Nasjonalt Register for Leddproteser

Nasjonalt Hoftebruddregister

Nasjonalt Korsbåndregister

Nasjonalt Barnehofteregister

NASJONAL KOMPETANSETJENESTE
for leddproteser og hoftebrudd

REPORT

2021

Norwegian National Advisory Unit on Arthroplasty and Hip Fractures

Norwegian Arthroplasty Register
Norwegian Cruciate Ligament Register
Norwegian Hip Fracture Register
Norwegian Paediatric Hip Register

Helse Bergen HF, Department of Orthopaedic Surgery,
Haukeland University Hospital
http://nrlweb.ihelse.net

ISBN: 978-82-91847-26-7
ISSN: 1893-8906 (Printed version)
1893-8914 (Online)

CONTENTS

Introduction 5

Norwegian Arthroplasty Register

Total hip replacement 9

Knee prostheses 71

Elbow prostheses 151
Ankle prostheses 157
Finger joint prostheses 161
Wrist prostheses 167
Carpometacarpal prostheses (CMC I) 171
Lumbar disc prostheses 173
Shoulder prostheses 175
Toe joint prostheses 199

Norwegian Hip Fracture Register 215

Norwegian Cruciate Ligament Register 281

Norwegian Paediatric Hip Register 321

List of publications 339

Operation forms (in Norwegian)

Total hip prosthesis 382
HOOS – questionnaire for hip patients 384
Knee and other joint prostheses 388
Hip fracture 390
Hip fracture – patient questionnaire 4 months post-operative 392
Cruciate ligament 398
Cruciate ligament – KOOS 400
Paediatric hip 404

NORWEGIAN NATIONAL ADVISORY UNIT ON ARTHROPLASTY AND HIP FRACTURES: ANNUAL REPORT

This annual report presents results and descriptive statistics up to and including 2020 from our four registers. The ongoing COVID-19 pandemic has affected orthopaedic patients differently; this may be seen in the figures in the reports from the individual registers, where the numbers of operations in each month in 2020 are compared with the figures for 2019. Hip, knee and shoulder arthroplasty in March, April and May 2020 fell to 54% (from 5592 to 3145) of the number of arthroplasties in 2019. More patients underwent surgery in autumn 2020 than in autumn 2019, but this was not enough to make up for the decrease. The final annual figure was 11.6% fewer arthroplasties in 2020 than in 2019. It is important to discuss how this can be avoided in any new pandemic. There is a need for studies on how this has affected functioning, pain and quality of life and whether it has impaired the long-term prognosis for these patients. We hope that hospitals will conduct studies in this area.

In 2020, 1622 primary ACL reconstructions were recorded, which was a decrease of 15% from the 2019 figure of 1918. There was also a marked decrease (7.5%) in the number of hip fractures reported to the Hip Fracture Register in 2020. However, it has come to our attention that several hospitals have had difficulty in obtaining consent from patients, which is a more likely explanation for the lower figures than the COVID-19 pandemic. There do not appear to be significant changes related to the COVID-19 situation in surgeries reported to the Paediatric Hip Register. We have noted a decrease in the number of registered patients in August 2020 compared to 2019, but we are unable to connect this with any certainty to the health care services available at that time.

Please also consult the introductions to the reports of the individual registers.

Results aimed at the general public are published on 20 June each year on the website of the National Service Centre for Medical Quality Registers (http://www.kvalitetsregistre.no/resultater/). Some of these results are included in this annual report.

This report is sent electronically to all orthopaedic surgeons in Norway. Paper copies can be obtained by contacting the Norwegian Arthroplasty Register. The National Advisory Unit website http://nrlweb.ihelse.net/ contains all our annual reports and references to our scientific papers and presentations. Most of the papers are also available electronically from this website. We publish most of our findings on implants and surgical methods in scientific journals. Here, we can account for materials and methods and discuss strengths and weaknesses and the significance of our findings. Please see the reference lists at the end of this report.

New this year are registry-based randomised controlled trials (RRCTs). The ALBA trial (Antibiotic-Loaded Bone Cement in Prevention of Periprosthetic Joint Infections in Primary Total Knee Arthroplasty) started to include patients in January 2021 and the aim is to include 9172 patients. By 30 April, 47 patients had been included.

The Cruciate Ligament Register is currently starting two RRCTs. Participation will require online registration in the medical registration system (MRS) in the Norwegian Health Network. We have created a randomisation solution in the MRS using HEMIT (Helse Midt-Norge IT). This is an important infrastructure for new studies and will be of interest to everyone involved in Norwegian orthopaedics. Following our efforts, we now hope that all Norwegian hospitals will take part.

The Norwegian Arthroplasty Register and the Norwegian Hip Fracture Register are collaborating on two national quality improvement projects. The goal is for all women >75 years receiving THA and all patients over 70 receiving arthroplasty for a hip fracture to have a cemented femoral component. Eighteen hospitals are participating in the project and the proportion of women over 75 receiving THA with a cemented femoral stem increased from 66.1% in 2017 to 85.5% in 2020. Cemented hemiarthroplasty for hip fractures has increased from 86.6% to 95.7% in 2020. Many thanks to everyone involved for your great efforts!

Hospital-based annual reports, with data from each hospital, will as before be sent electronically to our contact persons at the hospitals and to the director of each health trust in October. We encourage our contacts to pass on the reports to the hospital administration and to their colleagues, and to check that the number of operations registered and the data are correct. The reports should be used for local improvement work. Please contact us if you find any errors in the hospital reports.

A coverage analysis is published for each of the registers every second year. The analyses were not updated this year and we present the same figures as in last year's report for the years 2017 and 2018. However, the Paediatric Hip Register has updated figures for 2019 and 2020. Hospitals with low reporting rates need to review their reporting procedures. Some hospitals have low reporting of revisions.

The Cruciate Ligament Register has developed electronic (web-based) recording of the surgeon's form in the MRS. This is now being used is more than half of the hospitals, and 60% of patients are reported to the MRS. A bar code scanner is used to read information on implants. A corresponding system has now been developed for shoulder and knee arthroplasty and is being used at Haukeland University Hospital and the Coastal Hospital in Hagevik. The MRS solution for hip arthroplasty will soon be completed and we would like hospitals to start using it. In the Paediatric Hip Register, all patient data are recorded electronically by the surgeons. Please remember that adult hip surgery (osteotomy and arthroscopic surgery) must also be entered in the Paediatric Hip Register. The electronic form for the Hip Fracture Register has been used at Haukeland University Hospital and we hope that other hospitals will be able to use it in 2021. We will provide further information about this at a later date. Electronic recording of patient-reported outcome measures (PROMs) for hip and knee arthroplasty is now operative in 28 hospitals and we have a consultant responsible for teaching staff at the hospitals how to use the system. We would ask hospitals to prepare for collection of PROM data from patients undergoing hip, knee or shoulder arthroplasty. We are working on a PROM solution for patients receiving implants in other joints. Our goal is for all hospitals and patients to complete the PROM form before surgery and one, six and ten years after surgery. The instructions are available on our website http://nrlweb.ihelse.net/

Please remember that the Norwegian Data Protection Authority requires statements of consent to be signed by patients before operations are reported to the registers, and the statements must be stored in a secure archiving system. From 1 June 2021, operations may be recorded in the Hip Fracture Register without patient consent. However, patients must be informed of their right to refuse to consent. Our contact persons in hospitals will receive detailed information on how this must be done to ensure that patients have a real right to refuse. See also the introduction to the Annual Report of the Hip Fracture Register.

The National Advisory Unit has its own Facebook page, which we hope you will visit and follow. Please see https://www.facebook.com/leddregisteret/ or use the QR code on the back of this year's report. This page will contain information on published studies and other important information from the Arthroplasty Register.

We would like to thank all orthopaedic surgeons in Norway for good reporting to the registers. We are also grateful for good cooperation with all the hospital contact persons for the various registers, the reference group and the advisory committees, the Norwegian Orthopaedic Association, Helse Bergen, Helse Vest, the Centre for Clinical Documentation and Evaluation (SKDE) and the knowledge centres of Helse Vest, Helse Midt-Norge IT (HEMIT) and Helse Vest IKT via the National Service Centre for Medical Quality Registers, the equipment suppliers, the University of Bergen, the Norwegian Patient Register, the Norwegian Institute of Public Health, the Office of the Auditor General, the Norwegian Medicines Agency, the Directorate of Health and the Ministry of Health and Care Services.

Bergen, 20 May 2021

Ove Furnes
Chief Physician/Professor
Head of National Advisory Unit
Head of Norwegian Arthroplasty Register

Jan-Erik Gjertsen
Chief Physician/Associate Professor
Head of Hip Fracture Register

Geir Hallan
Chief Physician/Professor
Hip Arthroplasty

Håvard Visnes
Specialist Physician
Head of Cruciate Ligament Register

Trude Gundersen
Chief Physician/Associate Professor
Head of Paediatric Hip Register

Irina A. Kvinnesland
IT Consultant

Anne Marie Fenstad
Biostatistician/researcher
Deputy Head of National Advisory Unit

Eva Dybvik
Biostatistician/researcher

Gard Kroken
Biostatistician/researcher

CONTENTS

Norwegian Arthroplasty Register

Total Hip Replacement

Introduction... 11
Covid-19, operations by health trust 15
Survival of total hip prostheses, fixations 16
Survival of total hip prostheses, approach/articulation/head sizes 19
Last 10 years survival curves for all hospitals individually 20
One stage bilateral hip prosthesis operations 21
Fixation for women over 75 years 21
Number of primary operations in hip 2019 22
Percentage non-revised patients two years after operations 23
Percentage non-revised patients ten years after operations 24
How to interpret the hospital-based results 25
Percentage non-revised patients ten years after operations, funnelplot 26
Durability of hip replacements 2008-2019 27
How to interpret the prosthesis results 28
Portion of women over 75 years with cemented femur in 2019 29
Portion of patients with strong cup materials in 2019 30
Portion of patients with atibiotica prophylaxis as given by the guidelines in 2019.. 31
Portion of Portion of patients recieving well documented hipstem in 2019 32
Portion of Portion of patients recieving well documented hipcup in 2019 33
PROM in the hip arthroplasty register 34
Annual numbers and incidence of total hip replacements 37
Reasons for primary operations 39
Age by year of operation 39
Reasons for revisions 40
Type of revision 42
Bone transplantation in revisions 43
Bone loss in revisions 44
Surgical approach 45
Mini invasive surgery 45
Trochanteric osteotomy 47
Systemic antibiotic prophylaxis 47
Fixation in primary operations 48
Fixation in revisions 50
Type of fixation and bone transplantation in revisions 51
Cements 52
Cemented primary prostheses 53
Uncemented primary prostheses 54
Hybrid primary prostheses 55
Acetabular prostheses 56
Femoral prostheses 58
The 7 most used prostheses at primary operations the last 5 years 60
Femoral head diameter 61
Femoral head prostheses 62
Dual Mobility articulation 63
ASA classification 63
Thrombosis prophylaxis 64
Articulations (primary operations) All patients 66
Vancouver classification 67
Completeness analysis 2017-2018 68

HIP ARTHROPLASTY REGISTER: ANNUAL REPORT 2020

Our register still has excellent national reporting rates at over 97% of primary operations and 93% of revisions. Thank you very much for very good reporting!

In 2020, for the first time in the history of the register, we saw a decline in reported operations compared with the previous year. In 2020, 8538 primary operations, 93 reoperations without replacement and 1248 revisions were recorded. The figures are comparable to 2015 in size, but represent a decrease of 14% compared to 2019. The reason for the reduced activity was the COVID-19 pandemic that hit the country in March 2020. The reduction was most pronounced in March, April and May, which may be seen on page 15 of this report. Activity figures are also presented by region; here we see that all regions had significantly lower activity in March and April. In May, some regions were close to full activity again, while others still had a considerable reduction. There was also a fall in activity in October, but we have no obvious explanation for this. We see that the reduction in October was only for arthroplasty of the hip, not other joints. The activity of private surgeons showed a clear increase in 2020, and they were less affected by the pandemic in March and April. One might not expect the number of patients to decrease because of the pandemic, but there was a reduction from 613 THAs for hip fracture in 2019 to 512 in 2020. We do not know the reason for this, but it may be because THA patients are a different type of patient than those undergoing hemiarthroplasty and that reduced general activity, less travel, etc. may have lowered the risk of fractures in this group. It could also be because surgeons chose THA for hip fractures to a lesser degree than in the previous year.

Some patients have probably avoided seeing their doctor and voluntarily postponed surgery due to the risk of infection. However, we fear that some patients have had to and still have to wait longer for their planned operation due to the pandemic. There is also a clear reduction in revision surgery, and many patients in this group will suffer particularly badly from the increased waiting time.

There are no obvious changes in surgical trends. The posterior approach still dominates (72%). In 13.7% of patients, the anterolateral approach is used (Watson-Jones) while the anterior approach (Smith-Petersen) accounts for 9.3% of patients. We have seen a gradual increase in the anterior approach over the last five years. The direct lateral approach was used in only 226 patients (2.6%) in 2020. The lateral approach is still used in almost 20% of revisions. 32mm heads still dominate, but there is still an increase in the use of 36mm heads. No advantages were found by using 36mm compared to 32mm in a study based on NARA data (Tsikandylakis G et al., 2020). Heads larger than 36mm are used sporadically (7 in 2020), and we believe it is wise to limit the use of the largest heads. Dual mobility is increasing gradually, both in primary and revision surgery. In 2020, 939 dual mobility cups were used, which equates to almost one in ten patients. NARA studies on osteoarthritis and fracture patients have found that dual mobility cups in primary arthroplasty have good results (Kreipke R 2019, Jobory A 2019). The use of ceramic heads and ceramic-ceramic articulation is declining in favour of metal on XLPE. This also finds support in the literature since cross-linked polyethylene is used. There is no difference in risk of revision between ceramic on XLPE and metal on XLPE articulations in our register for patients operated on from 2010 to 2020 (Figure A.19), or in other registers with up to 20 years of follow-up.

We have completed a quality improvement project in which we have attempted to convince orthopaedic surgeons to use cemented stems in women over 75 years. We are pleased to note the increase in the use of cemented stems from 66% to 86% in this patient group. Please also remember that most registers find that older men also have better outcomes with cemented stem fixation.

As before, many results are presented both in this report and on the interactive website of SKDE. This applies to hospital results for prosthetic survival, results of different prosthetic combinations, reporting rates for primary and revision operations, and the extent to which hospitals meet the quality indicators.

Results are generally good, with 95% prosthetic survival after 10 years for the country as a whole. There is less variation than previously. Results for each hospital can be seen in Figure A.28. In Figure A.29, we can see that this year no hospital is below the 99.8 percentile, which is good news. This suggests that the tendering processes are working well, and that good prostheses have been used in the past 10 years. We recommend that all hospitals, especially those with the poorest prosthetic survival rates, carefully study their own results (in the hospital-based report) to identify where the problem lies. We would be more than happy to contribute to this work.

Survival graphs where the curves intersect do not fulfil the requirements of the Cox regression model, which assumes that the difference between the groups is constant over time. The Cox regression model is used to calculate the risk ratio, and the risk ratios indicated in such figures (Figures A1-A20) must therefore be interpreted with caution.

We record PROMs for hip arthroplasty, both primary operations and revisions. PROMs are still only provided by 28 hospitals, and this reporting is thus far lower than the reporting of the surgery itself. It would seem that the register currently has the greatest potential for improvement in the area of PROMs. It is especially important that hospitals ensure that the preoperative PROMs are recorded. There are now solutions that allow patients to complete the preoperative PROM electronically prior to preoperative clearance. The later PROMs (after one, six and ten years) are completed via helsenorge.no without involvement of the hospital. For assistance with PROM registration, please see the instructions on our website, or contact our consultant Mikal Solberg on 905 83 174 or the register administration on 55973742/43.

For knee and shoulder arthroplasty and for hip fractures, electronic recording has started. We expect this to include hip arthroplasty during 2021. Everyone who needs to register operations must create a user account in the Norwegian Health Network at www.helseregister.no. See separate guidelines for surgeons.

PUBLICATIONS 2020-21

Van Steenbergen L et al. compared patient demographics, procedural characteristics and short-term hip replacement survival in NARA and the Dutch Arthroplasty Register (LROI). Fewer patients under the age of 55 and fewer with diagnoses other than primary osteoarthritis were found in the Netherlands. The Netherlands was most similar to Denmark in terms of procedural characteristics, and had similar short-term results to the Nordic countries.

Høl P et al. prospectively studied changes in metal ions in the blood of patients with Birmingham Hip Resurfacing (BHR), and found that levels stabilised one year after implantation, and that the median values of Co (1.1 µg/L) and Cr (1.4 µg/L) were well below the threshold (7 µg/L). For patients with bilateral BHR, the values were approximately double. Five of 44 patients (all males) were revised before the five-year follow-up, all with metal values below the threshold. Patients with high values (n = 5) had no clinical or radiological signs of metal-related pathology.

Pollmann CT et al. studied whether surgical approach affected functioning following debridement, antibiotics and implant retention (DAIR) in infected hip implants. They found that patients operated with the posterior approach (both primary and DAIR) had better functional scores, greater satisfaction, lower likelihood of limping and better quality of life than patients operated using the lateral approach.

Halvorsen V et al. published a clinical review article on hip disorders in children and young people in the Journal of the Norwegian Medical Association. Emphasis was placed on assessment and treatment of the most common disorders, and it was pointed out that 10-year survival of hip prostheses in patients below 21 years has improved in the last couple of decades to >90%.

Dale H et al. studied the risk of revision due to infection after hip replacement. Previously, a significant increase in this risk has been seen throughout the history of the register. The authors found that this was mainly due to a rise in the number of early revisions, and that the increase in risk levelled off from around the year 2010.

Hallan G et al. studied the rare complication of ceramic fracture. Factors associated with fracture of a ceramic head were alumina ceramics, a small head (<32mm), ceramic-ceramic articulations, short neck/head length and male gender. Fractures occurred in about one in 1000 patients with a ceramic head, and there were very few fractures with delta ceramics and heads larger than 28mm.

Langvatn H et al. studied the relationship between ventilation in the operating room and the risk of revision due to infection. They found a lower risk (RR=0.8) in patients operated on in rooms with high-volume vertical laminar air flow (LAF) than in conventional operating rooms. Other types of systems, e.g. horizontal LAF and low-volume LAF, did not have this effect.

Tsikandylakis G et al. compared results between 36mm and 32mm heads used in hip fracture patients in a Nordic database (NARA), and found no differences between the two head sizes with the endpoints of ‘all revisions’ or ‘revision due to dislocation’. However, it is possible that patients selected for a 36mm head had a higher risk of dislocation.

Dale H et al. studied mortality in relation to different methods of fixation in hip arthroplasty in different age and gender groups. They found that perioperative death (three days) was rare (30/100 000), and was associated with patient factors (old age and ASA class), but not with the method of fixation.

Dale H et al. also studied risk of revision with different fixation methods in patients grouped by gender and age. All patients had well-documented prostheses that were still in use. They found that uncemented prostheses had a somewhat higher risk of revision, which was mainly due to periprosthetic fractures and dislocation in women aged 55 and above.

Langvatn H et al. validated the register data on type of operating room ventilation and found errors related to 12% of surgeries, i.e. a different type of ventilation had been reported than that actually used. Surgeons thus did not always know what kind of ventilation was used when they were operating, and this inaccurate reporting must be taken into account when we study the influence of type of ventilation on results.

Congratulations to Håkon Langvatn for successfully defending his dissertation "Infected total hip arthroplasty. Bacteriology and the role of operating room ventilation in the reduction of postoperative infection".

Bergen, 20 May 2021

Geir Hallan
Chief Physician/Professor
Hip Arthroplasty

Anne Marie Fenstad
Biostatistician

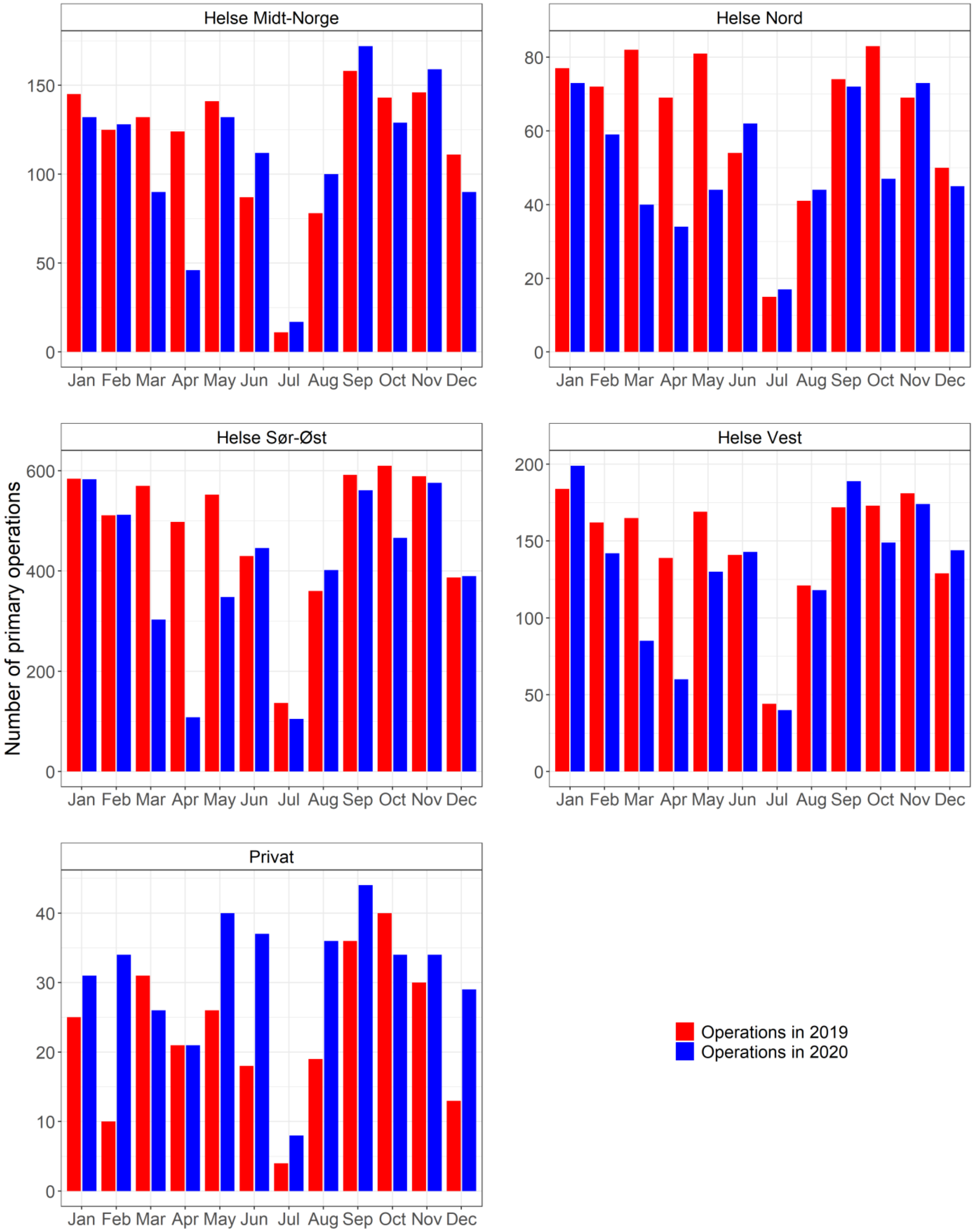
Merete Husøy
Consultant

Irina Kvinnesland
IT Consultant

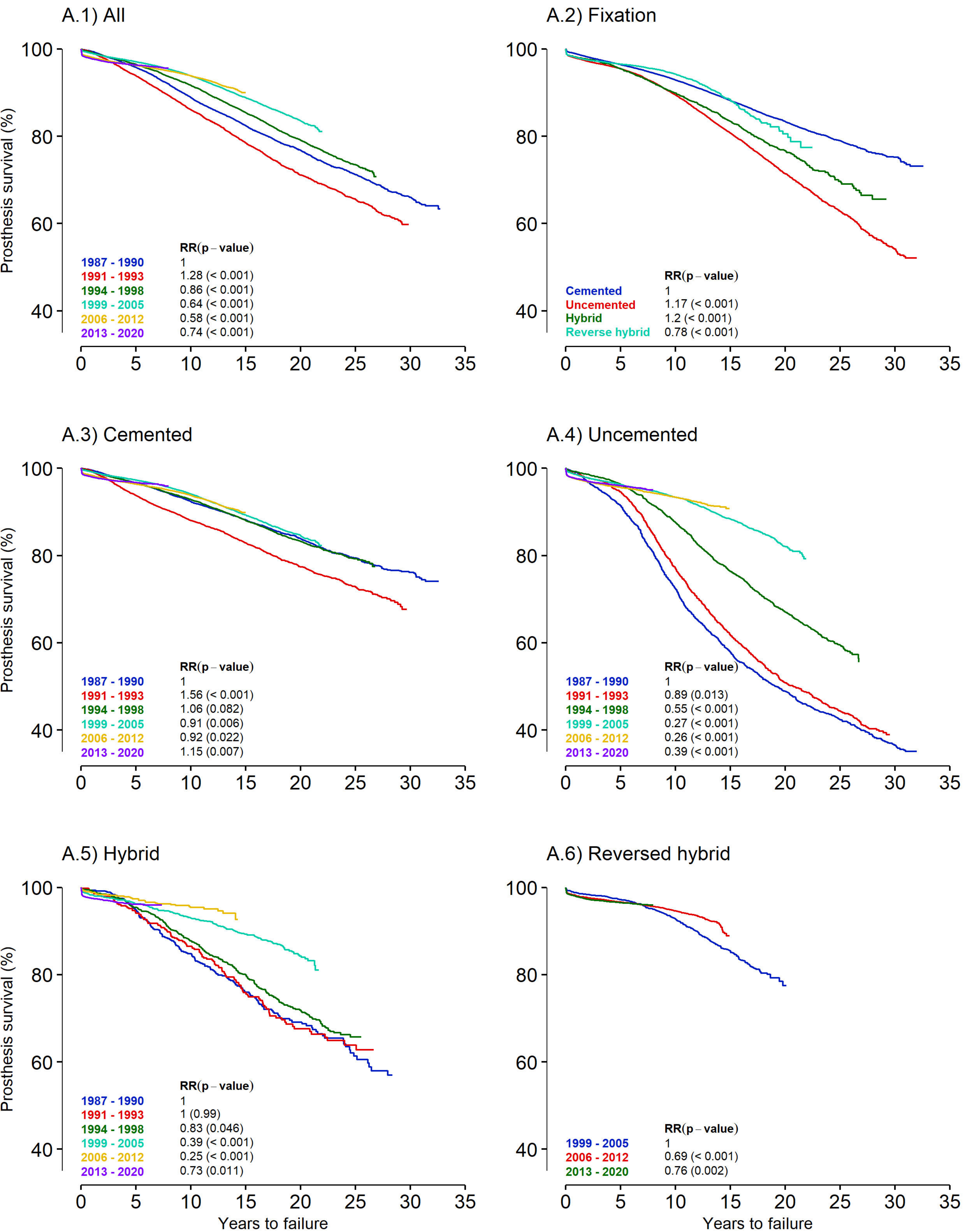
Gard Kroken
Biostatistician

COVID-19

Number of primary hip arthroplasties per health trust & month for 2019 vs. 2020



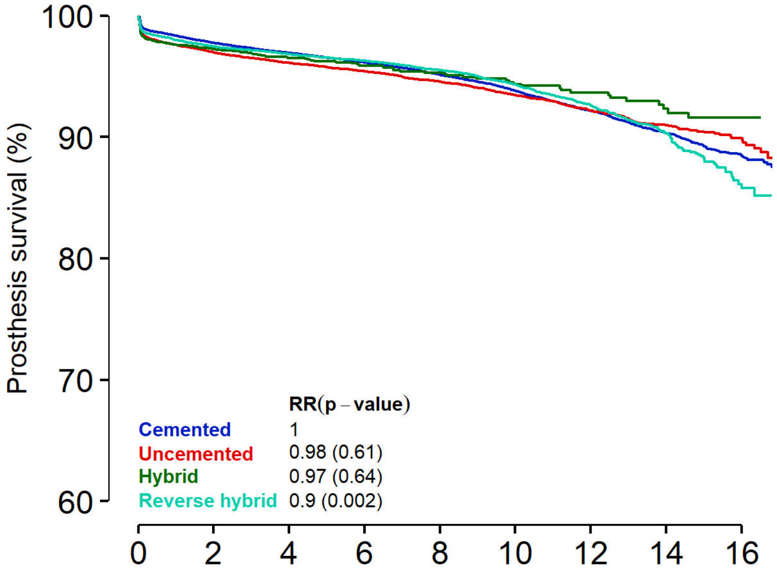
Survival of total hip prosthesis
1987-2020



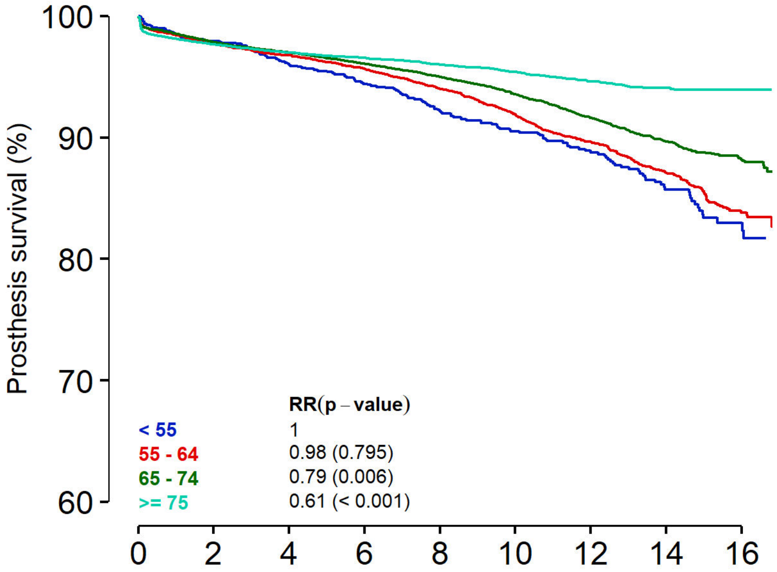
Kaplan-Meier survival curves. Risk ratio (RR) is adjusted for age, gender and diagnosis.
Survival estimate is given as long as more than 50 prostheses are at risk.
There is some uncertainty tied to the risk estimates from the Cox-analysisis as the assumption of proportional hazard does not hold for all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

Survival of total hip prosthesis
2004-2020

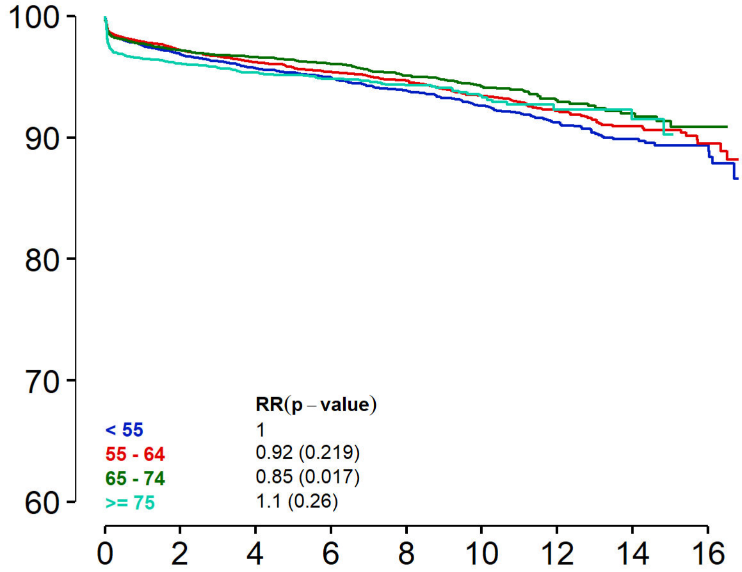
A.7) Fixation



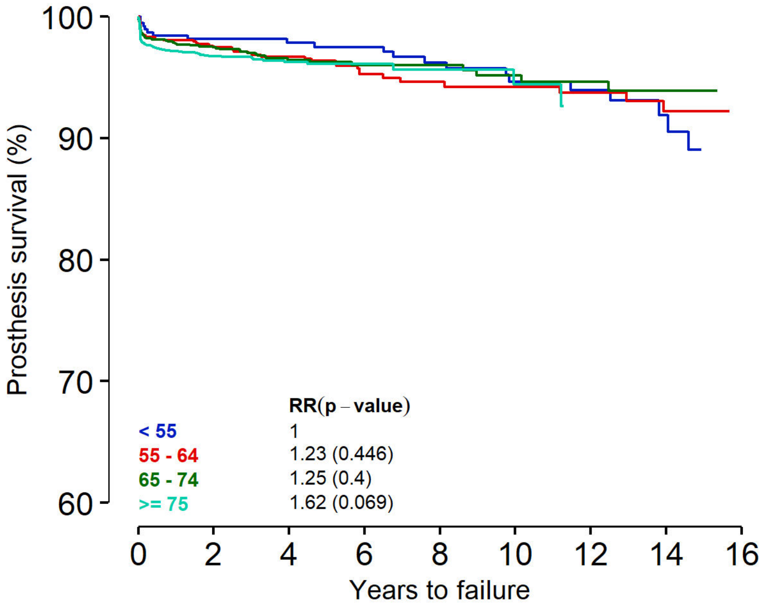
A.8) Cemented



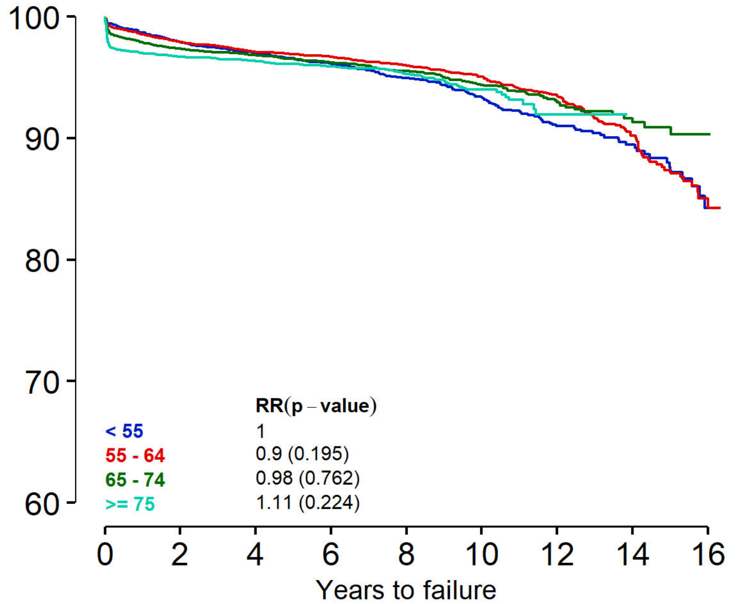
A.9) Uncemented



A.10) Hybrid

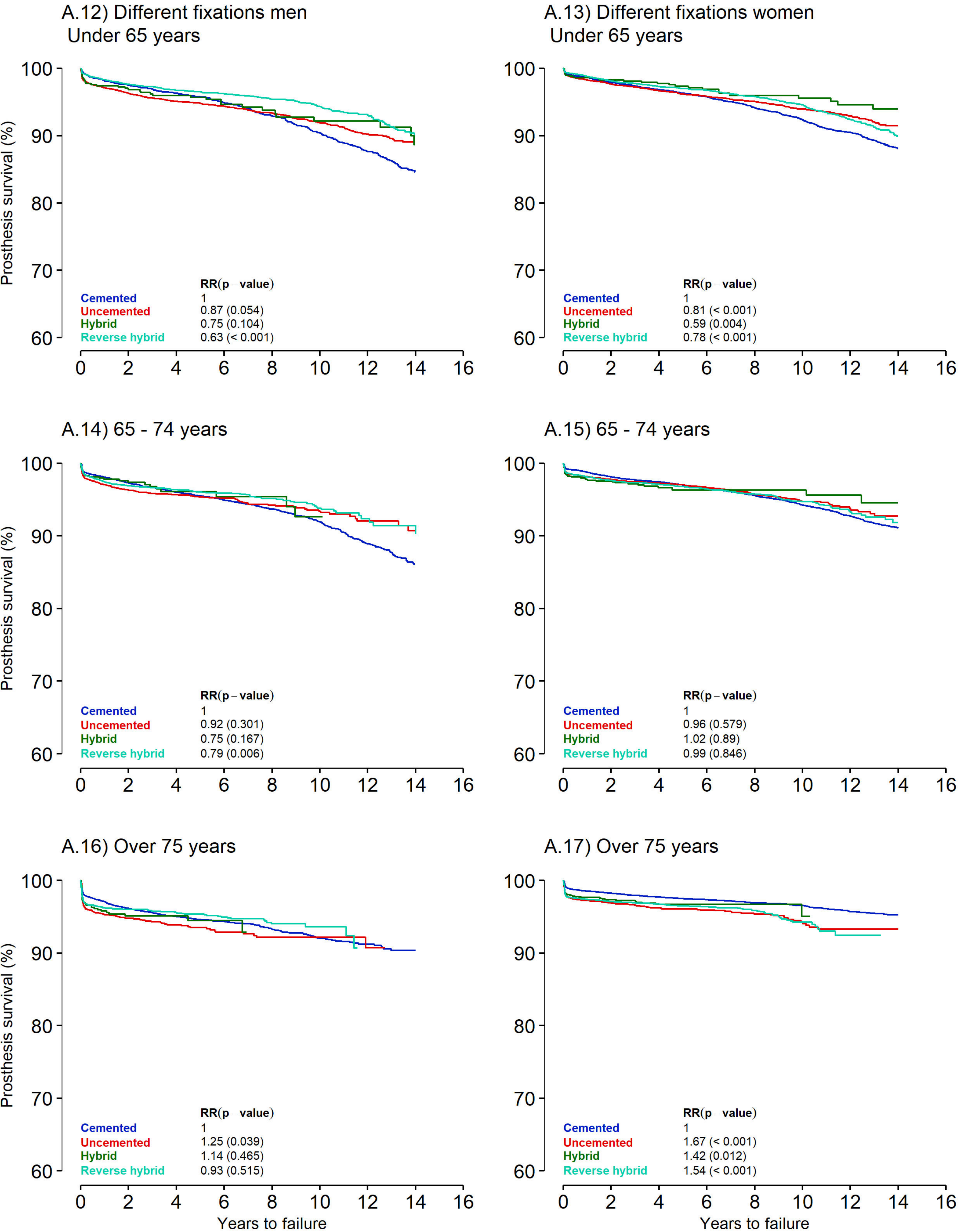


A.11) Reversed hybrid



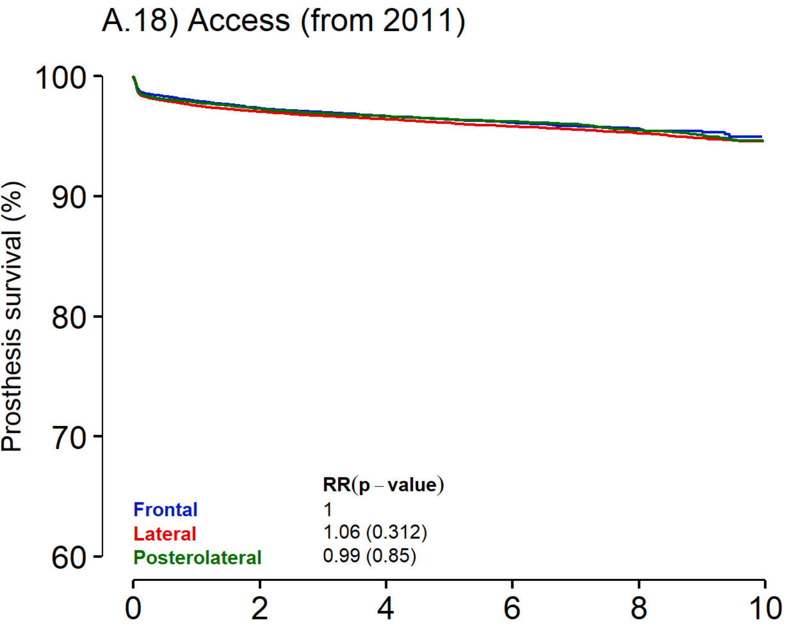
Kaplan-Meier survival curves. Risk ratio (RR) is adjusted for age, gender and diagnosis.
Survival estimate is given as long as more than 50 prostheses are at risk.
There is some uncertainty tied to the risk estimates from the Cox-analysisis as the assumption of proportional hazard does not hold for all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

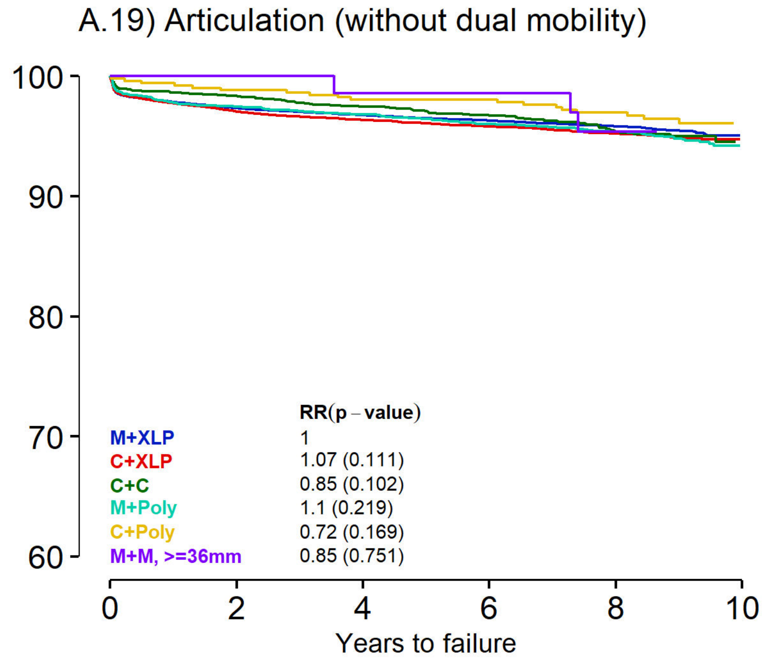
Survival of total hip prosthesis
2004-2020

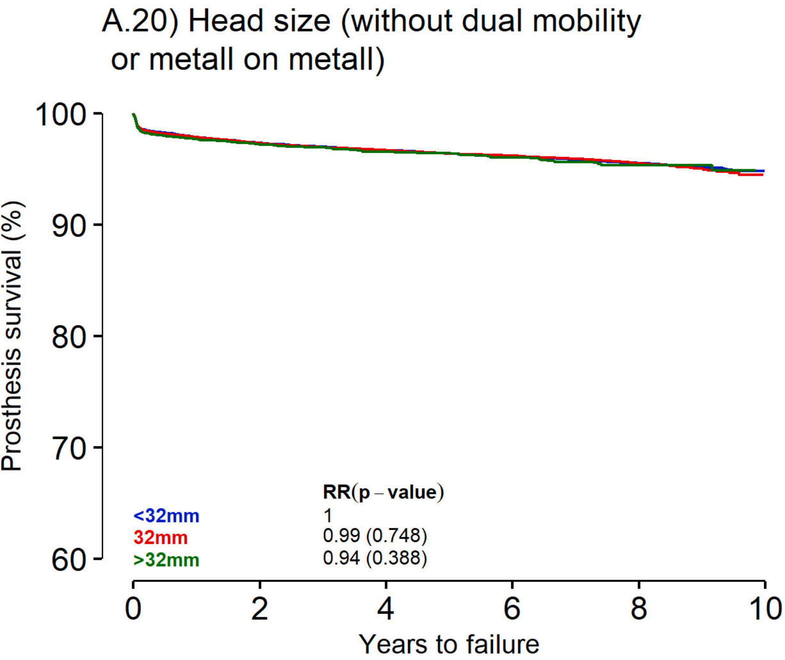


Kaplan-Meier survival curves. Risk ratio (RR) is adjusted for diagnosis.
Survival estimate is given as long as more than 50 prostheses are at risk.
There is some uncertainty tied to the risk estimates from the Cox-analysisis as the assumption of proportional hazard does not hold for all models.

Survival of total hip prosthesis
2009-2020



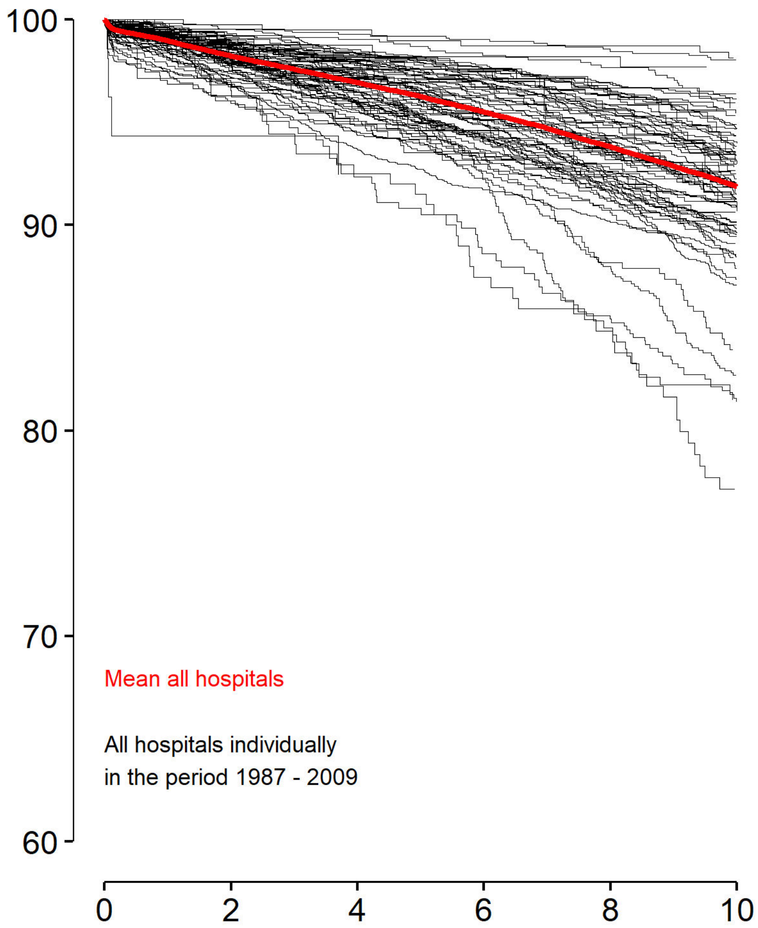




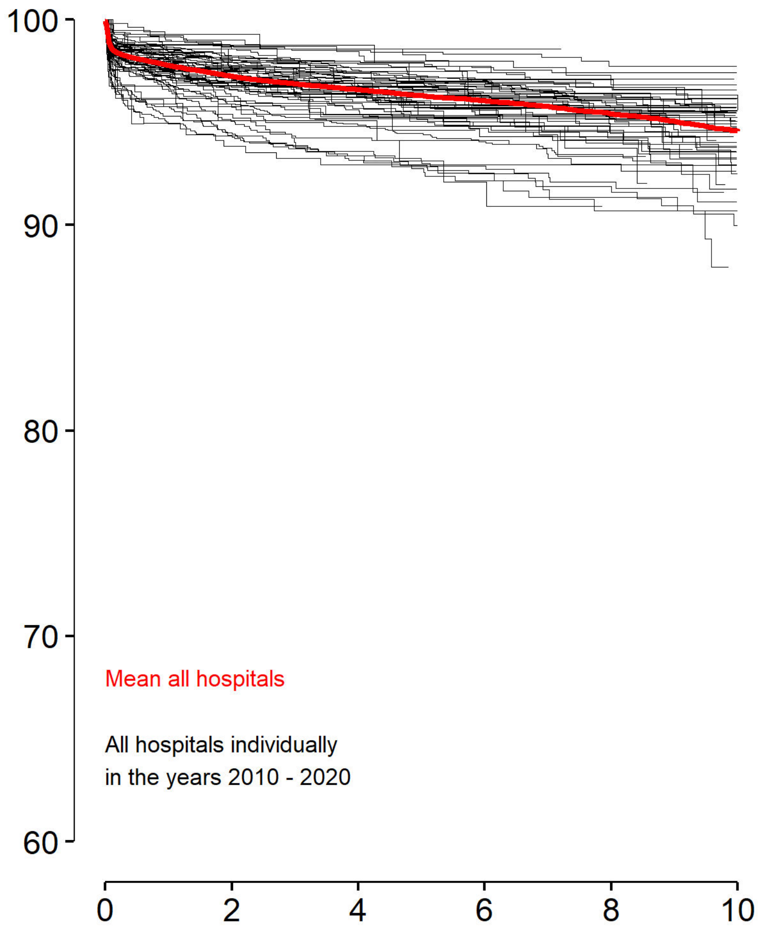
Kaplan-Meier survival curves. Risk ratio (RR) is adjusted for age, gender and diagnosis.
Survival estimate is given as long as more than 50 prostheses are at risk.
There is some uncertainty tied to the risk estimates from the Cox-analysisis as the assumption of proportional hazard does not hold for all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

Survival curves for all hospitals individually

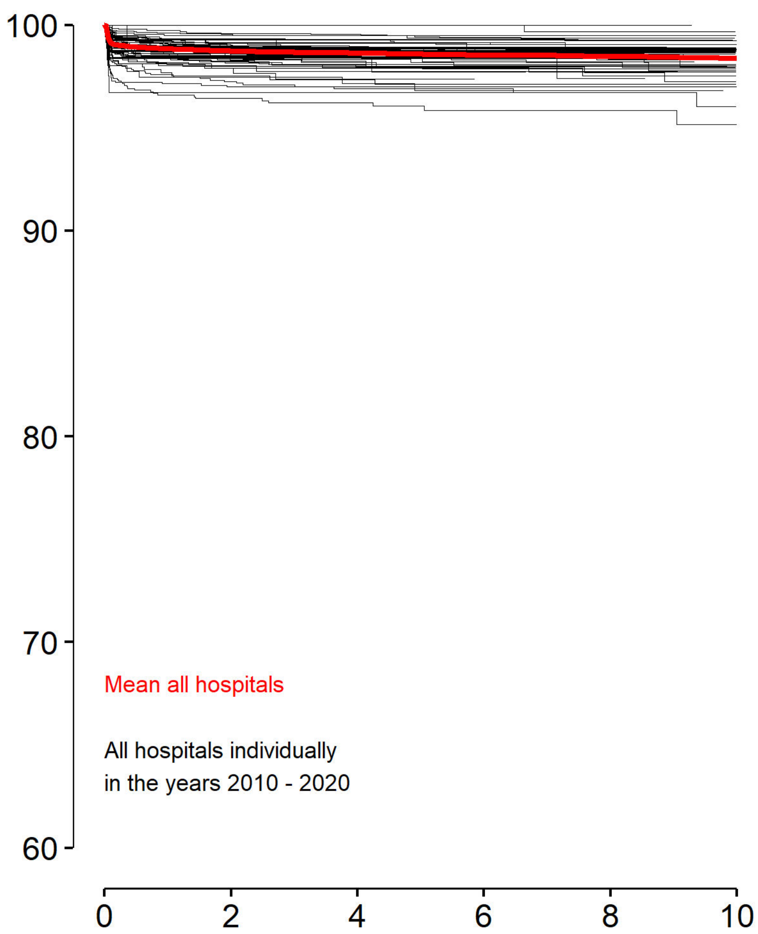
A.21) All hospitals in the years 1987 - 2009



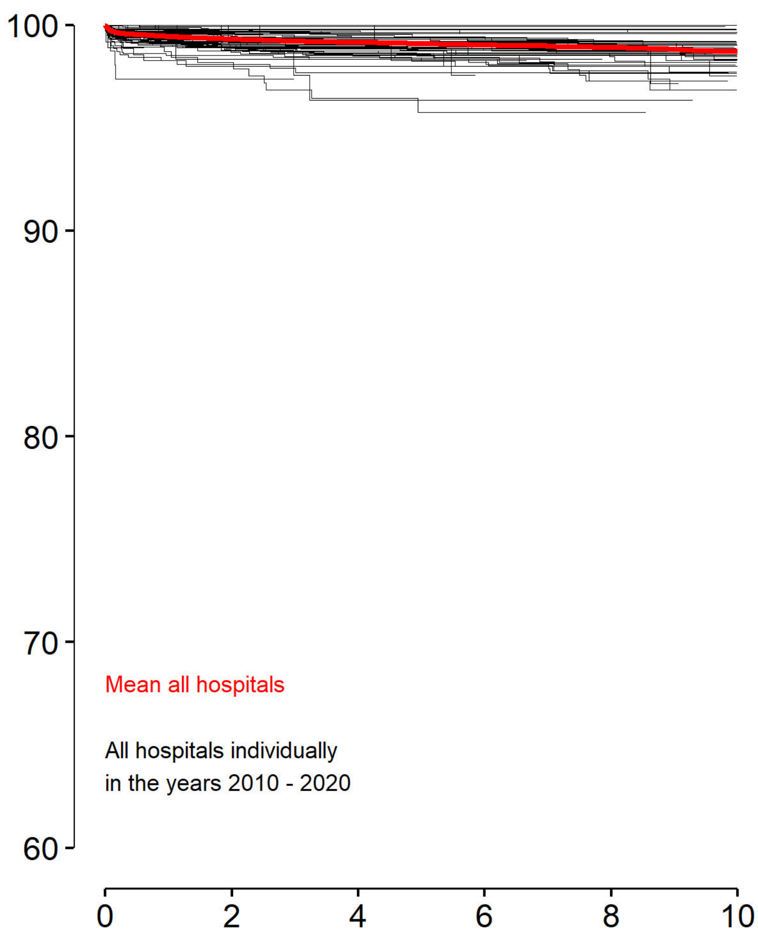
A.22) All hospitals in the years 2010 - 2020



A.23) Endpoint revision due to infection, 2010 - 2020



A.24) Endpoint revision due to dislocation, 2010 - 2020



One stage bilateral hip prosthesis operations

År	1987-2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Sum:
Antall pasienter	237	18	26	23	22	28	32	47	72	67	92	664

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.25: Fixation for women over 75 years, 1987 to 2020

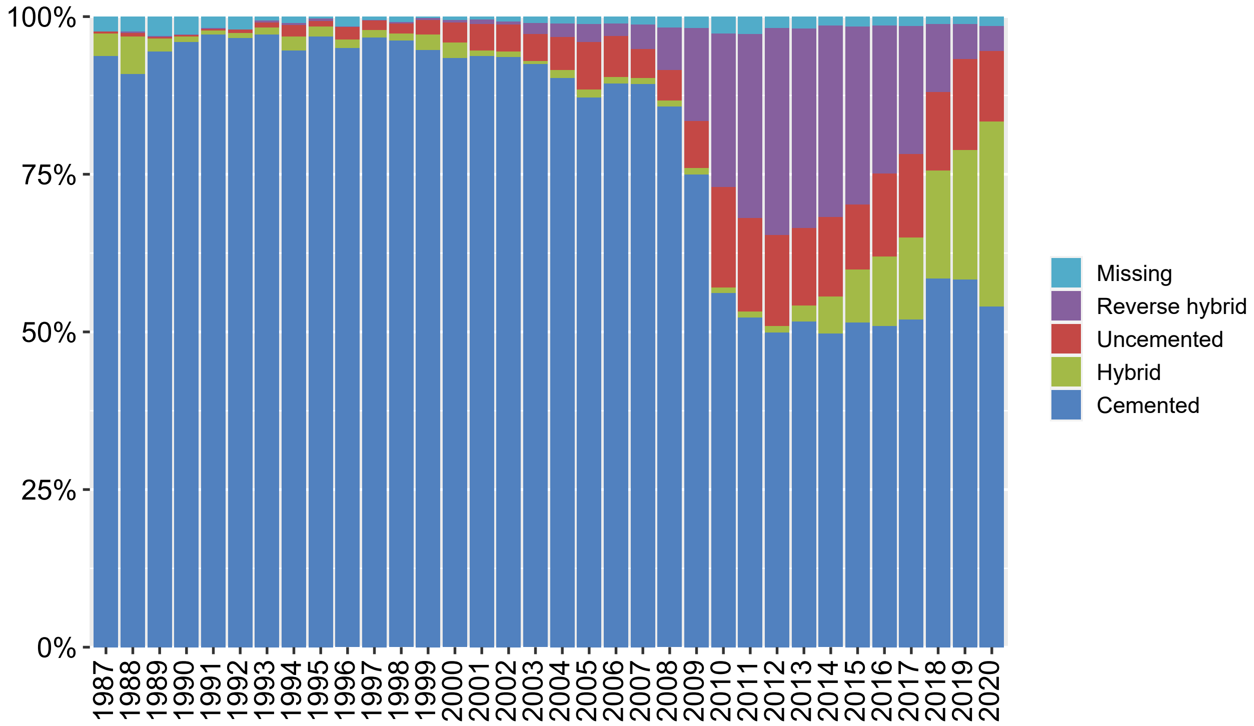


FIGURE A.26: Number of primary THA operations, 2020

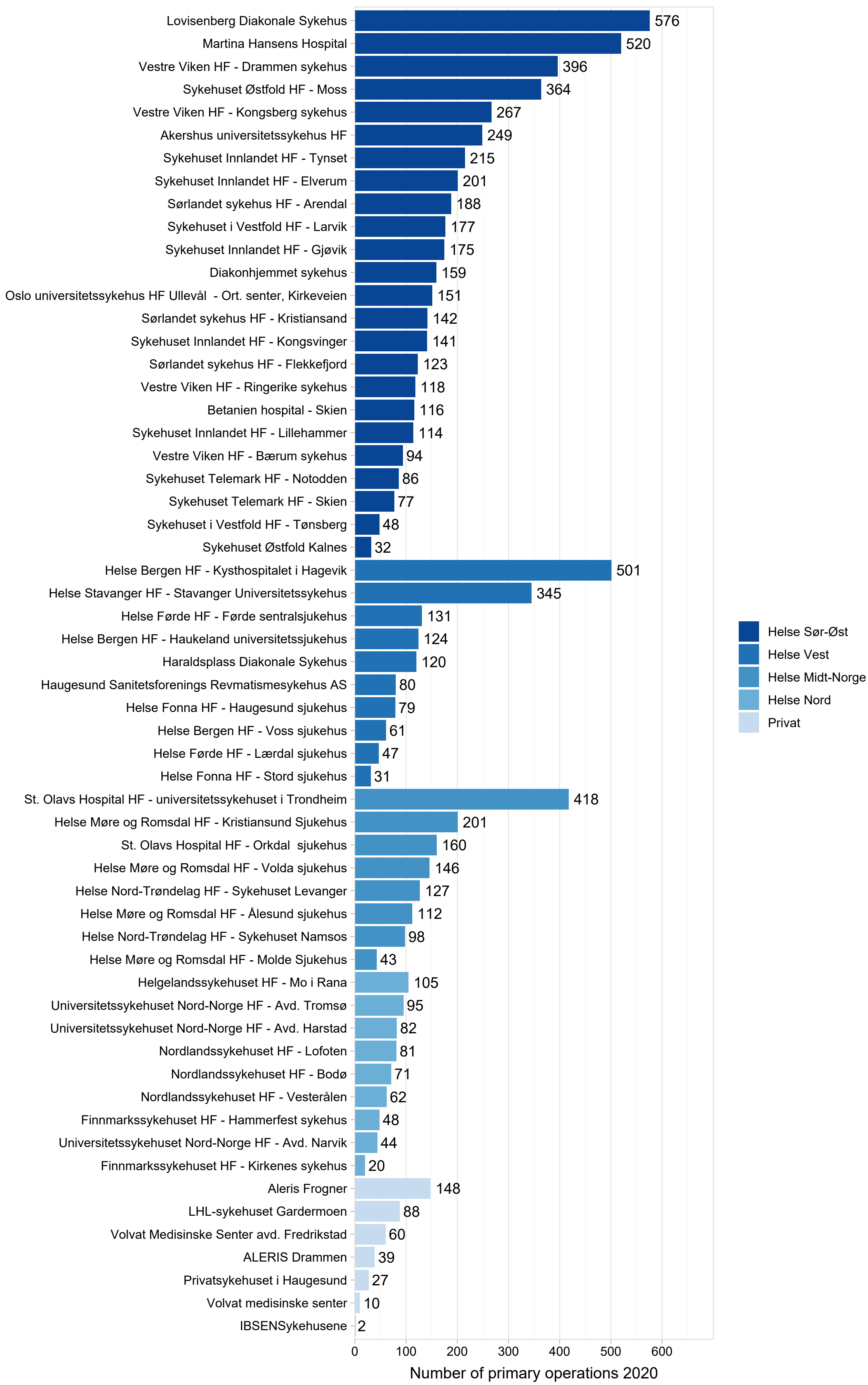
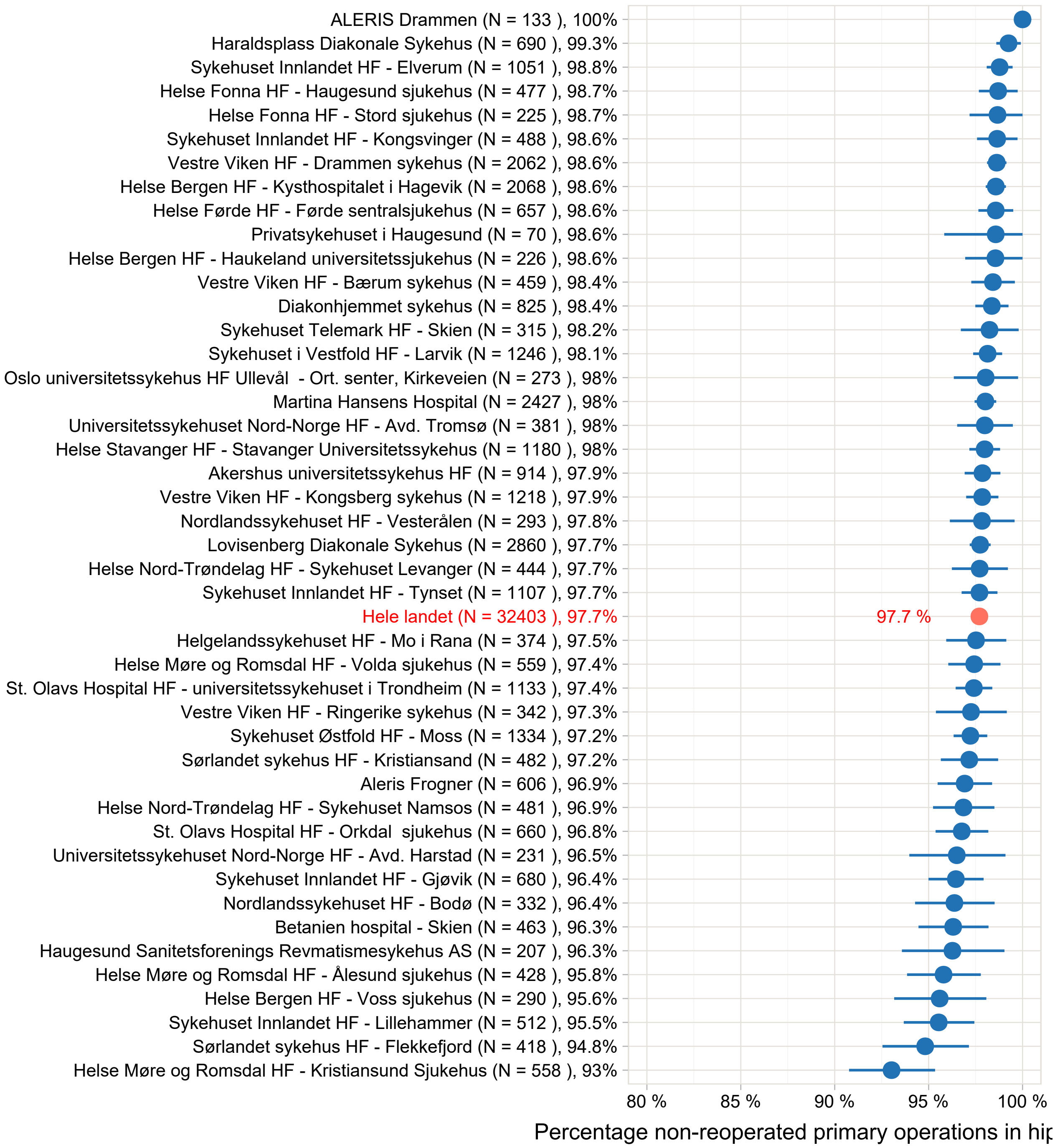
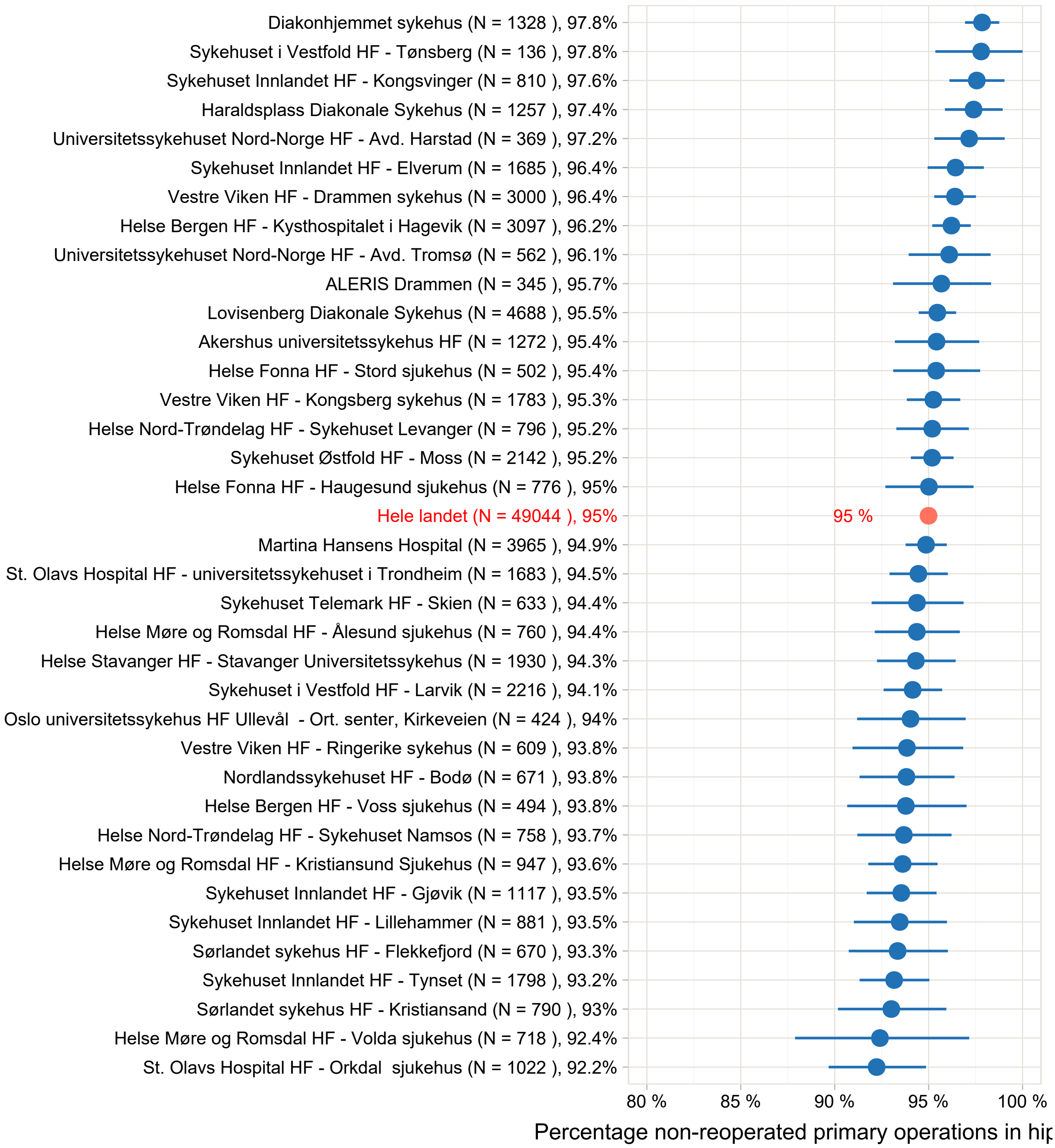


FIGURE A.27: Percentage non-revised standard patients two years after operations in 2014-2020



Kaplan-Meier estimates of percentage non-revised standard patients after two years with 95prosent confidence interval. Endpoint is all revisions. Standard patients are patients between 55 and 85 years old, with ASA class 1 or 2 and with idiopathic cox arthrosis 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 2014 to 2020. Only hospitals with operations in 2020 and with more than 50 operations from 2014 to 2020 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 2014 to 2018 are included.
See section «How to interpret the hospital-based results:».

FIGURE A.28: Percentage non-revised standard patients ten years after operations in 2009-2020



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 idiopathic cox arthrosis 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 2009 to 2020. Only hospitals with operations in 2020 and with more than 50 operations from 2009 to 2020 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 2009 to 2018 are included.
See section «How to interpret the hospital-based results:».

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:

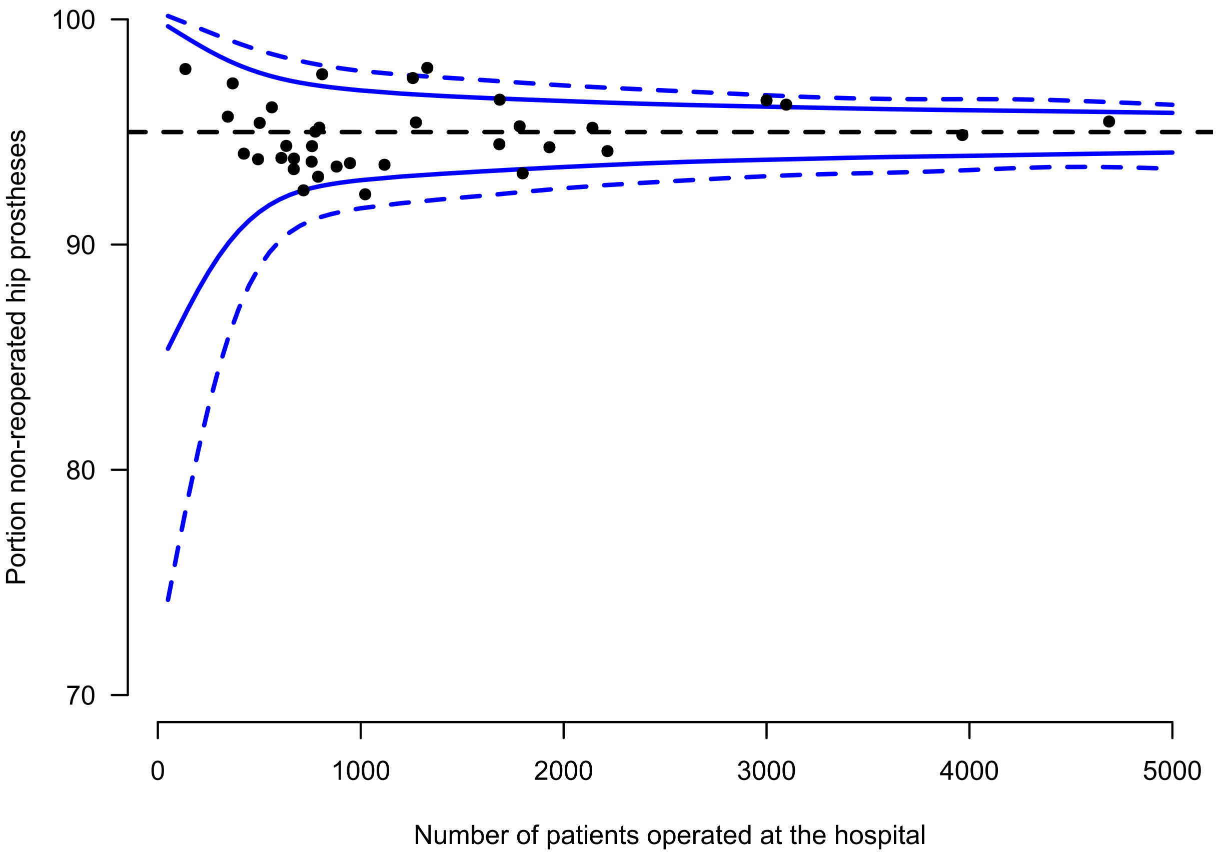
1. Hospitals that are more rigorous in reporting their complications and reoperations to the Register could have unfairly negative results in the analyses.
2. If surgeons at one hospital are more diligent in facilitating check-ups for patients than at other hospitals, and thus discover more complications, 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 NRL are poorly suited for such calculations. The NRL 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 0,0 % to 100,0 %. 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.29: Funnel plot, percentage non-revised standard patients ten years after operations in 2009-2020



Each point shows the percentage non-revised prostheses after 10 years for standard patients operated from 2009 to 2020 at Norwegian hospitals. Some hospitals are excluded. This can be due to low completeness of reporting of revisions (<80 % from 2009 to 2018), 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 2020. 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 points in the funnel plot correspond to a hospital in figure A.28. 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 A.28.

FIGURE A.30: Durability of hip replacements 2009-2020.

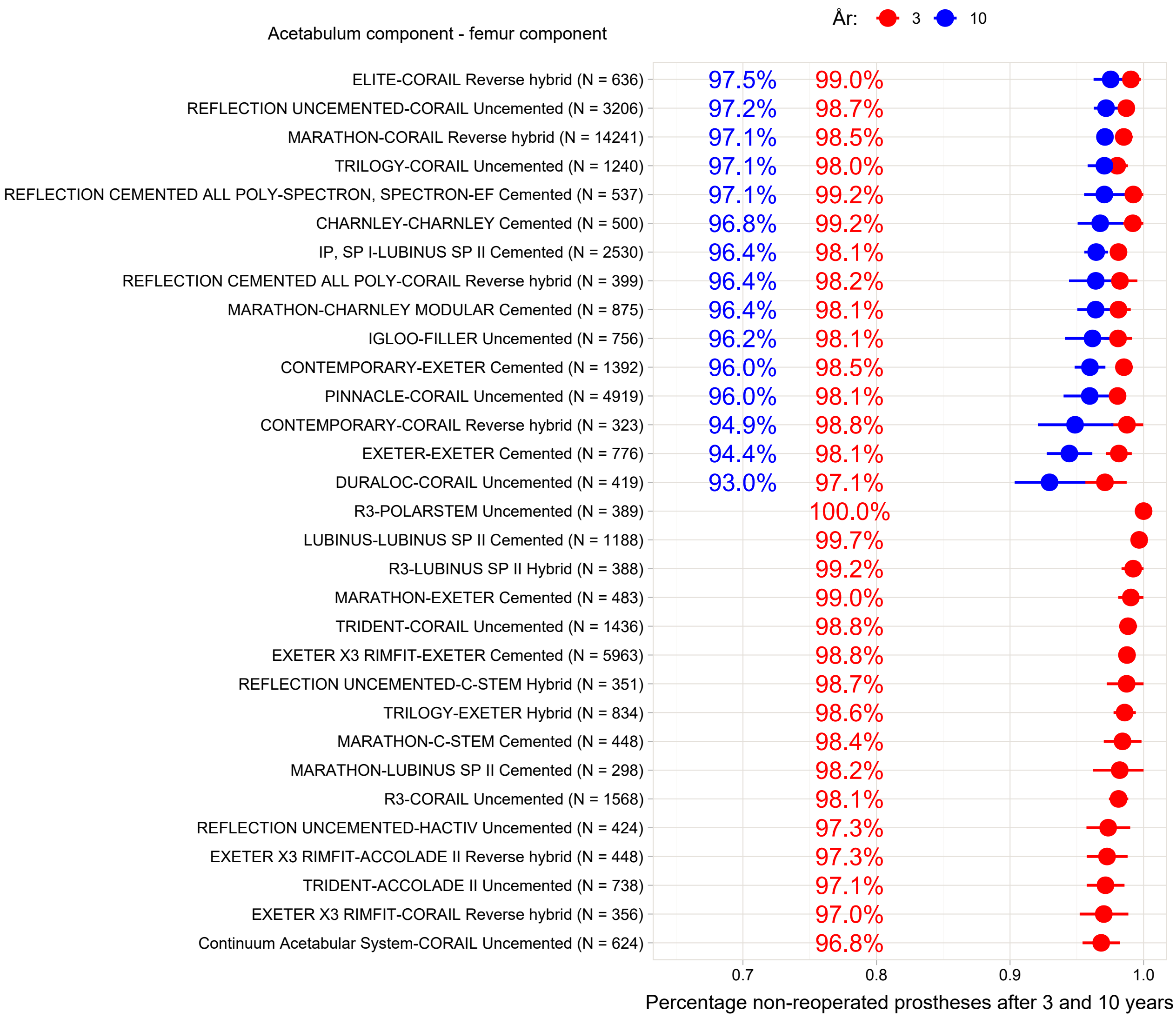


Figure A.30 shows the estimated Kaplan-Meier percentage at three and ten years for different combinations of hip prostheses. We have only included combinations used in 500 or more operations in 2009-2020. A further requirement for inclusion in the figure is that there must still be at least 50 examples of the combination at three and ten years respectively. Only standard patients from 2009 to 2020 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. 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 combinations Reflection All Poly/Spectron EF (cemented) and Titan/Titan (cemented) are no longer in use. This is based on results in studies published by the Register (Espehaug B 2009, Hallan G 2007, Hallan G 2010, Hallan G 2012 and Kadar T 2011), see our list of publications in the annual report `http://nrlweb.ihelse.net/)`. 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:

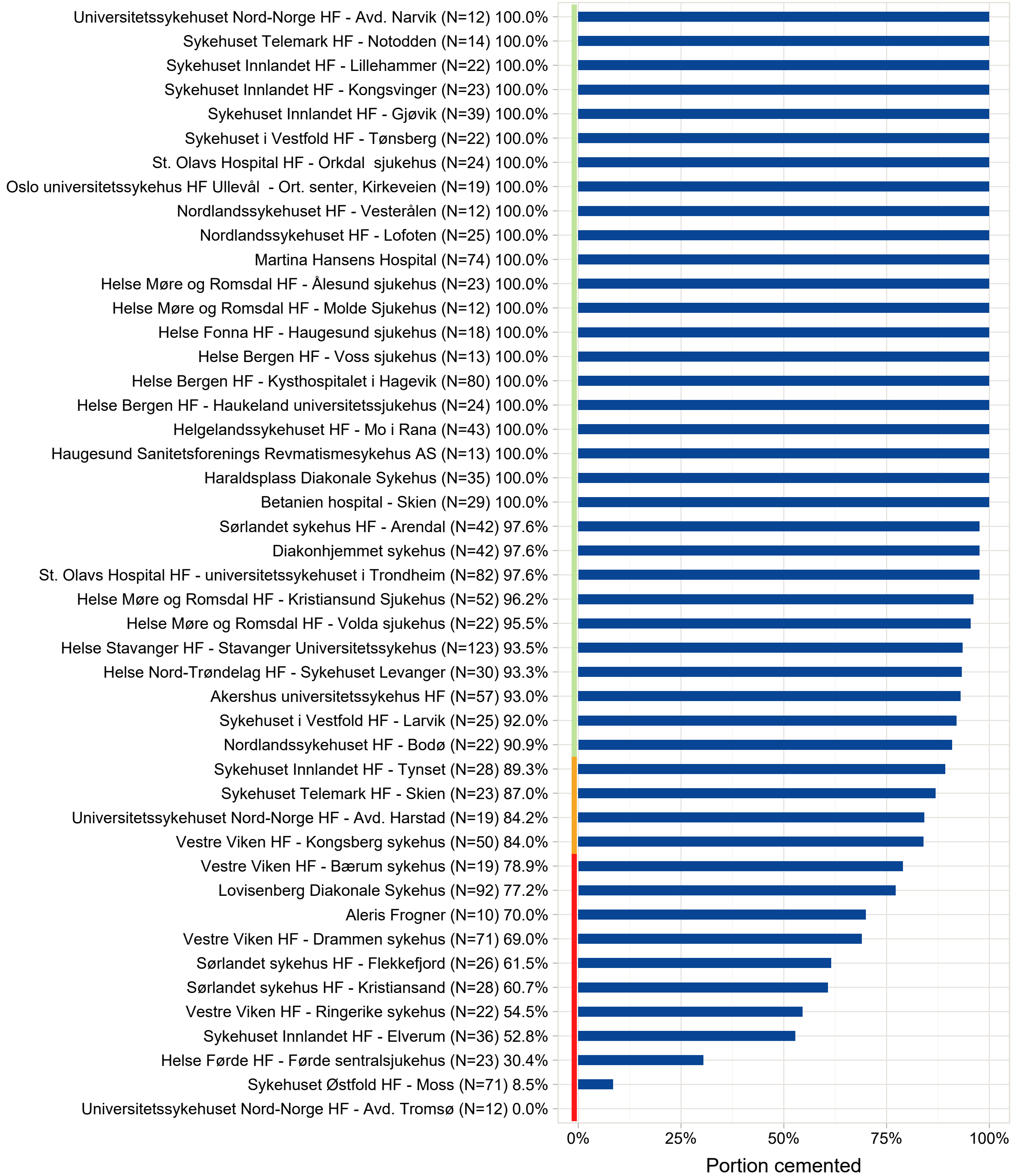
When prostheses are ranked by percentage of revisions, results must be interpreted with caution, as there may be many reasons for different revision percentages. We mainly publish prosthesis results in scientific journals and presentations where we account for materials and methods and discuss strengths and weaknesses and the significance of the findings (see the reference list in `http://nrlweb.ihelse.net/Rapporter/Rapport2019.pdf`).

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 is not recorded in the registers.
3. A prosthesis may be used at few hospitals and in small numbers, which may mean that the revision percentage reflects the skill of the surgeon or the threshold for revision rather than the qualities of the prosthesis.
4. If a prosthesis is used in a large number of patients (>3000) and in several hospitals (>5), we consider the results more reliable.
5. 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.
6. 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.31: Portion of women over 75 years with cemented stem in 2020.



The figure shows that some hospitals use cemented femoral prostheses in all women over 75 years, others differentiate and some choose uncemented femoral prostheses for all these patients. The Register recommends using a cemented prosthesis for this patient group. On a national level, 85,5 % of femoral stems were cemented in women over 75 years of age.

FIGURE A.32: Portion of patients with strong cup materials (cross-linked polyethylene/ceramic) in 2020.

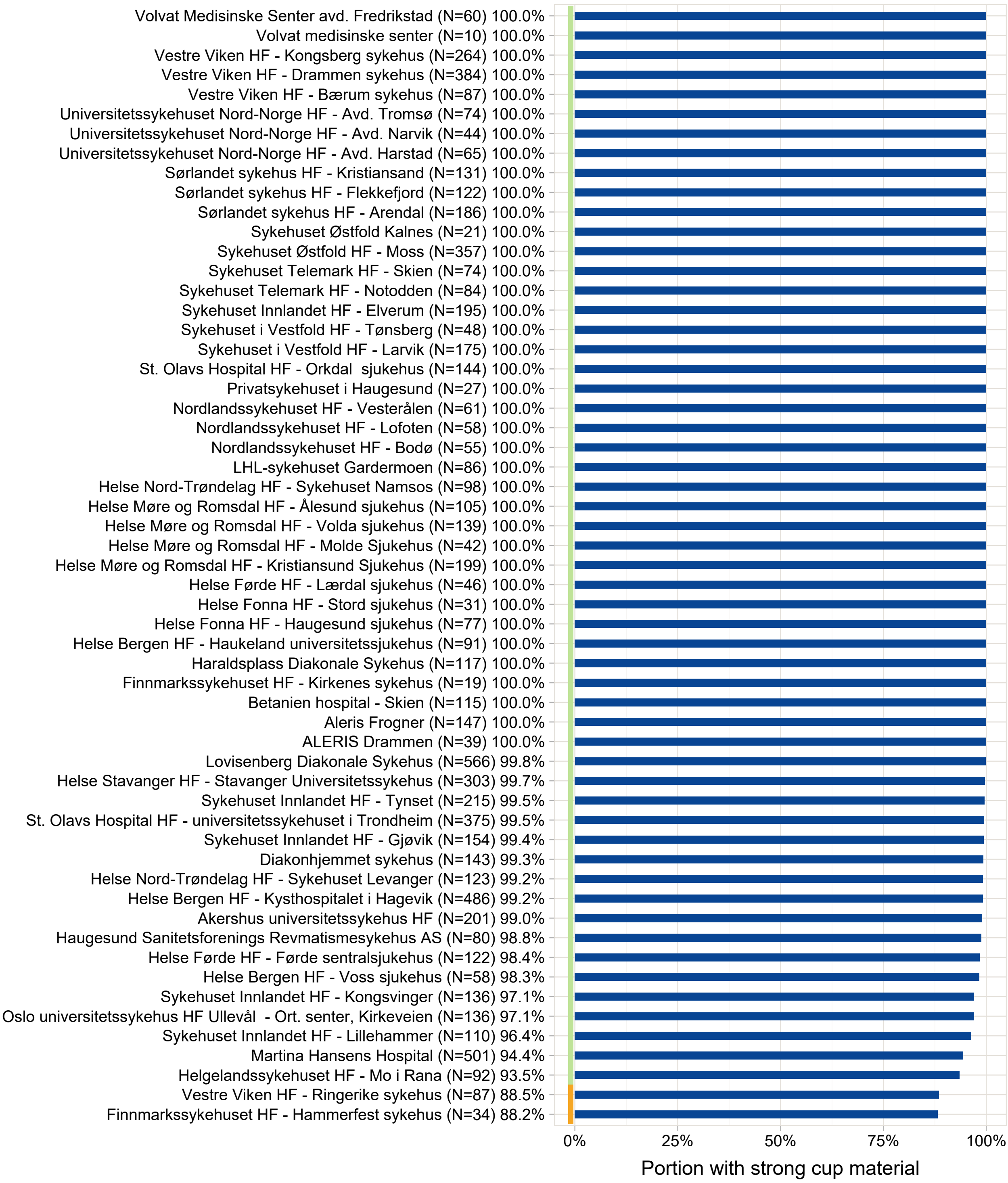
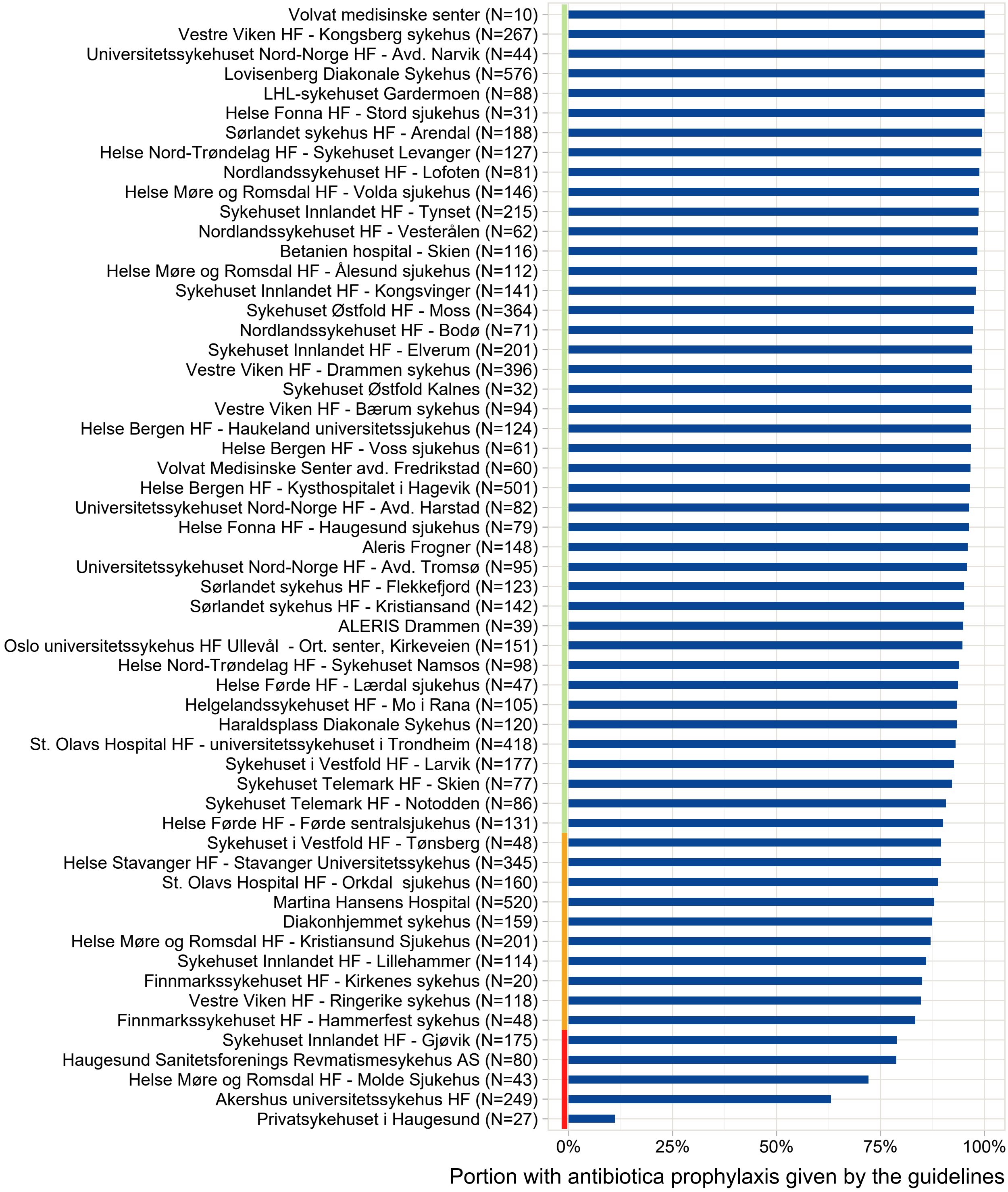


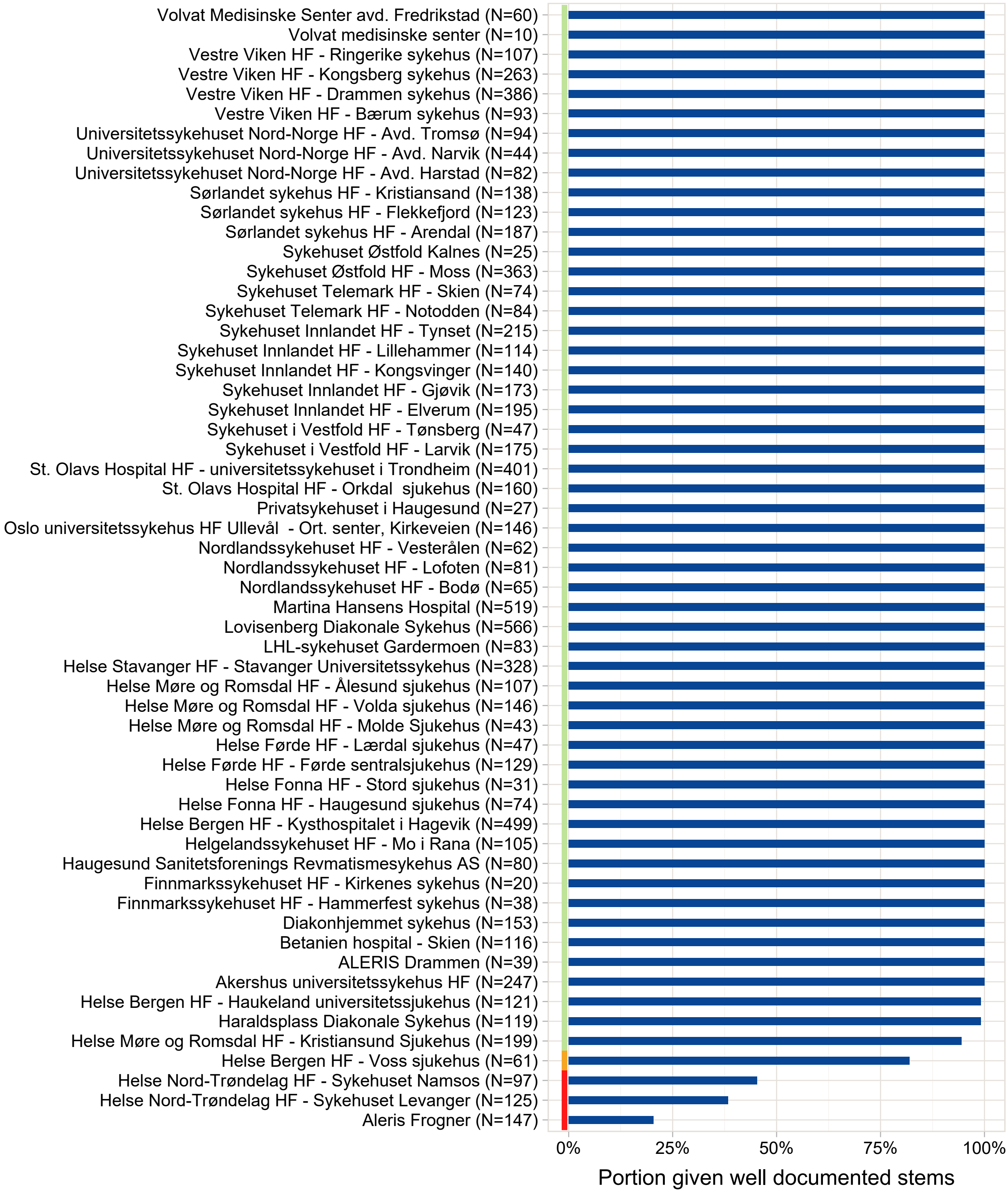
Figure A.32 shows that most patients at all hospitals receive hip prostheses with wear-resistant joint surfaces (Nationally: 99,0 %). The use of ordinary polyethylene is justified in certain patients who do not need a prosthesis lasting longer than 10-15 years.

FIGURE A.33: Portion of patients with atibiotica prophylaxis as given by the guidelines in 2020.



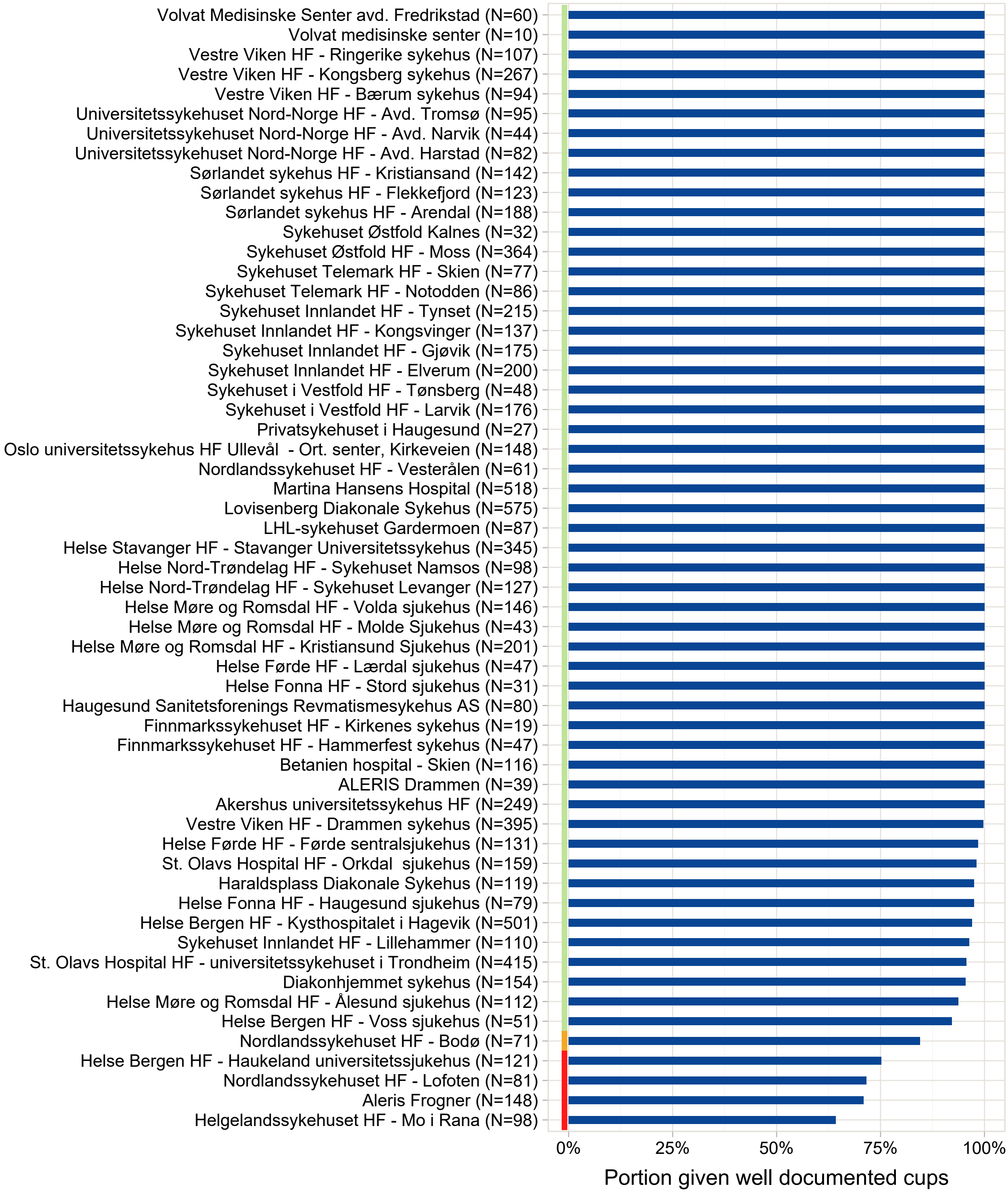
Antibiotica prophylaxis was administered according to the guidelines in 96,8 % of all operations. A low score (at the bottom of the figure) does not mean that patients have not received antibiotics; it generally means that they were given antibiotics in a manner contrary to the guidelines.

