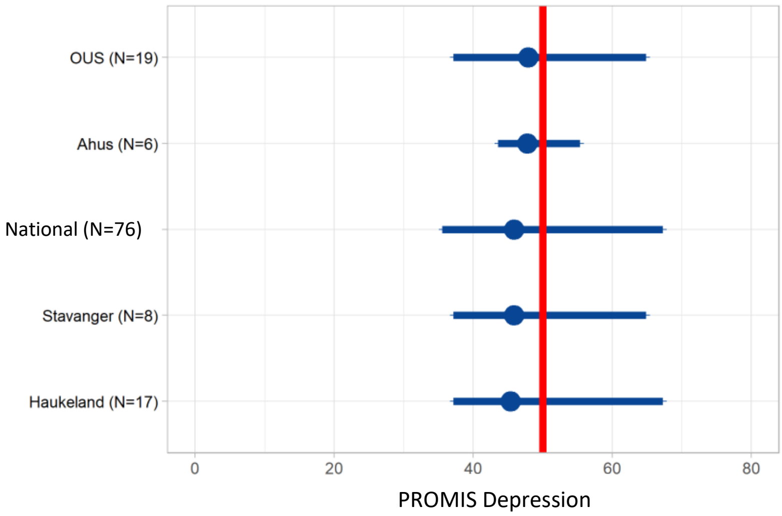


Figure F.23: Perthes disease – PROMIS 25-PED Fatigue

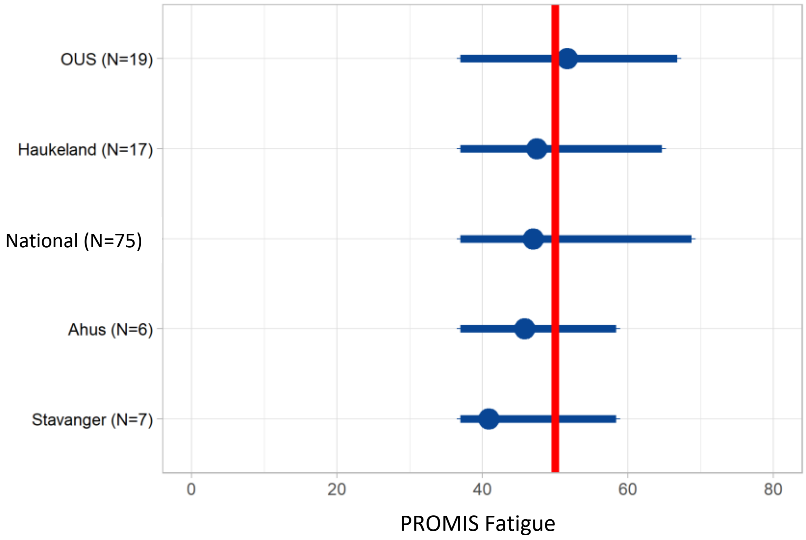


Figure F.24: Perthes disease – PROMIS 25-PED Peer relationship

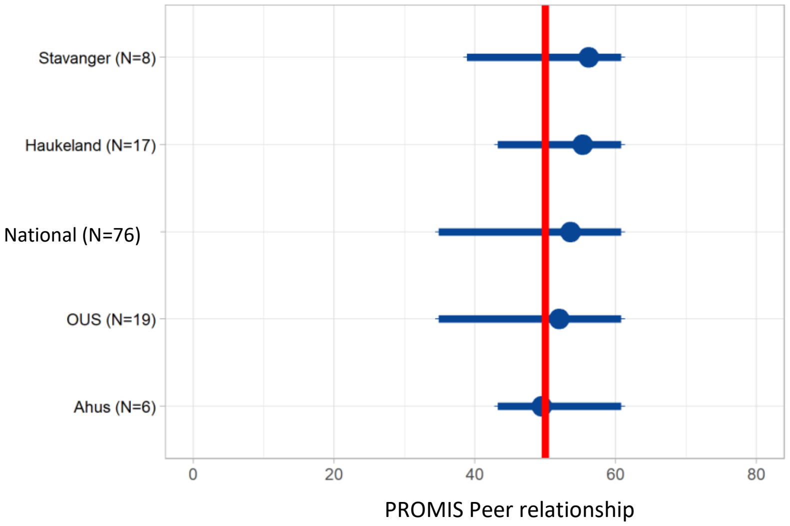


Figure F.25: Perthes disease – PROMIS 25-PED Pain interference

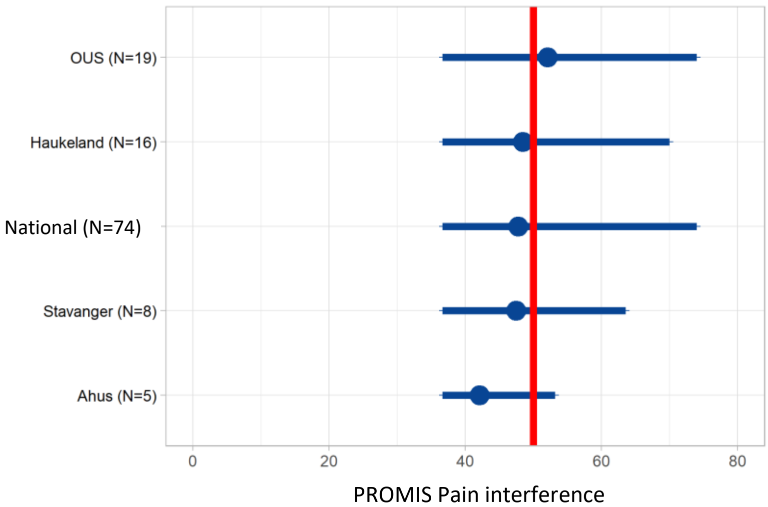


Figure F.26: SCFE – PROMIS 25-PED Function

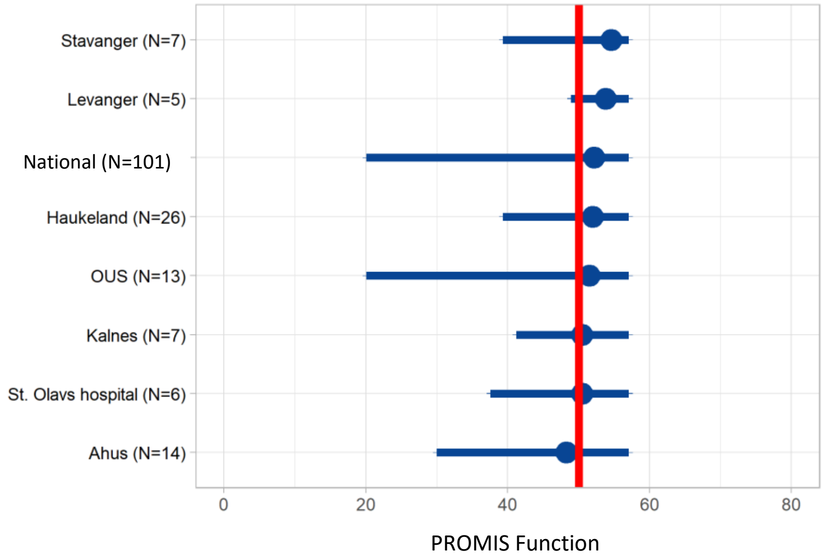


Figure F.27: SCFE – PROMIS 25-PED Anxiety

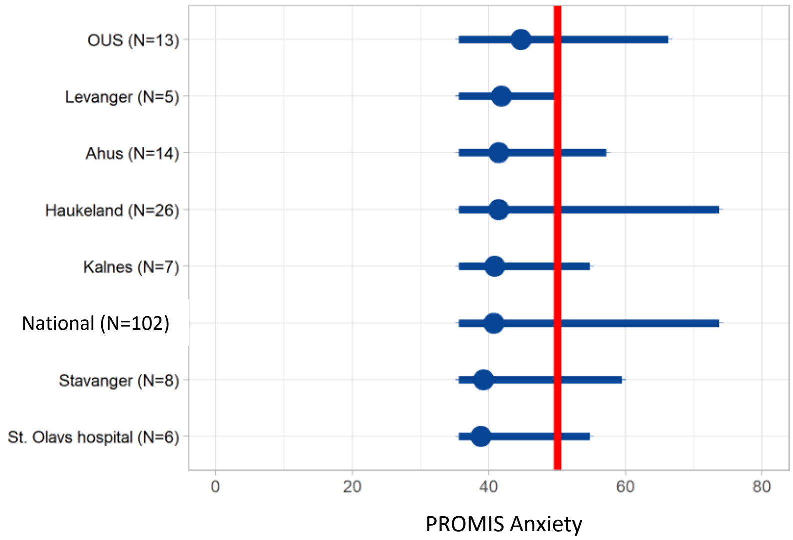


Figure F.28: SCFE – PROMIS 25-PED Depression

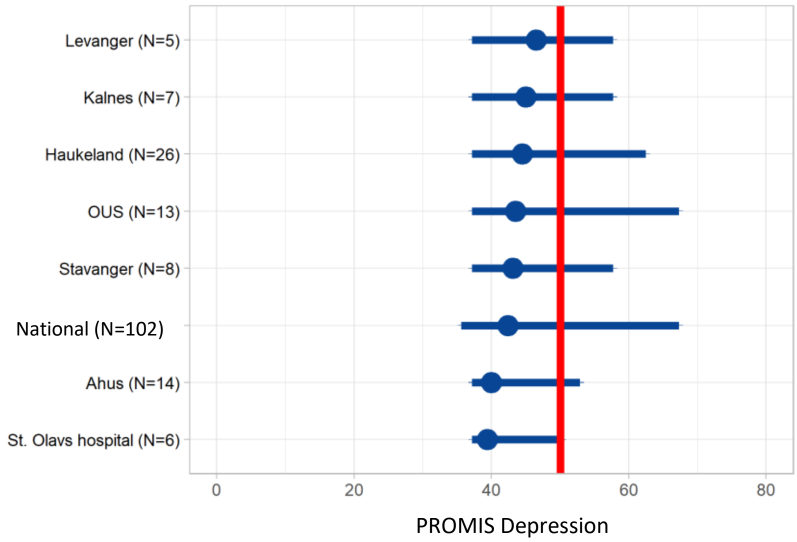


Figure F.29: SCFE – PROMIS 25-PED Fatigue

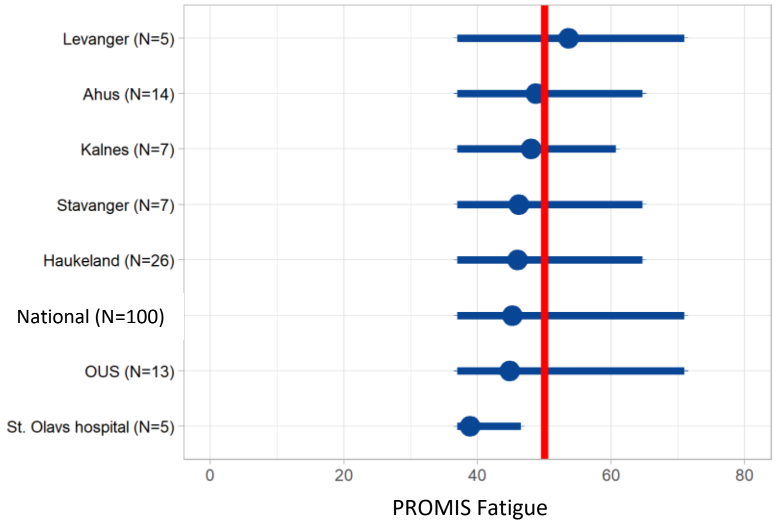


Figure F.30: SCFE – PROMIS 25-PED Peer relationship

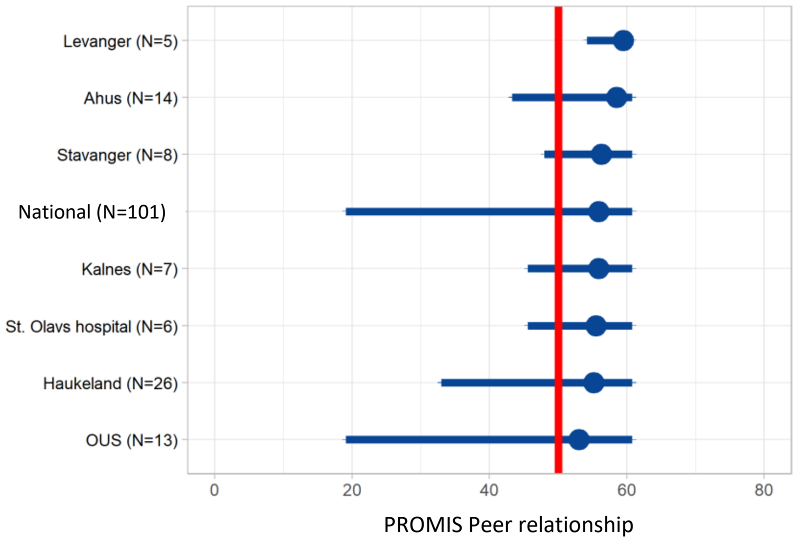
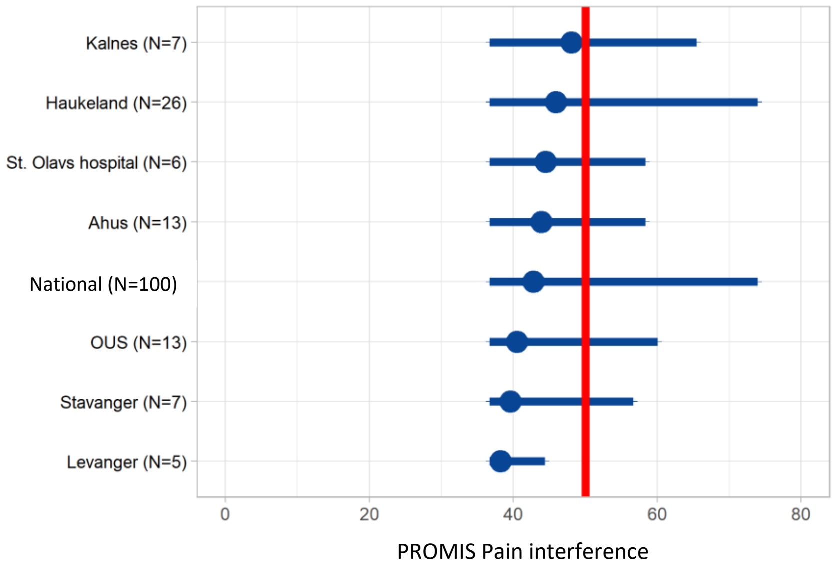


Figure F.31: SCFE – PROMIS 25-PED Pain interference



OPEN AND ARTHROSCOPIC PROCEDURES IN YOUNG ADULTS

Electronic registration of these procedures was initiated on February 1st, 2019, and since then, a total of 519 surgeries have been reported to the national registry. Among these, 342 patients have undergone hip arthroscopy, while 177 have undergone an open procedures (with the majority being periacetabular osteotomy - PAO).

This type of surgery has been performed at only a few hospitals, and especially for periacetabular osteotomies, it requires specialized expertise.