FIGURE A.34: Portion of patients recieving well documented hipstem in 2020.



The overwhelming majority of all inserted hipstems are well documented. On a national level, 96,8 % of all hip prostheses use well documented hipstems. A few hospitals fall short of satisfying the requirements. For some hospitals, this is due to ongoing clinical trials on new implants. Others have elected to use implants where the long-term results have yet to be documented. All hospitals have been asked to report these prostheses to the registry so that they could be excluded from the above presentation.

FIGURE A.35: Portion of patients recieving well documented hipcups in 2020.



On a national level, 97,5 % of all hip prostheses use well documented hipcups. 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.

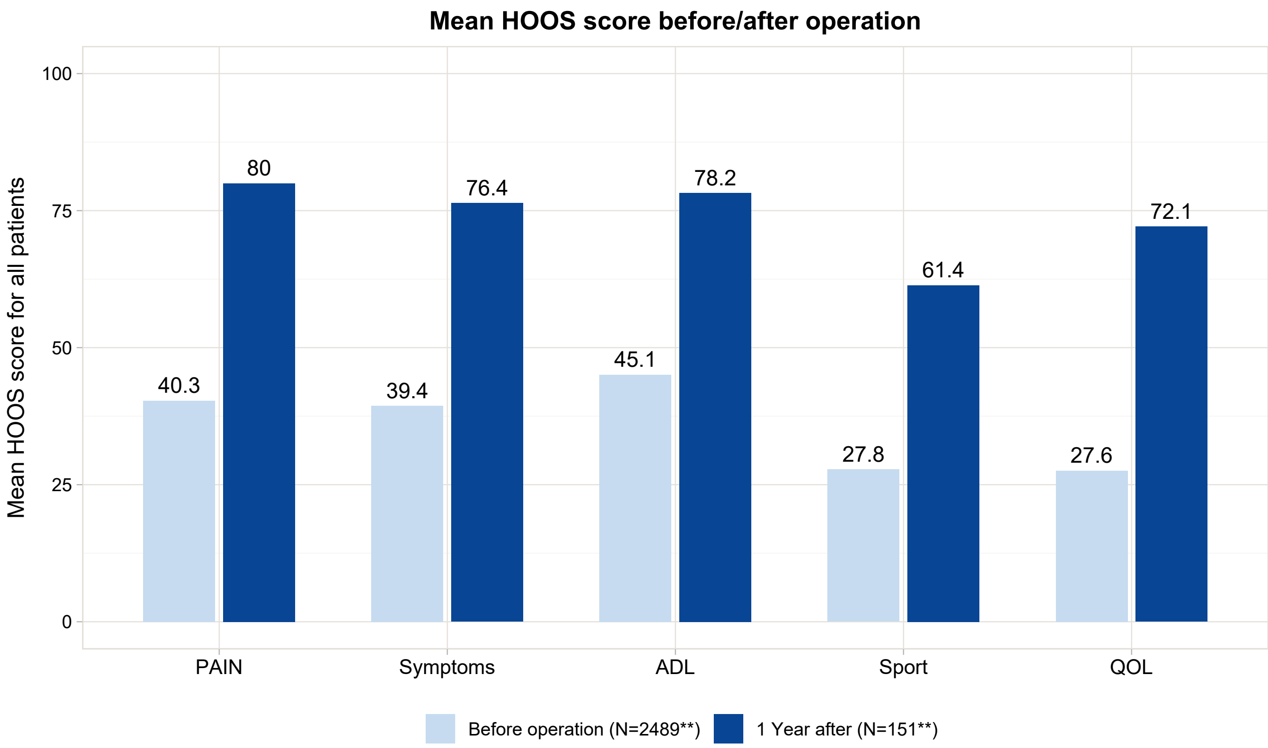
PROM, Hip Arthroplasty Register

The Hip Arthroplasty Register started electronic collection of PROM data in 2017. We wish to focus more on patients' perceived quality of life and joint function before and after surgery. Patients complete an electronic questionnaire before surgery and 1, 6 and 10 years after surgery. We will compare the data we collect from patients 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 a possible revision of the prosthesis.

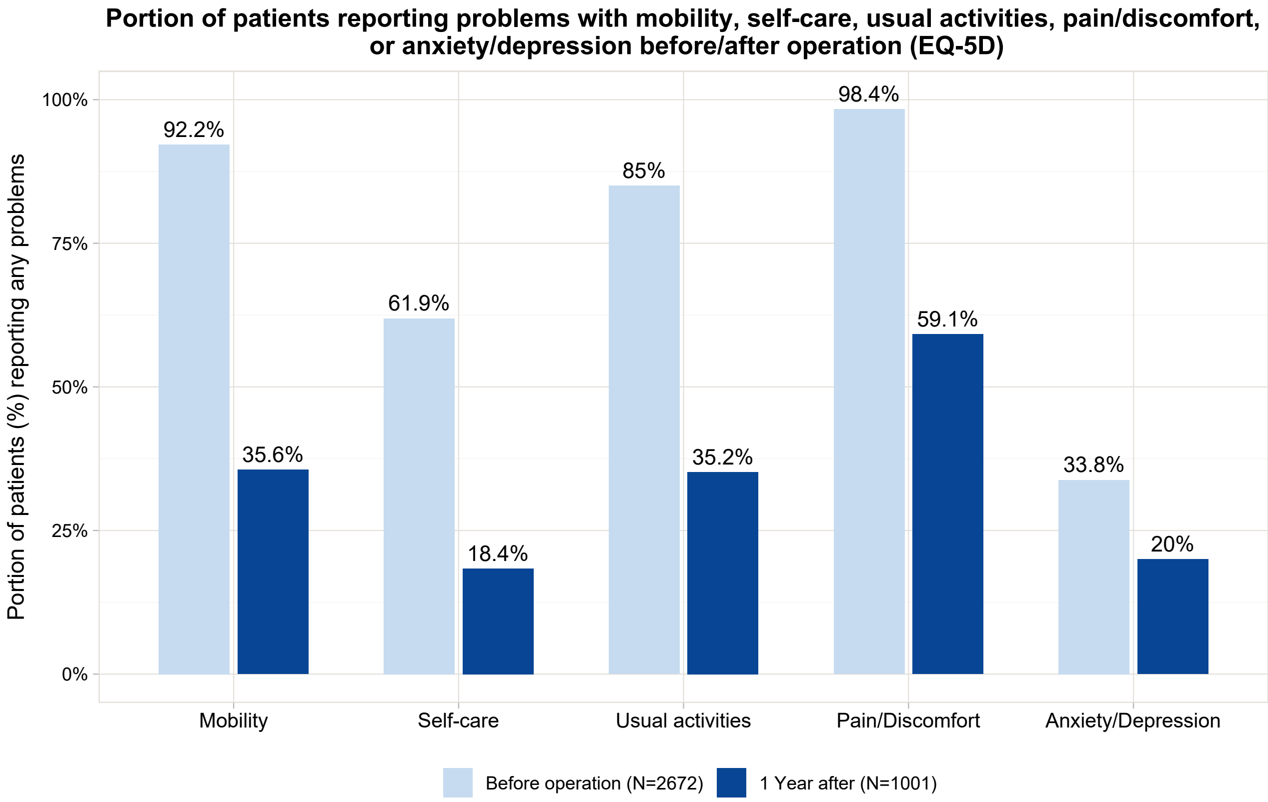
so far, 2672 pre-operative PROM forms and 1001 one year follow-up forms have been reported to the registry. Along with this we have also recieved 16 incomplete pro-operative forms. Up until this pointm, 33 hospitals have begun collecting and reporting PROMS. Due to a major bug in the MRS system, patients have been unable to fill out the questions regarding HOOS in the 1 year follow-up forms. All hospitals will recieve reports containing analyses of their own results. Any questions regarding collection and reporting of PROMs should be sent to our consultant Mikal Solberg mikal.solberg@helse-bergen.no.

Patient demografic	Before operation	1 Year after
number of forms (n)	2672	1001
Men (%)	38.9	41.6
Median age (min-maks)	67 (14-94)	66 (16-94)
Body-Mass Index (SD)	28.1 (9.8)	28.5 (11.4)
Uses alchohol n (%)	1952 (73.1)	690 (68.9)
Smokes n (%)	256 (9.6)	108 (10.8)
High school education or higher n (%)	1418 (53.1)	561 (56)
Lives alone n (%)	683 (25.6)	253 (25.3)
UCLA activity* mean (SD)	4.7 (2)	5.7 (2)
Health** (VAS) mean (SD)	58 (20.1)	73.9 (19)
Pain*** mean (SD)	65.1 (17.8)	24.3 (29.2)

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



*Only 2489 forms have adequate completeness of the questions tied to HOOS before the operation, and 151 forms 1 year after.



Health trust	Reporting hospitals	Number of pre-operative forms
Helse Sør-Øst	16/24	1364
Helse Vest	8/10	934
Helse Midt-Norge	4/8	265
Helse Nord	4/9	66
Privat	1/8	59

FIGURE A.36: Portion of primary hip operations where pre-operative PROMs have been reported in 2019-2020

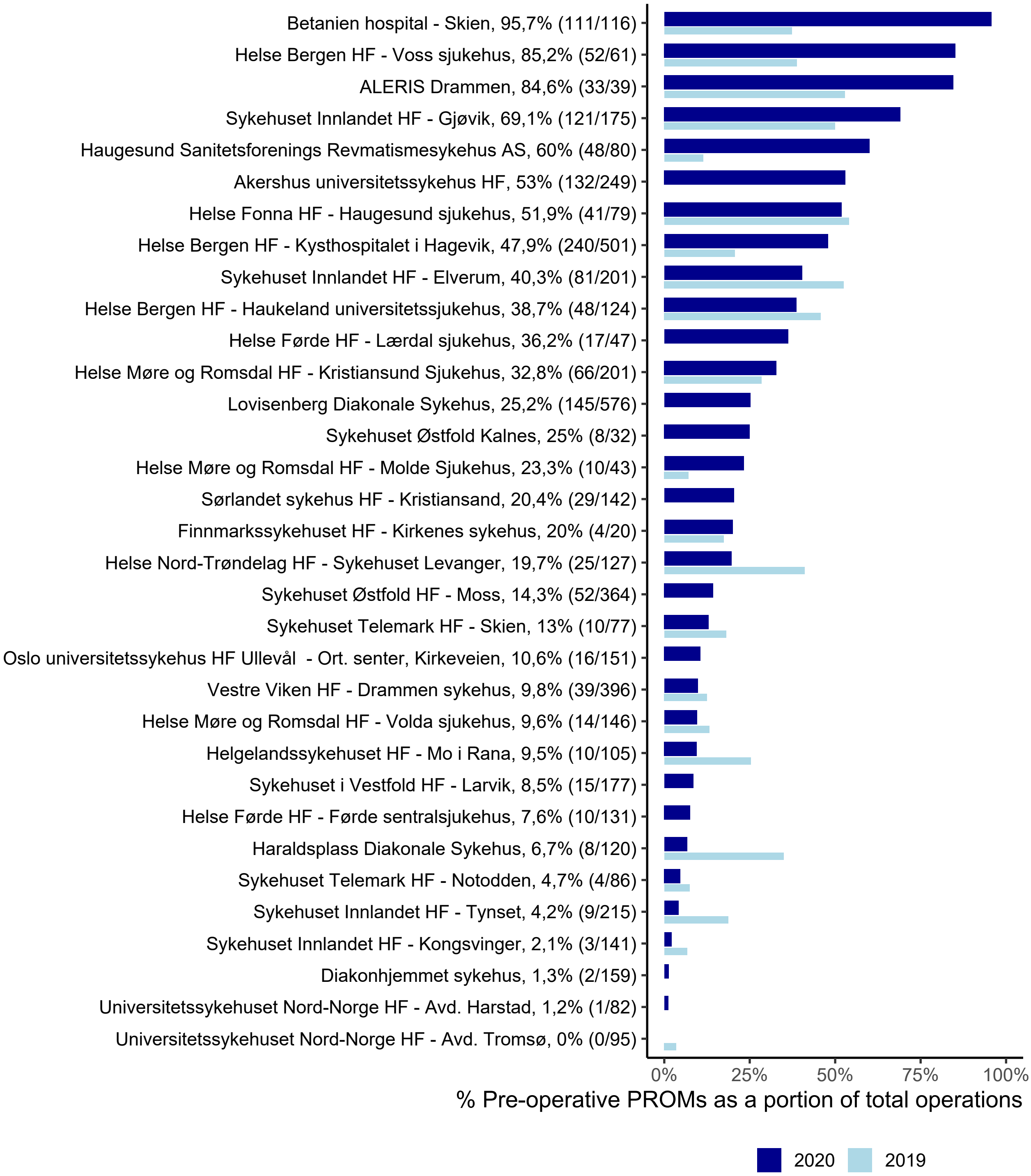


Figure A.36 presents pre-operative PROMs reported via paper or the online web solution MRS, as a portion of total number of hip operations reported in 2020 (dark blue line) and in 2019 (light blue line). The level is still low, but some hospitals seem to have taken steps to improve PROM reporting. We wish to remind the reader that any questions regarding registering and reporting of PROMS should be directed to the registry.

TOTAL HIP ARTHROPLASTY

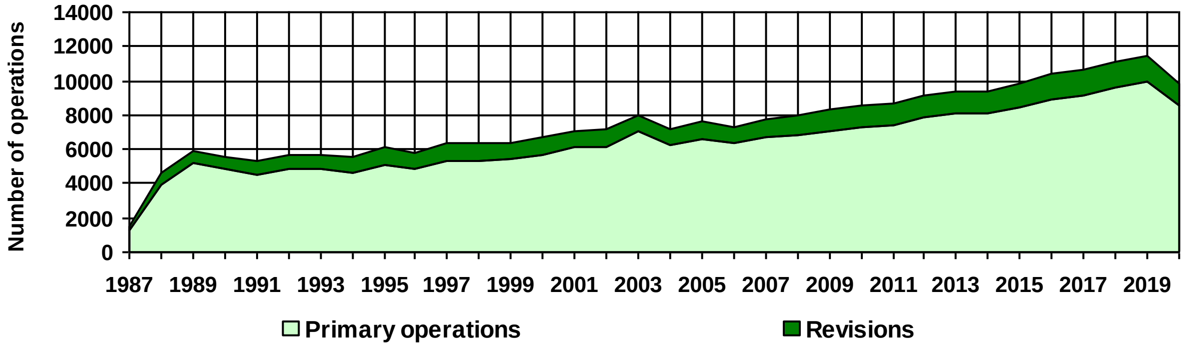
Table 1: Annual numbers of operations (Hemi prosthesis operations for hip fracture are not included here. These are found in tables of The Norwegian Hip Fracture Register)

Year	Primary operations *		Reoperations **		Revisions		Total
2020	8 538	(86,4%)	93	(0,9%)	1 248	(12,6%)	9 879
2019	9 979	(86,9%)	101	(0,9%)	1 402	(12,2%)	11 482
2018	9 603	(86,0%)	119	(1,1%)	1 441	(12,9%)	11 163
2017	9 176	(85,9%)	107	(1,0%)	1 396	(13,1%)	10 679
2016	8 954	(85,7%)	78	(0,7%)	1 420	(13,6%)	10 452
2015	8 450	(85,7%)	18	(0,2%)	1 392	(14,1%)	9 860
2014	8 138	(86,3%)	28	(0,3%)	1 266	(13,4%)	9 432
2013	8 104	(85,9%)	21	(0,2%)	1 306	(13,8%)	9 431
1987-12	147 503	(85,7%)	53	(0,0%)	24 642	(14,3%)	172 198
Total	**218 445**	**(85,8%)**	**618**	**(0,2%)**	**35 513**	**(13,9%)**	**254 576**

* In addition, there were reports 167 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 1a: Annual numbers of operations



54,7 % of all operations were performed on the right side. 66,3 % performed in women.
Mean age at primary surgery was 68,8 years, 69,7 years for women and 67 years for men.

COVID-19

Figure 1b: Monthly primary operations in 2019 - 2020

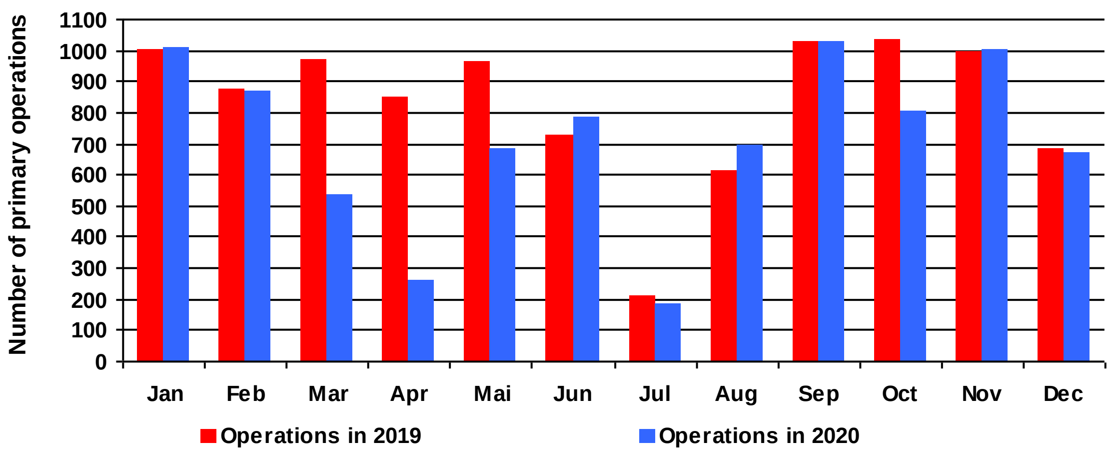
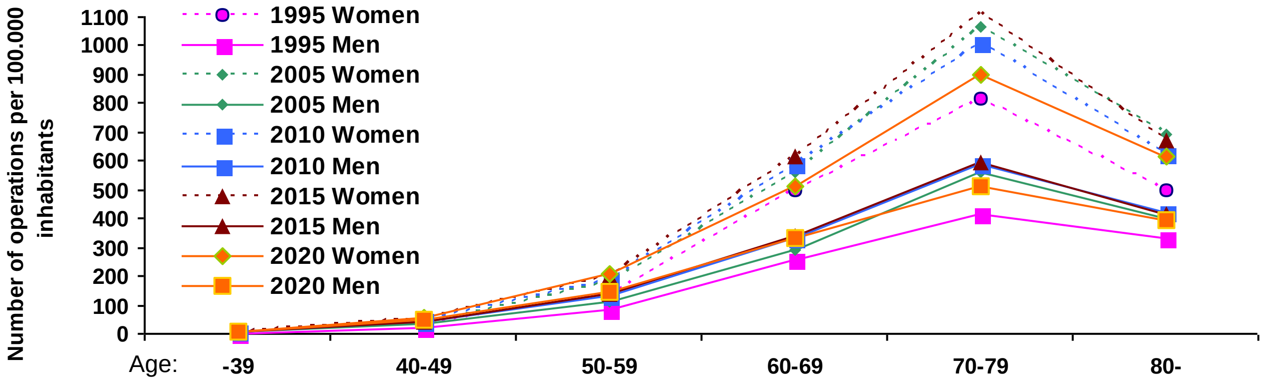


Figure 2: Incidence of primary hip prostheses



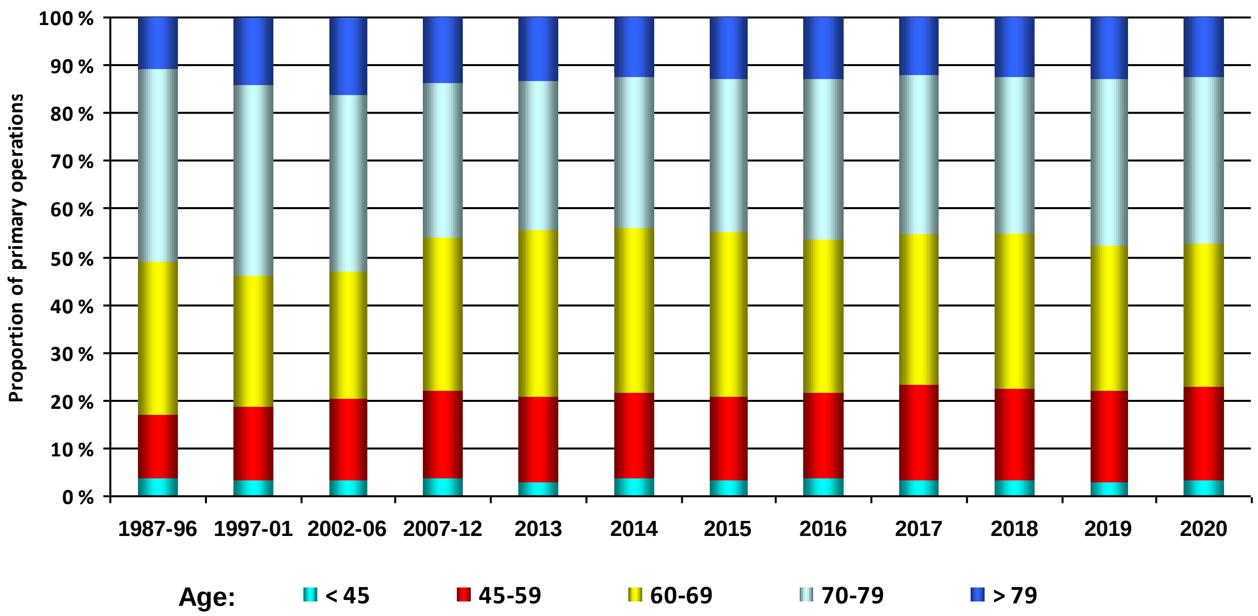
Reasons for primary operations

Table 2:

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
2020	6 755	101	257	605	5	72	18	512	214	25	231	33
2019	7 892	88	309	658	17	94	20	613	296	30	293	22
2018	7 624	99	298	653	24	113	21	572	266	23	282	9
2017	7 301	108	299	679	19	105	26	404	272	34	282	13
2016	7 109	139	355	685	11	107	19	342	229	33	247	9
2015	6 796	108	332	587	11	106	21	321	181	26	200	19
2014	6 414	115	354	648	18	86	28	287	250	22	175	19
2013	6 416	125	351	611	10	115	31	288	172	29	191	30
2007-12	33 785	840	2 399	3 298	144	583	156	1 008	969	104	1 000	147
2002-06	24 522	793	2 690	2 240	118	406	128	475	536	73	474	57
1997-01	20 078	877	3 027	1 952	143	380	128	223	328	55	532	291
1987-96	30 040	1 650	5 764	3 485	597	576	201	130	197	154	852	369
Total	**164 732**	**5 043**	**16 435**	**16 101**	**1 117**	**2 743**	**797**	**5 175**	**3 910**	**608**	**4 759**	**1 018**

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

Figure 3: Age by year of operation



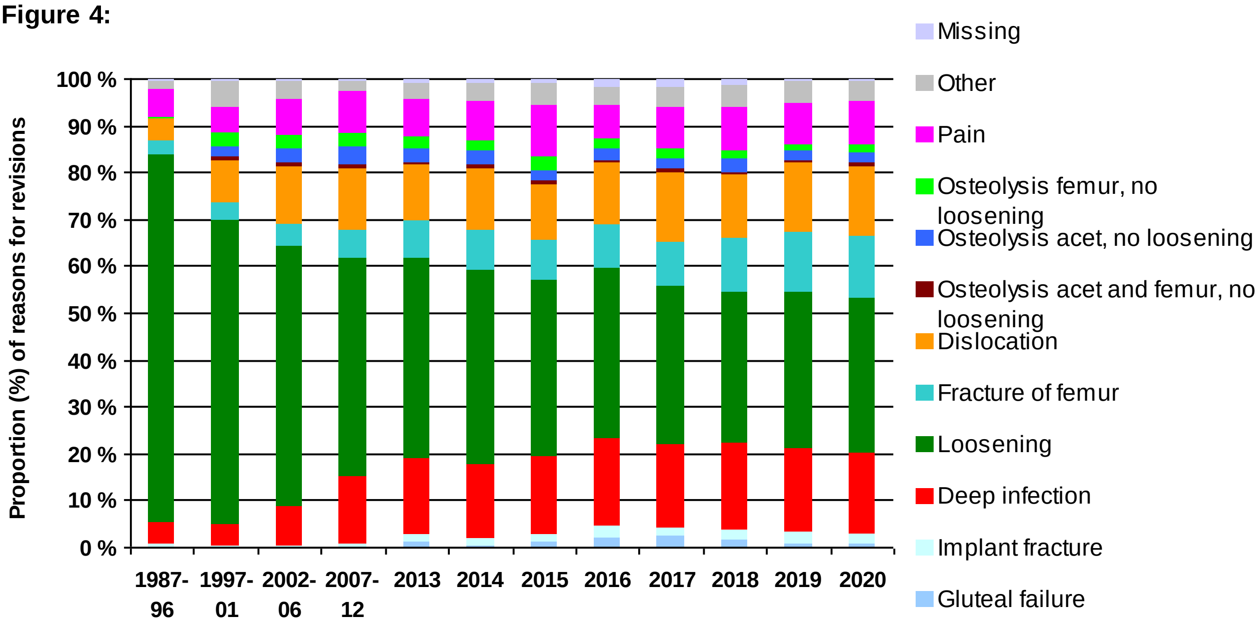
Reasons for revisions

Table 3a:

Year of revision	Loosening of acetabular component	Loosening of femoral component	Dislocation	Deep infection	Periprosthetic fracture	Pain	Osteolysis acet.,no loosening	Osteolysis femur, no loosening	Polyethylene wear	Previous Girdlestone	Implant fracture	Gluteal failure	Other	Missing information
2020	367	200	257	306	233	163	37	30	38	7	35	15	70	10
2019	395	244	282	337	236	171	43	22	40	10	42	19	86	8
2018	398	250	273	379	232	191	55	32	43	6	41	38	93	29
2017	416	240	286	346	189	175	42	43	37	10	35	51	77	35
2016	457	268	259	374	181	145	51	40	30	11	45	45	77	30
2015	434	292	229	315	163	212	46	56	49	9	32	28	86	17
2014	425	281	218	267	144	147	50	36	48	18	24	10	68	11
2013	450	323	213	294	140	146	53	43	55	13	30	24	61	18
2007-12	2 583	1 863	1 246	1 387	591	850	347	286	384	191	68	20	208	43
2002-06	1 999	1 631	805	554	321	481	181	206	320	158	25	0	262	26
1997-01	2 138	2 302	607	317	259	383	137	212	345	181	26	0	385	20
1987-96	3 898	4 535	503	519	322	671	14	25	60	178	81	0	163	48
Total	**13 960**	**12 429**	**5 178**	**5 395**	**3 011**	**3 735**	**1 056**	**1 031**	**1 449**	**792**	**484**	**250**	**1 636**	**295**

Revision causes are not mutually exclusive. More than one reason of revision is possible

Figure 4:



The graph is hierarchical, i.e. if a revision is marked both "Deep infection" and "Loosening", only "Deep infection" is counted.

Reasons for revisions

Table 3b: Implant Fracture

Year of revision	Femural stem	Femoral head	Acetabular cup	Liner	Other	Tota
2020	17	5	2	11	0	35
2019	25	2	1	14	0	42
2018	12	4	4	19	2	41
2017	9	7	3	16	0	35
2016	8	9	7	17	4	45
2015	8	5	4	11	4	32
2014	3	2	4	13	2	24
2013	9	6	3	10	2	30
2007-12	9	27	11	17	4	68
2002-06	9	6	10	0	0	25
1997-01	20	1	5	0	0	26
1987-96	61	1	19	0	0	81
Total	**190**	**75**	**73**	**128**	**18**	**484**

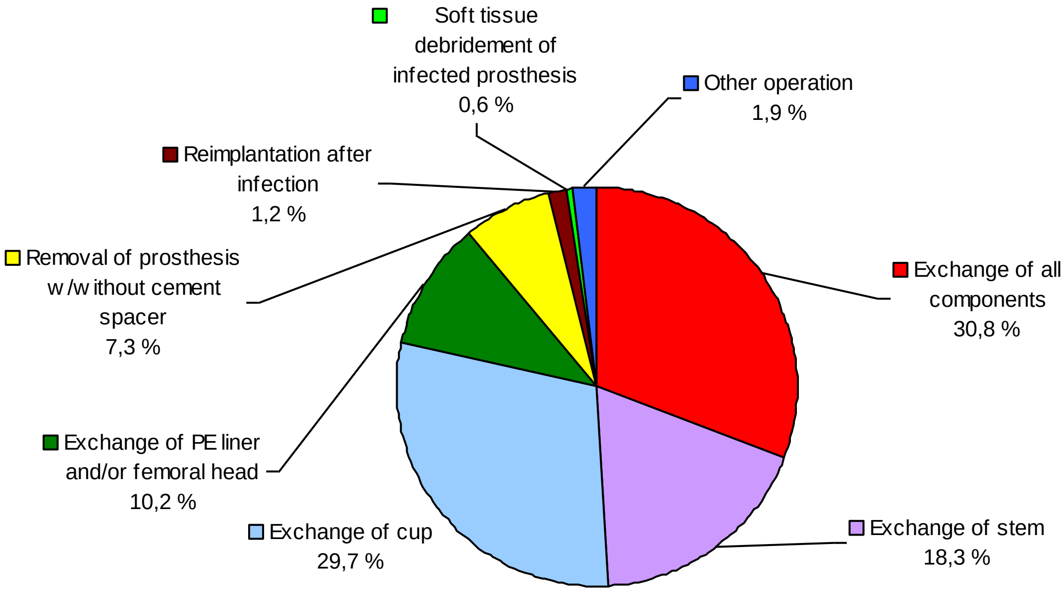
Revision causes are not mutually exclusive. More than one reason of revision is possible

Type of revision

Table 4:

Type of revision	1987-10	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Exchange of femoral stem and head	4 308	177	169	176	157	177	144	168	183	165	154	**5 978**
Exchange of stem, PE liner, head	244	21	18	20	30	29	25	40	39	47	30	**543**
Exchange of acetabular cup	3 014	196	187	168	200	203	164	218	182	233	241	**5 006**
Exchange of femoral head	646	113	113	114	100	118	135	124	118	99	86	**1 766**
Exchange of femoral head and acetabular cup	3 051	249	229	260	246	261	302	259	258	230	198	**5 543**
Exchange of all components	8 139	313	323	309	272	291	298	257	267	244	226	**10 939**
Exchange of PE liner only	104	6	6	4	8	11	3	7	14	9	11	**183**
Exchange of PE liner and femoral head	731	78	67	75	80	97	93	112	117	125	92	**1 667**
Removal of prosthesis or cement spacer	1 238	58	39	30	38	44	17	29	31	18	15	**1 557**
Removal of prosthesis and insertion of cement spacer	2	34	106	102	92	96	138	105	137	131	112	**1 055**
IInsertion of new prosthesis (after Girdlestone)	419	3	2	5	1	5	4		1	1	1	**442**
Soft tissue debridement of infected prosthesis	4	13	25	17	25	20	26	26	26	23	12	**217**
Muscle resonance and transposition							22	34	27	7	8	**98**
Osteosynthesis for fracture					1	1	35	46	68	82	86	**319**
Other operation	69	20	21	41	38	53	86	71	86	82	64	**631**
Missing information	124	6	10	6	6	4	6	7	6	7	5	**187**
Total	**22 093**	**1 287**	**1 315**	**1 327**	**1 294**	**1 410**	**1 498**	**1 503**	**1 560**	**1 503**	**1 341**	**36 131**

Figure 5:



Bone transplantation in revisions

Table 5: Acetabular cup

Year	Yes		No		Bone impaction[1]		Missing		Total
2020	41	(3,2 %)	883	(68,5 %)	52	(4 %)	313	(24,3 %)	**1 289**
2019	61	(4,2 %)	935	(64,7 %)	70	(4,8 %)	380	(26,3 %)	**1 446**
2018	50	(3,3 %)	964	(63,4 %)	76	(5 %)	430	(28,3 %)	**1 520**
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**
2015	102	(7,3 %)	971	(69,2 %)	92	(6,6 %)	238	(17 %)	**1 403**
2014	112	(8,7 %)	856	(66,2 %)	94	(7,3 %)	232	(17,9 %)	**1 294**
2013	89	(6,7 %)	854	(64,4 %)	131	(9,9 %)	253	(19,1 %)	**1 327**
2007-12	701	(9,7 %)	4 403	(61 %)	1162	(16,1 %)	955	(13,2 %)	**7 221**
2002-06	810	(16,4 %)	2 924	(59,3 %)	826	(16,7 %)	373	(7,6 %)	**4 933**
1997-01	1 033	(21,1 %)	3 049	(62,4 %)	703	(14,4 %)	102	(2,1 %)	**4 887**
1987-96	2 146	(28,2 %)	5 203	(68,5 %)	86	(1,1 %)	162	(2,1 %)	**7 597**
Total	**5 283**	**(14,7 %)**	**22 945**	**(64 %)**	**3 471**	**(9,7 %)**	**4 162**	**(11,6 %)**	**35 861**

Table 6: Femoral stem

Year	Yes		No		Bone impaction[1]		Missing		Total
2020	32	(2,6 %)	863	(70,8 %)	4	(0,3 %)	320	(26,3 %)	**1 219**
2019	33	(2,4 %)	934	(68,4 %)	5	(0,4 %)	393	(28,8 %)	**1 365**
2018	26	(1,8 %)	955	(66,8 %)	4	(0,3 %)	445	(31,1 %)	**1 430**
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**
2015	70	(5 %)	982	(70,4 %)	11	(0,8 %)	331	(23,7 %)	**1 394**
2014	63	(4,9 %)	880	(68 %)	3	(0,2 %)	348	(26,9 %)	**1 294**
2013	84	(6,3 %)	886	(66,8 %)	8	(0,6 %)	349	(26,3 %)	**1 327**
2007-12	714	(10 %)	4 484	(62,6 %)	278	(3,9 %)	1 687	(23,6 %)	**7 163**
2002-06	761	(15,4 %)	3 189	(64,6 %)	482	(9,8 %)	505	(10,2 %)	**4 937**
1997-01	1 015	(20,8 %)	2 872	(58,7 %)	898	(18,4 %)	104	(2,1 %)	**4 889**
1987-96	1 704	(22,4 %)	5 602	(73,7 %)	129	(1,7 %)	162	(2,1 %)	**7 597**
Total	**4 590**	**(13 %)**	**23 568**	**(66,6 %)**	**1 832**	**(5,2 %)**	**5 420**	**(15,3 %)**	**35 410**

1 Registration of "Bone impaction" started in 1996.

Bone loss in revisions

Table 7: Acetabular cup

Year	Type I	Type IIA	Type IIB	Type IIC	Type IIIA	Type IIIB	Missing	Total
2020	272	159	94	40	42	24	218	**849**
2019	234	194	109	53	62	19	249	**920**
2018	311	173	93	48	49	20	262	**956**
2017	311	166	99	62	55	9	256	**958**
2016	267	219	103	82	55	29	231	**986**
2015	241	180	108	51	59	20	266	**925**
2014	197	171	93	70	41	31	281	**884**
2013	253	186	85	78	61	25	230	**918**
2007-12	1 264	1 085	593	499	399	142	1 247	**5 229**
2002-06	450	273	165	139	118	47	404	**1 596**

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 8: Femoral stem

Year	Type I	Type II	Type IIIA	Type IIIB	Type IV	Missisng	Total
2020	228	105	51	11	5	210	**610**
2019	253	133	57	10	7	233	**693**
2018	296	123	59	15	10	244	**747**
2017	275	140	51	13	8	219	**706**
2016	253	153	70	24	4	214	**718**
2015	200	134	87	17	10	249	**697**
2014	162	149	67	13	3	237	**631**
2013	234	154	67	24	4	215	**698**
2007-12	1 034	952	426	106	50	1 247	**3 815**
2002-06	377	303	130	45	15	329	**1 199**

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.

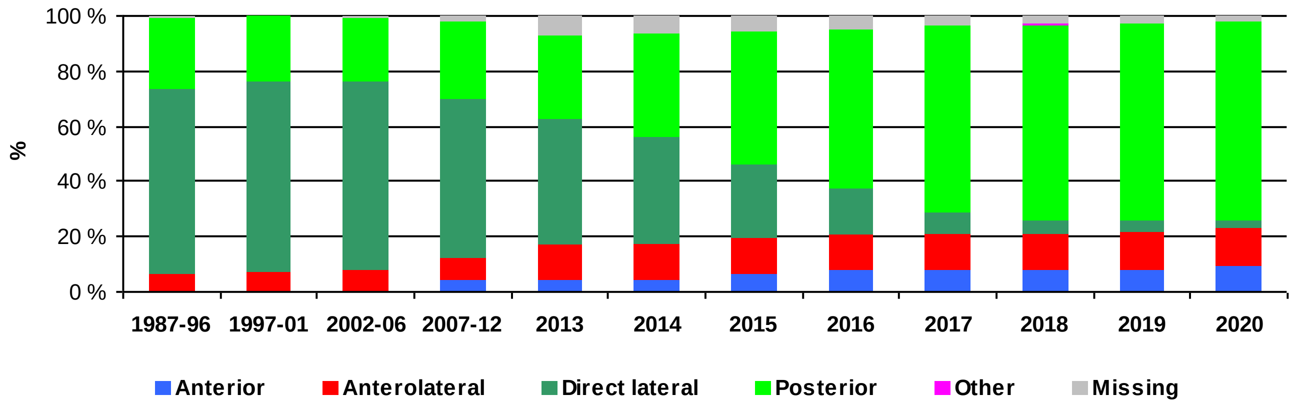
Registration of bone loss started in 2005

Surgical approach

Table 9: In primary operations *

Year	Anterior		Anterolateral		Direct lateral		Posterior		Other		Missing information		Total
2020	797	(9,3 %)	1 168	(13,7 %)	226	(2,6 %)	6 151	(72 %)	11	(0,1 %)	185	(2,2 %)	**8 538**
2019	754	(7,6 %)	1 422	(14,2 %)	407	(4,1 %)	7 095	(71,1 %)	23	(0,2 %)	278	(2,8 %)	**9 979**
2018	765	(8 %)	1 249	(13 %)	464	(4,8 %)	6 801	(70,8 %)	43	(0,4 %)	281	(2,9 %)	**9 603**
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**
2015	521	(6,2 %)	1 147	(13,6 %)	2 235	(26,4 %)	4 087	(48,4 %)	3	(0 %)	457	(5,4 %)	**8 450**
2014	337	(4,1 %)	1 059	(13 %)	3 175	(39 %)	3 021	(37,1 %)	16	(0,2 %)	530	(6,5 %)	**8 138**
2013	344	(4,2 %)	1 081	(13,3 %)	3 628	(44,8 %)	2 473	(30,5 %)	24	(0,3 %)	554	(6,8 %)	**8 104**
2007-12	1 900	(4,4 %)	3 372	(7,8 %)	4 863	(57,6 %)	2 029	(27,9 %)	119	(0,3 %)	871	(2 %)	**43 154**
2002-06	44	(0,1 %)	2 445	(7,6 %)	2 111	(68,4 %)	7 413	(22,9 %)	32	(0,1 %)	304	(0,9 %)	**32 349**
1997-01	41	(0,1 %)	2 068	(7,4 %)	9 182	(68,5 %)	6 586	(23,5 %)	19	(0,1 %)	89	(0,3 %)	**27 985**
1987-96	121	(0,3 %)	2 720	(6,2 %)	9 355	(66,7 %)	1 501	(26,1 %)	38	(0,1 %)	280	(0,6 %)	**44 015**
Total	**7 055**	**(3,2 %)**	**20 066**	**(9,2 %)**	**07 836**	**(49,4 %)**	**78 504**	**(35,9 %)**	**337**	**(0,2 %)**	**4 647**	**(2,1 %)**	**218 445**

Figure 6: In primary operations *

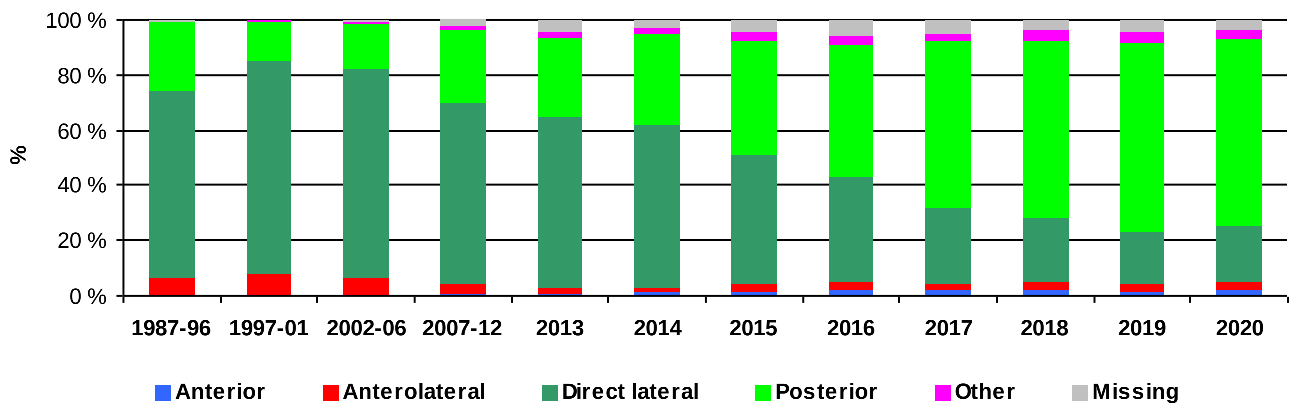


* Anterior: Operative approach between sartorius and tensor
Anterolateral: Operative approach between glut. medius and tensor
Direct lateral: Operative approach transgluteal
Posterior: Operative approach behind gluteus medius

Table 10: In revisions *

Year	Anterior		Anterolateral		Direct lateral		Posterior		Other		Missing information		Total
2020	30	(2,2 %)	35	(2,6 %)	263	(19,6 %)	879	(65,5 %)	49	(3,7 %)	85	(6,3 %)	**1 341**
2019	26	(1,7 %)	35	(2,3 %)	281	(18,7 %)	997	(66,3 %)	59	(3,9 %)	105	(7 %)	**1 503**
2018	34	(2,2 %)	47	(3 %)	342	(21,9 %)	975	(62,5 %)	63	(4 %)	99	(6,3 %)	**1 560**
2017	29	(1,9 %)	35	(2,3 %)	409	(27,2 %)	900	(59,9 %)	41	(2,7 %)	89	(5,9 %)	**1 503**
2016	27	(1,8 %)	45	(3 %)	570	(38,1 %)	714	(47,7 %)	54	(3,6 %)	88	(5,9 %)	**1 498**
2015	24	(1,7 %)	35	(2,5 %)	662	(47 %)	573	(40,6 %)	50	(3,5 %)	66	(4,7 %)	**1 410**
2014	16	(1,2 %)	25	(1,9 %)	762	(58,9 %)	427	(33 %)	23	(1,8 %)	41	(3,2 %)	**1 294**
2013	7	(0,5 %)	31	(2,3 %)	822	(61,9 %)	380	(28,6 %)	34	(2,6 %)	53	(4 %)	**1 327**
2007-12	62	(0,9 %)	227	(3,1 %)	4 786	(66,1 %)	1 900	(26,2 %)	119	(1,6 %)	150	(2,1 %)	**7 244**
2002-06	9	(0,2 %)	309	(6,2 %)	3 681	(74,3 %)	814	(16,4 %)	33	(0,7 %)	106	(2,1 %)	**4 952**
1997-01	15	(0,3 %)	384	(7,8 %)	3 746	(76,4 %)	678	(13,8 %)	35	(0,7 %)	42	(0,9 %)	**4 900**
1987-96	18	(0,2 %)	463	(6,1 %)	5 146	(67,7 %)	1 906	(25,1 %)	22	(0,3 %)	44	(0,6 %)	**7 599**
Total	**297**	**(0,8 %)**	**1 671**	**(4,6 %)**	**21 470**	**(59,4 %)**	**11 143**	**(30,8 %)**	**582**	**(1,6 %)**	**968**	**(2,7 %)**	**36 131**

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

Trochanteric osteotomy

Table 11:

	Primary operations						Revisions						
Year	No		Yes		Missing		No		Yes		Missing		Total
2020	8 158	(95,5 %)	15	(0,2 %)	365	(4,3 %)	1 174	(87,5 %)	69	(5,1 %)	98	(7,3 %)	**9 879**
2019	9 495	(95,1 %)	20	(0,2 %)	464	(4,6 %)	1 314	(87,4 %)	62	(4,1 %)	127	(8,4 %)	**11 482**
2018	9 020	(93,9 %)	27	(0,3 %)	556	(5,8 %)	1 337	(85,7 %)	93	(6 %)	130	(8,3 %)	**11 163**
2017	8 576	(93,5 %)	20	(0,2 %)	580	(6,3 %)	1 306	(86,9 %)	69	(4,6 %)	128	(8,5 %)	**10 679**
2016	8 458	(94,5 %)	25	(0,3 %)	471	(5,3 %)	1 307	(87,2 %)	91	(6,1 %)	100	(6,7 %)	**10 452**
2015	7 608	(90 %)	29	(0,3 %)	813	(9,6 %)	1 203	(85,3 %)	96	(6,8 %)	111	(7,9 %)	**9 860**
2014	7 400	(90,9 %)	21	(0,3 %)	717	(8,8 %)	1 112	(85,9 %)	66	(5,1 %)	116	(9 %)	**9 432**
2013	7 231	(89,2 %)	58	(0,7 %)	815	(10,1 %)	1 163	(87,6 %)	65	(4,9 %)	99	(7,5 %)	**9 431**
2007-12	39 291	(91 %)	297	(0,7 %)	3 566	(8,3 %)	6 037	(83,3 %)	680	(9,4 %)	527	(7,3 %)	**50 398**
2002-06	30 299	(93,7 %)	736	(2,3 %)	1 314	(4,1 %)	4 195	(84,7 %)	506	(10,2 %)	251	(5,1 %)	**37 301**
1997-01	26 707	(95,4 %)	1 038	(3,7 %)	240	(0,9 %)	4 214	(86 %)	604	(12,3 %)	82	(1,7 %)	**32 885**
1987-96	36 683	(83,3 %)	6 876	(15,6 %)	456	(1 %)	6 147	(80,9 %)	1 358	(17,9 %)	94	(1,2 %)	**51 614**
Total	**198 926**	**(91,1 %)**	**9 162**	**(4,2 %)**	**10 357**	**(4,7 %)**	**30 509**	**(84,4 %)**	**3 759**	**(10,4 %)**	**1 863**	**(5,2 %)**	**254 576**

Fixation in primary operations

Figure 8a: All patients

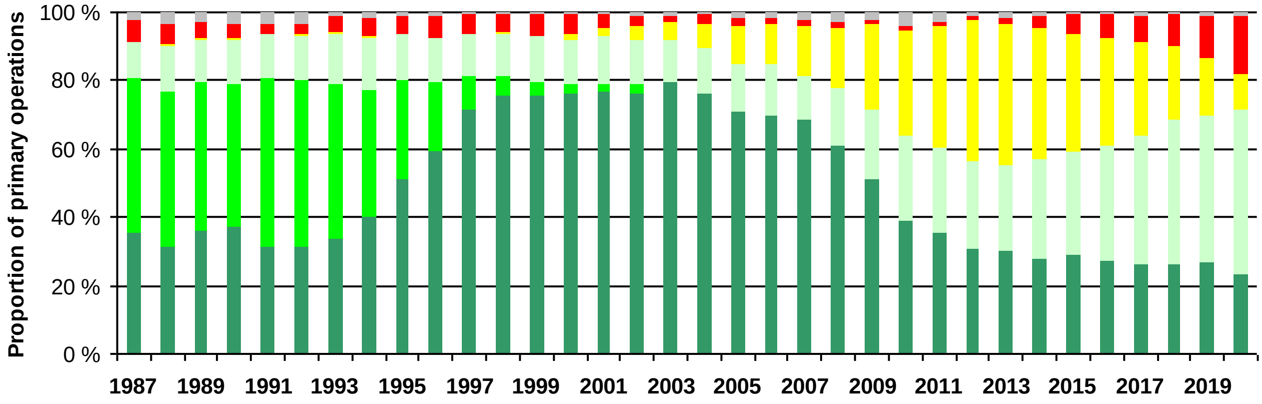
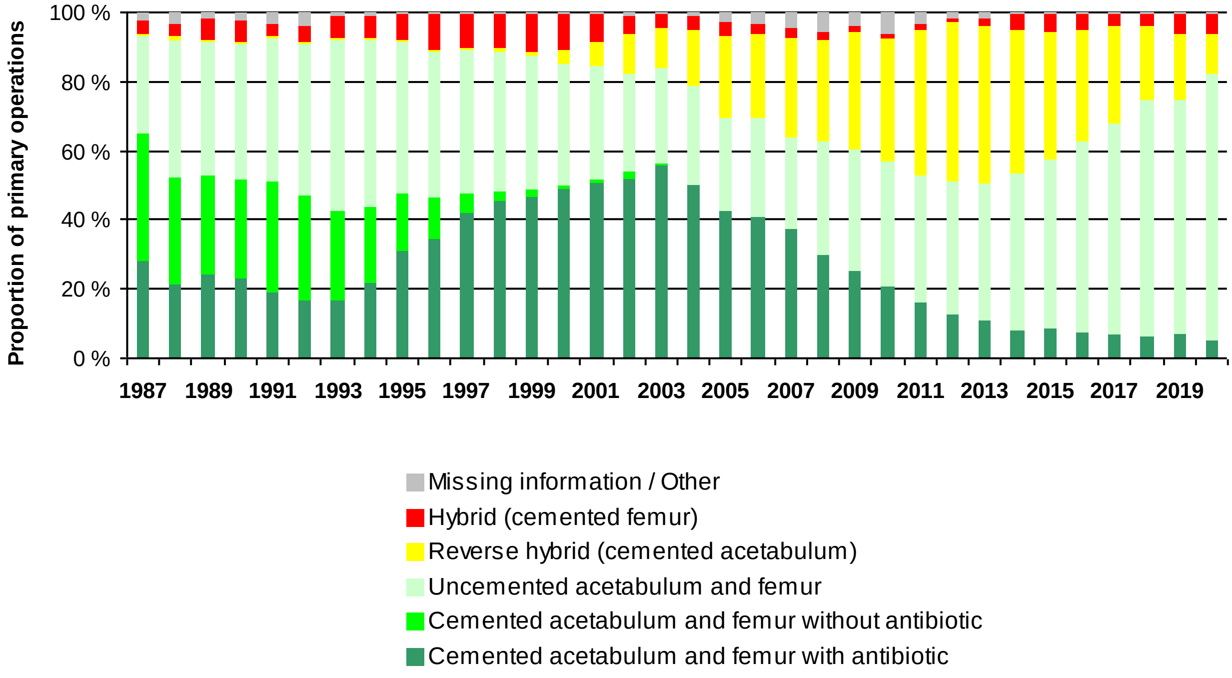


Figure 8b: Patients under 65 years old



Fixation in primary operations (cont.)

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

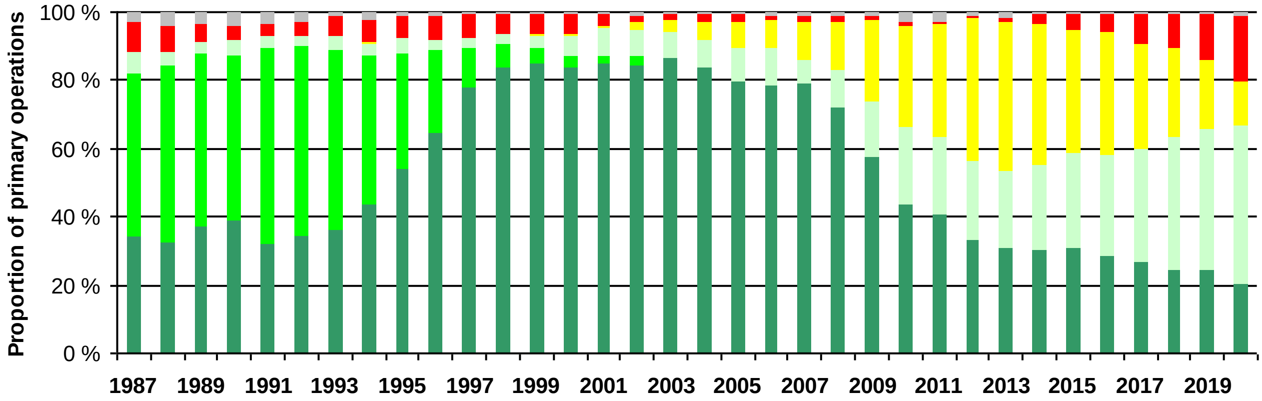
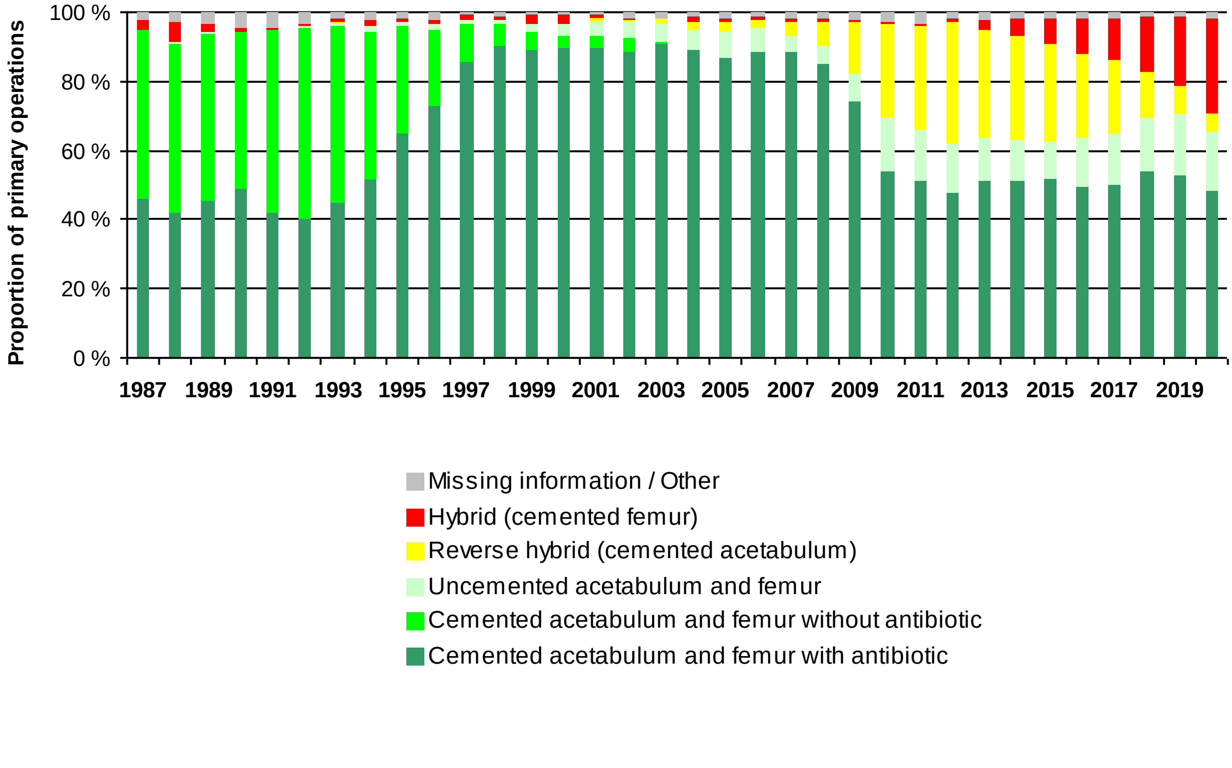


Figure 8d: Patients over 75 years old



Fixation in revisions

Figure 9: Acetabular cup - All patients

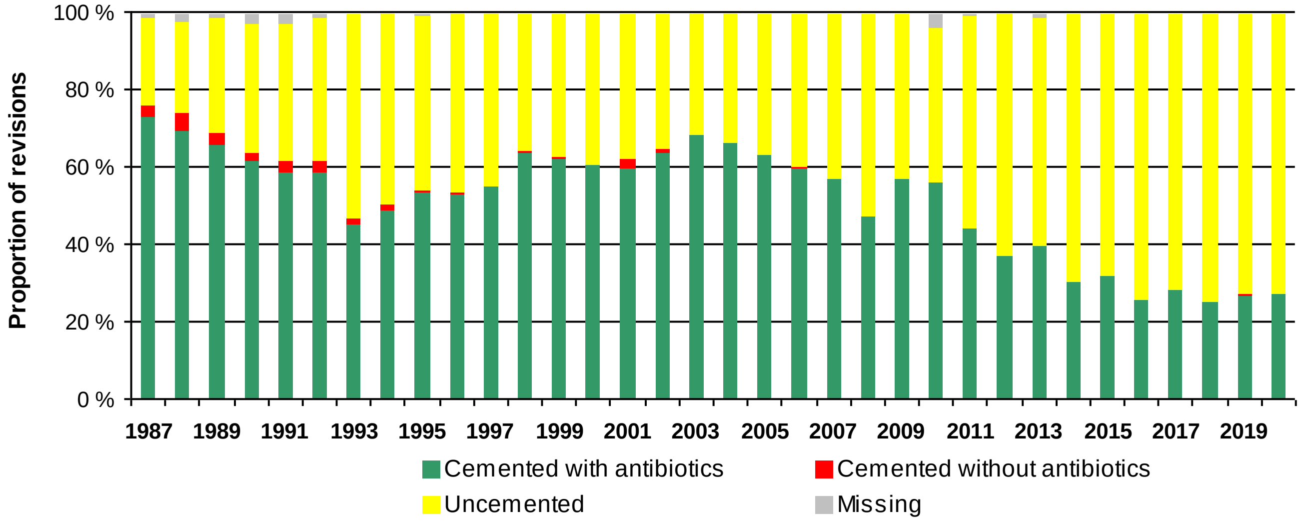
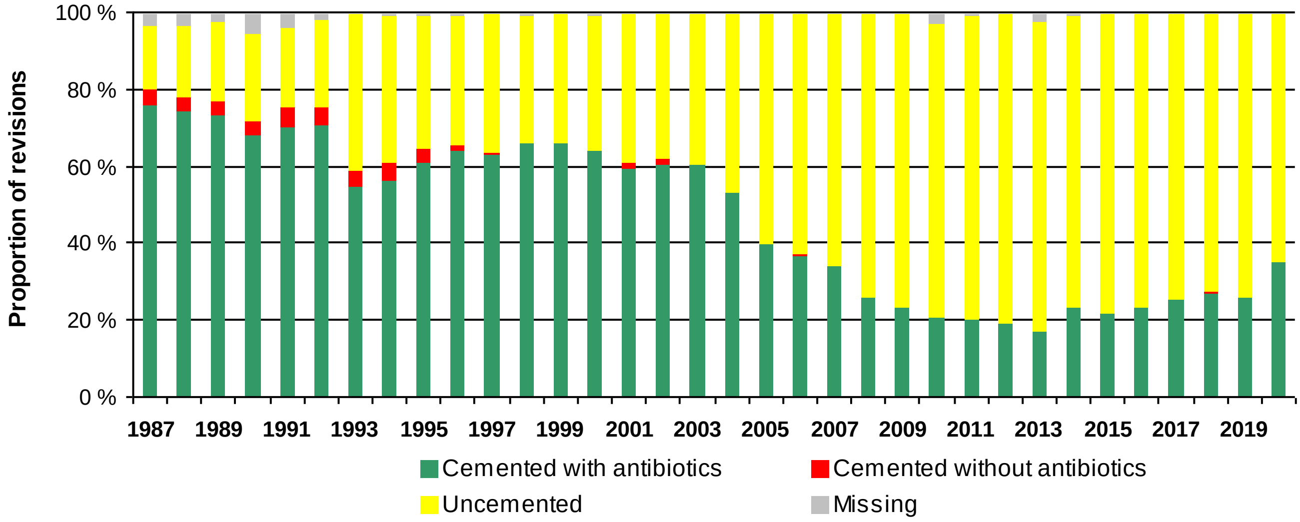


Figure 10: Femoral stem - All patients



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
2020	9%	2%	72%	17%	227	5%	5%	70%	19%	610
2019	11%	5%	68%	16%	251	6%	7%	65%	22%	677
2018	12%	5%	61%	22%	237	7%	5%	65%	23%	696
2017	16%	7%	56%	20%	258	5%	7%	73%	15%	655
2016	16%	7%	57%	20%	235	6%	8%	70%	17%	699
2015	21%	9%	63%	7%	301	5%	12%	69%	15%	638
2014	26%	10%	56%	8%	260	4%	14%	67%	14%	593
2013	31%	7%	50%	12%	347	4%	11%	71%	13%	515
2007-12	41%	8%	44%	6%	2 403	6%	20%	66%	8%	2 402
2002-06	35%	17%	46%	3%	2 148	5%	33%	57%	5%	1 185
1997-01	30%	21%	49%	0%	1 961	9%	47%	44%	1%	1 249
1987-96	2%	26%	71%	1%	3 133	1%	62%	35%	2%	2 082
Total	**24%**	**16%**	**55%**	**5%**	**11 761**	**5%**	**26%**	**58%**	**10%**	**12 001**

Table 13: Femoral stem

	Cemented					Uncemented				
	Bone impaction	Bone transpl.	No	Missing	Total	Bone impaction	Bone transpl.	No	Missing	Total
2020	1%	2%	80%	16%	163	0%	6%	71%	23%	305
2019	1%	1%	78%	19%	141	0%	4%	71%	24%	395
2018	1%	0%	73%	26%	148	0%	4%	71%	24%	406
2017	3%	3%	76%	18%	130	0%	7%	74%	19%	395
2016	0%	1%	77%	22%	126	1%	7%	75%	17%	412
2015	2%	4%	82%	12%	118	2%	9%	76%	14%	427
2014	3%	3%	63%	32%	114	0%	13%	74%	14%	376
2013	6%	4%	63%	27%	96	0%	14%	72%	14%	461
2007-12	27%	5%	53%	15%	694	2%	24%	64%	10%	2 247
2002-06	33%	10%	56%	2%	1 215	5%	41%	51%	3%	1 178
1997-01	36%	16%	48%	1%	1 931	17%	53%	29%	1%	1 060
1987-96	2%	14%	82%	2%	4 056	2%	65%	32%	1%	1 639
Total	**16%**	**12%**	**68%**	**5%**	**8 932**	**4%**	**31%**	**56%**	**9%**	**9 301**

Registration of "Bone impaction" started in 1996

Cements used in the acetabulum and femur

Table 14: In primary- and revision surgeries

Cements	1987-12	2013	2014	2015	2016	2017	2018	2019	2020	Total
Boneloc	1 353	0	0	0	0	0	0	0	0	**1 353**
Cemex System Genta FAST	1 163	215	116	84	0	0	0	1	0	**1 579**
Cemex system genta ID green	0	0	0	0	18	197	204	139	3	**561**
Cemex w/gentamicin	414	43	128	150	234	0	0	1	3	**973**
CMW I	5 110	0	0	0	0	0	0	0	0	**5 110**
CMW I w/gentamicin	3 345	0	0	0	1	0	0	0	0	**3 346**
CMW II	16	0	0	0	0	0	0	0	0	**16**
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	0	4	7	13	11	25	32	93	82	**267**
Copal w/gentamicin+clindamycin	13	3	3	9	3	13	23	41	41	**149**
Optipac Refobacin Bonecement R	6 107	1 918	2 111	2 466	2 207	1 633	1 181	89	0	**17 712**
Optipac Refobacin Bonecement R-3	0	0	0	0	0	0	0	131	120	**251**
Optipac Refobacin Revision	15	14	8	21	17	13	1	0	0	**89**
Palacos	6 992	0	0	1	0	0	0	0	0	**6 993**
Palacos E-Flow (low viscosity)	99	0	0	0	0	0	0	0	0	**99**
Palacos R + G	20 981	2 606	2 464	2 506	2 337	1 666	1 541	1 018	486	**35 605**
Palacos R+G pro	1	1	2	1	59	790	2 074	3 721	3 501	**10 150**
Palacos w/gentamicin	62 800	2	0	1	0	0	1	0	0	**62 804**
Palamed G (gentamicin)	13	0	0	0	0	0	0	0	0	**13**
Refobacin Bone Cement R	8 755	988	694	384	632	913	59	1	0	**12 426**
Refobacin Revision	275	38	38	36	24	70	24	5	0	**510**
Refobacin Revision-3	0	0	0	0	0	0	35	38	29	**102**
Refobacin-Palacos	2 387	0	0	0	0	0	0	0	0	**2 387**
Simplex	7 148	0	0	0	0	0	0	0	0	**7 148**
Simplex unknown	826	0	1	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	5 967	503	511	527	534	488	503	492	333	**9 858**
SmartSet GHV	159	0	0	0	0	0	0	0	0	**159**
SmartSet GHV Genta. Smartmix	185	2	2	26	157	179	99	117	33	**800**
SmartSet HV	15	0	0	0	0	0	0	0	0	**15**
Vancogenx	3	2	2	2	1	5	4	10	5	**34**
Annet (n<10)	18	1	1	1	0	1	0	0	1	**23**
Missing information	315	37	31	32	55	66	59	108	89	**792**

Cemented primary prostheses

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

Cup	Stem	1987-12	2013	2014	2015	2016	2017	2018	2019	2020	Total
CHARNLEY	CHARNLEY	40 274	65	39							**40 378**
EXETER	EXETER	12 919	26								**12 945**
EXETER X3 RIMFIT	EXETER	1 651	1 179	1 167	1 360	1 321	992	1 044	1 009	611	**10 334**
REFLECTION CEM. ALL POLY	SPECTRON-EF	9 700	33	1							**9 734**
TITAN	TITAN	6 955									**6 955**
IP	LUBINUS SP II	4 569	418	281	307	262	217	203	222	155	**6 634**
CONTEMPORARY	EXETER	4 574	104	57	15	3	1		3	4	**4 761**
SPECTRON	ITH	2 405									**2 405**
MARATHON	CHARNLEY MODULAR	1 004	202	228	137	46	26		2	13	**1 658**
LUBINUS	LUBINUS SP II	13	125	169	252	213	214	201	228	227	**1 642**
KRONOS	TITAN	1 483									**1 483**
MARATHON	EXETER	130	83	92	122	187	197	244	241	95	**1 391**
ELITE	TITAN	1 224									**1 224**
MARATHON	C-STEM	34			42	129	118	175	231	224	**953**
ELITE	CHARNLEY	935									**935**
REFLECTION CEM. ALL POLY	ITH	927									**927**
REFLECTION CEM. ALL POLY	BIO-FIT	898									**898**
WEBER ALLO PRO	MS-30	813									**813**
ELITE	EXETER	778									**778**
ZCA	CPT	756									**756**
CHARNLEY	CHARNLEY MODULAR	659		1							**660**
MARATHON	LUBINUS SP II	40	21	46	69	111	40	41	110	182	**660**
AVANTAGE	EXETER	160	49	62	38	40	32	65	71	73	**590**
IP	LUBINUS	587									**587**
MARATHON	MS-30				15	19	72	115	167	196	**584**
ELITE	ELITE	579									**579**
CHARNLEY	EXETER	571									**571**
TITAN	FJORD	523									**523**
ELITE	CHARNLEY MODULAR	466	30	22							**518**
SPECTRON	SP I	432									**432**
MODULAR HIP SYSTEM	BIO-FIT	430									**430**
SPECTRON	TITAN	411									**411**
MARATHON	CORAIL	74	68	55	51	61	28	25	14	4	**380**
CHARNLEY	C-STEM	378									**378**
CHARNLEY	ELITE	375									**375**
OPERA	SPECTRON-EF	356									**356**
ELITE	MS-30	339									**339**
EXCEED ABT RINGLOC-X	MS-30						65	97	97	38	**297**
PEARL	TITAN	285									**285**
EXCEED ABT RINGLOC-X	CPT						106	113	64		**283**
MODULAR HIP SYSTEM	ITH	277									**277**
SPECTRON	BIO-FIT	226									**226**
POLARCUP	LUBINUS SP II	31	13	10	9	15	25	16	45	52	**216**
IP	SP I	214									**214**
LMT	LMT	191									**191**
Other	Other	2 876	19	65	48	50	260	171	145	105	**3 739**

Uncemented primary prostheses

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

Cup	Stem	1987-12	2013	2014	2015	2016	2017	2018	2019	2020	Total
PINNACLE	CORAIL	1 194	360	319	383	490	1 240	1 674	1 711	1 562	**8 933**
REFLECTION UNCEMENTED	CORAIL	2 422	745	822	543	169	218	427	182	276	**5 804**
IGLOO	FILLER	2 691	210	173	124	165	108	121	136	73	**3 801**
TRILOGY	CORAIL	1 668	217	271	248	331	270	199	329	148	**3 681**
TRIDENT	CORAIL	65	25	74	113	270	240	303	657	1 053	**2 800**
TROPIC	CORAIL	2 674									**2 674**
R3	CORAIL	2			120	493	568	519	453	326	**2 481**
ATOLL	CORAIL	1 282									**1 282**
TRIDENT	ACCOLADE II		42	75	174	127	116	174	233	214	**1 155**
Continuum Acetabular System	CORAIL			190	302	332	88	41	48	78	**1 079**
DURALOC	CORAIL	1 009	62								**1 071**
REFLECTION UNCEMENTED	HACTIV	1	9	3	117	185	187	184	95		**781**
R3	POLARSTEM	145	82	51	50	74	50	14	25	108	**599**
BICON-PLUS	ZWEYMÜLLER	586									**586**
REFLECTION UNCEMENTED	SECURFIT	486	32								**518**
TRILOGY	SCP/UNIQUE	508	1								**509**
R3	FILLER			31	89	90	114	96	43		**463**
TRILOGY	HACTIV	442	7						8		**457**
TRIDENT	POLARSTEM			43	58	21	60	59	121	93	**455**
GEMINI	PROFILE	407									**407**
BICON-PLUS	HACTIV	386									**386**
DURALOC	PROFILE	332									**332**
REFLECTION UNCEMENTED	OMNIFIT	300									**300**
DURALOC	SCP/UNIQUE	267									**267**
TRILOGY	FILLER	241	18		2						**261**
ENDLER	ZWEYMÜLLER	247									**247**
REFLECTION UNCEMENTED	SCP/UNIQUE	179	14	25	13	10	2				**243**
EUROPEAN CUP SYSTEM	TAPERLOC	240									**240**
PLASMACUP	BICONTACT	232									**232**
LMT	TAPERLOC	227									**227**
TRABECULAR METAL	CORAIL	15	7	19	21	36	26	26	35	28	**213**
TRIDENT	ABG II	57	52	81	22						**212**
AVANTAGE	CORAIL	87	3	1	2	29	10	12	25	14	**183**
TI-FIT	BIO-FIT	175									**175**
REFLECTION UNCEMENTED	SL-PLUS MIA	169									**169**
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	148		1	1						**150**
REFLECTION UNCEMENTED	PROFEMUR GLADIATOR	105	37	1							**143**
TRIDENT	HACTIV			3	18	65	44	6			**136**
TRILOGY	OMNIFIT	134									**134**
Other	Other	2 898	136	152	157	147	145	253	241	167	**4 296**

Hybrid primary prostheses

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

Cup (uncemented)	Stem (cemented)	1987-12	2013	2014	2015	2016	2017	2018	2019	2020	Total
TRILOGY	EXETER	455	90	207	239	245	258	170	60	32	**1 756**
TRIDENT	EXETER	90	1	10	22	31	12	174	451	551	**1 342**
TROPIC	TITAN	869									**869**
MORSCHER	MS-30	699									**699**
REFLECTION UNCEMENTED	C-STEM			1	25	62	106	124	144	196	**658**
R3	LUBINUS SP II				44	159	141	145	94	74	**657**
TRILOGY	CHARNLEY	382									**382**
ENDLER	TITAN	336									**336**
TRIDENT	LUBINUS SP II		1		3	7	20	13	64	210	**318**
REFLECTION UNCEMENTED	LUBINUS SP II	8	39	68	83	1		22	9	4	**234**
PINNACLE	C-STEM					3	2	24	94	106	**229**
PINNACLE	LUBINUS SP II				2	4	4	28	36	105	**179**
AVANTAGE	EXETER	22	6	9	15	32	26	24	19	12	**165**
DURALOC	CHARNLEY	153									**153**
REFLECTION UNCEMENTED	BIO-FIT	142									**142**
TRILOGY	CPT	93					46	2	1		**142**
REFLECTION UNCEMENTED	SPECTRON-EF	121	1					1			**123**
TRIDENT	MS-30					1	1	4	39	67	**112**
ATOLL	TITAN	105									**105**
IP	SP I	101									**101**
Other	Other	1 218	15	29	40	33	103	155	243	112	**1 948**

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

Cup (cemented)	Stem (uncemened)	1987-12	2013	2014	2015	2016	2017	2018	2019	2020	Total
MARATHON	CORAIL	5 990	2 892	2 728	2 564	2 350	2 187	1 816	1 491	793	**22 811**
ELITE	CORAIL	2 517	85	71	3	2					**2 678**
REFLECTION CEM. ALL POLY	CORAIL	1 203	21	22	30	29	31	7	2	7	**1 352**
TITAN	CORAIL	986									**986**
EXETER X3 RIMFIT	ACCOLADE II		68	60	123	157	121	116	62	1	**708**
CONTEMPORARY	CORAIL	679	2	1							**682**
KRONOS	CORAIL	640									**640**
EXETER X3 RIMFIT	CORAIL	102	70	88	46	129	54	24	21	11	**545**
REFLECTION CEM. ALL POLY	HACTIV	455	20	1							**476**
REFLECTION CEM. ALL POLY	FILLER	208	32	20	1		2				**263**
IP	CORAIL	190	11	3	2	5	1	3	4		**219**
AVANTAGE	CORAIL	72	14	19	12	12	14	20	10	6	**179**
EXETER	CORAIL	173									**173**
EXETER	ABG II	172									**172**
REFLECTION CEM. ALL POLY	TAPERLOC	162									**162**
EXETER X3 RIMFIT	ABG II	140	8								**148**
EXETER X3 RIMFIT	FILLER	1	24	44	35	25	7		2		**138**
CHARNLEY	CORAIL	117	1								**118**
ELITE	SCP/UNIQUE	95	2	1	1						**99**
MARATHON	ACCOLADE II				15	51	28	1	1	1	**97**
Other	Other	1 109	76	70	71	69	66	58	75	59	**1 653**

Acetabular cups in primary operations

Table 19: (The 45 most common)

Cup	1987-10	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
CHARNLEY	42 872	117	114	66	40							**43 209**
MARATHON	2 252	2 139	3 090	3 319	3 193	3 045	3 000	2 762	2 488	2 305	1 519	**29 112**
REFLECTION CEM. ALL POL	13 487	193	234	108	53	36	33	34	8	17	15	**14 218**
EXETER	13 252	156	84	26	1							**13 519**
EXETER X3 RIMFIT	71	745	1 103	1 370	1 363	1 571	1 635	1 178	1 185	1 099	626	**11 946**
REFLECTION UNCEMENTED	2 956	768	848	933	968	798	435	520	834	452	494	**10 006**
PINNACLE	545	326	468	388	331	398	519	1 286	1 810	1 925	1 818	**9 814**
TITAN	8 767	48	1									**8 816**
TRILOGY	4 056	244	292	351	509	517	582	576	374	468	196	**8 165**
IP	4 757	557	482	440	286	315	267	220	211	228	162	**7 925**
ELITE	7 071	304	261	118	95	5	2					**7 856**
TRIDENT	199	33	53	161	347	441	548	546	783	1 626	2 279	**7 016**
CONTEMPORARY	4 248	889	195	111	58	15	3	1		3	4	**5 527**
R3	22	75	57	82	84	308	829	885	808	680	512	**4 342**
IGLOO	2 435	230	249	211	175	124	169	110	121	136	74	**4 034**
TROPIC	3 823											**3 823**
SPECTRON	3 652											**3 652**
KRONOS	2 186	7										**2 193**
DURALOC	1 605	245	72	62								**1 984**
AVANTAGE	441	110	119	103	119	98	158	190	182	222	187	**1 929**
LUBINUS	31		1	125	169	253	213	215	205	230	230	**1 672**
ATOLL	1 491											**1 491**
BICON-PLUS	1 209	2			1	1						**1 213**
Continuum Acetabular System					194	320	348	98	50	60	83	**1 153**
ZCA	1 063											**1 063**
EXCEED ABT RINGLOC-X	57	7	8	20	39	66	37	206	274	179	42	**935**
POLARCUP	10	46	58	79	66	64	49	91	99	181	180	**923**
MODULAR HIP SYSTEM	878											**878**
MORSCHER	837	6										**843**
WEBER ALLO PRO	830											**830**
ENDLER	662											**662**
BIRMINGHAM HIP RESURFA	456	43	21	2								**522**
GEMINI	510											**510**
OPERA	457											**457**
TRABECULAR METAL	5	7	14	17	33	35	54	41	44	57	34	**341**
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**
COXA	220											**220**
Other	2 196	31	6		6	31	67	204	121	106	76	**2 844**

Acetabular cups in revisions

Table 20: (The 45 most common)

Cup	1987-10	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
CHARNLEY	2 847	9	5	3				1				**2 865**
TROPIC	1 885											**1 885**
AVANTAGE	869	143	114	99	85	86	76	90	97	92	117	**1 868**
TRILOGY	1 157	70	50	51	56	65	59	46	42	24	28	**1 648**
TRABECULAR METAL	108	99	118	161	214	160	204	158	153	155	108	**1 638**
ELITE	1 530	33	19	12	6							**1 600**
PINNACLE	398	86	97	82	117	97	111	115	132	107	105	**1 447**
TRIDENT	52	22	38	41	44	94	88	111	170	228	267	**1 155**
POLARCUP	54	48	84	119	113	132	118	129	111	123	88	**1 119**
MARATHON	206	130	164	138	66	94	66	60	46	44	35	**1 049**
EXETER	939	1	3						1			**944**
REFLECTION CEM. ALL POL	884	11	7	4	3	4	2				1	**916**
REFLECTION UNCEMENTED	165	62	78	94	83	74	35	41	28	26	19	**705**
IGLOO	404	28	24	18	15	15	25	18	17	20	4	**588**
TITAN	527											**527**
ATOLL	396											**396**
R3			7	6	6	20	61	79	67	31	26	**303**
IP	234	7	10	4	3	5	3	4	1	1	1	**273**
Continuum Acetabular System					13	51	66	37	37	38	14	**256**
CONTEMPORARY	183	45	9	3								**240**
KRONOS	225											**225**
CHRISTIANSEN	196											**196**
EXETER X3 RIMFIT	2	23	24	30	25	29	29	9	5	11	5	**192**
SPECTRON	189											**189**
DURALOC	94	16	10	5	11	9	2	6	5	7	6	**171**
OPERA	101											**101**
HARRIS/GALANTE	99											**99**
ZCA	96											**96**
MODULAR HIP SYSTEM	95											**95**
CAPTIV	71						7					**78**
BICON-PLUS	48	1	2	3		2	1	5	4	5	4	**75**
EUROPEAN CUP SYSTEM	73											**73**
LMT (Uncemented)	67											**67**
ENDLER	66											**66**
HG II	53											**53**
MORSCHER	48	3										**51**
GEMINI	47											**47**
SECURFIT	45											**45**
REGENEREX RINGLOC	18	13	7	2							1	**41**
OCTOPUS	40											**40**
TI-FIT	36											**36**
PARHOFER	35											**35**
PCA	33		1									**34**
S-ROM	27											**27**
COXA	25											**25**
Other	334	7	2	3	5	4	7	18	19	19	17	**435**

Femoral stems in primary operations

Table 21: (The 45 most common)

Stem	1987-10	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
CORAIL	16 035	3 681	4 495	4 637	4 712	4 459	4 759	5 031	5 169	5 037	4 339	**62 354**
CHARNLEY	42 204	117	116	67	44							**42 548**
EXETER	18 737	1 558	1 461	1 570	1 651	1 850	1 894	1 553	1 838	1 928	1 446	**35 486**
TITAN	12 185	3										**12 188**
LUBINUS SP II	3 889	556	514	622	589	780	786	670	682	894	1 055	**11 037**
SPECTRON-EF	10 393	119	92	37	10	3	1	2	6	6	10	**10 679**
FILLER	2 669	295	321	374	328	262	287	245	235	195	94	**5 305**
ITH	3 723											**3 723**
MS-30	1 876	1				17	21	144	227	320	328	**2 934**
CHARNLEY MODULAR	1 578	352	258	237	261	154	46	28		2	13	**2 929**
C-STEM	540			1	2	76	203	250	355	567	596	**2 590**
HACTIV	1 221	58	108	38	9	150	281	242	204	134		**2 445**
ACCOLADE II				110	137	314	342	266	305	325	260	**2 059**
CPT	1 111	2		1	2	1	2	440	262	175	1	**1 997**
BIO-FIT	1 993											**1 993**
SCP/UNIQUE	1 263	23	15	33	36	28	35	11		1		**1 445**
POLARSTEM	23	101	83	108	103	110	97	111	112	169	219	**1 236**
ZWEYMÜLLER	1 102											**1 102**
ELITE	1 024	2	3	1								**1 030**
OMNIFIT	856	28	6									**890**
PROFILE	890											**890**
ABG II	467	106	94	78	81	23						**849**
TAPERLOC	787											**787**
SP I	780											**780**
FJORD	652											**652**
LUBINUS	624											**624**
SECURFIT	265	167	94	32								**558**
CPS-PLUS	496											**496**
BICONTACT	443											**443**
LMT (Cemented)	417											**417**
KAR/Corail Revision	138	12	20	32	21	29	42	39	24	37	21	**415**
ABG I	304											**304**
PROFEMUR GLADIATOR	4	54	71	38	4				33	20	11	**235**
TI-FIT	221											**221**
MÜLLER TYPE	213											**213**
FEMORA	182											**182**
BI-METRIC	129	16	5	2	3	7	16	1				**179**
SL-PLUS MIA	177											**177**
HARRIS/GALANTE	169											**169**
FURLONG EVOLUTION					4	19	19	36	32	32	25	**167**
PARHOFER	159											**159**
KAREY	136											**136**
FURLONG					41	16	19	23	18	15		**132**
MÜLLER TYPE V	132											**132**
ECHELON	121											**121**
Other	1 136	22	25	35	61	110	56	24	53	67	59	**1 648**

Femoral stems in revisions

Table 22: (The 45 most common)

Stem	1987-10	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
KAR/Corail Revision	2 097	157	138	147	120	138	103	99	89	106	72	**3 266**
CHARNLEY	2 972	6	1	1	2	1			1			**2 984**
EXETER	1 631	70	72	62	63	77	78	68	84	84	89	**2 378**
CORAIL	1 297	43	62	65	40	51	66	57	50	45	40	**1 816**
RESTORATION	180	39	57	67	63	70	55	36	73	51	61	**752**
CPT	468	6	7	2	5	7	6	23	17	9	1	**551**
TITAN	537	1										**538**
FJORD	476											**476**
FILLER	299	19	15	17	16	10	19	19	16	19	6	**455**
TTHR	108	61	71	52	37	20	24	24	16	19	6	**438**
SPECTRON-EF	341	14	4	8	3	3	2	1		2	3	**381**
ELITE	351			1								**352**
LUBINUS SP II	164	2	9	8	30	16	9	17	30	28	33	**346**
REEF	317	3	5	2								**327**
ARCOS		1	3	12	17	27	32	42	41	26	50	**251**
REVITAN	6	1	7	27	20	36	31	38	33	34	15	**248**
MP RECONSTRUCTION	48	21	24	26	18	17	12	14	14	10	10	**214**
ANATOMIC BR	192											**192**
ITH	192											**192**
BIO-FIT	167											**167**
Securus				7	15	11	19	20	21	39	34	**166**
HACTIV	102		4	4		13	9	10	8	7		**157**
REACTIV	45	6	3	6	19	13	27	14	9	13	2	**157**
BI-METRIC	87	15	16	16	1		2	2				**139**
TAPERLOC	115											**115**
C-STEM	13				1	3	12	11	14	17	24	**95**
ZWEYMÜLLER	83											**83**
Profemur	31	16	11	14	5							**77**
PRIUS					2	11	17	8	22	9	6	**75**
ECHELON	67	1										**68**
RECLAIM			1	13	9	12	12	6	9		6	**68**
SP I	66											**66**
SCAN HIP	59											**59**
MS-30	34						2	4	4	4	9	**57**
LUBINUS	51											**51**
HARRIS/GALANTE	44											**44**
CHARNLEY MODULAR	22	3	3	3	3	3	5	1				**43**
FEMORA	43											**43**
PARHOFER	43											**43**
PROFEMUR GLADIATOR	1	6	20	9	3							**39**
AURA	38											**38**
MRP-TITAN								6	18	12	1	**37**
LANDOS (Reconstruction)	33											**33**
MÜLLER TYPE	32											**32**
OMNIFIT	31	1										**32**
Other	309	7	4	3	2	12	6	10	2	7	8	**370**

The 7 most common primary prostheses in last 5 years

Table 23a: Acetabular cup

2016	2017	2018	2019	2020
MARATHON (3 000)	MARATHON (2 762)	MARATHON (2 488)	MARATHON (2 305)	TRIDENT (2 279)
EXETER X3 RIMFIT (1 635)	PINNACLE (1 286)	PINNACLE (1 810)	PINNACLE (1 925)	PINNACLE (1 818)
R3 (829)	EXETER X3 RIMFIT (1 178)	EXETER X3 RIMFIT (1 185)	TRIDENT (1 626)	MARATHON (1 519)
TRILOGY (582)	R3 (885)	REFLECTION * (834)	EXETER X3 RIMFIT (1 099)	EXETER X3 RIMFIT (626)
TRIDENT (548)	TRILOGY (576)	R3 (808)	R3 (680)	R3 (512)
PINNACLE (519)	TRIDENT (546)	TRIDENT (783)	TRILOGY (468)	REFLECTION * (494)
REFLECTION * (435)	REFLECTION * (520)	TRILOGY (374)	REFLECTION * (452)	LUBINUS (230)

Table 23b: Femoral stem

2016	2017	2018	2019	2020
CORAIL (4 759)	CORAIL (5 031)	CORAIL (5 169)	CORAIL (5 037)	CORAIL (4 339)
EXETER (1 894)	EXETER (1 553)	EXETER (1 838)	EXETER (1 928)	EXETER (1 446)
LUBINUS SP II (786)	LUBINUS SP II (670)	LUBINUS SP II (682)	LUBINUS SP II (894)	LUBINUS SP II (1 055)
ACCOLADE II (342)	CPT (440)	C-STEM (355)	C-STEM (567)	C-STEM (596)
FILLER (287)	ACCOLADE II (266)	ACCOLADE II (305)	ACCOLADE II (325)	MS-30 (328)
HACTIV (281)	C-STEM (250)	CPT (262)	MS-30 (320)	ACCOLADE II (260)
C-STEM (203)	FILLER (245)	FILLER (235)	FILLER (195)	POLARSTEM (219)

Table 23c: Combinations of cup and stem

2016	2017	2018	2019	2020
MARATHON + CORAIL (2 411)	MARATHON + CORAIL (2 215)	MARATHON + CORAIL (1 842)	PINNACLE + CORAIL (1 718)	PINNACLE + CORAIL (1 565)
EXETER X3 RIMFIT + EXETER (1 321)	PINNACLE + CORAIL (1 241)	PINNACLE + CORAIL (1 676)	MARATHON + CORAIL (1 506)	TRIDENT + CORAIL (1 055)
R3 + CORAIL (493)	EXETER X3 RIMFIT + EXETER (992)	EXETER X3 RIMFIT + EXETER (1 044)	EXETER X3 RIMFIT + EXETER (1 009)	MARATHON + CORAIL (797)
PINNACLE + CORAIL (491)	R3 + CORAIL (568)	R3 + CORAIL (519)	TRIDENT + CORAIL (658)	EXETER X3 RIMFIT + EXETER (611)
Continuum Acetabular System + CORAIL (334)	TRILOGY + CORAIL (270)	REFLECTION * + CORAIL (427)	TRIDENT + EXETER (460)	TRIDENT + EXETER (553)
TRILOGY + CORAIL (331)	TRILOGY + EXETER (259)	TRIDENT + CORAIL (303)	R3 + CORAIL (453)	R3 + CORAIL (328)
TRIDENT + CORAIL (272)	TRIDENT + CORAIL (242)	MARATHON + EXETER (244)	TRILOGY + CORAIL (329)	REFLECTION * + CORAIL (277)

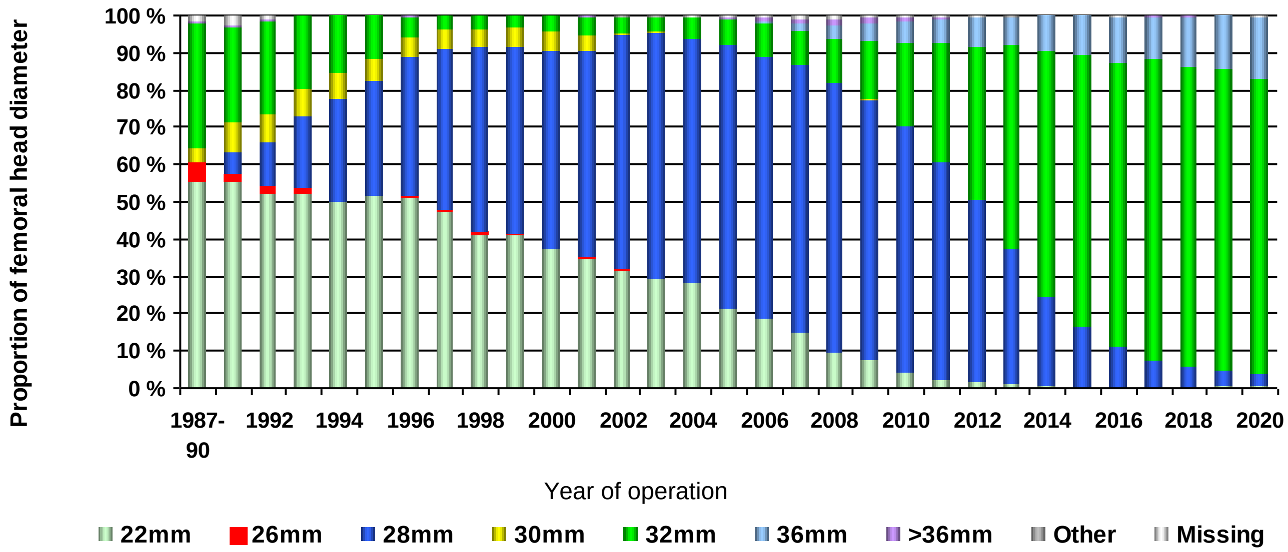
* UNCEMENTED
**' MODULAR

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
2020	26		315		6 870	1 444	7	14	28	**8 704**
2019	28		461	2	8 376	1 460	12		11	**10 350**
2018	14		592		8 212	1 359	6	4	19	**10 206**
2017	7		720		7 871	1 136	9	2	21	**9 766**
2016	9		1 082	1	7 366	1 186	1	2	27	**9 674**
2015	22		1 507		6 747	948	5	2	10	**9 241**
2014	57		2 094	1	5 863	807	4	3	15	**8 844**
2013	83	2	3 222	1	4 850	677	3	5	22	**8 865**
2012	148		4 213	3	3 503	671	25	4	25	**8 592**
2011	158		4 783		2 607	522	53	1	24	**8 148**
2010	348		5 340	3	1 827	490	82	1	40	**8 131**
2009	598	2	5 529	4	1 241	386	115	1	47	**7 923**
2008	732	2	5 494	2	880	279	136	3	64	**7 592**
2007	1 082		5 317	2	665	148	112	2	62	**7 390**
2006	1 291	6	4 908	3	639	58	60	5	33	**7 003**
2005	1 563	9	5 170		522	4	41	2	25	**7 336**
2004	1 931	26	4 505	7	393		4	3	27	**6 896**
2003	2 256	24	5 117	13	309		3	12	14	**7 748**
2002	2 173	16	4 315	62	274		2	24	14	**6 880**
2001	2 385	18	3 809	317	342		1	3	15	**6 890**
2000	2 392	6	3 425	347	269			3	8	**6 450**
1999	2 546	26	3 104	337	198			2	7	**6 220**
1998	2 505	66	3 037	305	224			1	5	**6 143**
1997	2 860	24	2 627	297	226		6	1	7	**6 048**
1996	2 862	7	2 102	287	306	1	15		5	**5 585**
1995	3 014	4	1 821	342	673		7		5	**5 866**
1994	2 639	13	1 474	359	806		5		7	**5 303**
1993	2 811	70	1 043	390	1 045		2		11	**5 372**
1992	2 775	124	605	404	1 332		8		70	**5 318**
1991	2 708	102	274	380	1 264		12		133	**4 873**
1987-90	8 665	817	34	550	5 228	1	64		290	**15 649**
Total	**50 688**	**1 364**	**88 039**	**4 419**	**80 928**	**11 577**	**800**	**100**	**1 091**	**239 006**

Figure 11: In primary operations and revisions



Femoral head prostheses

Table 25: In primary operations and revisions (The 50 most common)

Prosthesis	1987-12	2013	2014	2015	2016	2017	2018	2019	2020	Total
CORAIL	4 084	2 401	2 710	2 894	3 125	3 457	3 575	4 097	3 652	**29 995**
EXETER	22 772	744	653	793	744	563	568	571	379	**27 787**
CERAMTEC	7 928	2 586	2 449	2 218	2 211	2 109	2 177	1 445	1 027	**24 150**
LANDOS	21 721	7	15							**21 743**
UNIVERSAL	16 920	108	50	39	35	63	59	101	85	**17 460**
LFIT ANATOMIC	1 872	1 245	1 434	1 646	1 719	1 469	1 839	1 861	1 463	**14 548**
SP II	5 336	680	647	826	835	734	772	976	1 159	**11 965**
FJORD	11 761	6	2	3		2				**11 774**
ELITE	3 619	195	184	136	62	35	8	8	21	**4 268**
IGLOO	2 613	210	213	170	229	207	224	200	81	**4 147**
PINNACLE	741	340	249	161	286	358	372	720	753	**3 980**
PROTEK	1 985					381	332	285	101	**3 084**
SCANOS	1 667	28	30	211	347	289	267	178	17	**3 034**
PLUS ENDO	1 552	34	30	14	16	15	14	5	4	**1 684**
CPT	1 625	9	2	1	4	3	2	1	1	**1 648**
PROFILE	1 429									**1 429**
MALLORY-HEAD	756	43	65	107	93	64	61	45	82	**1 316**
HIPBALL PREMIUM	466	236	166	137	116	66	54	28	19	**1 288**
OXINIUM	883	68	47	5	10	6	8	26	173	**1 226**
VERSYS	150	38	29	80	81	141	164	227	270	**1 180**
TAPERLOC	1 088									**1 088**
BIOTECHNI	1 021	29	5	2	1					**1 058**
HARRIS/GALANTE	870	6		6	5		1	5	1	**894**
OMNIFIT	824	20	1	2	2	3	2	2	3	**859**
" OSTEONICS Hoder" , C-taper head	795	20								**815**
ZIRCONIA	763									**763**
FURLONG		8	73	80	91	108	84	97	78	**619**
BIOBALL	168	42	62	61	59	63	60	49	37	**601**
BICONTACT	487	3	6	2	2	2	2	1	5	**510**
STRYKER HODER	90	15	24	41	48	19	26	106	131	**500**
BIRMINGHAM HIP RESURFACING	465	2					1			**468**
ABG I	396	3	7	6	3	3	2	3	2	**425**
SURGIVAL	372									**372**
ZWEYMÜLLER	342									**342**
Zimmer Hoder			1			162	83	76	14	**336**
CERAMIC OSTEO	220									**220**
FEMORA	213									**213**
PARHOFER	183	1					1			**185**
TI-FIT	141									**141**
SMITH & NEPHEW KERAMIKKHODE	136									**136**
CHRISTIANSEN	126									**126**
BIOLOX DELTA	19	42	5	3	1	6	17	17	11	**121**
PCA	107	1		2		1	1			**112**
BIRMINGHAM HIP MODULÆR	58									**58**
MUTARS	15	1	2	10	8	6	3	4	4	**53**
ABG II	48									**48**
ASR MODULÆR	45									**45**
LINK Rippensystem	38									**38**
AURA II	29					1				**30**
HASTINGS HIP	29									**29**
Other	280	10	1	1	3	7	28	17	13	**360**

Dual Mobility articulation

Table 26 In primary operation

Prosthesis	1987-12	2013	2014	2015	2016	2017	2018	2019	2020	Total
AVANTAGE	670	104	118	98	158	190	175	208	179	**1 900**
POLARCUP	114	79	66	64	49	91	95	170	166	**894**
TRIDENT MDM	10	15	12	16	22	35	50	96	168	**424**
CAPTIV					19					**19**
Restoration Anatomic Cup	2	2	1		5	4	1	4		**19**
Other (n<5)	2									**2**
Total	**798**	**200**	**197**	**178**	**253**	**320**	**321**	**478**	**513**	**3 258**

Table 27 In revisions

Prosthesis	1987-12	2013	2014	2015	2016	2017	2018	2019	2020	Total
AVANTAGE	1 158	108	95	93	92	121	108	108	135	**2 018**
POLARCUP	188	130	125	144	129	141	123	129	99	**1 208**
TRIDENT MDM	10	12	23	48	33	44	90	137	192	**589**
Restoration Anatomic Cup	11	8	6	12	17	28	11	4		**97**
CAPTIV					10					**10**
GYROS	10									**10**
Other (n<5)						1	1			**2**
Total	**1 377**	**258**	**249**	**297**	**281**	**335**	**333**	**378**	**426**	**3 934**

ASA classification

Figure 12: Primary operations

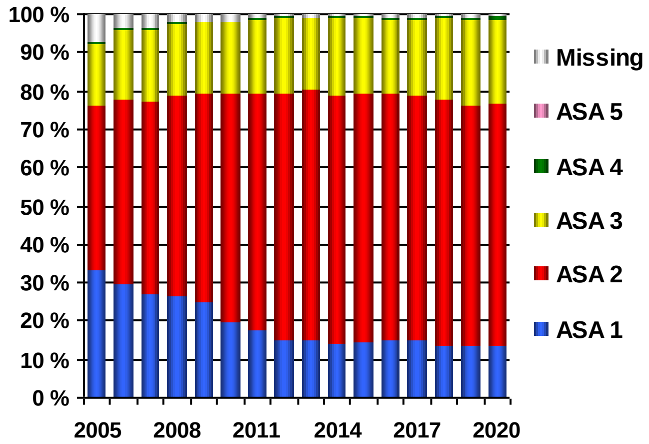
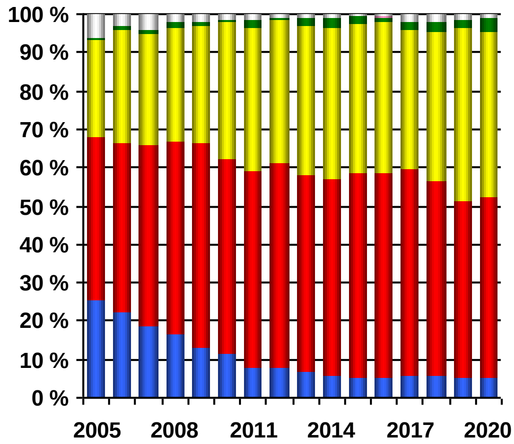


Figure 13: Revisions



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

Thrombosis prophylaxis

Table 28: Primary operations *

År	1		2		3		4		Missing		Total
2020	389	(5%)	7 257	(85%)	734	(9%)	130	(2%)	28	(0%)	**8 538**
2019	464	(5%)	8 448	(85%)	878	(9%)	150	(2%)	39	(0%)	**9 979**
2018	581	(6%)	7 783	(81%)	1 103	(11%)	91	(1%)	45	(0%)	**9 603**
2017	627	(7%)	7 458	(81%)	985	(11%)	65	(1%)	41	(0%)	**9 176**
2016	800	(9%)	7 055	(79%)	975	(11%)	72	(1%)	52	(1%)	**8 954**
2015	1 068	(13%)	6 277	(74%)	959	(11%)	57	(1%)	89	(1%)	**8 450**
2014	1 115	(14%)	5 950	(73%)	967	(12%)	31	(0%)	75	(1%)	**8 138**
2013	1 345	(17%)	5 638	(70%)	1 049	(13%)	10	(0%)	62	(1%)	**8 104**
2012	1 579	(20%)	4 853	(62%)	1 320	(17%)	9	(0%)	82	(1%)	**7 843**
2011	2 221	(30%)	4 305	(58%)	793	(11%)	3	(0%)	38	(1%)	**7 360**
2010	2 366	(32%)	4 307	(59%)	611	(8%)	3	(0%)	43	(1%)	**7 330**
2005-09	17 604	(52%)	11 575	(35%)	3 453	(10%)	42	(0%)	864	(3%)	**33 538**

Table 29: Revisions *

År	1		2		3		4		Missing		Total
2020	169	(13%)	973	(73%)	125	(9%)	47	(4%)	27	(2%)	**1 341**
2019	192	(13%)	1 074	(71%)	146	(10%)	66	(4%)	25	(2%)	**1 503**
2018	202	(13%)	1 123	(72%)	145	(9%)	66	(4%)	24	(2%)	**1 560**
2017	207	(14%)	1 105	(74%)	139	(9%)	24	(2%)	28	(2%)	**1 503**
2016	205	(14%)	1 077	(72%)	162	(11%)	27	(2%)	27	(2%)	**1 498**
2015	222	(16%)	1 019	(72%)	133	(9%)	12	(1%)	24	(2%)	**1 410**
2014	225	(17%)	921	(71%)	118	(9%)	10	(1%)	20	(2%)	**1 294**
2013	226	(17%)	916	(69%)	153	(12%)	6	(0%)	26	(2%)	**1 327**
2012	240	(18%)	823	(63%)	216	(16%)	10	(1%)	26	(2%)	**1 315**
2011	318	(25%)	758	(59%)	184	(14%)	8	(1%)	19	(1%)	**1 287**
2010	439	(35%)	682	(54%)	125	(10%)	2	(0%)	10	(1%)	**1 258**
2005-09	2 692	(49%)	1 984	(36%)	610	(11%)	19	(0%)	143	(3%)	**5 448**

Figure 14: Primary operations

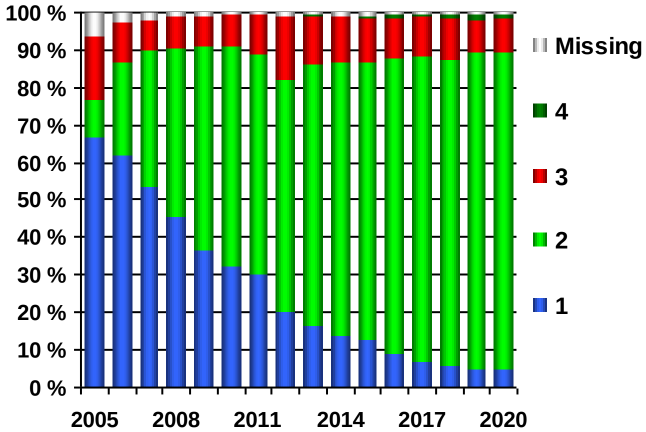
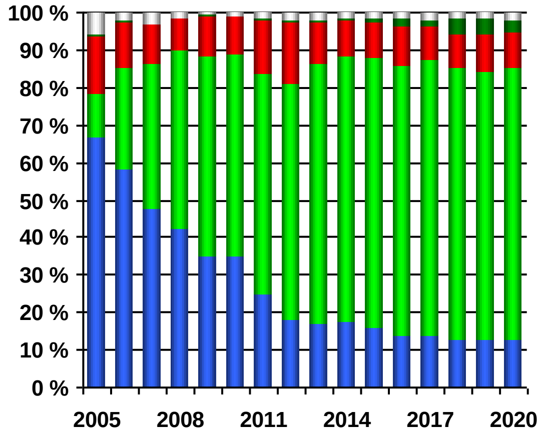


Figure 15: Revisions



*

1 = Yes - Medication started preoperatively
2 = Yes - Medication started postoperatively
3 = Yes - Missing information on medication start
4 = No

Registration of thrombosis prophylaxis started in 2005

Thrombosis prophylaxis

Table 30: All operations

Drugs	2005-11	2012	2013	2014	2015	2016	2017	2018	2019	2020
Acetylsalicylsyre (Albyl-E, Globoid, Acetyratio, Magnyl E)			0,1 %	0,4 %	0,6 %	0,8 %	0,8 %	0,9 %	1,1 %	1,0 %
Apixiban (Eliquis)		0,1 %	1,2 %	1,5 %	1,5 %	1,5 %	1,6 %	1,4 %	1,4 %	1,8 %
Dabigatranetixalat (Re-Novate, Pradaxa)	0,4 %			0,1 %	0,1 %					
Dalteparin (Fragmin)	55,9 %	63,2 %	56,1 %	51,6 %	58,4 %	61,6 %	64,1 %	64,9 %	53,5 %	50,1 %
Dekstran (Macrodex, Dextran)	0,1 %	0,1 %	0,1 %	0,1 %						
Enoksaparin (Klexane)	37,4 %	24,6 %	27,9 %	31,4 %	24,1 %	22,0 %	19,6 %	17,6 %	27,0 %	29,7 %
Rivaroksaban (Xarelto)	0,5 %	2,0 %	2,3 %	2,2 %	1,5 %	1,5 %	1,1 %	1,1 %	1,0 %	1,0 %
Warfarin (Marevan)	0,1 %	0,1 %			0,1 %					
Ximelagatran (Exanta, Malagatran)	0,3 %									
Other				0,1 %						0,1 %
Combination of 2 drugs	2,4 %	8,4 %	10,8 %	10,6 %	11,5 %	10,0 %	10,2 %	10,9 %	12,5 %	12,9 %
Clinical study	0,6 %									
No drugs										
Missing/Unknown	2,1 %	1,5 %	1,4 %	2,0 %	2,2 %	2,6 %	2,5 %	3,0 %	3,4 %	3,4 %
Total	**56 236**	**9 173**	**9 467**	**9 455**	**9 878**	**10 467**	**10 690**	**11 175**	**11 487**	**9 896**

Figure 16: Drugs - All operations

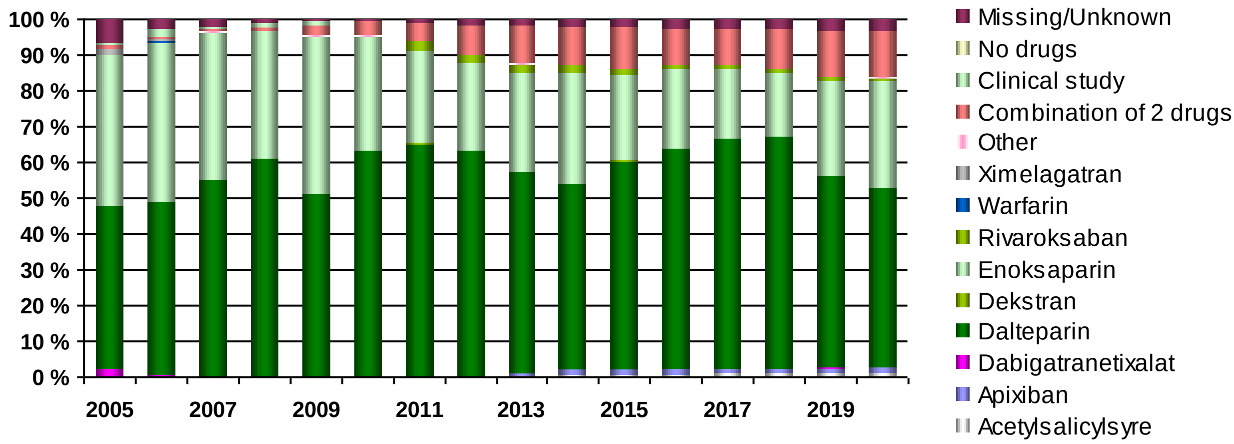


Table 31: Duration - All operations

Year	Days: 1-7	8-14	15-21	22-28	29-35	>35	No drugs	Missing	Total
2020	2 430	3 928	763	41	1 100	13	1	1 620	9 896
2019	2 594	4 463	919	117	1 410	14	0	1 970	11 487
2018	2 165	4 029	1 026	177	1 860	19	0	1 899	11 175
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	1 746	693	1 397	3 197	40	1	885	8 658
2010	758	2 173	636	1 079	3 155	44	2	744	8 591
2009	879	2 405	668	785	2 637	37	6	906	8 323
2008	837	2 479	787	701	2 166	124	5	871	7 970
2007	848	2 222	1 229	388	2 045	44	6	931	7 713
2005-06	2 014	4 170	2 296	639	3 154	342	0	2 366	14 981

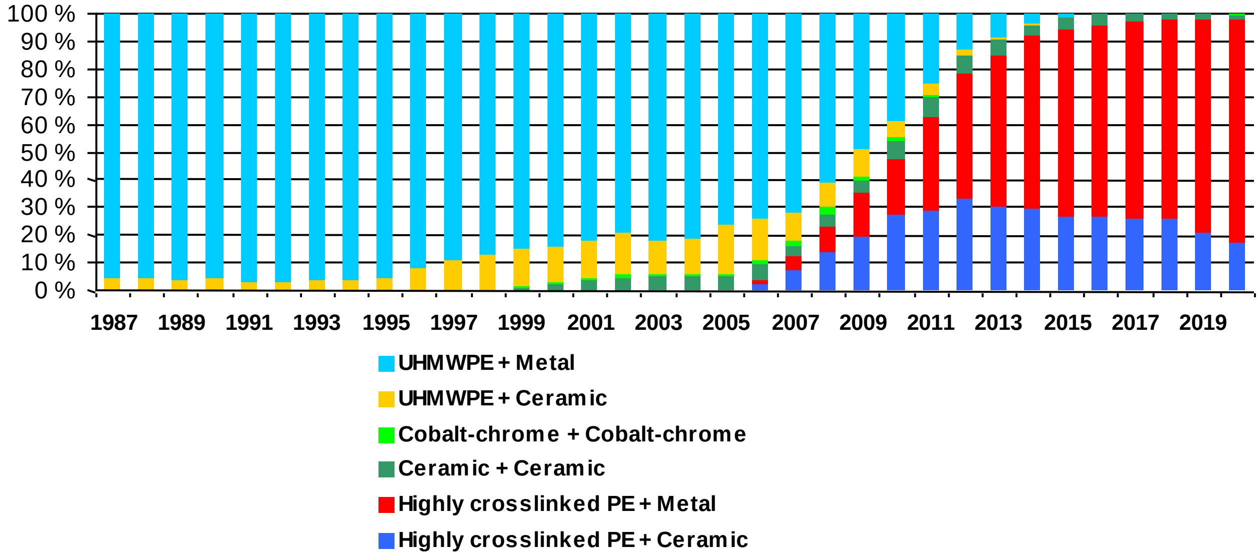
Registration of thrombosis prophylaxis started in 2005

Articulations (except dual mobility)

Table 32: In primary operations - All patients

Cup + Femoral head	1987-12	2013	2014	2015	2016	2017	2018	2019	2020	Total
UHMWPE + Steel	71 080	153	69	5	0	0	0	0	4	71 311
Highly crosslinked PE + Cobalt-chrome	7 676	3 557	4 168	4 781	5 242	5 774	6 188	6 793	6 038	50 217
UHMWPE + Cobalt-chrome	32 802	527	240	109	12	13	8	21	24	33 756
Highly crosslinked PE + Alumina	7 474	1 923	1 775	1 529	1 424	860	696	293	137	16 111
UHMWPE + Alumina	10 861	44	8	4	2	0	0	0	0	10 919
Highly crosslinked PE + Alumina/Zirconium[1]	1 749	430	557	635	904	1 423	1 688	1 670	1 192	10 248
Highly crosslinked PE + Steel	1 655	724	712	797	682	493	427	422	264	6 176
Alumina + Alumina	3 473	201	109	7	0	1	0	0	0	3 791
Alumina/Zirconium + Alumina/Zirconium[1]	767	225	211	342	372	218	205	193	118	2 651
UHMWPE + Titanium	1 903	4	1	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	1 043	2	0	0	0	0	0	0	12	1 057
Highly crosslinked PE + Oxinium	676	51	39	3	2	2	2	21	161	957
UHMWPE + Alumina/Zirconium[1]	277	3	1	0	0	0	0	0	0	281
Titanium + Alumina	136	9	2	2	2	1	0	0	0	152
Highly crosslinked PE + Titanium	60	13	10	0	0	0	0	0	0	83
UHMWPE + Oxinium	76	0	0	0	0	0	0	0	0	76
Missing	3 352	27	18	27	44	53	46	24	38	3 629
Other (n<50)	170	6	11	17	7	7	3	8	2	231
Total	**146 632**	**7 899**	**7 931**	**8 258**	**8 693**	**8 845**	**9 263**	**9 445**	**7 990**	**214 956**

Figure 17: In primary operations



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

Vancouver Classification

Table 33: Vancouver classification for periprosthetic femoral stem fractures operated with or without replacement of the prosthesis

	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
2020	7	7	61	27	1	14	24	16	7	7	40
2019	12	10	66	38	1	11	30	10	5	11	27
2018	12	7	70	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

Completeness of reporting analysis for the Hip Arthroplasty Register, 2017-2018

A completeness of reporting analysis for the Hip 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 Hip 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
Revisjon (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

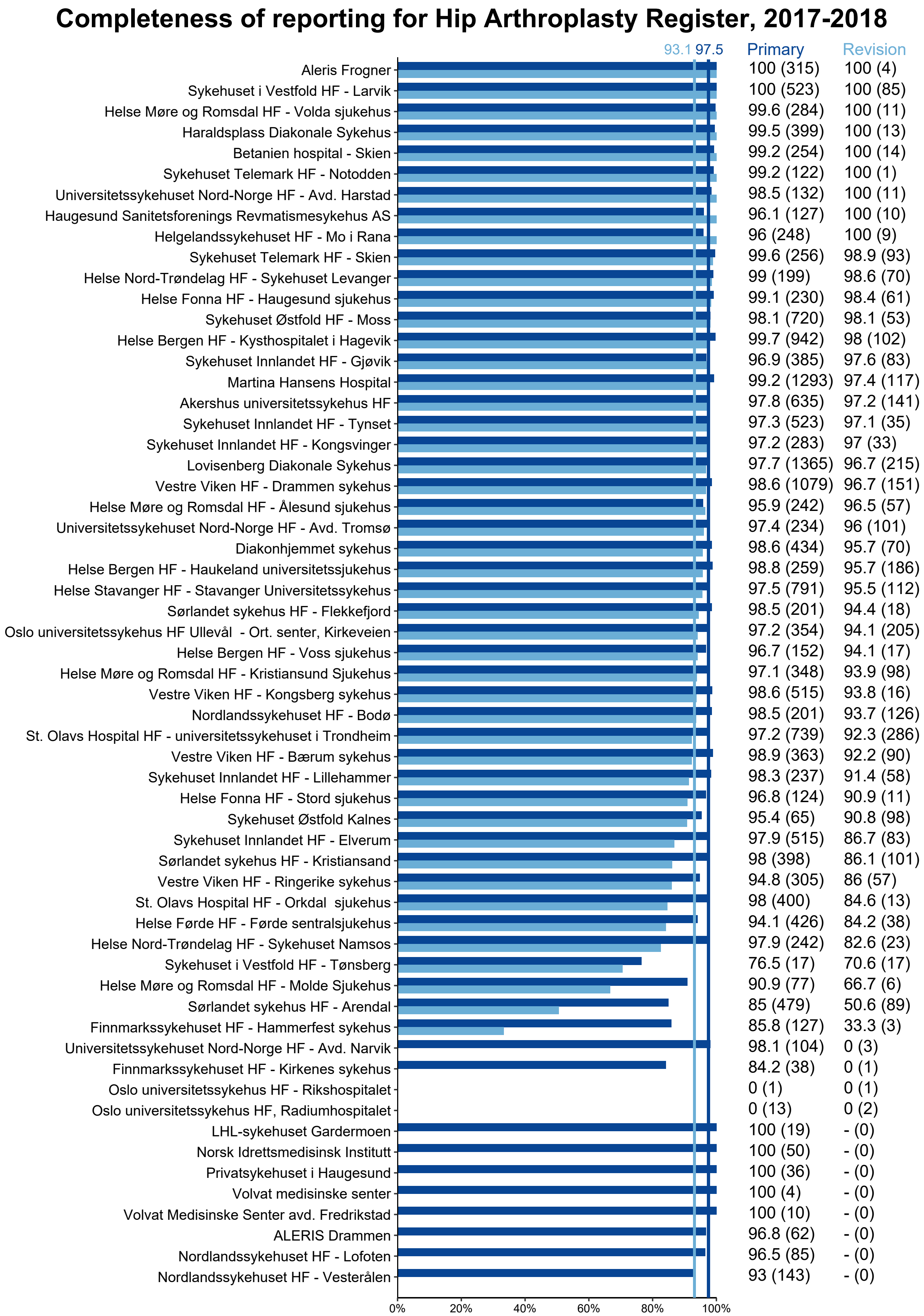
$$\text{Completeness rate NRL} = \frac{\text{Only NRL} + \text{begge registre}}{\text{Only NPR} + \text{Only NRL} + \text{both registries}}$$

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

Primary operations. In 2017-2018, 19 124 primary hip replacements were reported to one or both of the registers. 97,5 % of these were reported to the NAR while 95,5 % 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 Hip 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 2017-2018, 3 298 revisions were reported to one or both of the registers. 93,1 % of these were reported to the NAR while 75,7 % 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, 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.**



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

Knee prostheses

Introduction ... 72

Covid-19, Number of operations by region ... 80
Survival curves for knee prostheses ... 81
Last 10 years survival curves for all hospitals individually ... 87
One stage bilateral knee prosthesis operations ... 89
Number of primary operations in knee 2019 ... 91
Percentage non-revised patients two years after operations ... 92
Percentage non-revised patients ten years after operations ... 93
Percentage non-revised patients ten years after operations, funnelplot ... 94
Percentage non-reoperated prostheses after 3 and 10 years ... 95
Portion of patients recieving well documented total knee prostheseses in 2019 ... 96
PROM in the knee arthroplasty register ... 97
Annual numbers and incidence of knee prostheses ... 101
Insidence of knee arthroplasty ... 102
Age by year of primary operation ... 103
Types of knee prostheses ... 105
Classification in primary total prostheses ... 105
Reasons for primary operations ... 107
Fixation ... 109
The 7 most common primary total prostheses without patella component 2013-19 ... 111
Knee prostheses ... 115
Reasons for revisions ... 123
Type of revision ... 126
ASA classification ... 129
Thrombosis prophylaxis ... 130
Fibrinolysis Inhibitor ... 132
Peroperative complications ... 132
Previous operation in relevant joints ... 132
Mini-invasive surgery ... 133
Computernavigation ... 134
Cement ... 135
Systemic antibiotic prophylaxis ... 137
Patient specific instruments ... 138
Drain ... 138
Tourniquet ... 139
Completeness analysis 2017-18 ... 140

KNEE, SHOULDER AND OTHER JOINTS REGISTER: ANNUAL REPORT

In the period 1994-2020, 112 096 knee replacements, 11 296 shoulder replacements and 10 800 replacements of other joints than the hip, knee and shoulder were recorded. The COVID-19 epidemic has clearly affected arthroplasty. Figures 1a, 1b, 2a and 2b show the decline. There has been an 8.7% decrease in the number of primary knee replacements since 2019. The number of revisions has also declined, which is perhaps more worrying since patients should not wait long for a revision. The decline was greatest in March, April and May, but there was some recovery in the autumn. We hope hospitals will conduct studies to show how this has affected patients' functioning, pain, quality of life and possible poorer prognosis. The number of primary shoulder arthroplasties has only decreased by 2.6%. This moderate decline is probably because many shoulder prostheses are inserted for fractures and these have been less affected by reduced surgical capacity.

ELECTRONIC REPORTING

We have now established electronic reporting of knee and shoulder arthroplasty in the medical registration system (MRS) in the Norwegian Health Network. This registration provides each hospital with access to its own data. Reports can be accessed directly from the MRS system. Surgeons must register as users in the Norwegian Arthroplasty Register in the Norwegian Health Network at helseregister.no. They will then be able to log in to mrs.nhn.no and register patients in the surgery form. We have made some changes and simplifications in the form. For knee arthroplasty, we now ask about height and weight, access to the knee joint, closure technique, anaesthesia, degree of osteoarthritis based on the Ahlbäck classification, classification of bone loss during revision and classification of periprosthetic fractures. We also record stems, augments and cones. The recording of antibiotic prophylaxis, systemic antibiotic prophylaxis and the use of tranexamic acid is now more standardised and simplified.

There is now a separate form for shoulder arthroplasty. Here, we have added variables for e.g. glenoid type, access, rotator cuff status, and updated causes of surgery/revision and additional procedures. These changes have been made in collaboration with the other Nordic countries, to enable more uniform registration and thus easier comparison of results across the countries. We use the Procordo scanning software to read the barcodes for the implants: pscan.procordo.com. A scanner must be installed in the operating room. We have provided instructions on our website to help you get started. Please contact our consultant Mikal Solberg (mobile no. 90583174) or the National Advisory Unit (phone no. 55973742/43) if you need further assistance.

PROMs

We would ask all hospitals to arrange for patients to complete PROMs before hip, knee and shoulder arthroplasty. Further questions will automatically be sent to patients one year post-surgery via Digipost or Helsenorge.no. Results for knee function and pain (KOOS), quality of life (EQ-5D) and other variables recorded by patients are presented at the beginning of the section on knee arthroplasty. We have also made a summary of the proportion of patients who register the preoperative PROM at each hospital. However, there are currently very few hospitals with over 80% preoperative PROM registration, which is our target. Hospitals need to make greater efforts in this area, as they will be able to use this data for their own quality assurance, research and improvement. Instructions on how to get started are available on our website.

THE ALBA TRIAL

We have started the first registry-based randomised controlled trial in Norway through the Arthroplasty Register. The ALBA trial will examine whether antibiotic-loaded bone cement prevents periprosthetic infections in primary TKA. The protocol has been published (Leta T 2021). The web-based registration form, which is the same as that used for electronic registration of knee arthroplasty, has a built-in randomisation function. We hope that all knee arthroplasty patients will be included in the trial. Please contact us if your hospital has not started. Instructions can be found on our website.

PERIPROSTHETIC FRACTURES

Reoperations for periprosthetic fracture without replacement of the prosthesis should now also be reported for the knee, shoulder and other joints.

CHANGES IN TKA PRACTICE

We have noted a slight increase in the use of all-polyethylene tibial components in TKA. Studies from Sweden have shown that this type of tibial component can yield good results. The use of cross-linked plastic in TKA has increased in recent years. To date we have not seen better results with cross-linked plastic, but follow-up time is short. Figures from Australia show somewhat better or similar results with cross-linked plastic, depending on the brand of prosthesis. Consequently, it appears to be safe to use cross-linked plastic in TKA.

The use of mobile bearings in TKA has decreased, which is in line with Norwegian and international register studies that show a somewhat higher revision rate for this type of total prosthesis (Paxton E 2011, Gøthesen Ø 2014, Namba R 2014, Gøthesen Ø 2017).

The use of uncemented TKA has increased in recent years. This is not in line with findings from the registers. A recent Nordic NARA study showed higher rates of revision for uncemented TKA in patients both under and over 65 (Niemeläinen M 2020, Irmola T 2021).

Uncemented Oxford partial unicondylar knee replacement also increased, but has later decreased. In a study published at the autumn meeting, we found more early revisions with uncemented than with cemented Oxford unicondylar knee replacement, mostly due to infection (Skåden Ø 2019). A UK register study has shown good ten-year results with uncemented Oxford partial, so the Norwegian findings may be due to the learning curves.

QUALITY OF KNEE ARTHROPLASTY IN NORWAY

Survival curves show a gradual improvement since 1994 in TKA results, when the endpoint is revision surgery. We are pleased to note the improvement in results of unicondylar knee arthroplasty from 2012 to 2020. In a study based on our register data, hospitals that performed more than 100 knee arthroplasties per year had fewer revisions than hospitals performing a lower number (Badawy M 2013). Unicondylar knee replacements should be concentrated at a smaller number of hospitals (Badawy M 2014) to reduce the risk of revision.

Infection, instability, aseptic loosening of the tibial component, and axial deviation including malrotation and pain are still the most frequent *causes of revision of total knee arthroplasty* (Dyrhovden G 2017). Many of these revisions are probably due to poor surgery. Results can be improved with a focus on good patient selection, infection prevention, correct stabilisation of the prosthesis, sound techniques for the alignment of prosthetic components, good balancing and a correct cementation technique (Refsum et al. 2019). If pain is the only indication, revisions should be avoided.

DOCUMENTATION OF KNEE PROSTHESES

Last year we presented for the first time the proportion of patients who received well-documented knee prostheses at different hospitals (Figure B35). In consultation with the reference group, we have chosen the ODEP (Orthopaedic Data Evaluation Panel UK) classification 10A as the basis for referring to a prosthesis as well-documented. This corresponds to documentation of ≥93% survival of the prosthesis after ten years. The long-term goal is to use 10A*, which is ≥95% survival. We have excluded prostheses used in studies approved by REK and revision prostheses. In 2019, 51.5% of patients received well-documented prostheses, and in 2020 the figure was 60.4%. We hope that this is due to increased awareness among surgeons, but may also be because some prostheses such as Legion now have ten years of documented good results from the Australian Registry. We see that some hospitals decide to use prostheses that cannot be classified as well-documented. We hope that these hospitals will review their practice in relation to tenders in the health trusts, and ensure that they use the prostheses stated in the tenders. They should also be aware of the attitude of the register to tenders for joint replacement. Documentation for knee prostheses is available on our website.

We present three- and ten-year durability of the most commonly used knee prostheses in Norway (where more than 500 prostheses have been used) (Figures B33 and B34). None of those used today have poor results, but several prosthesis combinations lack ten-year results from Norway and/or abroad.

KNEE ARTHROPLASTY REVISION

There were 553 knee arthroplasty revisions reported to the register in 2020, which is a decrease since 2019. This may be due to postponement of revision surgery because of reduced capacity in connection with COVID-19 or it may represent a real decrease in the need for revisions. This will probably become clearer before next year's report.

When a stem is used, it must be indicated on the reporting form whether it was a tibial or femoral stem, and a sticker must be attached to the back of the form. For some prostheses, the same stem can be used as a femoral and tibial stem, and if this is not checked, we have no way of knowing where the stem was used. When the new electronic form is used, stems, augments and cones must be scanned.

COVERAGE ANALYSIS

In this report, we show coverage rates (reporting rates) for primary operations and revisions for 2017-2018. The national average is good for primary surgery (97.7%), and is an improvement on the figure of 97.1% for 2015-2016. For revisions, the reporting rate was 93.2%, which is an improvement on 91.1% in 2015-2016. We are pleased to note these improved figures. Thank you! Some hospitals have low reporting of revisions. This may result in too positive prosthesis survival rates at these hospitals. In the figures showing the proportion of non-revisions after two and ten years, we have excluded hospitals with lower than 80% reporting of revisions.

For shoulder arthroplasty, the reporting rate for primary operations is 95.0% and for revisions 84.3%. We would like hospitals with low reporting of revisions to investigate this further.

Please note that hand, finger, back and toe arthroplasty must also be reported; these operations have a lower reporting rate than the other joints. The next coverage analysis will be conducted in two years, for 2019 and 2020. We encourage hospitals to review their reporting procedures if their coverage is low.

HOSPITAL RESULTS

We present some hospital results. Proportion of non-revised TKAs after two years (operated in 2014-2020) and ten years for standard patients in 2009-2020. Standard patients are 55-85 years old, ASA class 1 or 2, with primary osteoarthritis. We also present funnel plots for the proportion of standard patients operated in 2009-2020 who were not revised after ten years. The funnel plot takes into account the number of knee arthroplasties performed at the hospital. Hospitals with a risk of revision of more than three standard deviations (99.8%) above the national average must be considered to have an excessively high risk of revision and must review their procedures (Figure B32). This year, with the approval of the reference group, we have written letters to four hospitals with a high proportion of revisions. These hospitals have provided details of their practice, reviewed their internal procedures and initiated improvement measures. We hope that this will yield better results in the long term, but the poor results from 10 years ago will continue to have an effect for a few more years.

SHOULDER ARTHROPLASTY

The number of shoulder arthroplasties has been steadily increasing from 2002 to 2018, although we have seen a slight decrease in the past two years. The decline in hemiarthroplasty continues, while the last two years have also seen a reduction in total anatomical arthroplasties and a continued increase in reverse total arthroplasties. There is an increased use of reverse prostheses for acute fractures, but they are now also more often used for idiopathic osteoarthritis. Reverse prostheses accounted for 70% of all shoulder prostheses inserted in 2020. With the help of our NARA collaboration we have shown that reverse shoulder arthroplasty has a greater risk of revision due to infection than anatomic shoulder arthroplasty (Moeini 2019) and anatomic prostheses must still be the preferred choice in patients with an intact rotator cuff.

Electronic reporting of shoulder arthroplasty has now commenced and can be used in all hospitals. The electronic recording system has been tried out at Haukeland University Hospital and after some initial difficulties with scanning of implants and logging on to the MRS system, it now seems to be working well. Electronic registration gives each hospital access to its own data and reports can be accessed directly from the MRS system. We would like all hospitals to start electronic registration and to contact us for help or training if needed. It is important that everyone involved registers as a user on helseregister.no.
Registration of PROM data on shoulder arthroplasty is currently being tested, and we also aim to start this during 2021.

ELBOW ARTHROPLASTY

The number of total elbow replacements in recent years had been decreasing until its low point in the year 2018. However, in 2019 and 2020 the figure almost doubled from 2018. In 2019, five hemiprostheses were inserted, which is a similar number to previous years. However, no hemiprosthesis was reported in 2020. A hemiprosthesis is used instead of a total prosthesis in supracondylar and intracondylar humerus fractures.
The humeral component was fixed with cement in all total arthroplasties except one, while the ulnar component was fixed with cement in fewer than half. This is a similar picture to the previous year. In the past six years, Nexel and Latitude EV have been most used, but have a relatively short follow-up time.
The number of revisions of elbow arthroplasty has decreased to some extent. Use of the radial head prosthesis has increased steadily over the past ten years, and a record number of these prostheses was recorded in 2019, followed by a slight decrease in 2020. This type is predominantly used for acute fractures.

FINGER AND HAND ARTHROPLASTY

The number of finger prostheses inserted is still low compared to previous years, and many of the operations were revisions. Twenty-four operations using the wrist (radiocarpal) prosthesis were performed in 2020, which is somewhat fewer than some years ago. In distal radioulnar joints, six prostheses were inserted in 2020, a marked decrease from the figure of 15 in 2019.
The use of a carpal (CMC I) prosthesis has stabilised in recent years at about ten primary prostheses annually, following the lowest number ever (5) in 2016. In 2019, 21 primary prostheses were inserted, compared to 12 in 2020.

ANKLE ARTHROPLASTY

There has been a decline in primary ankle arthroplasty, and only 29 primary operations were reported in 2020. There are many revisions (over 50% of all surgeries were reoperations in 2020), and the decline has been most marked in osteoarthritis, secondary osteoarthritis and sequelae of ligament instability. Some smaller hospitals that have now discontinued ankle arthroplasty had an unusually large number of such operations. In our opinion, it is difficult to determine whether an arthrodesis or a prosthesis is indicated and operations should therefore be limited to a few hospitals. The American Food and Drug Administration has reported many cases of plastic component breakage in the STAR ankle prosthesis. The STAR has not been used in Norway since 2013. We are conducting a study of ankle prostheses to improve our understanding of the large proportion of revisions.

SUMMARY OF THE MOST IMPORTANT SCIENTIFIC FINDINGS LAST YEAR

Please see the introduction to the section on hip arthroplasty for a review of studies including both hip and knee replacement. See also the list of publications in the report.

Niemeläinen M 2020 showed in a Nordic study that cemented knee arthroplasty in patients under 65 must still be considered the gold standard. Hybrid prostheses had similar results to cemented ones, but uncemented prostheses showed poorer results.

Irmola T 2021, in a Nordic study, showed that cemented knee prostheses in patients over 65 must still be considered the gold standard. Hybrid prostheses showed similar results, but were used in far fewer patients. Uncemented prostheses had poorer results than cemented ones. Reverse hybrid prostheses had good results, but were used in very few patients.

Øhrn FD 2020, in a study using Norwegian and Australian data, showed that medial pivot knee replacement without a patella component had poorer results than posterior cruciate retaining knee replacement with revision as the endpoint. These findings did not apply to all makes of prosthesis in the medial pivot group.

Lewis P 2020 studied results of patellofemoral arthroplasty from eight national registers. The study consistently showed a threefold greater risk of revision than total arthroplasty. The results for Norway were better than for some of the other countries. The study provides useful information to surgeons and patients regarding the choice of patellofemoral or total arthroplasty for isolated patellofemoral osteoarthritis. A Danish RCT has shown slightly better functional outcome for patellofemoral than for total prostheses in the first two years postoperatively, but after two years the results were similar.

Leta T 2021 has published the protocol for the first registry-based randomised controlled trial in the Arthroplasty Register (the ALBA trial). The research question is: Does the use of antibiotic-loaded bone cement prevent periprosthetic infection in TKA? We need to include 9172 knees, and we therefore hope that all surgeons, hospitals and TKA patients can be included.

Randsborg PH 2021 published a study based on data from the NPE (Norwegian Patient Injury Compensation) and the Arthroplasty Register from 2008 to 2018. 0.9% of all primary TKAs resulted in claims, while in 0.5% of primary TKAs, the claims were granted. Of the successful claims, 28% were due to infection, 26% poorly inserted implants and 13% aseptic loosening (compensation is routinely paid if loosening takes place within three years of primary surgery). Patients operated on in low-volume hospitals (≤57 surgeries annually) were more often successful in their claims.

Gøthesen Ø 2020 published a technique video in JBJS Essential Surgical Techniques on computer navigation in knee arthroplasty. It is based on the Norwegian multicentre study and register studies. The study showed that placement of components and axes improved with navigation. A larger proportion of patients scored higher on PROMs when navigation was used. Prosthetic survival rates did not improve in Norway, but long-term results from Australia may indicate that prosthetic survival is better with the use of computer navigation, especially in young patients.

Olsen U 2020 published a protocol for a systematic review and meta-analysis of factors that predict chronic pain and poor function following knee replacement surgery.

Lehtimäki K 2020 published data from the Nordic Arthroplasty Register Association (NARA) showing a low risk of revision of reverse shoulder arthroplasty for acute proximal humerus fractures. Of the 1523 surgeries in the period 2004-2016, only 33 revisions (2%) were recorded. The most frequent cause of revision in this data is instability, followed by periprosthetic fracture and infection.

Unbehaun D 2020 examined shoulder arthroplasty for sequelae of proximal humerus fractures in the Nordic countries. From 2004 to 2016, 3245 patients underwent this surgery and the results show poorer prosthesis survival than in previously published results of shoulder arthroplasty for acute fractures. Males and the youngest patients had particularly high rates of revision.

Hole RM 2021 compared the risk of premature death following shoulder arthroplasty with and without the use of thrombosis prophylaxis. No difference was found in the risk of premature death in any of the patient or diagnosis groups studied, and the use of thrombosis prophylaxis in shoulder arthroplasty should therefore be assessed on an individual basis.

Vakalopoulos K 2020 published an overview of six national hand surgery registers. We have contributed data to the study, which shows that we were the first of these six registers to start national registration of hand and finger surgery.

Thank you all for good reporting, but please remember the small joints in the hand and the back. We would be pleased to receive suggestions for research projects and we are interested in research collaboration.

Bergen, 20 May 2021

Ove Furnes

Ove Furnes
Chief Physician/Professor
Knee Surgery

Anne Marie Fenstad

Anne Marie Fenstad
Biostatistician/researcher

Yngvar Krukhaug

Yngvar Krukhaug
Chief Physician
Hand and Finger Surgery

Irina A. Kvinnesland

Irina A Kvinnesland
IT Consultant

Gard Kroken

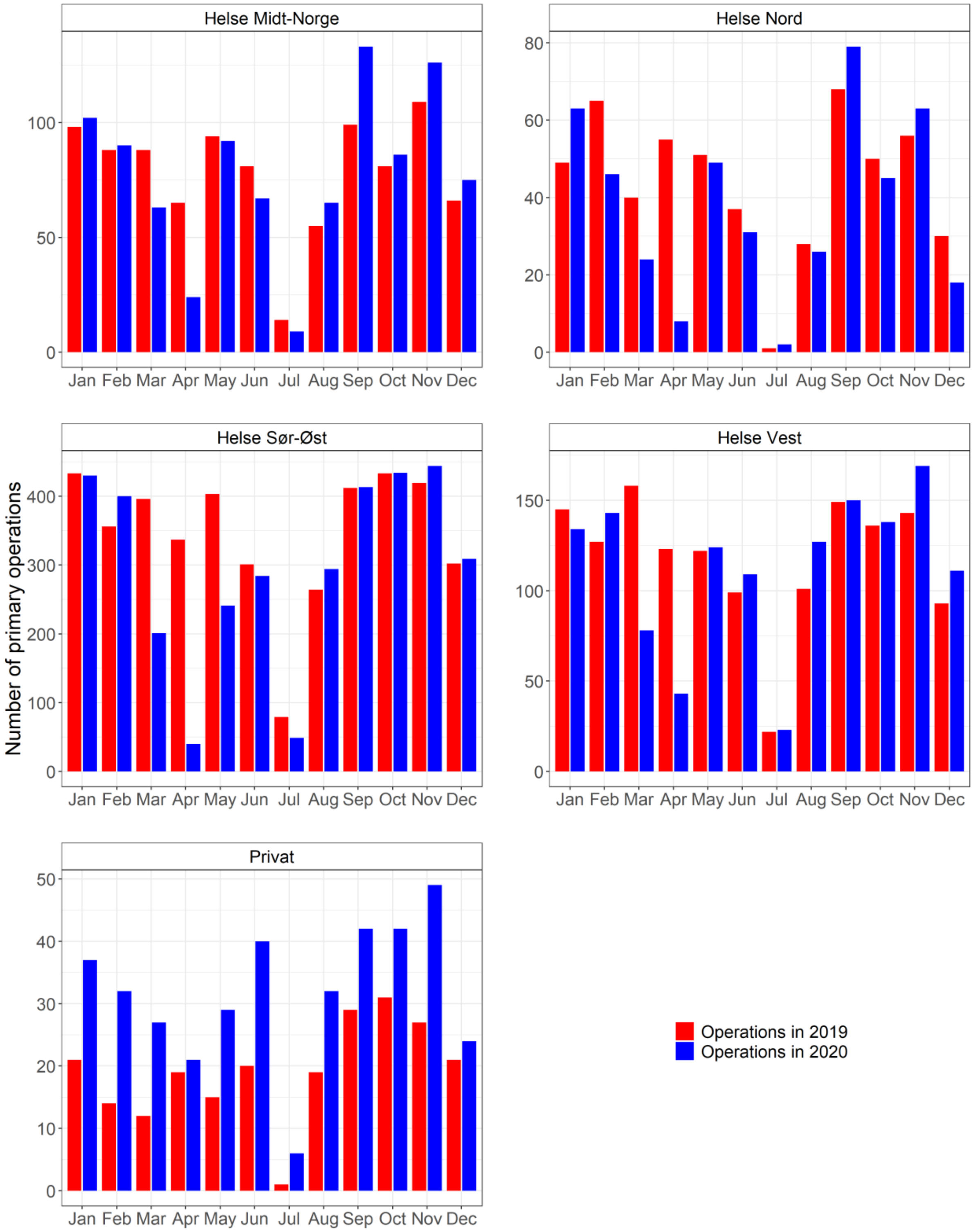
Gard Kroken
Biostatistician/researcher

Randi M. Hole

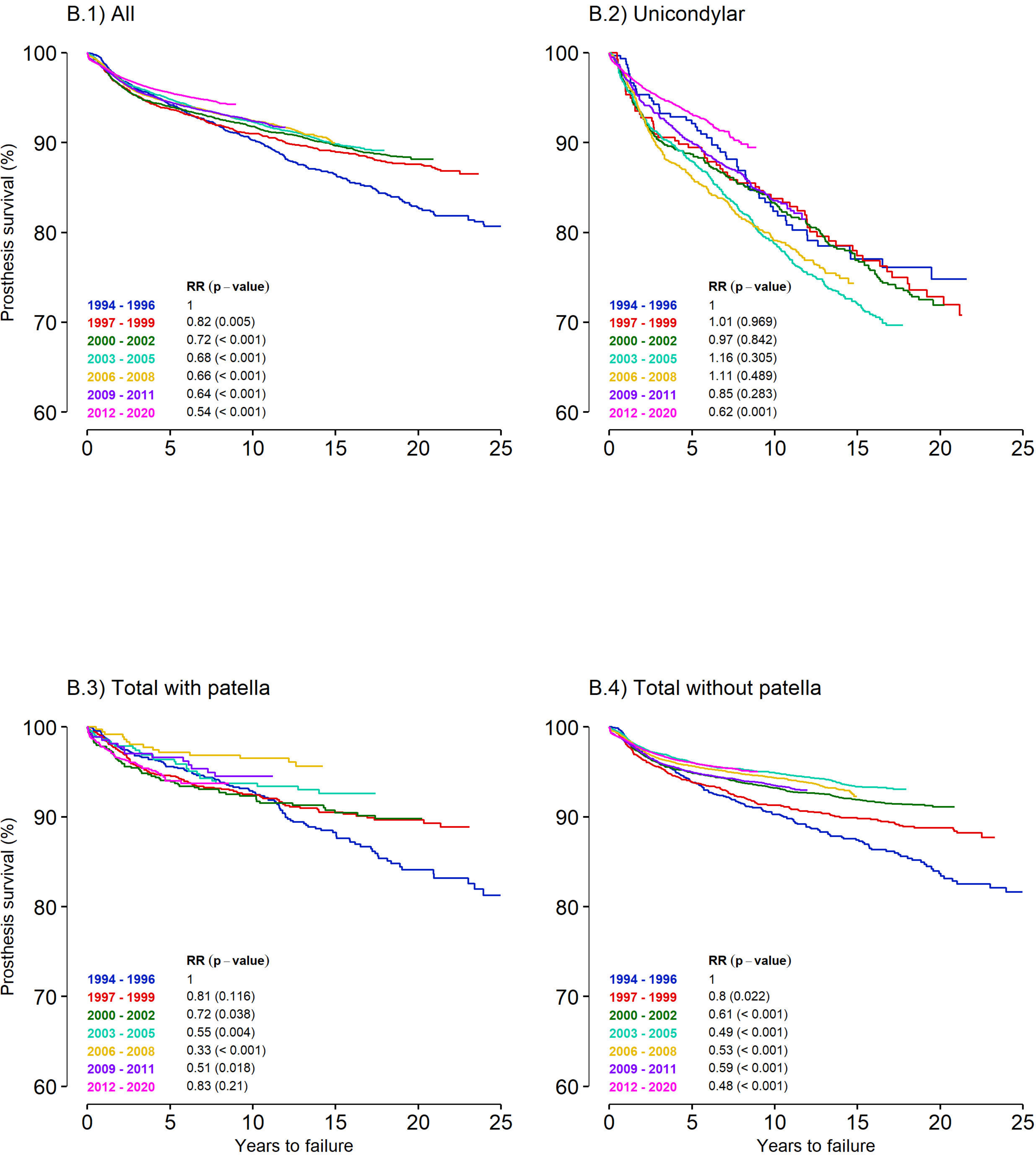
Randi Hole
Chief Physician
Shoulder Surgery

COVID-19

Number of primary knee arthroplasties per health trust & month for 2019 vs. 2020



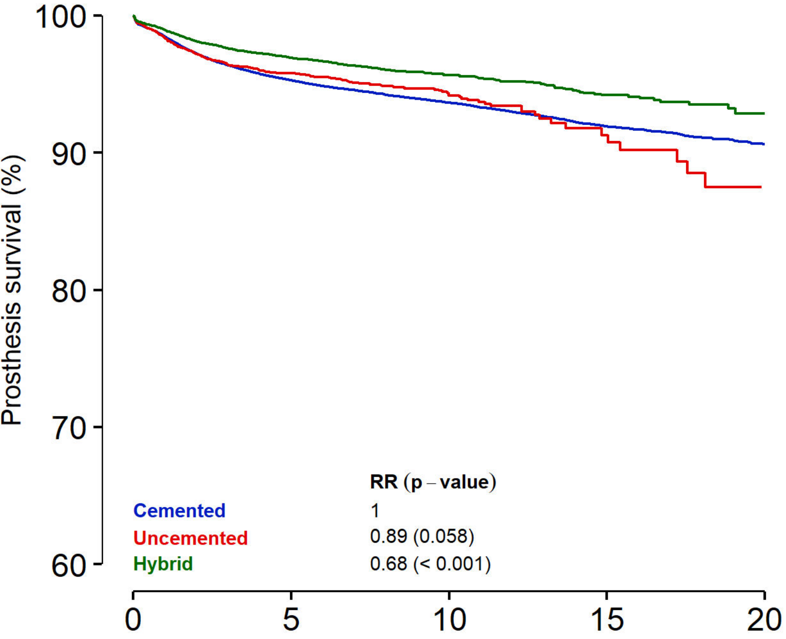
Survival curves for knee prosthesis
1994-2020



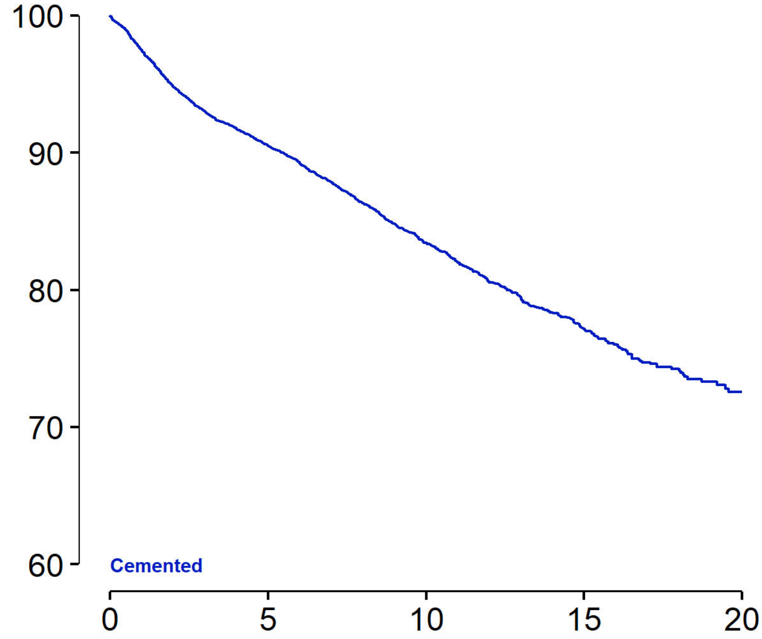
Kaplan-Meier survival curves. Survival estimate is given as long as > 50 prostheses are at risk.
Risk ratio (RR) estimates adjusted for age, sex and diagnosis.
There is some uncertainty tied to the risk estimates from the Cox-analysis as the assumption of proportional hazard does not hold for all models.

Survival curves for knee prosthesis - Fixation
1994 - 2020

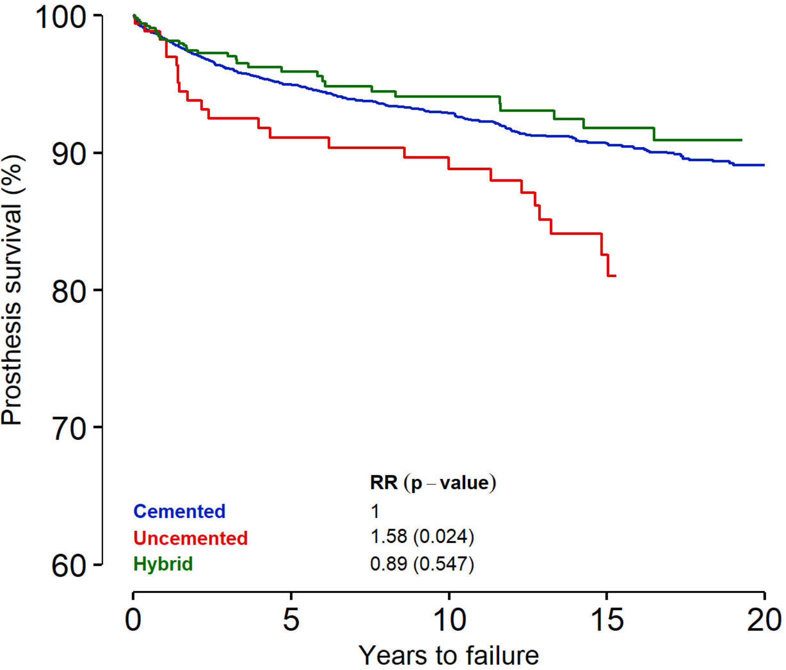
B.5) Total prosthesis



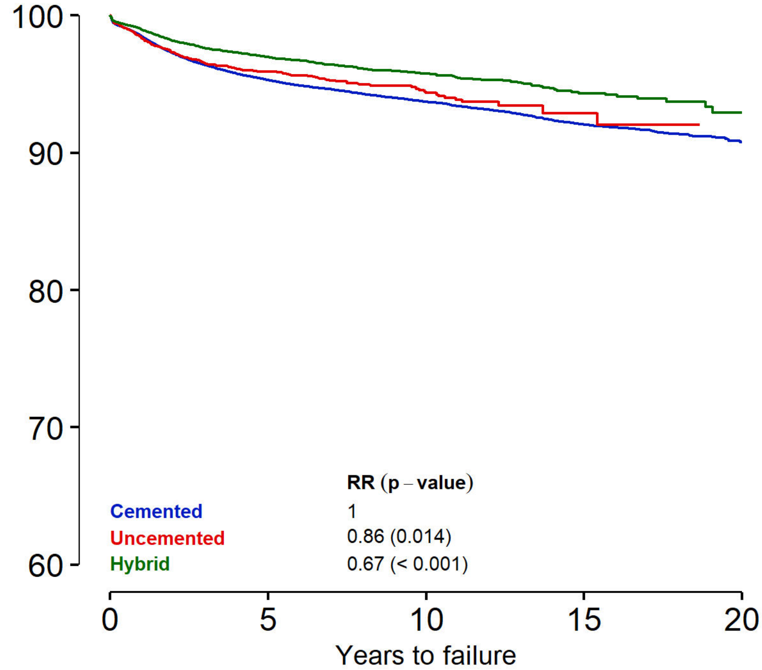
B.6) Unicondylar



B.7) Total with patella



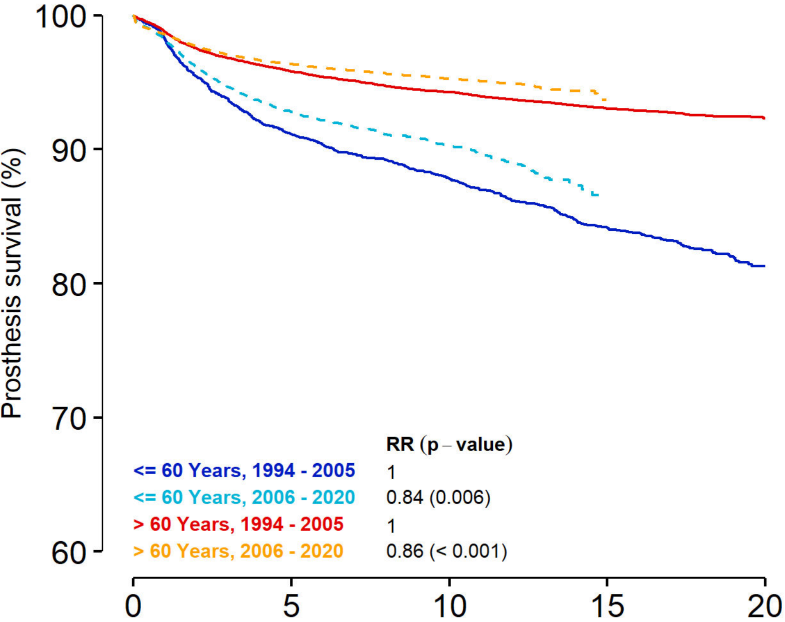
B.8) Total without patella



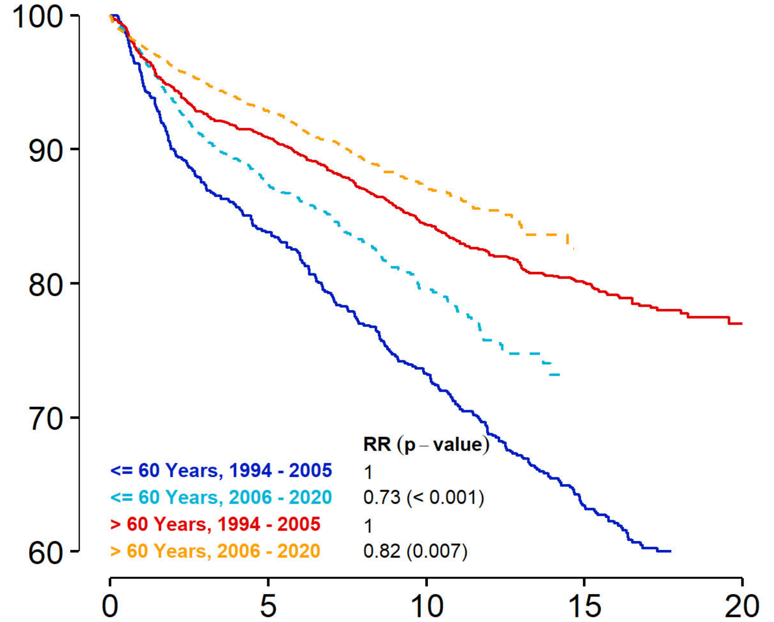
Kaplan-Meier survival curves. Survival estimate is given as long as > 50 prostheses are at risk.
Risk ratio (RR) estimates adjusted for age, sex and diagnosis.
There is some uncertainty tied to the risk estimates from the Cox-analysis as the assumption of proportional hazard does not hold for all models.

Survival curves for knee prosthesis - Age
1994 - 2020

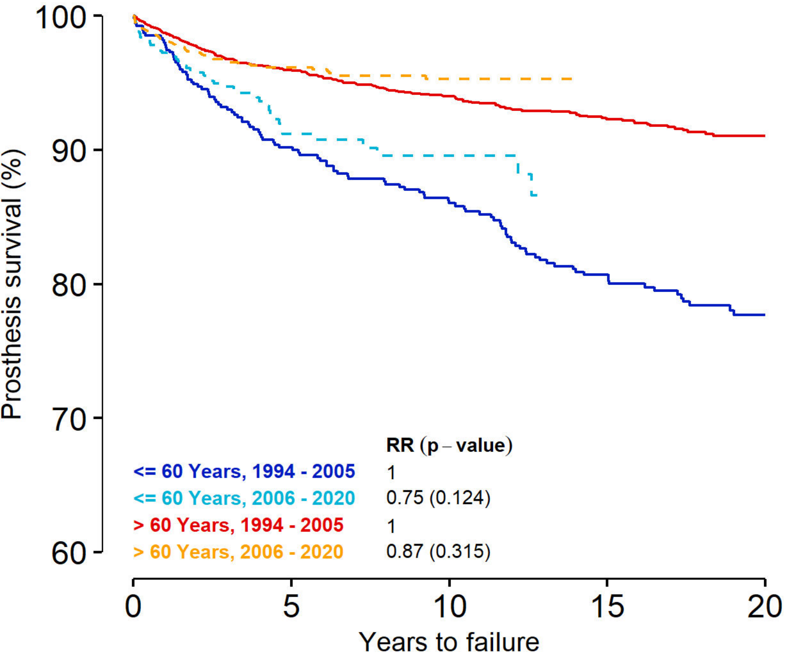
B.9) Total prosthesis



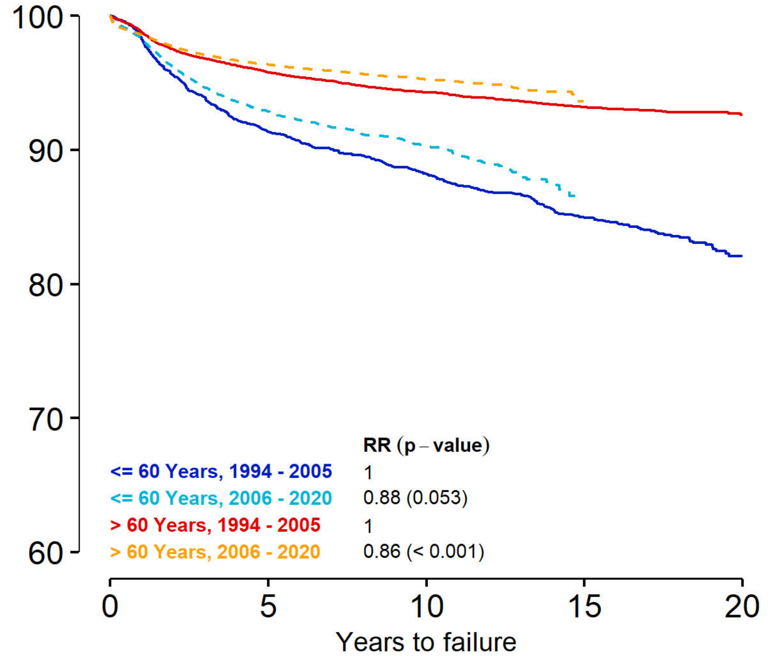
B.10) Unicondylar



B.11) Total with patella



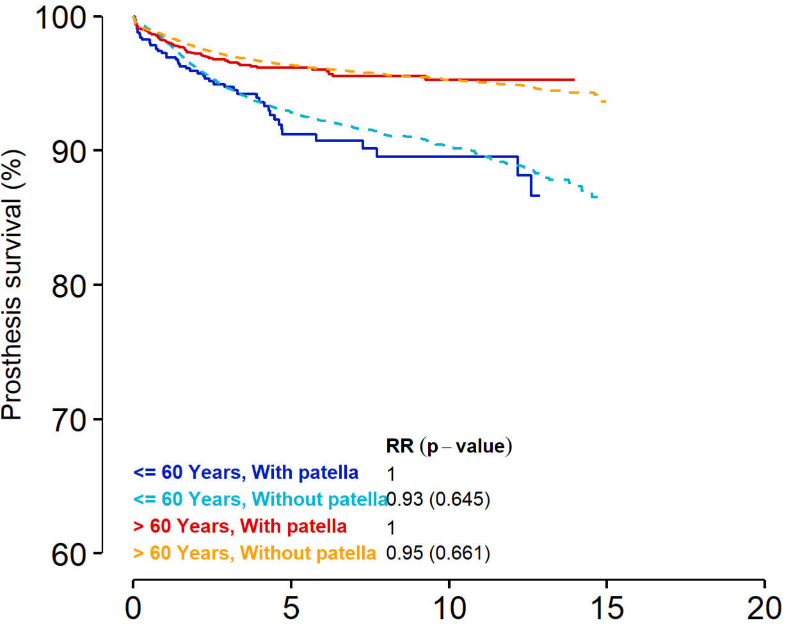
B.12) Total without patella



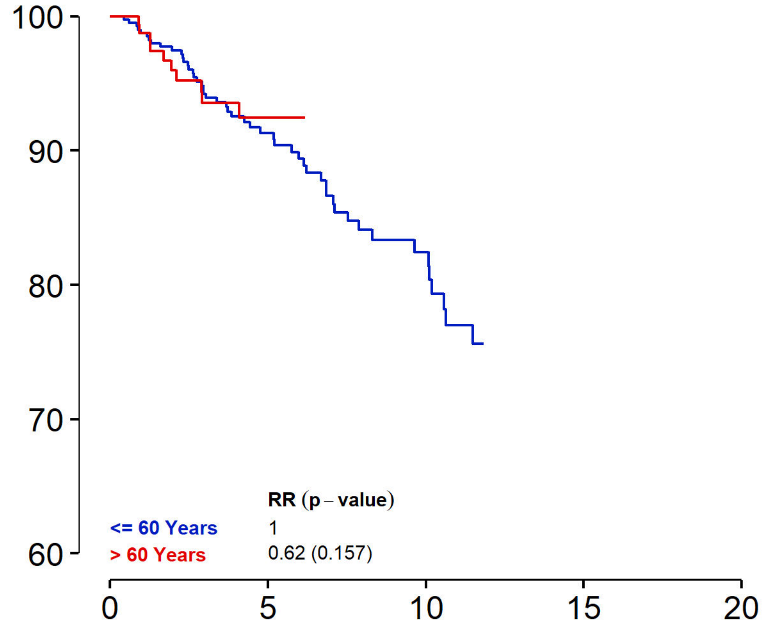
Kaplan-Meier survival curves. Survival estimate is given as long as > 50 prostheses are at risk.
Risk ratio (RR) estimates adjusted for age, sex and diagnosis.
For figures B.9-12 two Cox-regressions have been fit; one for each age group. the years 1994-2005 is used as reference in both models.
There 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 - 2020

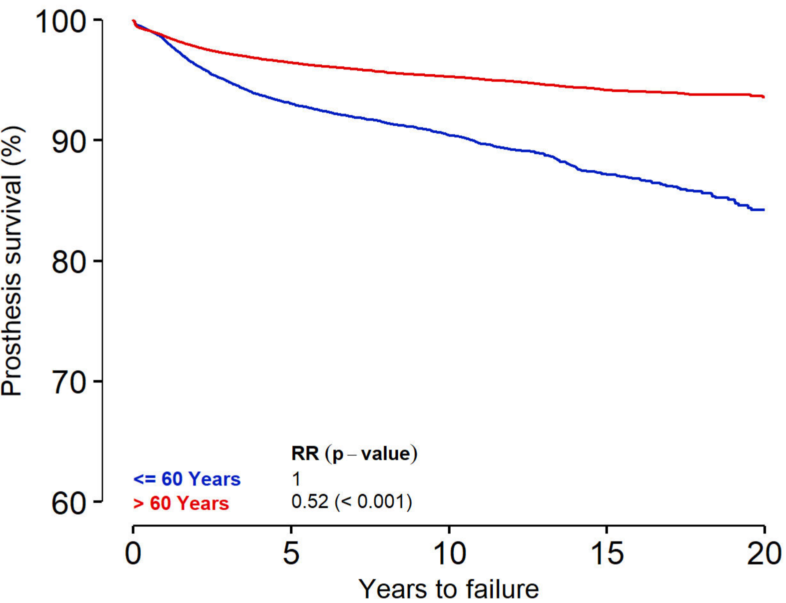
B.13) Total, 2006 - 20



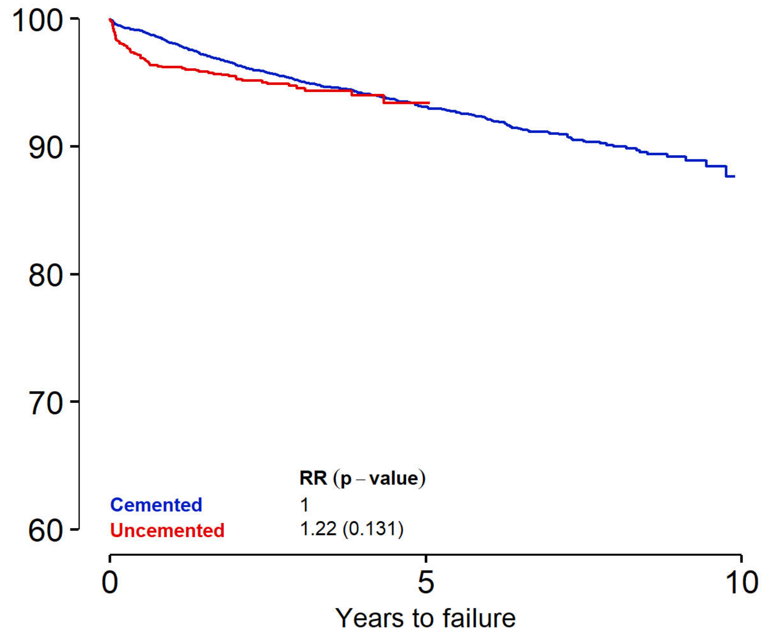
B.14) Patellofemoral



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



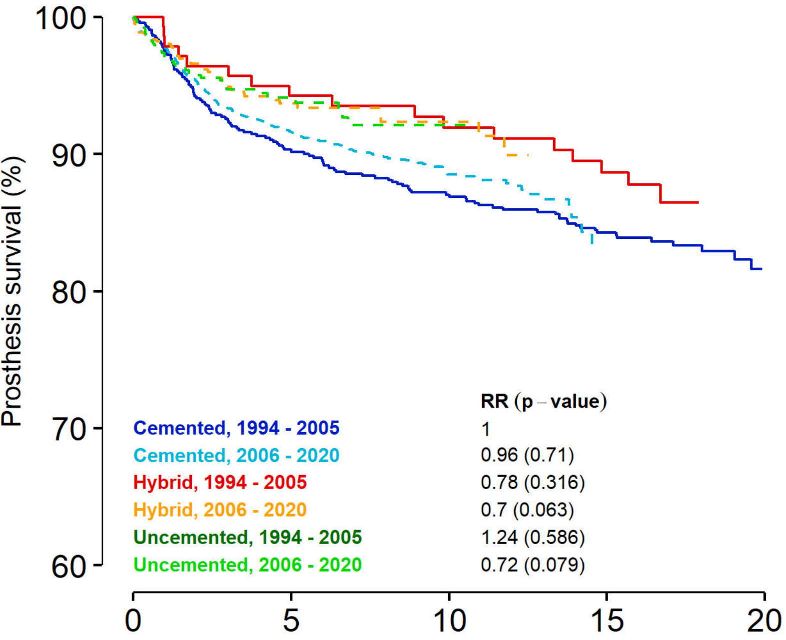
B.16) Unikcondylar prostheses cemented | uncemented



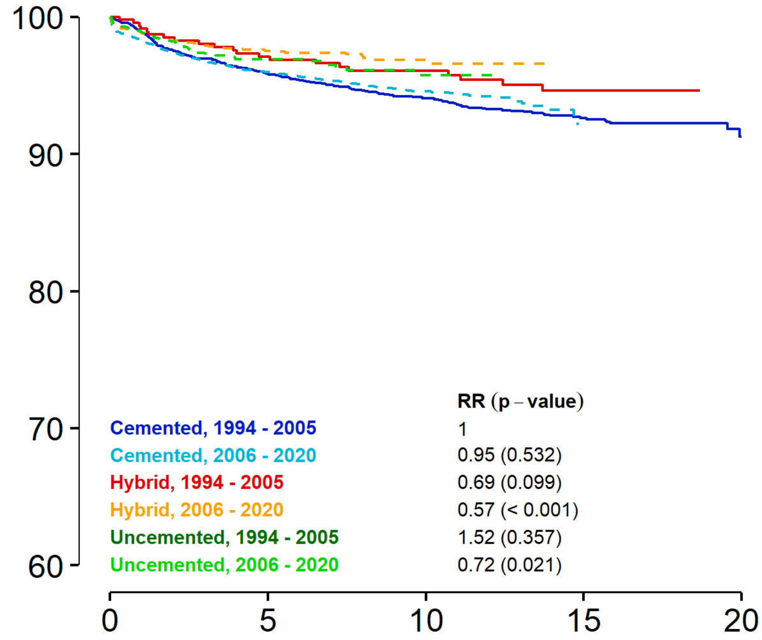
Kaplan-Meier survival curves. Survival estimate is given as long as > 50 prostheses are at risk.
Risk ratio (RR) estimates adjusted for age, sex and diagnosis.
For figure B.13 two Cox-regressions have been fit; one for each age group. the years 1994-2005 is used as reference in both models.
There is 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
1994 - 2020

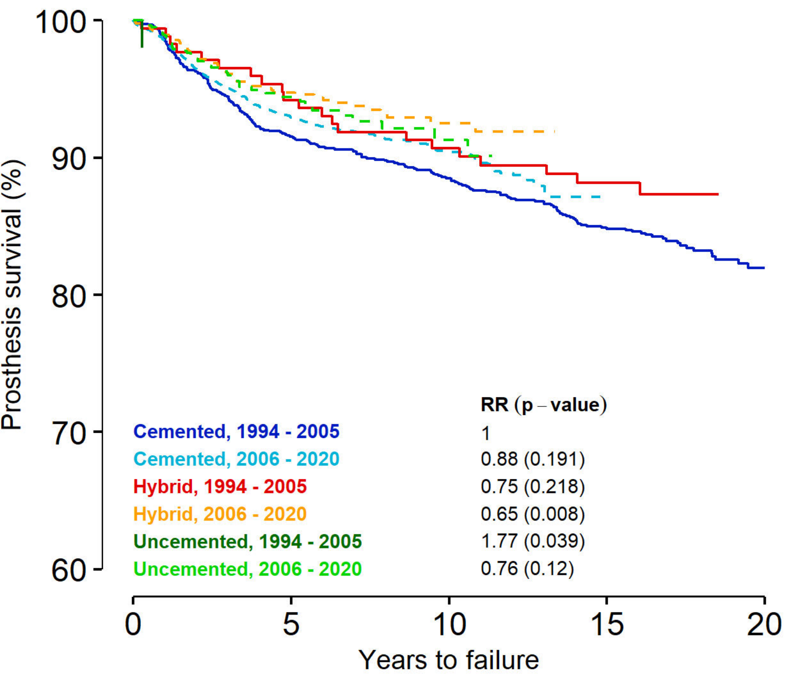
B.17) Men, under 60 years



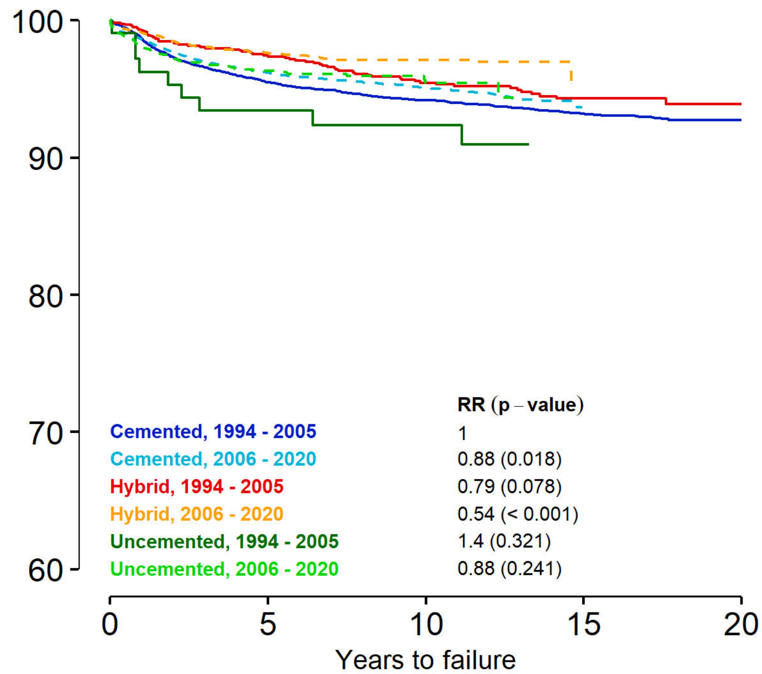
B.18) Men, over 60 years



B.19) Women, under 60 years

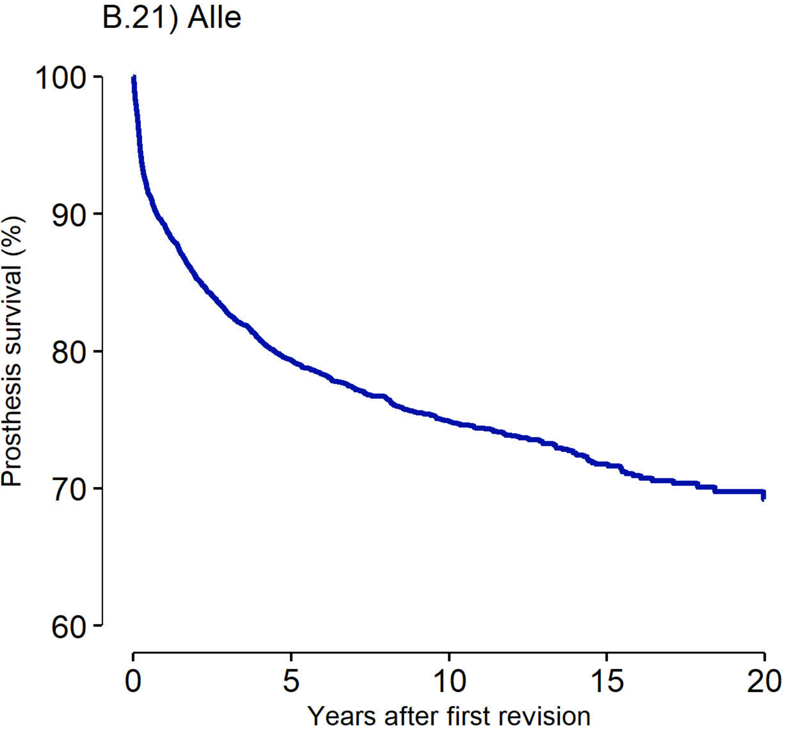


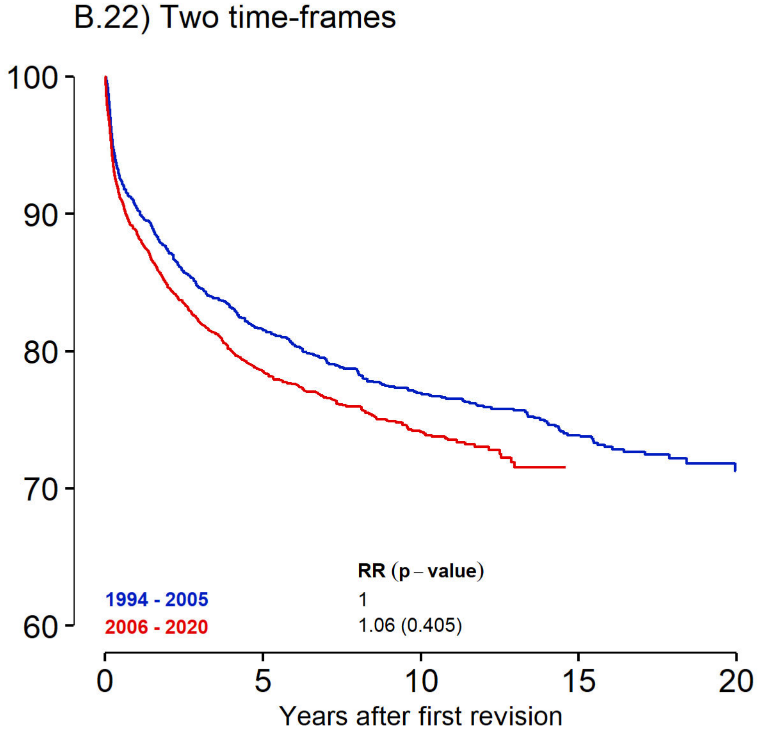
B.20) Women, over 60 years



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-analysis as the assumption of proportional hazard does not hold for all models.

Survival curves for revisions of knee prostheses
1994 - 2020

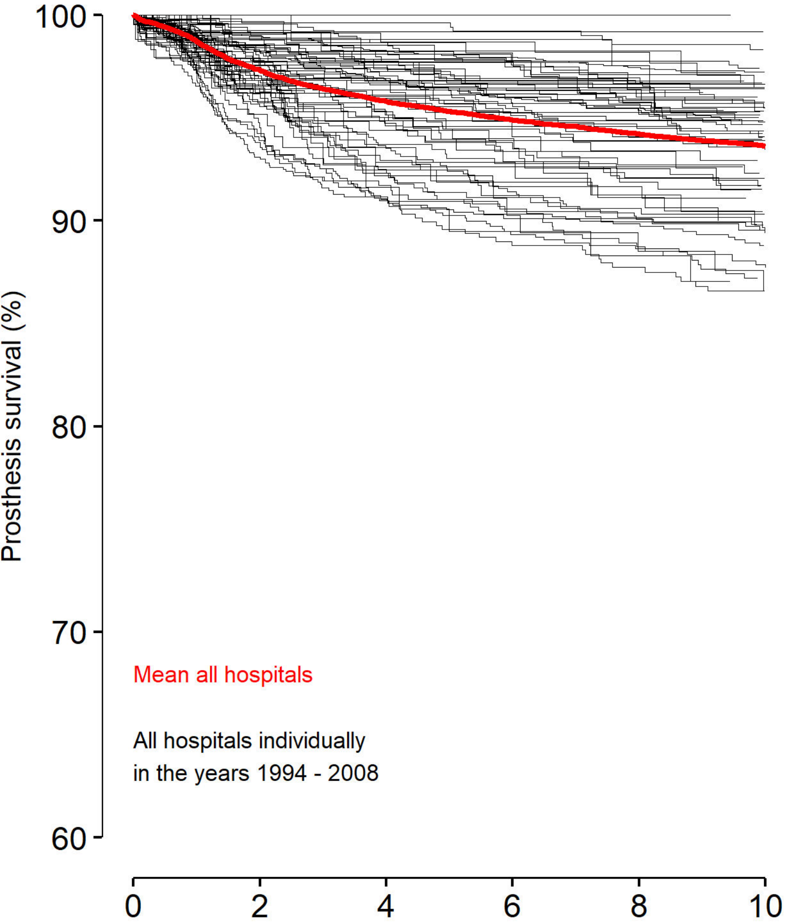




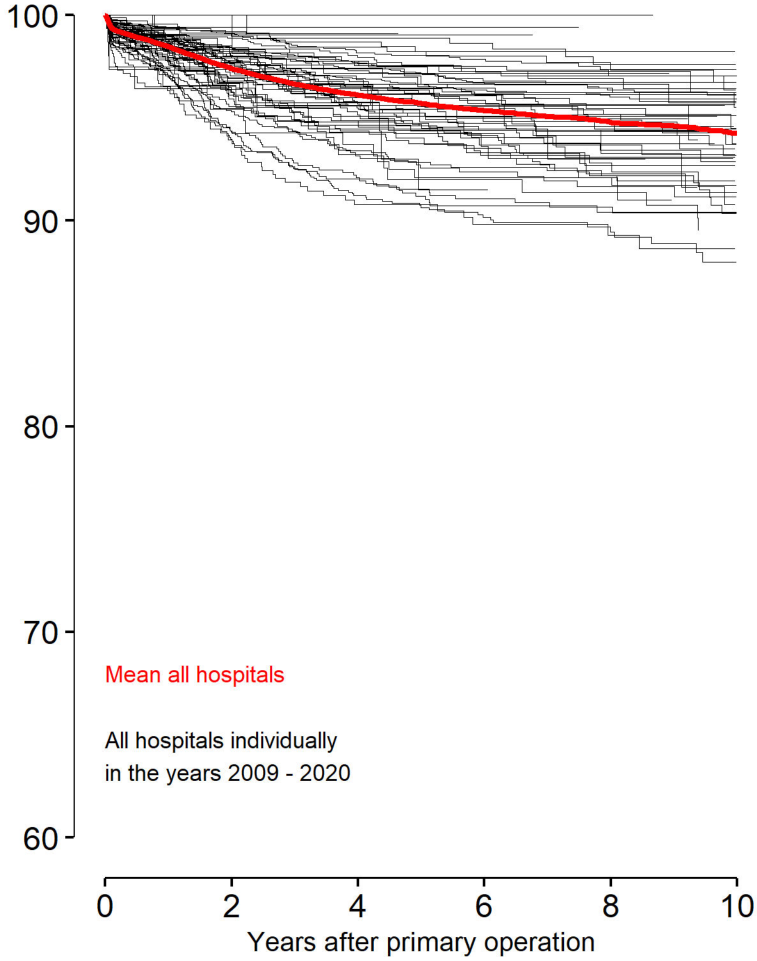
Kaplan-Meier survival curves. Survival estimate is given as long as > 50 prostheses are at risk.
Risk ratio (RR) estimates adjusted for age, sex and diagnosis.
There is some uncertainty tied to the risk estimates from the Cox-analysisis as the assumption of proportional hazard does not hold for all models.

Survival curves for total kneeprostheses

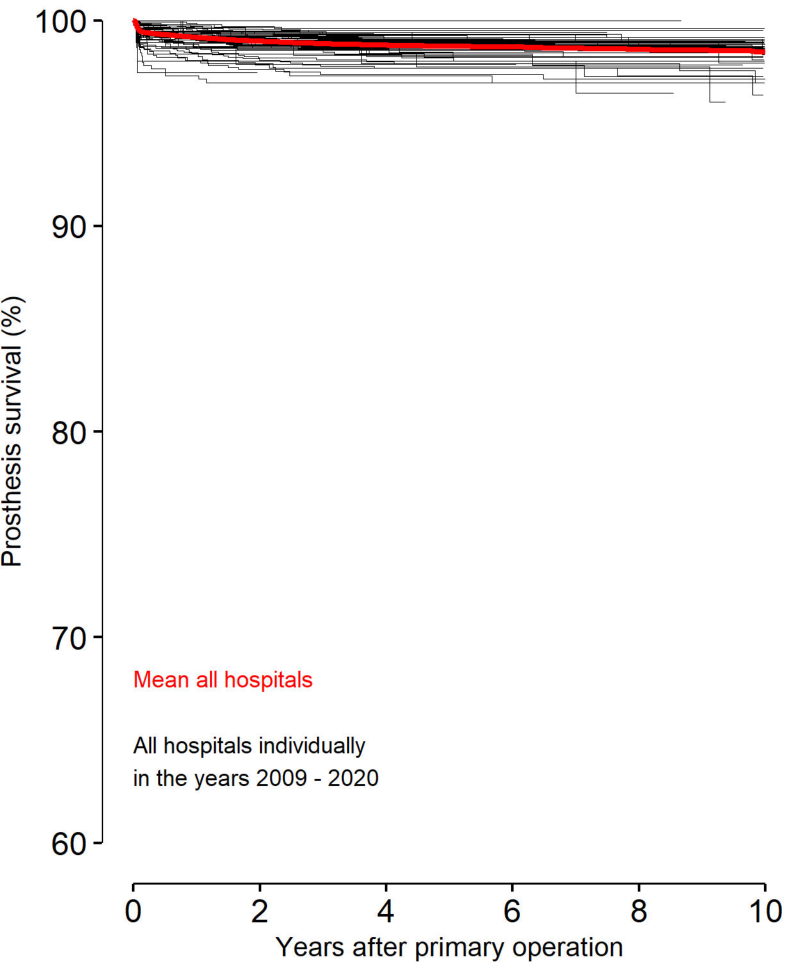
B.23) All hospitals in the years 1994 - 2008



B.24) All hospitals in the years 2009 - 2020

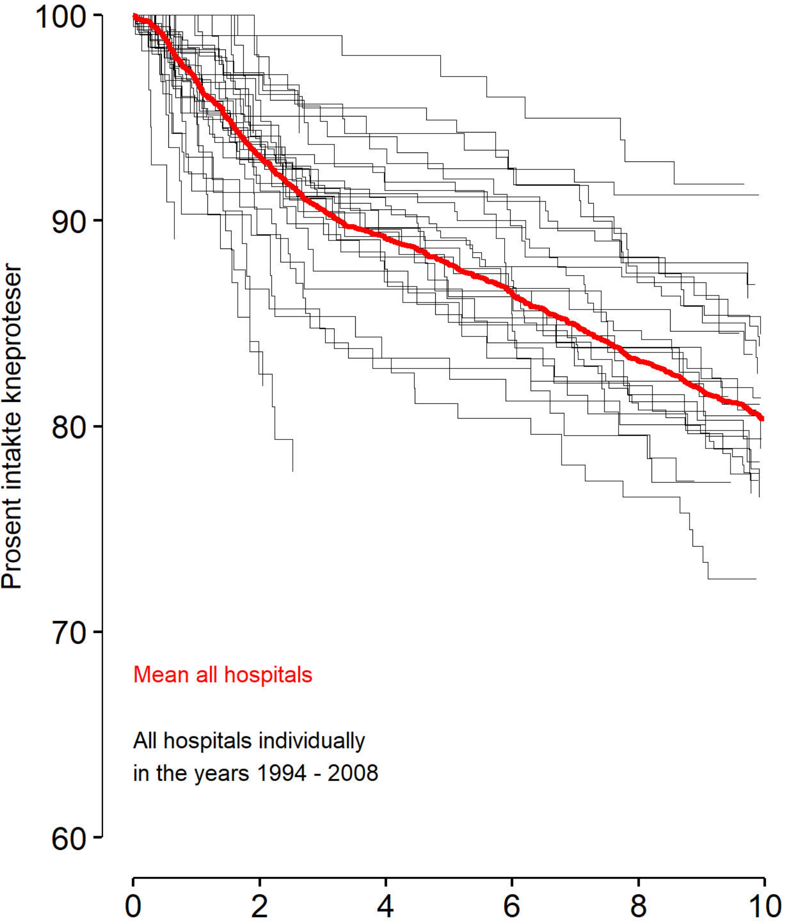


B.25) Endpoint revision for infection, 2009 - 2020

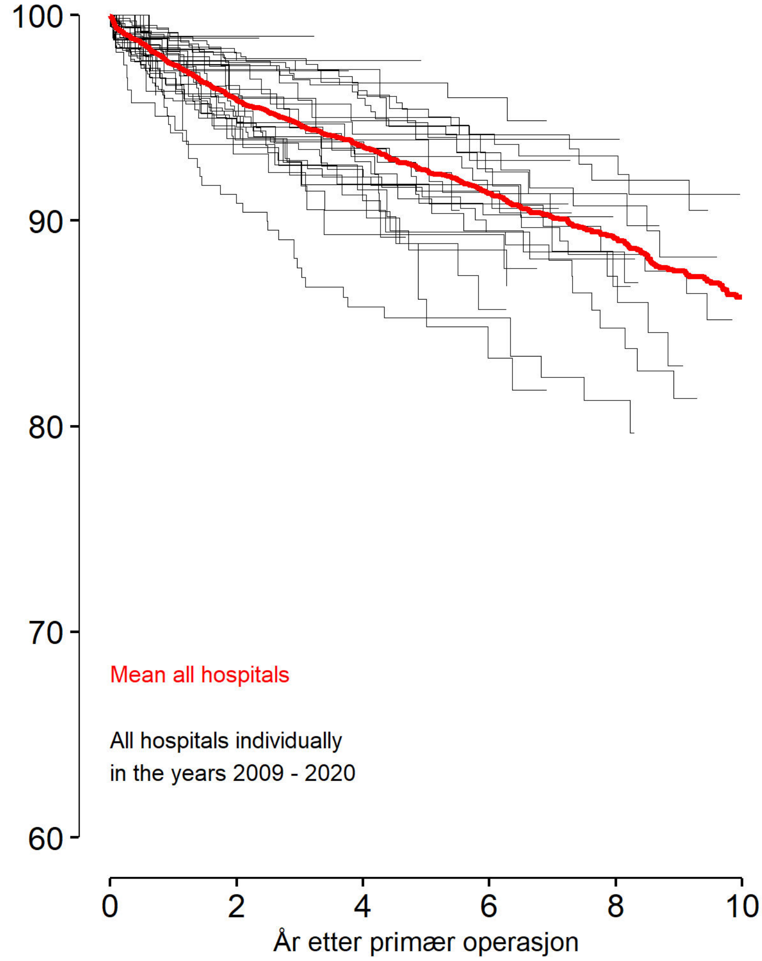


Survival curves for unicondylar kneeprostheses

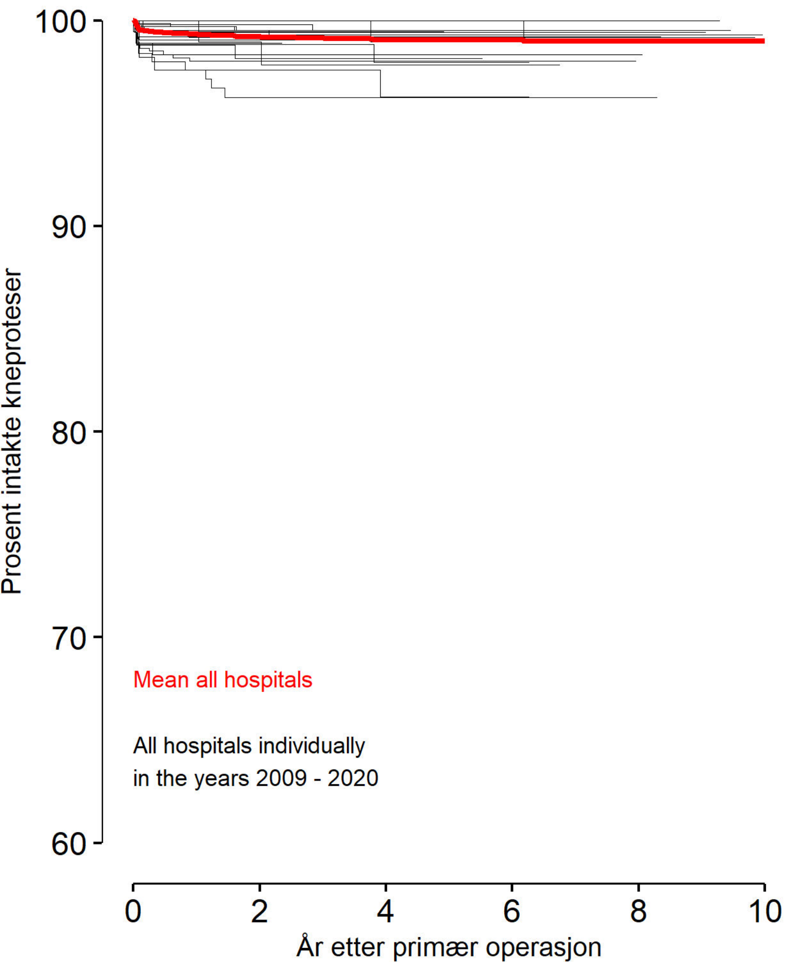
B.26) All hospitals in the years 1994 - 2008



B.27) All hospitals in the years 2009 - 2020



B.28) Endpoint revision for infection, 2009 - 2020



One stage bilateral operation in knee arthroplasty

Year	1994-2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Sum:
Number of patients	75	6	21	22	43	50	79	74	74	88	109	641

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 B.29: Number of primary operations in knee, 2020

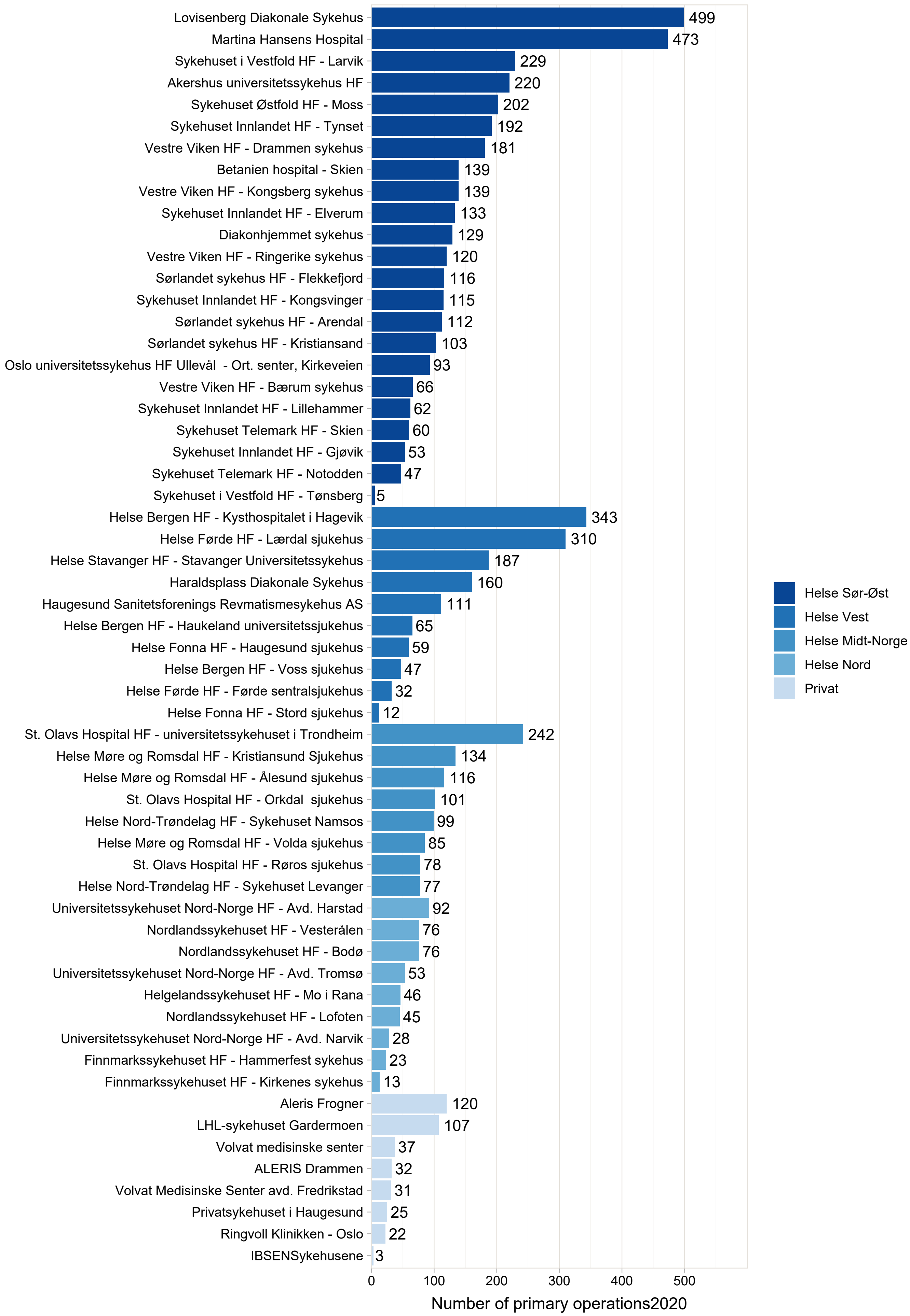
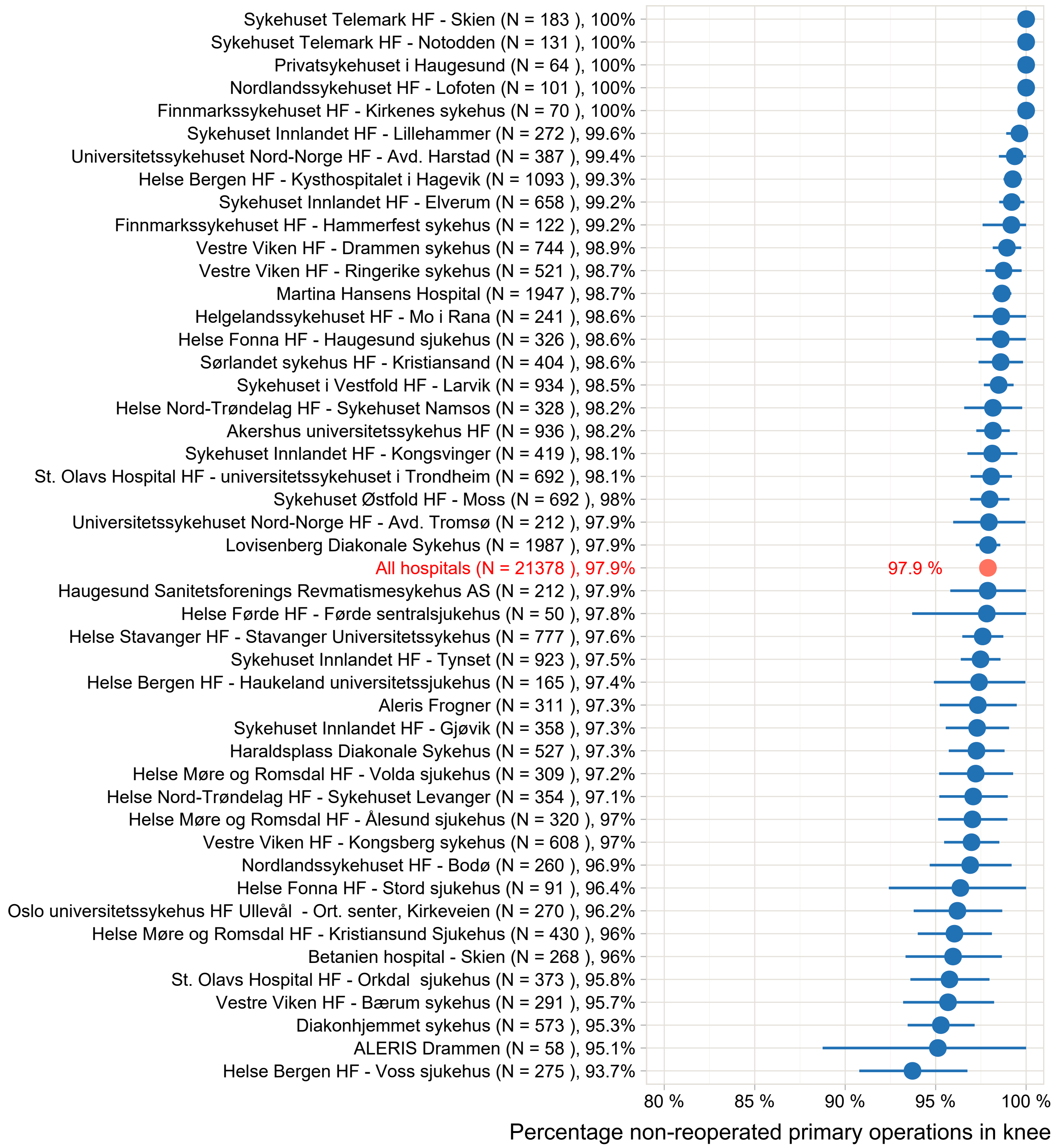
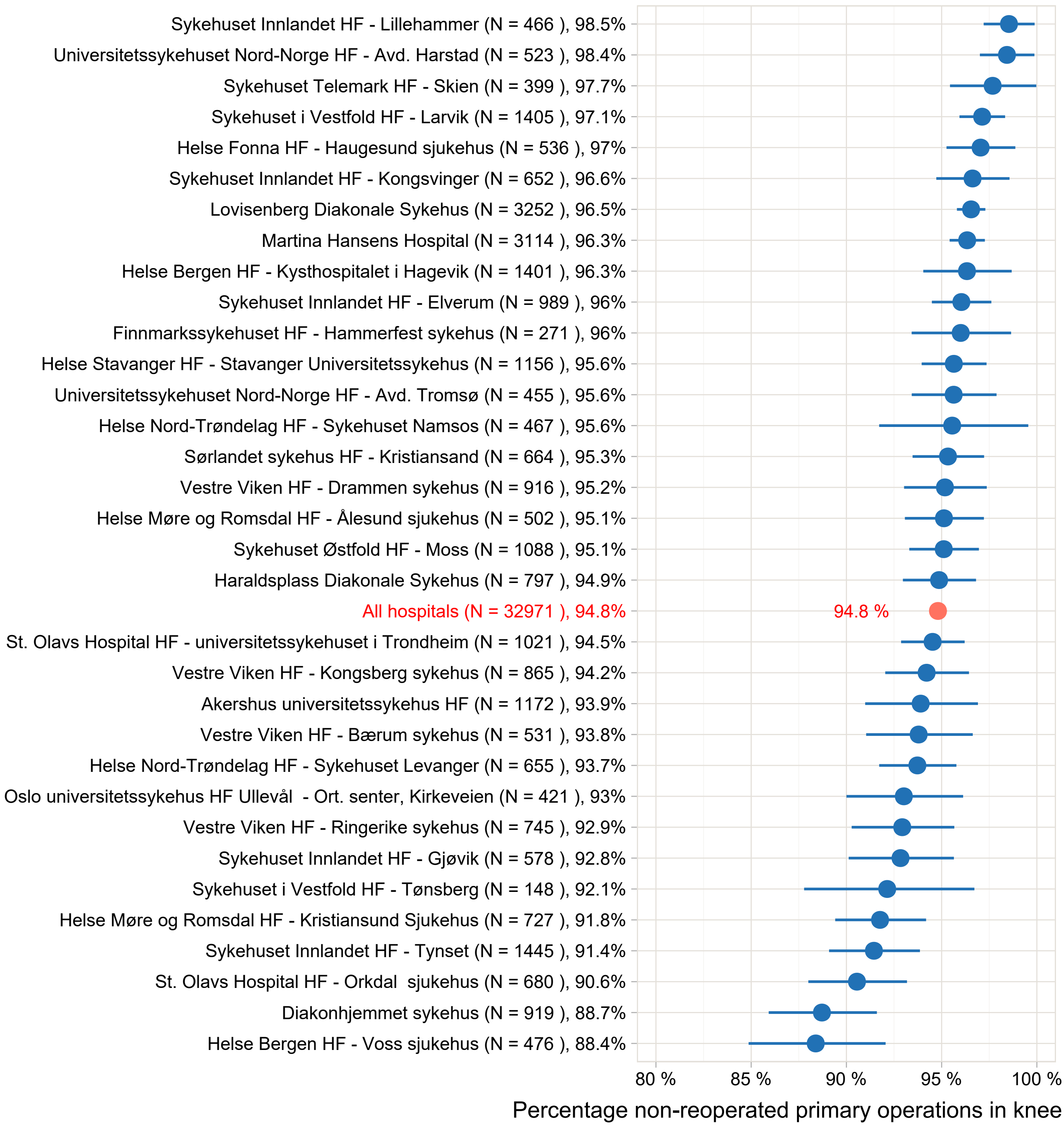


FIGURE B.30: Percentage non-revised standard patients two years after operations in 2014-2020



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 2014 to 2020. Only hospitals with operations in 2020 and with more than 50 operations from 2014 to 2020 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 2014 to 2018 are included.