Hip arthroscopies are performed for various indications, with the most frequent being femoroacetabular impingement syndrome (a triad of symptoms, clinical and imaging findings), loose bodies, synovial disorders, or as a result of sequelae of pediatric hip diseases that do not involve impingement.

Periacetabular osteotomies are performed when an acetabular dysplasia has been identified, either due to known hip dysplasia or due to undiagnosed hip dysplasia.

Other open surgeries include femoral osteotomies for torsion and/or axis deviations and impingement surgery through surgical hip dislocation.

Table 23: Number of open procedures and hip arthroscopies in the registry per year

Year	Hip arthroscopy	Open procedures	Total number of surgeries
2023	164	20	184
2022	86	41	127
2021	116	43	159
2020	60	41	101
2019	80	59	139
2017	0	1	1

Table 24: Distribution of open hip surgeries (including PAO) and hip arthroscopies recorded in 2023 by hospitals

Hospital	Hip arthroscopy	Open procedures	Total number of surgeries
Aleris_Frogner	22	0	22
OUS	74	0	74
Kysthospitalet	33	20	53
St. Olavs hospital	15	0	15
Ålesund	1	0	1
Aleris_Rosenborg	19	0	19

Table 25: Demographic data for patients reported with open procedures

Open procedure n=205		
	Mean (sd)	Min-Max
Age	25.7 (8.4)	12-45
Age groups	n	%
10-20 years	69	33.7
21-30 years	69	33.7
31-40 years	57	27.8
41-50 years	10	4.9
>50 years	0	0
Gender	n	%
Men	50	24.4
women	155	75.6
Type of procedure	n	%
Intraarticular	16	7.8
Extra-articular	189	92.2
Procedure	n	%
Periacetabular osteotomy	170	82.9
Varus-valgus femoral osteotomy	34	16.6
Other	14	6.8

Table 26: Lateral Center Edge (LCE) Angle

Periacetabular osteotomy (PAO) n=170		
LCE angel categori	n	%
< 0	14	8.2
0-10	12	7.1
11-15	43	25.3
16-20	60	35.3
21-25	12	7.1
> 25	28	16.5
Missing	1	0.6
Varus-valgus femoral osteotomy n=34		
LCE angel category	n	%
< 0	3	8.8
0-10	1	2.9
11-15	6	17.6
16-20	5	14.7
21-25	2	5.9
> 25	13	38.2
Missing	4	11.8

Table 27: Demographic data for patients operated with hip arthroscopy

Hip arthroscopy n=506		
	Mean (sd)	Min-Max
Age	31.9 (10.6)	14-77
Age groups	n	%
10-20 years	68	13.4
21-30 years	182	36
31-40 years	157	31
41-50 years	77	15.2
>50 years	22	4.3
Gender	n	%
Men	293	57.9
Women	213	42.1
LCE angel category	n	%
<20	11	2.2
20-25	77	15.2
26-35	280	55.3
>35	124	24.5
Missing	14	2.8
Indication for surgery	n	%
Femoroacetabular impingement (FAI)	387	76.5
Labral injury of unknown etiology	79	15.6
Acetabular dysplasia (including version anomalies)	41	8.1
Femoral dysplasi/malrotation	9	1.8
Sequelae of pediatric hip joint disease	13	2.6
Extra-articular cause	9	1.8
Other	58	11.5
Procedures performed	n	%
Cam resection only	197	38.9
Cam + Pincer	82	16.2
Labrum only	49	9.7
Other/Missing	178	35.2

Open and arthroscopic procedures in young adults PROM

For young adult hips, PROMs are sent to patients at 1, 2, 5, and 10 years postoperatively for both open and arthroscopic procedures. The PROMs used are EQ-5D-5L, a generic tool, and IHOT-12, a condition-specific tool developed for young, active patients with hip problems.

The EQ-5D-5L includes five questions with five response options for each question. It assesses mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Additionally, it features a VAS scale from 0 to 100, where patients rate their current health state, with 0 being the worst imaginable health and 100 the best imaginable health.

The IHOT-12 consists of 12 questions about hip-related symptoms and issues in various activities. Responses are given on a continuous scale ranging from extreme/severe symptoms (0 points) to no symptoms/problems (100 points). Scores for each question are averaged to produce an overall score between 0 and 100.

Data for PROMs at 1 year postoperatively are presented. For EQ-5D, we have chosen to present the proportion of patients reporting symptoms/problems. These responses are aggregated due to the current low response numbers.

Over time, we will be able to track scores at 2, 5, and 10 years postoperatively to observe any changes.