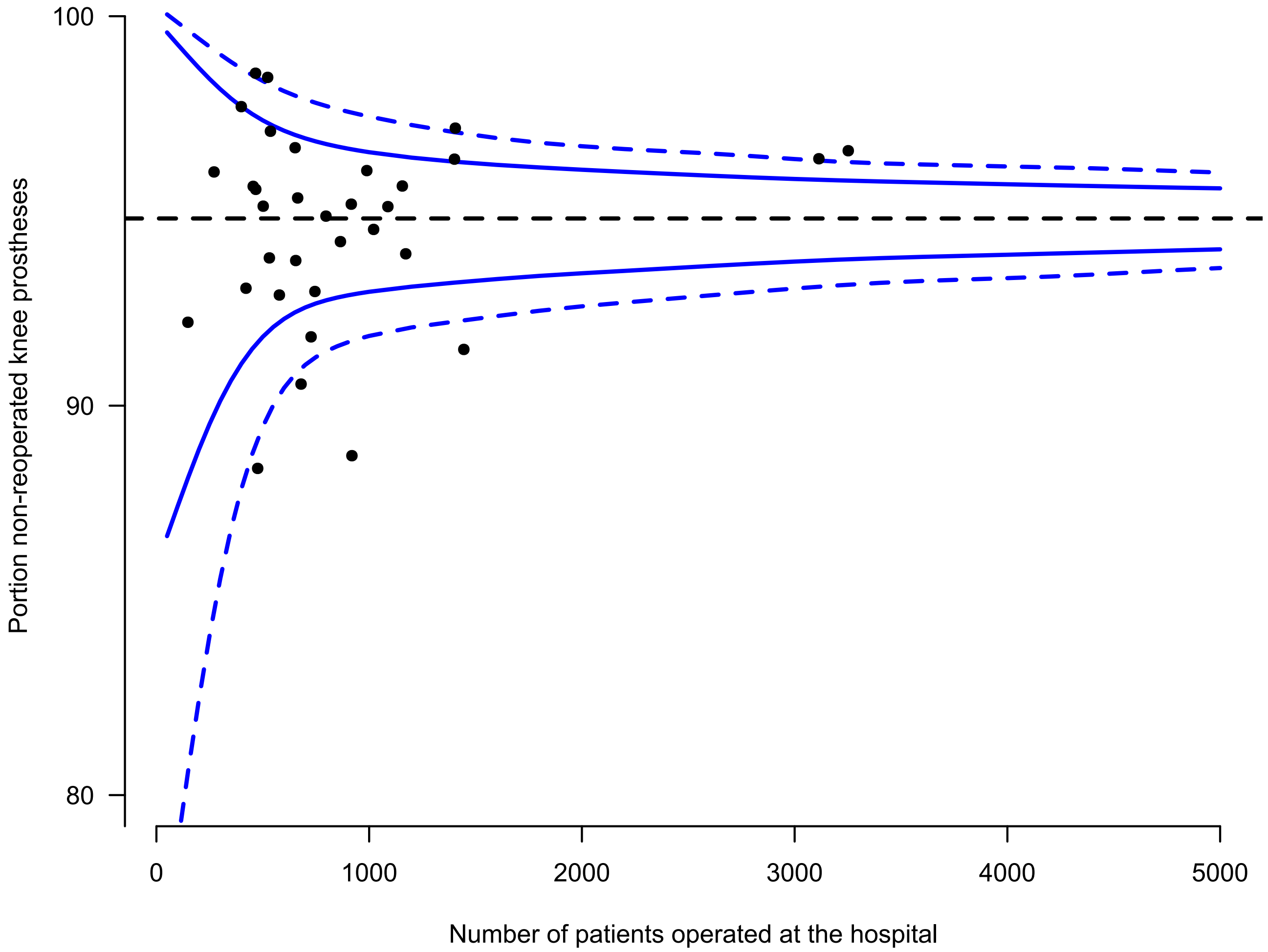
FIGURE B.31: Percentage non-revised standard patients ten years after operations in 2009-2020



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 2009 to 2020. Only hospitals with operations in 2020 and with more than 50 operations from 2009 to 2020 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 2009 to 2018 are included.

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

FIGURE B.32: Funnel plot, percentage non-revised standard patients ten years after operations in 2009-2020



Each point shows the percentage non-revised prostheses after 10 years for standard patients operated from 2009 to 2020 at Norwegian hospitals. Some hospitals are excluded. This can be due to low completeness of reporting of revisions (<80 % from 2008 to 2016), that less than 50 knee 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 2020. 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 points in the funnel plot correspond to a hospital in figure B.31. 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.31. The three 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.33: Percentage non-reoperated total prostheses in knee after 3 and 10 years, 2009-2020.

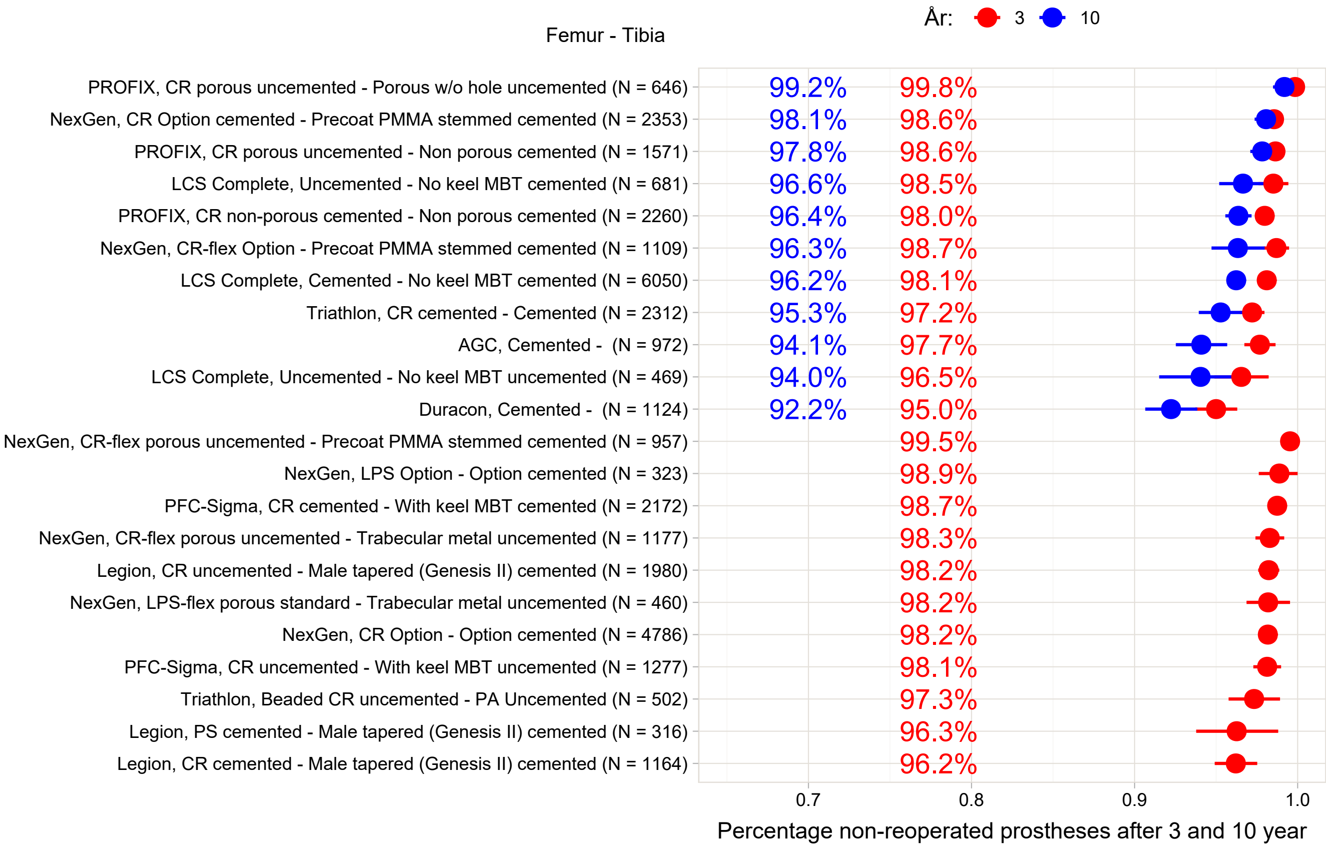


FIGURE B.34: Percentage non-reoperated uni prostheses in knee after 3 and 10 years, 2009-2020.

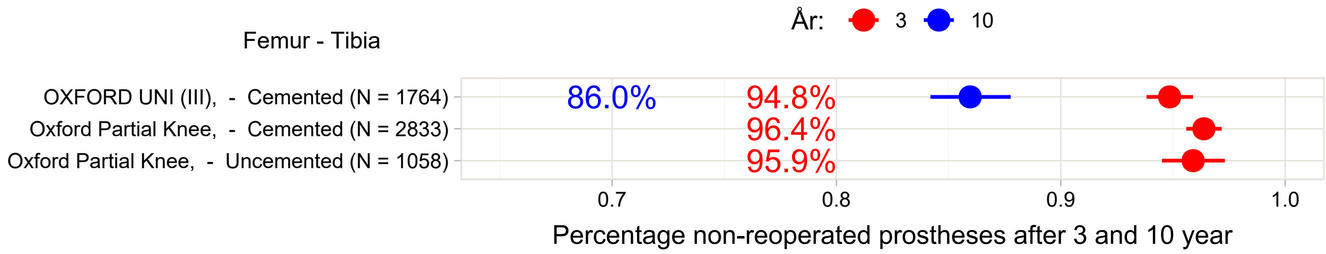
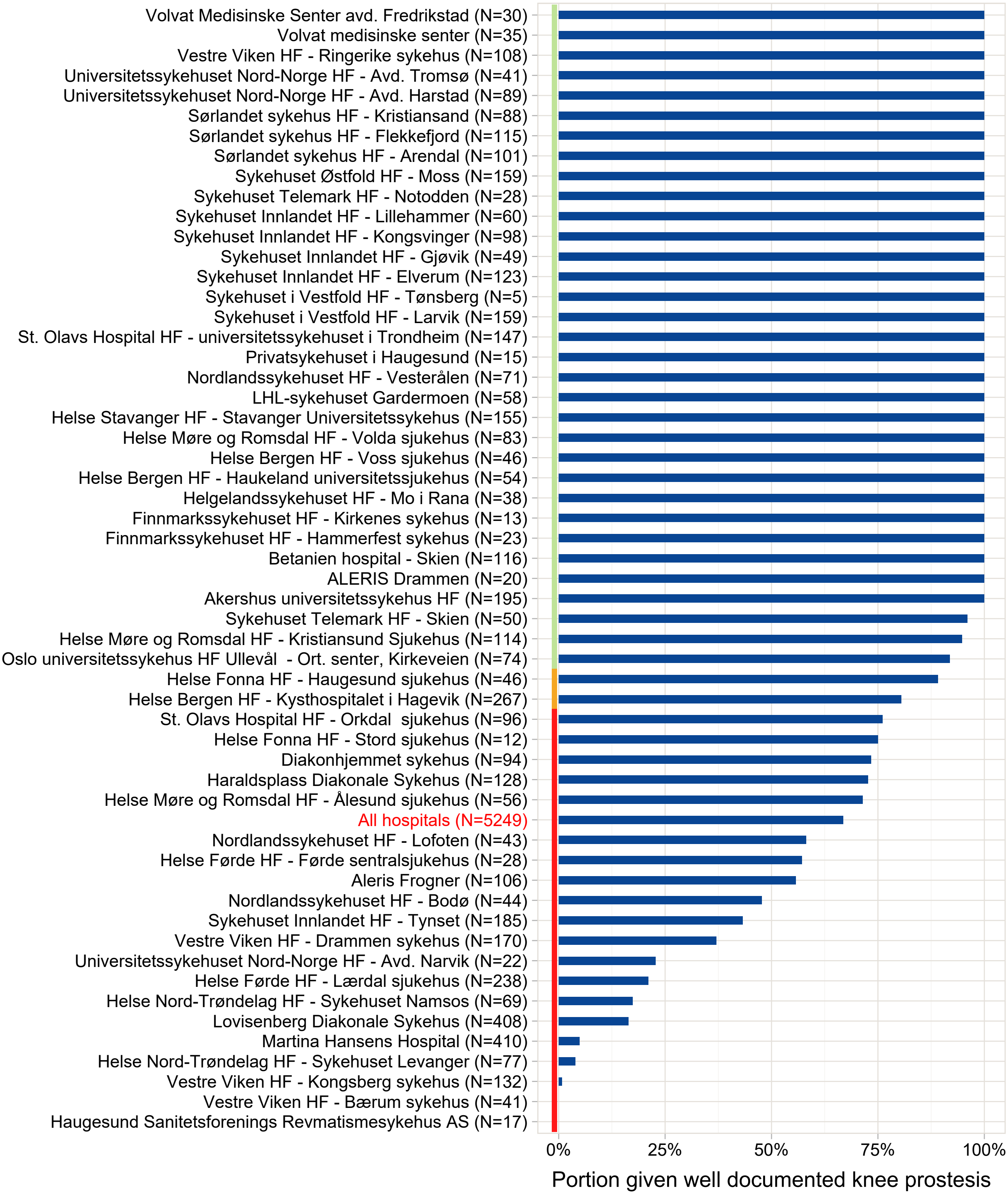


Figure B.33 and B.34 shows the estimated Kaplan-Meier percentage at three and ten years for different combinations of knee prostheses. We have only included combinations used in 500 or more operations in 2009-2020. A further requirement for inclusion in the figure is that there must still be at least 50 examples of the combination at three and ten years respectively. Only standard patients from 2009 to 2020 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.

Duracon, LCS, AGC Universal and Profix knee prosthesis is no longer in use.

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

FIGURE B.35: Portion of patients recieving well documented knee prosthesis by hospital and nationally in 2020



Most inserted knee prosthetics 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.

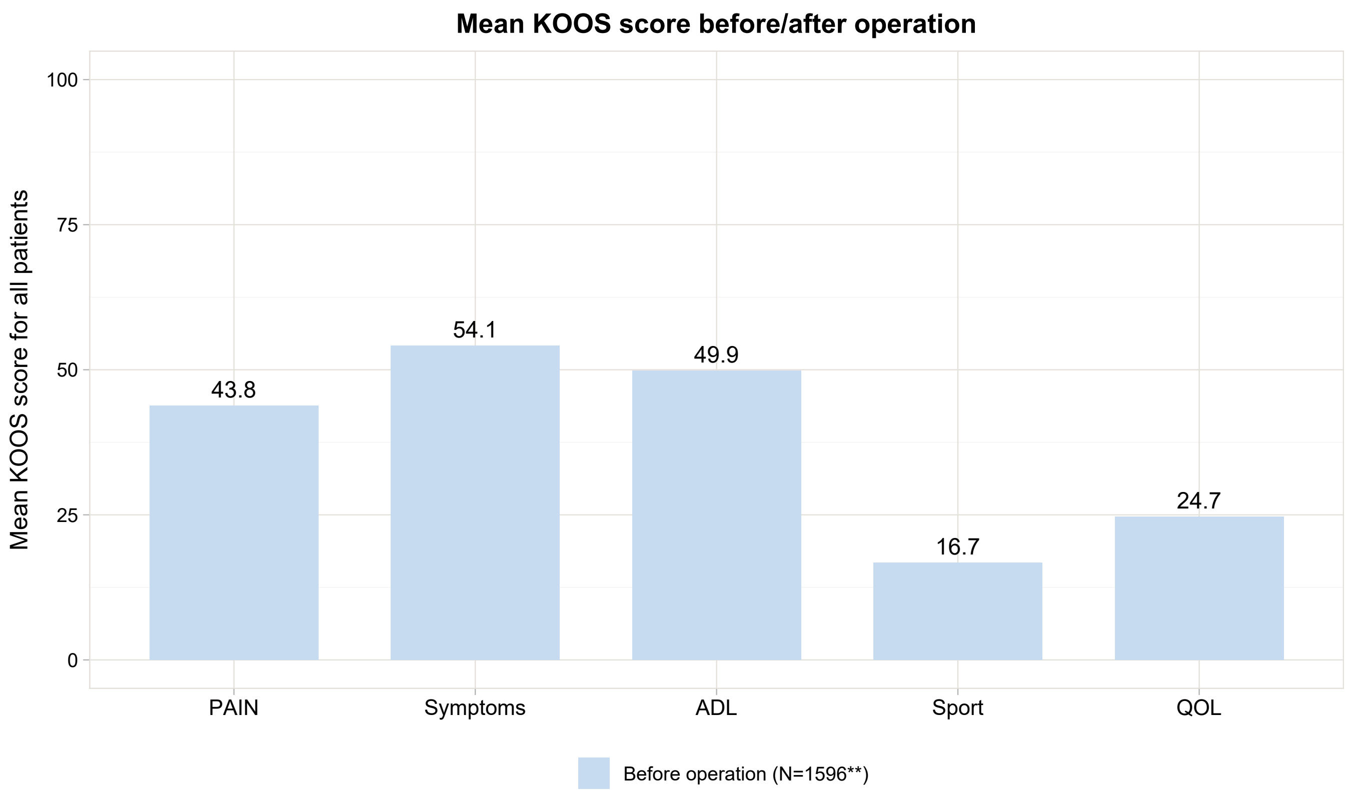
PROM, Knee Arthroplasty Register

The Knee Arthroplasty Register started electronic collection of PROM data in 2017. We wish to focus more on patients' perceived quality of life and joint function before and after surgery. Patients complete an electronic questionnaire before surgery and 1, 6 and 10 years after surgery. We will compare the data we collect from patients 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 a possible revision of the prosthesis.

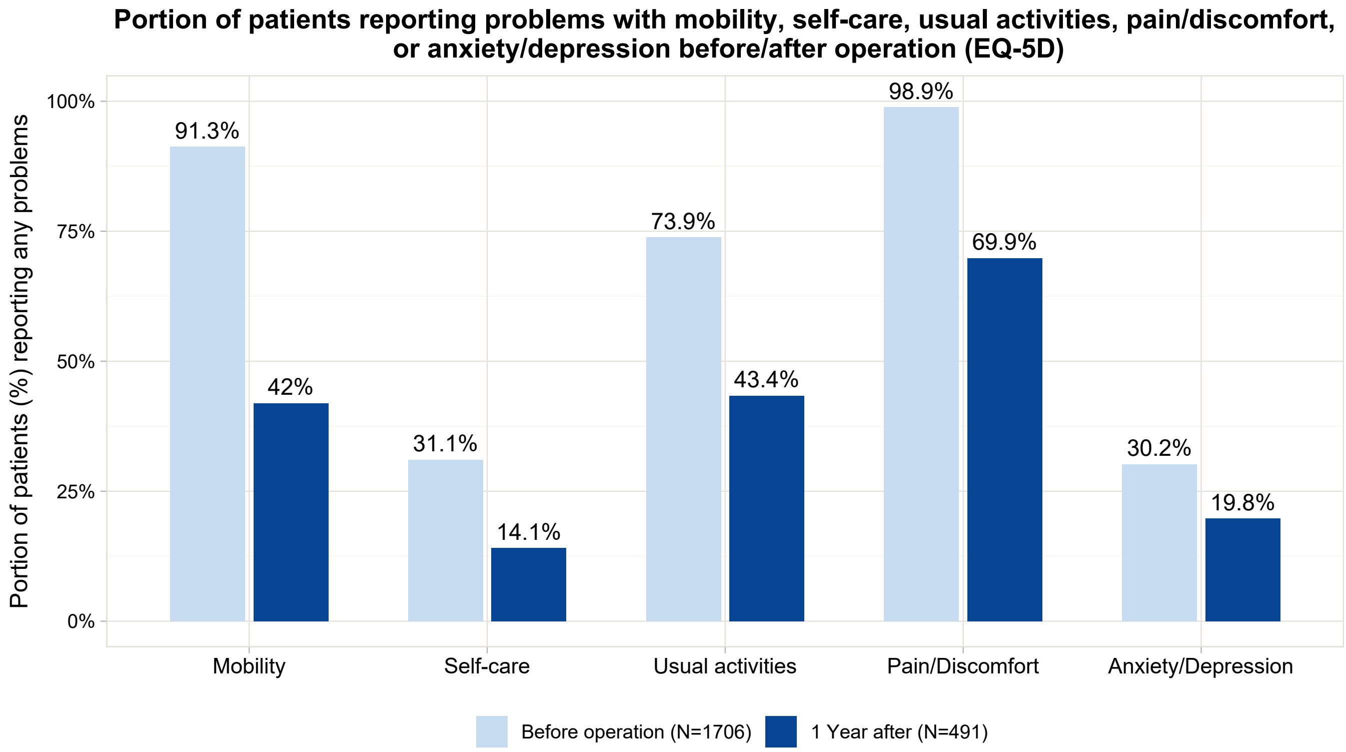
so far, 1706 pre-operative PROM forms and 491 one year follow-up forms have been reported to the registry. Along with this we have also recieved 13 incomplete pro-operative forms. Up until this pointm, 29 hospitals have begun collecting and reporting PROMS. Due to a major bug in the MRS system, patients have been unable to fill out the questions regarding KOOS in the 1 year follow-up forms. All hospitals will recieve reports containing analyses of their own results. Any questions regarding collection and reporting of PROMs should be sent to our consultant Mikal Solberg mikal.solberg@helse-bergen.no.

Patient demografic	Before operation	1 Year after
number of forms (n)	1706	491
Men (%)	45.1	48.1
Median age (min-maks)	67 (30-93)	66 (31-90)
Body-Mass Index (SD)	29.7 (4.9)	29.9 (5.5)
Uses alchohol n (%)	1238 (72.6)	351 (71.5)
Smokes n (%)	136 (8)	45 (9.2)
High school education or higher n (%)	840 (49.2)	268 (54.6)
Lives alone n (%)	363 (21.3)	90 (18.3)
UCLA activity* mean (SD)	4.9 (1.8)	5.7 (2)
Health** (VAS) mean (SD)	62 (18.3)	72.1 (17.6)
Pain*** mean (SD)	64.2 (17.7)	55.9 (26)

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



*Only 1596 forms have adequate completeness of the questions tied to KOOS before the operation, and 15 forms 1 year after.



Health trust	Reporting hospitals	Number of pre-operative forms
Helse Sør-Øst	14/23	766
Helse Vest	7/10	714
Helse Midt-Norge	3/8	156
Helse Nord	3/9	33
Privat	1/8	49

FIGURE B.36: Portion of primary knee operations where pre-operative PROMs have been reported in 2019-2020

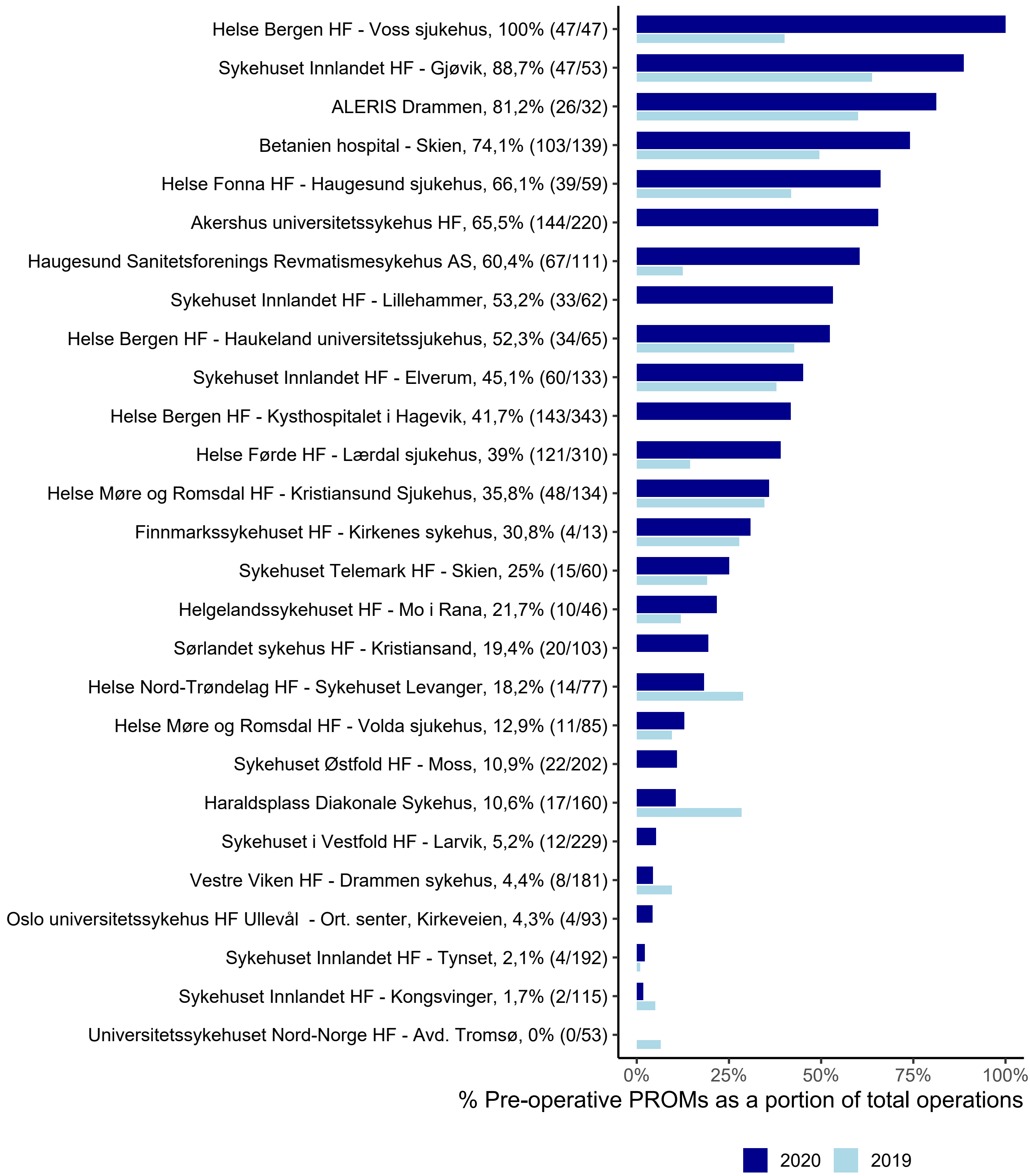


Figure B.36 presents pre-operative PROMs reported via paper or the online web solution MRS, as a portion of total number of knee operations reported in 2020 (dark blue line) and in 2019 (light blue line). The level is still low, but some hospitals seem to have taken steps to improve PROM reporting. We wish to remind the reader that any questions regarding registering and reporting of PROMS should be directed to the registry.

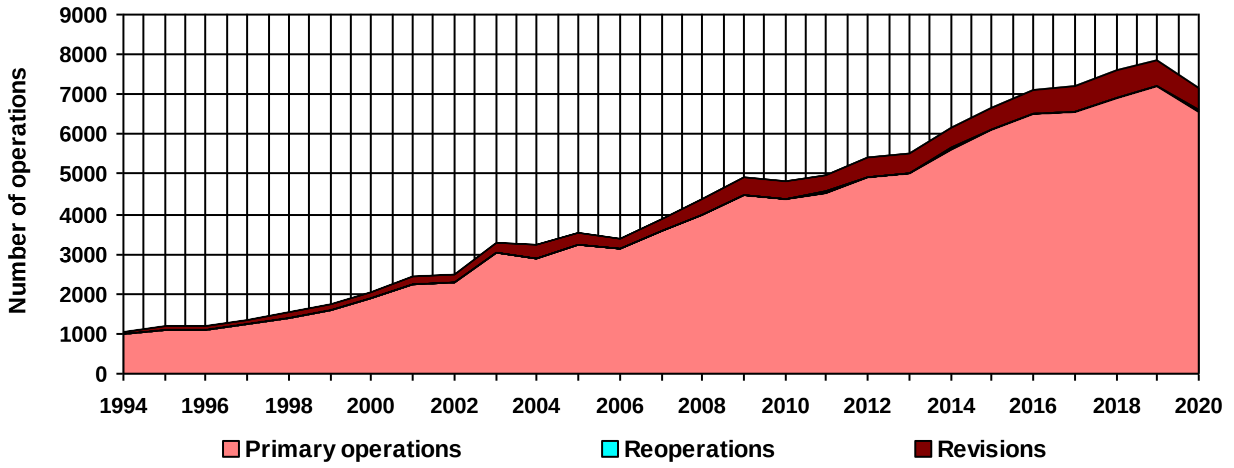
KNEE PROSTHESES

Table 1: Annual numbers of operations

Year	Primary operations		Reoperations *		Revisions		Total
2020	6 587	(92,0%)	19	(0,27%)	553	(7,7%)	**7 159**
2019	7 220	(91,7%)	19	(0,24%)	631	(8,0%)	**7 870**
2018	6 922	(91,2%)	13	(0,17%)	652	(8,6%)	**7 587**
2017	6 576	(91,2%)	15	(0,21%)	616	(8,5%)	**7 207**
2016	6 514	(91,5%)	16	(0,22%)	588	(8,3%)	**7 118**
2015	6 120	(91,7%)	8	(0,12%)	548	(8,2%)	**6 676**
2014	5 642	(91,9%)	7	(0,11%)	492	(8,0%)	**6 141**
2013	5 041	(91,3%)	5	(0,09%)	477	(8,6%)	**5 523**
2012	4 917	(90,9%)	7	(0,13%)	486	(9,0%)	**5 410**
1994-11	47 110	(91,6%)	2	(0,00%)	4 293	(8,4%)	**51 405**
Total	**102 649**	**(91,6%)**	**111**	**(0,10%)**	**9 336**	**(8,3%)**	**112 096**

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

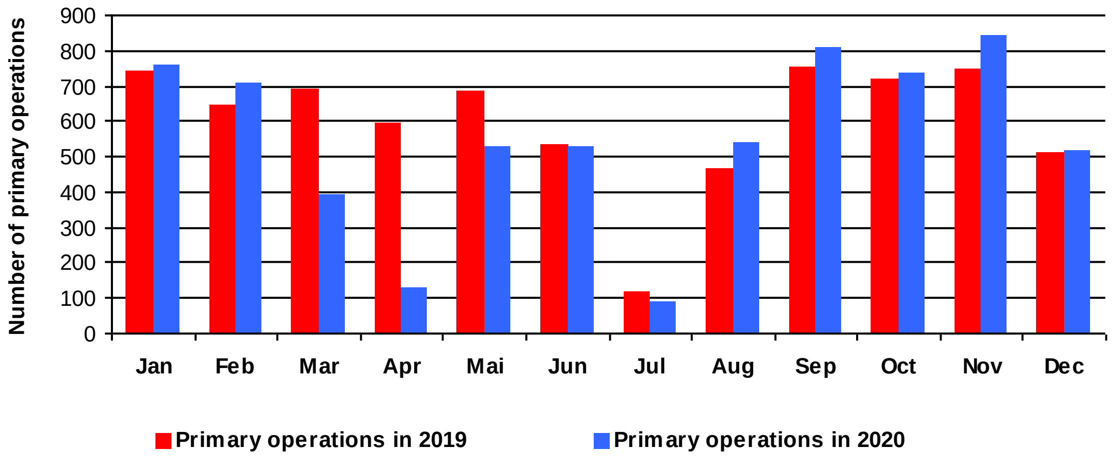
Figure 1a: Annual numbers of operations



53,2 % of all operations were performed on the right side. 61,6 % performed in women.
Mean age at primary surgery was 68,5 years, 69 years for women and 67,6 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 68,4 years in 2020, 68,6 years for women and 68,1 years for men.

COVID-19

Figure 1b: Monthly primary operations in 2019 - 2020



Incidence

Figure 2a: Incidence of primary knee prostheses

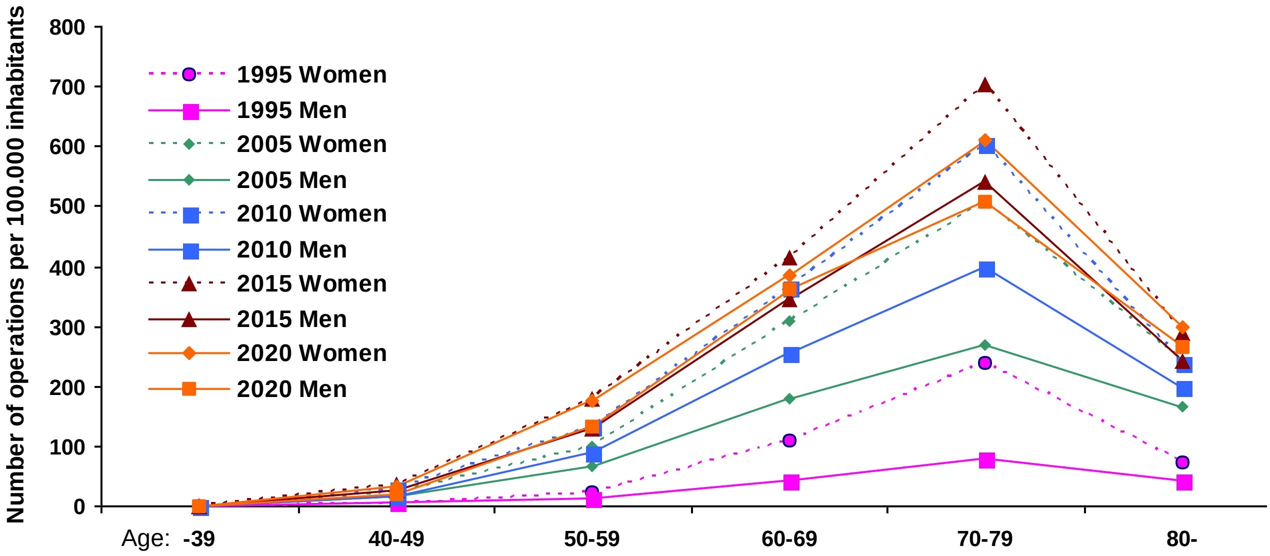


Figure 2b: Annual total incidence of primary knee prostheses for men and women

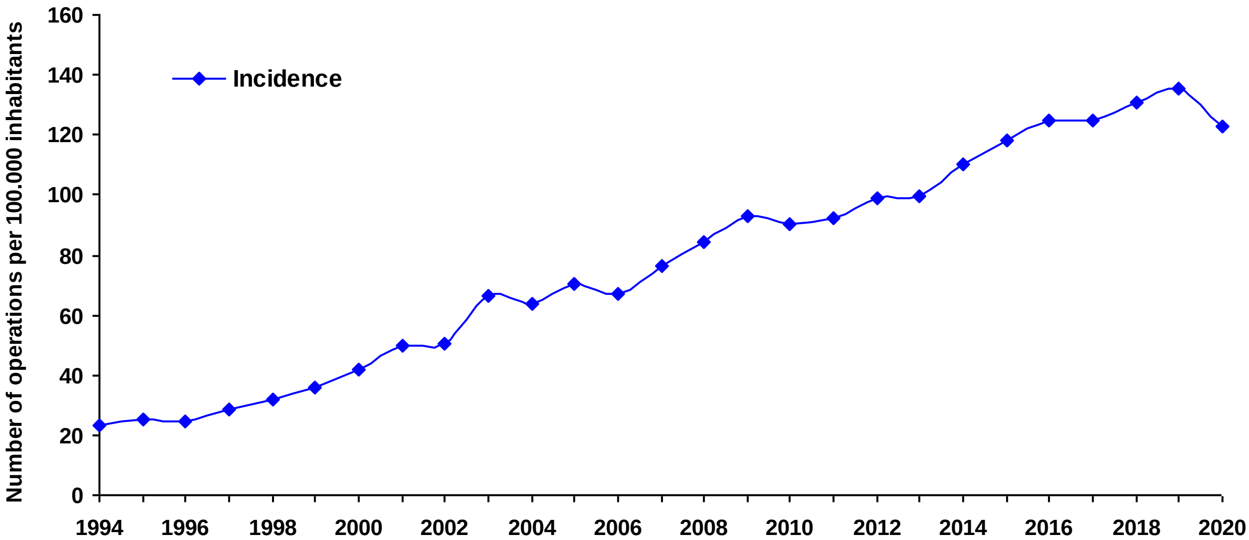


Figure 3: Age at the insertion of primary total knee prostheses

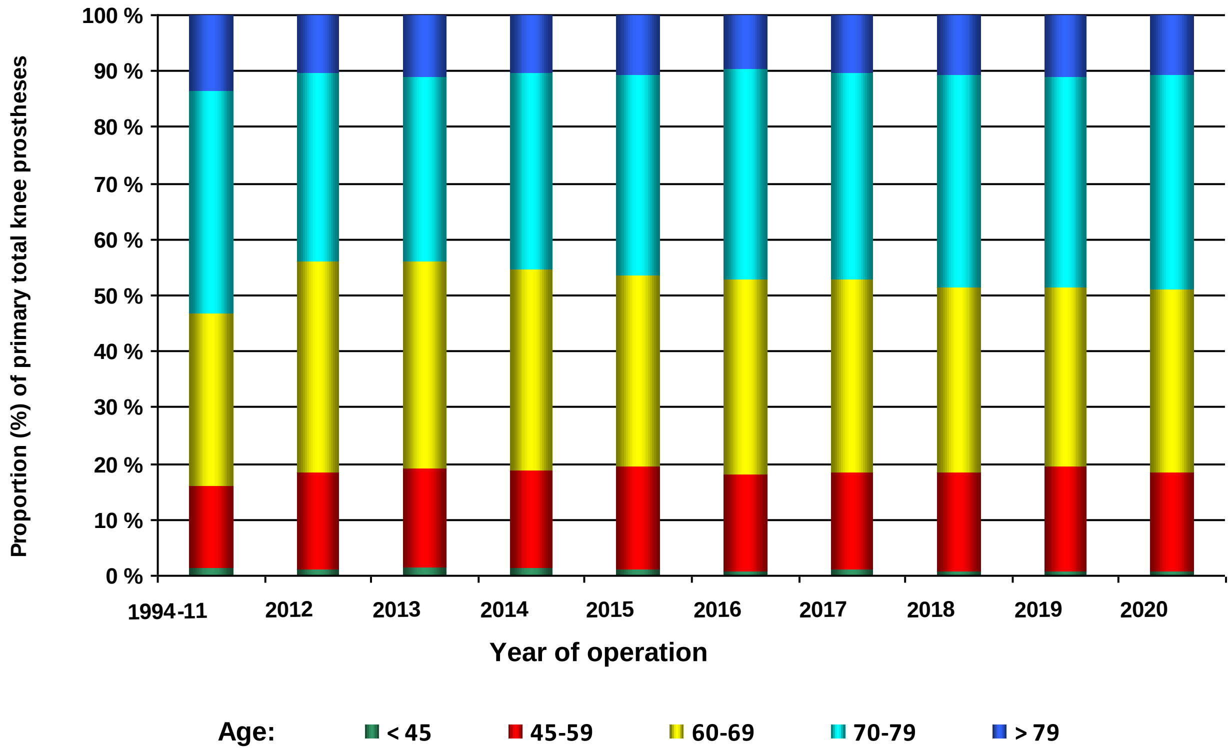


Figure 4: Age at the insertion of primary unicondylar knee prostheses

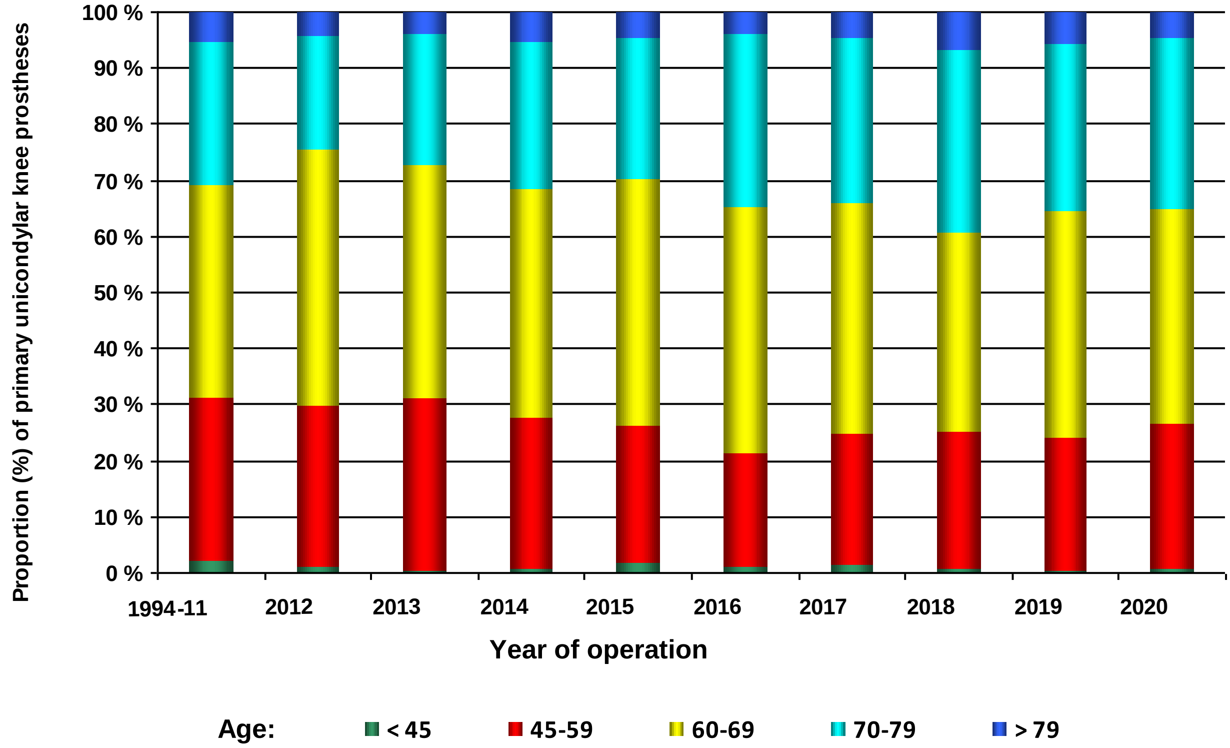


Figure 5: Age and sex at the insertion of primary total knee prostheses

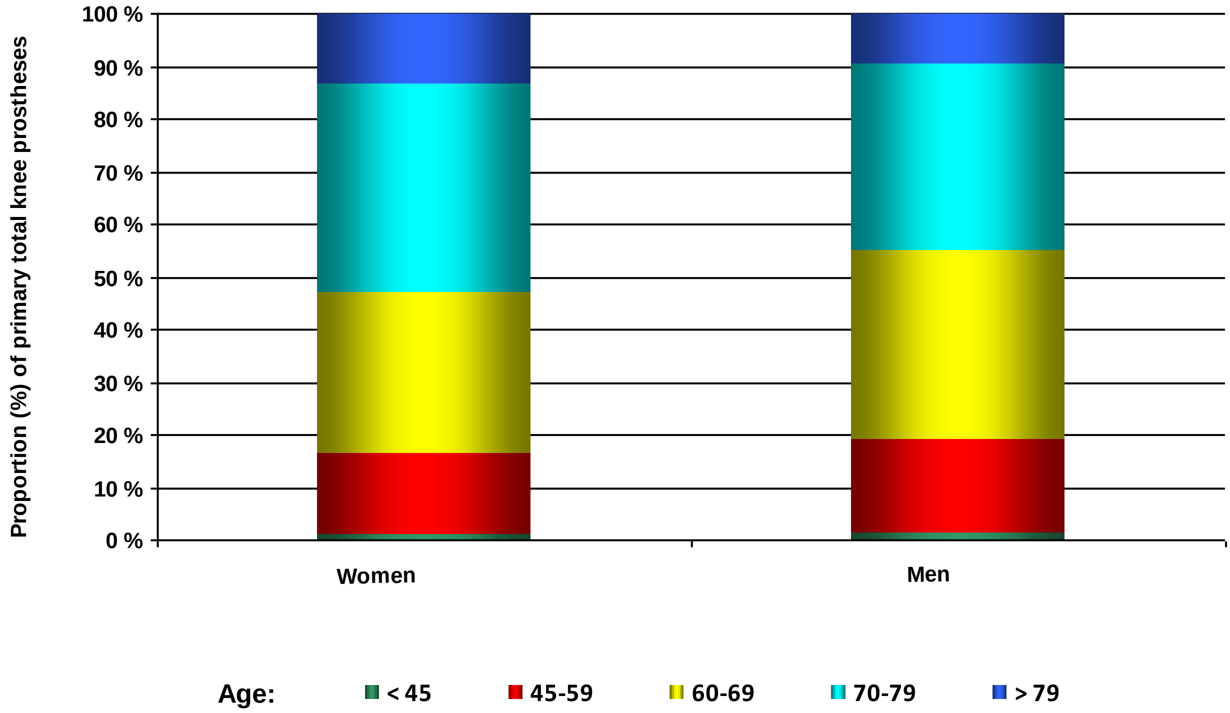
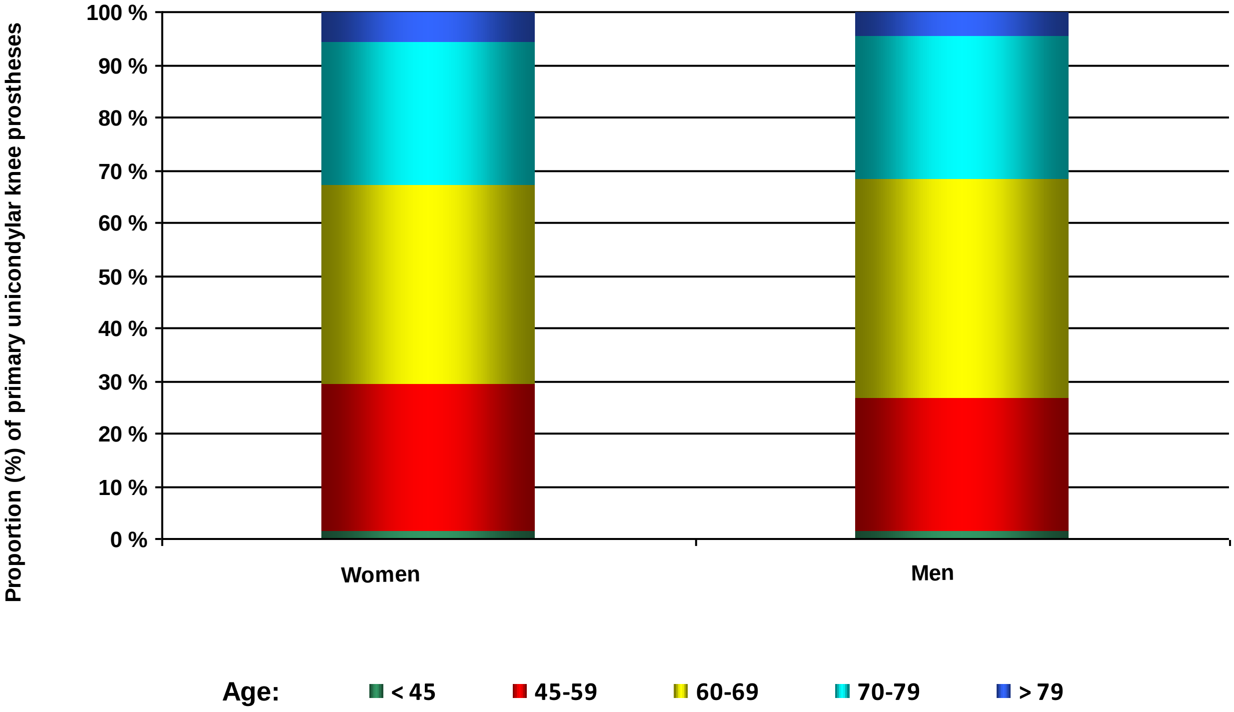


Figure 6: Age and sex at the insertion of primary unicondylar knee prostheses



Types of knee prostheses

Table 2: Primary operations

Year	Total with patella		Total without patella		Unicondylar		Patello-femoral		Bicompart-mental		Hinged * prostheses		Missing		Total
2020	499	(7,6%)	5 172	(78,5%)	829	(12,6%)	42	(0,6%)			44	(0,7%)			**6 587**
2019	583	(8,1%)	5 567	(77,1%)	984	(13,6%)	52	(0,7%)			33	(0,5%)			**7 220**
2018	504	(7,3%)	5 327	(77,0%)	1 000	(14,4%)	58	(0,8%)			31	(0,4%)			**6 922**
2017	453	(6,9%)	5 147	(78,3%)	868	(13,2%)	76	(1,2%)			32	(0,5%)			**6 576**
2016	221	(3,4%)	5 329	(81,8%)	863	(13,2%)	67	(1,0%)			32	(0,5%)			**6 514**
2015	160	(2,6%)	5 134	(83,9%)	753	(12,3%)	39	(0,6%)			33	(0,5%)	1	(0,0%)	**6 120**
2014	108	(1,9%)	4 866	(86,2%)	606	(10,7%)	41	(0,7%)			20	(0,4%)			**5 642**
2013	97	(1,9%)	4 420	(87,7%)	477	(9,5%)	38	(0,8%)			9	(0,2%)			**5 041**
2012	98	(2,0%)	4 292	(87,3%)	475	(9,7%)	34	(0,7%)			17	(0,3%)	1	(0,0%)	**4 917**
1994-11	4 144	(8,8%)	37 348	(79,3%)	5 374	(11,4%)	148	(0,3%)	2	(0,0%)	94	(0,2%)			**47 110**
Total	**6 867**	**(6,7%)**	**82 602**	**(80,5%)**	**12 229**	**(11,9%)**	**595**	**(0,6%)**	**2**	**(0,0%)**	**345**	**(0,3%)**	**2**	**(0,0%)**	**102 649**

* Indicated by the surgeon on the report form

Figure 7: Primary operations

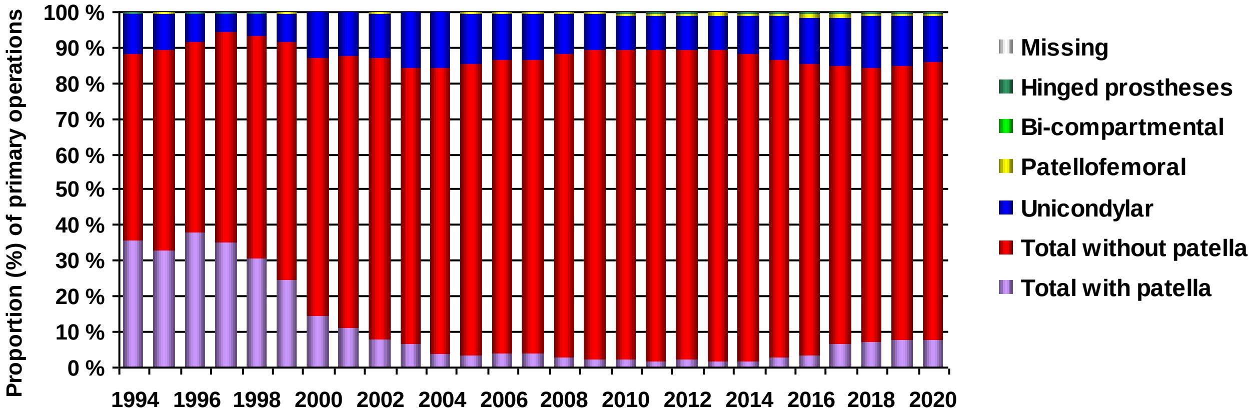


Table 3a: Classification of stability and modularity in primary total prostheses (with and without patella component)

Year	---------- MS ---------- All poly	MT	----------- PS ----------- All poly	MT	CCK	Rotating platform	Hinged * prostheses	Total
2020	244	4 030	1	576	33	787	44	**5 715**
2019	103	4 432	1	606	33	973	33	**6 181**
2018	1	3 997	1	565	26	1 238	33	**5 861**
2017	0	3 675	0	539	42	1 343	32	**5 631**
2016	4	3 688	0	465	19	1 370	33	**5 579**
2015	2	3 536	0	330	22	1 403	34	**5 327**
2014	2	3 398	0	131	22	1 416	20	**4 989**
2013	2	3 177	0	55	25	1 254	9	**4 522**
2012	5	2 855	0	21	16	1 490	17	**4 404**
2011	5	2 542	0	14	9	1 490	19	**4 079**
2010	3	2 486	0	19	5	1 427	18	**3 958**
2009	3	2 542	0	7	8	1 417	5	**3 982**
2008	1	2 173	0	22	3	1 324	8	**3 531**
2007	0	1 927	0	14	2	1 162	7	**3 112**
2006	0	1 637	0	8	2	1 047	2	**2 696**
2005	0	1 623	0	6	0	1 156	3	**2 788**
1994-04	11	12 790	0	27	15	4 483	33	**17 359**

MS = Minimally stabilized = Posterior cruciate retaining prosthesis and deep dish
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

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

	---------- MS ----------		----------- PS -----------					
Year	**All poly**	**MT**	**All poly**	**MT**	**CCK**	**Rotating platform**	**Hinged * prostheses**	**Total**
2020	0	105	0	107	90	61	63	**426**
2019	1	137	0	118	80	82	84	**502**
2018	1	150	0	112	109	93	44	**509**
2017	0	124	0	134	66	88	67	**479**
2016	0	110	0	96	67	80	83	**436**
2015	0	129	0	100	50	75	70	**424**
2014	0	120	0	57	66	90	64	**397**
2013	1	132	0	61	75	87	35	**391**
2012	0	151	0	39	46	102	31	**369**
2011	1	142	0	19	58	98	23	**341**
2010	0	154	0	11	62	94	13	**334**
2009	0	147	0	12	44	119	21	**343**
2008	0	126	0	8	23	121	13	**291**
2007	0	103	0	6	14	99	10	**232**
2006	0	91	0	8	7	83	10	**199**
2005	0	112	0	2	3	71	4	**192**
1994-04	2	817	0	44	48	265	34	**1 210**

MS = Minimally stabilized = Posterior cruciate retaining prosthesis and deep dish

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

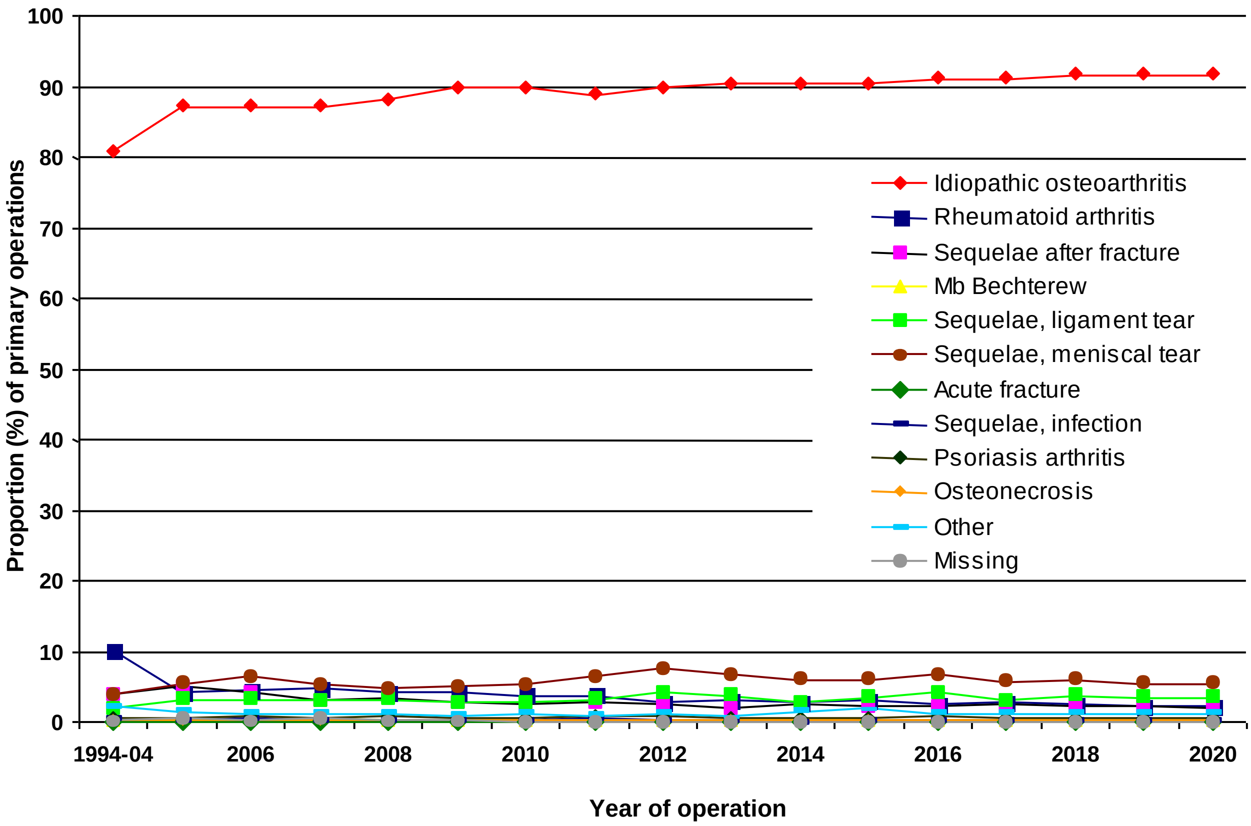
Reasons for primary operations - Total knee prostheses

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
2020	5 200	127	119	23	202	323	1	11	28	19	73	0
2019	5 649	134	136	14	233	344	3	10	29	16	95	0
2018	5 353	143	132	13	228	365	4	10	28	13	90	0
2017	5 111	156	147	19	179	339	3	18	39	13	71	0
2016	5 060	136	120	18	229	368	2	9	40	15	75	0
2015	4 794	166	114	16	199	321	1	17	36	10	99	2
2014	4 499	140	122	22	140	308	3	6	30	15	89	2
2013	4 086	145	94	11	174	311	1	16	29	9	41	4
2012	3 944	125	106	15	182	332	2	13	33	11	60	4
2011	3 618	161	113	12	133	260	1	18	35	10	51	2
2010	3 548	155	99	13	114	216	1	9	25	7	51	3
2009	3 579	167	117	11	116	200	2	13	25	7	42	10
2008	3 105	150	125	14	116	169	2	9	30	10	50	7
2007	2 715	146	94	17	97	162	4	11	17	11	43	16
2006	2 353	123	114	14	92	178	0	12	23	11	40	5
2005	2 435	120	145	13	94	155	2	11	19	7	47	14
1994-04	14 063	1 768	680	65	323	671	18	75	102	40	409	56
Total	**79 112**	**4 062**	**2 577**	**310**	**2 851**	**5 022**	**50**	**268**	**568**	**224**	**1 426**	**125**

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

Figure 8:



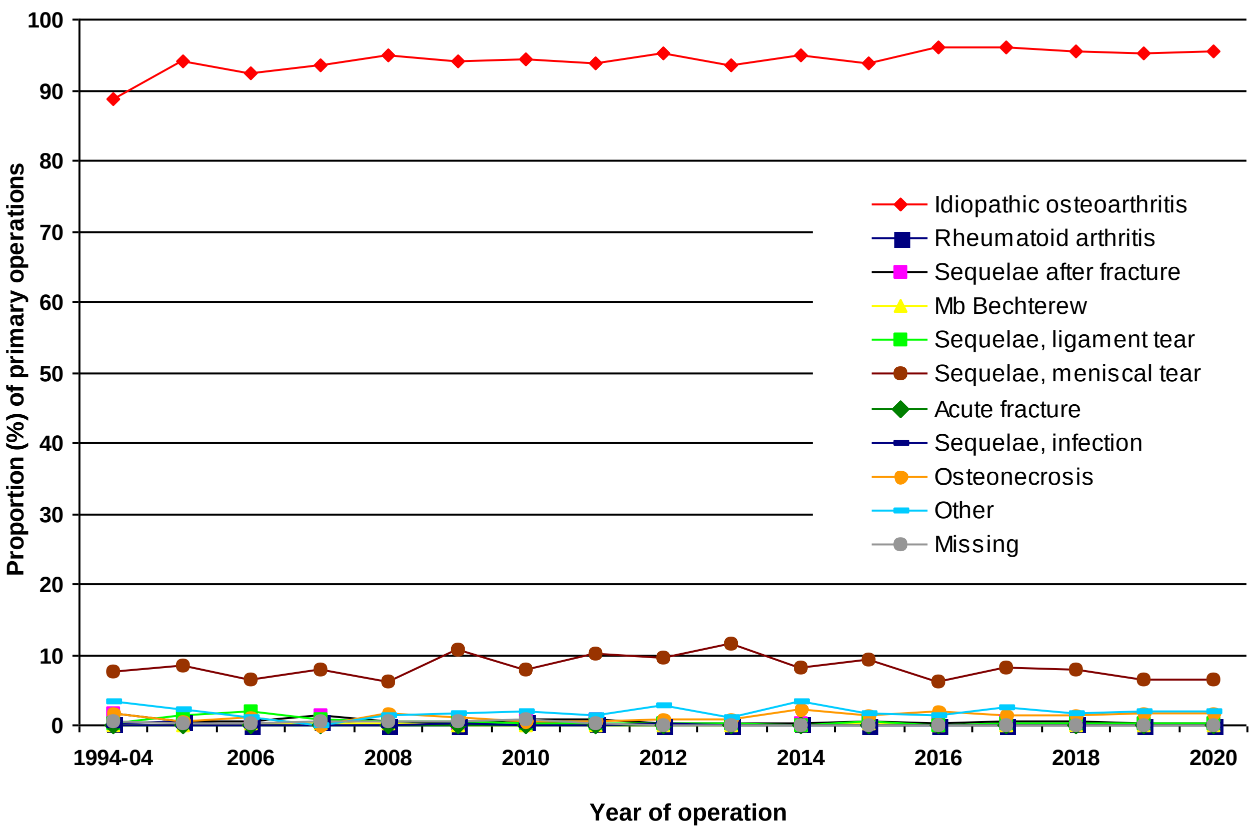
Reasons for primary operations - Unicondylar knee prostheses

Table 5:

Year	Idiopathic osteoarthritis	Rheumatoid arthritis	Sequelae after fracture	Mb. Bechterew	Sequelae, ligament tear	Sequelae, meniscal tear	Sequelae, infection	Osteonecrosis	Other	Missing
2020	791	0	3	0	2	53	0	14	17	0
2019	937	1	2	0	2	64	0	18	20	0
2018	954	2	7	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	576	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
2007	436	2	7	1	4	37	0	0	0	2
2006	369	0	2	1	8	26	0	5	5	1
2005	429	2	3	0	7	38	0	3	10	1
1994-04	2 037	5	39	1	9	173	3	36	78	11
Total	**11 452**	**19**	**87**	**7**	**52**	**972**	**6**	**168**	**263**	**23**

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

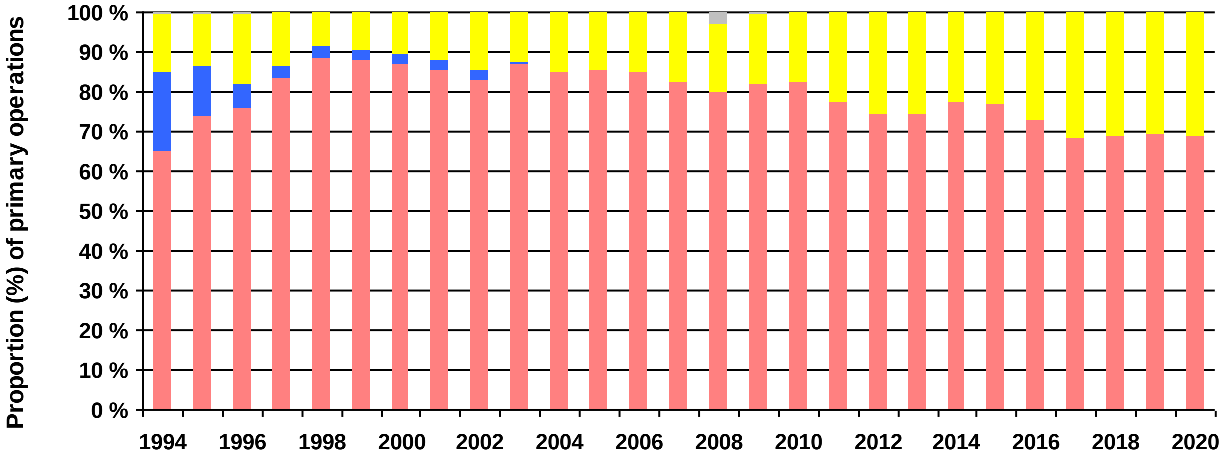


Figure 11: Tibia

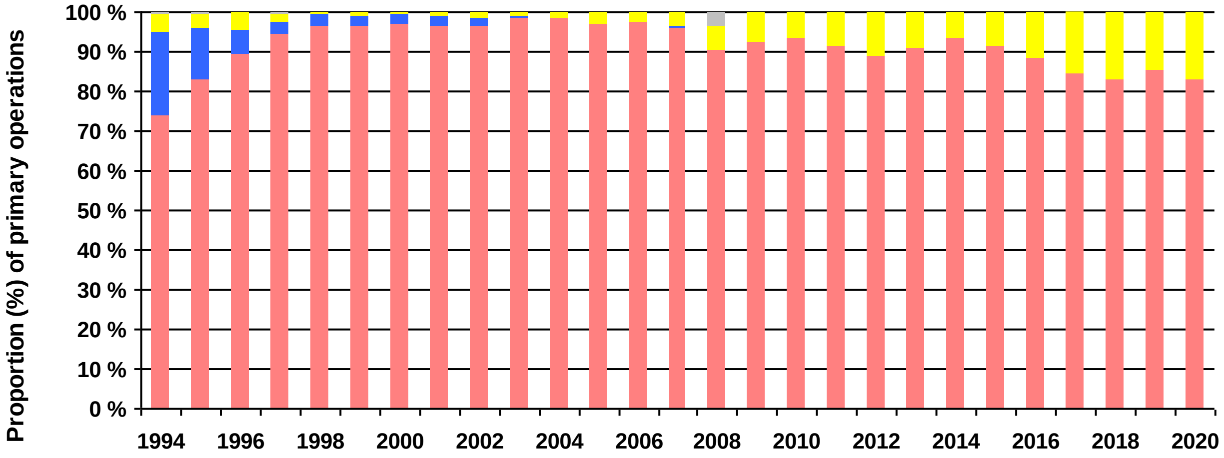
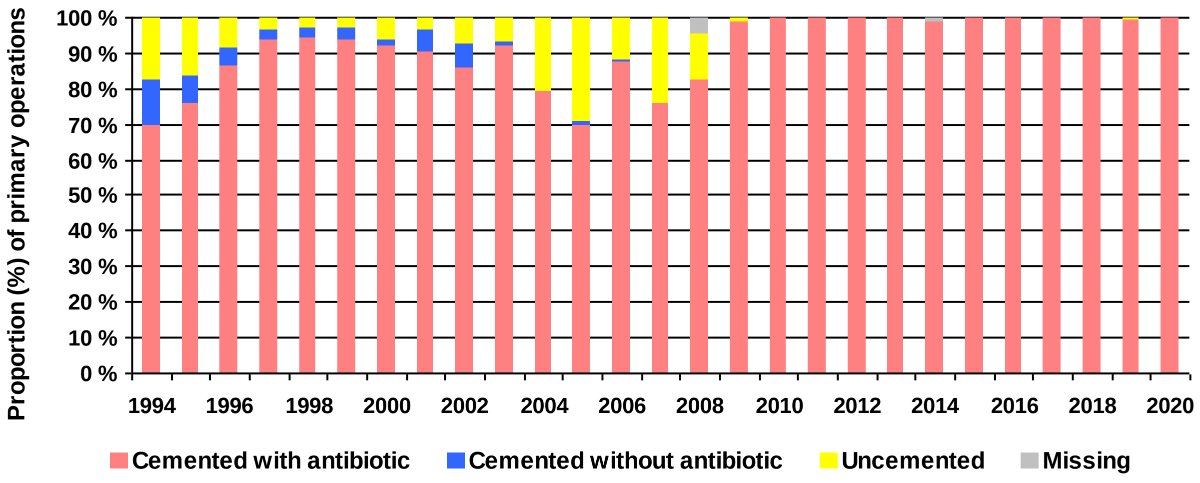


Figure 12: Patella



Use of cement in total knee prostheses

Figure 13: Primary operations

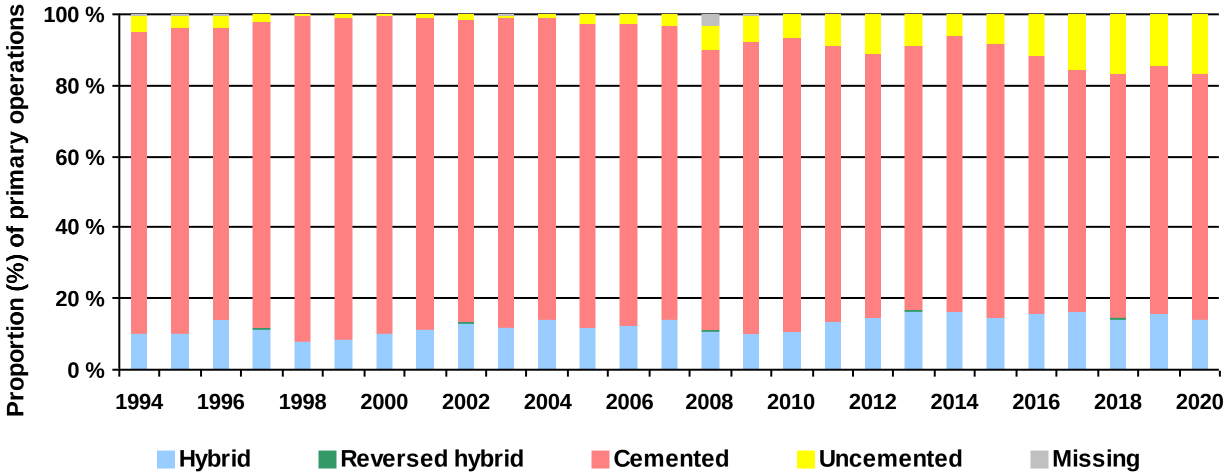
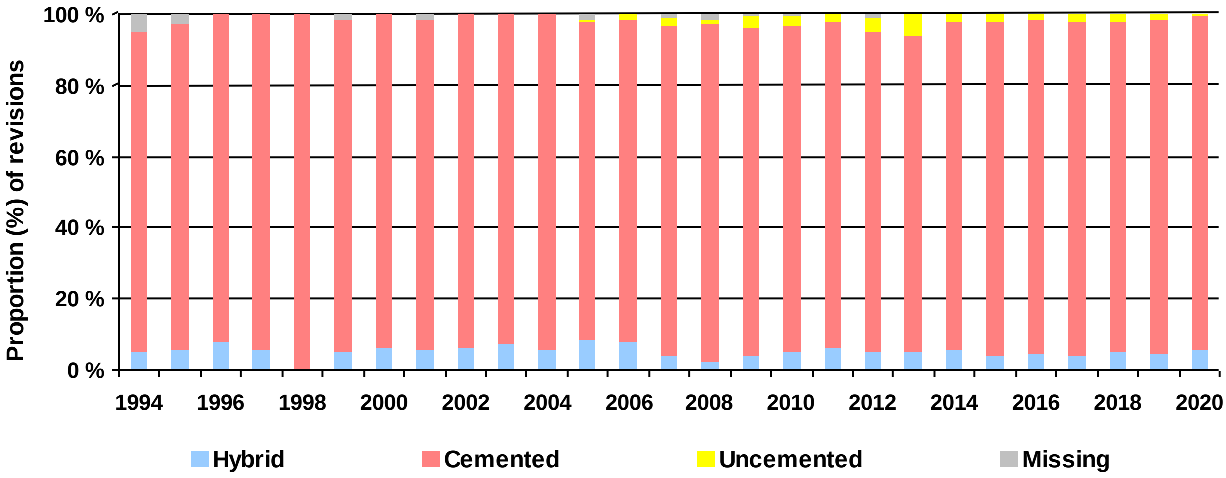
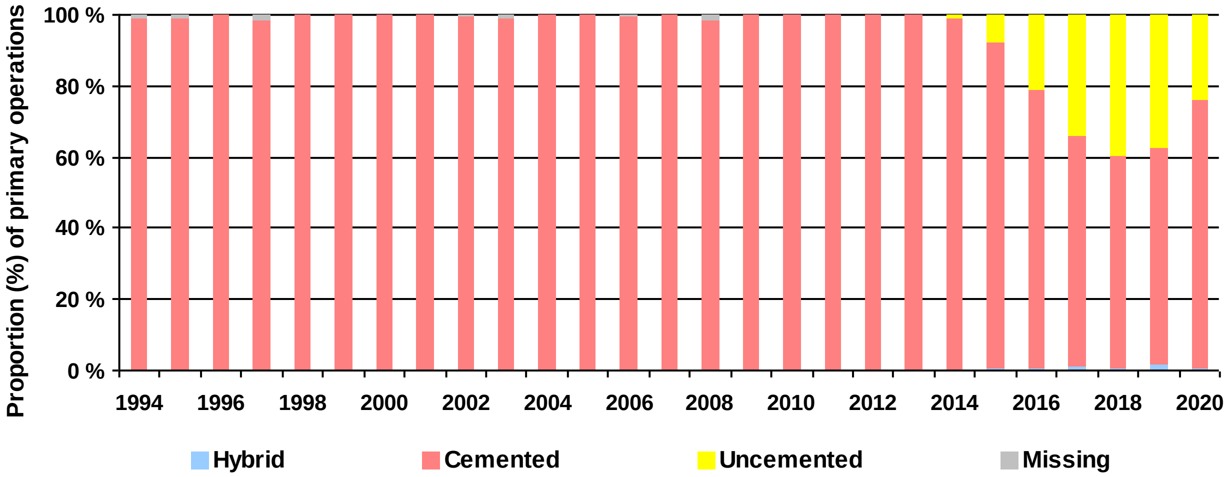


Figure 14: Revisions



Use of cement in unicondylar knee prostheses

Figure 15: Primary operations



The 7 most common primary total prostheses without patella component in 2014-2020

Table 6:

Product	Cemented *	Uncemented *	Hybrid	All poly	Rotating platform	HXLPE	Stabilization MS	PS	CCK	Total
NexGen	12 952	2 104	2 192	0	0	2 382	15 384	1 769	173	**17 259**
PFC-Sigma	3 009	1 908	299	0	5 211	0	5 207	14	3	**5 223**
Legion	1 884	9	2 517	0	0	113	4 281	137	16	**4 413**
Triathlon	2 725	1 005	137	0	0	3 829	3 745	107	40	**3 871**
LCS Complete	2 843	2	380	0	3 228	0	3 219	7	3	**3 228**
Vanguard TM	168	0	0	0	0	0	168	8	0	**168**
PROFIX	110	17	4	0	0	0	131	0	0	**131**

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	9 185	2	9 190	0	0	**9 190**
CR-flex porous uncemented	101	3 092	3 197	0	0	**3 197**
CR-flex Option	1 561	1	1 563	0	0	**1 563**
LPS Option	742	0	0	742	0	**742**
LPS-flex porous standard	5	732	0	738	0	**738**
CR-flex gender	724	0	724	0	0	**724**
CR Porous uncemented	20	254	274	0	0	**274**
CR Precoat	248	4	252	0	0	**252**
LPS-flex Option	160	18	0	178	0	**178**
CR-flex porous	7	167	174	0	0	**174**
LCCK Option	172	0	0	0	172	**172**
LPS-Flex Tivanium	10	0	0	10	0	**10**
LPS macro Option	8	0	0	8	0	**8**
LPS-flex	7	0	0	7	0	**7**
Other	8	6	1	13	0	**14**
Unknown	14	6	0	0	0	**20**

Product: PROFIX (35)

Product Category	Cemented *	Uncemented *	Stabilization MS	PS	CCK	Total
CR non-porous cemented	92	1	93	0	0	**93**
CR porous uncemented	15	18	33	0	0	**33**
Other	2	0	2	0	0	**2**
Unknown	2	1	0	0	0	**3**

Product: LCS Complete (48)

Product Category	Cemented *	Uncemented *	Stabilization MS	PS	CCK	Total
Cemented	2 786	1	0	0	0	**2 789**
Uncemented	48	381	0	0	0	**429**
Revision	5	0	0	0	3	**5**
Unknown	5	0	0	5	0	**5**

Product: PFC-Sigma (49)

Product Category	Cemented*	Uncemented *	Stabilization MS	PS	CCK	Total
CR cemented	3 032	1	3 039	0	0	**3 039**
CR uncemented	8	2 265	2 273	0	0	**2 273**
PS	14	0	0	14	0	**14**
Other	2	0	0	0	0	**2**
Unknown	6	3	0	0	0	**9**

Product: Triathlon (58)

Product Category	Cemented*	Uncemented *	Stabilization MS	PS	CCK	Total
CR cemented	2 823	3	2 830	0	0	**2 830**
Beaded CR uncemented	8	1 133	1 141	0	0	**1 141**
PS cemented	90	0	0	90	0	**90**
TS cemented	35	0	0	0	35	**35**
Unknown	10	0	0	0	0	**10**

Product: Legion (62)

Product Category	Cemented*	Uncemented *	Stabilization MS	PS	CCK	Total
CR uncemented	30	2 511	2 542	0	0	**2 542**
CR cemented	1 703	2	1 706	0	0	**1 706**
PS cemented	93	3	0	96	0	**96**
PS Oxinium cemented	30	0	0	31	0	**31**
CR Oxinium cemented	26	1	27	0	0	**27**
Femur cemented	9	0	0	9	0	**9**
Legion CR cemented	8	0	8	0	0	**8**
Other	2	1	1	0	2	**3**
Unknown	2	0	0	0	0	**2**

Product: Vanguard TM (67)

Product Category	Cemented*	Uncemented *	Stabilization MS	PS	CCK	Total
CR Anatomic interlok cemented	164	0	164	0	0	**164**
PS Anatomic interlok cemented	6	0	0	6	0	**6**
Unknown	1	0	0	0	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
Option cemented	8 469	8	0	**8 477**
Precoat PMMA stemmed cemented	6 423	1	0	**6 425**
Trabecular metal uncemented	10	2 114	0	**2 124**
Precoat AP wedge stemmed	199	0	0	**199**
Other	0	4	0	**4**
Unknown	30	3	0	**34**

Product: PROFIX (35)

Product Category	Cemented *	Uncemented *	All poly	Total
Non porous cemented	107	0	0	**107**
Porous w/o hole uncemented	0	18	0	**18**
Other	4	0	0	**4**
Unknown	1	0	0	**1**

Table 6 B: Tibia

Product: LCS Complete (48)

Product Category	Cemented *	Uncemented *	All poly	Total
No keel MBT* cemented	3 194	2	0	**3 197**
MBT* revision	24	0	0	**24**
Other	3	1	0	**4**
Unknown	5	0	0	**5**

* MBT = Mobile bearing tray

Product: PFC-Sigma (49)

Product Category	Cemented *	Uncemented *	All poly	Total
With keel MBT* cemented	3 238	9	0	**3 248**
With keel MBT* uncemented	9	1 910	0	**1 919**
All poly	113	0	113	**113**
MBT* revision	32	7	0	**39**
No keel MBT* cemented	3	3	0	**6**
Unknown	7	3	0	**10**

* MBT = Mobile bearing tray

Product: Triathlon (58)

Product Category	Cemented *	Uncemented *	All poly	Total
Cemented	2 757	3	0	**2 760**
PA uncemented	5	723	0	**728**
Tritanium baseplate	1	284	0	**285**
CS All poly, cemented	233	0	233	**233**
Universal cemented	88	0	0	**88**
Other	2	0	2	**2**
Unknown	9	1	0	**10**

Product: Legion (62)

Product Category	Cemented *	Uncemented *	All poly	Total
Male tapered cemented (Genesis II)	4 390	8	0	**4 398**
Porous HA tibial base w/o holes uncemented	0	10	0	**10**
All poly CR	9	0	9	**9**
Other	1	0	1	**1**
Unknown	7	0	0	**7**

Product: Vanguard TM (67)

Product Category	Cemented *	Uncemented *	All poly	Total
Highly polished modular PCR	167	0	0	**167**
Other	4	0	0	**4**

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	12 952	0	0	**12 952**
CR-Prolong	0	2 360	2 360	0	0	**2 360**
LPS-FlexFixed	0	0	0	1 741	0	**1 741**
LCCK	0	0	0	0	129	**129**
LPS-flex	0	22	0	22	0	**22**
CR	0	0	9	0	0	**9**
Unknown	0	0	0	0	0	**46**

Product: PROFIX (35)

Product Category	Rotating platform	HXLPE	Stabilization MS	PS	CCK	Total
Conforming PCR	0	0	118	0	0	**118**
Conforming+	0	0	10	0	0	**10**
Unknown	0	0	2	0	0	**2**

Product: LCS Complete (48)

Product Category	Rotating platform	HXLPE	Stabilization MS	PS	CCK	Total
Rotating platform RP	3 219	0	3 219	0	0	**3 219**
Other	3	0	0	0	3	**3**
Unknown	6	0	0	6	0	**6**

Product: PFC-Sigma (49)

Product Category	Rotating platform	HXLPE	Stabilization MS	PS	CCK	Total
Rotating platform RP-CV	5 195	0	5 195	0	0	**5 195**
Revision STB	13	0	0	13	0	**13**
Other	3	0	1	0	3	**4**
Unknown	0	0	0	0	0	**11**

Product: Triathlon (58)

Product Category	Rotating platform	HXLPE	Stabilization MS	PS	CCK	Total
CR-X3 HXLPE	0	2 429	2 429	0	0	**2 429**
CS-X3 HXLPE	0	813	813	0	0	**813**
CR-X3 HXLPE, EtO sterilized	0	436	430	6	0	**436**
PS-X3 HXLPE	0	61	0	61	0	**61**
CS-X3 HXLPE, EtO sterilized	0	51	51	0	0	**51**
PS	0	0	0	35	0	**35**
TS-X3 HXLPE	0	31	0	0	31	**31**
CR	0	0	7	0	0	**7**
Unknown	0	8	0	0	0	**8**

Product: Legion (62)

Product Category	Rotating platform	HXLPE	Stabilization MS	PS	CCK	Total
CR standard	0	0	2 659	0	0	**2 659**
Dished	0	0	1 594	0	0	**1 594**
PS high flex	0	86	0	86	0	**86**
PS	0	0	0	34	0	**34**
CR-highflex HXLPE	0	19	19	0	0	**19**
Constrained	0	0	0	0	14	**14**
Other	0	1	1	0	0	**1**
Unknown	0	7	0	0	0	**7**

Product: Vanguard TM (67)

Product Category	Rotating platform	HXLPE	Stabilization MS	PS	CCK	Total
Arcom CR	0	0	161	0	0	**161**
Arcom PS	0	0	0	6	0	**6**
Other	0	0	0	1	0	**1**

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	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
NexGen	1 777	606	1 436	2 201	2 313	2 047	1 794	1 853	2 138	1 593	**17 758**
LCS Complete	6 740	1 113	625	589	587	567	558	313	140	93	**11 325**
Profix	8 432	738	598	112		1					**9 881**
LCS	4 164										**4 164**
Triathlon	705	286	183	195	257	449	404	380	502	800	**4 161**
PFC-Sigma	4	1	288	428	428	473	450	542	463	326	**3 403**
AGC Universal	2 930	155	27								**3 112**
Genesis I	3 100										**3 100**
Legion		3	10	252	350	324	342	397	446	464	**2 588**
Duracon	2 474	101									**2 575**
AGC Anatomic	1 656	69									**1 725**
Attune						44	122	424	484	443	**1 517**
Tricon -C with Pro-Fit	1 079										**1 079**
Vanguard TM	412	149	146	65	65	42	2				**881**
E-motion	461										**461**
Kinemax	411										**411**
Persona						12	78	60	72	126	**348**
Advance	204	43	51	12							**310**
Journey II BCS				7	69	57	31	6	34	81	**285**
NexGen Rotating Hinge	40	10	4	19	29	25	29	25	23	29	**233**
Scorpio	124	2									**126**
Evolution Medial-Pivot					10	19	26	42	1		**98**
Tricon M	47										**47**
AGC Dual	43										**43**
Search	40										**40**
GMK Sphere						18	16	3			**37**
Interax I.S.A.	24										**24**
Legion Hinge Knee					3	5	1	3	5	4	**21**
RT-Plus Modular	6	6	4						1		**17**
Other (n<15)	57	5	2	2	1	2	3	2	4	11	**89**
Total	**34 930**	**3 287**	**3 374**	**3 882**	**4 112**	**4 085**	**3 856**	**4 050**	**4 313**	**3 970**	**69 859**

Table 7b: Uncemented femoral prostheses in primary operations *

Prosthesis	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Profix	3 671	651	443	19			1				**4 785**
NexGen	31	50	174	234	382	652	814	815	726	678	**4 556**
Legion			126	422	401	448	420	367	420	360	**2 964**
PFC-Sigma			165	278	300	280	283	314	443	387	**2 450**
LCS Complete	1 359	375	177	121	88	51	55	52	15		**2 293**
Triathlon	24	43	62	33	41	57	203	257	259	293	**1 272**
LCS	652										**652**
Tricon M	288										**288**
Genesis I	192										**192**
Duracon	163										**163**
Interax I.S.A.	81										**81**
Kotz	29										**29**
Persona									2	26	**28**
Other (n<15)	21	1		1					1	1	**25**
Total	**6 511**	**1 120**	**1 147**	**1 108**	**1 212**	**1 488**	**1 776**	**1 805**	**1 866**	**1 745**	**19 778**

* Surgeon's report for fixation

Total prostheses

Table 8a: Cemented femoral prostheses in revisions *

Prosthesis	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
NexGen LCCK Option	73	46	84	73	79	80	79	86	59	62	**721**
Profix	484	33	36	4							**557**
LCS Complete	281	35	24	16	11	16	23	24	17	10	**457**
NexGen	145	12	22	29	40	26	38	42	37	36	**427**
NexGen Rotating Hinge	60	17	18	47	53	53	39	26	64	47	**424**
Legion			1	18	33	30	46	53	62	50	**293**
Triathlon TS	22	13	26	13	12	6	20	28	31	37	**208**
Genesis I	207										**207**
LCS	172										**172**
PFC-Sigma			9	15	20	27	15	26	30	16	**158**
Triathlon	6	16	8	11	11	11	11	12	8	11	**105**
Scorpio TS	69	7									**76**
LCS Complete VVS	29	10	3	12	5	5	1	4		1	**70**
Vanguard TM	62	3	2								**67**
Duracon	60	4									**64**
AGC Dual	62										**62**
AGC Universal	58	3	1								**62**
Profix constrained	40	2	1	2							**45**
Legion Hinge Knee				1	7	8	9	5	3	6	**39**
S-ROM Rotat. Hinge	12	1		3	1	3	7	6	2	1	**36**
Legion constrained	16	1	4	3	2	3	1	2	1		**33**
Dual Articular 2000	30										**30**
RT-Plus Modular	4	8	9	1							**22**
Tricon -C with Pro-Fit	20										**20**
AGC Anatomic	18	1									**19**
Scorpio	18										**18**
E-motion	16										**16**
Kinemax	16										**16**
Other (n<15)	79	6	2	2		4	10	4	7	7	**121**
Total	**2 059**	**218**	**250**	**250**	**274**	**272**	**299**	**318**	**321**	**284**	**4 545**

Table 8b: Uncemented femoral prostheses in revisions *

Prosthesis	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Profix	68	5	6								**79**
LCS Complete	37	8	8	2		2	1	2	2		**62**
PFC-Sigma			3	6	4	3	4	7	6	5	**38**
Legion			1	5	6	5	4	5	1	4	**31**
NexGen	2	2	1	1	2	1	7	4	4	1	**25**
LCS Complete VVS	5	4	7	1							**17**
Andre (n<15)	29	2	1	1	1	4	1	3	2		**44**
Total	**141**	**21**	**27**	**16**	**13**	**15**	**17**	**21**	**15**	**10**	**296**

* Surgeon's report for fixation

Table 9a: Cemented tibial prostheses in primary operations *

Prosthesis	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
NexGen	1 780	615	1 544	2 364	2 513	2 363	2 205	2 223	2 517	1 921	**20 045**
Profix	11 522	1 213	908	113		1					**13 757**
LCS Complete	7 255	1 247	744	712	674	618	615	364	155	94	**12 478**
Legion		3	136	672	751	772	763	760	860	821	**5 538**
AGC Universal	4 270	213	26								**4 509**
Triathlon	707	301	228	229	294	458	408	398	521	810	**4 354**
LCS	4 351										**4 351**
PFC-Sigma	4	1	321	477	473	505	460	559	601	386	**3 787**
Genesis I	3 284										**3 284**
Duracon	2 603	101									**2 704**
Attune						44	122	424	483	436	**1 509**
Tricon II	1 346										**1 346**
Vanguard TM	413	147	145	65	65	42	2				**879**
E-motion	468										**468**
Kinemax	411										**411**
Persona						12	78	61	74	152	**377**
LCS Universal	372										**372**
AGC Anatomic	318	11	1								**330**
Advance	204	43	51	12							**310**
Journey II BCS				7	70	57	31	6	35	81	**287**
NexGen Rotating Hinge	39	10	4	19	29	25	29	26	23	29	**233**
Scorpio	124	2									**126**
Interax I.S.A.	106										**106**
Evolution Medial-Pivot					10	19	26	42	1		**98**
Search	40										**40**
GMK Sphere						18	16	3			**37**
AGC Dual	28										**28**
Legion Hinge Knee					3	5	1	3	5	4	**21**
RT-Plus Modular	6	6	4						1		**17**
Other (n<15)	67	6	3	3		2	2	1	3	11	**98**
Total	**39 718**	**3 919**	**4 115**	**4 673**	**4 882**	**4 941**	**4 758**	**4 870**	**5 279**	**4 745**	**81 900**

Table 9b: Uncemented tibial prostheses in primary operations *

Prosthesis	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
NexGen	27	41	68	69	182	340	402	447	350	350	**2 276**
PFC-Sigma			132	230	257	247	273	300	306	332	**2 077**
LCS Complete	794	241	58			1		2			**1 096**
Triathlon	20	28	17		4	50	199	239	241	283	**1 081**
Profix	577	176	134	18							**905**
LCS	141										**141**
Tricon II	66										**66**
Duracon	28										**28**
Kotz	27										**27**
Legion				2	1	2		4	6	3	**18**
Other (n<15)	12	1							1		**14**
Total	**1 692**	**487**	**409**	**319**	**444**	**640**	**874**	**992**	**904**	**968**	**7 729**

* Surgeon's report for fixation

Table 10a: Cemented tibial prostheses in revisions *

Prosthesis	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
NexGen	219	61	111	110	122	114	124	132	97	93	**1 183**
LCS Complete	430	54	39	40	24	25	33	38	21	14	**718**
Profix	588	45	44	7	1	1	1				**687**
NexGen Rotating Hinge	59	16	18	47	50	51	39	24	62	47	**413**
Legion	16	1	6	26	40	38	48	64	57	47	**343**
Triathlon	29	31	35	24	24	20	31	44	43	49	**330**
Genesis I	257										**257**
LCS	232										**232**
PFC-Sigma			8	13	21	32	22	31	32	20	**179**
Duracon	100	10	7								**117**
Scorpio	89	8			1						**98**
AGC Universal	73	4									**77**
Vanguard TM	60	4	3								**67**
AGC Dual	59										**59**
Tricon II	57										**57**
Legion Hinge Knee				1	7	8	9	5	3	6	**39**
Dual Articular 2000	29										**29**
RT-Plus Modular	4	8	9	1							**22**
Maxim	20										**20**
E-motion	17	1									**18**
Kinemax	16										**16**
Other (n<15)	68	9	3	3	1	4	11	5	7	9	**120**
Total	**2 422**	**252**	**283**	**272**	**291**	**293**	**318**	**343**	**322**	**285**	**5 081**

Table 10b: Uncemented tibial prostheses in revisions *

Prosthesis	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
LCS Complete	31	13	16	6	1						**67**
PFC-Sigma			4	7	3	1	6	8	3	1	**33**
Other (n<15)	12	2		1	2	6	1	1	1	3	**29**
Total	**43**	**15**	**20**	**14**	**6**	**7**	**7**	**9**	**4**	**4**	**129**

* Surgeon's report for fixation

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

Prosthesis	Material	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Advance	Uhmwpe	204	42	51	12							**309**
AGC	Uhmwpe	4 594	223	27								**4 844**
AGC Dual	Uhmwpe	36										**36**
Attune	HXLPE						44	122	424	484	444	**1 518**
Dual Articular 2000	Uhmwpe	4										**4**
Duracon	Uhmwpe	2 638	101									**2 739**
E-motion	Uhmwpe	467										**467**
Evolution Medial-Pivot	Uhmwpe					10	19	26	42	1		**98**
Freemann/Samuelson	Uhmwpe	4										**4**
Genesis I	Uhmwpe	3 280										**3 280**
GMK Sphere	Uhmwpe						18	16	3			**37**
INTERAX I.S.A.	Uhmwpe	103										**103**
Journey II BCS	HXLPE				7	70	57	31	6	35	81	**287**
Kinemax	Uhmwpe	410										**410**
LCS	Uhmwpe	4 469										**4 469**
LCS Complete	Uhmwpe	8 067	1 488	802	712	675	618	613	365	155	93	**13 588**
LCS Universal	Uhmwpe	383										**383**
Legion	HXLPE			7	13	29	18	44	62	104	58	**335**
Legion	Uhmwpe		2	129	658	721	752	719	700	761	766	**5 208**
MAXIM	Uhmwpe	5										**5**
MG II	Uhmwpe	1										**1**
Mutars	Uhmwpe	8	1	1	1				1	1	3	**16**
NexGen	HXLPE	23	9	54	120	152	292	493	498	522	311	**2 474**
NexGen	Uhmwpe	1 791	647	1 558	2 315	2 543	2 411	2 115	2 168	2 345	1 960	**19 853**
NexGen Rotating Hinge	Uhmwpe	40	10	4	19	29	24	29	25	23	29	**232**
Persona	HXLPE										4	**4**
Persona	Uhmwpe						12	78	61	74	148	**373**
PFC-Sigma	Uhmwpe	4		453	707	729	753	733	859	814	692	**5 744**
PROFIX	Uhmwpe	12 115	1 385	1 042	131		1					**14 674**
RT-Plus Modular	Uhmwpe	6	6	4						1		**17**
Scan Knee	Uhmwpe	8										**8**
Scorpio	HXLPE	16	2									**18**
Scorpio	Uhmwpe	109										**109**
Search	Uhmwpe	40										**40**
S-ROM Rotating Hinge	Uhmwpe	1				1		2	1	1	6	**12**
Triathlon	HXLPE	566	284	241	222	295	499	601	632	743	861	**4 944**
Triathlon	Uhmwpe	161	45	4	7	3	9	6	5	8	8	**256**
Tricon II	Uhmwpe	1 414										**1 414**
Vanguard 360 Revision	Uhmwpe		2									**2**
Vanguard TM	Uhmwpe	137	99	134	62	65	42	2				**541**
Total		**41 104**	**4 346**	**4 511**	**4 986**	**5 322**	**5 569**	**5 630**	**5 852**	**6 072**	**5 464**	**88 856**

* Surgeon's report for fixation

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

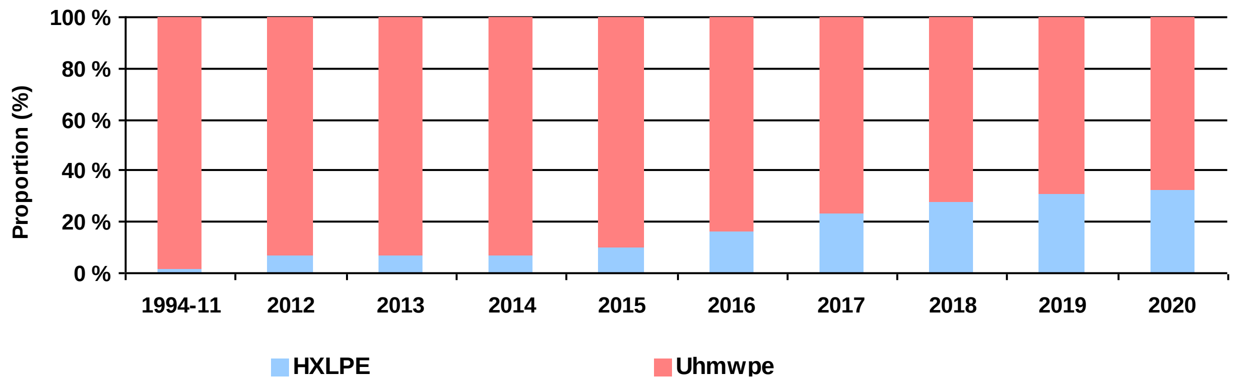
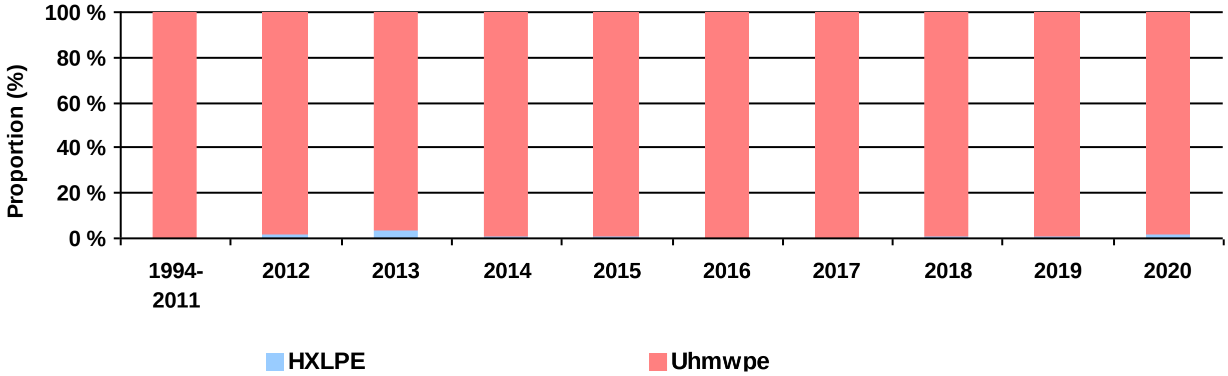


Table 10d: Material in tibia insert for unicondylar knee prostheses in primary operations

Prosthesis	Material	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Genesis UNI	Uhmwpe	230										**230**
iBalance UKA	Uhmwpe								12		10	**22**
Journey Uni	Uhmwpe				3	2	6	2				**13**
Miller-Galante UNI	Uhmwpe	6										**6**
Oxford Partial Knee	Uhmwpe	3	108	206	374	523	634	557	763	942	793	**4 903**
Oxford UNI (III)	Uhmwpe	4 209	332	232	205	191	202	292	204			**5 867**
Oxford UNI II	Uhmwpe	46										**46**
Persona Partial Knee	HXLPE									11	16	**27**
Preservation Uni	Uhmwpe	69										**69**
Sigma High Performance Uni	HXLPE	8	6	11	6	9	3	1	5			**49**
Thriathlon PKR - UNI	HXLPE			3								**3**
Total		**4 571**	**446**	**452**	**588**	**725**	**845**	**852**	**984**	**953**	**819**	**11 235**

* Surgeon's report for fixation

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	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Oxford UNI (III)	4 212	334	233	198	136	18	1				**5 132**
Oxford Partial Knee	1	106	205	374	517	631	551	575	582	598	**4 140**
Genesis UNI	332										**332**
Miller-Galante UNI	294										**294**
MOD III uni	198										**198**
Preservation Uni	166										**166**
LINK Schlitten UNI	12	14	21	15	17	17	14	8	11	7	**136**
Journey Uni	7	14	3	6	13	7	2				**52**
Duracon uni	50										**50**
Sigma High Performance Uni	8	6	11	6	9	3	1	5			**49**
Oxford UNI II	45										**45**
ZUK (Unicondylar)	26	1									**27**
iBalance UKA								12		10	**22**
Other (n<15)	17		3								**20**
Total	**5 368**	**475**	**476**	**599**	**692**	**676**	**569**	**600**	**593**	**615**	**10 663**

Table 11b: Uncemented femoral prostheses in primary operations *

Prosthesis	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Oxford Partial Knee	2			7	61	187	299	400	379	198	**1 533**
Total	**2**	**0**	**0**	**7**	**61**	**187**	**299**	**400**	**379**	**198**	**1 533**

Table 12a: Cemented tibial prostheses in primary operations *

Prosthesis	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Oxford UNI (III)	4 212	334	232	199	131	24	3	1			**5 136**
Oxford Partial Knee	1	106	206	373	521	628	545	573	592	594	**4 139**
Genesis UNI	332										**332**
Miller-Galante UNI	282										**282**
MOD III uni	199										**199**
Preservation Uni	165										**165**
LINK Schlitten UNI	12	14	21	15	17	17	14	8	11	7	**136**
Journey Uni	7	14	3	6	13	7	2				**52**
Duracon uni	49										**49**
Sigma High Performance Uni	8	6	11	6	9	3	1	5			**49**
Oxford UNI II	46										**46**
ZUK (Unicondylar)	26	1									**27**
iBalance UKA								12		9	**21**
Other (n<15)	15		3							1	**19**
Total	**5 354**	**475**	**476**	**599**	**691**	**679**	**565**	**599**	**603**	**611**	**10 652**

Table 12b: Uncemented tibial prostheses in primary operations *

Prosthesis	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Oxford Partial Knee	1			7	62	184	303	401	370	202	**1 530**
Total	**1**	**0**	**0**	**7**	**62**	**184**	**303**	**401**	**370**	**202**	**1 530**

* Surgeon's report for fixation

Patellofemoral prostheses

Table 13a: Cemented femoral prostheses in primary operations *

Prosthesis	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
NexGen PFJ Gender	6	20	16	19	32	49	53	45	35	28	**303**
Journey PFJ	82	14	18	22	7	18	17	10	15	11	**214**
Patella Mod III / II	29										**29**
LCS PFJ	18										**18**
iBalance PFJ								3	2	3	**8**
Legion							6				**6**
Other (n<5)	8		4								**12**
Total	**143**	**34**	**38**	**41**	**39**	**67**	**76**	**58**	**52**	**42**	**590**

Patellofemoral femoral prostheses in primary operations are all cemented

Table 14a: Cemented patella prostheses in primary operations *

Prosthesis	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
NexGen PFJ Gender	6	20	16	19	31	48	53	45	34	28	**300**
Journey PFJ	80	14	18	22	7	18	23	10	15	11	**218**
Patella Mod III / II	31										**31**
LCS PFJ	11										**11**
iBalance PFJ								2	2	3	**7**
Other (n<5)	7		4		1	1			1		**14**
Total	**135**	**34**	**38**	**41**	**39**	**67**	**76**	**57**	**52**	**42**	**581**

Table 14b: Uncemented patella prostheses in primary operations *

Prosthesis	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	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

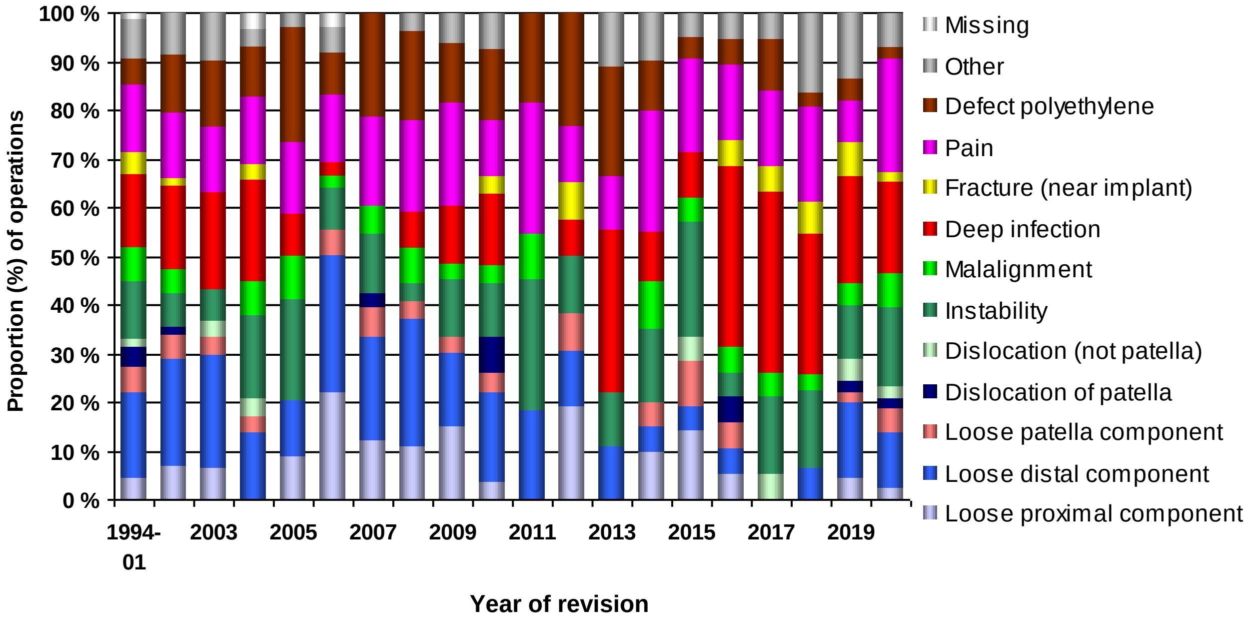
Reasons for revisions

Table 15: Reasons for revisions of 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	Fracture (near implant)	Pain	Defect polyethylene	Other	Missing
2020	1	5	2	1	1	7	3	8	1	10	1	3	0
2019	2	7	1	1	2	5	2	10	3	4	2	6	0
2018	0	2	0	0	0	5	1	9	2	6	1	5	0
2017	0	0	0	0	1	3	1	7	1	3	2	1	0
2016	1	1	1	1	0	1	1	7	1	3	1	1	0
2015	3	1	2	0	1	5	1	2	0	4	1	1	0
2014	2	1	1	0	0	3	2	2	0	5	2	2	0
2013	0	1	0	0	0	1	0	3	0	1	2	1	0
2012	5	3	2	0	0	3	0	2	2	3	6	0	0
2011	0	2	0	0	0	3	1	0	0	3	2	0	0
2010	1	5	1	2	0	3	1	4	1	3	4	2	0
2009	5	5	1	0	0	4	1	4	0	7	4	2	0
2008	3	7	1	0	0	1	2	2	0	5	5	1	0
2007	4	7	2	1	0	4	2	0	0	6	7	0	0
2006	8	10	2	0	0	3	1	1	0	5	3	2	1
2005	3	4	0	0	0	7	3	3	0	5	8	1	0
2004	0	4	1	0	1	5	2	6	1	4	3	1	1
2003	2	7	1	0	1	2	0	6	0	4	4	3	0
2002	4	13	3	1	0	4	3	10	1	8	7	5	0
1994-01	8	30	9	7	3	20	12	26	8	24	9	14	2
Total	**52**	**115**	**30**	**14**	**10**	**89**	**39**	**112**	**21**	**113**	**74**	**51**	**4**

Revision causes are not mutually exclusive. More than one reason for revision is possible

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



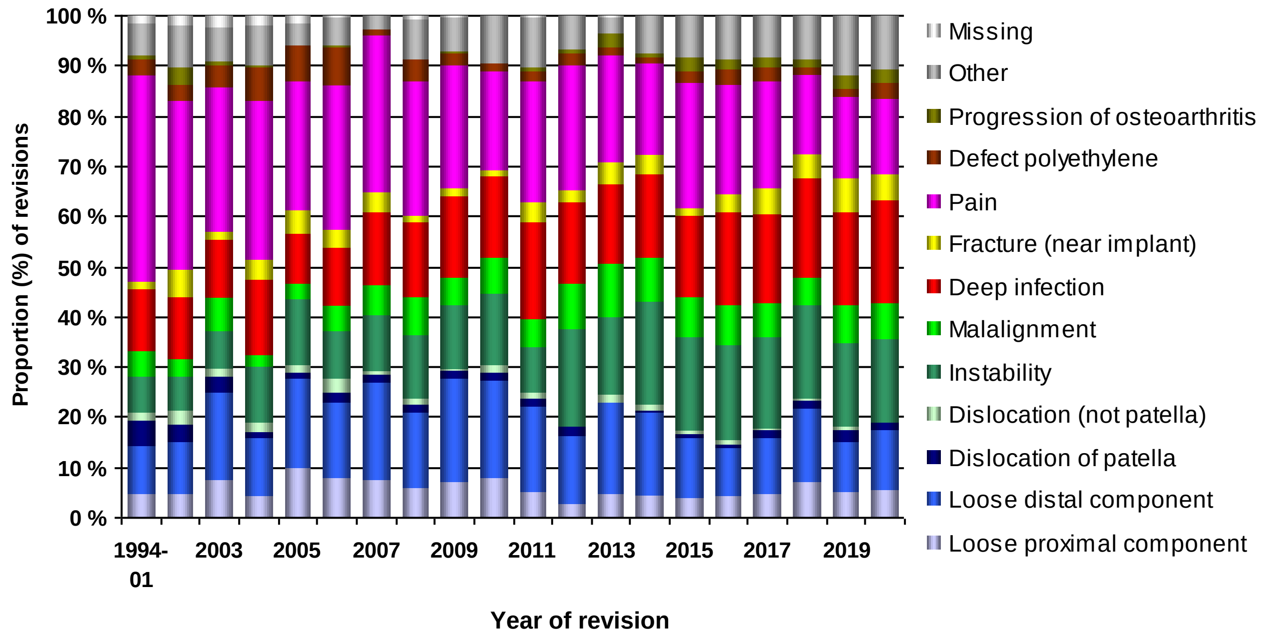
Reasons for revisions

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

Year of revision	Loose proximal comp.	Loose distal comp.	Dislocation of patella	Dislocation (not patella)	Instability	Malalignment	Deep infection	Fracture (near implant)	Fracture osteosynthesis	Pain	Defect polyethylene	Progression of osteoarthritis	Other	Missing
2020	20	44	6	0	61	27	75	12	8	55	12	10	39	0
2019	21	42	9	3	69	32	77	16	11	68	7	11	49	0
2018	32	67	7	1	84	26	90	15	5	73	7	6	40	0
2017	20	49	6	3	78	30	77	20	3	92	13	8	36	0
2016	19	39	3	3	81	33	78	9	5	92	13	8	37	0
2015	15	47	3	3	73	30	63	7		97	9	10	33	0
2014	16	60	2	4	75	31	61	14		67	4	2	28	0
2013	15	58	1	5	49	34	51	14		68	6	8	11	1
2012	8	42	7	0	60	28	51	7		77	8	2	21	0
2011	16	54	5	3	29	17	62	12		76	6	3	31	1
2010	21	51	4	4	38	19	43	3		52	4		25	0
2009	20	60	4	2	36	16	47	5		71	6	1	20	1
2008	15	39	4	3	32	19	39	3		69	11		20	2
2007	13	33	3	1	19	10	25	7		53	2		5	0
2006	14	26	3	5	16	9	20	6		50	13	1	9	1
2005	13	23	2	2	17	4	13	6		34	9		6	2
2004	7	19	2	3	18	4	24	7		51	11	1	13	3
2003	10	23	4	2	10	9	15	2		38	6	1	9	3
2002	5	11	4	3	7	4	13	6		36	3	4	9	2
1994-01	16	33	17	5	25	17	41	6		140	11	2	21	6
Total	**316**	**820**	**96**	**55**	**877**	**399**	**965**	**177**	**32**	**1 359**	**161**	**78**	**462**	**22**

Revision causes are not mutually exclusive. More than one reason for revision is possible

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



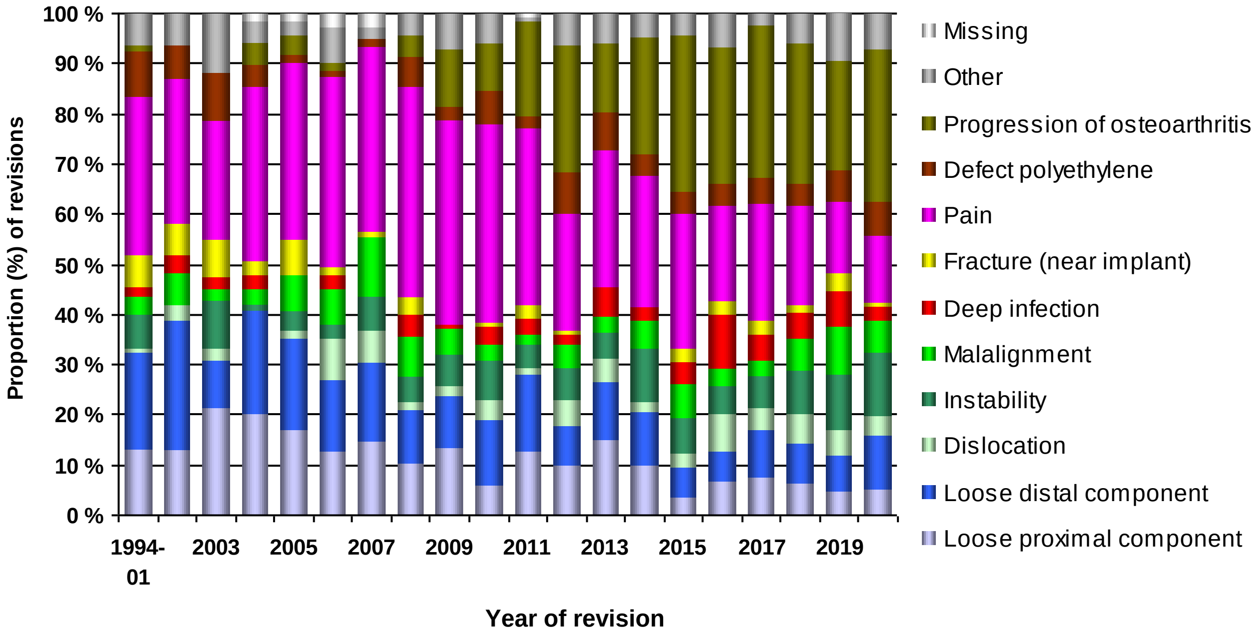
Reasons for revisions

Table 17: Reasons for revisions of unicondylar knee prostheses

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	8	16	6	19	10	4	1	21	10	46	11	0
2019	9	13	9	20	18	13	6	26	12	40	17	0
2018	12	15	11	16	12	10	3	37	8	53	11	0
2017	12	15	7	10	5	8	4	37	8	48	4	0
2016	9	8	10	7	5	14	4	25	6	36	9	0
2015	5	8	4	10	9	6	4	37	6	43	6	0
2014	14	15	3	15	8	4	0	37	6	33	7	0
2013	18	14	6	6	4	7	0	33	9	17	7	0
2012	13	10	7	8	6	3	1	30	11	33	8	0
2011	15	18	1	6	2	4	3	41	3	22	1	1
2010	7	15	5	9	4	4	1	46	8	11	7	0
2009	19	14	3	9	7	1	0	57	4	16	10	0
2008	12	12	2	6	9	5	4	48	7	5	5	0
2007	11	12	5	5	9	0	1	28	1		2	2
2006	9	10	6	2	5	2	1	27	1	1	5	2
2005	12	13	1	3	5	0	5	25	1	3	2	1
2004	14	14	0	1	2	2	2	24	3	3	3	1
2003	9	4	1	4	1	1	3	10	4		5	0
2002	4	8	1	0	2	1	2	9	2		2	0
1994-01	14	21	1	7	4	2	7	34	10	1	7	0
Total	**226**	**255**	**89**	**163**	**127**	**91**	**52**	**632**	**120**	**411**	**129**	**7**

Revision causes are not mutually exclusive. More than one reason for revision is possible

Figure 20: Reasons for revisions of unicondylar knee prostheses

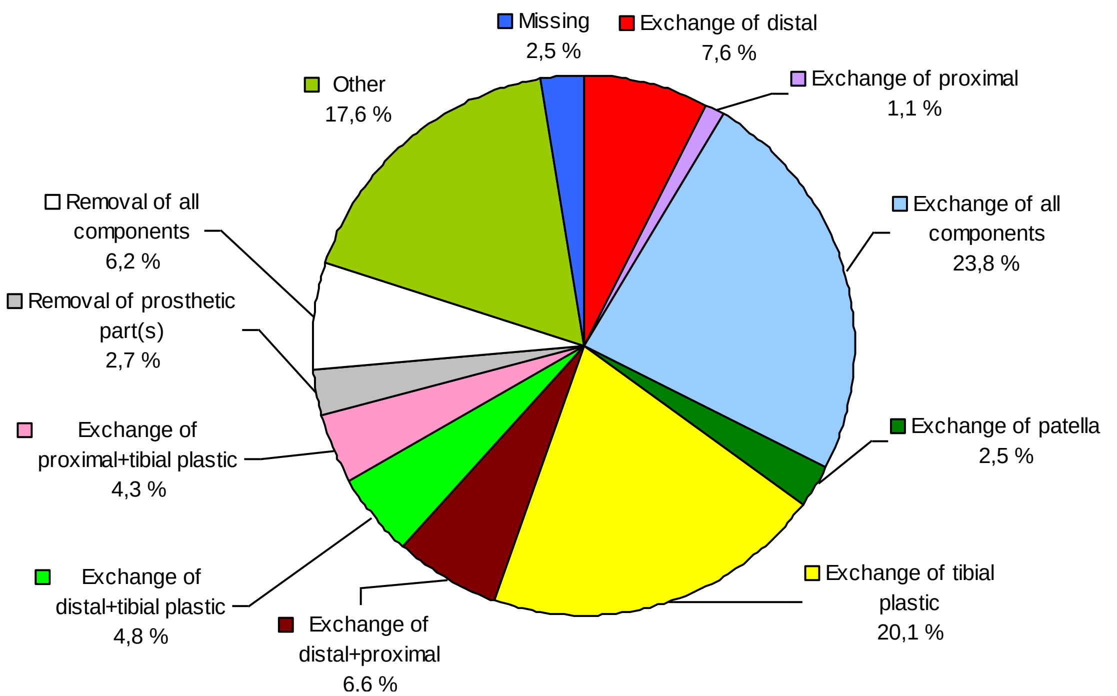


Type of revision

Table 18: Total knee prostheses with patella

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
2020						4		1			2		**7**
2019		2		3		8		2			4		**19**
2018		3		4		5		2					**15**
2017		2		2		7		3			5	1	**20**
2016		1		1		8					4		**14**
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		**7**
2008				2		1		1	1			1	**6**
2007				2		2				1			**5**
2006		1			1			1					**3**
2005		1		1	1				1		1	1	**6**
2004		1		2		3		1		1	2		**10**
2003	1	1		6		2			1		2		**13**
2002	4		1	3	1	2			1		3		**15**
1994-01	28	6	27	75	6	32	5	7	23	10	44	6	**269**
Total	**33**	**21**	**29**	**104**	**11**	**88**	**5**	**19**	**27**	**12**	**77**	**11**	**439**

Figure 21: Total knee prostheses with patella

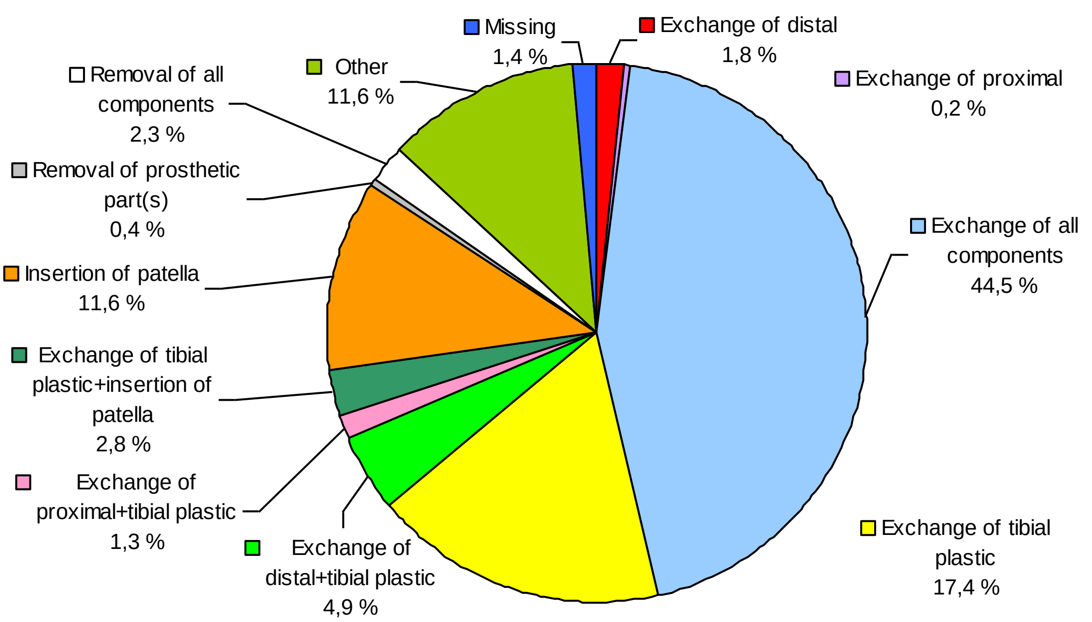


Type of revision

Table 19: Total knee prostheses without patella

Year of primary operation	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
2020		2	2		28		3					10	3	**48**
2019	1	5	31	3	34		5			5	2	21		**107**
2018		7	72	3	64		6			6	3	25	2	**188**
2017		16	69	6	65	2	7			13	1	23	4	**206**
2016		8	91	13	57		2	2		7	4	52	7	**243**
2015		8	95	10	68		4			32	1	43	4	**265**
2014		14	115	16	59		1	9	1	20	3	26	4	**268**
2013	1	10	143	11	51		5	2	1	20	2	24	6	**276**
2012	1	21	168	11	51			5	1	18	1	34	6	**317**
2011	1	23	175	11	62	1	2	8		30	2	39	6	**360**
2010	2	23	166	5	47		2	5	2	37	3	26	3	**321**
2009	4	20	176	2	53		6	9	1	28	3	29	2	**333**
2008	2	20	126	9	52		2	9	2	22	1	25	1	**271**
2007	2	13	137	6	34	1	2	6	2	22		24	2	**251**
2006	6	11	117	4	20		2	9	1	25	5	19	1	**220**
2005	6	11	85	2	15		2	7		27		26		**181**
2004	9	11	80	4	30		5	9		23		16	3	**190**
2003	5	7	78	1	29		2	12		30		19	2	**185**
2002	9	11	67	7	22		2	5	1	26		9	1	**160**
1994-01	54	15	348	21	72	1	7	26	11	217	1	83	16	**872**
Total	**103**	**256**	**2 341**	**145**	**913**	**5**	**67**	**123**	**23**	**608**	**32**	**573**	**73**	**5 262**

Figure 22: Total knee prostheses without patella

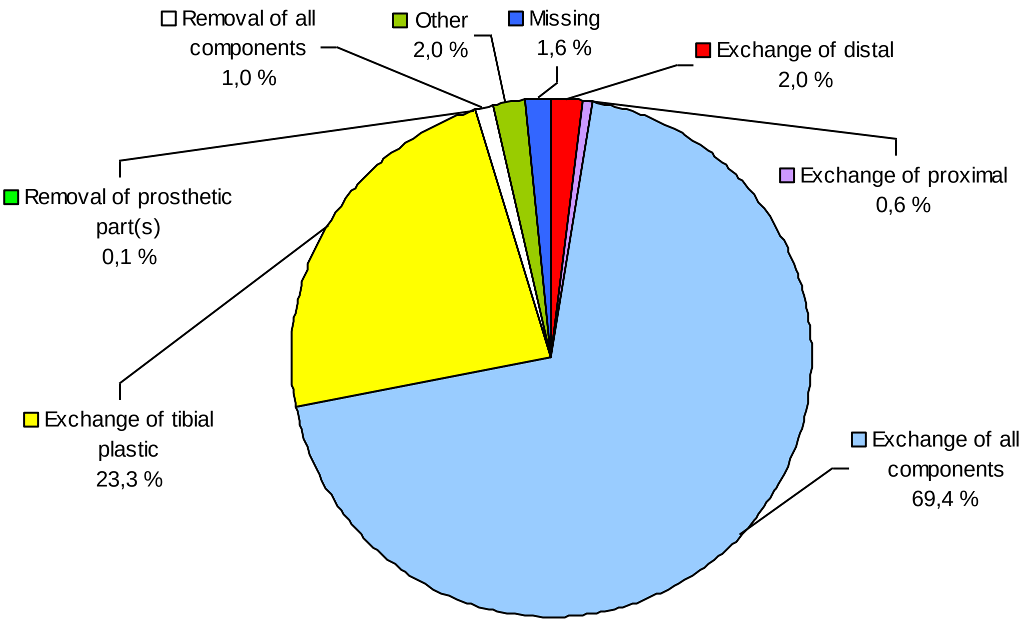


Type of revision

Table 20: Unicondylar prostheses

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
2020		1	8						**9**
2019	4	15	32				1		**52**
2018		28	36	1				1	**66**
2017	1	16	26					1	**44**
2016	1	31	26				6	1	**65**
2015	1	40	24				1	1	**67**
2014	2	38	8		1		3		**52**
2013		24	22		1				**47**
2012	2	45	22	1	1			1	**72**
2011	1	43	16	1			1	1	**63**
2010		62	24				2	1	**89**
2009		67	24		1		1		**93**
2008	1	74	18		2				**95**
2007		99	14	1	2		4	2	**122**
2006	1	84	14	1	1		3	2	**106**
2005	2	88	22				1	4	**117**
2004	1	104	16		2			2	**125**
2003	4	116	18	1			8	5	**152**
2002	1	43	16	2	2	1			**65**
1994-01	13	207	26	3	4		5	7	**265**
Total	**35**	**1 225**	**412**	**11**	**17**	**1**	**36**	**29**	**1 766**

Figure 23: Unicondylar prostheses



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
2020	618	4 426	1 380	9		154	**6 587**
2019	711	4 789	1 515	7		198	**7 220**
2018	708	4 605	1 436	7		166	**6 922**
2017	668	4 406	1 275	13		214	**6 576**
2016	707	4 391	1 236	12		168	**6 514**
2015	683	4 153	1 189	7		88	**6 120**
2014	587	3 914	1 058	8		75	**5 642**
2013	551	3 520	896	5	1	68	**5 041**
2012	667	3 277	902	8		63	**4 917**
2011	582	3 023	873	6		65	**4 549**
2010	661	2 845	797	7		90	**4 400**
2009	832	2 745	794	8		94	**4 473**
2008	787	2 355	765	8	1	80	**3 996**
2005-07	2 429	5 345	1 809	12	1	356	**9 952**

Table 22: Revisions

Year	ASA 1	ASA 2	ASA 3	ASA 4	ASA 5	Missing	Total
2020	30	311	198	12		21	**572**
2019	27	369	211	11		32	**650**
2018	39	364	224	11		27	**665**
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			12	**482**
2012	52	287	136	3		15	**493**
2011	54	249	119			9	**431**
2010	77	199	121	1		13	**411**
2009	93	212	117	1		15	**438**
2008	102	164	88			13	**367**
2005-07	191	369	196	6		57	**819**

Figure 24: Primary operations

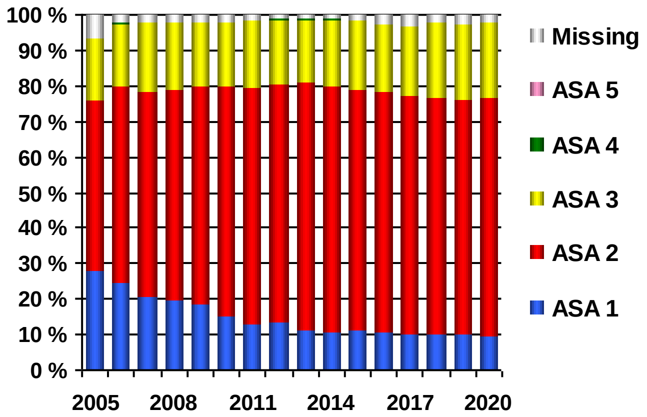
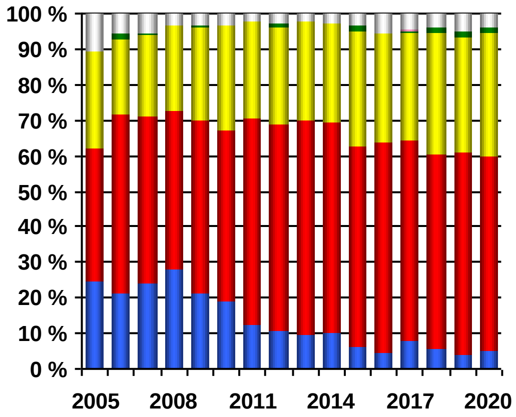


Figure 25: Revisions



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
2020	389	5 519	554	67	58	**6 587**
2019	406	5 859	803	101	51	**7 220**
2018	712	5 300	832	48	30	**6 922**
2017	778	4 891	826	51	30	**6 576**
2016	846	4 793	787	59	29	**6 514**
2015	931	4 299	816	29	45	**6 120**
2014	811	4 015	763	25	28	**5 642**
2013	909	3 352	716	10	54	**5 041**
2012	1 132	2 879	871	7	28	**4 917**
2011	1 271	2 289	952	8	29	**4 549**
2010	1 412	2 408	533	8	39	**4 400**
2009	1 610	2 388	424	10	41	**4 473**
2008	1 652	1 829	464	13	38	**3 996**
2005-07	5 700	2 322	1 696	27	207	**9 952**

Table 24: Revisions

Year	Preoperatively	Postoperatively	Unknown* pre / post	No	Missing	Total
2020	59	445	42	18	8	**572**
2019	74	478	70	23	5	**650**
2018	83	488	76	11	7	**665**
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**
2010	107	227	70	6	1	**411**
2009	93	262	74	4	5	**438**
2008	106	184	62	7	8	**367**
2005-07	423	196	156	11	33	**819**

* Missing information on medication start

Figure 26: Primary operations

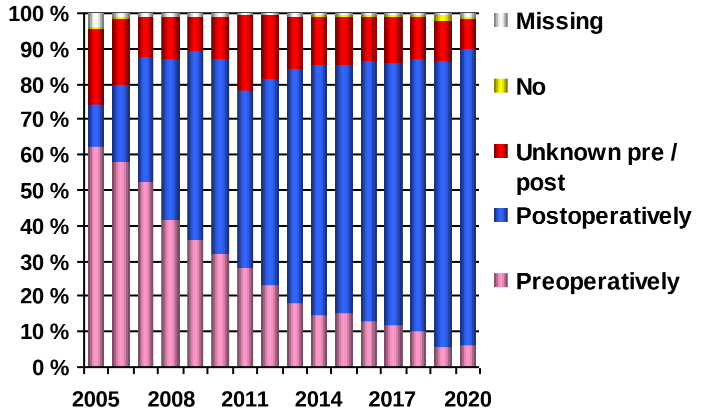
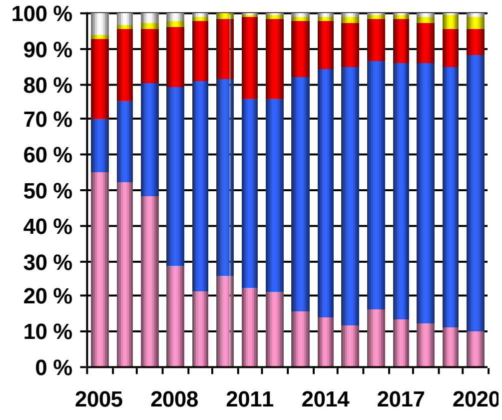


Figure 27: Revisions



Registration of thrombosis prophylaxis started in 2005

Thrombosis prophylaxis

Table 25: Drugs - All operations

Drugs	2005-10	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Acetylsalicylsyre (Albyl-E, Globoid, Acetyratio, Magnyl E)	0,0%	0,0%	0,0%		0,3%	0,4%	0,6%	0,9%	1,0%	1,0%	1,0%
Apixiban (Eliquis)				1,2%	1,1%	0,9%	1,0%	1,1%	1,3%	1,1%	1,9%
Dalteparin (Fragmin)	55,1%	64,4%	59,2%	54,1%	50,2%	56,2%	56,5%	60,6%	61,5%	52,7%	48,8%
Enoksaparin (Klexane)	39,7%	28,2%	29,3%	29,9%	32,1%	26,8%	24,4%	20,2%	19,3%	23,9%	24,9%
Rivaroksaban (Xarelto)	0,0%	2,2%	2,6%	2,4%	1,8%	1,4%	1,1%	1,1%	1,1%	1,3%	1,2%
Ximelagatran (Exanta, Malagatran)	0,5%										
No drugs	0,4%	0,2%	0,2%	0,3%	0,5%	0,6%	0,9%	0,8%	0,8%	1,6%	1,2%
Clinical study	0,3%										
Combination of 2 drugs	1,8%	3,5%	7,2%	10,2%	12,5%	12,3%	14,2%	13,9%	14,0%	17,2%	19,5%
Other	0,2%	0,0%	0,2%	0,2%	0,2%	0,1%	0,0%	0,1%	0,0%	0,0%	0,0%
Missing	1,9%	1,4%	1,2%	1,6%	1,2%	1,5%	1,2%	1,3%	1,1%	1,3%	1,4%

Figure 28: Drugs

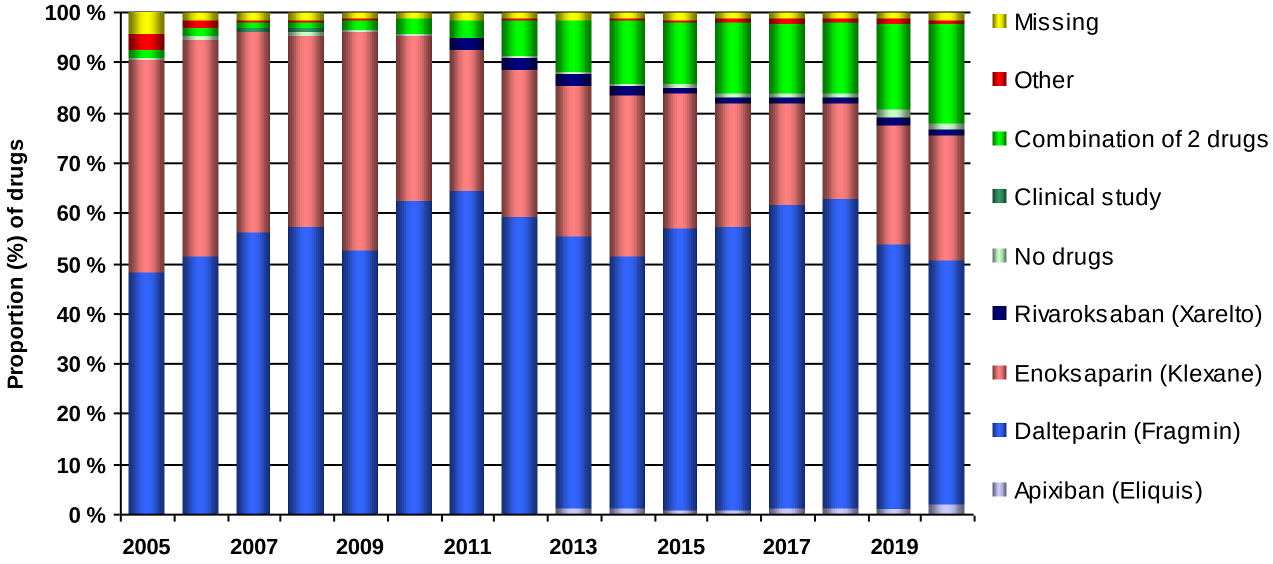


Table 26: Duration - All operations

Year	Days: 1-7	8-14	15-21	22-28	29-35	>35	No drugs	Missing	Total
2020	2 204	3 118	233	11	568	5	85	935	**7 159**
2019	2 166	3 318	394	29	692	9	124	1 138	**7 870**
2018	1 684	3 208	442	142	803	5	59	1 244	**7 587**
2017	1 180	3 202	502	281	781	13	58	1 190	**7 207**
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	1 799	1 024	370	1 065	153	32	723	**6 141**
2013	733	1 595	1 005	398	1 002	120	16	654	**5 523**
2012	584	1 633	1 206	335	890	96	13	653	**5 410**
2011	289	1 345	1 381	403	799	101	10	652	**4 980**
2010	348	1 348	1 321	239	779	52	14	710	**4 811**
2009	398	1 588	1 168	228	762	8	14	745	**4 911**
2008	425	1 456	828	172	754	31	20	677	**4 363**
2005-07	1 476	3 278	1 995	343	1 817	86	38	1 738	**10 771**

Registration of thrombosis prophylaxis started in 2005

Fibrinolysis Inhibitor

Table 27: Drugs - Primary operations

Drugs	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Cyclokapron (Tranexamic acid)	2	1 376	3 491	3 960	4 730	5 324	5 755	5 814	6 180	49 496
Missing		74	145	92	114	72	63	84	72	851
Total	**2**	**1 450**	**3 636**	**4 052**	**4 844**	**5 396**	**5 818**	**5 898**	**6 252**	**50 347**

Registration of fibrinolysis inhibitor started in 2011

Perioperative complications

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

Type	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Patella tendon rupture / Avulsion fractures / ligament rupture / tendon injury	81	12	10	21	17	15	6	11	19	17	209
Fracture	105	11	10	8	12	12	10	7	8	7	190
Rupture / damage MCL (medial colateral ligament)	27	12	12	5	5	10	19	18	22	20	150
Technical problem with cement	41	5	6	5	4		1	5	3	2	72
Adm. failure (missing comp. etc.)	23	7	7	2		4	3	7	3	1	57
Blood torniquet failing	39	4	3		1			1	1	6	55
Problem due to difficult anatomy	20	6	3	5	5	3	2	4	5		53
Failure of instruments	33	5	3	7	1	1		1			51
Anesthesia problems	20	2	4	7	4	1	3	3			44
Violation of sterility routines	13	2	7	4	6	1		1	1		35
Other periop. compl.	172	26	26	30	34	26	22	22	23	19	400

Previous operation in relevant joint

Table 29: For primary total prostheses

Type	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Meniscus	4 218	706	703	769	757	882	735	764	701	627	10 862
Osteotomy	1 949	116	112	134	119	137	111	108	151	112	3 049
Arthroscopy (diagnostic)	955	111	97	183	205	194	166	149	93	75	2 228
Osteosynthesis of intraarticular joint fracture	899	72	60	95	94	98	114	107	108	85	1 732
Cruciate Ligament	490	101	105	104	125	188	119	143	143	142	1 660
Synovectomy	1 070	65	64	66	66	41	51	41	32	33	1 529
Artrodesis	23	2	2			2	1	1			31
Other previous op.	724	95	90	89	78	86	119	146	122	123	1 672

Mini-invasive surgery

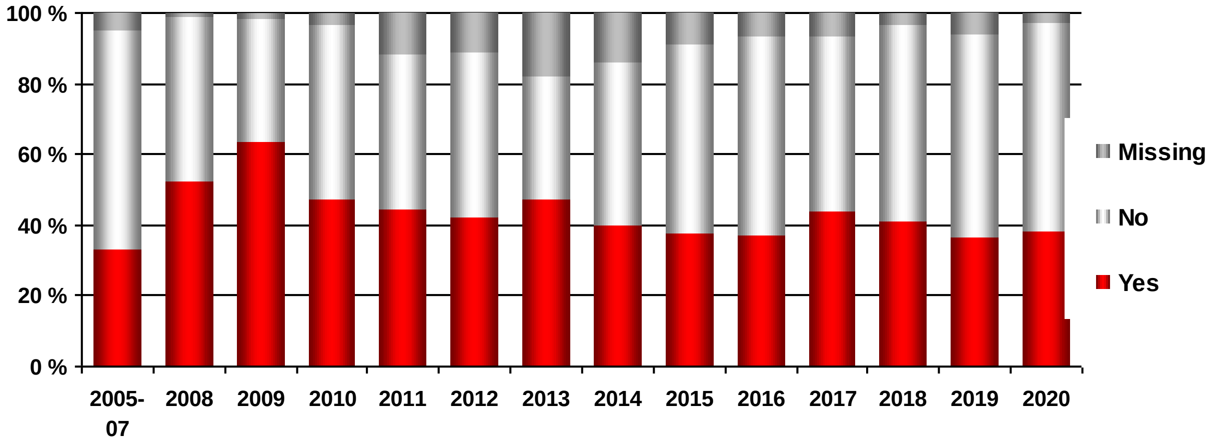
Table 30: Primary operations - Total knee prostheses

Year	Yes	No	Missing	Total
2020	8 (0%)	5 240 (92%)	423 (7%)	**5 671**
2019	8 (0%)	5 691 (93%)	451 (7%)	**6 150**
2018	14 (0%)	5 343 (92%)	474 (8%)	**5 831**
2017	9 (0%)	5 030 (90%)	561 (10%)	**5 600**
2016	10 (0%)	4 964 (89%)	576 (10%)	**5 550**
2015	5 (0%)	4 632 (87%)	657 (12%)	**5 294**
2014	2 (0%)	4 325 (87%)	647 (13%)	**4 974**
2013	10 (0%)	3 791 (84%)	716 (16%)	**4 517**
2012	16 (0%)	3 689 (84%)	685 (16%)	**4 390**
2011	15 (0%)	3 582 (88%)	465 (11%)	**4 062**
2010	21 (1%)	3 739 (95%)	185 (5%)	**3 945**
2009	25 (1%)	3 796 (95%)	165 (4%)	**3 986**
2008	15 (0%)	3 356 (95%)	155 (4%)	**3 526**
2005-07	30 (0%)	8 017 (93%)	544 (6%)	**8 591**

Table 31: Primary operations - Unicondylar knee prostheses

Year	Yes	No	Missing	Total
2020	319 (38%)	485 (59%)	25 (3%)	**829**
2019	358 (36%)	565 (57%)	61 (6%)	**984**
2018	409 (41%)	555 (56%)	36 (4%)	**1 000**
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	241 (40%)	280 (46%)	85 (14%)	**606**
2013	224 (47%)	167 (35%)	86 (18%)	**477**
2012	199 (42%)	222 (47%)	54 (11%)	**475**
2011	196 (45%)	191 (44%)	52 (12%)	**439**
2010	196 (47%)	205 (50%)	13 (3%)	**414**
2009	293 (63%)	161 (35%)	9 (2%)	**463**
2008	230 (52%)	204 (46%)	6 (1%)	**440**
2005-07	438 (33%)	819 (62%)	64 (5%)	**1 321**

Figure 29: Primary operations - Unicondylar knee prostheses



Registration of MIS started in 2005

Computernavigation

Table 32: Primary operations - Total knee prostheses

Year	Yes		No		Missing		Total
2020	480	(8%)	4 779	(84%)	412	(7%)	**5 671**
2019	514	(8%)	5 203	(85%)	433	(7%)	**6 150**
2018	597	(10%)	4 785	(82%)	449	(8%)	**5 831**
2017	569	(10%)	4 515	(81%)	516	(9%)	**5 600**
2016	584	(11%)	4 413	(80%)	553	(10%)	**5 550**
2015	475	(9%)	4 167	(79%)	652	(12%)	**5 294**
2014	443	(9%)	3 883	(78%)	648	(13%)	**4 974**
2013	390	(9%)	3 404	(75%)	723	(16%)	**4 517**
2012	416	(9%)	3 292	(75%)	682	(16%)	**4 390**
2011	445	(11%)	3 170	(78%)	447	(11%)	**4 062**
2010	659	(17%)	3 101	(79%)	185	(5%)	**3 945**
2009	762	(19%)	3 064	(77%)	160	(4%)	**3 986**
2008	742	(21%)	2 640	(75%)	144	(4%)	**3 526**
2005-07	813	(9%)	7 278	(85%)	500	(6%)	**8 591**

Figure 30: Primary operations - Total knee prostheses

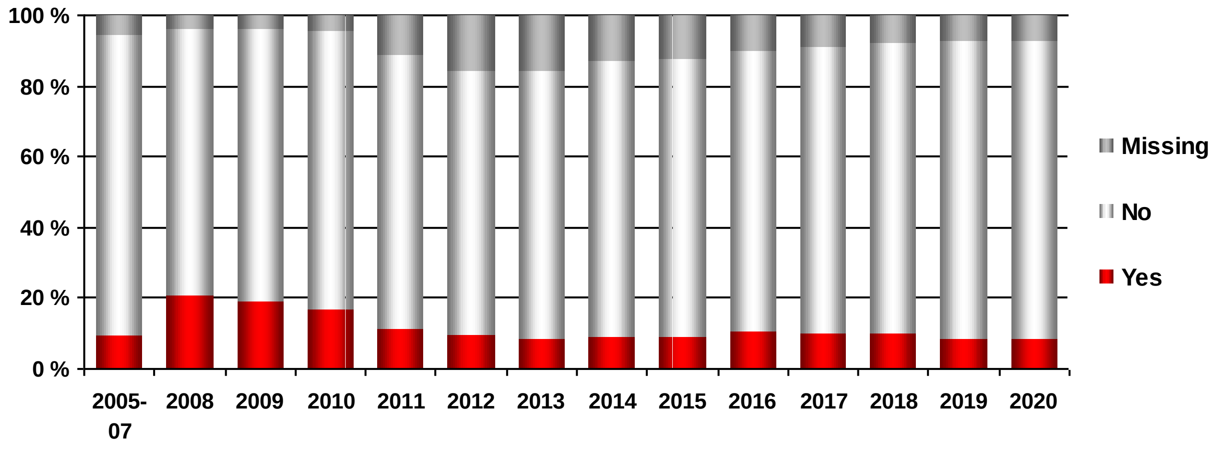


Table 33: Primary operations - Unicondylar knee prostheses

Year	Yes		No		Missing		Total
2020	2	(0%)	801	(97%)	26	(3%)	**829**
2019	0		920	(93%)	64	(7%)	**984**
2018	1	(0%)	961	(96%)	38	(4%)	**1 000**
2017	0		810	(93%)	58	(7%)	**868**
2016	0		800	(93%)	63	(7%)	**863**
2015	4	(1%)	681	(90%)	68	(9%)	**753**
2014	0		519	(86%)	87	(14%)	**606**
2013	0		389	(82%)	88	(18%)	**477**
2012	0		419	(88%)	56	(12%)	**475**
2011	1	(0%)	387	(88%)	51	(12%)	**439**
2010	7	(2%)	394	(95%)	13	(3%)	**414**
2009	3	(1%)	452	(98%)	8	(2%)	**463**
2008	15	(3%)	416	(95%)	9	(2%)	**440**
2005-07	21	(2%)	1 231	(93%)	69	(5%)	**1 321**

Registration of CAOS started in 2005

Cements used in total knee prostheses

Table 34: Primary operations - Femur

Cement	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Palacos R + G	8 845	1 272	1 406	1 444	1 479	1 429	1 001	955	633	342	**18 806**
Optipac Refobacin Bonecement R	3 265	1 315	1 324	1 730	2 150	1 835	1 451	1 469	483		**15 022**
Palacos w/gentamicin	14 677										**14 677**
Palacos R+G pro					5	15	359	1 535	2 904	3 149	**7 967**
Refobacin Bone Cement R	4 417	397	349	353	158	551	882	49	1		**7 157**
SmartSet GHV Genta. Smartmix	95	188	183	269	291	275	246	214	242	297	**2 300**
Cemex w/gentamicin	978	189	216	209	160	149	92	43	24	4	**2 064**
Refobacin-Palacos	1 577										**1 577**
Simplex w/Tobramycin	674										**674**
Optipac Refobacin Bonecement R-3								2	252	373	**627**
Palacos	424										**424**
Cemex System Genta FAST	202										**202**
Simplex	184										**184**
CMW I w/gentamicin	169										**169**
CMW I	53										**53**
Other (n<50)	138	3	7	6	7	4	21	15	14	21	**236**
Missing information	72	3	2								**77**
Total	**35 770**	**3 367**	**3 487**	**4 011**	**4 250**	**4 258**	**4 052**	**4 282**	**4 553**	**4 186**	**72 216**

Table 35: Primary operations - Tibia

Cement	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Palacos R + G	11 735	1 949	2 132	2 186	2 225	2 249	1 143	1 095	730	375	**25 819**
Palacos w/gentamicin	17 799										**17 799**
Optipac Refobacin Bonecement R	3 502	1 448	1 478	1 910	2 323	1 969	1 520	1 554	480		**16 184**
Palacos R+G pro			1	1	5	40	1 131	2 316	3 987	4 106	**11 587**
Refobacin Bone Cement R	4 697	472	394	374	171	566	931	47			**7 652**
SmartSet GHV Genta. Smartmix	105	188	182	270	293	277	246	214	242	298	**2 315**
Cemex w/gentamicin	1 110	190	214	222	165	150	91	43	24	4	**2 213**
Refobacin-Palacos	1 626										**1 626**
Simplex w/Tobramycin	679										**679**
Optipac Refobacin Bonecement R-3								2	266	362	**630**
Palacos	452										**452**
Cemex System Genta FAST	282										**282**
CMW I w/gentamicin	194										**194**
Simplex	186										**186**
CMW I	54										**54**
Copal G+ V	4		1	4	10	3	13	6	7	4	**52**
Other (n<50)	157	5	8	2	2	2	17	11	10	17	**231**
Missing information	77	3	3	1	1						**85**
Total	**42 659**	**4 255**	**4 413**	**4 970**	**5 195**	**5 256**	**5 092**	**5 288**	**5 746**	**5 166**	**88 040**

Cements used in unicondylar knee prostheses

Table 36: Primary operations - Femur

Cement	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Palacos R + G	1 305	256	288	390	428	364	169	130	172	121	**3 623**
Palacos w/gentamicin	2 211										**2 211**
Optipac Refobacin Bonecement R	396	164	156	171	228	222	176	250	62		**1 825**
Palacos R+G pro				1		6	110	214	320	411	**1 062**
Refobacin Bone Cement R	730	49	18	26	25	81	111				**1 040**
Refobacin-Palacos	269										**269**
Simplex w/Tobramycin	219		2	2							**223**
Optipac Refobacin Bonecement R-3									48	99	**147**
Cemex w/gentamicin	63										**63**
Cemex System Genta FAST	63										**63**
SmartSet GHV	10	6	11	6	9	2	1	6	1		**52**
Simplex	40										**40**
Other (n<20)	75		2	3	2	1	2		1		**86**
Total	**5 381**	**475**	**477**	**599**	**692**	**676**	**569**	**600**	**604**	**631**	**10 704**

Table 37: Primary operations - Tibia

Cement	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Palacos R + G	1 315	256	289	391	427	366	170	129	172	121	**3 636**
Palacos w/gentamicin	2 205										**2 205**
Optipac Refobacin Bonecement R	393	164	154	170	228	223	175	250	62		**1 819**
Palacos R+G pro				1		6	108	214	330	407	**1 066**
Refobacin Bone Cement R	720	49	18	26	25	81	109				**1 028**
Refobacin-Palacos	266										**266**
Simplex w/Tobramycin	214		2	2							**218**
Optipac Refobacin Bonecement R-3									48	99	**147**
Cemex w/gentamicin	63										**63**
Cemex System Genta FAST	62										**62**
SmartSet GHV	10	6	11	6	9	2	1	6	1		**52**
Simplex	39										**39**
Other (n<20)	70		2	3	2	1	2		1		**81**
Total	**5 357**	**475**	**476**	**599**	**691**	**679**	**565**	**599**	**614**	**627**	**10 682**

Antibiotic prophylaxis

Table 38: Primary operations

Drugs	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Cefalotin (Keflin)	37 408	3 941	4 184	4 895	5 229	5 640	5 637	4 713	605	466	**72 718**
Cefazolin (Cephazolin)	38	1		1			339	1 669	5 884	5 656	**13 588**
Cefuroksim (Zinacef, Cefuroxim, Lifuro	3 682	162	101	14		1			74	1	**4 035**
Klindamycin (Dalacin, Clindamycin)	913	215	227	281	316	341	346	404	365	294	**3 702**
Kloksacillin (Ekvacillin)	1 591	265	185	134	208	23	1	1	199	109	**2 716**
Dikloksacillin (Diclocil, Dicillin)	1 636	17	22	8	1	3	1	1			**1 689**
Imipenem (Tienam)	51										**51**
Cefaleksin (Keflex, Cefalexin)	19	1		1					5		**26**
Benzylpenicillin (Penicillin G)	18		1	1							**20**
Erytromycin (Ery-max, Abboticin)	16		1								**17**
Vankomycin (Vancomycin, Vancocin)	5		1		1		3		3	1	**14**
Ciprofloksasin (Ciproxin)	7	1				2					**10**
Combination of 2 drugs	1 408	271	283	248	312	462	223	107	57	26	**3 397**
Other (n<10)	22	1	1	2	3	6	3			6	**44**
Missing	296	42	35	57	50	36	23	27	28	28	**622**
Total	**47 110**	**4 917**	**5 041**	**5 642**	**6 120**	**6 514**	**6 576**	**6 922**	**7 220**	**6 587**	**102 649**

Table 39: Revisions

Drugs	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Cefalotin (Keflin)	2 743	291	300	290	322	356	355	276	20	28	**4 981**
Cefazolin (Cephazolin)	1						25	158	380	331	**895**
Klindamycin (Dalacin, Clindamycin)	166	27	23	27	25	27	27	35	42	22	**421**
Cefuroksim (Zinacef, Cefuroxim, Lifurox)	311	12	2	1	1	1		1	4	1	**334**
Kloksacillin (Ekvacillin)	110	9	18	21	19	15	9	15	24	20	**260**
Dikloksacillin (Diclocil, Dicillin)	195	12	8	3	6	5	4	9	1		**243**
Vankomycin (Vancomycin, Vancocin)	86	13	21	19	8	14	10	8	7	10	**196**
Benzylpenicillin (Penicillin G)	30		4	2	4	4	7	5	4	6	**66**
Ampicillin (Pentrexyl, Pondocillin, Doktacilin)	12		1				1	1	1	1	**17**
Ciprofloksasin (Ciproxin)	8			1		1	1			2	**13**
Cefotaksim (Claforan)	2			1	2		3	2	1	1	**12**
Combination of 2 drugs	440	123	98	123	158	139	150	104	111	95	**1 541**
Other (n<10)	19	1	1	3	4	1	1	2	3	1	**36**
Missing	172	5	6	8	7	41	38	49	52	54	**432**
Total	**4 295**	**493**	**482**	**499**	**556**	**604**	**631**	**665**	**650**	**572**	**9 447**

Patient specific instruments

Table 40:

Year	Yes	No	Missing	Total
2020	7	7 624	752	**8 383**
2019	7	8 197	914	**9 118**
2018	7	7 875	1 014	**8 896**
2017	1	7 195	1 150	**8 346**
2016	5	7 069	1 157	**8 231**
2015	14	6 223	1 521	**7 758**
2014	22	5 509	1 572	**7 103**
2013	25	4 682	1 784	**6 491**
2012	88	4 243	1 958	**6 289**
2011	65	1 696	4 142	**5 903**

Registration started in 2011

Drain

Table 41:

Year	Yes	No	Missing	Total
2020	607	7 300	476	**8 383**
2019	813	7 595	710	**9 118**
2018	1 196	6 812	888	**8 896**
2017	1 586	5 711	1 049	**8 346**
2016	2 061	5 161	1 009	**8 231**
2015	2 277	4 695	786	**7 758**
2014	2 246	3 933	924	**7 103**
2013	2 085	3 353	1 053	**6 491**
2012	2 208	2 842	1 239	**6 289**
2011	1 096	1 129	3 678	**5 903**

Registration started in 2011

Torniquet

Table 42:

	Torniquet		
Year	Yes	No	Mean Time (min) *
2020	3 826	2 416	70
2019	4 069	2 143	69
2018	1 900	709	70

Registration started in 2018. There are 35 forms are missing registration

* Mean duration of torniquet time

Completeness of reporting analysis for the Knee Arthroplasty Register, 2017-2018

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

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

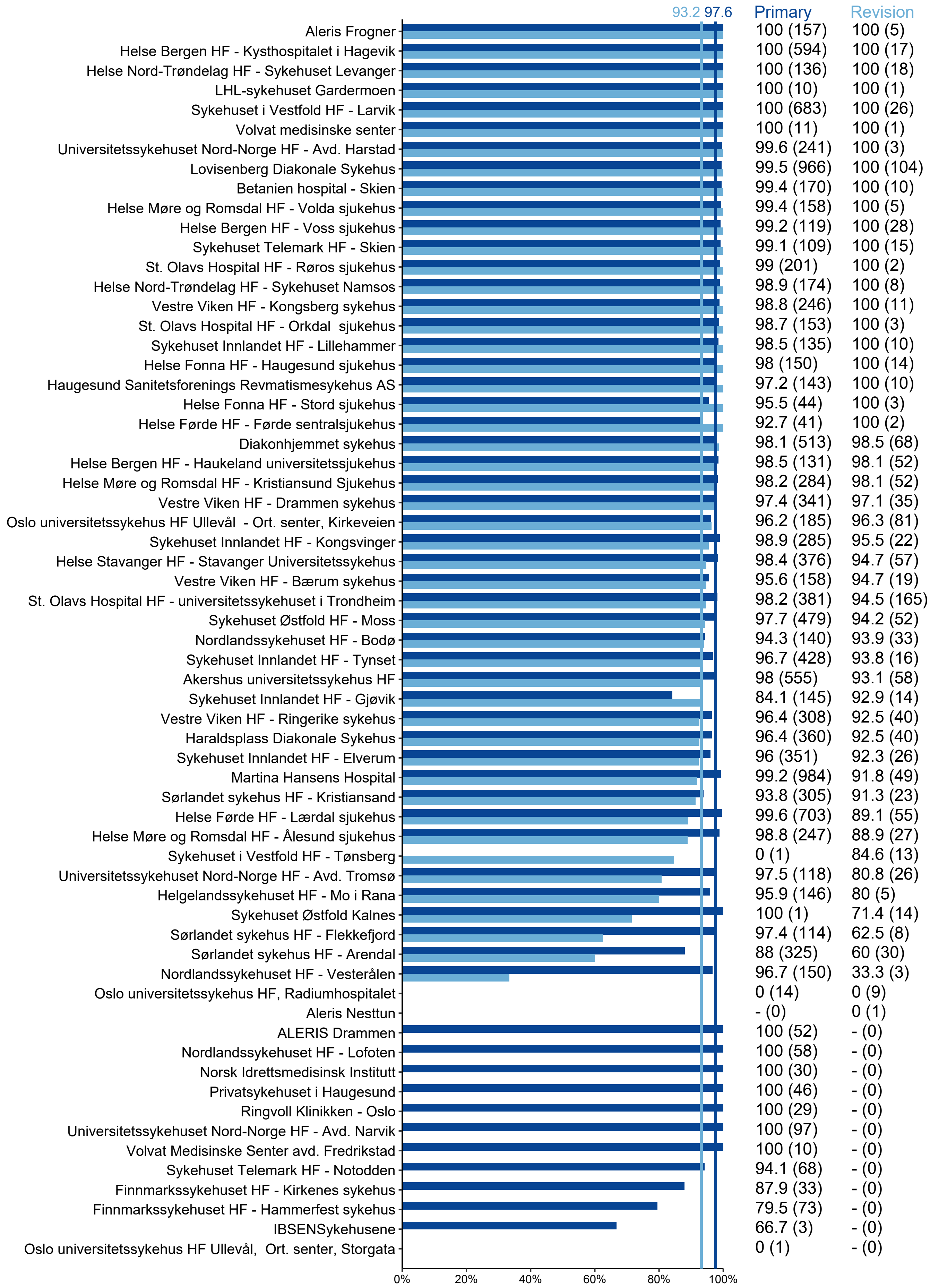
$$\text{Completeness rate NPR} = \frac{\text{only NPR} + \text{both registers}}{\text{only NPR} + \text{only NAR} + \text{both registers}}$$

Primary operations. In 2017-2018, 13669 primary knee replacements were reported to one or both of the registers. 97,6 % of these were reported to the NAR while 96,5 % 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 hip 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

Revision operations. In 2017-2018, 1389 revisions were reported to one or both of the registers. 93,2 % of these were reported to the NAR while 81,6 % 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 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, 2017-2018



Mørkeblå stolpe og første tall til høyre for stolpene gir prosent dekningsgrad for primæroperasjon. Lyseblå stolpe og andre tall til høyre for stolpene gir prosent dekningsgrad for revisjonsoperasjon (nivå 1). Tallene i parentes gir antall pasienter registrert hos både NRL og NPR. Vertikale linjer viser landsgjennomsnitt.

CONTENTS

Prostheses in other joints

Covid-19, number of shoulder operations by health trust 145
Survival of joint prostheses 147
Survival of shoulder prostheses 149

Elbow prostheses

Annual number of prostheses 151
Elbow disease in primary operations 152
Use of cement 153
Prostheses 154
Reasons for revisions 155

Ankle prostheses

Annual number of prostheses 157
Ankle disease in primary operations 157
Use of cement 158
Prostheses 159
Reasons for revisions 160

Finger joint prostheses

Annual number of prostheses 161
Reasons for primary operations 162
Use of cement 163
Prostheses 165
Reasons for revisions 166

Wrist prostheses

Annual number of prostheses 167
Wrist disease in primary operations 167
Use of cement 169
Prostheses 169
Reasons for revisions 169

Carpometacarpal prostheses (CMC I)

Annual number of prostheses 171
Carpometacarpal disease in primary operations 171
Use of cement 172
Prostheses 172
Reasons for revisions 172

Lumbar disc prostheses

Annual number of prostheses 173
Back disease in primary operations 173
Use of cement 174
Prostheses 174

Shoulder prostheses

Annual number of prostheses 175
Number of primary operations by month, 2019 & 2020 175
Types of prostheses 176
Age by year of operation 177
Reasons for primary operations 181
Use of cement 185
Prostheses 188
Reasons for revisions 193
ASA classification 196
Thrombosis prophylaxis 197
Previous operation in relevant joints 197

Toe joint prostheses

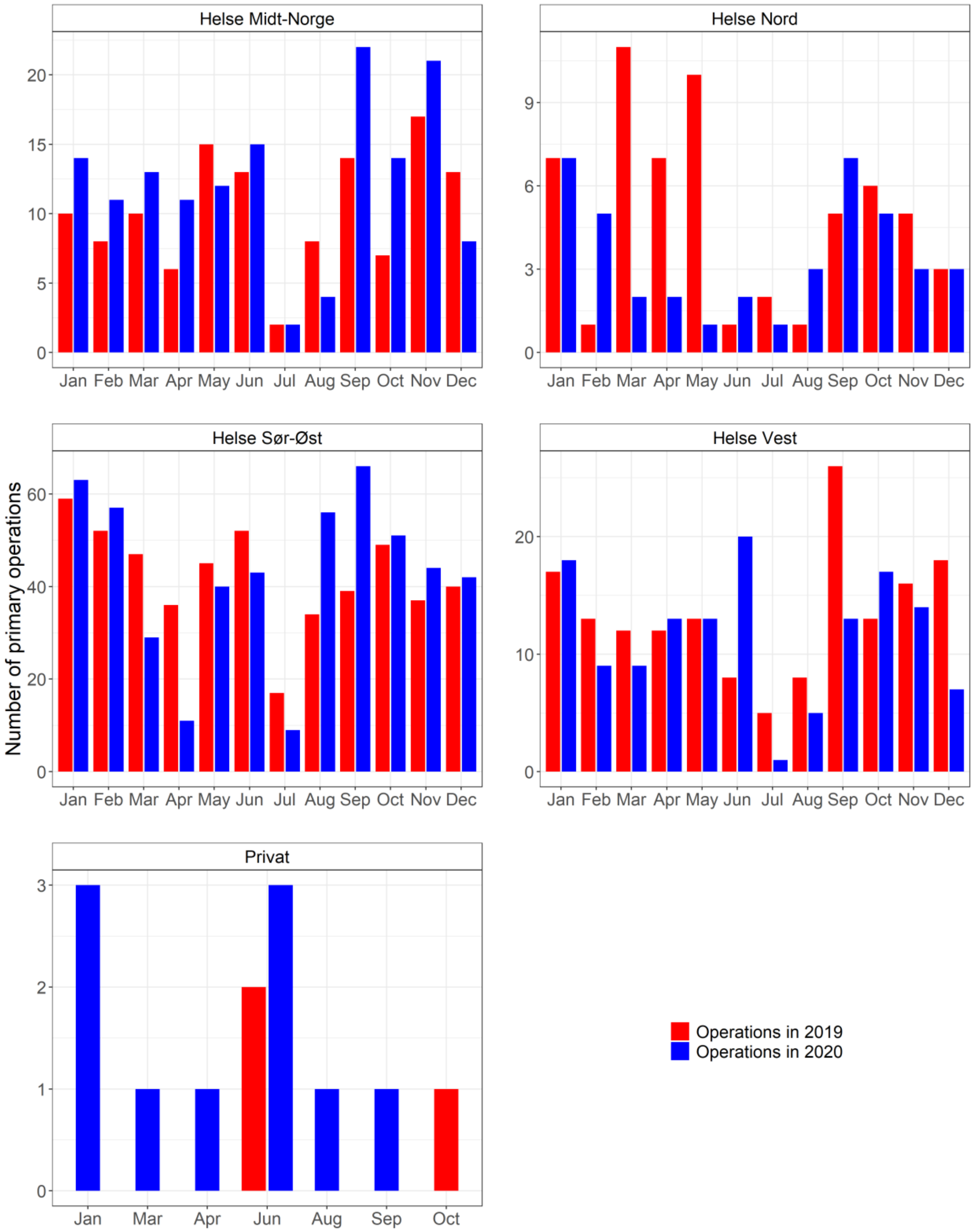
Annual number of prostheses 199
Toe disease in primary operations 199
Use of cement 200
Prostheses 201
Reasons for revisions 201

Completeness analysis

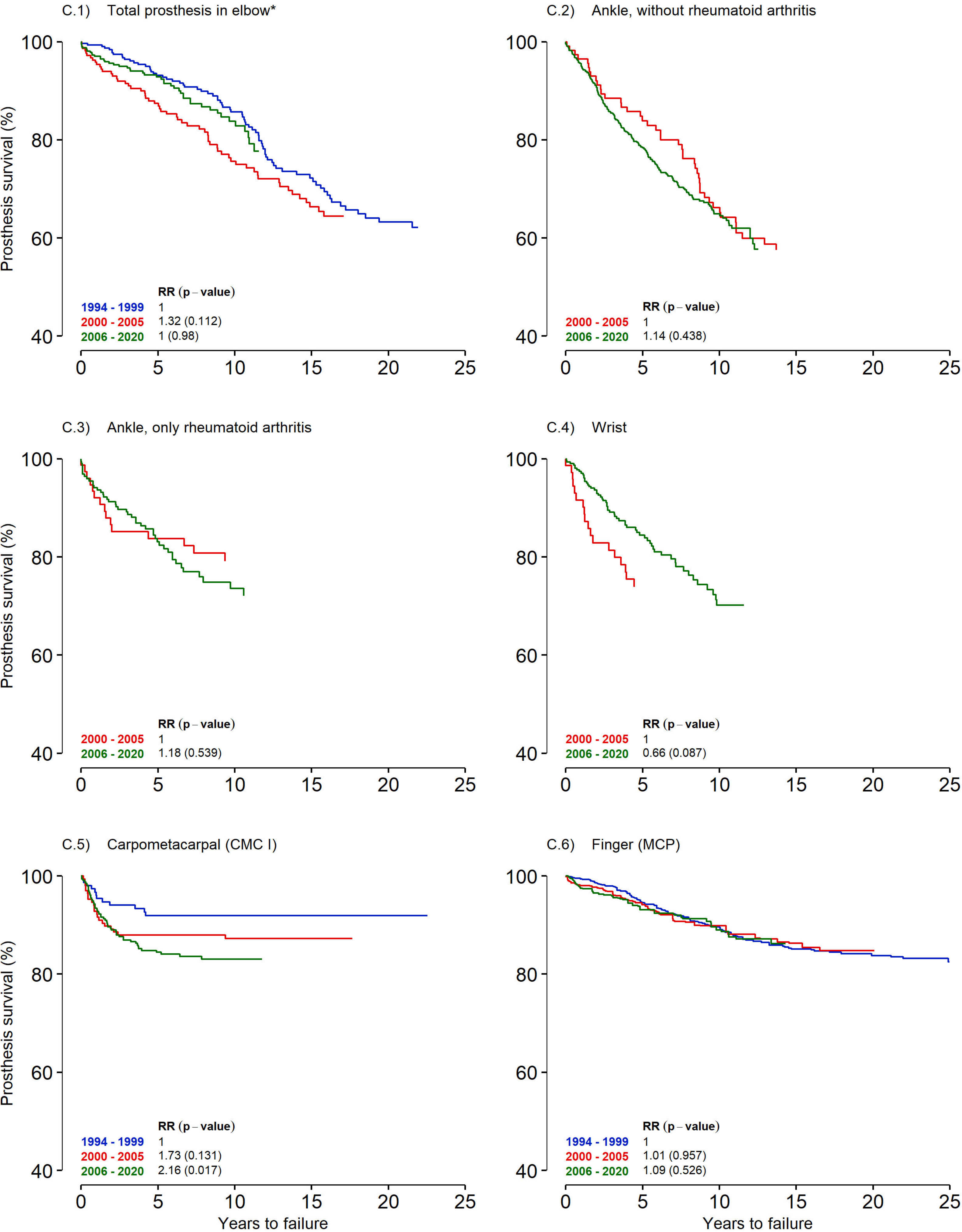
Completeness of reporting total prosthesis in elbow 202
Completeness of reporting prosthesis in ankle 204
Completeness of reporting prosthesis in finger 206
Completeness of reporting prosthesis in wrist 208
Completeness of reporting prosthesis in shoulder 210
Completeness of reporting prosthesis in toe 212

COVID-19

Number of primary shoulder arthroplasties per health trust & month for 2019 vs. 2020



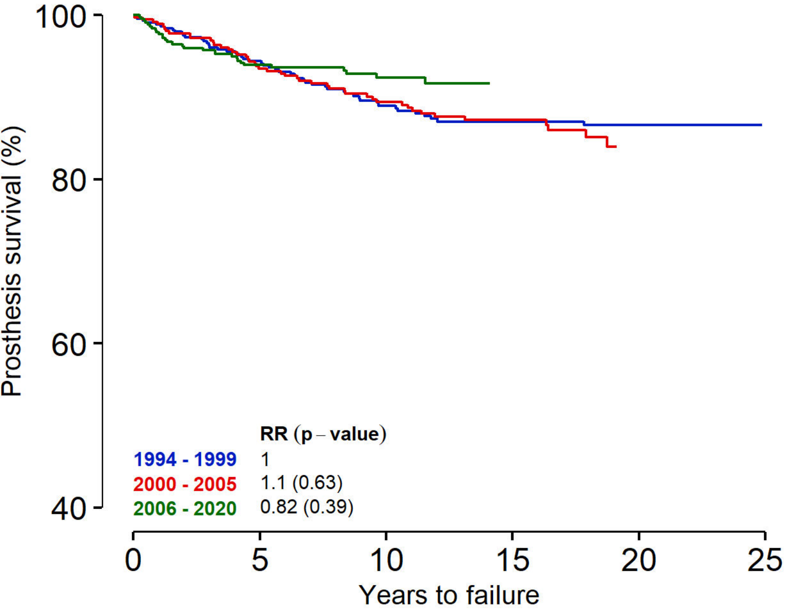
Survival curves for joint prosthesis
1994-2020



*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.

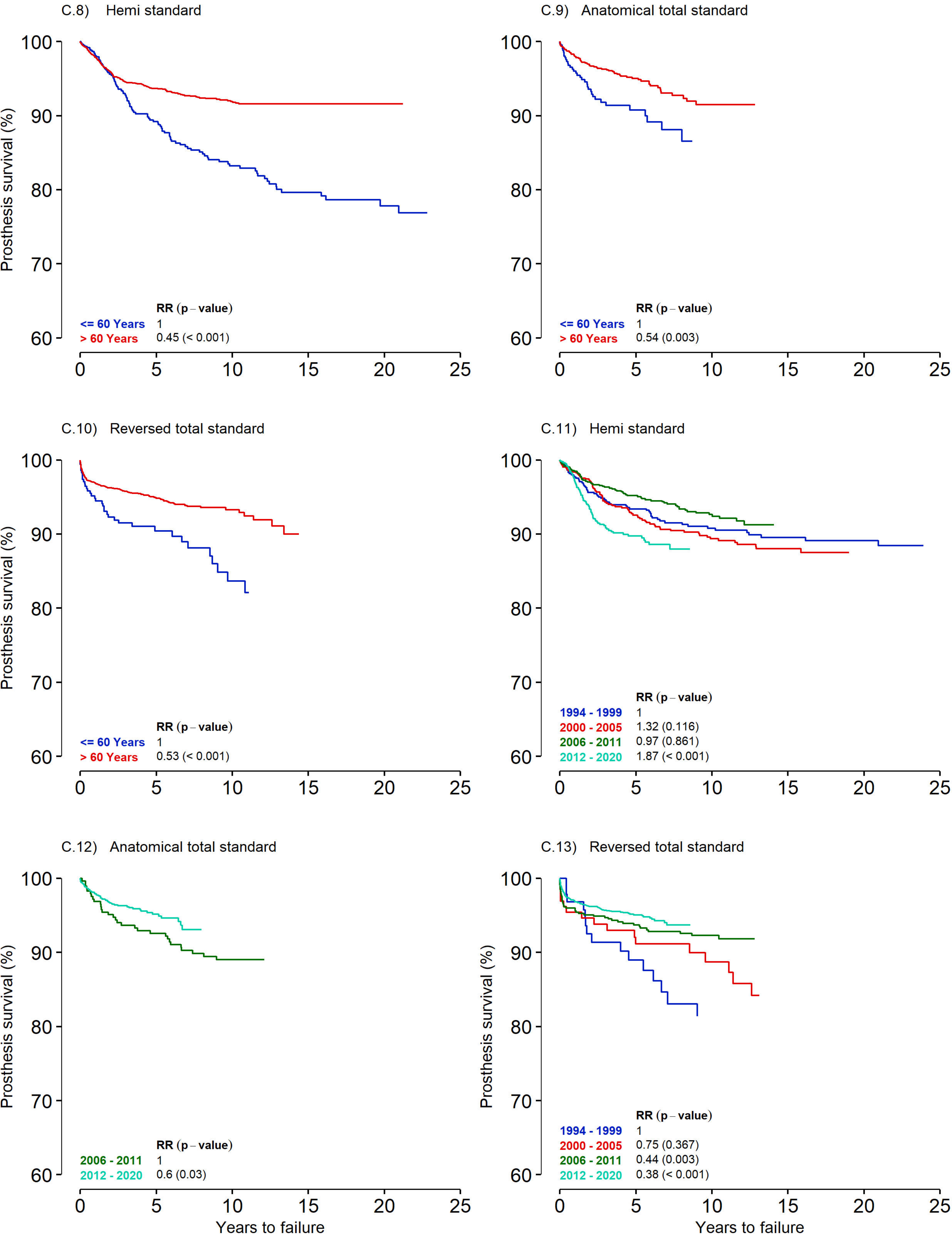
Survival curves for joint prosthesis
1994-2020

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.

Survival curves of shoulder prosthesis
1994-2020



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.