Figure F.32: Young adults - Proportion of reported problems with mobility, self-care, usual activities, pain, or anxiety 1 year after open procedure (EQ-5D-5L) (N=59)

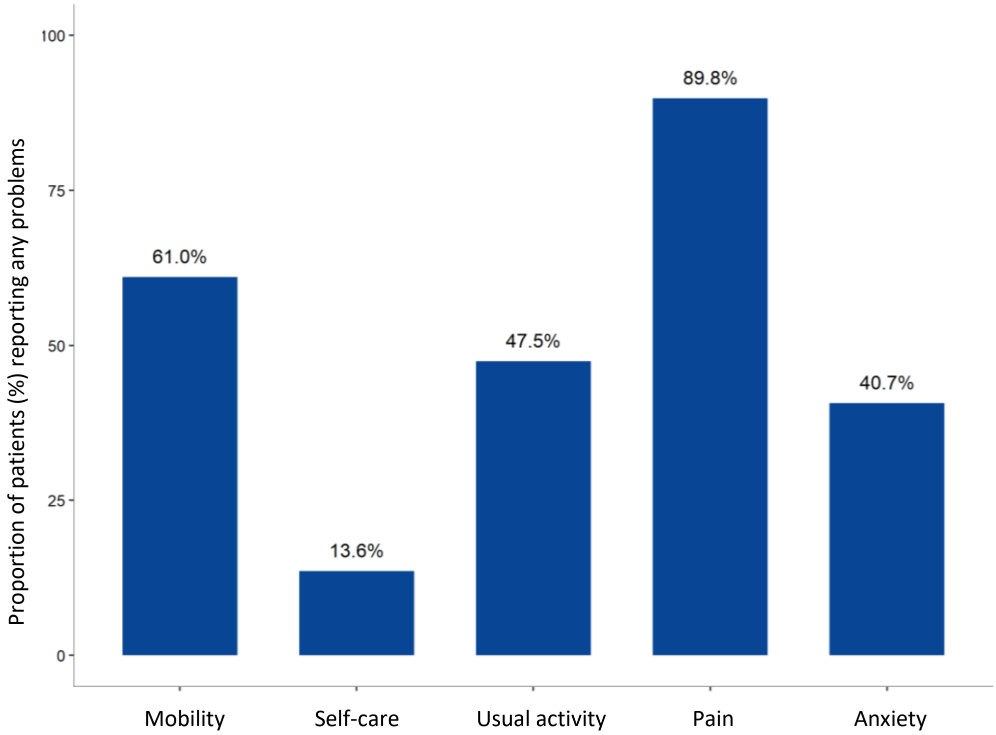


Figure F.33: Young adults - Proportion of reported problems with mobility, self-care, usual activities, pain, or anxiety 1 year after hip arthroscopy (EQ-5D-5L). (N=160)

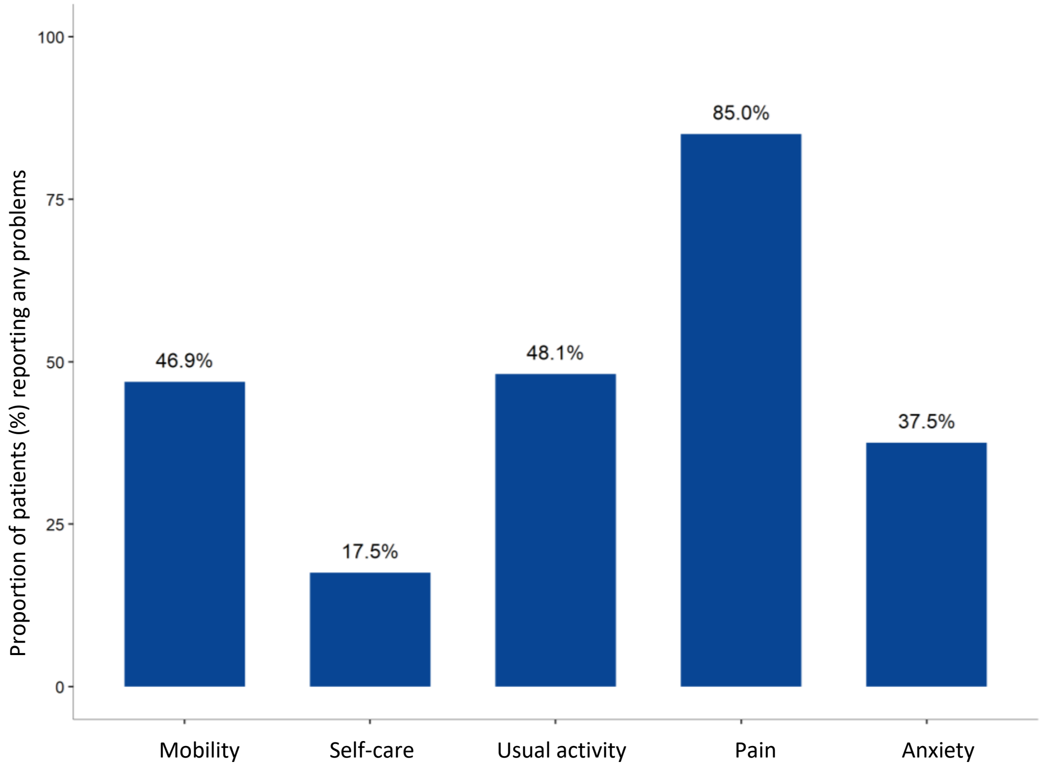
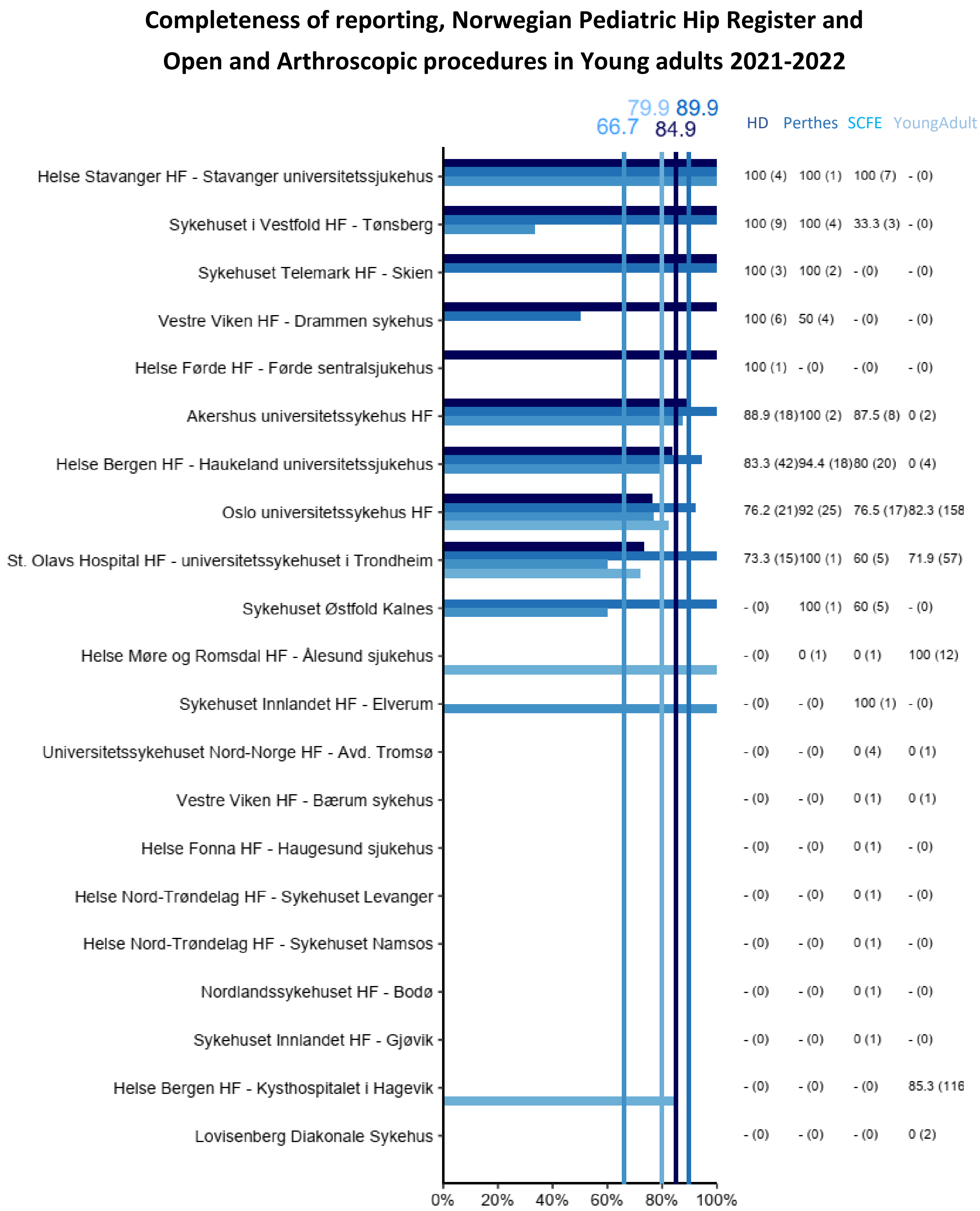


Table 29: Young adults – PROM IHOT-12 - 1 year after Open procedure

Hospital	N	IHOT-12 score	min-max
National	59	64.7	8.7-98.3
Kysthospitalet	28	67.2	23.8-98.2
OUS	31	62.4	8.7-96.3

Table 30: Young adults – PROM IHOT-12 - 1 year after Hip artroscopy

Hospital	N	IHOT-12 score	min-max
National	160	62.4	10.3-99.6
Kysthospitalet	49	72.1	22.6-99.6
OUS	63	58.6	10.3-96.5
St. Olavs	37	59.2	12.9-99.3
Ålesund	11	52.1	10.3-83.5



The completeness is reported for the years 2021–2022. This analysis is conducted every other year and involves linking the registry's data with data reported by your hospital to the Norwegian Patient Register (NPR).

The completeness is calculated only for inpatients and does not reflect the completeness of Perthes disease and Hip dysplasia, which are followed up exclusively in outpatient clinics.

To ensure high data quality, a minimum completeness rate of 80% is required for all groups. Most hospitals have a small number of patients in each group, so the goal is to achieve a completeness of over 90% at all hospitals to include as many patients as possible in the registry. If your hospital's completeness rate is lower than desired, we ask that measures be taken to ensure the registration of these patients.

Previously, completeness calculations were only performed for admitted/operated patients. For the 2021/2022 completeness analyses, this has been extended to include outpatient patients for the first time, with a protocol developed for this purpose.

In 2023, completeness analyses for outpatient patients were also conducted in collaboration with the Norwegian Patient Register (NPR). This is particularly challenging for patients diagnosed with hip dysplasia. In the ICD-10 coding system, the code Q65.8 is used for patients with pure acetabular dysplasia with the hip in place. This diagnosis indicates "other congenital deformities of the hip" and is also used for several other conditions unrelated to hip dysplasia.