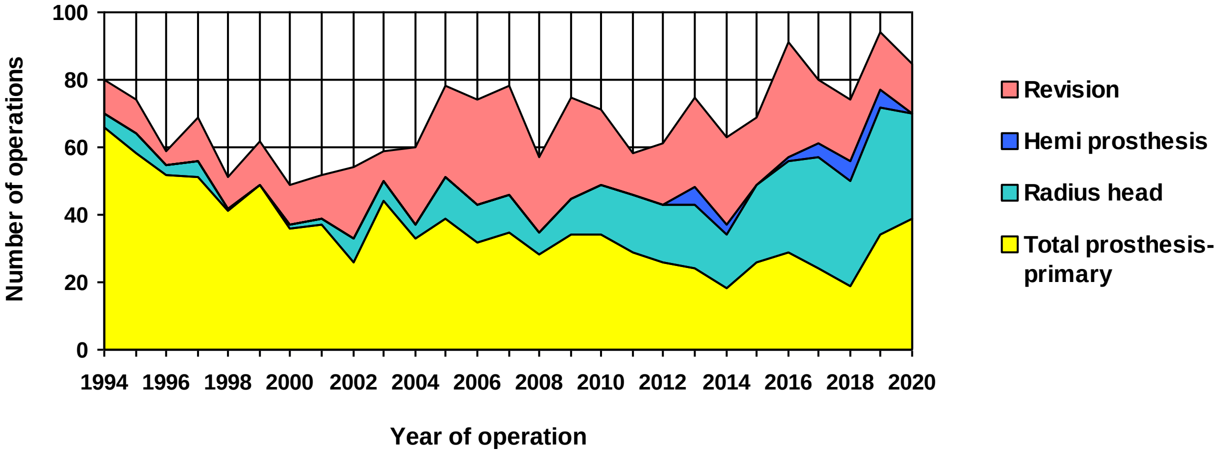
ELBOW PROSTHESES

Table 1: Annual number of prostheses

Year	Hemi prosthesis		Primary operations Total prosthesis		Radius head		Reoperations *		Revisions		Total
2020			39	(45,9%)	31	(36,5%)			15	(17,6%)	**85**
2019	5	(5,3%)	34	(36,2%)	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	3	(4,8%)	18	(28,6%)	16	(25,4%)			26	(41,3%)	**63**
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**
2007			35	(44,9%)	11	(14,1%)			32	(41,0%)	**78**
2006			32	(43,2%)	11	(14,9%)			31	(41,9%)	**74**
2005			39	(50,0%)	12	(15,4%)			27	(34,6%)	**78**
1994-04			493	(73,7%)	39	(5,8%)			137	(20,5%)	**669**
Total	**24**	**0**	**963**	**(52,0%)**	**358**	**(19,3%)**	**4**	**(0,2%)**	503	(27,2%)	**1 852**

* 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



52,8 % of all operations were performed on the right side. 73,8 % performed in women. Mean age: 62,4 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
2020	3	9	10			18	1	3	
2019	1	12	6		1	16		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	5			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	
2007	3	22	4			2		6	
2006	3	19	9					1	
2005	6	26	9	3	1	2		1	
1994-04	20	439	21	3		9	1	18	7
Total	**57**	**688**	**116**	**6**	**4**	**101**	**4**	**52**	**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
2019						5			
2018	1		1			5			
2017						4			
2016						1			
2014		1				3			
2013			1			4			
Total	**1**	**1**	**2**	**0**	**0**	**22**	**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
2020	1		3			27		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			
2007						11			
2006			5			5		1	
2005	2		2			7		1	1
1994-04	2	13	10			14		4	
Total	**10**	**14**	**51**	**0**	**2**	**283**	**0**	**10**	**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
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**
2007	31	(88,6%)			4	(11,4%)			**35**
2006	24	(75,0%)			8	(25,0%)			**32**
2005	23	(59,0%)			16	(41,0%)			**39**
1994-04	261	(52,9%)	95	(19,3%)	134	(27,2%)	3	(0,6%)	**493**
Total	**702**	**(71,0%)**	**95**	**(9,6%)**	**182**	**(18,4%)**	**10**	**(1,0%)**	**989**

Table 6: Primary operations - Ulna/radius

Year	Cement with antibiotics		Cement without antibiotics		Uncemented		Missing		Total
2020	34	(54,8%)			28	(45,2%)			**62**
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	21	(63,6%)	1	(3,0%)	9	(27,3%)	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**
2007	43	(93,5%)			2	(4,3%)	1	(2,2%)	**46**
2006	36	(83,7%)			7	(16,3%)			**43**
2005	42	(82,4%)			9	(17,6%)			**51**
1994-04	383	(72,0%)	96	(18,0%)	50	(9,4%)	3	(0,6%)	**532**
Total	**913**	**(69,7%)**	**97**	**(7,4%)**	**283**	**(21,6%)**	**16**	**(1,2%)**	**1 309**

Prostheses used in elbow prostheses - Total prostheses

Table 7: Primary operations - Humerus

Prostheses	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Discovery	115	18	19	9	18	16	5	1	1		**202**
Norway	180										**180**
Kudo	162										**162**
IBP	132	3	1								**136**
Nexel					4	13	19	17	28	22	**103**
GSB III	66	4	3	3	1						**77**
NES	54										**54**
Latitude EV				3					4	16	**23**
Mutars	4	1		1	2			1	1	1	**11**
IBP Reconstruction	5										**5**
Coonrad/Morrey	3			1	1						**5**
Other (n < 5)	3		1	1							**5**
Total	**724**	**26**	**24**	**18**	**26**	**29**	**24**	**19**	**34**	**39**	**963**

Table 8: Primary operations - Ulna/radius

Prostheses	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Discovery	115	18	19	9	18	16	5	1	1		**202**
Norway	179										**179**
Kudo	162										**162**
IBP	132	3	1								**136**
Nexel					4	13	19	17	28	22	**103**
GSB III	66	4	3	3	1						**77**
NES	55										**55**
Mutars	4	1		1	2			1	1	1	**11**
Latitude EV				2						7	**9**
IBP Reconstruction	5										**5**
Coonrad/Morrey	3			1	1						**5**
Other (n < 5)	3		1	1							**5**
Total	**724**	**26**	**24**	**17**	**26**	**29**	**24**	**19**	**30**	**30**	**949**

Prostheses used in elbow prostheses - Hemiprostheses

Table 9: Primary operations - Humerus

Prostheses	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Latitude Anatomic hemi			5	3		1	4	6	5		**24**
Total			**5**	**3**	**0**	**1**	**4**	**6**	**5**	**0**	**24**

Prostheses used in elbow prostheses - Radius head prostheses

Table 10: Primary operations - Radius

Prostheses	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Acumed anatomic radial head	5	11	16	5	13	13	12	17	20	12	**124**
Explor	2	2	3	5	7	10	17	14	16	15	**91**
rHead	59	1		2		1	1				**64**
Radial Head	29										**29**
Silastic H.P. 100	20										**20**
EVOLVE (Proline)	3	2					3		2	1	**11**
Link radius	2	1		4	3						**10**
Other (n < 5)	3					3				3	**9**
Total	**123**	**17**	**19**	**16**	**23**	**27**	**33**	**31**	**38**	**31**	**358**

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	Other	Missing
2020	1			2		2	1	2	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	3	
2015	3	4	1	1		2		1	6	1	
2014	4	4		1	1	1	1	1	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	
2007	3	7	1	2	1	1		5	4	4	
2006	6	5	1	2	1	3	2		1	2	
2005	4	6	4	1			1	1	1		
1994-04	51	45	10	11	6	7	19	23	6	16	1
Total	**99**	**109**	**24**	**35**	**15**	**31**	**48**	**50**	**62**	**67**	**2**

More than one reason for revision is possible

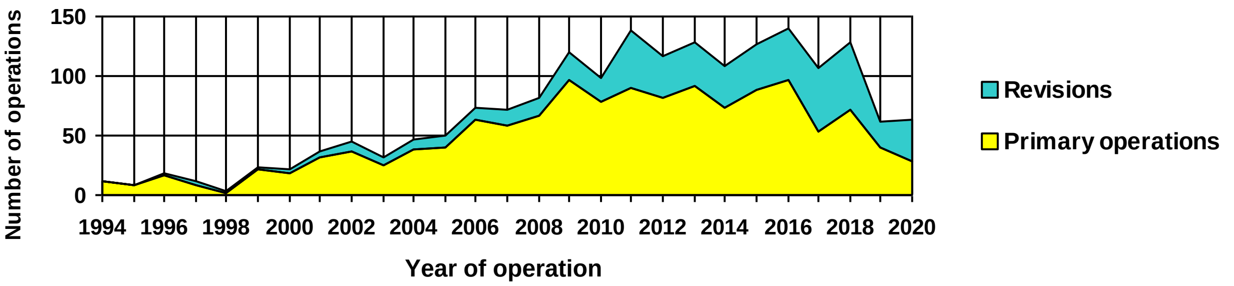
ANKLE PROSTHESES

Table 1: Annual number of operations

Year	Primary operations		Reoperations *		Revisions		Total
2020	29	(45,3%)			35	(54,7%)	**64**
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**
2007	58	(80,6%)			14	(19,4%)	**72**
2006	63	(86,3%)			10	(13,7%)	**73**
2005	40	(80,0%)			10	(20,0%)	**50**
1994-04	219	(84,6%)			40	(15,4%)	**259**
Total	**1 339**	**(71,5%)**	**2**	**(0,1%)**	**533**	**(28,4%)**	**1 874**

* 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. 53,4 % performed in women. Mean age: 60,2 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
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	
2007	13	16	20	2	6			2	
2006	19	14	24		5			5	
2005	15	9	18		3			1	
1994-04	40	120	39	4	2			24	1
Total	**361**	**353**	**415**	**13**	**178**	**1**	**7**	**90**	**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
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**
2007					58	(100,0%)			**58**
2006					63	(100,0%)			**63**
2005	1	(2,5%)			39	(97,5%)			**40**
1994-04	22	(10,0%)	10	(4,6%)	186	(84,9%)	1	(0,5%)	**219**
Total	**29**	**(2,2%)**	**10**	**(0,7%)**	**1 290**	**(96,5%)**	**8**	**(0,6%)**	**1 337**

Table 4: Primary operations - Talus

Year	Cement with antibiotics		Cement without antibiotics		Uncemented		Missing		Total
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**
2007					58	(100,0%)			**58**
2006	1	(1,6%)			62	(98,4%)			**63**
2005	1	(2,5%)			39	(97,5%)			**40**
1994-04	23	(10,5%)	11	(5,0%)	185	(84,5%)			**219**
Total	**31**	**(2,3%)**	**11**	**(0,8%)**	**1 290**	**(96,4%)**	**6**	**(0,4%)**	**1 338**

Prostheses used in ankle prostheses

Table 5: Primary operations - Tibia

Prostheses	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
STAR	538	39	38		1						**616**
Salto Talaris			26	62	85	81	28	35			**317**
Mobility	74	12	15								**101**
CCI	46	12	11	9							**78**
TM Total Ankle				3	3	16	22	20	8	1	**73**
INFINITY							2	11	29	28	**70**
Norwegian TPR	32										**32**
Rebalance	7	8									**15**
Salto Mobile		11	1								**12**
Hintegra	11										**11**
Integra Cadence							2	4	2		**8**
AES	3										**3**
Total	**711**	**82**	**91**	**74**	**89**	**97**	**54**	**70**	**39**	**29**	**1 336**

Table 6: Primary operations - Talus

Prostheses	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
STAR	538	39	38		1						**616**
Salto Talaris			22	61	84	80	27	35			**309**
Mobility	74	12	15								**101**
CCI	46	12	11	9							**78**
TM Total Ankle				3	3	16	22	20	8	1	**73**
INFINITY							2	11	29	25	**67**
Norwegian TPR	32										**32**
Rebalance	7	8									**15**
Salto Mobile		11	1								**12**
Hintegra	11										**11**
Salto XT			4	1	1	1	1				**8**
Integra Cadence							2	4	2		**8**
INVISION										3	**3**
AES	3										**3**
Talus Hemicap									1		**1**
Total	**711**	**82**	**91**	**74**	**89**	**97**	**54**	**70**	**40**	**29**	**1 337**

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	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Totalt
STAR	Uhmwpe	538	39	38		1						**616**
Salto Talaris	Uhmwpe			25	62	85	81	28	35			**316**
Mobility	Uhmwpe	74	12	15								**101**
CCI	Uhmwpe	46	12	10	9							**77**
TM Total Ankle	HXLPE				3	3	16	22	20	8	1	**73**
INFINITY	Uhmwpe							2	11	29	28	**70**
Rebalance	Uhmwpe	7	8									**15**
Salto Mobile	Uhmwpe		11	1								**12**
Hintegra	Uhmwpe	11										**11**
Integra Cadence	HXLPE							2	4	2		**8**
AES	Uhmwpe	3										**3**
Salto XT	Uhmwpe			1								**1**
Totalt		**679**	**82**	**90**	**74**	**89**	**97**	**54**	**70**	**39**	**29**	**1 303**

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
2020	7	8	1	1	3	1	2	11	3	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	8		4	
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	1	
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	
2007	2	2		2	1	1		5	3		1		
2006	3	2		2	2	1	1	4	1				
2005	1	2			1	1		2			1		
1994-04	22	15		4	8	2	1	11	3			3	
Total	**105**	**89**	**5**	**33**	**68**	**24**	**17**	**###**	**97**	**24**	**7**	**16**	**0**

More than one reason for revision is possible

FINGER JOINT PROSTHESES

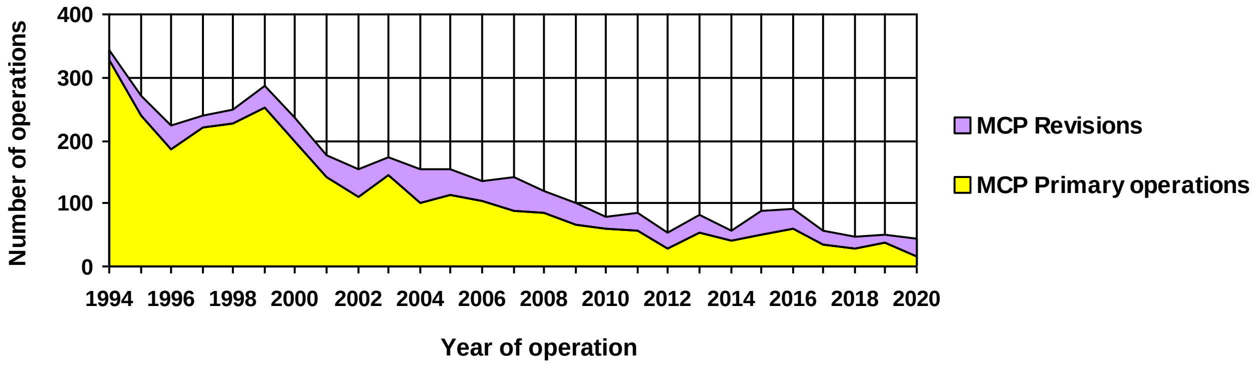
Table 1: Annual number of operations - MCP

Year	Primary operations		Revisions		Total
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	35	(62,5%)	21	(37,5%)	**56**
2016	61	(67,0%)	30	(33,0%)	**91**
2015	51	(57,3%)	38	(42,7%)	**89**
2014	42	(75,0%)	14	(25,0%)	**56**
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	84	(70,0%)	36	(30,0%)	**120**
2007	88	(61,5%)	55	(38,5%)	**143**
2006	104	(77,6%)	30	(22,4%)	**134**
2005	112	(72,7%)	42	(27,3%)	**154**
1994-04	2 148	(85,9%)	354	(14,1%)	**2 502**
Total	**3 071**	**(79,1%)**	**813**	**(20,9%)**	**3 884**

Table 2: Annual number of operations - PIP

Year	Primary operations		Revisions		Total
2020	16	(100,0%)			**16**
2019	14	(93,3%)	1	(6,7%)	**15**
2018	9	(81,8%)	2	(18,2%)	**11**
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**
2007	6	(85,7%)	1	(14,3%)	**7**
2006	7	(87,5%)	1	(12,5%)	**8**
2005	6	(85,7%)	1	(14,3%)	**7**
1994-04	38	(82,6%)	8	(17,4%)	**46**
Total	**136**	**(88,3%)**	**18**	**(11,7%)**	**154**

Figure 1: Annual number of operations



61,4 % of all operations were performed on the right side. 87,3 % 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
2020	1	15							
2019	4	28					1	4	
2018	4	22		1			1	1	
2017	6	27						2	
2016	4	57						2	
2015	5	43		1				2	
2014		33					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	81						1	
2007	2	85		1				4	
2006	10	91	1		1			3	
2005	9	91	9				1	3	1
1994-04	40	2 057	3	8		1	1	55	2
Total	**93**	**2 874**	**16**	**11**	**1**	**1**	**5**	**99**	**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
2020	14	3	1						
2019	10	2	2					1	
2018	6	1	2						
2017	6								
2016	1						2		
2015	3		2						
2014	3		1						
2013	1	5							
2011		2	1						
2010		2	2		1			1	
2009	2						1		
2008	2		1					1	
2007	3		1		1				1
2006	4	3							
2005	4	2	1						
1994-04	12	22	2			2		4	
Total	**71**	**42**	**16**	**0**	**2**	**2**	**3**	**7**	**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
2020					16	(100,0%)			**16**
2019	2	(5,4%)			35	(94,6%)			**37**
2018					28	(100,0%)			**28**
2017					35	(100,0%)			**35**
2016	2	(3,3%)			59	(96,7%)			**61**
2015	1	(2,0%)			48	(94,1%)	2	(3,9%)	**51**
2014					41	(97,6%)	1	(2,4%)	**42**
2013					52	(98,1%)	1	(1,9%)	**53**
2012					27	(100,0%)			**27**
2011					57	(100,0%)			**57**
2010					60	(100,0%)			**60**
2009					66	(100,0%)			**66**
2008	1	(1,2%)			83	(98,8%)			**84**
2007					88	(100,0%)			**88**
2006					103	(99,0%)	1	(1,0%)	**104**
2005			2	(1,8%)	109	(97,3%)	1	(0,9%)	**112**
2004	1	(1,0%)			100	(99,0%)			**101**
2003					145	(100,0%)			**145**
2002					108	(99,1%)	1	(0,9%)	**109**
2001	1	(0,7%)			140	(99,3%)			**141**
2000					198	(100,0%)			**198**
1999					253	(100,0%)			**253**
1998					228	(100,0%)			**228**
1997					216	(98,6%)	3	(1,4%)	**219**
1996					187	(100,0%)			**187**
1995					238	(100,0%)			**238**
1994					326	(99,4%)	2	(0,6%)	**328**
Total	**8**	**(0,3%)**	**2**	**(0,1%)**	**3 046**	**(99,3%)**	**12**	**(0,4%)**	**3 068**

Table 6: Primary operations - Distal

Year	Cement with antibiotics		Cement without antibiotics		Uncemented		Missing		Total
2019					2	(100,0%)			**2**
2018					2	(100,0%)			**2**
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**
2007					2	(100,0%)			**2**
2006					7	(100,0%)			**7**
2005					4	(100,0%)			**4**
2004					1	(100,0%)			**1**
2003					1	(100,0%)			**1**
2002					5	(100,0%)			**5**
2001					1	(100,0%)			**1**
2000					1	(100,0%)			**1**
1996					2	(100,0%)			**2**
1995					4	(100,0%)			**4**
Total					**41**	**(100,0%)**			**41**

Use of cement in PIP prostheses

Table 7: Primary operations - Proximal

Year	Cement with antibiotics	Cement without antibiotics	Uncemented	Missing	Total
2020			14 (93,3%)	1 (6,7%)	**15**
2019			14 (100,0%)		**14**
2018			9 (100,0%)		**9**
2017			6 (100,0%)		**6**
2016			3 (100,0%)		**3**
2015			5 (100,0%)		**5**
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			**131 (97,0%)**	**4 (3,0%)**	**135**

Table 8: Primary operations - Distal

Year	Cement with antibiotics	Cement without antibiotics	Uncemented	Missing	Total
2020			13 (100,0%)		**13**
2019			12 (100,0%)		**12**
2018			9 (100,0%)		**9**
2017			6 (100,0%)		**6**
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			**69 (98,6%)**	**1 (1,4%)**	**70**

Finger prostheses

Table 9: MCP prostheses in primary operations - Proximal

Prostheses	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Silastic HP 100	1 916	27	25		5	1	5		3		**1 982**
Avanta	555				1		4				**560**
Silastic HP 100 II	13		28	41	45	56	26	26	27	16	**278**
NeuFlex	198										**198**
Ascension MCP	29			1		2		2	1		**35**
MCS	6										**6**
SR Avanta						2			2		**4**
HAPY									2		**2**
TACTYS									1		**1**
Moje	1										**1**
Integra									1		**1**
Total	**2 718**	**27**	**53**	**42**	**51**	**61**	**35**	**28**	**37**	**16**	**3 068**

Table 10: MCP prostheses in primary operations - Distal

Prostheses	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Ascension MCP	27			1		2		2	1		**33**
MCS	6										**6**
TACTYS									1		**1**
Moje	1										**1**
Total	**34**			**1**		**2**		**2**	**2**		**41**

Table 11: PIP prostheses in primary operations - Proximal

Prostheses	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
TACTYS						2	6	7	7	11	**33**
Silastic HP 100	21		4	2						1	**28**
SR Avanta	15		1	1	5	1			2		**25**
Ascension MCP	18										**18**
Ascension PIP PyroCarbon	4			1				2	1	2	**10**
NeuFlex	7										**7**
CapFlex PIP									4	1	**5**
MCS	4										**4**
Avanta	3		1								**4**
Moje	1										**1**
Total	**73**		**6**	**4**	**5**	**3**	**6**	**9**	**14**	**15**	**135**

Table 12: PIP prostheses in primary operations - Distal

Prostheses	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
TACTYS						2	6	7	7	11	**33**
Ascension MCP	18										**18**
Ascension PIP PyroCarbon	4			1				2	1	1	**9**
CapFlex PIP									4	1	**5**
MCS	4										**4**
Moje	1										**1**
Total	**27**			**1**		**2**	**6**	**9**	**12**	**13**	**70**

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
2020									4	10		
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		8	
2015	5	2		4		1		15	8	4	10	
2014		1		1					2		4	
2013				4	12			8		8	1	
2012				2				10	3	12		
2011					4	2		8		7	5	
2010	1	1	1				2	3		6	1	
2009	1	2	3	1	1	3		5	3	16	2	
2008		1	2	4	11	1		9	1	5	3	
2007		2	10	7	2	1		7		28		3
2006			2	10	4	1		4	4	8		1
2005			5	5	5			12	1	19	3	2
1994-04	5	16	9	37	47	5	20	88	4	150	48	11
Total	**12**	**25**	**40**	**82**	**93**	**14**	**30**	**186**	**35**	**283**	**89**	**17**

Revision reasons are not mutually exclusive. More than one reason for revision is possible

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
2019											1	
2018	1								1			
2016	1											
2008	1	1	1	1	1			2				
2007								1			1	
2006					1							
2005										1		
1994-04	3	2		1						5		
Total	**6**	**3**	**1**	**2**	**2**	**0**	**0**	**3**	**1**	**6**	**2**	**0**

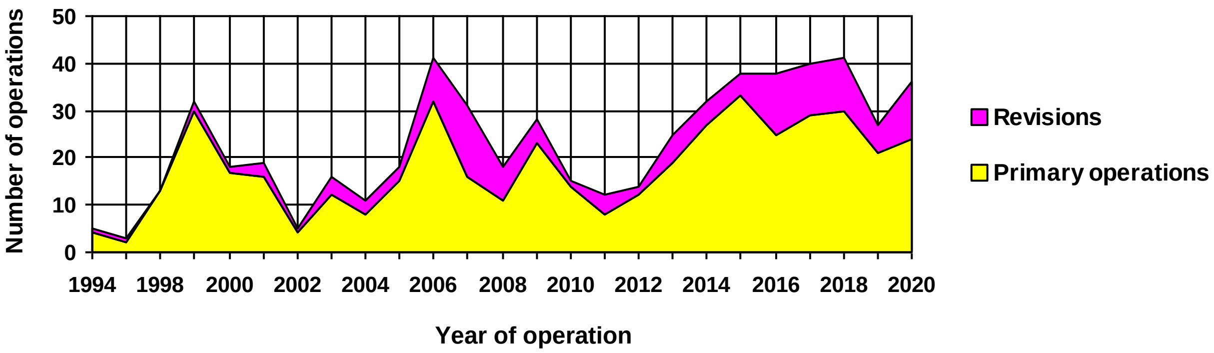
Revision reasons are not mutually exclusive. More than one reason for revision is possible

WRIST PROSTHESES

Table 1: Annual number of operations

Year	Primary operations		Revisions		Total
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**
2007	16	(51,6%)	15	(48,4%)	**31**
2006	32	(78,0%)	9	(22,0%)	**41**
2005	15	(83,3%)	3	(16,7%)	**18**
1994-04	106	(86,9%)	16	(13,1%)	**122**
Total	**445**	**(77,3%)**	**131**	**(22,7%)**	**576**

Figure 1: Annual number of operations



56,8 % of all operations were performed on the right side. 58 % performed in women. Mean age: 56,8 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
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
2007	1	6	6		1			2	
2006	5	19	6		1			3	
2005	5		4					6	
1994-04	3	90	5	1				7	
Total	**60**	**151**	**116**	**1**	**79**	**2**	**3**	**55**	**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
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**
2007					16	(100,0%)			**16**
2006					32	(100,0%)			**32**
2005					15	(100,0%)			**15**
2004	2	(25,0%)			6	(75,0%)			**8**
2003	1	(8,3%)			11	(91,7%)			**12**
2002					4	(100,0%)			**4**
2001	1	(6,3%)	1	(6,3%)	14	(87,5%)			**16**
2000	3	(17,6%)			14	(82,4%)			**17**
1999					29	(96,7%)	1	(3,3%)	**30**
1998					13	(100,0%)			**13**
1995					2	(100,0%)			**2**
1994					4	(100,0%)			**4**
Total	**7**	**(1,7%)**	**1**	**(0,2%)**	**398**	**(96,8%)**	**5**	**(1,2%)**	**411**

Table 4: Primary operations - Distal

Year	Cement with antibiotics		Cement without antibiotics		Uncemented		Missing		Total
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**
2007					15	(100,0%)			**15**
2006					32	(100,0%)			**32**
2005					15	(100,0%)			**15**
2004	4	(50,0%)			4	(50,0%)			**8**
2003	3	(25,0%)			9	(75,0%)			**12**
2002					3	(100,0%)			**3**
2001	1	(6,7%)			14	(93,3%)			**15**
2000	1	(5,9%)			16	(94,1%)			**17**
1999					30	(100,0%)			**30**
1998					13	(100,0%)			**13**
Total	**9**	**(2,1%)**			**422**	**(97,7%)**	**1**	**(0,2%)**	**432**

Wrist prostheses

Table 5: Primary operations - Proximal

Prostheses	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Motec Wrist	96	5	4	9	17	12	9	19	1	17	**189**
Biax	90										**90**
Remotion Wrist	3	3	10	13	13	8	6		2	1	**59**
Scheker Radio-ulnar	2	1	3	3	1	3	8	2	3		**26**
Elos[1]	23										**23**
Uhead (Druj)		3	2	2	1	2	4				**14**
Silastic ulnar head	7										**7**
Eclypse radio-ulnar	2										**2**
TMW	1										**1**
Total	**224**	**12**	**19**	**27**	**32**	**25**	**27**	**21**	**6**	**18**	**411**

Table 6: Primary operations - Distal

Prostheses	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Motec Wrist	96	5	4	9	17	12	9	19	1	17	**189**
Biax	89										**89**
Remotion Wrist	3	3	10	13	14	8	6		2	1	**60**
Scheker Radio-ulnar		1	3	3	1	3	8	2	3		**24**
Elos[1]	23										**23**
Herbert UHP								6	7	5	**18**
Uhead (Druj)		3	2	2	1	2	4				**14**
RCPI							2	3	8	1	**14**
TMW	1										**1**
Total	**212**	**12**	**19**	**27**	**33**	**25**	**29**	**30**	**21**	**24**	**432**

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
2020	3	1						4		1		9
2019	2				1			2	1	1		7
2018	2	4					1	3		1		11
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
2007		5		1	1	1		2	1	2		13
2006	3	5				1						9
2005		2		1								3
1994-04	2	5	1	1	6	2		8				25
Total	**15**	**43**	**4**	**6**	**13**	**9**	**1**	**36**	**5**	**11**	**0**	**142**

Revision reasons are not mutually exclusive. More than one reason for revision is possible

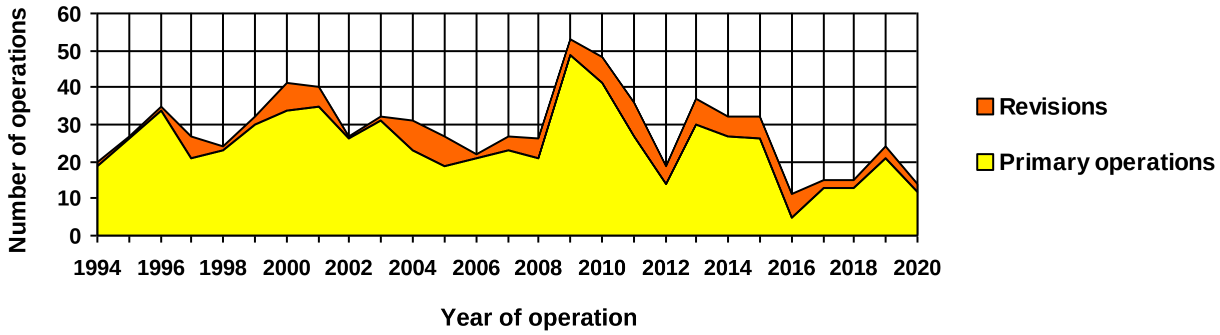
[1]Elos are 3 different development models of Motec Wrist. Motec Wrist was previously sold under the name Gibbon.

CARPOMETACARPAL PROSTHESES (CMC I)

Table 1: Annual number of operations

Year	Primary operations		Revisions		Total
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	13	(86,7%)	2	(13,3%)	**15**
2016	5	(45,5%)	6	(54,5%)	**11**
2015	26	(81,3%)	6	(18,8%)	**32**
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**
2007	23	(85,2%)	4	(14,8%)	**27**
2006	21	(95,5%)	1	(4,5%)	**22**
2005	19	(70,4%)	8	(29,6%)	**27**
1994-04	302	(89,9%)	34	(10,1%)	**336**
Total	**664**	**(85,8%)**	**110**	**(14,2%)**	**774**

Figure 1: Annual number of operations



47,5 % of all operations were performed on the right side. 80,2 % performed in women. Mean age: 62,5 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
2020	12								
2019	19				2				
2018	13								
2017	13								
2016	3	2							
2015	24	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							
2007	17	6						1	
2006	15	4						2	
2005	16	2						1	
1994-04	211	77	2	4				14	
Total	**531**	**109**	**3**	**5**	**2**	**1**	**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 antibiotics	Uncemented	Missing	Total
2020			12 (100,0%)		**12**
2019			21 (100,0%)		**21**
2018			13 (100,0%)		**13**
2017			13 (100,0%)		**13**
2016			5 (100,0%)		**5**
2015			26 (100,0%)		**26**
2014			26 (96,3%)	1 (3,7%)	**27**
2013			30 (100,0%)		**30**
2012			14 (100,0%)		**14**
2007-11			155 (96,9%)	5 (3,1%)	**160**
2002-06	2 (1,7%)		118 (98,3%)		**120**
1994-01	1 (0,5%)		220 (99,1%)	1 (0,5%)	**222**
Total	**3 (0,5%)**		**653 (98,5%)**	**7 (1,1%)**	**663**

Carpometacarpal prostheses - Prosthesis brand

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

Prostheses	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Swanson Silastic Trapezium	334	6	8	8	4	2		1			**363**
Swanson Titanium Basal	72										**72**
Motec	53	2									**55**
Elektra	31	5	4	5	8	2					**55**
Motec II		1	18	14	14						**47**
ARPE						1	9	8	10	4	**32**
Moovis								4	7	8	**19**
Avanta Trapezium	7										**7**
Custom made	5										**5**
Pyrocardan									4		**4**
IVORY							4				**4**
Total	**502**	**14**	**30**	**27**	**26**	**5**	**13**	**13**	**21**	**12**	**663**

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
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			
2007			1	3				1			
2006			1								
2005			3	1				6		1	
1994-04	2		14	2				19	1	7	1
Total	**32**	**0**	**37**	**9**	**0**	**3**	**1**	**45**	**3**	**10**	**1**

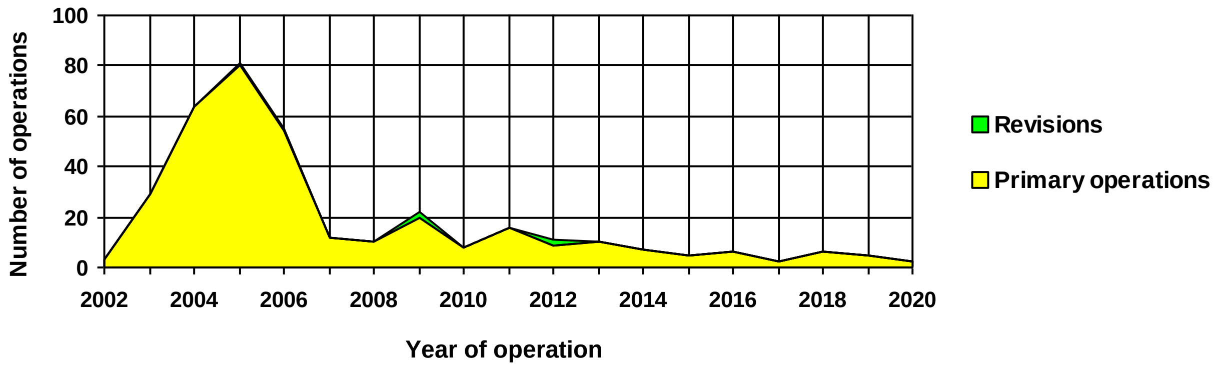
Revision reasons are not mutually exclusive. More than one reason for revision is possible

LUMBAR DISC PROSTHESES

Table 1: Annual number of operations

Year	Primary operations		Revisions		Total
2020	2	(100,0%)			**2**
2019	5	(100,0%)			**5**
2018	6	(100,0%)			**6**
2017	2	(100,0%)			**2**
2016	6	(100,0%)			**6**
2015	5	(100,0%)			**5**
2014	7	(100,0%)			**7**
2013	10	(100,0%)			**10**
2012	9	(81,8%)	2	(18,2%)	**11**
2011	16	(100,0%)			**16**
2010	8	(100,0%)			**8**
2009	20	(90,9%)	2	(9,1%)	**22**
2008	10	(100,0%)			**10**
2007	12	(100,0%)			**12**
2006	54	(98,2%)	1	(1,8%)	**55**
2005	80	(98,8%)	1	(1,2%)	**81**
2004	64	(100,0%)			**64**
2003	29	(100,0%)			**29**
2002	3	(100,0%)			**3**
Total	**348**	**(98,3%)**	**6**	**(1,7%)**	**354**

Figure 1: Annual number of operations



59,6 % performed in women. Mean age: 43,4 years.

Table 2: Back disease - Primary operations

Year	Idiopathic osteoarthritis	Sequelae after fracture	Spondylitis	Sequelae after prolapse surgery	Disc degeneration	Sequelae of infection	Other	Missing
2020					2			
2019					5			
2018	1				6			
2017					2			
2016	1				6			
2015					5			
2014			5		2			
2013				1	9			
2012					9			
2007-11			6	9	54		4	
2002-06	10	1	150	33	39	1	24	
Totalt	**12**	**1**	**161**	**43**	**139**	**1**	**28**	**0**

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

Use of cement in lumbar disc prostheses

Table 3: Primary operations - Proximal

Year	Cement with antibiotics		Cement without antibiotics		Uncemented		Missing		Total
2020					2	(100,0%)			**2**
2019					5	(100,0%)			**5**
2018					6	(100,0%)			**6**
2017					2	(100,0%)			**2**
2016					6	(100,0%)			**6**
2015					5	(100,0%)			**5**
2014					7	(100,0%)			**7**
2013					10	(100,0%)			**10**
2012					9	(100,0%)			**9**
2007-11					66	(100,0%)			**66**
2002-06					230	(100,0%)			**230**
Total					**348**	**(100,0%)**			**348**

Table 4: Primary operations - Distal

Year	Cement with antibiotics		Cement without antibiotics		Uncemented		Missing		Total
2020					2	(100,0%)			**2**
2019					5	(100,0%)			**5**
2018					6	(100,0%)			**6**
2017					2	(100,0%)			**2**
2016					6	(100,0%)			**6**
2015					5	(100,0%)			**5**
2014					7	(100,0%)			**7**
2013					10	(100,0%)			**10**
2012					9	(100,0%)			**9**
2007-11	2	(3,0%)			63	(95,5%)	1	(1,5%)	**66**
2002-06	1	(0,4%)			228	(99,1%)	1	(0,4%)	**230**
Total	**3**	**(0,9%)**			**343**	**(98,6%)**	**2**	**(0,6%)**	**348**

Lumbar disc prostheses - Prosthesis brand

Table 5: Primary operations - Proximal

Prostheses	2002-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Prodisc	234	9	10	7	5	6	2	1			**274**
Charité	62										**62**
BAGUERA L								3	5	2	**10**
Mobidisc L								2			**2**
Total	**296**	**9**	**10**	**7**	**5**	**6**	**2**	**2**	**5**	**2**	**348**

Table 6: Primary operations - Distal

Prostheses	2002-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Prodisc	234	9	10	7	5	6	2	1			**274**
Charité	62										**62**
BAGUERA L								3	5	2	**10**
Mobidisc L								2			**2**
Total	**296**	**9**	**10**	**7**	**5**	**6**	**2**	**2**	**5**	**2**	**348**

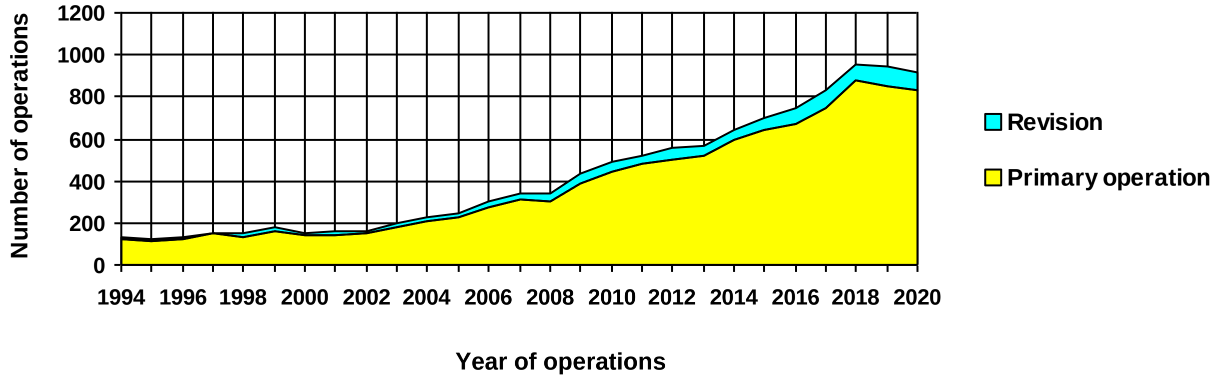
SHOULDER PROSTHESES

Table 1: Annual number of operations in shoulder prostheses

Year	Primary operations		Reoperations *		Revisions		Total
2020	831	(90,6%)	4	(0,4%)	82	(8,9%)	**917**
2019	853	(90,5%)	1	(0,1%)	89	(9,4%)	**943**
2018	877	(91,8%)			78	(8,2%)	**955**
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**
2014	596	(92,5%)			48	(7,5%)	**644**
2013	517	(90,9%)	2	(0,4%)	50	(8,8%)	**569**
2012	500	(89,1%)	1	(0,2%)	60	(10,7%)	**561**
1994-11	4 050	(91,4%)			381	(8,6%)	**4 431**
Total	**10 284**	**(91,0%)**	**9**	**(0,1%)**	**1 003**	**(8,9%)**	**11 296**

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

Figure 1a: Annual number of operations - All prostheses



53,6 % of all operations were performed on the right side 69,6 % performed in women. Mean age: 70,1 years.

COVID-19

Figure 1b: Monthly primary operations in 2019 - 2020

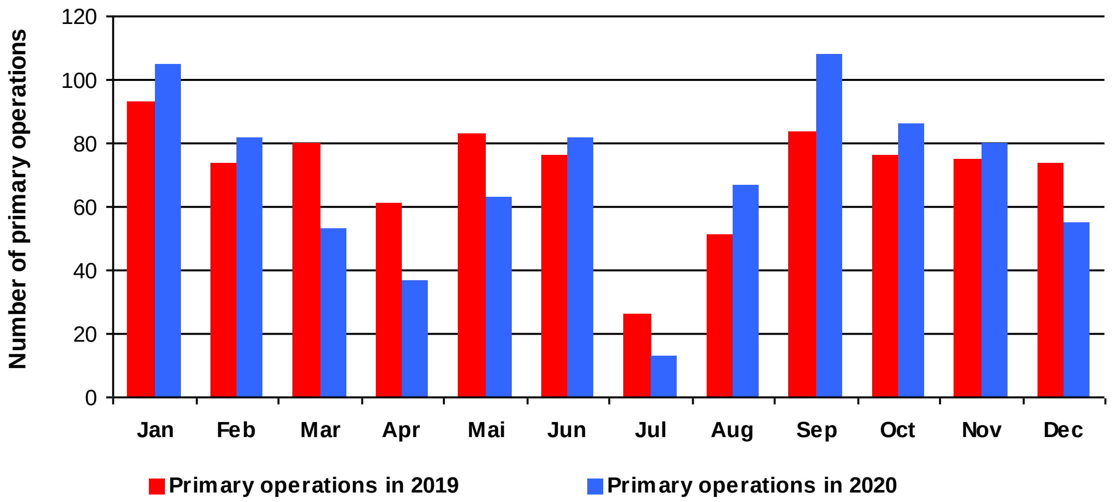


Figure 2a: Prostheses - all operations

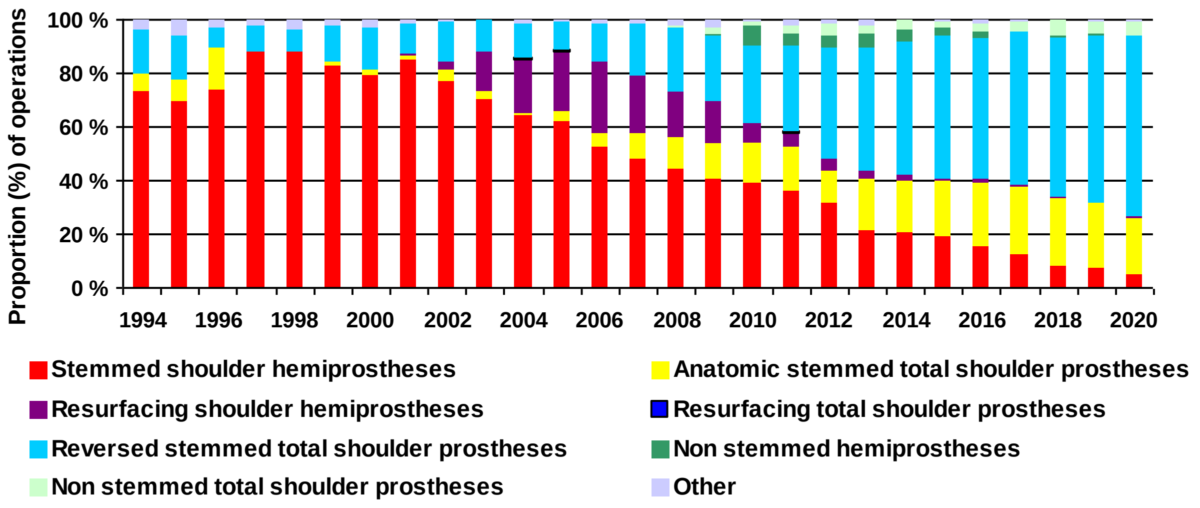


Figure 2b: Prostheses - Idiopathic osteoarthritis

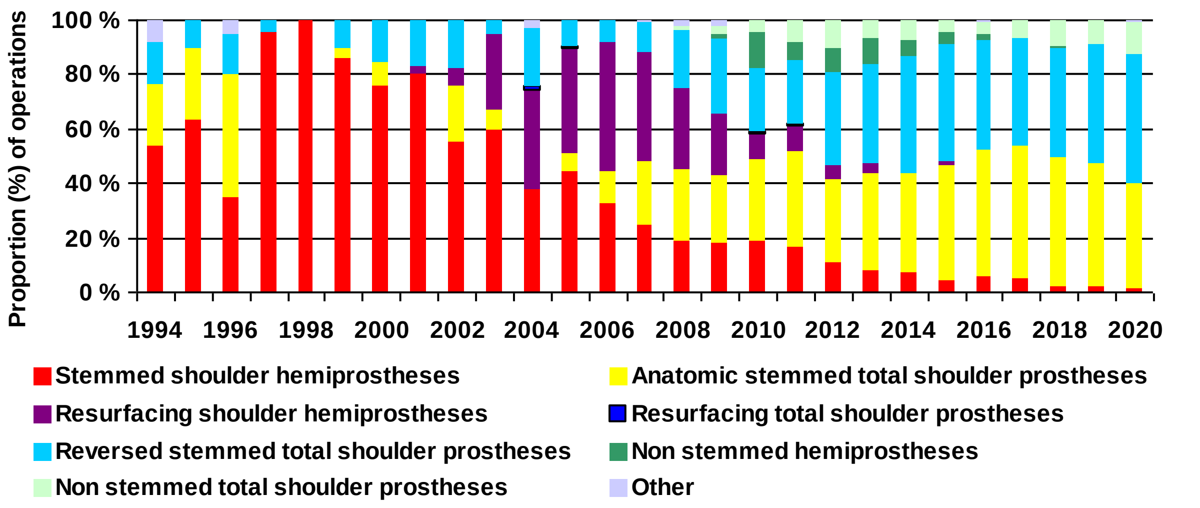


Figure 2c: Prostheses - Acute fracture

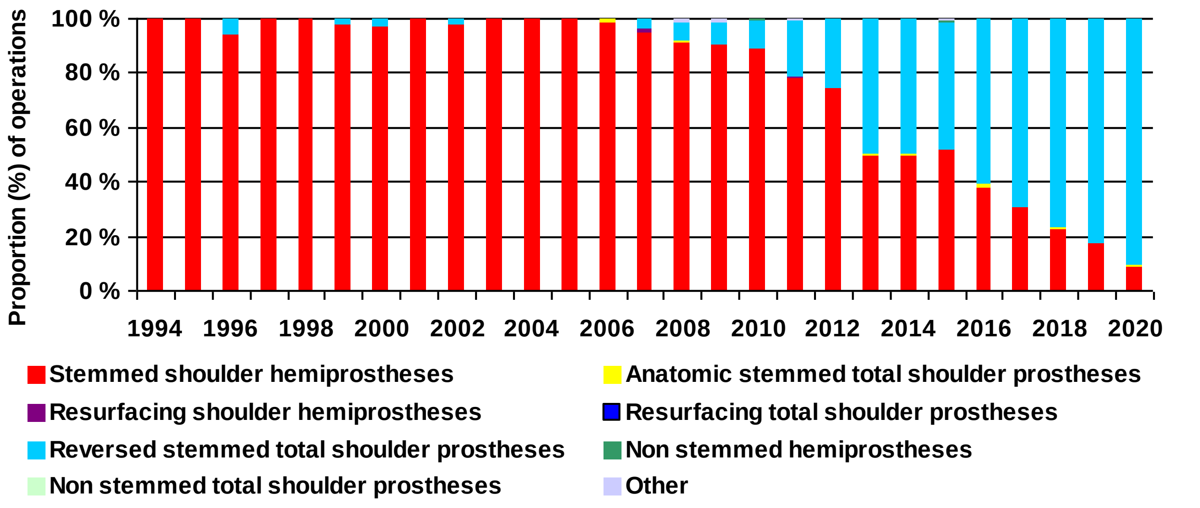


Figure 3: Age at the insertion of primary total prostheses

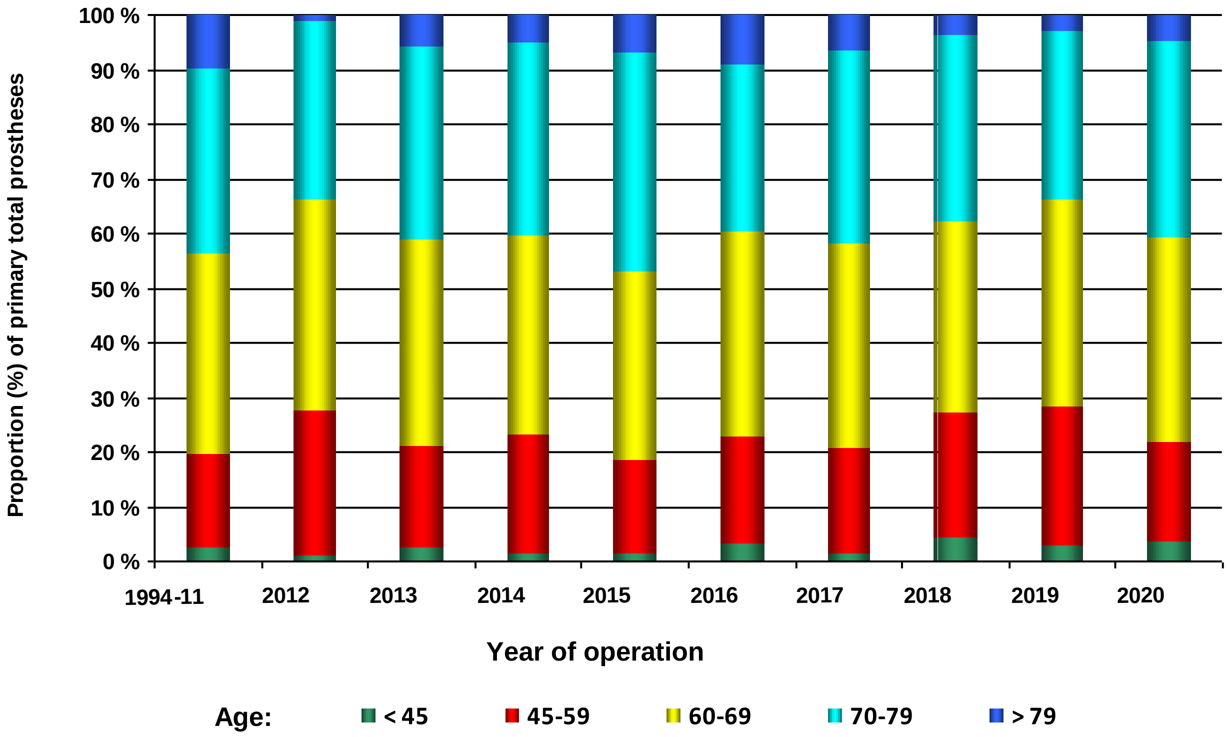


Figure 4: Age at the insertion of primary reversed total prostheses

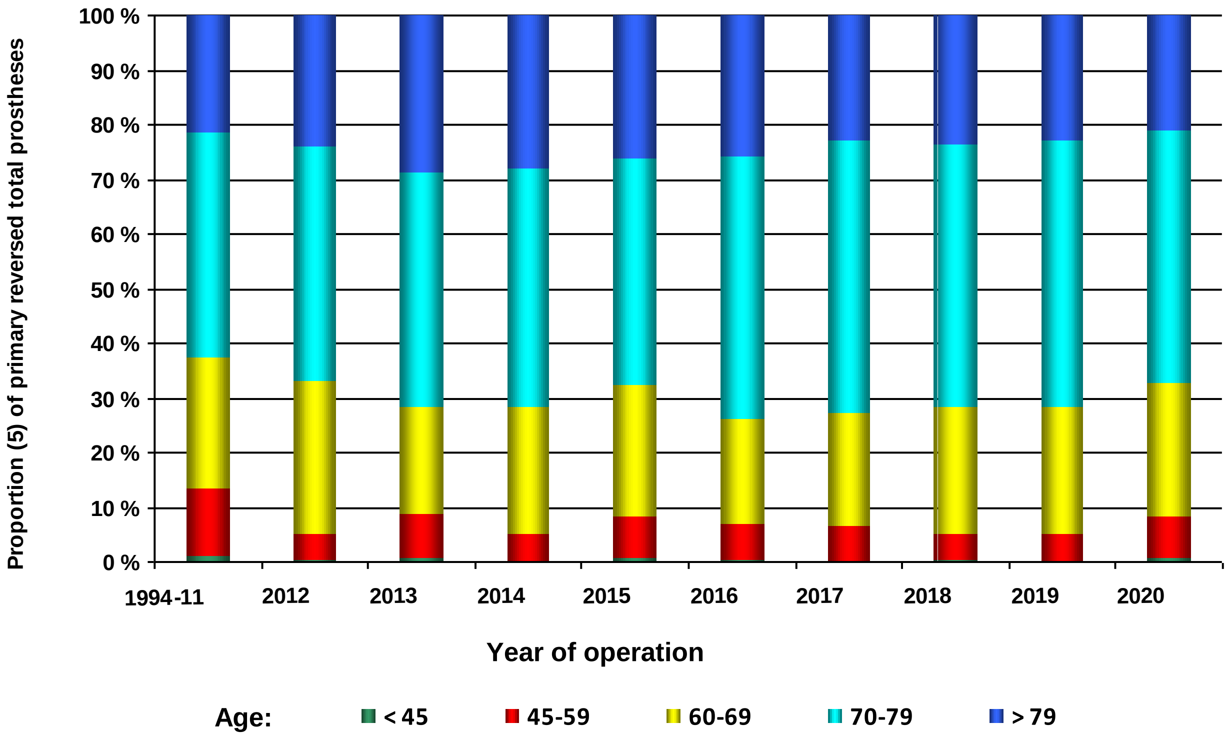


Figure 5: Age at the insertion of primary hemiprostheses

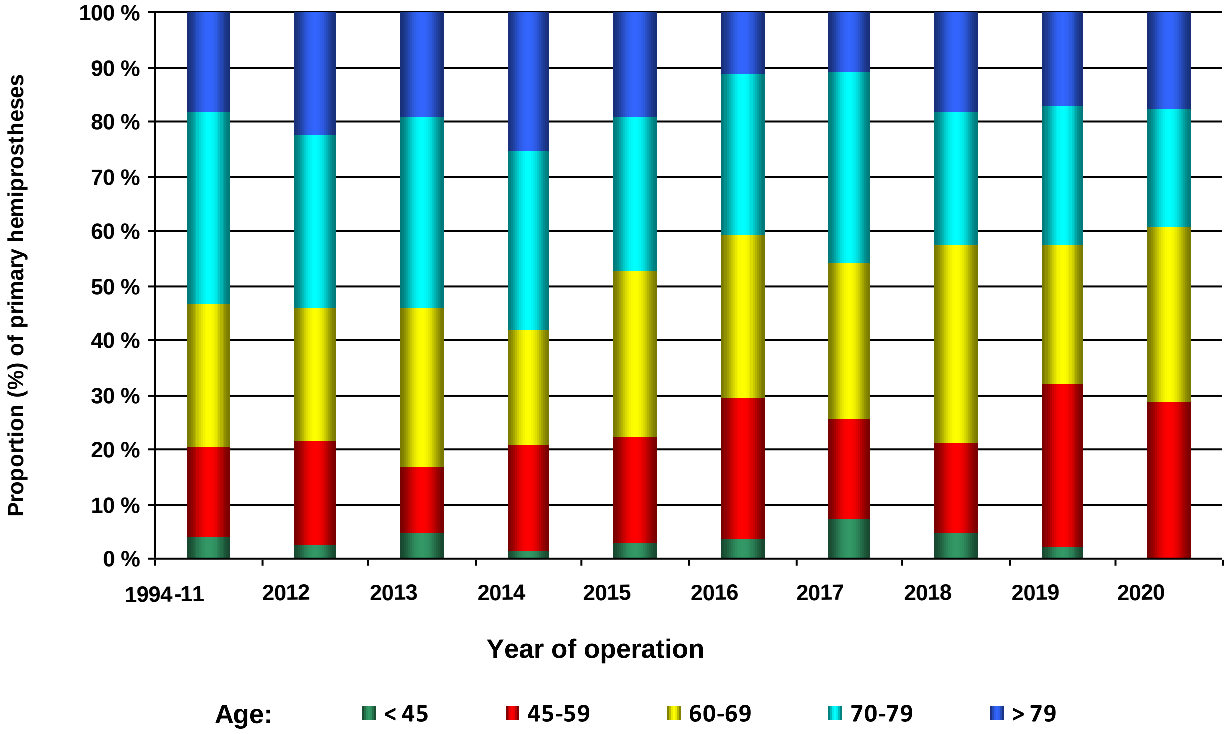


Table 2: Annual number of operations - Stemmed shoulder hemiprostheses

Year	Primary operations		Reoperations *		Revisions		Total
2020	28	(59,6%)	2	(4,3%)	17	(36,2%)	**47**
2019	46	(65,7%)			24	(34,3%)	**70**
2018	65	(76,5%)			20	(23,5%)	**85**
2017	83	(77,6%)	1	(0,9%)	23	(21,5%)	**107**
2016	95	(82,6%)			20	(17,4%)	**115**
2015	115	(85,8%)			19	(14,2%)	**134**
2014	123	(93,2%)			9	(6,8%)	**132**
2013	107	(85,6%)			18	(14,4%)	**125**
2012	164	(91,6%)			15	(8,4%)	**179**
1994-11	2 358	(92,8%)			183	(7,2%)	**2 541**
Total	**3 184**	**(90,1%)**	**3**	**(0,1%)**	**348**	**(9,8%)**	**3 535**

* 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

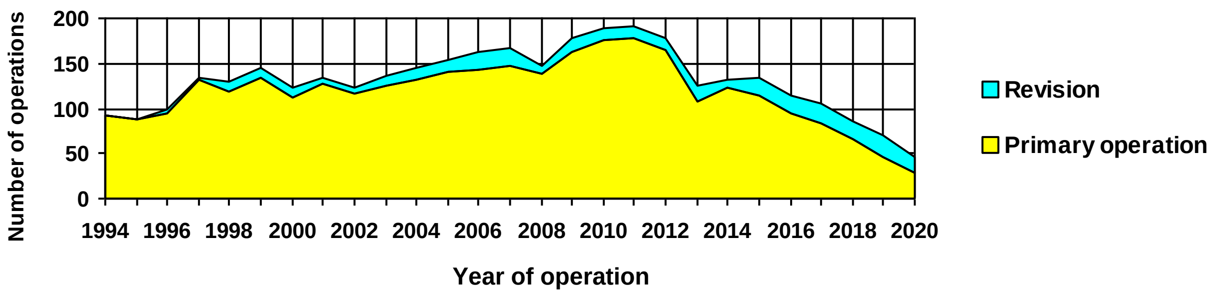


Table 3: Annual number of operations - Anatomic stemmed total shoulder prostheses

Year	Primary operations		Revisions		Total
2020	183	(94,3%)	10	(5,2%)	**194**
2019	209	(91,3%)	20	(8,7%)	**229**
2018	224	(94,9%)	12	(5,1%)	**236**
2017	190	(92,2%)	16	(7,8%)	**206**
2016	169	(92,9%)	13	(7,1%)	**182**
2015	141	(95,9%)	6	(4,1%)	**147**
2014	120	(91,6%)	11	(8,4%)	**131**
2013	101	(95,3%)	5	(4,7%)	**106**
2012	63	(94,0%)	4	(6,0%)	**67**
1994-11	353	(88,7%)	45	(11,3%)	**398**
Total	**1 753**	**(92,5%)**	**142**	**(7,5%)**	**1 896**

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

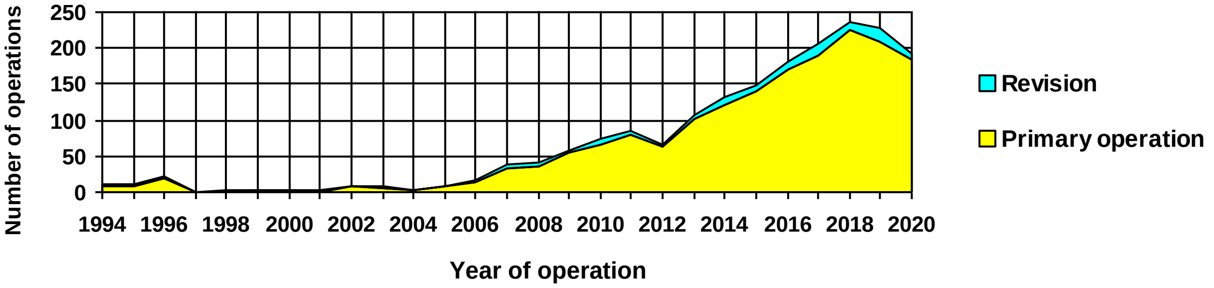


Table 4: Annual number of operations - Resurfacing shoulder hemiprostheses

Year	Primary operations		Revisions		Total
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**
2014			11	(100,0%)	**11**
2013	9	(52,9%)	8	(47,1%)	**17**
2012	11	(45,8%)	13	(54,2%)	**24**
1994-11	415	(89,8%)	47	(10,2%)	**462**
Total	**438**	**(78,4%)**	**121**	**(21,6%)**	**559**

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

Year	Primary operations		Revisions		Total
1994-11	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
2020	574	(91,7%)	5	(0,8%)	47	(7,5%)	**626**
2019	558	(93,6%)	1	(0,2%)	37	(6,2%)	**596**
2018	536	(92,3%)	2	(0,3%)	43	(7,4%)	**581**
2017	441	(93,8%)			29	(6,2%)	**470**
2016	378	(95,0%)	1	(0,3%)	19	(4,8%)	**398**
2015	353	(92,4%)			29	(7,6%)	**382**
2014	309	(94,2%)			19	(5,8%)	**328**
2013	254	(95,1%)			13	(4,9%)	**267**
2012	217	(90,4%)	1	(0,4%)	22	(9,2%)	**240**
1994-11	799	(91,6%)			73	(8,4%)	**872**
Total	**4 419**	**(92,8%)**	**10**	**(0,2%)**	**331**	**(7,0%)**	**4 760**

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

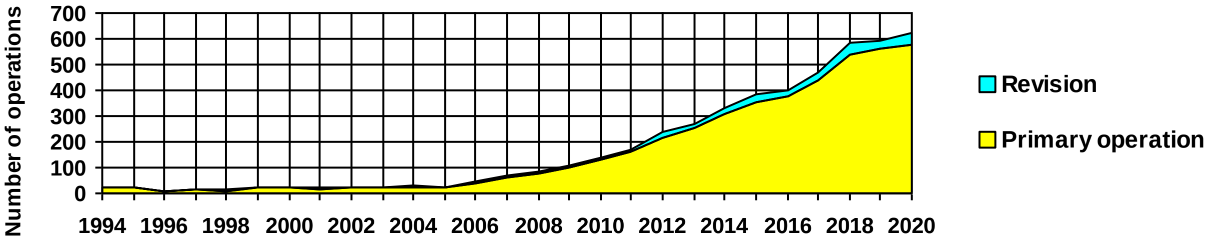


Table 7: Annual number of operations - Non stemmed hemiprostheses

Year	Primary operations		Revisions		Total
2020			2	(100,0%)	**2**
2019	1	(14,3%)	6	(85,7%)	**7**
2018	1	(16,7%)	5	(83,3%)	**6**
2017			4	(100,0%)	**4**
2016	13	(76,5%)	4	(23,5%)	**17**
2015	17	(73,9%)	6	(26,1%)	**23**
2014	23	(82,1%)	5	(17,9%)	**28**
2013	28	(100,0%)			**28**
2012	24	(82,8%)	5	(17,2%)	**29**
1994-11	61	(98,4%)	1	(1,6%)	**62**
Total	**168**	**(81,6%)**	**38**	**(18,4%)**	**206**

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

Year	Primary operations		Revisions		Total
2020	46	(97,9%)	1	(2,1%)	**47**
2019	39	(90,7%)	4	(9,3%)	**43**
2018	50	(87,7%)	7	(12,3%)	**57**
2017	28	(90,3%)	3	(9,7%)	**31**
2016	18	(78,3%)	5	(21,7%)	**23**
2015	15	(75,0%)	5	(25,0%)	**20**
2014	21	(95,5%)	1	(4,5%)	**22**
2013	18	(100,0%)			**18**
2012	20	(80,0%)	5	(20,0%)	**25**
1994-11	38	(100,0%)			**38**
Total	**293**	**(90,4%)**	**31**	**(9,6%)**	**324**

Reasons for primary operations

Table 9: Shoulder disease in primary operations

Year	Idiopathic osteo-arthritis	Rheumatoid arthritis	Sequelae after fracture	Mb. Bechte-rew	Sequelae ligament tear	Acute fracture	Sequelae after infection	Rotarcuff arthropathy	Other	Missing
2020	384	22	89	2	21	219	5	116	51	
2019	395	26	109		16	208	4	129	45	
2018	407	45	102	1	22	212	5	131	45	
2017	332	40	104		12	167	4	124	44	
2016	294	39	97	3	17	168	3	85	20	
2015	294	36	89	1	19	164	6	61	31	
2014	267	29	79	2	22	177	2	39	23	
2013	238	31	59	1	19	157	2	26	12	
2012	179	26	70	3	26	170	4	34	20	
1994-11	1273	829	720	24	35	1023	25	118	190	18
Total	**4 063**	**1 123**	**1 518**	**37**	**209**	**2 665**	**60**	**863**	**481**	**18**

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	Mb. Bechte-rew	Sequelae ligament tear	Acute fracture	Sequelae after infection	Rotarcuff arthropathy	Other	Missing
2020	6		1			19	1	1	1	
2019	8		2			36			2	
2018	9		7			48		4	5	
2017	17	3	10			52	1	1	7	
2016	16	1	9	1		64		2	3	
2015	14	2	15			85	1		5	
2014	20		15			89			3	
2013	19	1	7		1	78		2	3	
2012	20	3	13			126			4	
1994-11	439	459	471	16	7	954	8	6	88	10
Total	**568**	**469**	**550**	**17**	**8**	**1 551**	**11**	**16**	**121**	**10**

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

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

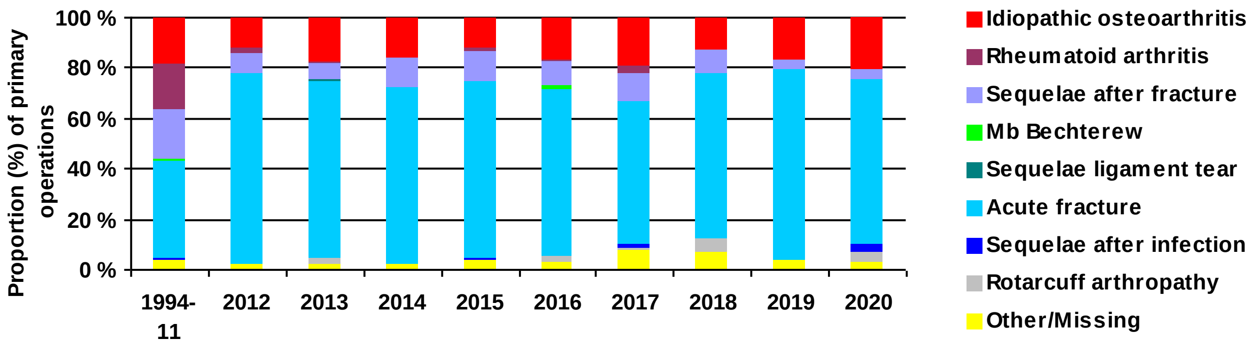


Table 11: Shoulder disease in primary operations - Anatomic stemmed total shoulder prostheses

Year	Idiopathic osteo-arthritis	Rheumatoid arthritis	Sequelae after fracture	Mb. Bechte-rew	Sequelae ligament tear	Acute fracture	Sequelae after infection	Rotarcuff arthropathy	Other	Missing
2020	151	5	13		6	1	1	2	8	
2019	180	7	17		5		2	1	10	
2018	195	14	11	1	3	1		2	9	
2017	161	3	16		4				11	
2016	140	7	20		1	2	1		2	
2015	125	4	7		1		1		6	
2014	96	5	14		3				4	
2013	86	3	10		1	1	1			
2012	56	1	4		1				2	
1994-11	262	26	43	1	4	2	3		16	2
Total	**1 452**	**75**	**155**	**2**	**29**	**7**	**9**	**5**	**68**	**2**

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

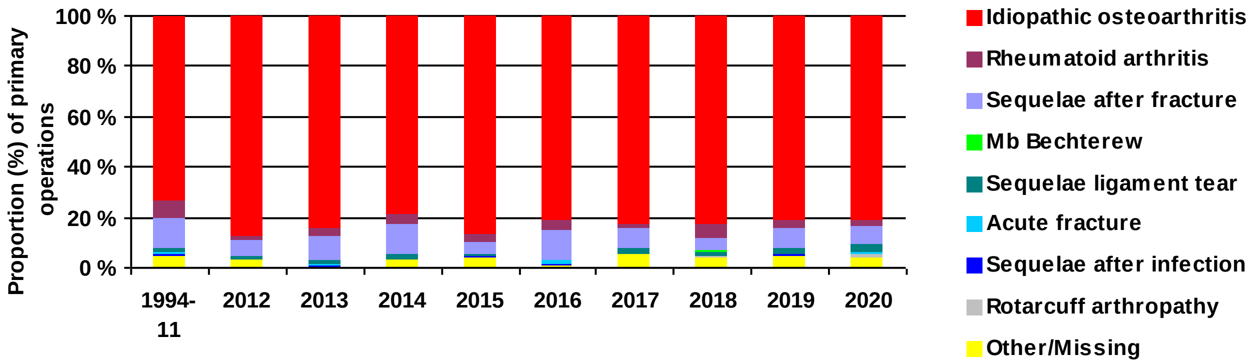


Table 12: Shoulder disease in primary operations - Resurfacing shoulder hemiprostheses

Year	Idiopathic osteo-arthritis	Rheumatoid arthritis	Sequelae after fracture	Mb. Bechte-rew	Sequelae ligament tear	Acute fracture	Sequelae after infection	Rotarcuff arthropathy	Other	Missing
2015	3									
2013	8		1	1						
2012	9								2	
1994-11	274	94	33	3	5	1	3	5	17	3
Total	**294**	**94**	**34**	**4**	**5**	**1**	**3**	**5**	**19**	**3**

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

Figure 11:Shoulder disease in primary operations - Resurfacing shoulder hemiprostheses

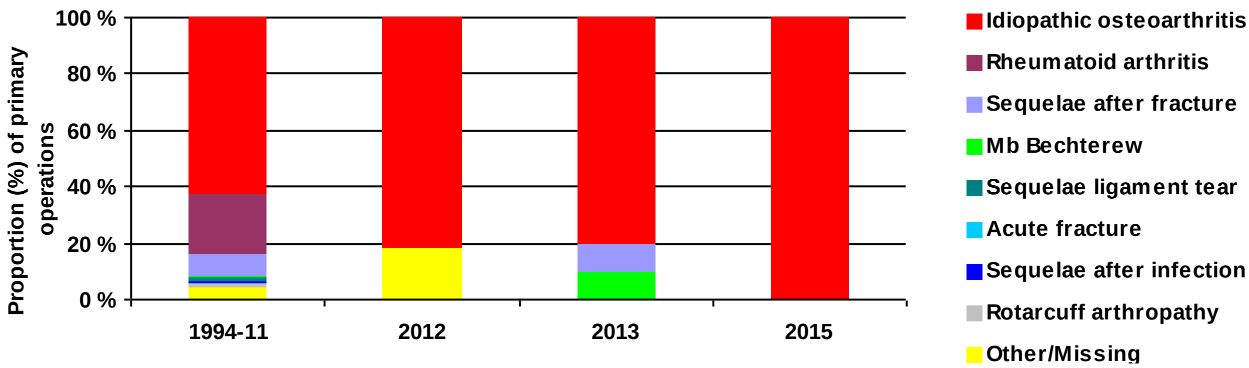


Table 13: Shoulder disease in primary operations - Resurfacing total shoulder prostheses

Year	Idiopathic osteo-arthritis	Rheumatoid arthritis	Sequelae after fracture	Mb. Bechte-rew	Sequelae ligament tear	Acute fracture	Sequelae after infection	Rotarcuff arthropathy	Other	Missing
1994-11	4								1	
Total	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**

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

Figure 12: Shoulder disease in primary operations - Resurfacing total shoulder prostheses

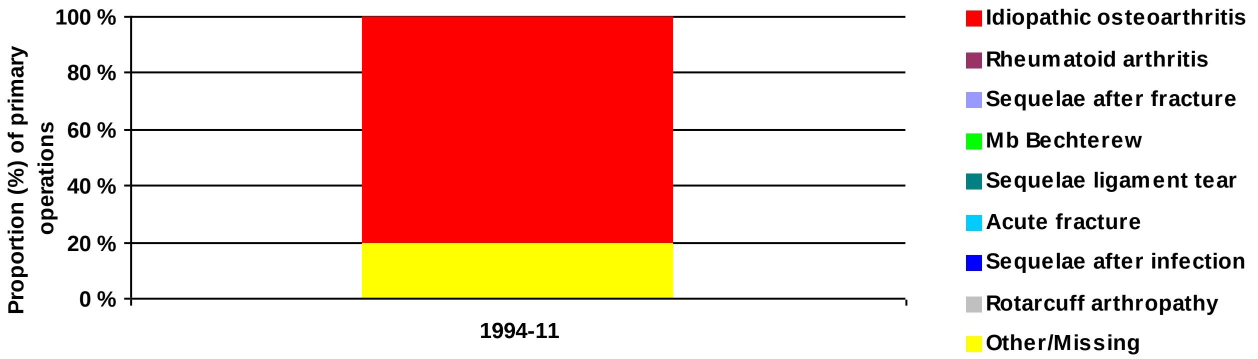


Table 14: Shoulder disease in primary operations - Reversed stemmed total shoulder prostheses

Year	Idiopathic osteo-arthritis	Rheumatoid arthritis	Sequelae after fracture	Mb. Bechte-rew	Sequelae ligament tear	Acute fracture	Sequelae after infection	Rotarcuff arthropathy	Other	Missing
2020	184	17	75	2	12	199	3	113	39	
2019	175	19	88		10	172	2	127	26	
2018	165	31	81		16	163	5	125	21	
2017	134	34	74		8	115	2	123	20	
2016	119	29	62	2	13	102	2	82	14	
2015	126	30	63	1	17	78	4	60	19	
2014	117	24	45	2	18	88	2	39	12	
2013	87	26	37		15	78	1	24	4	
2012	61	19	50		24	44	4	33	10	
1994-11	221	234	158	4	18	63	10	107	49	3
Total	**1 389**	**463**	**733**	**11**	**151**	**1 102**	**35**	**833**	**214**	**3**

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

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

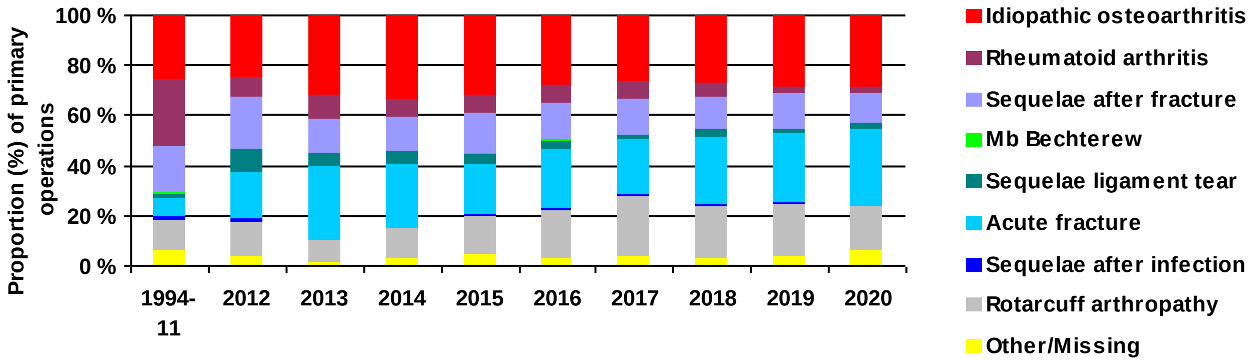


Table 15: Shoulder disease in primary operations - Non stemmed shoulder hemiprostheses

Year	Idiopathic osteo-arthritis	Rheumatoid arthritis	Sequelae after fracture	Mb. Bechte-rew	Sequelae ligament tear	Acute fracture	Sequelae after infection	Rotarcuff arthropathy	Other	Missing
2019	1									
2018	1									
2016	7		5		1				1	
2015	13		3			1		1	1	
2014	16		2		1				4	
2013	23	1	3		1				3	
2012	16	3	3	2				1		
1994-11	39	9	11		1	1			5	
Total	**116**	**13**	**27**	**2**	**4**	**2**	**0**	**2**	**14**	**0**

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

Figure 14: Shoulder disease in primary operations - Non stemmed shoulder hemiprostheses

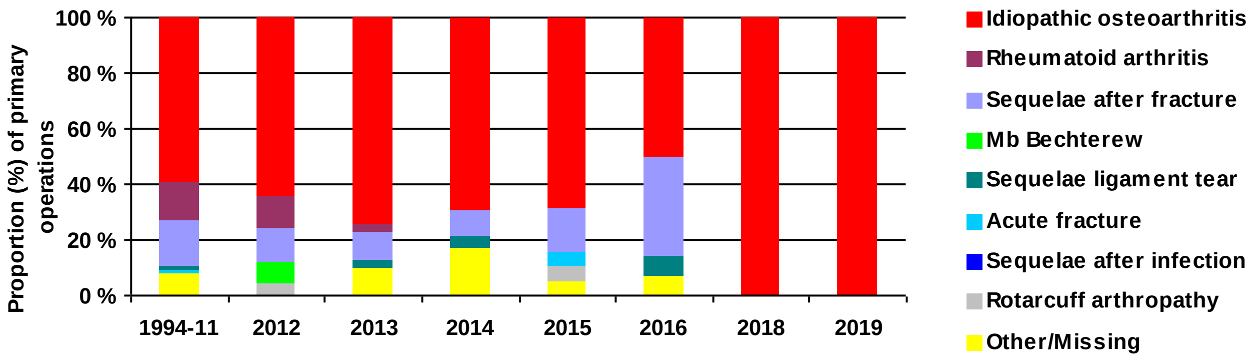
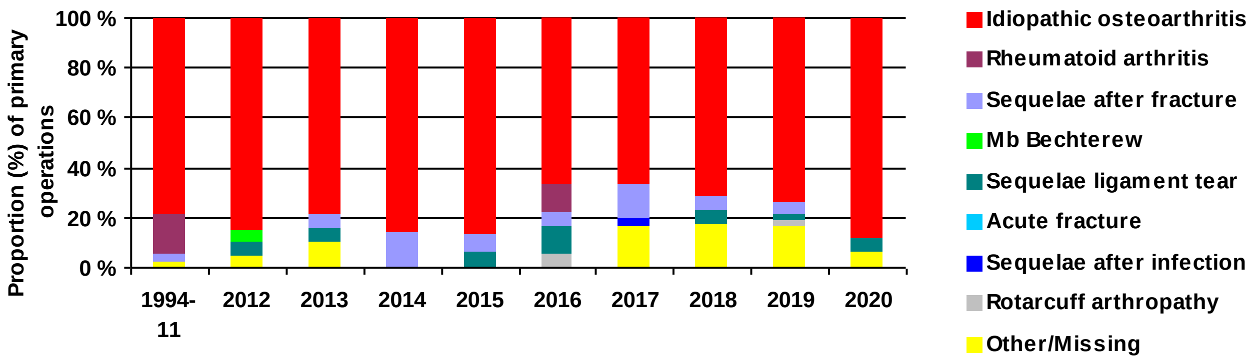


Table 16: Shoulder disease in primary operations - Non stemmed total shoulder prostheses

Year	Idiopathic osteo-arthritis	Rheumatoid arthritis	Sequelae after fracture	Mb. Bechte-rew	Sequelae ligament tear	Acute fracture	Sequelae after infection	Rotarcuff arthropathy	Other	Missing
2020	43				3				3	
2019	31		2		1			1	7	
2018	37		3		3				9	
2017	20		4				1		5	
2016	12	2	1		2			1		
2015	13		1		1					
2014	18		3							
2013	15		1		1				2	
2012	17			1	1				1	
1994-11	30	6	1						1	
Total	**236**	**8**	**16**	**1**	**12**	**0**	**1**	**2**	**28**	**0**

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

Figure 15: Shoulder disease in primary operations - Non stemmed total shoulder prostheses



Use of cement in shoulder prostheses

Figure 16: Stemmed shoulder hemiprostheses - Primary operations - Humerus

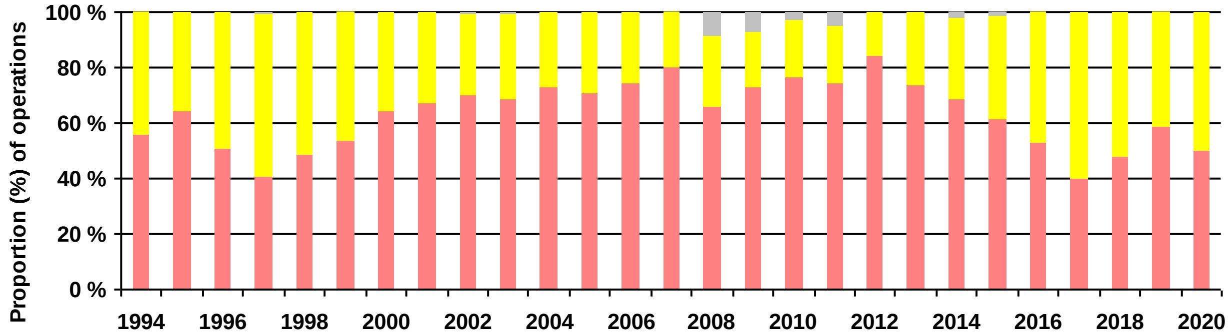


Figure 17: Anatomic stemmed total shoulder prostheses - Primary operations - Glenoid

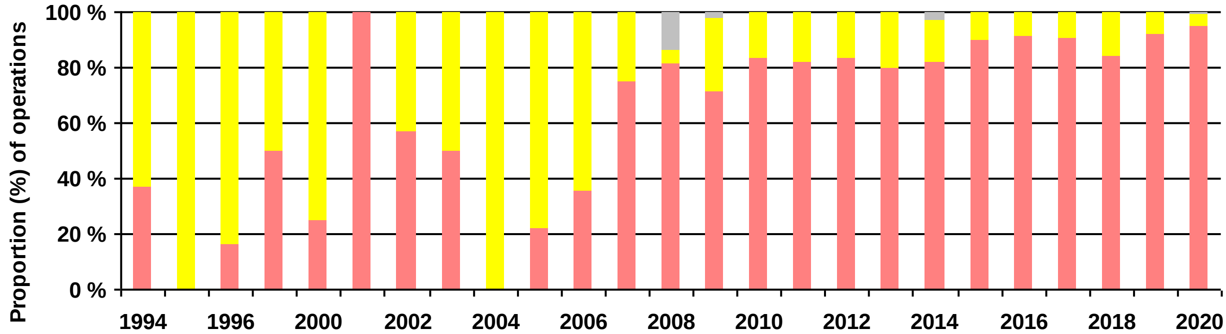


Figure 18: Anatomic stemmed total shoulder prostheses - Primary operations - Humerus

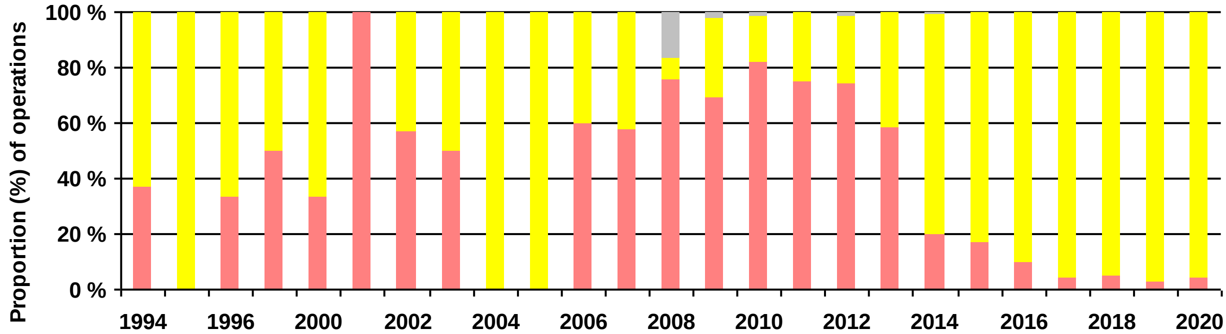


Figure 19: Resurfacing shoulder hemiprostheses - Primary operations - Humerus

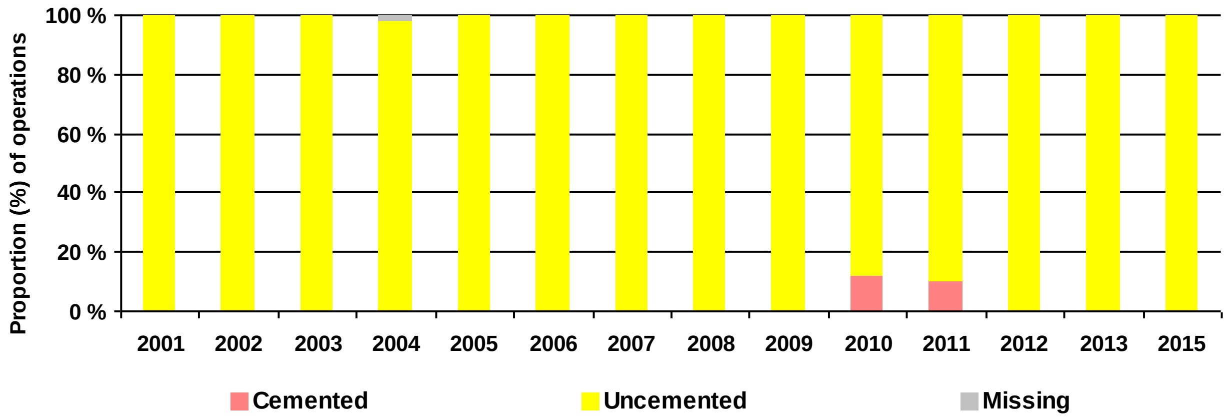


Figure 20: Resurfacing total shoulder prostheses - Primary operations - Glenoid

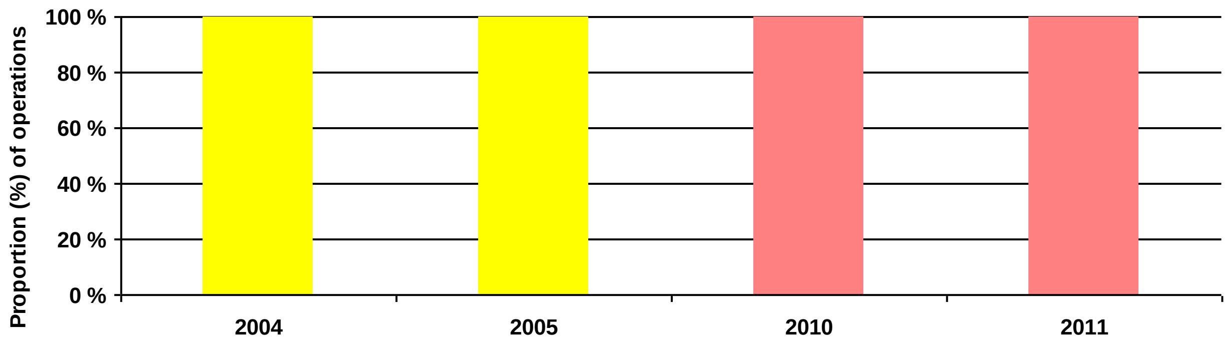


Figure 21: Resurfacing total shoulder prostheses - Primary operations - Humerus

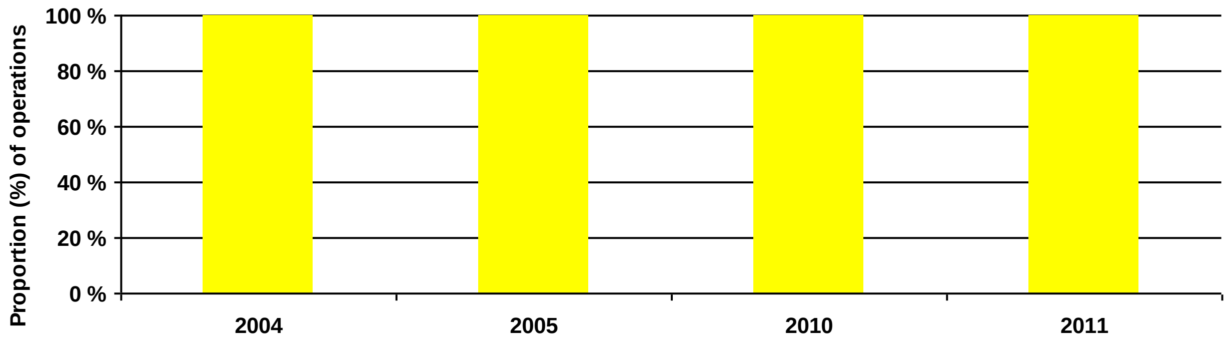


Figure 22: Reversed stemmed total shoulder prostheses - Primary operations - Glenoid

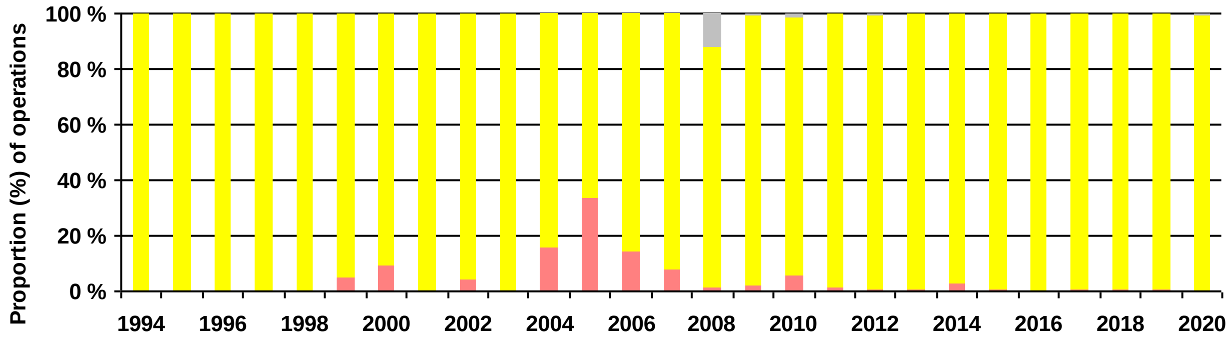


Figure 23: Reversed stemmed total shoulder prostheses - Primary operations - Humerus

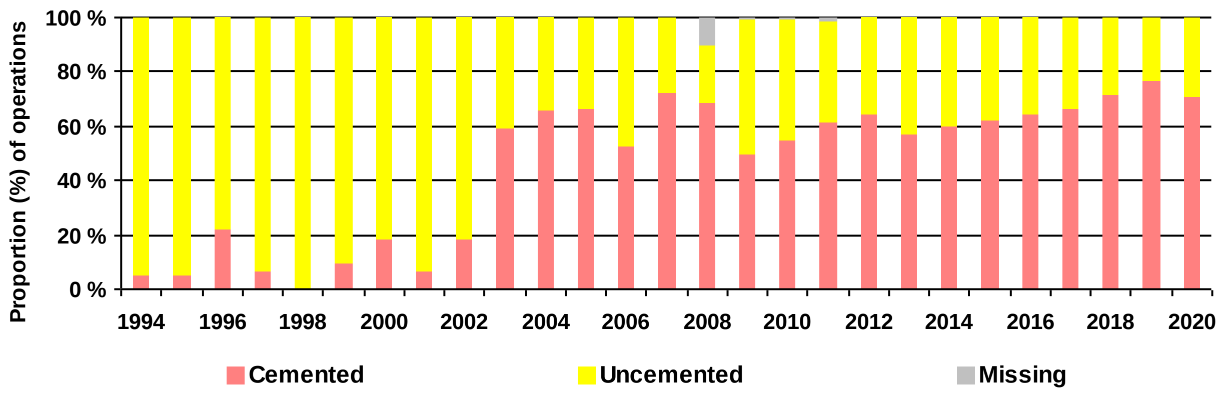


Figure 24: Non stemmed shoulder hemiprostheses - Primary operations - Humerus

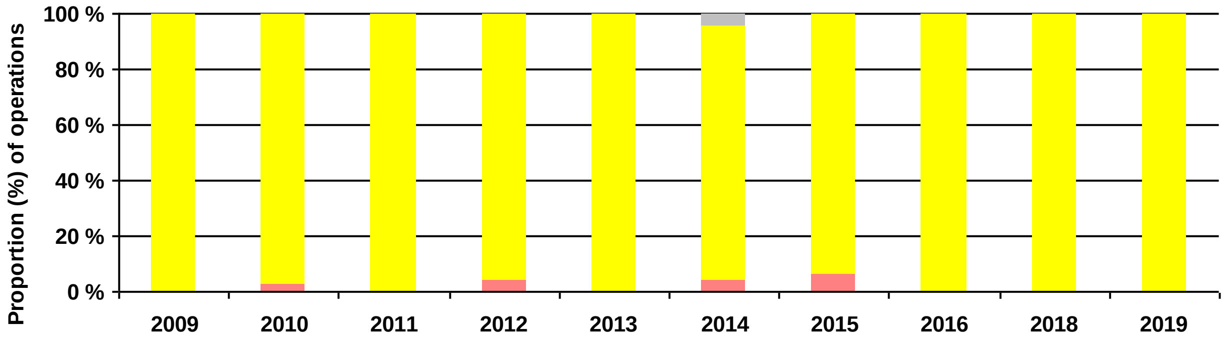


Figure 25: Non stemmed total shoulder prostheses - Primary operations - Glenoid

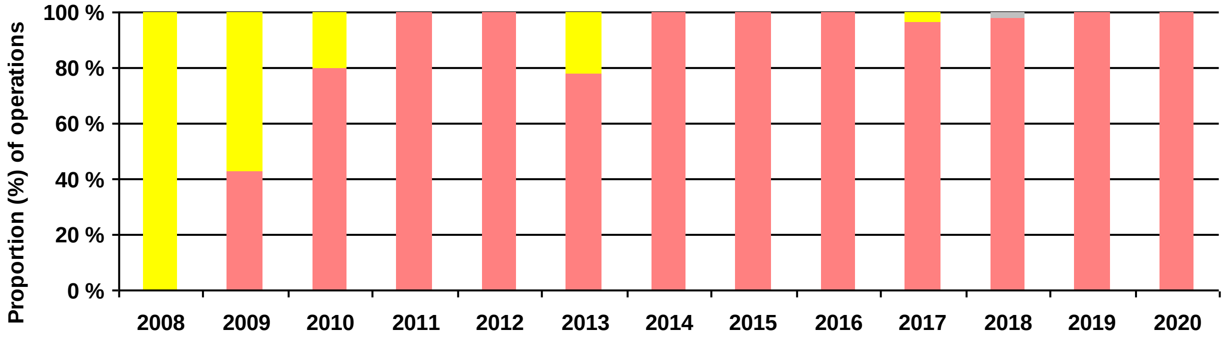
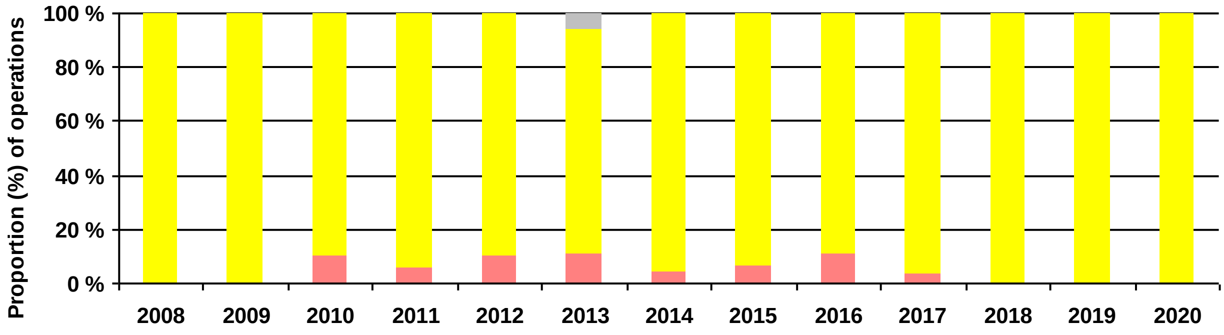


Figure 26: Non stemmed total shoulder prostheses - Primary operations - Humerus



Prosthesis brand

Stemmed hemiprostheses shoulder

Table 17: Primary operations- Caput humeri

Prostheses	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Bio - Modular	739	20	2	1	2			2			**766**
Global Advantage	558	44	36	40	34	15	1				**728**
Global Fx	171	50	17	16	13	11			1		**279**
Global	248										**248**
Nottingham	201	3									**204**
Global Unite		1		14	23	34	31	37	26	11	**177**
EPOCA	75	24	20	21	5						**145**
Delta I	63										**63**
Comprehensive		2	4	6	5	13	16	4	5	7	**62**
Promos standard		8	14	11	11	6	2				**52**
SMR- anatomic				1	2	7	13	11	8	4	**46**
Aequalis	32	5	5								**42**
Aequalis-Fracture	26	2	3	3	1	1	3	2			**41**
Aequalis Ascend Flex Anatomic			1	2	8	2	11	6	4	5	**39**
Nottingham 1	31	4	2								**37**
Modular	33										**33**
Bigliani/Flatow	27		2		1			1	1		**32**
JR-Vaios Anatomic			1	7	9	3	6	2	1		**29**
Other (n < 10)	7			1	1	3				1	**13**
Total	**2 211**	**163**	**107**	**123**	**115**	**95**	**83**	**65**	**46**	**28**	**3 036**

Table 18: Primary operations - Humerus

Prostheses	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Bio - Modular	751	20	2	1	2			2			**778**
Global Advantage	369	41	35	38	33	15	1				**532**
Global Fx	361	54	18	18	14	11			1		**477**
Global	261										**261**
Nottingham	203	7									**210**
Global Unite		1		14	23	34	31	37	26	11	**177**
EPOCA	76	24	20	21	5						**146**
Delta I	64										**64**
Scan Shoulder	56										**56**
Promos standard		8	14	11	11	6	2				**52**
Neer II	47										**47**
SMR- anatomic				1	2	7	13	11	8	4	**46**
Aequalis-Fracture	29	2	4	3	1	1	3	2			**45**
Aequalis Ascend Flex Anatomic			1	2	8	2	11	6	4	5	**39**
Aequalis	29	5	4								**38**
Modular	33										**33**
Bigliani/Flatow	27		2		1			1	1		**32**
Nottingham 1	30		2								**32**
Comprehensive Fracture	1	2	4	6	5	3	3	2	3	3	**32**
Comprehensive						10	13	2	2	4	**31**
JR-Vaios Anatomic			1	7	9	3	6	2	1		**29**
Monosperical	14										**14**
Other (n < 10)	7			1	1	3				1	**13**
Total	**2 358**	**164**	**107**	**123**	**115**	**95**	**83**	**65**	**46**	**28**	**3 184**

Anatomic stemmed total shoulder prostheses

Table 19: Primary operations - Glenoid

Prostheses	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Global unite anatomic				3	82	100	130	136	141	146	**738**
Aequalis	174	34	37	3							**248**
Aequalis Ascend Flex Anatomic			12	68	15	30	25	25	10	8	**193**
Global	70	14	30	9	1						**124**
Comprehensive	2	3	2		1		10	24	41	16	**99**
Global Advantage	4		2	17	27	19	1				**70**
SMR- anatomic				1		4	11	27	15	9	**67**
Bio - Modular	50										**50**
JR-Vaios Anatomic			4	8	8	11	8	8	1		**48**
Promos standard		1	3	7	6	4	3	3			**27**
Bigliani/Flatow	13	4	1	2		1	2	1			**24**
Anatomical shoulder		5	8	2	1						**16**
Nottingham	13										**13**
Elos	13										**13**
Other (n < 10)	12	1							1	4	**18**
Total	**351**	**62**	**99**	**120**	**141**	**169**	**190**	**224**	**209**	**183**	**1 748**

Table 20: Primary operations - Caput humeri

Prostheses	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Global unite anatomic				3	82	100	130	135	140	144	**734**
Aequalis	174	35	37	6							**252**
Aequalis Ascend Flex Anatomic			13	65	14	30	25	25	10	11	**193**
Global Advantage	74	14	31	26	28	18	1				**192**
Comprehensive	2	3	2		1		10	24	41	16	**99**
SMR- anatomic				1		4	11	27	15	9	**67**
Bio - Modular	49										**49**
JR-Vaios Anatomic			4	8	8	11	8	8	1		**48**
Promos standard		1	4	7	6	4	3	3			**28**
Bigliani/Flatow	13	4	1	2		1	2	1			**24**
Anatomical shoulder		5	8	2	2						**17**
Nottingham	15										**15**
Other (n < 10)	13	1	1			1		1	2	3	**22**
Total	**340**	**63**	**101**	**120**	**141**	**169**	**190**	**224**	**209**	**183**	**1 740**

Table 21: Primary operations - Humerus

Prostheses	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Global unite anatomic				3	82	100	130	135	140	144	**734**
Aequalis	174	35	37	6							**252**
Aequalis Ascend Flex Anatomic			13	63	14	30	25	25	10	11	**191**
Global Advantage	72	14	31	26	27	17	1				**188**
Comprehensive	2	3	2		1		10	24	41	16	**99**
SMR- anatomic				1		4	11	27	15	9	**67**
Bio - Modular	48										**48**
JR-Vaios Anatomic			3	8	8	11	8	8	1		**47**
Promos standard		1	4	7	6	4	3	3			**28**
Bigliani/Flatow	13	4	1	2		1	2	1			**24**
Anatomical shoulder		5	8	1	2						**16**
Nottingham	15										**15**
Other (n < 10)	14	1	2	2	1	2		1	2	3	**28**
Total	**338**	**63**	**101**	**119**	**141**	**169**	**190**	**224**	**209**	**183**	**1 737**

Resurfacing shoulder hemiprostheses

Table 22: Primary operations - Humerus

Prostheses	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Copeland	300	4									**304**
Global C.A.P.	85	4	2		2						**93**
EPOCA Resurfacing	9	2	7		1						**19**
Aequalis Resurfacing	14	1									**15**
Other (n < 10)	7										**7**
Total	**415**	**11**	**9**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**438**

Resurfacing total shoulder prostheses

Table 23: Primary operations - Glenoid

Prostheses	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	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	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	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	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Delta Xtend	333	147	142	181	222	245	305	394	420	406	**2 795**
Delta III	314										**314**
Tess Reversed	104	32	30	38	39	28	22	3			**296**
Aequalis Ascend Flex Reversed			17	38	47	40	32	33	21	28	**256**
Comprehensive Reverse	1	1	1	4	8	29	22	20	43	64	**193**
SMR-reverse				2	3	11	31	51	47	44	**189**
Aequalis Reversed II	1	18	37	11	13	5	8	19	17	30	**159**
Promos Reverse	9	11	17	21	14	17	11	9			**109**
JRI-Vaios Inverse			9	5	4	3	5	5	6		**37**
Aequalis-Reversed	30	2									**32**
Trebecular Metal Reverse Shou	4	1	1	3	2		2				**13**
Anatomical shoulder Reversed		5		5							**10**
Other (n < 10)				1	1				2	2	**6**
Total	**796**	**217**	**254**	**309**	**353**	**378**	**438**	**534**	**556**	**574**	**4 409**

Table 26: Primary operations - Caput humeri

Prostheses	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Delta Xtend	336	147	142	181	222	245	308	396	422	406	**2 805**
Delta III	307										**307**
Tess Reversed	102	32	30	38	39	28	22	3			**294**
Aequalis Ascend Flex Reversed			17	41	44	34	32	31	27	47	**273**
Comprehensive Reverse	1	1	1	4	8	29	22	20	43	64	**193**
SMR-reverse				2	4	11	31	51	48	44	**191**
Promos Reverse	9	11	17	21	14	17	11	9			**109**
Aequalis Reversed Fracture		3	16	8	16	11	8	21	12	13	**108**
Aequalis-Reversed	28	10	13								**51**
JRI-Vaios Inverse			9	5	4	3	5	5	6		**37**
Aequalis Reversed II		6	8								**14**
Trebecular Metal Reverse Shou	4	1		3	2		2				**12**
Anatomical shoulder Reversed		5		5							**10**
Other (n < 10)				1							**1**
Total	**787**	**216**	**253**	**309**	**353**	**378**	**441**	**536**	**558**	**574**	**4 405**

Table 27: Primary operations - Humerus

Prostheses	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Delta Xtend	334	147	142	182	222	245	305	394	420	406	**2 797**
Delta III	315										**315**
Tess Reversed	103	32	30	38	39	28	22	3			**295**
Aequalis Ascend Flex Reversed			17	41	44	34	32	31	27	47	**273**
SMR-reverse				2	4	11	31	51	48	44	**191**
Comprehensive Reverse	1	1	1	4	8	27	21	19	33	44	**159**
Promos Reverse	9	11	17	21	14	17	11	9			**109**
Aequalis Reversed Fracture		3	16	8	16	11	8	21	12	13	**108**
Aequalis-Reversed	31	12	19								**62**
JRI-Vaios Inverse			9	5	4	3	5	5	6		**37**
Comprehensive Fracture						2	1	1	9	20	**33**
Trebecular Metal Reverse Shou	4	1	1	3	2		2				**13**
Anatomical shoulder Reversed		5		5							**10**
Other (n < 10)	2	5	2				3	2	3		**17**
Total	**799**	**217**	**254**	**309**	**353**	**378**	**441**	**536**	**558**	**574**	**4 419**

Non stemmed shoulder hemiprostheses

Table 28: Primary operations - Caput humeri

Prostheses	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Tess-Anatomic	51	13	7	7	3	6					**87**
ECLIPSE TM	10	10	15	10	11	3					**59**
Simpliciti		1	3	4		1		1	1		**11**
Other (n < 10)			3	2	3	3					**11**
Total	**61**	**24**	**28**	**23**	**17**	**13**	**0**	**1**	**1**	**0**	**168**

Table 29: Primary operations - Humerus

Prostheses	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Tess-Anatomic	51	13	7	7	3	6					**87**
ECLIPSE TM	10	10	15	10	11	3					**59**
Simpliciti		1	3	4		1		1	1		**11**
Other (n < 10)			1	2	2	3					**8**
Total	**61**	**24**	**26**	**23**	**16**	**13**	**0**	**1**	**1**	**0**	**165**

Non stemmed total shoulder prostheses

Table 30: Primary operations - Glenoid

Prostheses	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Aequalis Ascend Flex Anatomic				13	7	12	13	24	11	8	**88**
Global unite anatomic							9	16	24	34	**83**
Tess-Anatomic	32	7	3	3	3	4	2	3			**57**
ECLIPSE TM	5	3	2	4	5		2	1	2	4	**28**
Simpliciti		10	10								**20**
Other (n < 10)			3	1		2	1	1			**8**
Total	**37**	**20**	**18**	**21**	**15**	**18**	**27**	**45**	**37**	**46**	**284**

Table 31: Primary operations - Caput humeri

Prostheses	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Simpliciti		10	12	13	7	12	13	24	11	8	**110**
Global Icon							10	21	26	34	**91**
Tess-Anatomic	33	7	4	3	3	4	2	3			**59**
ECLIPSE TM	5	3	2	4	5		2	1	2	4	**28**
Other (n < 10)				1		2	1	1			**5**
Total	**38**	**20**	**18**	**21**	**15**	**18**	**28**	**50**	**39**	**46**	**293**

Table 32: Primary operations - Humerus

Prostheses	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Simpliciti		10	12	14	7	12	13	24	11	8	**111**
Global Icon							9	16	24	34	**83**
Tess-Anatomic	33	7	4	3	3	4	2	3			**59**
ECLIPSE TM	5	3	2	4	5		2	1	2	4	**28**
Other (n < 10)						2	2	6	2		**12**
Total	**38**	**20**	**18**	**21**	**15**	**18**	**28**	**50**	**39**	**46**	**293**

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	Other	Missing
2020				2		2	3	6	1	8	
2019		2	1			1	2	8		9	
2018		1		2		2		7		5	
2017			2	2		2	2	9		10	
2016		1	1	1				7		6	
2015			1	3		1		8		5	
2014			2	1				6		2	
2013		1	2	5		1	1	10		2	
2012		2	3	1			2	4		3	1
2011			2	2		1		5		2	
2010		3	2	1		1	1	8		5	
2009				1		2	1	6		1	
2008				2		1		4		2	1
2007		1	1	2		1		10		2	2
2006		2		4		1	2	9		3	
2005				1	1	1		4		4	
1994-04		5	11	5		4	2	41		18	1
Total	**0**	**18**	**28**	**35**	**1**	**21**	**16**	**152**	**1**	**87**	**5**

Revision reasons are not mutually exclusive. More than one reason for revision is possible. All revisions were included.