Additionally, children coded at birth with unstable, subluxable, or dislocated hips may normalize by 4–6 months of age when the first X-ray is taken. These children will also have this diagnosis code but should not be included in our registry.

Therefore, completeness analyses against the NPR were performed with the criterion that the child must be over 6 months old and have at least three consultations with the same specified diagnosis within 18 months. This approach helps filter out patients reported to NPR but likely have other hip deformities or congenital instability that normalizes before 6 months of age.

For 2021/2022, completeness analyses were conducted for patients registered in the adult hip section of the registry. This had not been done previously.

Dropout analyses are also planned at four hospitals: Haukeland University Hospital, Stavanger University Hospital, Oslo University Hospital, and St. Olav's Hospital. These analyses will examine patients reported to NPR with the three relevant diagnoses in the pediatric hip registry. By reviewing medical records and X-rays, it will be assessed whether these patients should have been reported to the registry or if they fall outside the inclusion criteria.

Table 32: Hip dysplasia, outpatients

Place of treatment	Both	Only NPHR	Only NPR	Total	NPHR (%)	NPR (%)
Oslo universitetssykehus HF	2	14	4	20	80,0	30,0
Ahus, Nordbyhagen	14	2	1	17	94,1	88,2
Sykehuset i Vestfold, Tønsberg	9	0	0	9	100,0	100,0
Sykehuset Østfold, Kalnes	0	0	3	3	0,0	100,0
Vestre Viken, Drammen	3	3	2	8	75,0	62,5
Sykehuset Telemark, Skien	3	0	0	3	100,0	100,0
Helse Bergen, Haukeland	25	10	36	71	49,3	85,9
Helse Førde, Førde	0	1	1	2	50,0	50,0
Helse Stavanger, Stavanger	3	1	1	5	80,0	80,0
St. Olavs hospital, Trondheim	6	5	1	12	91,7	58,3
UNN, Tromsø	0	0	4	4	0,0	100,0
Total	**65**	**36**	**53**	**154**	**65,6**	**76,6**

Table 33: Perthes disease, outpatients

Place of treatment	Both	Only NPHR	Only NPR	Total	NPHR (%)	NPR (%)
Oslo universitetssykehus HF	7	16	20	43	53,5	62,8
Ahus, Nordbyhagen	2	0	6	8	25,0	100,0
Sykehuset i Vestfold, Tønsberg	2	2	7	11	36,4	81,8
Sykehuset Innlandet, Lillehammer	0	0	2	2	0,0	100,0
Sykehuset Innlandet, Elverum	0	0	1	1	0,0	100,0
Sykehuset Innlandet, Gjøvik	0	0	1	1	0,0	100,0
Sykehuset Østfold, Kalnes	1	0	0	1	100,0	100,0
Sykehuset Østfold, Moss	0	0	1	1	0,0	100,0
Sørlandet sykehus, Arendal	0	0	2	2	0,0	100,0
Sørlandet sykehus, Kristiansand	0	0	1	1	0,0	100,0
Vestre Viken, Drammen	2	0	10	12	16,7	100,0
Vestre Viken, Kongsberg	0	0	1	1	0,0	100,0
Vestre Viken, Ringerike	0	0	1	1	0,0	100,0
Sykehuset Telemark, Porsgrunn	2	0	2	4	50,0	100,0
Helse Bergen, Haukeland	13	4	6	23	73,9	82,6
Helse Bergen, Skadepoliklinikken	0	0	1	1	0,0	100,0
Helse Fonna, Haugesund	0	0	1	1	0,0	100,0
Helse Stavanger, Stavanger	1	0	6	7	14,3	100,0
Helse Møre og Romsdal, Ålesund	0	0	3	3	0,0	100,0
St. Olavs hospital, Trondheim	1	0	2	3	33,3	100,0
Helgelandssykeh., Sandnessjøen	0	0	1	1	0,0	100,0
UNN, Tromsø	0	0	3	3	0,0	100,0
Finnmarkssykehuset, Kirkenes	0	0	1	1	0,0	100,0
Total	**31**	**22**	**79**	**132**	**40,2**	**83,3**

PUBLICATIONS

Full list of publications on our website **https://www.helse-bergen.no/nrl**

PhD thesis (64 from 1995 to June 2024)

Norwegian Arthroplasty Register (33 from 1995 to June 2024)

PhD thesis from 2021 to June 2024 (3)

Thoen PS. Advancements in total hip arthroplasty - polyethylene, articulation and factors associated with dislocation [dissertation]. 2022 University of Oslo; Oslo, Norway

Øhrn FD. Contemporary total knee arthroplasty: Designs and surgical methods [dissertation]. 2022 NTNU; Norway

Mjaaland KE. The anterior approach in total hip arthroplasty. Assessment of the approach and comparison to other approaches [dissertation]. 2021 University of Oslo; Oslo, Norway

Norwegian Hip Fracture Register (11 from 1995 to June 2024)

PhD thesis from 2021 to June 2024 (6)