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	Other	Missing
2020	2					1		4	2	5	
2019	2	1	1	5		2	1	3	2	7	
2018			2	3	1			1	1	5	
2017	4		2	4			1	2		5	
2016	3	1		1		2		2		1	
2015								3		1	
2014	2			4	1		1	3		3	
2013	1					1		1	1		
2012				1				1	1		
2011	1	1	2					1			
2010			1	2						1	
2009			1								
2008								1	3		
2007	1		1						2		
2006			1								
1994-04	4		5			1		4		2	
Total	**20**	**3**	**16**	**20**	**2**	**7**	**3**	**26**	**12**	**30**	**0**

Revision reasons are not mutually exclusive. More than one reason for revision is possible. All revisions were included.

Table 35: Resurfacing shoulder hemiprostheses

Year of revision	Loose proximal	Loose distal comp	Dislocation	Instability	Malalignment	Deep infection	Fracture (near implant)	Pain	Defect polyethylene	Other	Missing
2020								1			
2019		1					1	2			
2018							1	5		3	
2017				1				6			
2016		3		1				7		2	
2015		2						1		1	
2014		1		1			1	9		2	
2013		1						7		1	
2012		1	1	2		1		5		3	
2011					1			5		5	
2010								8		1	
2009								9		2	
2008		2		1				11		2	
2007			1			1		2	1	1	
2006		1		1		1		2			
2005		1						1			
Total	**0**	**13**	**2**	**7**	**1**	**3**	**3**	**81**	**1**	**23**	**0**

Revision reasons are not mutually exclusive. More than one reason for revision is possible. All revisions were included.

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	Other	Missing
2005			1	1							
Total	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Revision reasons are not mutually exclusive. More than one reason for revision is possible. All revisions were included.

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	Other	Missing
2020	3	1	12	1		9	7	1	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	7	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		1	
2013	3	2	3	1		3		1		1	
2012	4	4	6	1		5			2	2	
2011	1		2	1			3				
2010	3	1	2	1		1	1			2	
2009	2	1				2				1	
2008	1		3		1						
2007	2	1	2	2		3		1			
2006			1	1					1		
2005	1	1						1			
1994-04	11	4	4	2		5	1	2		4	
Total	**42**	**27**	**68**	**18**	**4**	**59**	**26**	**22**	**11**	**17**	**0**

Revision reasons are not mutually exclusive. More than one reason for revision is possible. All revisions were included.

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	Other	Missing
2020											
2019		1		2				2		1	
2018		1						1		2	
2017								3			
2016							1	3		2	
2015								3		2	
2014		1						4		1	
2012			1			2		1		1	
2011										1	
Total	**0**	**3**	**1**	**2**	**0**	**2**	**1**	**17**	**0**	**10**	**0**

Revision reasons are not mutually exclusive. More than one reason for revision is possible. All revisions were included.

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	Other	Missing
2020	1										
2019	2	1						1	1		
2018	3			1		1		1	1	3	
2017	1		1							1	
2016						1		1		1	
2015	2			1		2					
2014	1							1			
2012	2					1		1			
Total	**12**	**1**	**1**	**2**	**0**	**5**	**0**	**5**	**2**	**5**	**0**

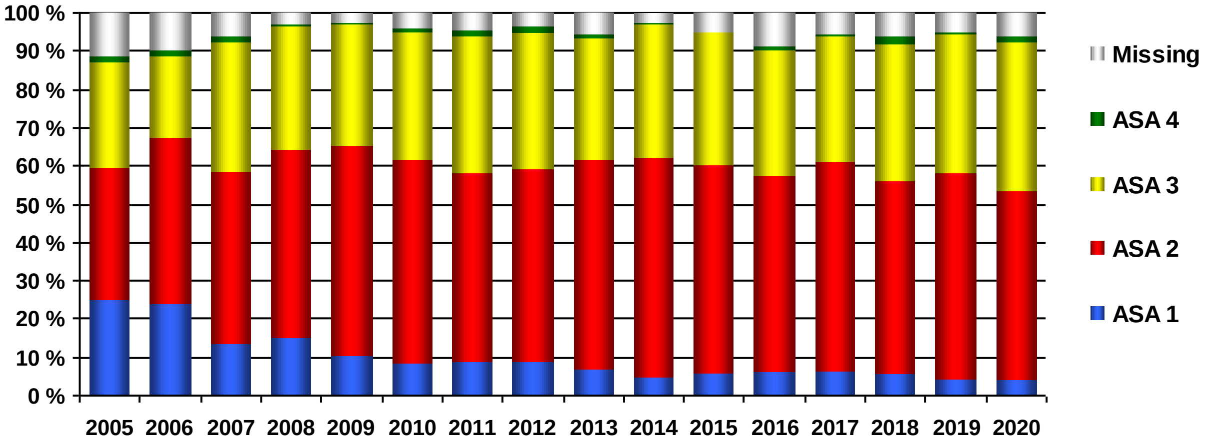
Revision reasons are not mutually exclusive. More than one reason for revision is possible. All revisions were included.

ASA classification all shoulder prostheses

Table 40: Primary operations

Year	ASA 1	ASA 2	ASA 3	ASA 4	ASA 5	Missing	Total
2020	36	406	326	13		50	**831**
2019	37	460	306	6		44	**853**
2018	49	442	313	20		53	**877**
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**
2010	36	240	147	6		18	**447**
2009	41	215	123	3		10	**392**
2008	46	148	97	2		9	**302**
2007	41	140	104	4		20	**309**
2006	66	121	60	4		27	**278**
2005	56	79	62	3		26	**226**

Figure 27: 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.

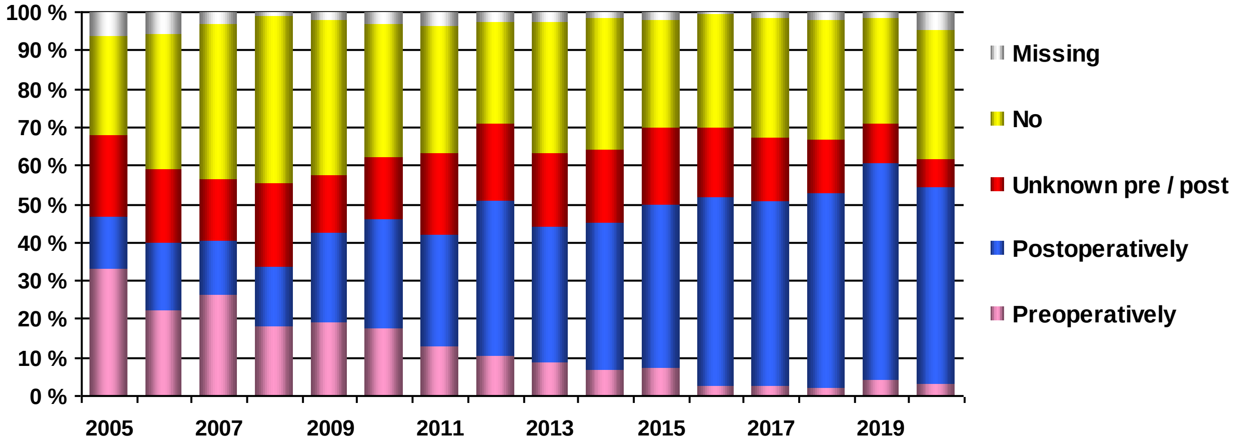
Registration of ASA classification started in 2005

Thrombosis prophylaxis

Table 41: Primary operations

Year	Preoperatively	Postoperatively	Unknown* pre / post	No	Missing	Total
2020	27	426	58	282	38	**831**
2019	34	485	88	233	13	**853**
2018	18	444	122	273	20	**877**
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**
2010	78	128	72	155	14	**447**
2009	75	92	58	159	8	**392**
2008	54	47	67	131	3	**302**
2007	82	43	50	125	9	**309**
2006	62	49	53	98	16	**278**
2005	75	30	48	59	14	**226**

Figure 28: Primary operations



Registration of thrombosis prophylaxis started in 2005

Previous operation in relevant joint

Table 42: For primary total prostheses

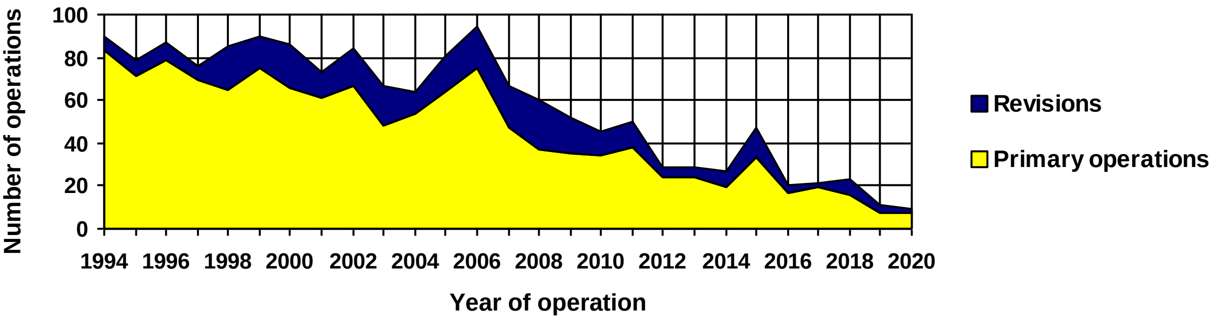
Type	1994-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Osteosynthesis of intraarticular joint fracture	259	35	25	30	37	46	55	46	47	46	626
Synovectomy	130	7	9	6	5	5	7	9	4	6	188
"Shaving"/Cleanup (Debridement)	11		2	1		1	5	3		2	25
Osteotomy	8		2	1	1	4	1	3	1	1	22
Ligament	2				1	2	6				11
Artrodesis	3					1	1		1		6
Other previous op.	210	49	45	59	54	68	84	146	94	73	882

TOE JOINT PROSTHESES

Table 1: Annual number of operations

Year	Primary operations		Revisions		Total
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**
2007	47	(70,1%)	20	(29,9%)	**67**
2006	75	(79,8%)	19	(20,2%)	**94**
2005	64	(79,0%)	17	(21,0%)	**81**
1994-04	738	(83,8%)	143	(16,2%)	**881**
Total	**1 234**	**(79,8%)**	**312**	**(20,2%)**	**1 546**

Figure 1: Annual number of operations



52,3 % of all operations were performed on the right side.   82,8 % performed in women.   Mean age: 60,3 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
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	
2007	13	28		1				4	1
2006	21	46	2					8	
2005	31	22	9				1	10	
1994-04	72	617	4	7	1			40	3
Total	**296**	**841**	**20**	**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
2020				7	(100,0%)			**7**
2019				7	(100,0%)			**7**
2018				16	(100,0%)			**16**
2017				19	(100,0%)			**19**
2016				17	(100,0%)			**17**
2015				32	(97,0%)	1	(3,0%)	**33**
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%)		64	(97,0%)			**66**
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				81	(97,6%)	2	(2,4%)	**83**
Total	**6**	**(0,5%)**		**1 219**	**(98,9%)**	**8**	**(0,6%)**	**1 233**

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	2002-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Silastic HP 100	875	14	13	11	11	5	6	4			**939**
LPT	55	9	10	8	20	12		6	6	2	**128**
Toefit-plus	49	1	1		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	**6**
Swanson Titanium	5										**5**
Total	**1 067**	**24**	**24**	**19**	**33**	**17**	**19**	**19**	**7**	**7**	**1 233**

Table 6: Primary operations - Distal

Prostheses	2002-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Toefit-plus	49	1	1		1						**52**
Biomet Total Toe	25										**25**
Moje	18										**18**
Total	**92**	**1**	**1**	**0**	**1**	**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	Other	Missing
2020						1		1		1	
2019		1						3		1	
2018					3	1	1	3	3	3	
2017	1							1		1	
2016								1			
2015				1	3			2	5	2	
2014		1		1	2			1	2		
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	
2007	2	2	2	1	3	2	1	9		4	
2006		1		1	4	2		10	1	6	1
2005	1	1	1		6	2		5	1	4	2
1994-04	1	13	2	9	34	15	2	57	2	47	5
Total	**5**	**21**	**5**	**15**	**69**	**27**	**4**	**122**	**22**	**86**	**8**

Revision reasons are not mutually exclusive. More than one reason for revision is possible

Completeness of reporting analysis for the Elbow Arthroplasty Register, 2017-2018

A completeness of reporting analysis for the Elbow 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 Elbow Arthroplasty Register (NAR). There are separate statistics on primary operations and revisions.

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

Type	Code	Description
Primary operation	NCB20	Primary total prosthetic replacement of elbow joint not using cement
	NCB 30	Primary total prosthetic replacement of elbow joint using hybrid technique
	NCB 40	Primary total prosthetic replacement of elbow joint using cement
	NCB 99	Other primary prosthetic replacement in elbow joint
Revision (level 1)	NCC 2y	Secondary implantation of total prosthesis in elbow joint not using cement Includes: Of component of total prosthesis
	NCC 3y	Secondary implantation of total prosthesis in elbow joint using hybrid technique Includes: Of component of total prosthesis
	NCC 4y	Secondary implantation of total prosthesis in elbow joint using cement Includes: Of component of total prosthesis
	NCC 99	Other secondary prosthetic replacement in elbow joint
	NCU 1y	Removal of total prosthesis from elbow joint

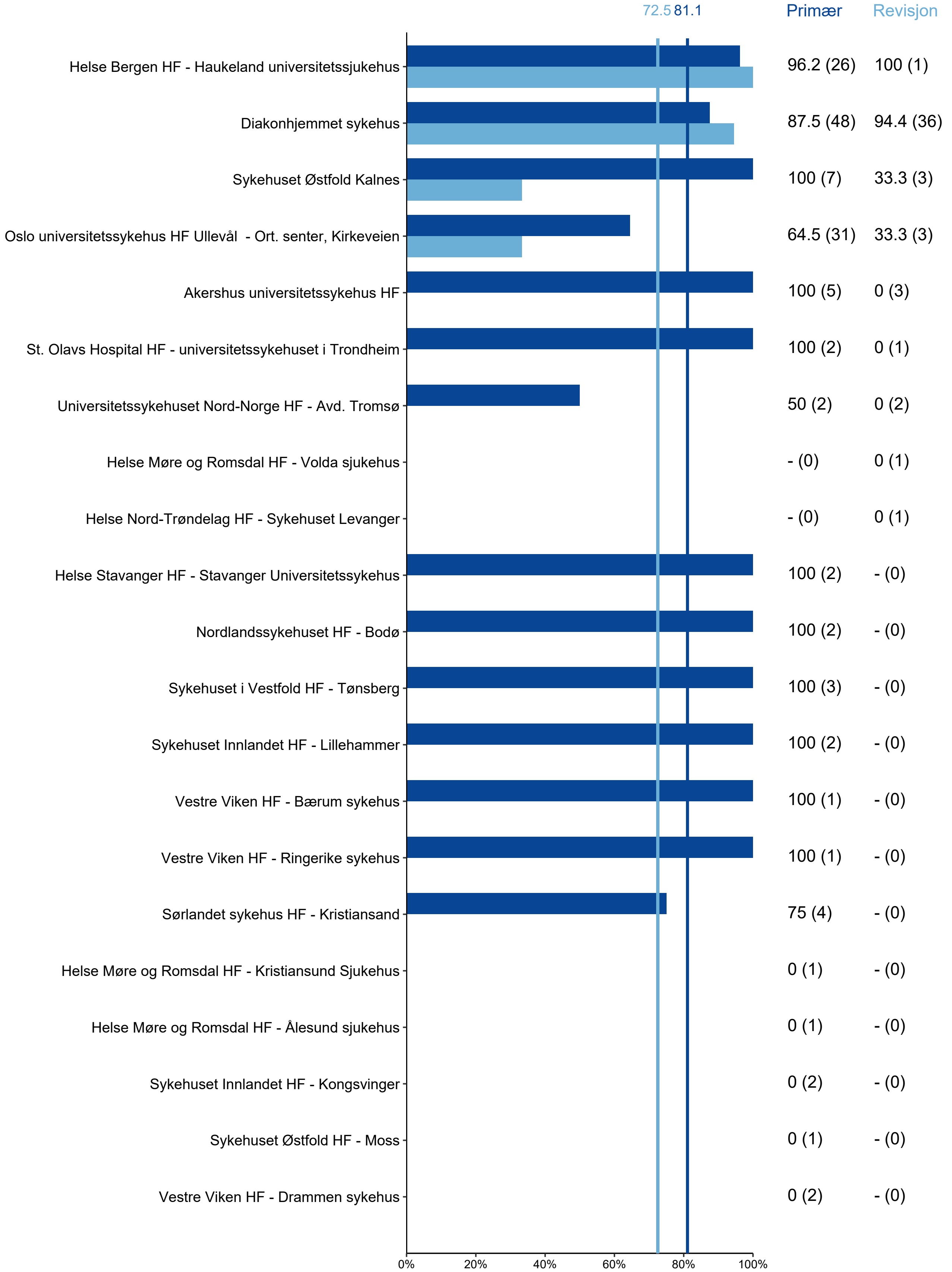
Primary operations. From 2017-2018, 143 primary total elbow arthroplasties were reported to one or both of the registers. 81.1% were reported to the NAR while 52.4% were reported to the NPR. Completeness of reporting varies much between the different hospitals. For hospitals with a low completeness of reporting rate for the NAR, either the form was not sent, or other interventions than elbow arthroplasties were incorrectly coded with NCB 20*/NCB 30*/NCB 40*.

Procedure codes to be used for primary operations:
NCB 20*/NCB 30*/NCB 40*

Revision operations. From 2017-2018, 51 revisions were reported to one or both of the registers. 72.5% of these were reported to the NAR, while 76.5% 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:
NCC 2* - NCC 3* - NCC 4* and possibly NCU 1* og NCC 99.

Completeness of reporting for primary operations and revisions, Elbow prosthesis, 2017-2018



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 Ankle Arthroplasty Register, 2017-2018

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

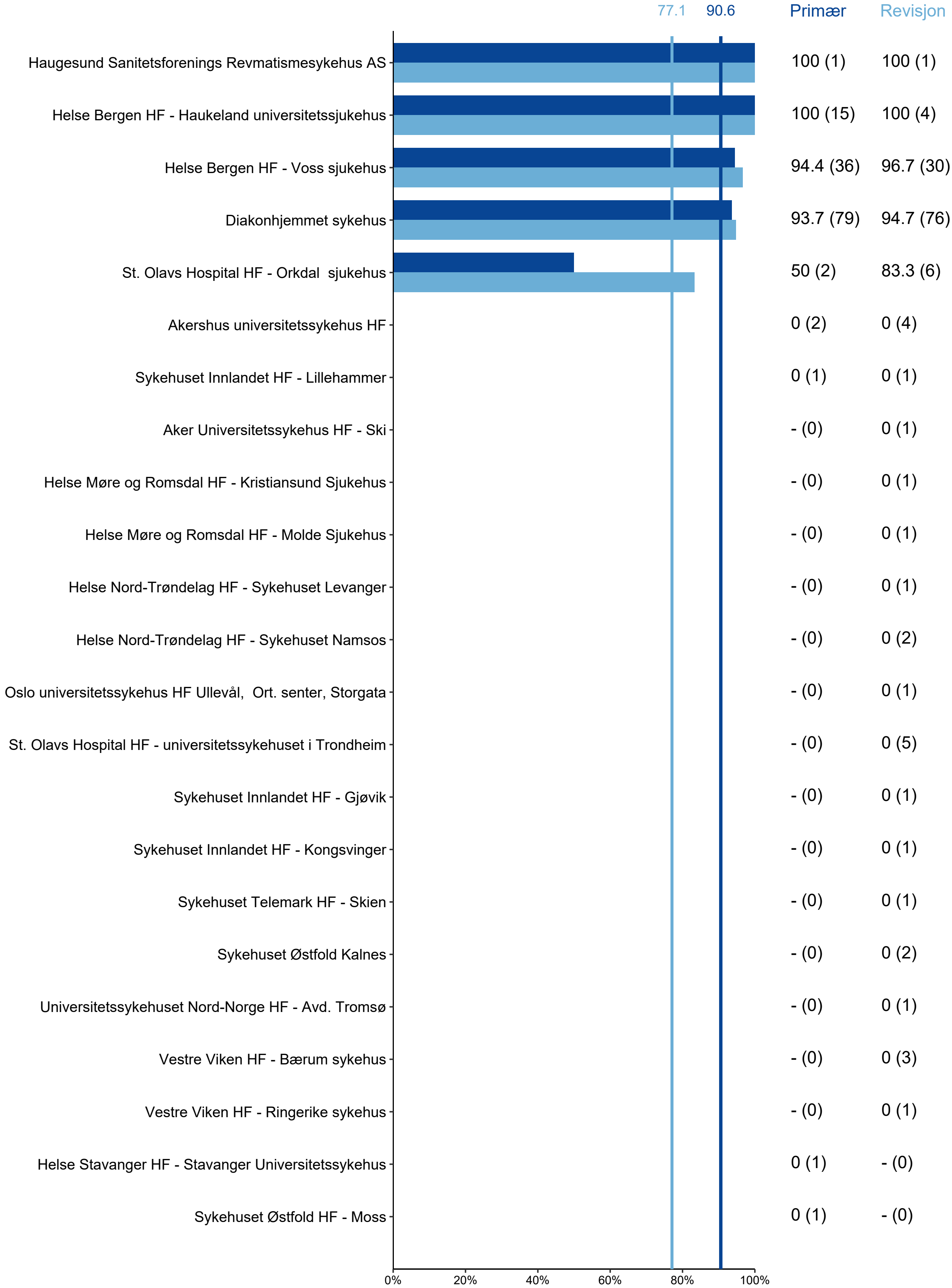
Primary operations. From 2017-2018, 138 primary total ankle arthroplasties were reported to one or both of the registers. 90.6% were reported to the NAR while 94.9% were reported to the NPR. Completeness of reporting varies much between the different hospitals. For hospitals with a low completeness of reporting rate for the NAR, either the form was not sent, or other interventions than elbow arthroplasties were incorrectly coded with 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 2017-2018, 144 revisions were reported to one or both of the registers. 77.1% of these were reported to the NAR, while 85.4% 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:
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, 2017-2018



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, 2017-2018

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

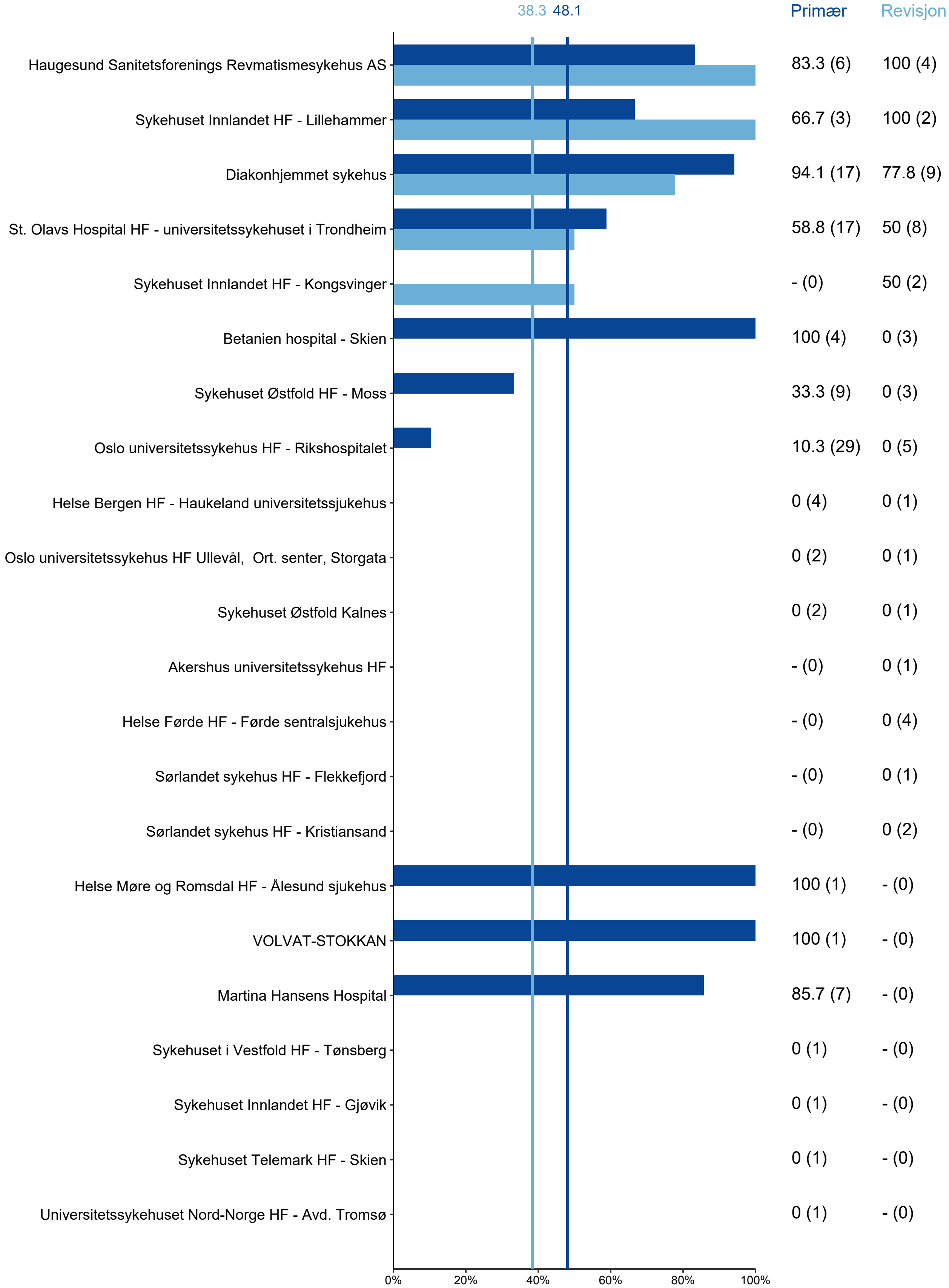
Primary operations. From 2017-2018, 106 primary total finger arthroplasties were reported to one or both of the registers. 48.1% were reported to the NAR while 98.1% were reported to the NPR. Completeness of reporting varies much between the different hospitals. For hospitals with a low completeness of reporting rate for the NAR, either the form was not sent, or other interventions than elbow arthroplasties were incorrectly coded with NDB 8y.

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

Revision operations. From 2017-2018, 47 revisions were reported to one or both of the registers. 38.3% of these were reported to the NAR, while 95.7% 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.

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

Completeness of reporting for primary operations and revisions, Finger prosthesis, 2017-2018



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, 2017-2018

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

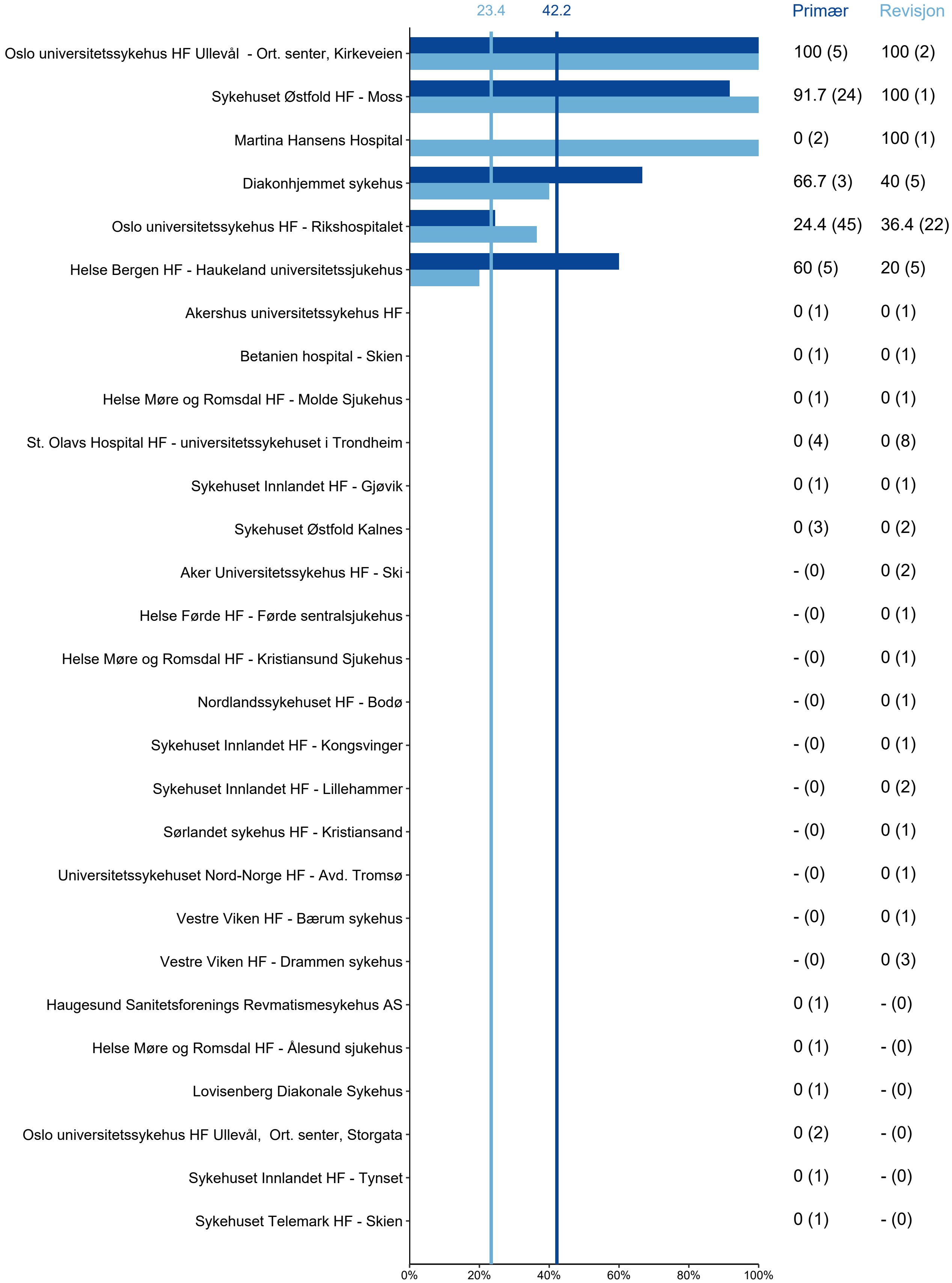
Primary operations. From 2017-2018, 102 primary total wrist/carpus/distal radioulnar joint arthroplasties were reported to one or both of the registers. 42.2% were reported to the NAR while 98% were reported to the NPR. Completeness of reporting varies much between the different hospitals.

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

Revision operations. From 2017-2018, 64 revisions were reported to one or both of the registers. 23.4% of these were reported to the NAR, while 93.8% 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:
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, 2017-2018



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 Shoulder Arthroplasty Register, 2017-2018

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

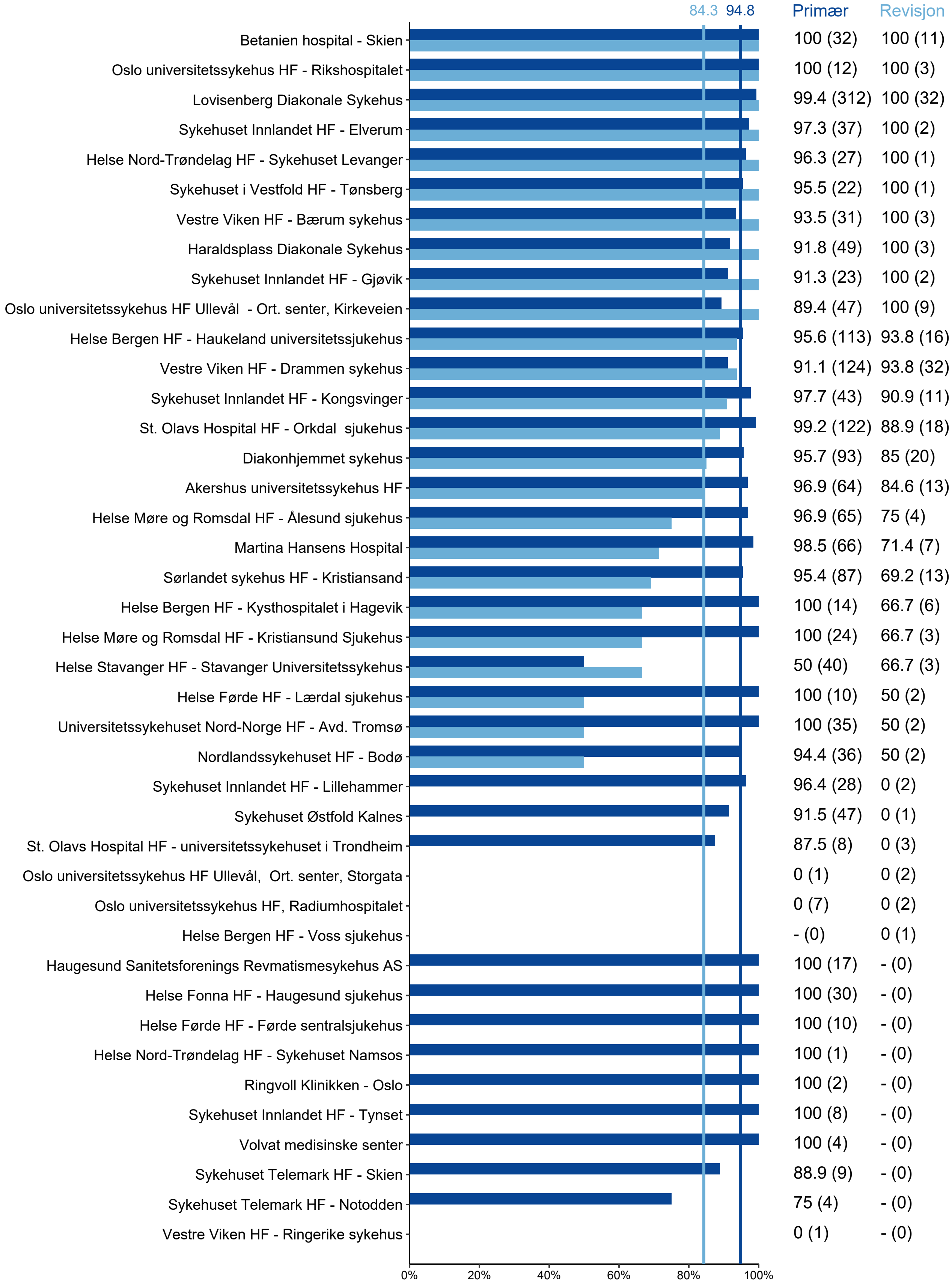
Primary operations. From 2017-2018, 1705 primary total shoulder arthroplasties were reported to one or both of the registers. 94.8% were reported to the NAR while 98.2% were reported to the NPR. Completeness of reporting varies much between the different hospitals. For hospitals with a low completeness 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 2017-2018, 230 revisions were reported to one or both of the registers. 84.3% of these were reported to the NAR, while 82.6% 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, 2017-2018



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, 2017-2018

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

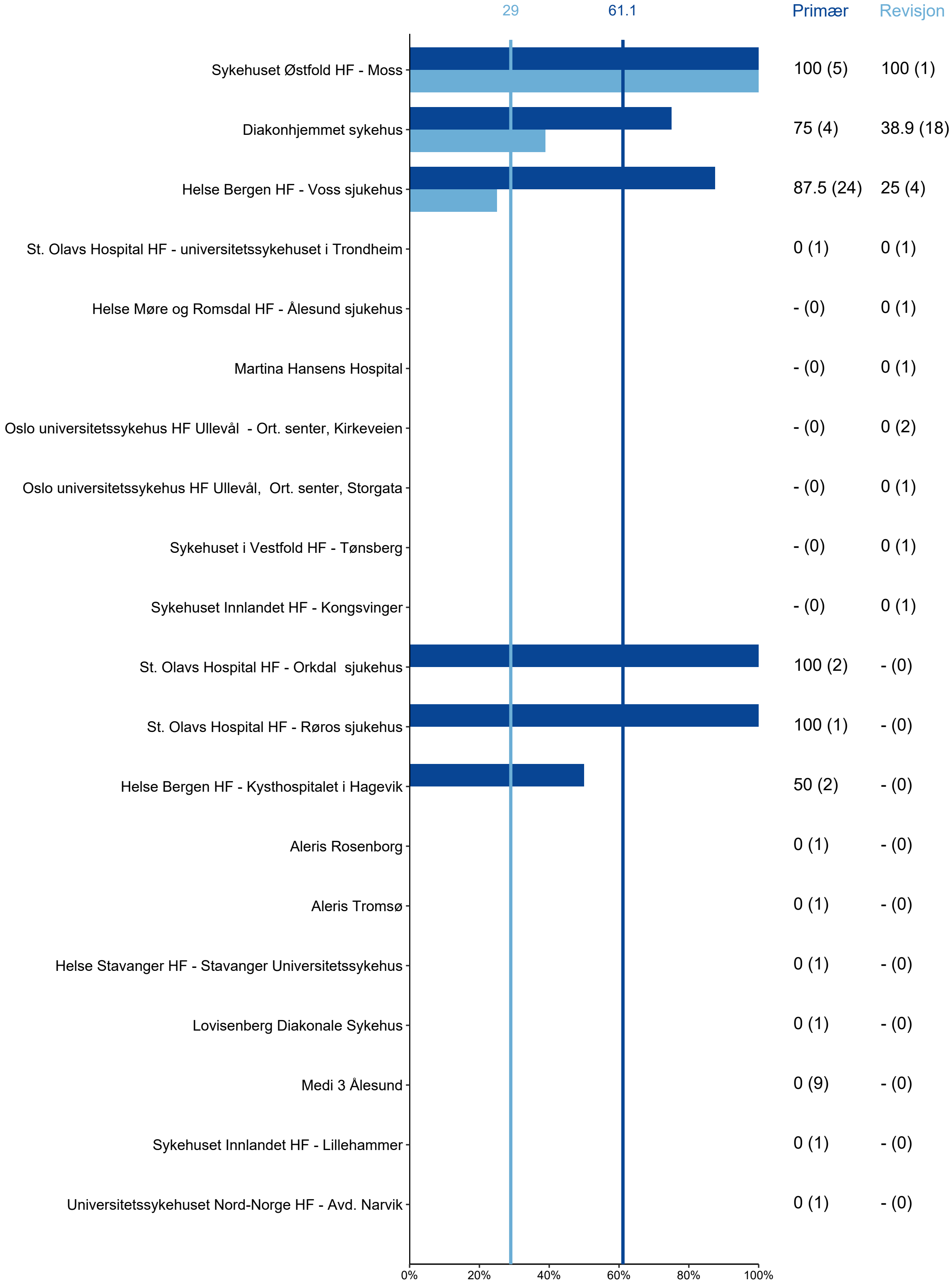
Primary operations. From 2017-2018, 54 primary total toe arthroplasties were reported to one or both of the registers. 61.1% were reported to the NAR while 94.4% were reported to the NPR. Completeness of reporting varies much between the different hospitals. For hospitals with a low completeness of reporting rate for the NAR, either the form was not sent, or other interventions than elbow 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 2017-2018, 31 revisions were reported to one or both of the registers. 29% of these were reported to the NAR, while 96.8% 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:
NHC 6y - NHC 7y - NHC 8y - NHU 2y

Completeness of reporting for primary operations and revisions, Toe prosthesis, 2017-2018



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

Introduction ... 217

Covid-19 Primary operations and waiting time by month, 2019 vs. 2020 ... 221
Survival curves, hip fractures 2005-2019 ... 223
Results for all hospitals individually ... 224
Annual numbers of operations ... 227
Age by primary operation (in 2007, 2013 and 2019) ... 227
Time from fracture to operation in hours (primary operations) ... 228
Cognitive impairment ... 229
Type of anaesthesia ... 230
ASA classification ... 231
Type of primary fracture ... 232
Type of primary operations – all fractures ... 233
Type of primary operation per fracture type ... 234
Time trend for treatment ... 236
Reasons for reoperation ... 238
Numbers of reoperation for each fracture type ... 239
Type of reoperation ... 240
Reoperation with primary screw osteosynthesis ... 241
Reoperation with primary uni/bipolar hemiprosthesis ... 242
Hemiprostheses ... 244
Screws ... 248
Hip compression screws ... 248
Intramedullary nails ... 248
Fixation ... 249
Time trend for fixation ... 249
Cement ... 250
Hydroxyapatite ... 250
Pathological fractures ... 251
Surgical approach ... 251
Intraoperative complications ... 252
Systemic antibiotic prophylaxis ... 253
Pharmacological antitrombotic prophylaxis ... 256
Duration of surgery ... 258
PROM ... 259
Data for all hospitals individually ... 272
Completeness analysis 2017-2018 ... 278

HIP FRACTURE REGISTER: ANNUAL REPORT

The Norwegian Hip Fracture Register now contains data from more than 129 000 primary operations and over 14 000 reoperations. In 2020, 7399 primary and 700 reoperations were reported to the register. There has been a marked decline in the number of primary operations compared to previous years, and this decrease is greater than might be expected within natural variability. It is therefore likely that reporting by hospitals has become poorer. When the annual report with the hospital results is sent out later this year, we would therefore like all hospitals to compare their numbers of primary and reoperations with those recorded in the Hip Fracture Register.

The main reason for the lower numbers of patients reported is probably problems in obtaining consent from hip fracture patients. Ever since the establishment of the Hip Fracture Register in 2005, patient consent has been required before data are entered in the register. We know this has been challenging and we have made constant efforts to remove this requirement. The new health register regulations now allow quality registers to be based on the right to refuse to provide consent instead of the right to consent. In 2020, the Hip Fracture Register conducted a data privacy impact assessment. Following a recommendation from the Helse Bergen privacy officer, this has now been approved. One of the conclusions is that the requirement for consent for inclusion in the Hip Fracture Register is to be removed. Future reporting to the register is based on patients’ right to refuse to consent to enable them to refuse to have their data in the register. In order to ensure that patients have a real right to refuse, it is therefore essential to provide patients with information about the Hip Fracture Register during their hospital stay. Information leaflets have been written for distribution to patients, and a separate leaflet has been made for children under 18. In addition, posters containing information about the Hip Fracture Register will be sent to all wards that report hip surgery with a request for them to be hung up at a suitable place in the ward. In connection with the four-month questionnaire, the register will also enclose information for patients about the possibility to refuse to consent to registration.

During 2021 the plan is for paper forms to be replaced by electronic recording of data. This registration solution is in place in the medical registration system (MRS) in the Norwegian Health Network. Surgeons must register as users in the Hip Fracture Register in the Norwegian Health Network at falk.nhn.no before they can register patients for the first time. Once approved, they can log in to mrs.nhn.no and enter the patient data in the surgery form. In electronic registration, implants must be scanned using the Procordo scanning software. Instructions will be sent to hospitals shortly before the start of electronic reporting. Instructions will also be posted on helse-bergen.no/nasjonal-kompetansetjeneste-for-leddproteser-og-hoftebrudd

In connection with the change to electronic reporting, some new variables will be introduced on the surgery form. If waiting time from fracture to surgery is entered as longer than 48 hours, a drop-down menu will ask for a reason for the long waiting time. For non-displaced femoral neck fractures (Garden 1 and 2), it must be stated whether the posterior tilt is above or below 20 degrees.

We want the register to be used to an even greater extent for quality improvement over time, by ensuring that hip fracture patients are treated in accordance with Norwegian interdisciplinary guidelines. We are therefore working to expand the list of variables in the register to include e.g. length of hospital stay, in-hospital mobilisation, fall prevention, osteoporosis treatment, medical complications in connection with the hospital stay and level of care after discharge. The new variables can probably be included in the Hip Fracture Register with the introduction of a new electronic form to be completed by a doctor or nurse at discharge. The introduction of new variables will enable the register's hospital results and interactive results to provide greater clarification as to whether the recommendations in the national interdisciplinary guidelines are being followed.

The COVID-19 pandemic has brought major changes to everyday work in orthopaedic wards throughout Norway during the past year. In many wards, elective surgery has periodically been reduced, but acute surgery has fortunately been less affected. International recommendations have stated that treatment goals for hip fractures should not change due to the pandemic situation. We have conducted an analysis to determine whether COVID-19 has affected the number of hip fractures and the waiting time for hip fracture surgery. These results are presented in the first part of this year's report from the Hip Fracture Register. The total number of hip fractures recorded in 2020 is somewhat lower than in 2019, but as mentioned above we have indications that this is mainly due to the difficulty of obtaining consent from patients, and thus only to a small extent caused by COVID-19.

The National Service Centre for Medical Quality Registers assesses all medical quality registers in Norway every year. The Norwegian Hip Fracture Register is still assessed as a stage 3A register. The main reason why our register again did not quite qualify as a stage 4 register in last year's evaluation was that it still lacks an online reporting solution that provides the units that report data with continuous information on their own and national data. The situation will improve when the electronic reporting solution has been fully implemented by all relevant hospitals. The Hip Fracture Register has published interactive results online since 2017. The interactive results are hospital-based and are available at www.kvalitetsregistre.no. These results have so far been well received and we hope that they will be used for local quality improvement work.

The Hip Fracture Register has in recent years been collaborating with the Hip Arthroplasty Register on a quality improvement project. The aim has been to reduce the use of uncemented femoral stems in older hip fracture patients. The Hip Fracture Register has previously recommended avoiding the use of uncemented femoral stems in hip fracture surgery for patients over 70 years. We are therefore pleased to note that the proportion of uncemented prostheses has been steadily decreasing in recent years. In 2020, only 4.2% of hemiprostheses were uncemented. Few hospitals now routinely use uncemented stems in hemiarthroplasty.

PUBLICATIONS SINCE 1 JANUARY 2020

Torbjørn Berge Kristensen compared results of cemented and unsemented hemiarthroplasty. His study found no difference in pain and satisfaction with the operation, or between quality of life and mortality after one year. Uncemented prostheses had a higher risk of reoperation, particularly due to periprosthetic fracture and infection, and the study thus lends support to recommendations in international and national guidelines to use cemented stems in hip fracture patients.

Christian Pollmann examined whether the introduction of a fast-track care pathway reduced 30-day mortality following hip fracture. Data from the Hip Fracture Register were linked to a local patient register at Akershus University Hospital. The results showed that the fast-track pathway reduced waiting time for surgery and risk of reoperation for the first 30 days, but did not affect mortality.

Målfrid Holen Kristoffersen published an article comparing the surgical treatment of hip fractures in patients with and without cognitive impairment. The study showed that cognitively impaired patients were operated in the same way as those without cognitive impairment, but that they had a greater risk of revision after hemiarthroplasty than non-impaired patients. The risk of revision was particularly high in cases of dislocation after surgery using the posterior approach and periprosthetic fracture with an uncemented stem. The study therefore concluded that hemiarthroplasty with the posterior approach or an uncemented stem should be avoided in patients with cognitive impairment.

Christian Pollmann also published an article on prosthetic infection and mortality following hemiarthroplasty performed at Akershus University Hospital. Data from the Hip Fracture Register and the Norwegian Surveillance System for Hospital-Acquired Infections (NOIS) were linked to a local patient register at the hospital. The results showed that early prosthetic infection increased mortality.

Andrea Boutera explored a possible weekend effect in relation to hip fractures. Regarding time of surgery, the results showed no difference in revision risk or mortality between weekends and weekdays. However, there was a slight increase in mortality for patients who fractured their hip during the weekend compared to weekdays.

Nolan Horner investigated a possible association between waiting time for surgery and risk of infection following hip hemiarthroplasty. Data from Østfold Hospital were included in the study and validated against data in the Hip Fracture Register. No differences were found in infection rates for different waiting times for surgery.

Tom Lian published an article that explored whether the guidelines for antibiotic prophylaxis introduced in 2013 were being followed in hemiarthroplasty in Norwegian hospitals. The results showed great variation between hospitals in compliance with the guidelines. In 2016, the recommended antibiotic prophylaxis was still only used in three out of every five hemiarthroplasties.

Cato Kjærvik studied variations in hip fracture treatment in Norway from 2014 to 2018 with a particular emphasis on whether recommended guidelines were followed. The study showed great variation in compliance with evidence-based guidelines in Norwegian hospitals, but an increasing proportion of hip fracture treatments followed the guidelines in the latter part of the period. Displaced femoral neck fractures without prosthetic treatment had higher mortality and greater risk of revision. Uncemented hemiarthroplasty increased the reoperation risk.

Carl Erik Alm explored the role of the trochanter support plate used in conjunction with a sliding screw in the treatment of trochanteric and subtrochanteric fractures. Hospitals varied considerably in their use of the trochanter support plate. The most common factor affecting the use was type of fracture. The support plate was mostly used for AO/OTA A3 trochanteric fractures and subtrochanteric fractures.

Please also see the list of publications at the end of this report and on the website of the Advisory Unit helse-bergen.no/nasjonal-kompetansetjeneste-for-leddproteser-og-hoftebrudd

The Hip Fracture Register cooperates with a number of hospitals on studies of national and local results. We are very pleased that the huge amount of data in the register is being used in research and we encourage all researchers who wish to use data from the register to contact us.

Thank you all for good reporting and we look forward to continued fruitful cooperation!

Bergen, 20 May 2021

Jan-Erik Gjertsen
Chief Physician/Associate Professor
Head of Hip Fracture Register

Eva Dybvik
Biostatistician

Gard Kroken
Biostatistician

Randi K. Furnes
Consultant

Irina Kvinnesland
IT Consultant

COVID-19

Figure 13: Monthly primary operations in 2019 - 2020

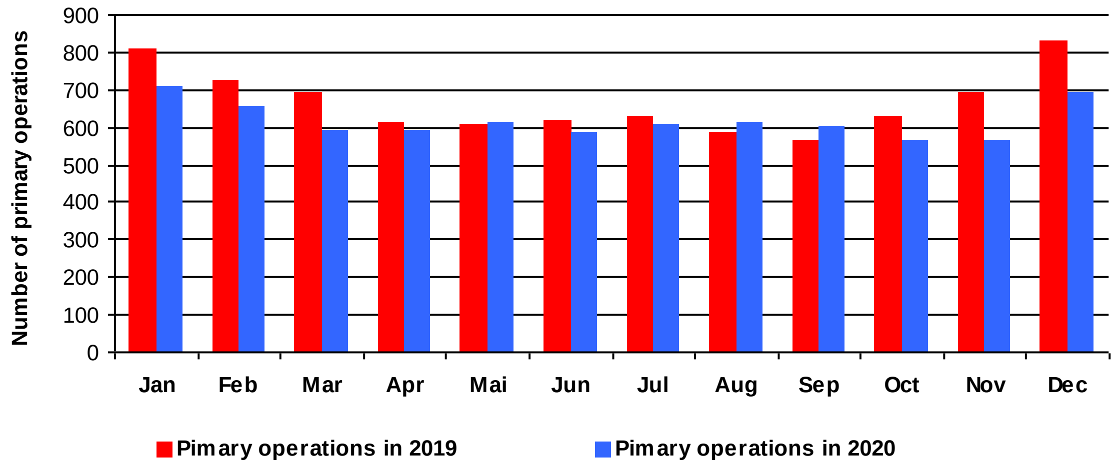
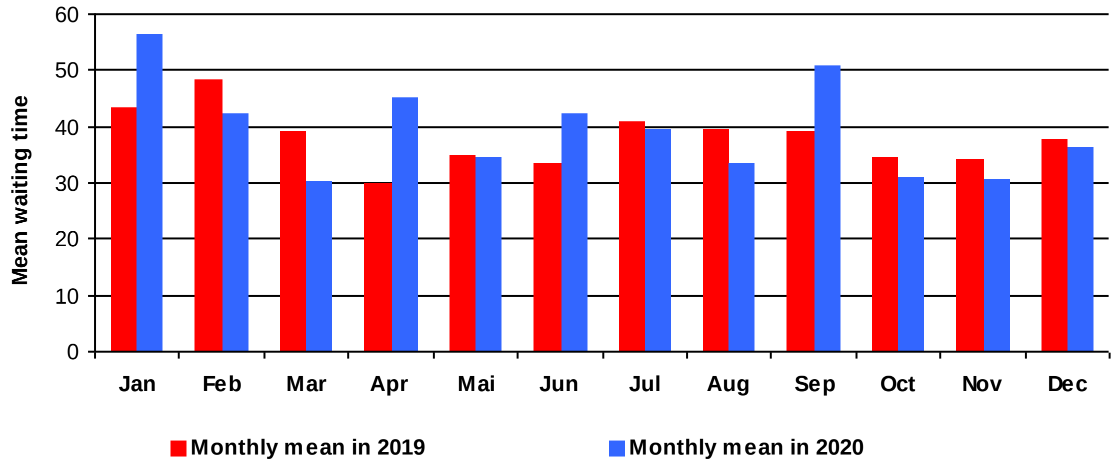
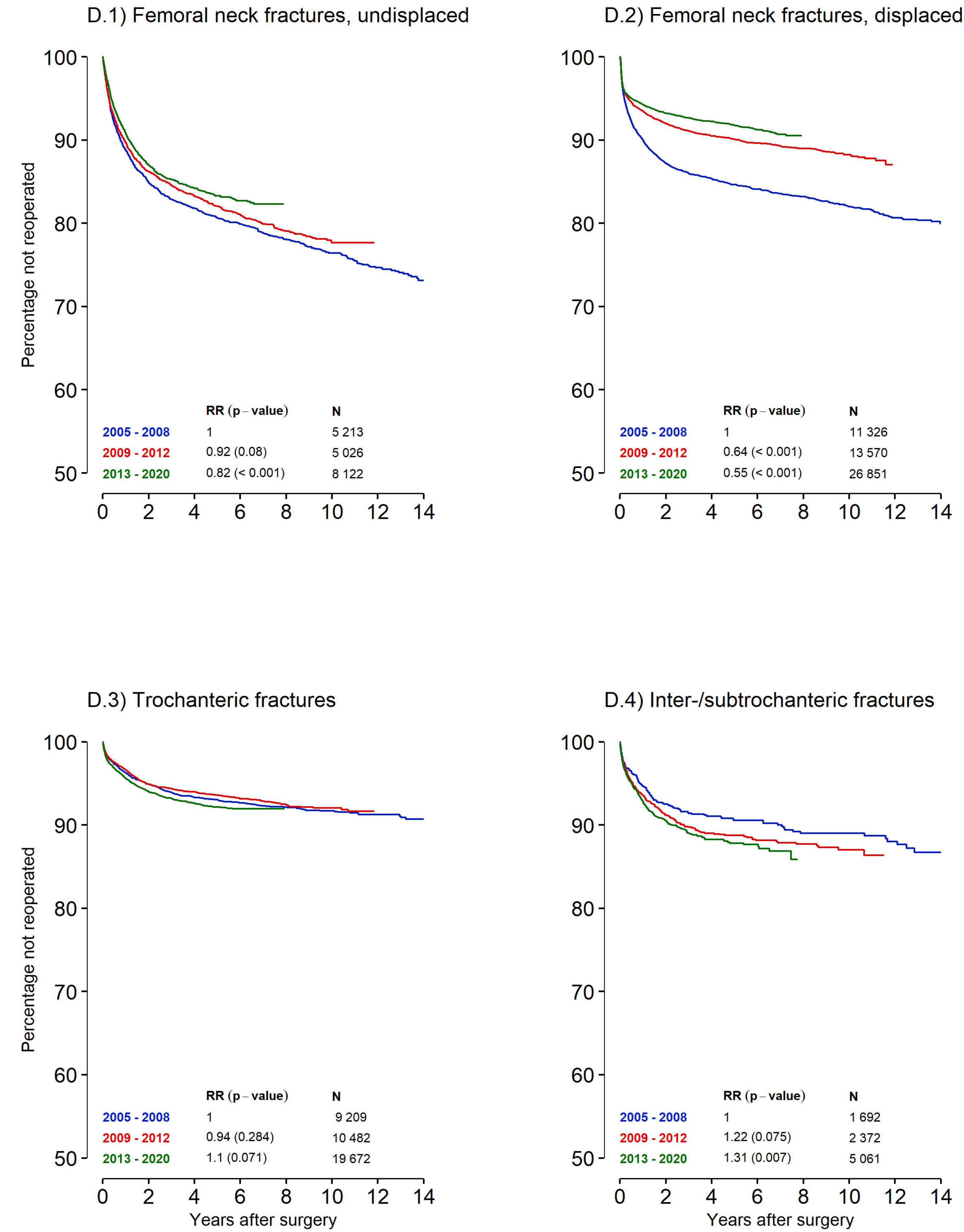


Figure 14: Monthly mean waiting time from fracture to surgery (hours) in 2019 - 2020

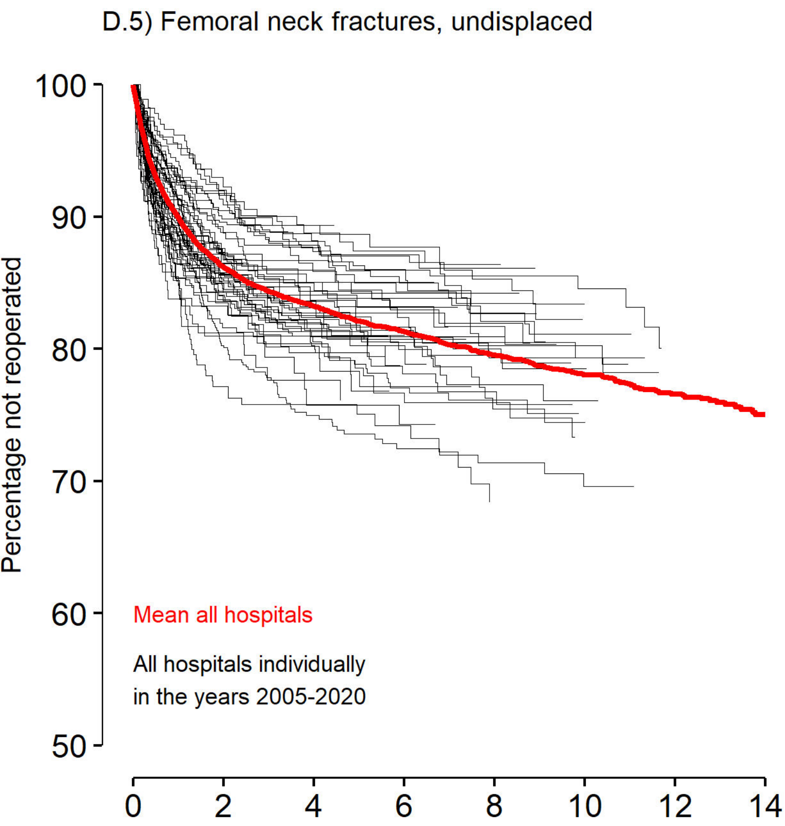


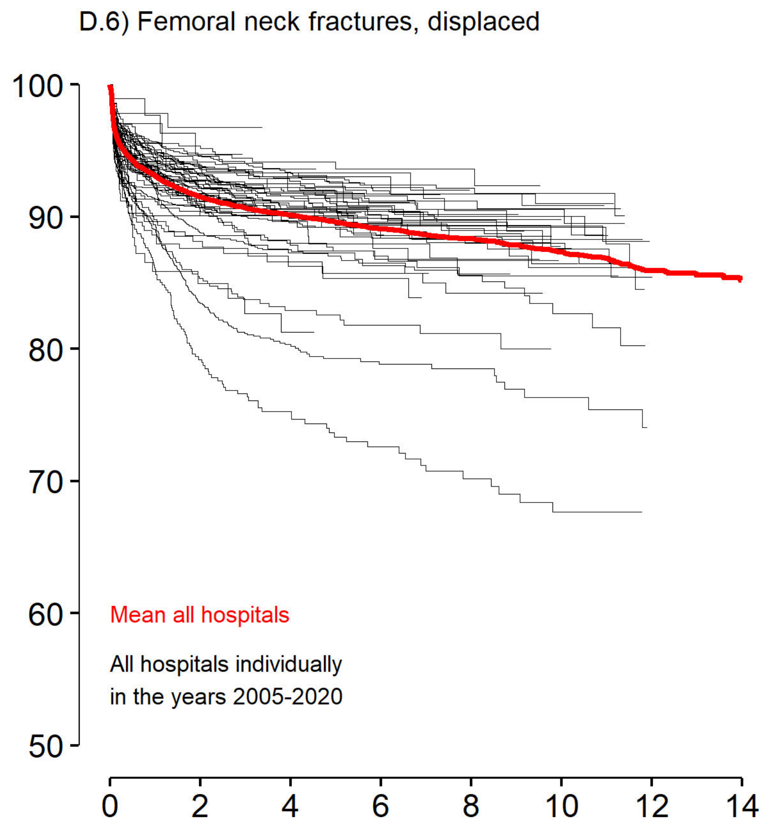
Survival of hip fracture implants, 2005-2020
Endpoint: All reoperations

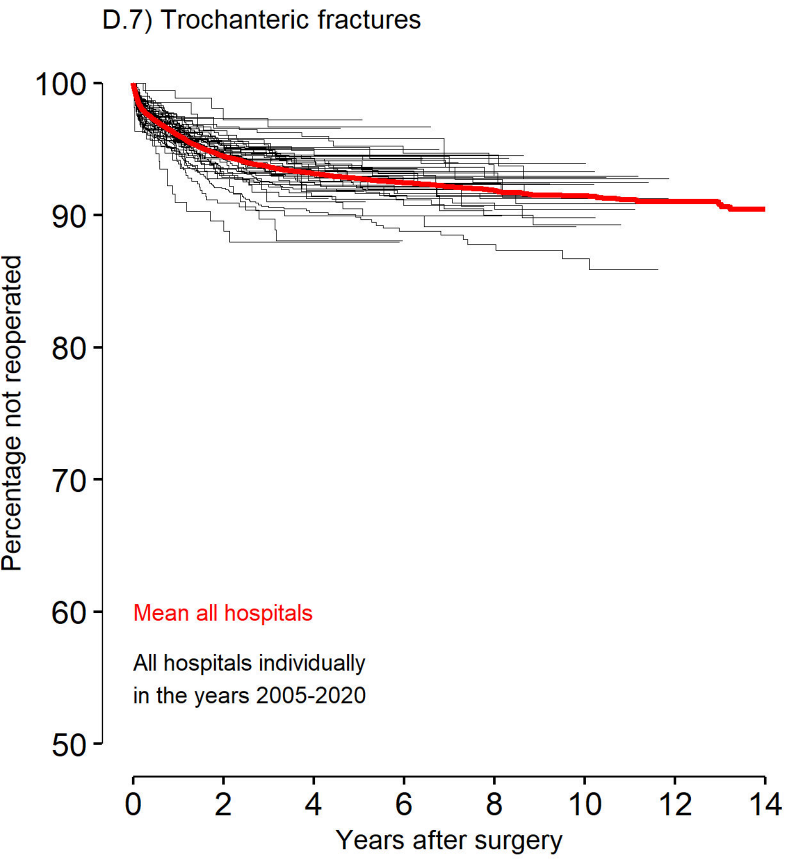


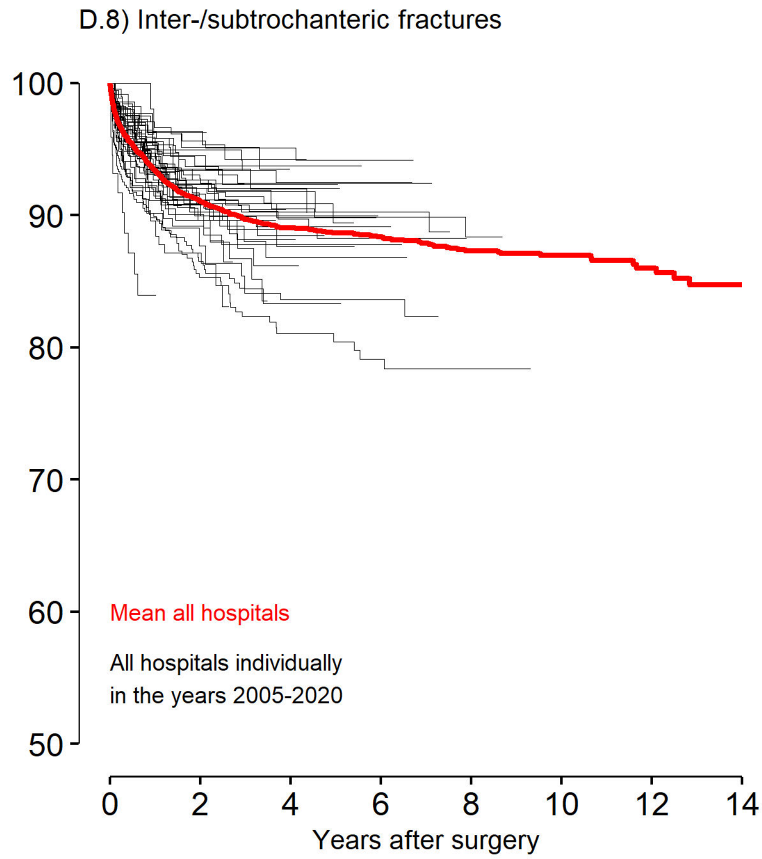
Kaplan-Meier estimatet survival curves (unadjusted). Survival is calculated as long as the number of prosthesis at risk of reoperation is greater than 50.

Hospital results after hip fractures 2005-2020
Endpoint: All reoperations



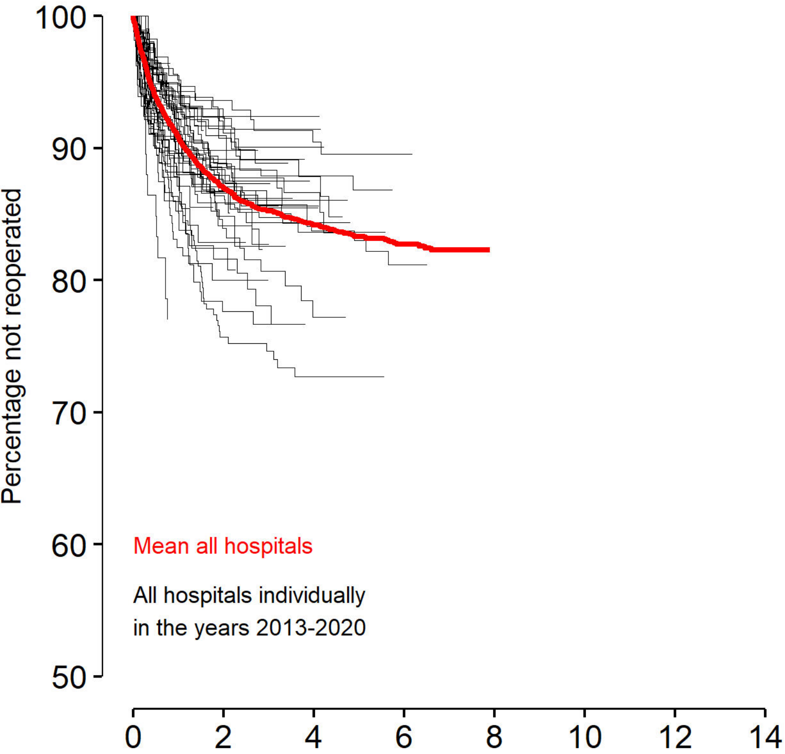




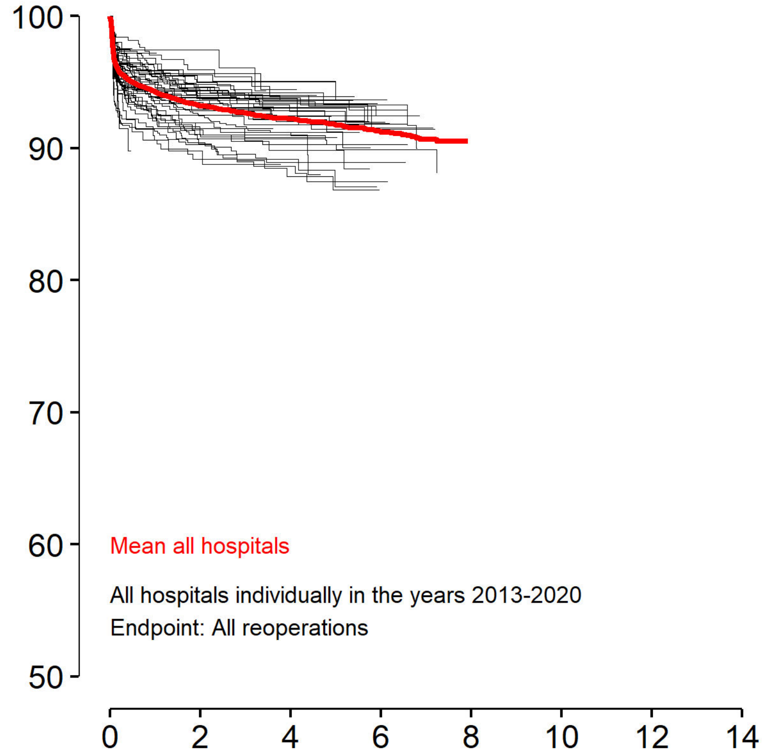


Hospital results after hip fractures 2013-2020
Endpoint: All reoperations

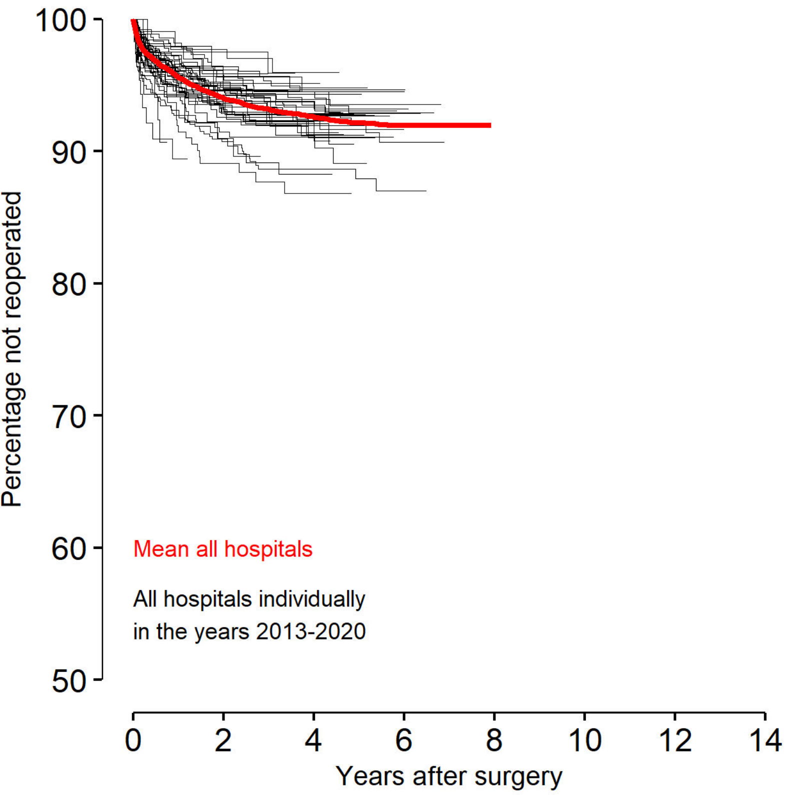
D.9) Femoral neck fractures, undisplaced



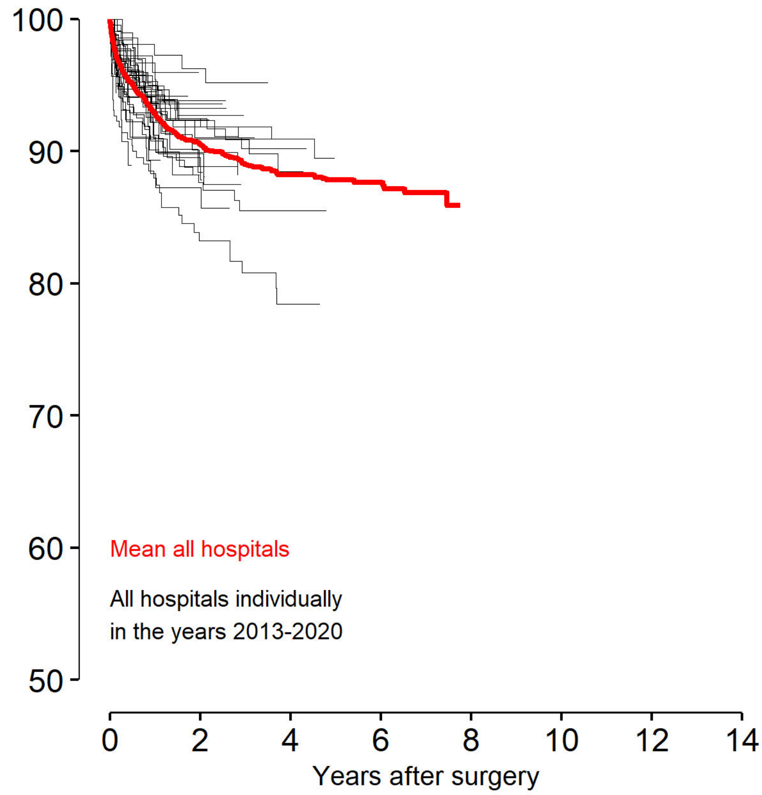
D.10) Femoral neck fractures, displaced



D.11) Trochanteric fractures



D.12) Inter-/subtrochanteric fractures



HIP FRACTURES

Numbers of operations

Table 1: Annual numbers of operations

Year	Primary operation		Reoperation		Total
2020	7 399	(91,4%)	700	(8,6%)	**8 099**
2019	8 010	(89,8%)	905	(10,2%)	**8 915**
2018	8 415	(90,0%)	937	(10,0%)	**9 352**
2017	8 350	(90,3%)	901	(9,7%)	**9 251**
2016	8 503	(89,6%)	987	(10,4%)	**9 490**
2015	8 410	(90,0%)	938	(10,0%)	**9 348**
2014	8 182	(91,2%)	793	(8,8%)	**8 975**
2013	8 309	(90,2%)	899	(9,8%)	**9 208**
2012	8 437	(90,4%)	896	(9,6%)	**9 333**
2011	8 601	(90,3%)	925	(9,7%)	**9 526**
2010	8 363	(90,7%)	861	(9,3%)	**9 224**
2009	8 258	(89,5%)	970	(10,5%)	**9 228**
2008	8 362	(89,9%)	942	(10,1%)	**9 304**
2007	7 870	(89,4%)	933	(10,6%)	**8 803**
2005-06	13 396	(89,6%)	1 557	(10,4%)	**14 953**
Total	**128 865**	**(90,1%) ***	**14 144**	**(9,9%) ****	**143 009**

49% of primary operations were on the right side. 69% of primary operations were performed on women.
Mean age at primary surgery was 80 years: 82 years for women and 77 years for men.
* 4 663 (4%) were primary operations with total hip prostheses from the Norwegian Arthroplasty Register
** 5 159 (36%) were reoperations with total hip prostheses from the Norwegian Arthroplasty Register.

Figure 1: Annual numbers of operations

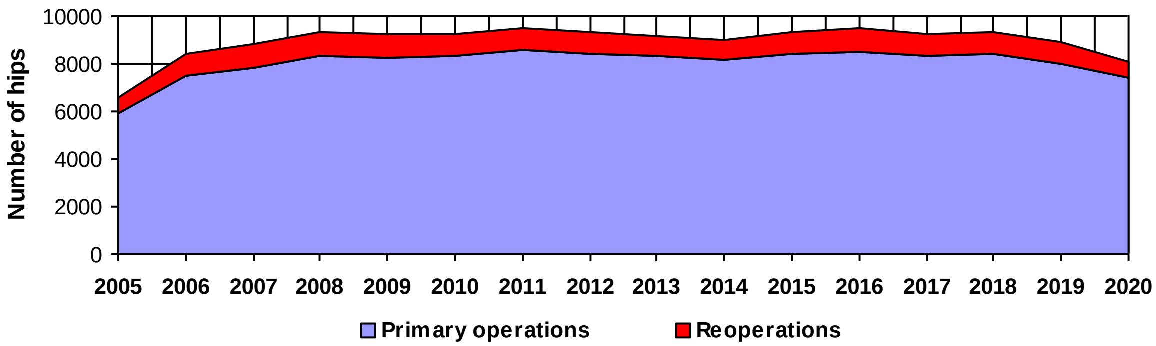
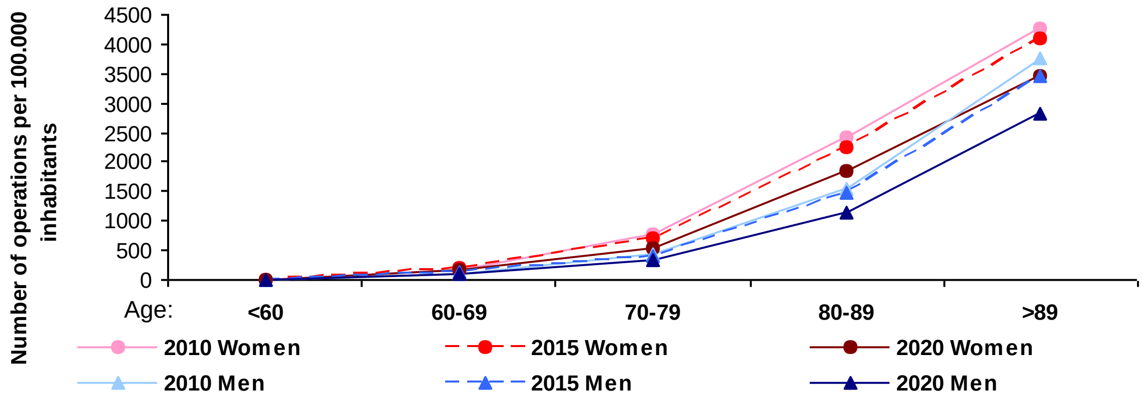


Figure 2: Incidence of primary operation (in 2010, 2015 and 2020)



Time from fracture to operation in hours - primary operations

Table 2: Time from fracture to operation in hours*

	0 - 6		>6 - 12		>12 - 24		>24 - 48		>48		Missing		Total
2020	224	(3,3%)	927	(13,5%)	2 617	(38,1%)	2 066	(30,1%)	908	(13,2%)	132	(1,9%)	**6 874**
2019	214	(2,9%)	874	(11,8%)	2 627	(35,6%)	2 476	(33,5%)	1 056	(14,3%)	139	(1,9%)	**7 386**
2018	279	(3,6%)	956	(12,2%)	2 715	(34,6%)	2 415	(30,8%)	1 288	(16,4%)	183	(2,3%)	**7 836**
2017	298	(3,8%)	1 113	(14,0%)	2 773	(34,9%)	2 378	(30,0%)	1 207	(15,2%)	169	(2,1%)	**7 938**
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%)	180	(2,3%)	**7 893**
2013	314	(3,9%)	1 129	(14,1%)	2 932	(36,6%)	2 260	(28,2%)	1 198	(15,0%)	179	(2,2%)	**8 012**
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%)	1 206	(14,3%)	2 844	(33,8%)	2 419	(28,8%)	1 421	(16,9%)	208	(2,5%)	**8 411**
2010	355	(4,3%)	1 218	(14,9%)	2 882	(35,1%)	2 216	(27,0%)	1 340	(16,3%)	190	(2,3%)	**8 201**
2009	354	(4,4%)	1 290	(15,9%)	2 857	(35,3%)	2 128	(26,3%)	1 306	(16,1%)	166	(2,0%)	**8 101**
2008	385	(4,7%)	1 321	(16,1%)	2 834	(34,5%)	2 201	(26,8%)	1 292	(15,7%)	179	(2,2%)	**8 212**
2007	452	(5,9%)	1 434	(18,6%)	2 610	(33,8%)	1 872	(24,3%)	1 188	(15,4%)	155	(2,0%)	**7 711**
2005-0	910	(6,9%)	2 782	(21,1%)	4 621	(35,1%)	2 830	(21,5%)	1 792	(13,6%)	220	(1,7%)	**13 155**
Total	**5 348**	**(4,3%)**	**18 767**	**(15,1%)**	**44 195**	**(35,6%)**	**34 515**	**(27,8%)**	**18 707**	**(15,1%)**	**2 670**	**(2,1%)**	**124 202**

* Total hip prostheses are not counted

Figure 3: Time from fracture to operation - grouped in hours (n=124 202)

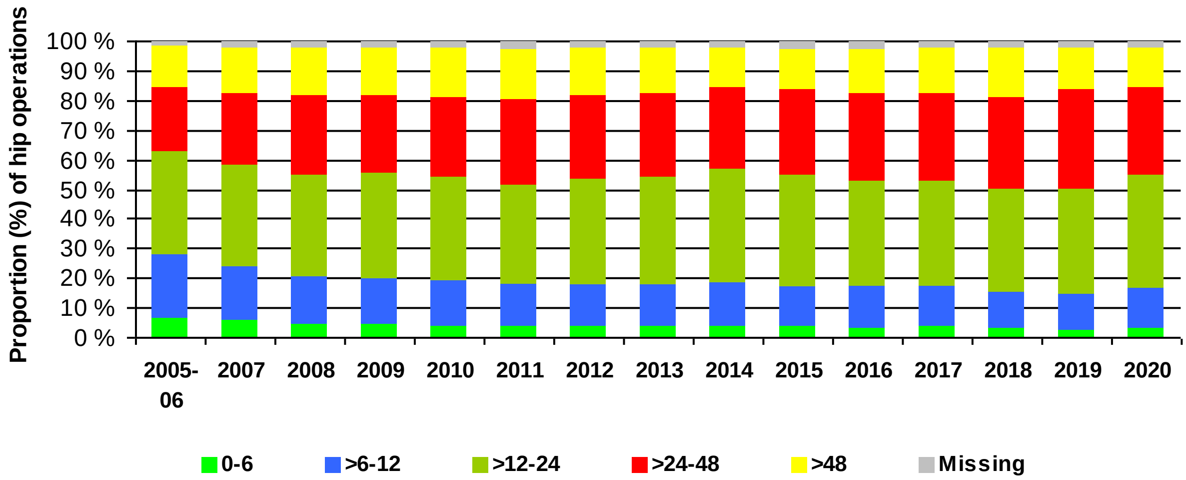
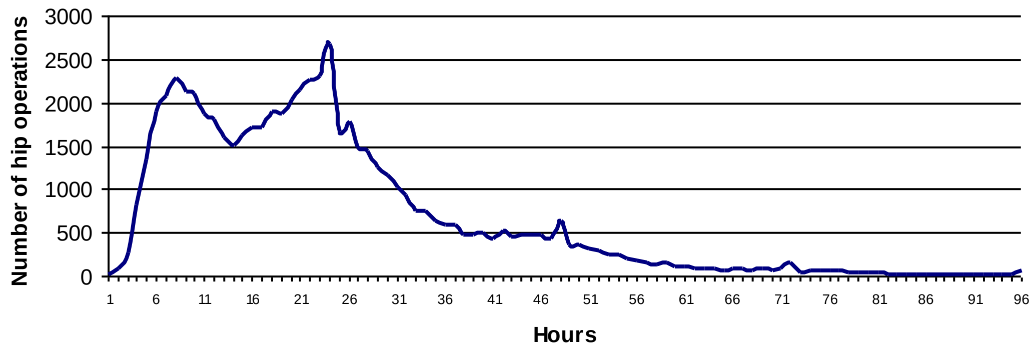


Figure 4: Time from fracture to operation - continuous (n=64 521)



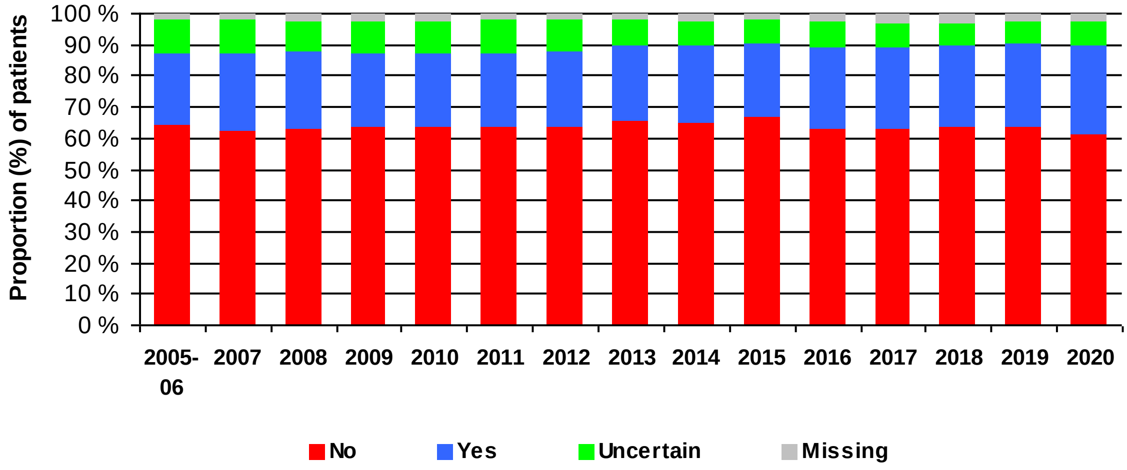
Mean time from fracture to operation was 24 hours (median 21 hours).