Bartels S. Functional outcome and complications after surgical treatment of displaced low-energy femoral neck fractures in patients between 55 and 70 years [dissertation]. 2024 University of Oslo; Oslo, Norway

Grønhaug KM. Intramedullary nailing in the treatment of trochanteric and subtrochanteric fractures [dissertation]. 2023 University of Bergen; Bergen, Norway

Kjærvik C. Hip fractures in Norway - Inequity in treatment and outcomes [dissertation]. 2022 University of Tromsø; Vesterålen, Norway

Pollmann C. Improving outcomes in hip fracture patients [dissertation]. 2022 University of Oslo; Oslo, Norway

Kristoffersen MH. Hip fracture in patients with cognitive impairment [dissertation]. 2021 University of Bergen; Bergen, Norway

Leer-Salvesen S. Timing of anticoagulation and surgery for hip fracture patients [dissertation]. 2021 University of Bergen; Bergen, Norway

Norwegian Knee Ligament Register (11 from 1995 to June 2024)

Norwegian National Network for Arthroplasty and Hip Fractures (9 from 1995 to June 2024)

PhD thesis from 2021 to June 2024 (4)

Olsen U. Advancing the understanding of preoperative factors and patient experience related to pain and physical function after total knee arthroplasty [dissertation]. 2024 University of Oslo; Oslo, Norway

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Oral presentations/Abstracts/Posters between 2023 and June 2024 (44)

Norwegian Arthroplasty Register (29)

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Fenstad AM. Erfaringer fra kobling av registre. Halvårssamling for medisinske kvalitetsregistre i Helse Vest;2024 21 Mars; Bergen

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Mikaelsen JR, Røtterud JH, Jakobsen RB, Fenstad AM, Randsborg PH. Effekten av kroppsmasseindeks (kmi) på revisjonsraten 2–7 år etter kneprotese. Høstmøtet i Norsk Ortopedisk Forening; 2023 25.–27. Oktober; Oslo

Birkenes T, Furnes O, Lygre SHL, Solheim E, Årøen A, Knutsen G, Drogset JO, Heir S, Engebretsen L, Løken S, Visnes H. Tidligere fokal bruskskade er assosiert med dårligere pasientrapportert resultat etter kneprotese. Høstmøtet i Norsk Ortopedisk Forening; 2023 25.–27. Oktober; Oslo

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Gjertsen JE. Metall eller keramikk i artikulasjonen ved hofteproteser? Høstmøtet i Norsk Ortopedisk Forening; 2023 25.–27. Oktober; Oslo

Furnes O. ALBA-studien. Fagdag Ortopedisk avdeling Haukeland Universitetssykehus; 2023 09. Juni; Bergen

Furnes O. Thirty years follow-up of three commonly used femoral stems in the Norwegian Arthroplasty Register 1987–2021. International Hip Society 17.–20. May; Boston, USA

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Gjertsen JE. Nytt utreiseskjema i Nasjonalt Hoftebruddregister. Høstmøtet i Norsk Ortopedisk Forening; 2023 25.–27. Oktober; Oslo

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Norwegian Knee Ligament Register (3)

Vindfeld S, Persson A, Fenstad AM, Lindager L, Visnes H, Inderhaug E. Årsaker til revisjon etter fremre korsbåndsrekonstruksjon i Norge i perioden 2004–2022. Høstmøtet i Norsk Ortopedisk Forening; 2023 25.–27. Oktober; Oslo

Persson A. Trender og tendenser fra Nasjonalt Korsbåndsregister. Artroskopiforeningens Vintermøte: 2023 3.–5. Februar, Kvitfjell

Visnes H. Siste nytt innen korsbåndskirurgi. Vestlands Ortopedisk Forum (VOF): 2023 26.–27. Januar, Haugesund.

Norwegian Paediatric Hip Register (2)

Gundersen T. Hofteleddsdysplasi - tall fra Barnehofteregisteret. Høstmøtet i Norsk Ortopedisk Forening; 2023 25.–27. Oktober; Oslo

Håberg Ø, Foss OA, Gundersen T, Lian ØB, Hoel MS, Holen KJ. Insidensen av senoppdaget hofteleddsdysplasi. Høstmøtet i Norsk Ortopedisk Forening; 2023 25.–27. Oktober; Oslo

Clinical studies related to Norwegian National Network for Arthroplasty and Hip Fractures (4)

Skåden Ø, Furnes O, Moldestad I, Høl PJ, Fenstad AM, Lygre SHL, Gøthesen ØJ. Lik migrasjon for totalprotese operert med robotisert computer navigasjon og konvensjonell teknikk. Høstmøtet i Norsk Ortopedisk Forening; 2023 25.–27. Oktober; Oslo

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Registration forms

All hospitals have fully or partially transitioned to electronic registration (MRS). This year's report will therefore be the first without including paper forms. These forms have not been updated since the transition to electronic registration and therefore do not capture all the data we request.

All variables with explanations and definitions are available in MRS. We are in the process of defining metadata. This has been completed and published under “variabelbibliotek” on helsedata.no for Norwegian Arthroplasty Register. The other three registries will follow later this year.

See also our own website https://www.helse-bergen.no/nrl