Cognitive impairment

Table 3: Cognitive impairment - primary operations*

	No		Yes		Uncertain		Missing		Total
2020	4 201	(61,1%)	1 956	(28,5%)	540	(7,9%)	177	(2,6%)	**6 874**
2019	4 712	(63,8%)	1 979	(26,8%)	518	(7,0%)	177	(2,4%)	**7 386**
2018	4 968	(63,4%)	2 067	(26,4%)	559	(7,1%)	242	(3,1%)	**7 836**
2017	4 981	(62,7%)	2 084	(26,3%)	637	(8,0%)	236	(3,0%)	**7 938**
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%)	182	(2,3%)	**7 893**
2013	5 235	(65,3%)	1 938	(24,2%)	675	(8,4%)	164	(2,0%)	**8 012**
2012	5 222	(63,5%)	2 007	(24,4%)	821	(10,0%)	179	(2,2%)	**8 229**
2011	5 348	(63,6%)	1 990	(23,7%)	901	(10,7%)	172	(2,0%)	**8 411**
2010	5 220	(63,7%)	1 917	(23,4%)	834	(10,2%)	230	(2,8%)	**8 201**
2009	5 157	(63,7%)	1 890	(23,3%)	832	(10,3%)	222	(2,7%)	**8 101**
2008	5 186	(63,2%)	2 026	(24,7%)	794	(9,7%)	206	(2,5%)	**8 212**
2007	4 834	(62,7%)	1 873	(24,3%)	836	(10,8%)	168	(2,2%)	**7 711**
2005-06	8 455	(64,3%)	3 059	(23,3%)	1 369	(10,4%)	272	(2,1%)	**13 155**
Total	**79 201**	**(63,8%)**	**30 777**	**(24,8%)**	**11 195**	**(9,0%)**	**3 029**	**(2,4%)**	**124 202**

Figure 5: Cognitive impairment - primary operations*



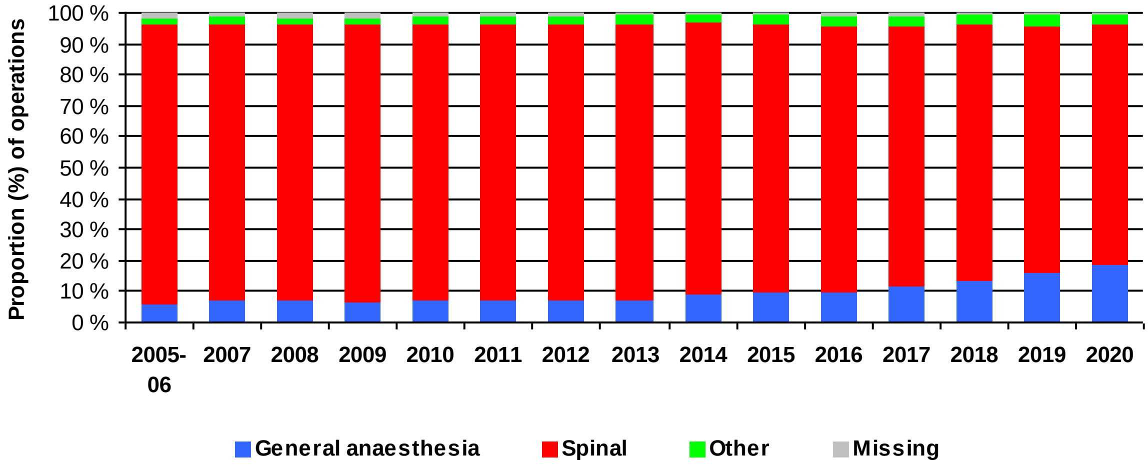
* Total hip prostheses are not counted

Type of anaesthesia

Table 4: Type of anaesthesia - primary operations*

	General anaesthesia		Spinal		Other		Missing		Total
2020	1 260	(18,3%)	5 331	(77,6%)	222	(3,2%)	61	(0,9%)	**6 874**
2019	1 178	(15,9%)	5 885	(79,7%)	259	(3,5%)	64	(0,9%)	**7 386**
2018	1 062	(13,6%)	6 473	(82,6%)	231	(2,9%)	70	(0,9%)	**7 836**
2017	929	(11,7%)	6 669	(84,0%)	259	(3,3%)	81	(1,0%)	**7 938**
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%)	68	(0,9%)	**7 893**
2013	588	(7,3%)	7 094	(88,5%)	256	(3,2%)	74	(0,9%)	**8 012**
2012	560	(6,8%)	7 364	(89,5%)	219	(2,7%)	86	(1,0%)	**8 229**
2011	586	(7,0%)	7 506	(89,2%)	219	(2,6%)	100	(1,2%)	**8 411**
2010	565	(6,9%)	7 321	(89,3%)	194	(2,4%)	121	(1,5%)	**8 201**
2009	520	(6,4%)	7 246	(89,4%)	188	(2,3%)	147	(1,8%)	**8 101**
2008	591	(7,2%)	7 297	(88,9%)	182	(2,2%)	142	(1,7%)	**8 212**
2007	550	(7,1%)	6 852	(88,9%)	187	(2,4%)	122	(1,6%)	**7 711**
2005-06	795	(6,0%)	11 854	(90,1%)	260	(2,0%)	246	(1,9%)	**13 155**
Total	**11 484**	**(9,2%)**	**107 799**	**(86,8%)**	**3 387**	**(2,7%)**	**1 532**	**(1,2%)**	**124 202**

Figure 6: Type of anaesthesia in primary operations*



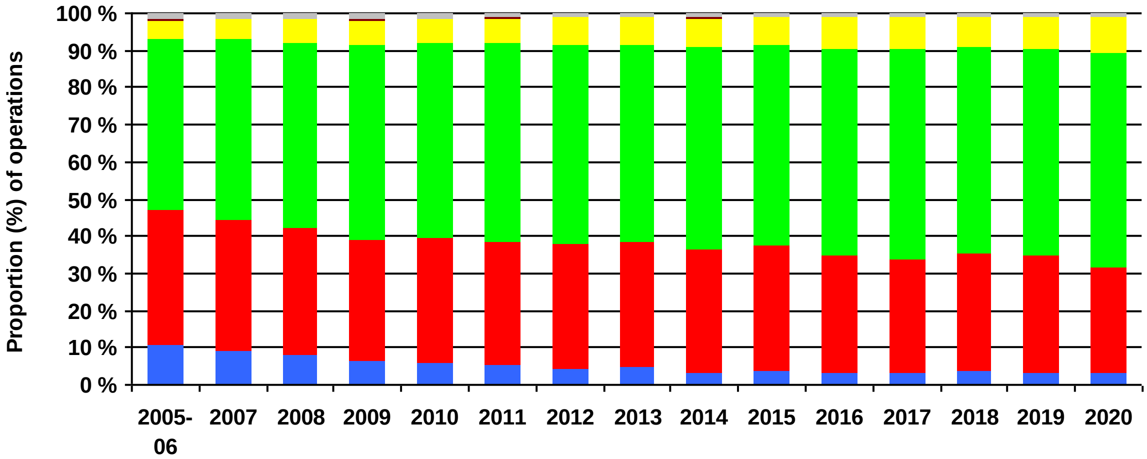
* Total hip prostheses are not counted

ASA classification

Table 5: ASA classification - primary operations

	ASA 1		ASA 2		ASA 3		ASA 4		ASA 5		Missing		Total
2020	231	(3,1%)	2 090	(28,2%)	4 304	(58,2%)	690	(9,3%)	11	(0,1%)	73	(1,0%)	**7 399**
2019	277	(3,5%)	2 508	(31,3%)	4 461	(55,7%)	674	(8,4%)	6	(0,1%)	84	(1,0%)	**8 010**
2018	319	(3,8%)	2 654	(31,5%)	4 689	(55,7%)	644	(7,7%)	13	(0,2%)	96	(1,1%)	**8 415**
2017	282	(3,4%)	2 552	(30,6%)	4 730	(56,6%)	679	(8,1%)	15	(0,2%)	92	(1,1%)	**8 350**
2016	264	(3,1%)	2 694	(31,7%)	4 732	(55,7%)	708	(8,3%)	10	(0,1%)	94	(1,1%)	**8 502**
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%)	101	(1,2%)	**8 182**
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%)	2 877	(33,4%)	4 612	(53,6%)	558	(6,5%)	6	(0,1%)	111	(1,3%)	**8 601**
2010	493	(5,9%)	2 806	(33,6%)	4 410	(52,7%)	498	(6,0%)	16	(0,2%)	140	(1,7%)	**8 363**
2009	509	(6,2%)	2 720	(32,9%)	4 309	(52,2%)	564	(6,8%)	10	(0,1%)	146	(1,8%)	**8 258**
2008	677	(8,1%)	2 858	(34,2%)	4 172	(49,9%)	527	(6,3%)	9	(0,1%)	119	(1,4%)	**8 362**
2007	716	(9,1%)	2 767	(35,2%)	3 820	(48,5%)	451	(5,7%)	7	(0,1%)	109	(1,4%)	**7 870**
2005-06	1 411	(10,5%)	4 912	(36,7%)	6 116	(45,7%)	688	(5,1%)	26	(0,2%)	243	(1,8%)	**13 396**
Total	**6 909**	(5,4%)	**42 692**	(33,1%)	**68 281**	(53,0%)	**9 117**	(7,1%)	**180**	(0,1%)	**1 685**	(1,3%)	**128 865**

Figure 7: 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: Type of fracture (reason for primary operation)

	Type 1	Type 2	Type 3	Type 4	Type 5	Type 9	Type 6	Type 7	Type 8	Other	Missing	Total
2020	780	3 095	146	962	1 237	177	390	514	11	81	6	**7 399**
	10,5%	41,8%	2,0%	13,0%	16,7%	2,4%	5,3%	6,9%	0,1%	1,1%	0,1%	
2019	872	3 359	186	1 041	1 248	179	410	615	9	81	10	**8 010**
	10,9%	41,9%	2,3%	13,0%	15,6%	2,2%	5,1%	7,7%	0,1%	1,0%	0,1%	
2018	972	3 440	199	1 113	1 289	227	499	574	5	94	3	**8 415**
	11,6%	40,9%	2,4%	13,2%	15,3%	2,7%	5,9%	6,8%	0,1%	1,1%	0,0%	
2017	1 037	3 435	217	1 153	1 316	206	476	405	7	98	0	**8 350**
	12,4%	41,1%	2,6%	13,8%	15,8%	2,5%	5,7%	4,9%	0,1%	1,2%	0,0%	
2016	1 086	3 545	234	1 245	1 321	162	467	343	4	94	2	**8 503**
	12,8%	41,7%	2,8%	14,6%	15,5%	1,9%	5,5%	4,0%	0,0%	1,1%	0,0%	
2015	1 154	3 350	243	1 336	1 255	228	442	321	2	78	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	1	**8 182**
	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	448	293	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	3 444	276	1 346	1 394	162	398	186	4	74	0	**8 601**
	15,3%	40,0%	3,2%	15,6%	16,2%	1,9%	4,6%	2,2%	0,0%	0,9%	0,0%	
2010	1 249	3 287	321	1 313	1 364	167	431	160	2	67	2	**8 363**
	14,9%	39,3%	3,8%	15,7%	16,3%	2,0%	5,2%	1,9%	0,0%	0,8%	0,0%	
2009	1 234	3 368	328	1 306	1 211	149	425	150	7	72	8	**8 258**
	14,9%	40,8%	4,0%	15,8%	14,7%	1,8%	5,1%	1,8%	0,1%	0,9%	0,1%	
2008	1 316	3 222	351	1 475	1 240	83	439	148	2	83	3	**8 362**
	15,7%	38,5%	4,2%	17,6%	14,8%	1,0%	5,2%	1,8%	0,0%	1,0%	0,0%	
2007	1 416	2 993	391	1 353	1 052	0	438	158	1	66	2	**7 870**
	18,0%	38,0%	5,0%	17,2%	13,4%	0,0%	5,6%	2,0%	0,0%	0,8%	0,0%	
2005-06	2 481	5 111	619	2 322	1 767	0	732	233	8	106	17	**13 396**
	18,5%	38,2%	4,6%	17,3%	13,2%	0,0%	5,5%	1,7%	0,1%	0,8%	0,1%	
Total	**18 361**	**51 747**	**4 319**	**19 877**	**19 486**	**2 241**	**6 884**	**4 592**	**71**	**1 228**	**59**	**128 865**
	14,2%	**40,2%**	**3,4%**	**15,4%**	**15,1%**	**1,7%**	**5,3%**	**3,6%**	**0,1%**	**1,0%**	**0,0%**	

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	Total
2020	622	56	3 241	0	799	154	60	4	1 028	9	871	525	26	2	**7 399**
	8,4%	0,8%	43,8%	0,0%	10,8%	2,1%	0,8%	0,1%	13,9%	0,1%	11,8%	7,1%	0,4%	0,0%	
2019	838	74	3 352	0	917	249	73	21	975	4	861	624	21	0	**8 010**
	10,5%	0,9%	41,8%	0,0%	11,4%	3,1%	0,9%	0,3%	12,2%	0,0%	10,7%	7,8%	0,3%	0,0%	
2018	969	63	3 415	1	1 121	315	79	13	965	17	859	579	19	0	**8 415**
	11,5%	0,7%	40,6%	0,0%	13,3%	3,7%	0,9%	0,2%	11,5%	0,2%	10,2%	6,9%	0,2%	0,0%	
2017	1 080	46	3 335	1	1 262	402	104	19	828	24	802	412	35	0	**8 350**
	12,9%	0,6%	39,9%	0,0%	15,1%	4,8%	1,2%	0,2%	9,9%	0,3%	9,6%	4,9%	0,4%	0,0%	
2016	1 160	39	3 447	2	1 386	520	97	21	817	11	617	347	39	0	**8 503**
	13,6%	0,5%	40,5%	0,0%	16,3%	6,1%	1,1%	0,2%	9,6%	0,1%	7,3%	4,1%	0,5%	0,0%	
2015	1 241	36	3 234	2	1 499	664	96	14	758	8	510	323	25	0	**8 410**
	14,8%	0,4%	38,5%	0,0%	17,8%	7,9%	1,1%	0,2%	9,0%	0,1%	6,1%	3,8%	0,3%	0,0%	
2014	1 127	31	3 189	1	1 551	689	102	17	734	8	418	289	26	0	**8 182**
	13,8%	0,4%	39,0%	0,0%	19,0%	8,4%	1,2%	0,2%	9,0%	0,1%	5,1%	3,5%	0,3%	0,0%	
2013	1 289	32	3 100	3	1 495	749	109	20	747	4	431	297	33	0	**8 309**
	15,5%	0,4%	37,3%	0,0%	18,0%	9,0%	1,3%	0,2%	9,0%	0,0%	5,2%	3,6%	0,4%	0,0%	
2012	1 455	27	3 142	5	1 632	848	97	19	635	8	332	208	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%	0,3%	0,0%	
2011	1 650	50	3 005	19	1 697	871	112	12	658	14	281	190	42	0	**8 601**
	19,2%	0,6%	34,9%	0,2%	19,7%	10,1%	1,3%	0,1%	7,7%	0,2%	3,3%	2,2%	0,5%	0,0%	
2010	1 616	83	2 782	29	1 733	899	127	17	571	4	280	162	60	0	**8 363**
	19,3%	1,0%	33,3%	0,3%	20,7%	10,7%	1,5%	0,2%	6,8%	0,0%	3,3%	1,9%	0,7%	0,0%	
2009	1 688	81	2 756	82	1 765	788	101	50	489	8	228	157	65	0	**8 258**
	20,4%	1,0%	33,4%	1,0%	21,4%	9,5%	1,2%	0,6%	5,9%	0,1%	2,8%	1,9%	0,8%	0,0%	
2008	1 943	64	2 440	70	1 784	690	128	64	686	10	266	150	65	0	**8 362**
	23,2%	0,8%	29,2%	0,8%	21,3%	8,3%	1,5%	0,8%	8,2%	0,1%	3,2%	1,8%	0,8%	0,0%	
2007	2 181	50	2 115	48	1 868	644	127	36	430	6	157	159	48	1	**7 870**
	27,7%	0,6%	26,9%	0,6%	23,7%	8,2%	1,6%	0,5%	5,5%	0,1%	2,0%	2,0%	0,6%	0,0%	
2005-06	4 620	112	2 755	58	3 383	1 097	252	71	483	7	182	241	130	3	**13 396**
	34,5%	0,8%	20,6%	0,4%	25,3%	8,2%	1,9%	0,5%	3,6%	0,1%	1,4%	1,8%	1,0%	0,0%	
Total	**23 479**	**844**	**45 308**	**321**	**23 892**	**9 579**	**1 664**	**398**	**10 804**	**142**	**7 095**	**4 663**	**662**	**6**	**128 865**
	18,2%	**0,7%**	**35,2%**	**0,2%**	**18,5%**	**7,4%**	**1,3%**	**0,3%**	**8,4%**	**0,1%**	**5,5%**	**3,6%**	**0,5%**	**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: Other
T14: Missing

Figure 8: Type of primary operations - all fractures

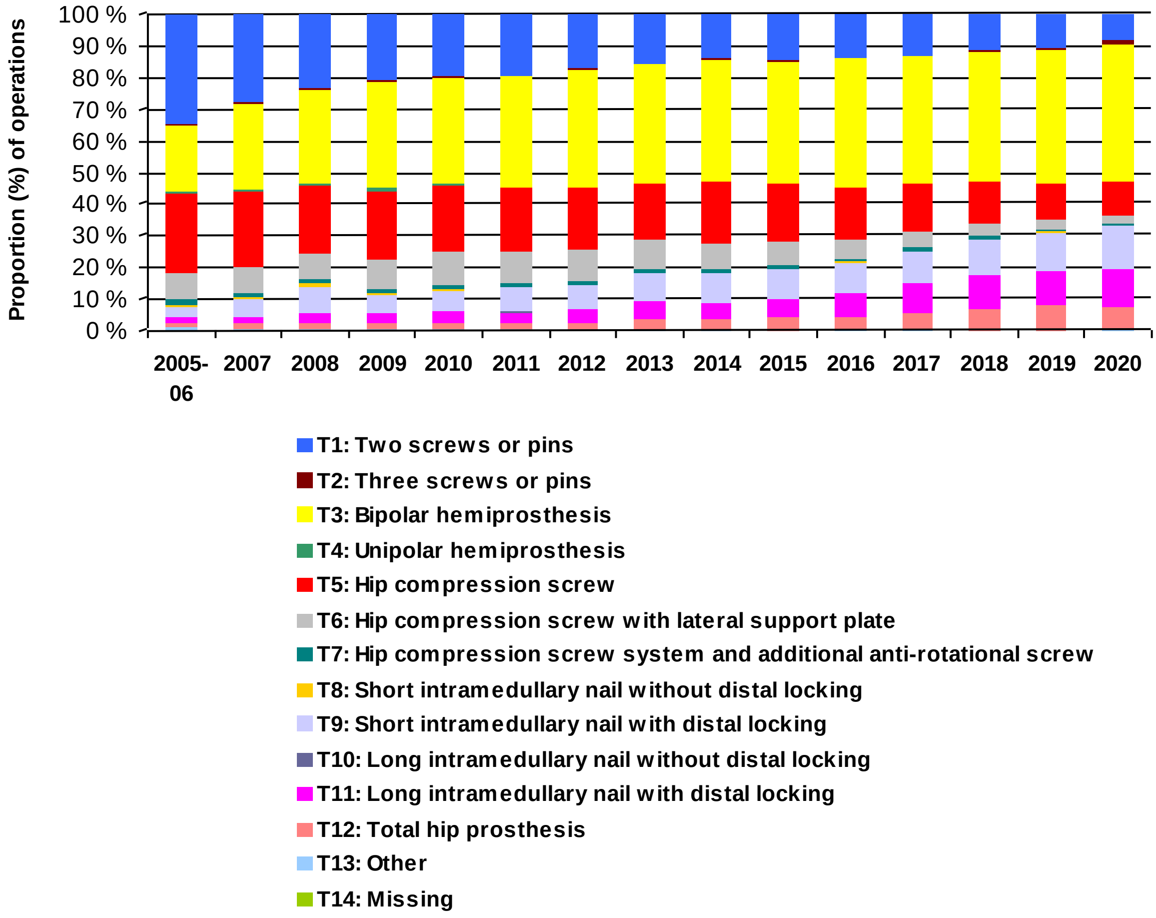


Table 8: Type of primary operation per type of primary fracture

Type of primary fracture	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	Total
Intracapsular fracture, undisplaced	16 133 87,3%	330 1,8%	1 329 7,2%	4 0,0%	386 2,1%	2 0,0%	111 0,6%	7 0,0%	35 0,2%	0 0,0%	4 0,0%	0 0,0%	18 0,1%	0 0,0%	**18 471**
Intracapsular fracture, displaced	7 160 13,8%	508 1,0%	42 942 82,7%	302 0,6%	384 0,7%	10 0,0%	187 0,4%	5 0,0%	52 0,1%	0 0,0%	16 0,0%	0 0,0%	180 0,3%	1 0,0%	**51 934**
Basocervical fracture	139 2,7%	3 0,1%	459 9,0%	12 0,2%	2 320 45,7%	88 1,7%	758 14,9%	30 0,6%	445 8,8%	1 0,0%	30 0,6%	0 0,0%	33 0,6%	0 0,0%	**5 077**
Trochanteric fracture (2 fragments)	13 0,1%	0 0,0%	67 0,3%	0 0,0%	13 382 66,1%	1 025 5,1%	361 1,8%	266 1,3%	4 274 21,1%	14 0,1%	425 2,1%	0 0,0%	44 0,2%	3 0,0%	**20 238**
Trochanteric fracture (multifragment)	3 0,0%	1 0,0%	148 0,8%	0 0,0%	6 117 31,1%	5 907 30,1%	166 0,8%	77 0,4%	4 898 24,9%	42 0,2%	1 915 9,7%	0 0,0%	209 1,1%	1 0,0%	**19 652**
Intertrochanteric fracture **	0 0,0%	0 0,0%	23 1,0%	0 0,0%	180 8,0%	798 35,5%	7 0,3%	5 0,2%	429 19,1%	12 0,5%	757 33,7%	0 0,0%	30 1,3%	0 0,0%	**2 248**
Subtrochanteric fracture	5 0,1%	1 0,0%	50 0,7%	0 0,0%	952 13,8%	1 524 22,1%	19 0,3%	6 0,1%	558 8,1%	67 1,0%	3 630 52,6%	0 0,0%	72 1,0%	0 0,0%	**6 903**
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%	4 592 100,0%	0 0,0%	0 0,0%	**4 592**
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%	71 100,0%	0 0,0%	0 0,0%	**71**
Other	21 1,6%	1 0,1%	258 20,2%	2 0,2%	162 12,7%	221 17,3%	52 4,1%	2 0,2%	111 8,7%	6 0,5%	316 24,7%	0 0,0%	76 5,9%	0 0,0%	**1 280**
Missing	5 8,1%	0 0,0%	32 51,6%	1 1,6%	9 14,5%	4 6,5%	3 4,8%	0 0,0%	2 3,2%	0 0,0%	2 3,2%	0 0,0%	0 0,0%	1 1,6%	**62**
Total	**23 479** **18,0%**	**844** **0,6%**	**45 308** **34,7%**	**321** **0,2%**	**23 892** **18,3%**	**9 579** **7,3%**	**1 664** **1,3%**	**398** **0,3%**	**10 804** **8,3%**	**142** **0,1%**	**7 095** **5,4%**	**4 663** **3,6%**	**662** **0,5%**	**6** **0,0%**	**130 528**

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: Other
T14: Missing

* Total hip prostheses reported to the Norwegian Arthroplasty Register

** The registration started in 2008

Figure 9a: Time trend for treatment of undisplaced femoral neck fractures

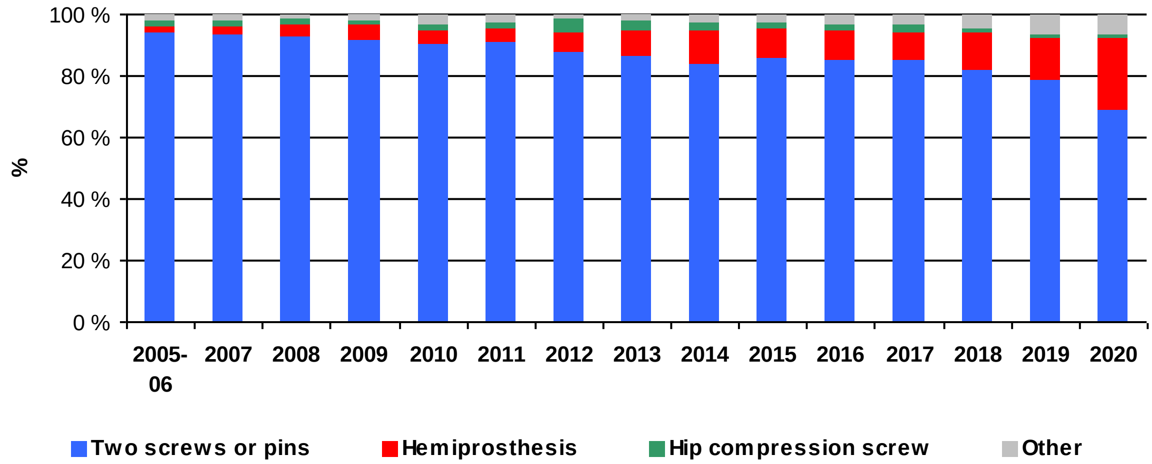
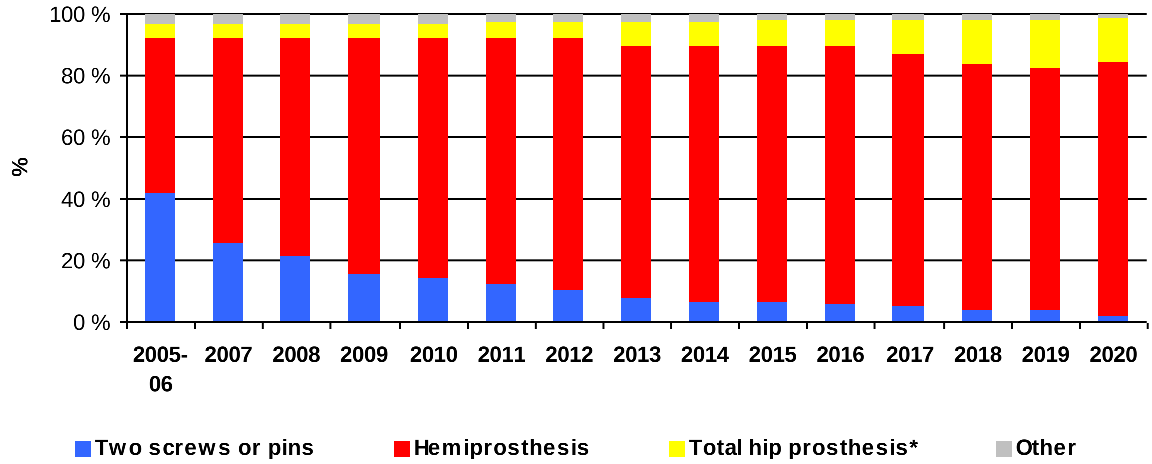


Figure 9b: Time trend for treatment of displaced femoral neck fractures



* Total hip prostheses for femoral neck fracture were reported to the Norwegian Arthroplasty Register without information about dislocation fracture

Figure 9c: Time trend for treatment of basocervical fracture

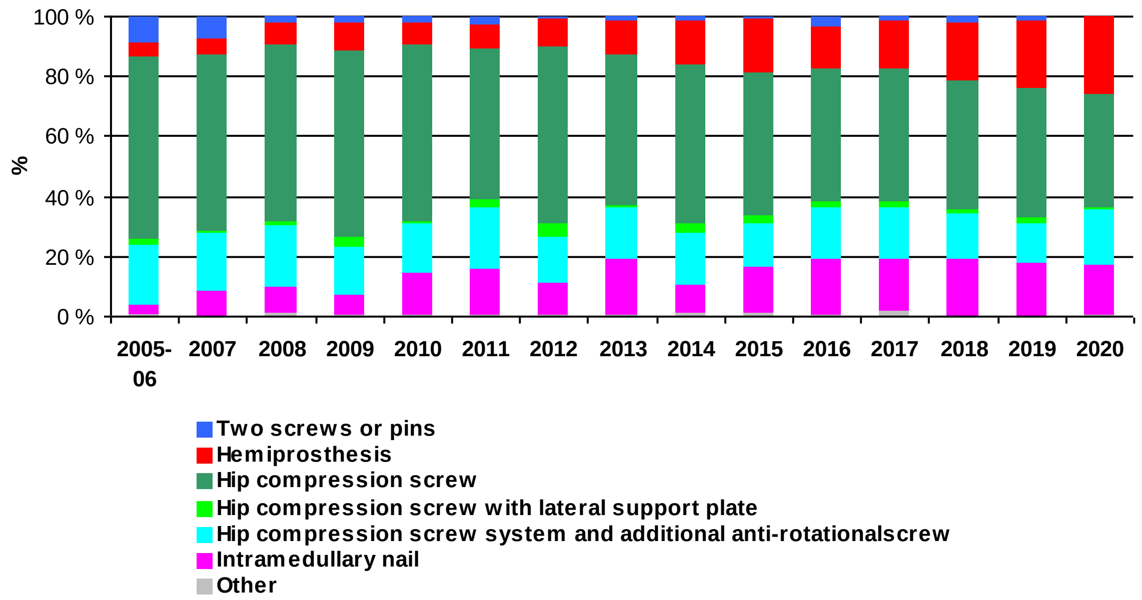


Figure 9d: Time trend for treatment of trochanteric fractures (AO / OTA type A1)

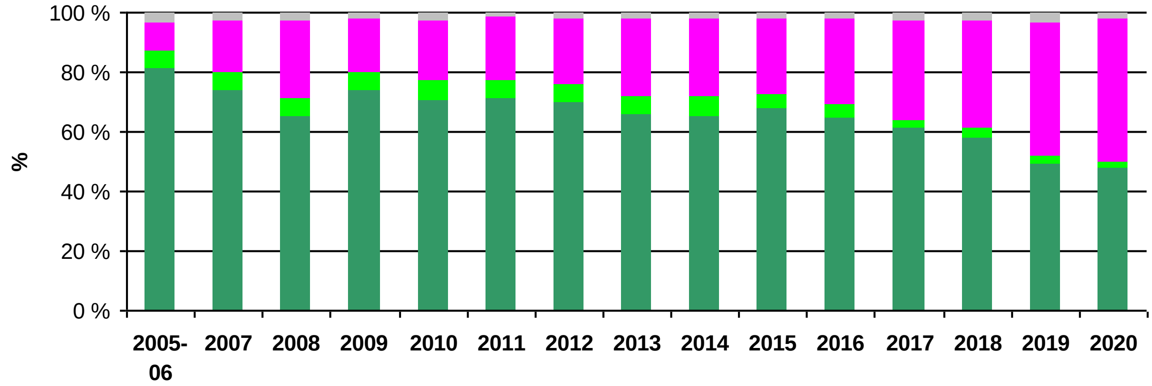


Figure 9e: Time trend for treatment of trochanteric fractures (AO / OTA type A2)

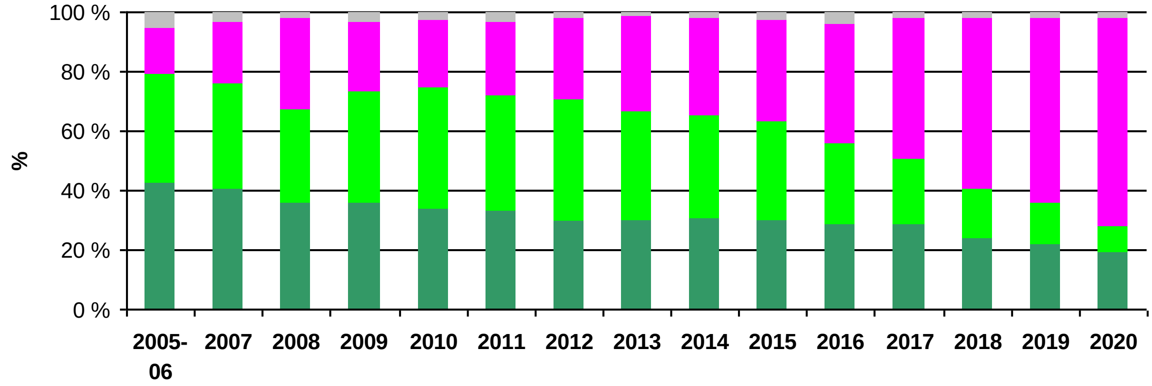
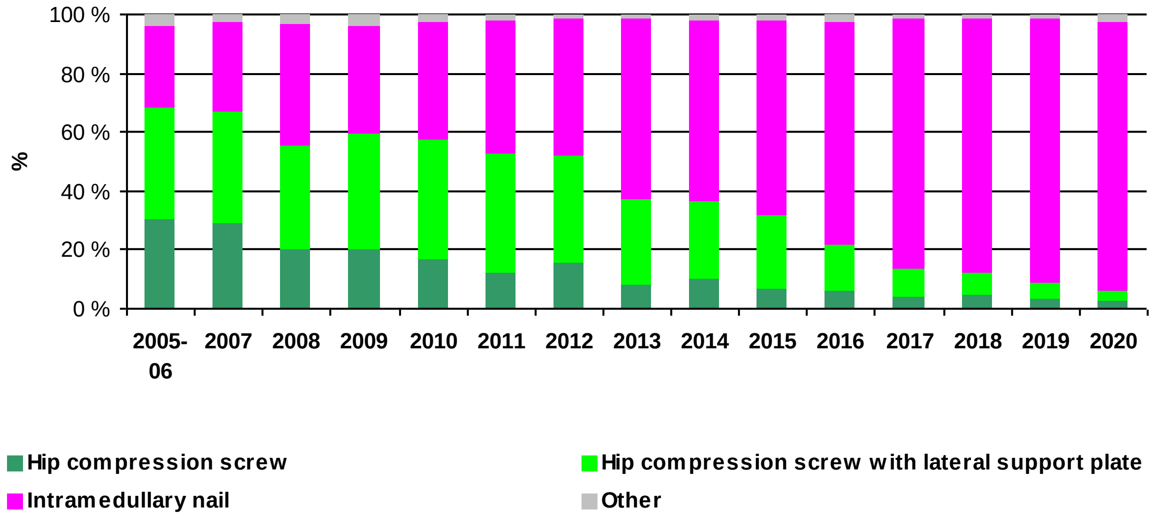


Figure 9f: Time trend for treatment of inter-* and subtrochanteric fractures



* Intertrochanteric fracture (AO / OTA type A3)

Reoperations

Table 9: Reasons for reoperation - all fractures (more than one reason is possible)

	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	Total
2020	60	30	15	36	4	9	146	9	25	13	82	2	22	337	**790**
	7,6%	3,8%	1,9%	4,6%	0,5%	1,1%	18,5%	1,1%	3,2%	1,6%	10,4%	0,3%	2,8%	42,7%	
2019	89	46	19	72	10	9	180	12	28	19	94	7	40	441	**1 066**
	8,3%	4,3%	1,8%	6,8%	0,9%	0,8%	16,9%	1,1%	2,6%	1,8%	8,8%	0,7%	3,8%	41,4%	
2018	98	46	17	70	3	8	220	10	35	24	75	9	44	415	**1 074**
	9,1%	4,3%	1,6%	6,5%	0,3%	0,7%	20,5%	0,9%	3,3%	2,2%	7,0%	0,8%	4,1%	38,6%	
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	383	**1 148**
	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	349	**1 076**
	14,2%	6,0%	3,5%	7,0%	1,8%	0,8%	17,4%	1,4%	3,2%	2,0%	5,9%	0,4%	4,0%	32,4%	
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	292	**1 018**
	17,4%	7,8%	4,7%	7,8%	1,1%	1,1%	13,0%	1,4%	4,3%	2,6%	5,7%	1,0%	3,6%	28,7%	
2009	216	96	59	95	8	18	155	7	38	36	49	9	57	301	**1 144**
	18,9%	8,4%	5,2%	8,3%	0,7%	1,6%	13,5%	0,6%	3,3%	3,1%	4,3%	0,8%	5,0%	26,3%	
2008	245	104	63	102	10	10	110	20	39	42	57	10	33	269	**1 114**
	22,0%	9,3%	5,7%	9,2%	0,9%	0,9%	9,9%	1,8%	3,5%	3,8%	5,1%	0,9%	3,0%	24,1%	
2007	287	132	85	111	10	10	86	13	32	39	48	9	31	252	**1 145**
	25,1%	11,5%	7,4%	9,7%	0,9%	0,9%	7,5%	1,1%	2,8%	3,4%	4,2%	0,8%	2,7%	22,0%	
2005-06	599	232	135	186	16	20	129	36	46	57	66	9	44	284	**1 859**
	32,2%	12,5%	7,3%	10,0%	0,9%	1,1%	6,9%	1,9%	2,5%	3,1%	3,6%	0,5%	2,4%	15,3%	
Total	**2 743**	**1 187**	**671**	**1 254**	**145**	**150**	**2 398**	**226**	**514**	**429**	**1 041**	**131**	**596**	**5 246**	**16 731**
	16,4%	**7,1%**	**4,0%**	**7,5%**	**0,9%**	**0,9%**	**14,3%**	**1,4%**	**3,1%**	**2,6%**	**6,2%**	**0,8%**	**3,6%**	**31,4%**	

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: Penetration of osteosynthesis material through caput
R11: New fracture around implant
R12: Loosening of hemiprosthesis
R13: Other
R14: Reported reoperations to the Arthroplasty Register except ”Deep infection” which is included in R7: Infection – deep.

Table 10: Reasons for reoperation per type of primary fracture (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	641	260	213	330	34	6	146	16	26	61	215	7	115	**2 070**
	31,0%	12,6%	10,3%	15,9%	1,6%	0,3%	7,1%	0,8%	1,3%	2,9%	10,4%	0,3%	5,6%	
Intracapsular fracture, displaced	667	261	169	298	25	83	1 369	132	415	55	330	86	124	**4 014**
	16,6%	6,5%	4,2%	7,4%	0,6%	2,1%	34,1%	3,3%	10,3%	1,4%	8,2%	2,1%	3,1%	
Basocervical fracture	132	62	31	67	8	2	51	5	13	31	19	2	24	**447**
	29,5%	13,9%	6,9%	15,0%	1,8%	0,4%	11,4%	1,1%	2,9%	6,9%	4,3%	0,4%	5,4%	
Trochanteric fracture (2 fragments)	176	62	25	75	16	13	106	16	7	66	81	0	66	**709**
	24,8%	8,7%	3,5%	10,6%	2,3%	1,8%	15,0%	2,3%	1,0%	9,3%	11,4%	0,0%	9,3%	
Trochanteric fracture (multifragment)	373	157	35	134	24	18	282	30	10	107	103	3	92	**1 368**
	27,3%	11,5%	2,6%	9,8%	1,8%	1,3%	20,6%	2,2%	0,7%	7,8%	7,5%	0,2%	6,7%	
Intertrochanteric fracture*	68	30	7	29	5	2	46	7	3	15	11	0	17	**240**
	28,3%	12,5%	2,9%	12,1%	2,1%	0,8%	19,2%	2,9%	1,3%	6,3%	4,6%	0,0%	7,1%	
Subtrochanteric fracture	180	107	7	69	6	7	129	11	5	24	44	3	62	**654**
	27,5%	16,4%	1,1%	10,6%	0,9%	1,1%	19,7%	1,7%	0,8%	3,7%	6,7%	0,5%	9,5%	
Other	31	12	2	9	2	3	30	2	4	8	12	2	13	**130**
	23,8%	9,2%	1,5%	6,9%	1,5%	2,3%	23,1%	1,5%	3,1%	6,2%	9,2%	1,5%	10,0%	
Missing	2	0	0	0	0	0	3	0	0	0	0	0	0	**5**
	40,0%	0,0%	0,0%	0,0%	0,0%	0,0%	60,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	
Total	**2 270**	**951**	**489**	**1 011**	**120**	**134**	**2 162**	**219**	**483**	**367**	**815**	**103**	**513**	**9 637**
	23,6%	**9,9%**	**5,1%**	**10,5%**	**1,2%**	**1,4%**	**22,4%**	**2,3%**	**5,0%**	**3,8%**	**8,5%**	**1,1%**	**5,3%**	

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: Penetration of osteosynthesis material through caput
R11: New fracture around implant
R12: Loosening of hemiprosthesis
R13: Other

* The registration started in 2008

** Total hip prostheses are not counted

Table 11: Type of reoperation (more than one reason is possible)

	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	Total
2020	32 3,9%	17 2,1%	82 9,9%	0 0,0%	76 9,2%	114 13,8%	11 1,3%	3 0,4%	145 17,5%	347 42,0%	**827**
2019	68 6,4%	21 2,0%	128 12,0%	0 0,0%	85 8,0%	147 13,8%	16 1,5%	4 0,4%	176 16,5%	421 39,5%	**1 066**
2018	71 6,3%	27 2,4%	114 10,2%	0 0,0%	108 9,7%	167 14,9%	16 1,4%	7 0,6%	189 16,9%	420 37,5%	**1 119**
2017	70 6,7%	33 3,2%	138 13,2%	0 0,0%	115 11,0%	153 14,6%	18 1,7%	6 0,6%	145 13,8%	369 35,2%	**1 047**
2016	90 8,0%	36 3,2%	151 13,3%	0 0,0%	100 8,8%	151 13,3%	14 1,2%	7 0,6%	161 14,2%	422 37,3%	**1 132**
2015	75 6,9%	36 3,3%	182 16,9%	0 0,0%	114 10,6%	131 12,1%	19 1,8%	4 0,4%	148 13,7%	371 34,4%	**1 080**
2014	48 5,4%	26 2,9%	159 17,9%	0 0,0%	81 9,1%	112 12,6%	7 0,8%	4 0,5%	99 11,1%	352 39,6%	**888**
2013	71 7,0%	32 3,2%	159 15,8%	0 0,0%	117 11,6%	116 11,5%	14 1,4%	6 0,6%	118 11,7%	376 37,3%	**1 009**
2012	73 7,3%	42 4,2%	189 18,8%	0 0,0%	91 9,1%	137 13,6%	14 1,4%	9 0,9%	109 10,8%	341 33,9%	**1 005**
2011	72 7,0%	34 3,3%	215 21,0%	0 0,0%	97 9,5%	105 10,2%	19 1,9%	13 1,3%	113 11,0%	358 34,9%	**1 026**
2010	86 8,9%	40 4,2%	221 23,0%	2 0,2%	89 9,3%	106 11,0%	15 1,6%	11 1,1%	104 10,8%	288 29,9%	**962**
2009	120 11,4%	40 3,8%	254 24,0%	0 0,0%	97 9,2%	129 12,2%	10 0,9%	11 1,0%	94 8,9%	302 28,6%	**1 057**
2008	112 11,0%	40 3,9%	317 31,1%	1 0,1%	84 8,2%	83 8,1%	10 1,0%	15 1,5%	91 8,9%	266 26,1%	**1 019**
2007	118 12,0%	31 3,1%	371 37,7%	1 0,1%	78 7,9%	67 6,8%	5 0,5%	11 1,1%	64 6,5%	239 24,3%	**985**
2005-06	179 11,1%	62 3,8%	693 42,8%	41 2,5%	128 7,9%	102 6,3%	17 1,1%	12 0,7%	98 6,1%	287 17,7%	**1 619**
Total	**1 285** **8,1%**	**517** **3,3%**	**3 373** **21,3%**	**45** **0,3%**	**1 460** **9,2%**	**1 820** **11,5%**	**205** **1,3%**	**123** **0,8%**	**1 854** **11,7%**	**5 159** **32,6%**	**15 841**

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: Drainage of haematoma or infection
R7: Closed reduction of dislocated hemiprosthesis
R8: Open reduction of dislocated hemiprosthesis
R9: Other
R10: Total hip prosthesis

Table 12: Reoperation with primary screw osteosynthesis (reasons are not mutually exclusive)

	R1	R2	R3	R4	R5	R6	R9	R10	Total
2020	12 8,2%	0 0,0%	19 12,9%	0 0,0%	16 10,9%	1 0,7%	3 2,0%	96 65,3%	**147**
2019	30 15,6%	0 0,0%	40 20,8%	0 0,0%	10 5,2%	3 1,6%	6 3,1%	103 53,6%	**192**
2018	27 12,2%	1 0,5%	30 13,5%	0 0,0%	25 11,3%	3 1,4%	7 3,2%	129 58,1%	**222**
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 35,1%	1 0,3%	26 8,0%	2 0,6%	4 1,2%	124 38,2%	**325**
2009	65 17,9%	8 2,2%	126 34,7%	0 0,0%	15 4,1%	7 1,9%	5 1,4%	137 37,7%	**363**
2008	54 13,9%	12 3,1%	161 41,4%	0 0,0%	21 5,4%	3 0,8%	3 0,8%	135 34,7%	**389**
2007	64 14,8%	8 1,8%	198 45,7%	1 0,2%	15 3,5%	1 0,2%	5 1,2%	141 32,6%	**433**
2005-06	38 6,4%	11 1,8%	317 53,3%	17 2,9%	27 4,5%	6 1,0%	6 1,0%	173 29,1%	**595**
Total	**543** **11,8%**	**82** **1,8%**	**1 515** **33,0%**	**19** **0,4%**	**335** **7,3%**	**44** **1,0%**	**66** **1,4%**	**1 991** **43,3%**	**4 595**

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: Drainage of haematoma or infection
R9: Other
R10: Total hip prosthesis

Table 13: Reoperation with primary uni/bipolar hemiprosthesis (reasons are not mutually exclusive)

	R2	R3	R6	R7	R8	R9	R10	Total
2020	4	20	74	5	3	85	23	**214**
	1,9%	9,3%	34,6%	2,3%	1,4%	39,7%	10,7%	
2019	7	33	84	10	3	98	44	**279**
	2,5%	11,8%	30,1%	3,6%	1,1%	35,1%	15,8%	
2018	9	28	105	10	4	113	45	**314**
	2,9%	8,9%	33,4%	3,2%	1,3%	36,0%	14,3%	
2017	9	28	78	8	4	84	48	**259**
	3,5%	10,8%	30,1%	3,1%	1,5%	32,4%	18,5%	
2016	12	20	81	9	6	98	42	**268**
	4,5%	7,5%	30,2%	3,4%	2,2%	36,6%	15,7%	
2015	5	18	66	16	1	74	47	**227**
	2,2%	7,9%	29,1%	7,0%	0,4%	32,6%	20,7%	
2014	9	20	48	5	4	61	37	**184**
	4,9%	10,9%	26,1%	2,7%	2,2%	33,2%	20,1%	
2013	11	15	68	9	4	78	37	**222**
	5,0%	6,8%	30,6%	4,1%	1,8%	35,1%	16,7%	
2012	11	23	55	10	8	56	31	**194**
	5,7%	11,9%	28,4%	5,2%	4,1%	28,9%	16,0%	
2011	10	14	60	16	8	70	32	**210**
	4,8%	6,7%	28,6%	7,6%	3,8%	33,3%	15,2%	
2010	8	17	59	10	9	69	16	**188**
	4,3%	9,0%	31,4%	5,3%	4,8%	36,7%	8,5%	
2009	9	10	44	7	9	49	20	**148**
	6,1%	6,8%	29,7%	4,7%	6,1%	33,1%	13,5%	
2008	10	7	46	5	12	45	20	**145**
	6,9%	4,8%	31,7%	3,4%	8,3%	31,0%	13,8%	
2007	5	9	27	3	10	35	11	**100**
	5,0%	9,0%	27,0%	3,0%	10,0%	35,0%	11,0%	
2005-06	7	3	40	7	6	42	12	**117**
	6,0%	2,6%	34,2%	6,0%	5,1%	35,9%	10,3%	
Total	**126**	**265**	**935**	**130**	**91**	**1 057**	**465**	**3 069**
	4,1%	**8,6%**	**30,5%**	**4,2%**	**3,0%**	**34,4%**	**15,2%**	

R2: Girdlestone (= Removal of implant/hemiprosthesis)
R3: Bipolar hemiprosthesis
R6: Drainage of 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

	2005-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Cable Ready plate + cerclage	2	1		2			1	1		1	**8**
Cement spacer	4	1	3	3	4	4	3	1	2	1	**26**
Cerclage	6	1	3	2	3	2	2		4	4	**27**
Dall Miles plate + cerclage	7	1		4	4	3	2	2	1	2	**26**
DCP plate + possibly cerclage						3	4	4	2		**13**
Drainage of haematoma	24	1				1	1				**27**
Exchange of caput/bipolar head	246	42	67	43	55	77	67	95	72	67	**831**
Exchange of caput/bipolar head + osteosynthesis with plate/cerclage	2		1	1	1			1			**6**
Fixation of trochanter (Dall Miles)	2	1				1			1		**5**
NCB-plate + cerclage								4	10	8	**22**
Suture of muscle/fascie	5	1			1	2	1	1	2		**13**
Unspecified plate + cerclage	4	3	2	2	5	1	2	2	2		**23**
Other (n<5)	8	4	2	4	1	4	1	2	2	2	**30**
Total	**310**	**56**	**78**	**61**	**74**	**98**	**84**	**113**	**98**	**85**	**1 057**

Implants

Table 15: Cemented hemiprostheses - primary operations

Femur	Caput	Bipolar head	2005 -12	2013	2014	2015	2016	2017	2018	2019	2020	Total
Charnley		Hastings bipolar head	2 535	98	61							**2 694**
Charnley Modular	Elite	Hastings bipolar head	1 116	152	1							**1 269**
Charnley Modular	Elite	Landos bipolar cup	24									**24**
Charnley Modular	Elite	Self-centering bipolar	121	55	241	258	71	45				**791**
Corail	Articul/Eze CoCr	Self-centering bipolar	43	48	72	117	93	80	84	49		**586**
Corail	Articul/Eze CoCr	Vario-Cup	16	8	35	48	64	7				**178**
Corail	Cobalt chrome (DePuy)	Self-centering bipolar	49									**49**
CPS-PLUS	Metal Ball Head	Bipolar Ball Head	23									**23**
CPT	Protasul/Metasul	Multipolar						763	350	98		**1 211**
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	326	599	**1 250**
C-Stem	Articul/Eze Ultamet (M-Spec)	Self-centering bipolar				12	99	97			2	**210**
ETS			292	2	2	2	1					**299**
Exeter/V40	Exeter/V40	Multipolar						28	113	79	24	**244**
Exeter/V40	Exeter/V40	Self-centering bipolar	81	94	240	228	218	46				**907**
Exeter/V40	Exeter/V40	UHR	5 752	1262	1 318	1 456	1 568	884	1 346	1 539	1 369	**16 494**
Lubinus SPII	Articul/Eze CoCr	Self-centering bipolar	1		17	8		1				**27**
Lubinus SPII	CoCrMo (Link)	Multipolar									60	**60**
Lubinus SPII	CoCrMo (Link)	Self-centering bipolar		7	49	70	98	17				**241**
Lubinus SPII	CoCrMo (Link)	UHR		62	204	218	257	258	261	234	241	**1 735**
Lubinus SPII	CoCrMo (Link)	Vario-Cup	1 408	263	72	90	113	178	270	314	476	**3 184**
MS-30	Protasul/Metasul	Multipolar						106	265	227	100	**698**
MS-30	Protasul/Metasul	Self-centering bipolar									33	**33**
MS-30	Protasul/Metasul	UHR	21									**21**
MS-30	Versys	Multipolar								61	91	**152**
MS-30	Versys	Self-centering bipolar				11	45	38	11			**105**
MS-30	Versys	UHR							21	35	41	**97**
Spectron EF Primary	Cobalt Chrom (S&N)	Biarticular cup	33									**33**
Spectron EF Primary	Cobalt Chrom (S&N)	HIP Bipolar Cup	48	16	21	19	15	15	13	10	8	**165**
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	1 002	65								**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)		544	32	37	20	42	163	97	65	69	**1 069**
Unknown			30		1	2	1	1	2	1	2	**40**
Total			**14 228**	**2 164**	**2 371**	**2 564**	**2 771**	**2 885**	**3 093**	**3 126**	**3 115**	**36 317**

Table 16: Uncemented hemiprostheses - primary operations

Femur	Caput	Bipolar head	2005 -11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Accolade II	Exeter/V40	Vario-Cup			2	8	11	4	2		2	2	**31**
Corail	Alumina Biolox (DePuy)	Vario-Cup	10										**10**
Corail	Articul/Eze CoCr	Bipolar Ball Head	17	39	8								**64**
Corail	Articul/Eze CoCr	Landos bipolar cup	102										**102**
Corail	Articul/Eze CoCr	Multipolar									3	9	**12**
Corail	Articul/Eze CoCr	Self-centering bipolar	659	614	532	470	429	486	295	165	105	38	**3 793**
Corail	Articul/Eze CoCr	UHR	65	41	40	82	74	67	33	39	27	10	**478**
Corail	Articul/Eze CoCr	Vario-Cup	58	32	47	17	4	1					**159**
Corail	Articul/Eze Ultamet (M-Spec)	Multipolar								6	4		**10**
Corail	Articul/Eze Ultamet (M-Spec)	Self-centering bipolar	21	143	146	80	9	6	1				**406**
Corail	Cobalt Chrom (S&N)	Self-centering bipolar	37										**37**
Corail	Cobalt Chrom (S&N)	Vario-Cup	13										**13**
Corail	Cobalt chrome (DePuy)	Landos bipolar cup	757										**757**
Corail	Cobalt chrome (DePuy)	Self-centering bipolar	1 096	31									**1 127**
Corail	Cobalt chrome (DePuy)	Tandem	11										**11**
Corail	Cobalt chrome (DePuy)	UHR	11										**11**
Corail	Metal Ball Head	Bipolar Ball Head	25										**25**
Corail	Modular Cathcart (Fracture head hip ball)		14										**14**
Filler	Biotechni fem. head	Biarticular cup	24										**24**
Filler	Cobalt Chrom (S&N)	Biarticular cup	18	1									**19**
Filler	Hipball Premium	Biarticular cup	190										**190**
Filler	Hipball Premium	HIP Bipolar Cup	248	126	99	37	44	36	35	63	50	55	**793**
Filler	Hipball Premium	UHR			10	20	2						**32**
Furlong	Furlong	UHR					21	57	31				**109**
HACTIV	HACTIV head	Moonstone	22										**22**
HACTIV	HACTIV head	Tandem	16	2	1								**19**
HACTIV	HACTIV head	UHR				41	22		1				**64**
Polarstem	Cobalt Chrom (S&N)	Tandem	82	74	39	16	2						**213**
Polarstem	Cobalt Chrom (S&N)	UHR				25	33	9	12	16	13	9	**117**
SL-PLUS/ SLR PLUS	HACTIV head	Bipolar Ball Head	16										**16**
SL-PLUS/ SLR PLUS	Metal Ball Head	Bipolar Ball Head	155										**155**
Other	(n < 10)		271	35	15	23	22	20	45	36	25	14	**506**
Unknown			5			1					1		**7**
Total			**3 943**	**1 138**	**939**	**820**	**673**	**686**	**455**	**325**	**230**	**137**	**9 346**

Table 17: Cemented hemiprostheses - reoperations

Femur	Caput	Bipolar head	2005-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Charnley		Hastings bipolar head	438	8	3	3							**452**
Charnley Modular	Elite	Hastings bipolar head	67	2	8								**77**
Charnley Modular	Elite	Self-centering bipolar	6	7	1	8	7						**29**
Corail	Articul/Eze CoCr	Self-centering bipolar	3	4			3	5	1	2	1		**19**
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						3	2	2	2	2	**11**
ETS			21		1								**22**
Exeter/V40	Exeter/V40	Self-centering bipolar	2	5	4	12	11	6	1				**41**
Exeter/V40	Exeter/V40	UHR	487	62	51	41	68	42	31	35	46	25	**888**
Lubinus SPII	CoCrMo (Link)	UHR			2	12	15	12	11	7	2	2	**63**
Lubinus SPII	CoCrMo (Link)	Vario-Cup	102	20	12	7	4	6	11	2	7	2	**173**
MS-30	Protasul/Metasul	Multipolar							4	1	4	1	**10**
Restoration Modular	Exeter/V40	Self-centering bipolar	10	1	1		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	102	11	6	1							**120**
Titan	Cobalt chrome (DePuy)	Landos bipolar cup	125										**125**
Other	(n <10)		212	14	13	30	22	36	35	32	33	23	**450**
Unknown			5				1		2				**8**
Total			**1 606**	**134**	**102**	**114**	**133**	**112**	**104**	**87**	**99**	**57**	**2 548**

Table 18: Uncemented hemiprostheses - reoperations

Femur	Caput	Bipolar head	2005 -11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Arcos	Modular Head (Biomet)	Multipolar							4	2	1	2	**9**
Arcos	Modular Head (Biomet)	Self-centering bipolar				2	3	5					**10**
Arcos	Modular Head (Biomet)	UHR							1	2	6	4	**13**
Corail	Articul/Eze CoCr	Landos bipolar cup	19										**19**
Corail	Articul/Eze CoCr	Self-centering bipolar	34	13	14	11	13	13	6	6	1	4	**115**
Corail	Articul/Eze CoCr	UHR						4	1				**5**
Corail	Articul/Eze Ultamet (M-Spec)	Self-centering bipolar	4	13	10	2							**29**
Corail	Cobalt chrome (DePuy)	Landos bipolar cup	81										**81**
Corail	Cobalt chrome (DePuy)	Self-centering bipolar	65	1									**66**
Corail Revisjon/KAR	Articul/Eze Ultamet (M-Spec)	Self-centering bipolar		4	3								**7**
Corail Revisjon/KAR	Cobalt chrome (DePuy)	Landos bipolar cup	9										**9**
Corail Revisjon/KAR	Cobalt chrome (DePuy)	Self-centering bipolar	5	1									**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	30	7	12	11	8	7	9	5	1	7	**97**
HACTIV	HACTIV head	Moonstone	5										**5**
Link MP Reconstruction	CoCrMo (Link)	UHR					1	1		1	2		**5**
Polarstem	Cobalt Chrom (S&N)	UHR				2	1	1	2	1	2		**9**
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)		148	16	18	12	19	5	9	8	14	6	**255**
Unknown			3						1				**4**
Total			**511**	**55**	**57**	**45**	**50**	**39**	**34**	**26**	**30**	**25**	**872**

Table 19: Screws - primary operations

Product	2005-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Asnis III	742	156	105	121	120	118	114	119	212	178	**1 985**
Cannulated screw (DePuySynthes)									4	6	**10**
Cannulated screw (S&N)	2							18	82	59	**161**
Hansson pin system (LIH)	1 783	69	60	41	60	49	79	62	55	33	**2 291**
Olmed	7 856	660	563	448	483	433	272	195	83	59	**11 052**
Richards CHP	3 772	597	593	547	614	596	658	635	473	342	**8 827**
Other (n<10)				1		3	2	5	6	1	**18**
Total	**14 155**	**1 482**	**1 321**	**1 158**	**1 277**	**1 199**	**1 125**	**1 034**	**915**	**678**	**24 344**

Table 20: Hip compression screws - primary operations

Product	2005-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
DHS	4 161	28	8	13	25	25	29	11	5		**4 305**
LCP DHS	1 701	458	468	662	1 357	1 162	1 093	922	742	588	**9 153**
Omega	107	2	2								**111**
Richards CHS	11 247	1 992	1 764	1 564	773	712	534	493	406	362	**19 847**
Swemac CHS System					8	5	6	10	13	2	**44**
Other (n<10)	3		1	1		2	2			1	**10**
Total	**17 219**	**2 480**	**2 243**	**2 240**	**2 163**	**1 906**	**1 664**	**1 436**	**1 166**	**953**	**33 470**

Table 21: Intramedullary nails - primary operations

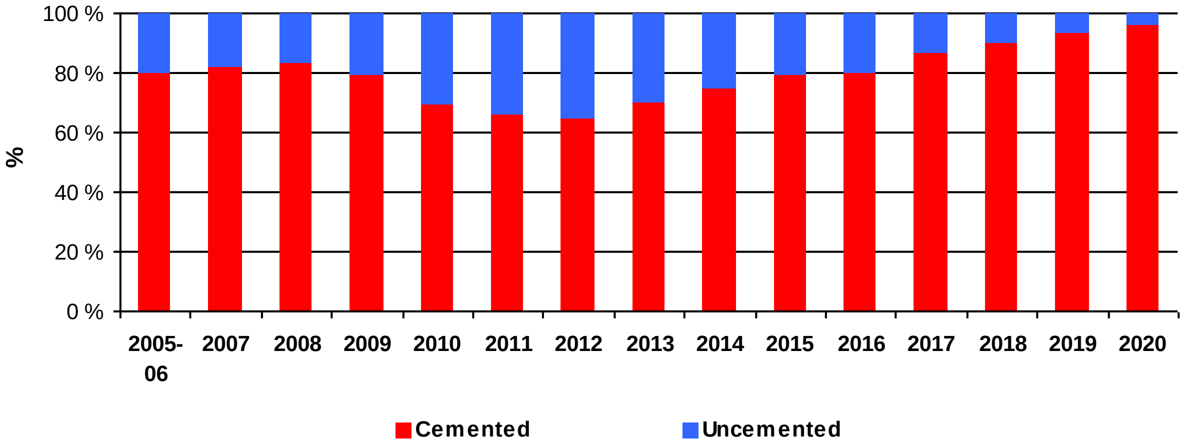
Product	2005-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
ACE	49										**49**
AFFIXUS							5	14	23	29	**71**
Gamma 3	2 858	657	766	710	467	429	369	512	1 033	1 179	**8 980**
IMHS	27										**27**
IMHS CP	10										**10**
LFN	39	8	8	7	4	3	5	2	7	1	**84**
PFN	26										**26**
PFNA	222	91	136	117	174	200	186	231	128	141	**1 626**
T2	10	1		2	1				1	1	**16**
T2 recon	59	29	61	33	24	28	34	31	36	62	**397**
TFNA femoral nail								1	171	136	**308**
T-Gamma	507										**507**
Trigen Intertan	1 028	186	198	285	561	744	990	988	411	348	**5 739**
Trigen TAN/FAN	170	22	34	22	62	65	88	76	49	19	**607**
Other (n<10)	7	1		2	1			2	2		**15**
Total	**5 012**	**995**	**1 203**	**1 178**	**1 294**	**1 469**	**1 677**	**1 857**	**1 861**	**1 916**	**18 462**

Fixation of hemiprostheses

Table 22: Primary operations

	Uncemented		Cement with antibiotics		Cement without antibiotics		Missing		Total
2020	138	(4,2%)	3 114	(95,8%)	0	(0,0%)	0	(0,0%)	**3 252**
2019	231	(6,9%)	3 125	(93,1%)	0	(0,0%)	0	(0,0%)	**3 356**
2018	332	(9,7%)	3 077	(90,0%)	1	(0,0%)	8	(0,2%)	**3 418**
2017	455	(13,6%)	2 884	(86,3%)	0	(0,0%)	1	(0,0%)	**3 340**
2016	687	(19,9%)	2 769	(80,1%)	0	(0,0%)	1	(0,0%)	**3 457**
2015	667	(20,6%)	2 563	(79,2%)	1	(0,0%)	6	(0,2%)	**3 237**
2014	811	(25,4%)	2 361	(74,0%)	3	(0,1%)	16	(0,5%)	**3 191**
2013	921	(29,7%)	2 154	(69,4%)	0	(0,0%)	28	(0,9%)	**3 103**
2012	1 064	(33,8%)	1 963	(62,4%)	11	(0,3%)	110	(3,5%)	**3 148**
2011	987	(32,6%)	1 927	(63,7%)	6	(0,2%)	105	(3,5%)	**3 025**
2010	837	(29,8%)	1 897	(67,5%)	7	(0,2%)	71	(2,5%)	**2 812**
2009	568	(20,0%)	2 175	(76,6%)	8	(0,3%)	87	(3,1%)	**2 838**
2008	399	(15,9%)	2 011	(80,1%)	8	(0,3%)	92	(3,7%)	**2 510**
2007	387	(17,9%)	1 726	(79,8%)	1	(0,0%)	49	(2,3%)	**2 163**
2005-06	556	(19,8%)	2 213	(78,7%)	7	(0,2%)	37	(1,3%)	**2 813**
Total	**9 040**	**(19,8%)**	**35 959**	**(78,7%)**	**53**	**(0,1%)**	**611**	**(1,3%)**	**45 663**

Figure 10: Time trend for fixation of primary hemiprostheses *



* 611 operations with missing fixation information were excluded

Table 23: Type of cement - primary operations

Product	Manufacturer	2005-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Cemex System Genta FAST	Alere	366	74	84	86	29						**639**
Cemex system genta ID green	Alere		1				16	126	106	75	6	**330**
Cemex w/gentamicin	Alere	50		11	10	71	111			1		**254**
Copal G+ V	Heraeus				1	1	2	8	4	6	2	**24**
Optipac Refobacin Bonecement R	Biomet	1 501	790	725	911	1 248	1 040	948	767	35		**7 965**
Optipac Refobacin Bonecement R-3	Zimmer Bio									13		**13**
Optipac Refobacin Revision	Biomet	2	1	58	67							**128**
Palacos R + G	Heraeus	6 474	692	869	881	958	1 007	763	882	562	252	**13 340**
Palacos R+G pro	Heraeus	1				1	93	374	1 078	2 297	2 765	**6 609**
Palacos w/gentamicin	Heraeus/Sc	353										**353**
Refobacin Bone Cement R	Biomet	2 577	368	394	380	221	367	524	77			**4 908**
Refobacin-Palacos	Biomet	314										**314**
Simplex unknown	Stryker	75										**75**
Simplex w/Tobramycin	Stryker	2									10	**12**
SmartSet GHV Genta. Smartmix	Ortomedic	66				3	39	31	21	11	30	**201**
Other (n<10)						1	1	3		1		**6**
Missing information		168	37	13	25	30	93	107	142	124	48	**787**
Total		**11 949**	**1 963**	**2 154**	**2 361**	**2 563**	**2 769**	**2 884**	**3 077**	**3 125**	**3 113**	**35 958**

Table 24: Hydroxyapatite (HA) - uncemented prostheses

	With HA		Without HA		Missing		Total
2020	137	(99,3%)	0	(0,0%)	1	(0,7%)	**138**
2019	227	(98,3%)	2	(0,9%)	2	(0,9%)	**231**
2018	325	(97,9%)	3	(0,9%)	4	(1,2%)	**332**
2017	452	(99,3%)	0	(0,0%)	3	(0,7%)	**455**
2016	680	(99,0%)	5	(0,7%)	2	(0,3%)	**687**
2015	664	(99,6%)	3	(0,4%)	0	(0,0%)	**667**
2014	805	(99,3%)	5	(0,6%)	1	(0,1%)	**811**
2013	920	(99,9%)	1	(0,1%)	0	(0,0%)	**921**
2012	1 062	(99,8%)	2	(0,2%)	0	(0,0%)	**1 064**
2011	986	(99,9%)	1	(0,1%)	0	(0,0%)	**987**
2010	824	(98,4%)	13	(1,6%)	0	(0,0%)	**837**
2009	524	(92,3%)	44	(7,7%)	0	(0,0%)	**568**
2008	362	(90,7%)	37	(9,3%)	0	(0,0%)	**399**
2007	351	(90,7%)	36	(9,3%)	0	(0,0%)	**387**
2005-06	476	(85,6%)	80	(14,4%)	0	(0,0%)	**556**
Total	**8 795**	**(97,3%)**	**232**	**(2,6%)**	**13**	**(0,1%)**	**9 040**

Pathological fractures

Table 25: Pathological fracture (osteoporotic fracture not included) - primary operations *

	No		Yes		Missing		Total
2020	5 938	(86,4%)	85	(1,2%)	851	(12,4%)	**6 874**
2019	6 354	(86,0%)	102	(1,4%)	930	(12,6%)	**7 386**
2018	6 779	(86,5%)	109	(1,4%)	948	(12,1%)	**7 836**
2017	6 851	(86,3%)	118	(1,5%)	969	(12,2%)	**7 938**
2016	7 065	(86,6%)	118	(1,4%)	973	(11,9%)	**8 156**
2015	7 077	(87,5%)	117	(1,4%)	893	(11,0%)	**8 087**
2014	6 919	(87,7%)	81	(1,0%)	893	(11,3%)	**7 893**
2013	6 987	(87,2%)	133	(1,7%)	892	(11,1%)	**8 012**
2012	7 191	(87,4%)	106	(1,3%)	932	(11,3%)	**8 229**
2011	7 485	(89,0%)	135	(1,6%)	791	(9,4%)	**8 411**
2010	7 611	(92,8%)	93	(1,1%)	497	(6,1%)	**8 201**
2009	7 307	(90,2%)	107	(1,3%)	687	(8,5%)	**8 101**
2008	7 388	(90,0%)	104	(1,3%)	720	(8,8%)	**8 212**
2007	6 956	(90,2%)	95	(1,2%)	660	(8,6%)	**7 711**
2005-06	11 788	(89,6%)	156	(1,2%)	1 211	(9,2%)	**13 155**
Total	**109 696**	**(88,3%)**	**1 659**	**(1,3%)**	**12 847**	**(10,3%)**	**124 202**

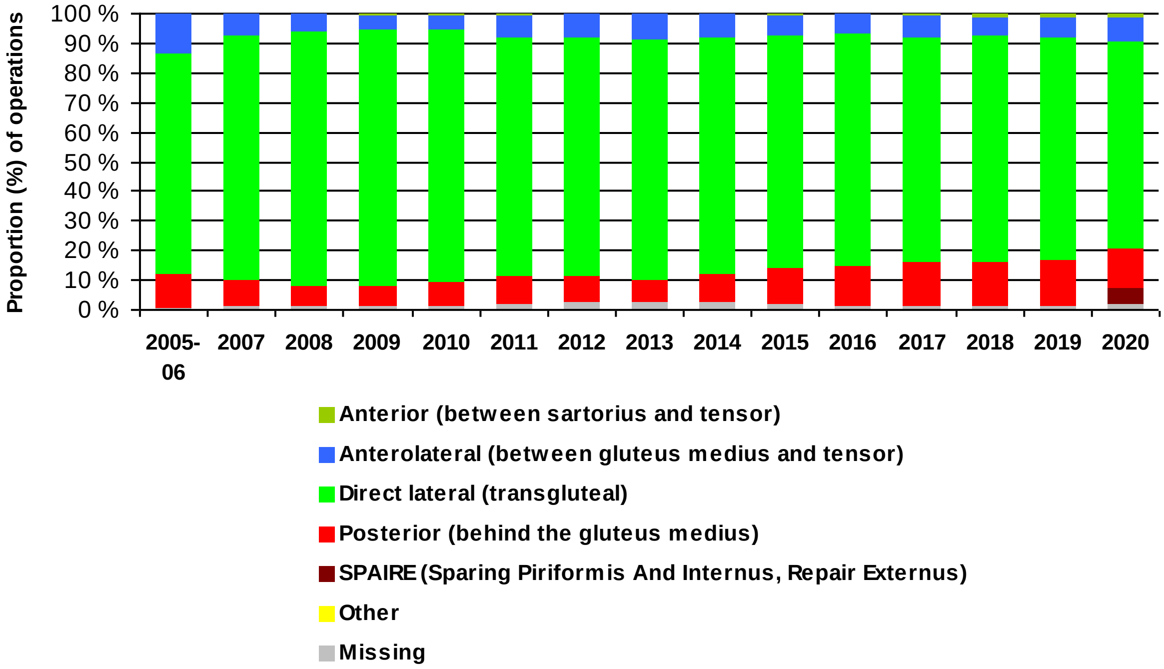
* Patients operated with total hip prostheses were excluded

Surgical approach used in hemiarthroplasty

Table 26: Surgical approach used in hemiarthroplasty

	Anterior		Anterolateral		Direct lateral		Posterior		SPAIRE		Other		Missing		Total
2020	53	(1,6%)	248	(7,6%)	2 267	(69,7%)	438	(13,5%)	185	(5,7%)	0	(0,0%)	62	(1,9%)	**3 253**
2019	44	(1,3%)	229	(6,8%)	2 524	(75,2%)	514	(15,3%)	4	(0,1%)	1	(0,0%)	40	(1,2%)	**3 356**
2018	45	(1,3%)	196	(5,7%)	2 629	(76,9%)	501	(14,7%)	0	(0,0%)	0	(0,0%)	47	(1,4%)	**3 418**
2017	24	(0,7%)	247	(7,4%)	2 540	(76,0%)	493	(14,8%)	0	(0,0%)	0	(0,0%)	36	(1,1%)	**3 340**
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%)	2 561	(80,3%)	291	(9,1%)	0	(0,0%)	1	(0,0%)	83	(2,6%)	**3 191**
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%)	2 445	(80,8%)	290	(9,6%)	0	(0,0%)	0	(0,0%)	51	(1,7%)	**3 025**
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**
2009	14	(0,5%)	147	(5,2%)	2 442	(86,0%)	200	(7,0%)	0	(0,0%)	0	(0,0%)	35	(1,2%)	**2 838**
2008	1	(0,0%)	155	(6,2%)	2 144	(85,4%)	176	(7,0%)	0	(0,0%)	0	(0,0%)	34	(1,4%)	**2 510**
2007	0	(0,0%)	162	(7,5%)	1 777	(82,2%)	201	(9,3%)	0	(0,0%)	0	(0,0%)	23	(1,1%)	**2 163**
2005-06	1	(0,0%)	375	(13,3%)	2 088	(74,2%)	325	(11,6%)	0	(0,0%)	0	(0,0%)	24	(0,9%)	**2 813**
Total	**249**	**(0,5%)**	**3 317**	**(7,3%)**	**36 142**	**(79,1%)**	**5 036**	**(11,0%)**	**189**	**(0,4%)**	**4**	**(0,0%)**	**727**	**(1,6%)**	**45 664**

Figure 11: Surgical approach used in hemiarthroplasty



Intraoperative complications

Table 27: Intraoperative complications - primary operations

	Yes		No		Missing		Total
2020	203	(2,7%)	6 973	(94,2%)	223	(3,0%)	**7 399**
2019	225	(2,8%)	7 553	(94,3%)	232	(2,9%)	**8 010**
2018	266	(3,2%)	7 901	(93,9%)	248	(3,0%)	**8 415**
2017	267	(3,2%)	7 862	(94,2%)	221	(2,7%)	**8 350**
2016	335	(3,9%)	7 908	(93,0%)	260	(3,1%)	**8 503**
2015	305	(3,6%)	7 811	(92,9%)	294	(3,5%)	**8 410**
2014	308	(3,8%)	7 586	(92,7%)	288	(3,5%)	**8 182**
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	353	(4,1%)	7 959	(92,5%)	289	(3,4%)	**8 601**
2010	322	(3,9%)	7 762	(92,8%)	279	(3,3%)	**8 363**
2009	302	(3,7%)	7 684	(93,1%)	272	(3,3%)	**8 258**
2008	365	(4,4%)	7 726	(92,4%)	271	(3,2%)	**8 362**
2007	273	(3,5%)	7 359	(93,5%)	238	(3,0%)	**7 870**
2005-06	432	(3,2%)	12 577	(93,9%)	387	(2,9%)	**13 396**
Total	**4 602**	**(3,6%)**	**120 178**	**(93,3%)**	**4 085**	**(3,2%)**	**128 865**

Antibiotic prophylaxis

Table 28: Antibiotic prophylaxis in primary screw fixation

	Yes		No		Missing		Total
2020	663	(97,8%)	12	(1,8%)	3	(0,4%)	**678**
2019	888	(97,4%)	16	(1,8%)	8	(0,9%)	**912**
2018	995	(96,4%)	30	(2,9%)	7	(0,7%)	**1 032**
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**
2009	885	(50,0%)	859	(48,6%)	25	(1,4%)	**1 769**
2008	930	(46,3%)	1 050	(52,3%)	27	(1,3%)	**2 007**
2007	905	(40,6%)	1 300	(58,3%)	26	(1,2%)	**2 231**
2005-06	1 345	(28,4%)	3 289	(69,5%)	98	(2,1%)	**4 732**
Total	**14 933**	**(61,4%)**	**9 102**	**(37,4%)**	**288**	**(1,2%)**	**24 323**

Table 29: Antibiotic prophylaxis in primary hemiprosthesis operations

	Yes		No		Missing		Total
2020	3 221	(99,4%)	1	(0,0%)	19	(0,6%)	**3 241**
2019	3 336	(99,5%)	1	(0,0%)	15	(0,4%)	**3 352**
2018	3 397	(99,4%)	4	(0,1%)	15	(0,4%)	**3 416**
2017	3 320	(99,5%)	2	(0,1%)	14	(0,4%)	**3 336**
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%)	6	(0,2%)	**3 190**
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	3 011	(99,6%)	4	(0,1%)	9	(0,3%)	**3 024**
2010	2 803	(99,7%)	4	(0,1%)	4	(0,1%)	**2 811**
2009	2 827	(99,6%)	8	(0,3%)	3	(0,1%)	**2 838**
2008	2 488	(99,1%)	13	(0,5%)	9	(0,4%)	**2 510**
2007	2 150	(99,4%)	7	(0,3%)	6	(0,3%)	**2 163**
2005-06	2 794	(99,3%)	11	(0,4%)	8	(0,3%)	**2 813**
Total	**45 419**	**(99,5%)**	**71**	**(0,2%)**	**139**	**(0,3%)**	**45 629**

Table 30: Antibiotic prophylaxis in primary hip compression screw operations

	Yes		No		Missing		Total
2020	947	(99,4%)	0	(0,0%)	6	(0,6%)	**953**
2019	1 161	(99,6%)	0	(0,0%)	5	(0,4%)	**1 166**
2018	1 422	(99,0%)	2	(0,1%)	12	(0,8%)	**1 436**
2017	1 658	(99,6%)	2	(0,1%)	4	(0,2%)	**1 664**
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%)	2	(0,1%)	**2 244**
2012	2 461	(99,2%)	14	(0,6%)	5	(0,2%)	**2 480**
2011	2 527	(98,4%)	28	(1,1%)	13	(0,5%)	**2 568**
2010	2 583	(98,1%)	37	(1,4%)	12	(0,5%)	**2 632**
2009	2 490	(97,5%)	53	(2,1%)	10	(0,4%)	**2 553**
2008	2 376	(96,0%)	82	(3,3%)	16	(0,6%)	**2 474**
2007	2 361	(94,0%)	138	(5,5%)	13	(0,5%)	**2 512**
2005-06	4 164	(92,9%)	282	(6,3%)	34	(0,8%)	**4 480**
Total	**32 666**	**(97,6%)**	**653**	**(2,0%)**	**152**	**(0,5%)**	**33 471**

Table 31: Antibiotic prophylaxis in primary Intramedullary nail operations

	Yes		No		Missing		Total
2020	1 900	(99,4%)	1	(0,1%)	11	(0,6%)	**1 912**
2019	1 846	(99,2%)	3	(0,2%)	12	(0,6%)	**1 861**
2018	1 840	(99,2%)	1	(0,1%)	13	(0,7%)	**1 854**
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**
2009	712	(91,9%)	58	(7,5%)	5	(0,6%)	**775**
2008	914	(89,1%)	105	(10,2%)	7	(0,7%)	**1 026**
2007	573	(91,1%)	54	(8,6%)	2	(0,3%)	**629**
2005-06	633	(85,2%)	104	(14,0%)	6	(0,8%)	**743**
Total	**17 760**	**(96,3%)**	**572**	**(3,1%)**	**107**	**(0,6%)**	**18 439**

Table 32: Antibiotic prophylaxis in reoperations

	Yes		No		Missing		Total
2020	613	(87,6%)	79	(11,3%)	8	(1,1%)	**700**
2019	787	(87,0%)	108	(11,9%)	10	(1,1%)	**905**
2018	794	(84,7%)	127	(13,6%)	16	(1,7%)	**937**
2017	771	(85,6%)	121	(13,4%)	9	(1,0%)	**901**
2016	859	(87,0%)	115	(11,7%)	13	(1,3%)	**987**
2015	856	(91,3%)	65	(6,9%)	17	(1,8%)	**938**
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	739	(85,8%)	110	(12,8%)	12	(1,4%)	**861**
2009	801	(82,6%)	151	(15,6%)	18	(1,9%)	**970**
2008	794	(84,3%)	131	(13,9%)	17	(1,8%)	**942**
2007	800	(85,7%)	125	(13,4%)	8	(0,9%)	**933**
2005	1 302	(83,6%)	230	(14,8%)	25	(1,6%)	**1 557**
Total	**12 314**	**(87,1%)**	**1 645**	**(11,6%)**	**185**	**(1,3%)**	**14 144**

Table 33: Type of antibiotics - primary operations

Antibiotics (generic name)	2005-11	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Cefalotin (Keflin)	38 382	6 544	6 745	6 947	7 305	7 837	7 030	5 821	822	841	88 274
	84,0%	81,7%	83,3%	85,8%	87,1%	92,0%	84,5%	69,5%	10,3%	11,4%	74,2%
Cefazolin (Cephazolin)	2	1		1		2	748	2 071	6 243	5 926	14 994
	0,0%	0,0%		0,0%		0,0%	9,0%	24,7%	77,9%	80,2%	12,6%
Klindamycin (Dalacin, Clindamycin)	1 149	288	325	338	366	397	394	377	383	354	4 371
	2,5%	3,6%	4,0%	4,2%	4,4%	4,7%	4,7%	4,5%	4,8%	4,8%	3,7%
Kloksacillin (Ekvacillin)	1 229	422	511	532	510	80	15	9	445	181	3 934
	2,7%	5,3%	6,3%	6,6%	6,1%	0,9%	0,2%	0,1%	5,6%	2,4%	3,3%
Cefuroksim (Zinacef, Cefuroxim, Lifurox)	2 203	385	193	87	31	27	21	6	30	9	2 992
	4,8%	4,8%	2,4%	1,1%	0,4%	0,3%	0,3%	0,1%	0,4%	0,1%	2,5%
Dikloksacillin (Diclocil, Dicillin)	1 890	201	141	18	18	14	3	12	13	7	2 317
	4,1%	2,5%	1,7%	0,2%	0,2%	0,2%	0,0%	0,1%	0,2%	0,1%	1,9%
Other *	679	148	139	133	121	130	75	67	70	61	1 623
	1,5%	1,8%	1,7%	1,6%	1,4%	1,5%	0,9%	0,8%	0,9%	0,8%	1,4%
Missing information	177	18	41	38	34	28	30	12	3	10	391
	0,4%	0,2%	0,5%	0,5%	0,4%	0,3%	0,4%	0,1%	0,0%	0,1%	0,3%
Total	**45 711**	**8 007**	**8 095**	**8 094**	**8 385**	**8 515**	**8 316**	**8 375**	**8 009**	**7 389**	**118 896**

* Drugs used less than 1% of operations last year or less than 1% of total surgery

Pharmacological antithrombotic prophylaxis

Table 34: Primary operation

	Yes		No		Missing		Total
2020	7 139	(96,5%)	237	(2,9%)	22	(0,6%)	**7 399**
2019	7 780	(97,1%)	195	(2,0%)	35	(0,8%)	**8 010**
2018	8 198	(97,4%)	190	(2,0%)	27	(0,6%)	**8 415**
2017	8 147	(97,6%)	182	(1,9%)	21	(0,5%)	**8 350**
2016	8 281	(97,4%)	186	(1,9%)	35	(0,7%)	**8 503**
2015	8 209	(97,6%)	168	(1,8%)	33	(0,6%)	**8 410**
2014	7 966	(97,4%)	191	(1,9%)	25	(0,7%)	**8 182**
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	8 488	(98,7%)	92	(1,0%)	21	(0,3%)	**8 601**
2010	8 238	(98,5%)	94	(1,1%)	31	(0,4%)	**8 363**
2009	8 150	(98,7%)	78	(0,9%)	30	(0,4%)	**8 258**
2008	8 218	(98,3%)	112	(1,3%)	32	(0,4%)	**8 362**
2007	7 707	(97,9%)	135	(1,7%)	28	(0,4%)	**7 870**
2005-06	13 010	(97,1%)	314	(2,3%)	72	(0,5%)	**13 396**
Total	**126 003**	**(97,8%)**	**2 438**	**(1,9%)**	**422**	**(0,3%)**	**128 865**

Table 35: Number of drugs in antithrombotic prophylaxis

	One drug		Two drugs		Total
2020	6 935	(97,1%)	203	(2,8%)	**7 139**
2019	7 555	(97,1%)	225	(2,9%)	**7 780**
2018	8 014	(97,8%)	184	(2,2%)	**8 198**
2017	7 963	(97,7%)	184	(2,3%)	**8 147**
2016	8 098	(97,8%)	183	(2,2%)	**8 281**
2015	7 962	(97,0%)	247	(3,0%)	**8 209**
2014	7 749	(97,3%)	217	(2,7%)	**7 966**
2013	7 902	(96,8%)	260	(3,2%)	**8 162**
2012	8 136	(97,9%)	174	(2,1%)	**8 310**
2011	8 402	(99,0%)	86	(1,0%)	**8 488**
2010	8 204	(99,6%)	34	(0,4%)	**8 238**
2009	8 132	(99,8%)	18	(0,2%)	**8 150**
2008	8 202	(99,8%)	16	(0,2%)	**8 218**
2007	7 692	(99,8%)	15	(0,2%)	**7 707**
2005-06	12 970	(99,7%)	36	(0,3%)	**13 010**
Total	**123 916**	**(98,3%)**	**2 082**	**(1,7%)**	**126 003**

Table 36: Antithrombotic prophylaxis if one drug - primary operations (n=123 909)

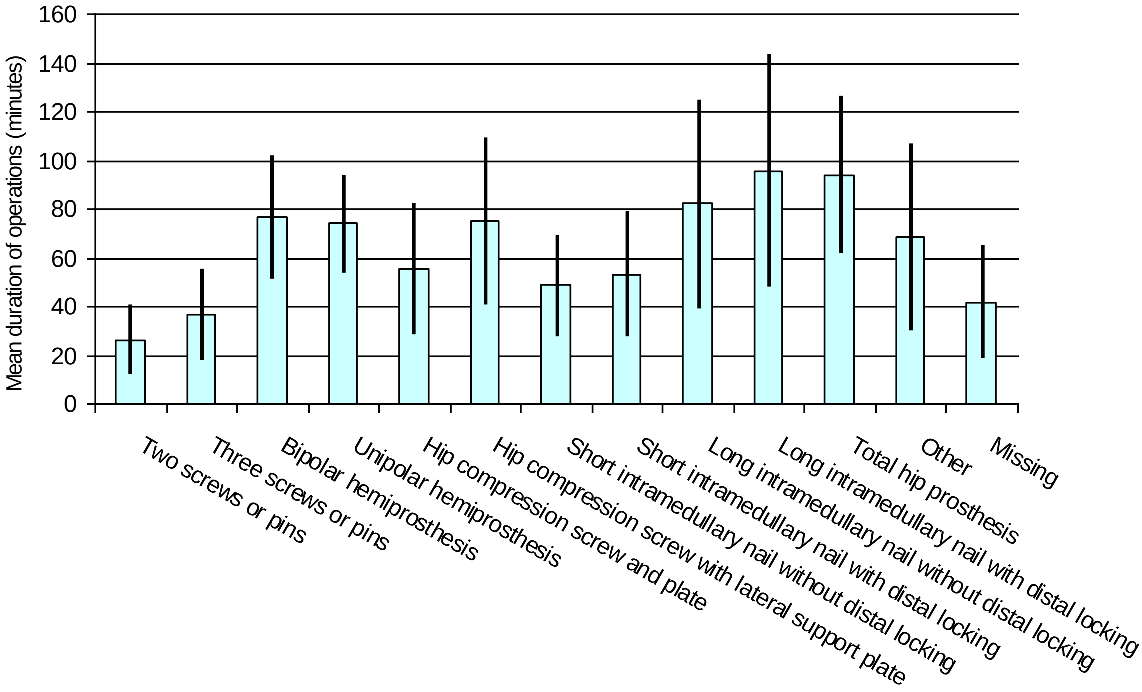
	2005-11	2012	2013	2014	2015	2016	2017	2018	2019	2020
Dalteparin (Fragmin)	56,9%	62,9%	53,4%	51,1%	59,8%	64,8%	70,5%	71,6%	58,5%	54,8%
Enoksaparin (Klexane)	42,8%	36,3%	45,7%	48,0%	39,1%	34,3%	28,2%	27,5%	40,4%	43,8%
Other	0,1%	0,0%	0,3%	0,4%	0,5%	0,4%	0,5%	0,5%	0,8%	1,1%
Missing information	0,2%	0,7%	0,7%	0,6%	0,6%	0,6%	0,7%	0,4%	0,3%	0,3%
Totalt	**53 602**	**8 135**	**7 899**	**7 748**	**7 962**	**8 098**	**7 962**	**8 013**	**7 545**	**6 931**

Table 37: Time of first dose in antithrombotic prophylaxis - primary operations

	Preoperatively		Postoperatively		Missing		Total
2020	1 866	(26,1%)	4 445	(62,3%)	829	(11,6%)	**7 140**
2019	2 148	(27,6%)	4 818	(61,9%)	815	(10,4%)	**7 781**
2018	2 405	(29,3%)	4 927	(60,1%)	866	(10,5%)	**8 198**
2017	2 345	(28,8%)	4 846	(59,5%)	956	(11,7%)	**8 147**
2016	2 595	(31,4%)	4 761	(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	3 322	(39,2%)	4 060	(47,8%)	1 106	(9,8%)	**8 488**
2010	3 309	(40,2%)	3 585	(43,5%)	1 344	(10,5%)	**8 238**
2009	3 760	(46,2%)	3 046	(37,4%)	1 344	(12,1%)	**8 150**
2008	3 509	(42,7%)	2 973	(36,2%)	1 736	(16,3%)	**8 218**
2007	2 925	(38,0%)	2 968	(38,5%)	1 814	(17,6%)	**7 707**
2005-06	5 119	(39,6%)	2 102	(16,2%)	5 789	(22,7%)	**13 010**
Total	**44 481**	**(35,3%)**	**60 190**	**(47,8%)**	**21 335**	**(16,9%)**	**126 006**

DURATION OF SURGERY

Figure 13: Duration of surgery for the different types of operations



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

Table 38: Duration of surgery for the different types of operations

Type of operations	Total	Mean duration of operations (minutes)	Standard deviation
Two screws or pins	22 378	26	14
Three screws or pins	787	37	19
Bipolar hemiprosthesis	43 688	77	25
Unipolar hemiprosthesis	301	74	20
Hip compression screw and plate	22 837	56	27
Hip compression screw with lateral support plate	9 191	75	34
Short intramedullary nail without distal locking	368	49	21
Short intramedullary nail with distal locking	10 297	53	26
Long intramedullary nail without distal locking	133	82	43
Long intramedullary nail with distal locking	6 797	96	48
Total hip prosthesis	4 547	94	32
Other	2 222	68	39
Missing	6	42	23

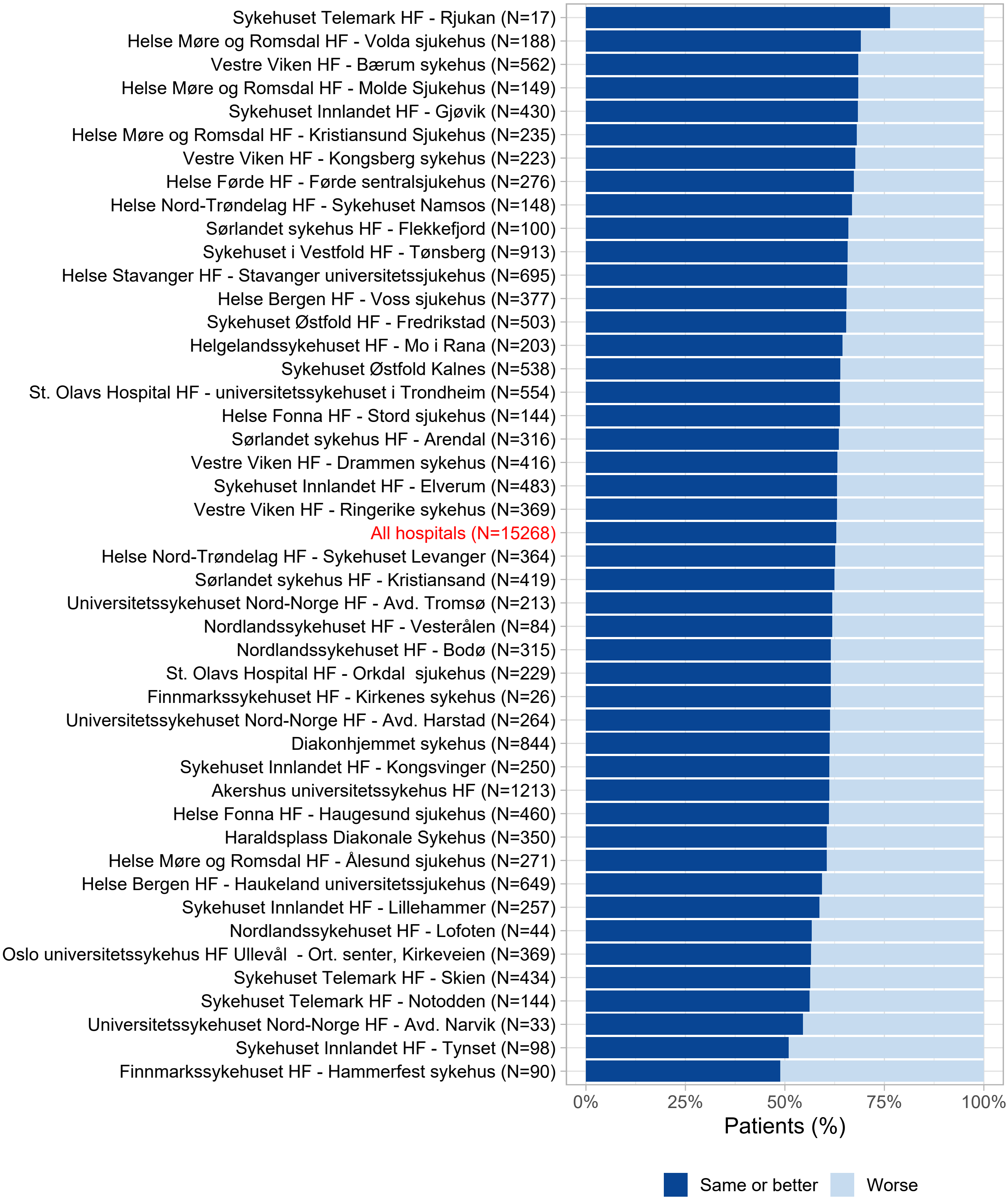
PROM (Patient Reported Outcome Measures)

Table 39: Number of issued and answered patient questionnaires

	4 months *			12 months *			36 months *			Total		
	Issued	Answered	(%)	Issued	Answered	(%)	Issued	Answered	(%)	Issued	Answered	(%)
2020	6 372	3 641	(57,1%)	5 434	2 899	(53,3%)	4 270	2 251	(52,7%)	**16 076**	**8 791**	(54,7%)
2019	6 748	3 731	(55,3%)	5 837	3 350	(57,4%)	4 241	2 224	(52,4%)	**16 826**	**9 305**	(55,3%)
2018	7 331	4 170	(56,9%)	5 996	3 438	(57,3%)	4 346	2 380	(54,8%)	**17 673**	**9 988**	(56,5%)
2017	7 009	4 060	(57,9%)	5 952	3 420	(57,5%)	4 091	2 255	(55,1%)	**17 052**	**9 735**	(57,1%)
2016	7 010	3 961	(56,5%)	6 077	3 519	(57,9%)	4 206	2 326	(55,3%)	**17 293**	**9 806**	(56,7%)
2015	6 919	3 980	(57,5%)	5 844	3 346	(57,3%)	4 384	2 393	(54,6%)	**17 147**	**9 719**	(56,7%)
2014	6 816	3 823	(56,1%)	6 003	3 272	(54,5%)	4 332	2 350	(54,2%)	**17 151**	**9 445**	(55,1%)
2013	6 901	3 954	(57,3%)	6 095	3 516	(57,7%)	4 442	2 439	(54,9%)	**17 438**	**9 909**	(56,8%)
2012	7 575	4 202	(55,5%)	6 784	3 816	(56,3%)	1 788	1 049	(58,7%)	**16 147**	**9 067**	(56,2%)
2011	6 457	3 555	(55,1%)	5 551	3 117	(56,2%)	1 410	816	(57,9%)	**13 418**	**7 488**	(55,8%)
2010	4 985	2 826	(56,7%)	2 263	1 308	(57,8%)	3 752	2 134	(56,9%)	**11 000**	**6 268**	(57,0%)
2009	2 552	1 482	(58,1%)	2 356	1 360	(57,7%)	4 095	2 207	(53,9%)	**9 003**	**5 049**	(56,1%)
2008	2 273	1 305	(57,4%)	1 902	1 084	(57,0%)	3 180	1 817	(57,1%)	**7 355**	**4 206**	(57,2%)
2007	3 503	1 967	(56,2%)	5 068	2 836	(56,0%)				**8 571**	**4 803**	(56,0%)
2006	6 160	3 607	(58,6%)	4 848	2 787	(57,5%)				**11 008**	**6 394**	(58,1%)
2005	2 817	1 640	(58,2%)							**2 817**	**1 640**	(58,2%)
Total	**91 428**	**51 904**	**(56,8%)**	**76 010**	**43 068**	**(56,7%)**	**48 537**	**26 641**	**(54,9%)**	**215 975**	**121 613**	**(56,3%)**

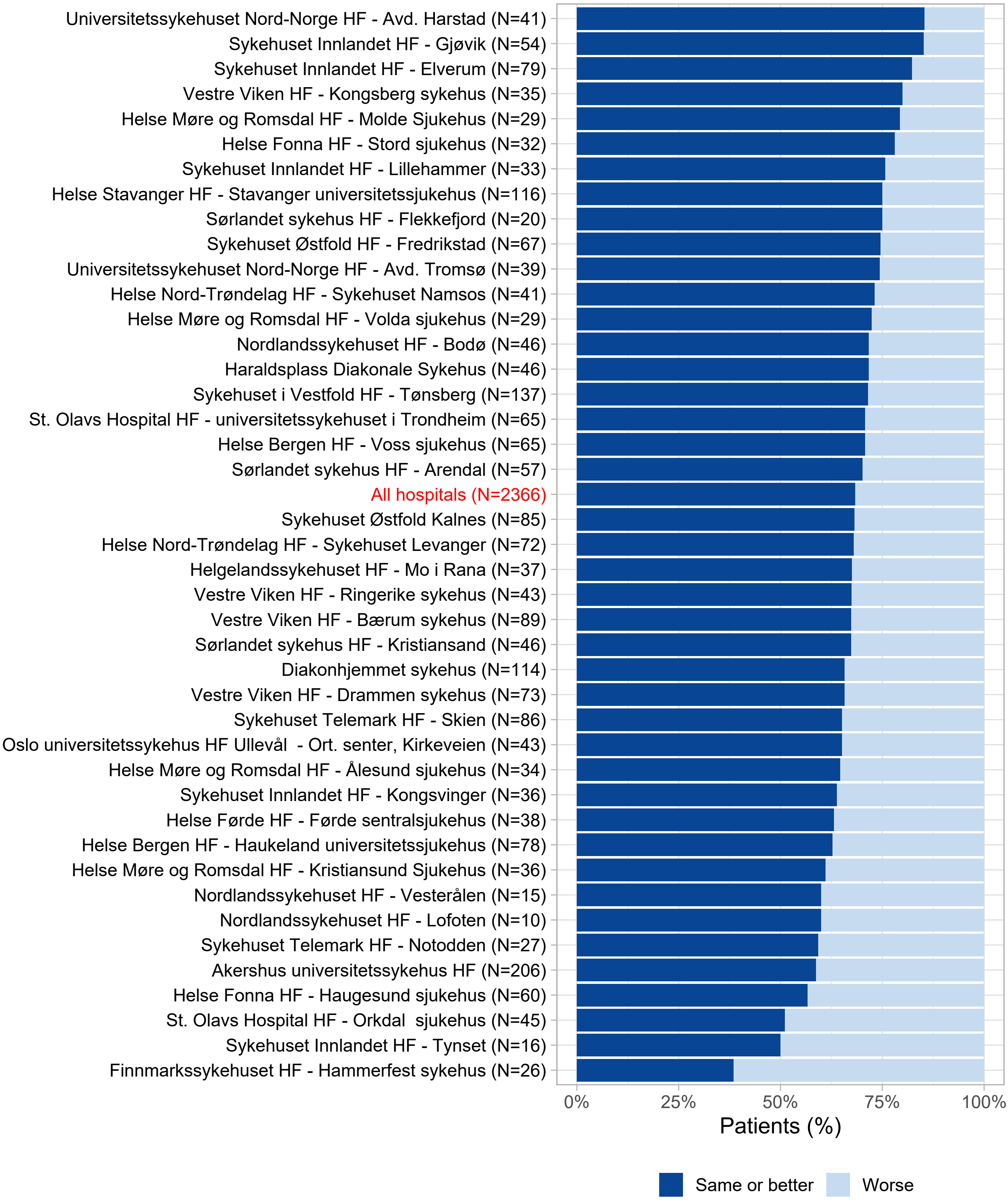
* The register sends questionnaires to patients 4, 12 and 36 months post-operatively

Figure D.13: Walking ability after hip fracture, 2013-2018 - all types of hip fracture



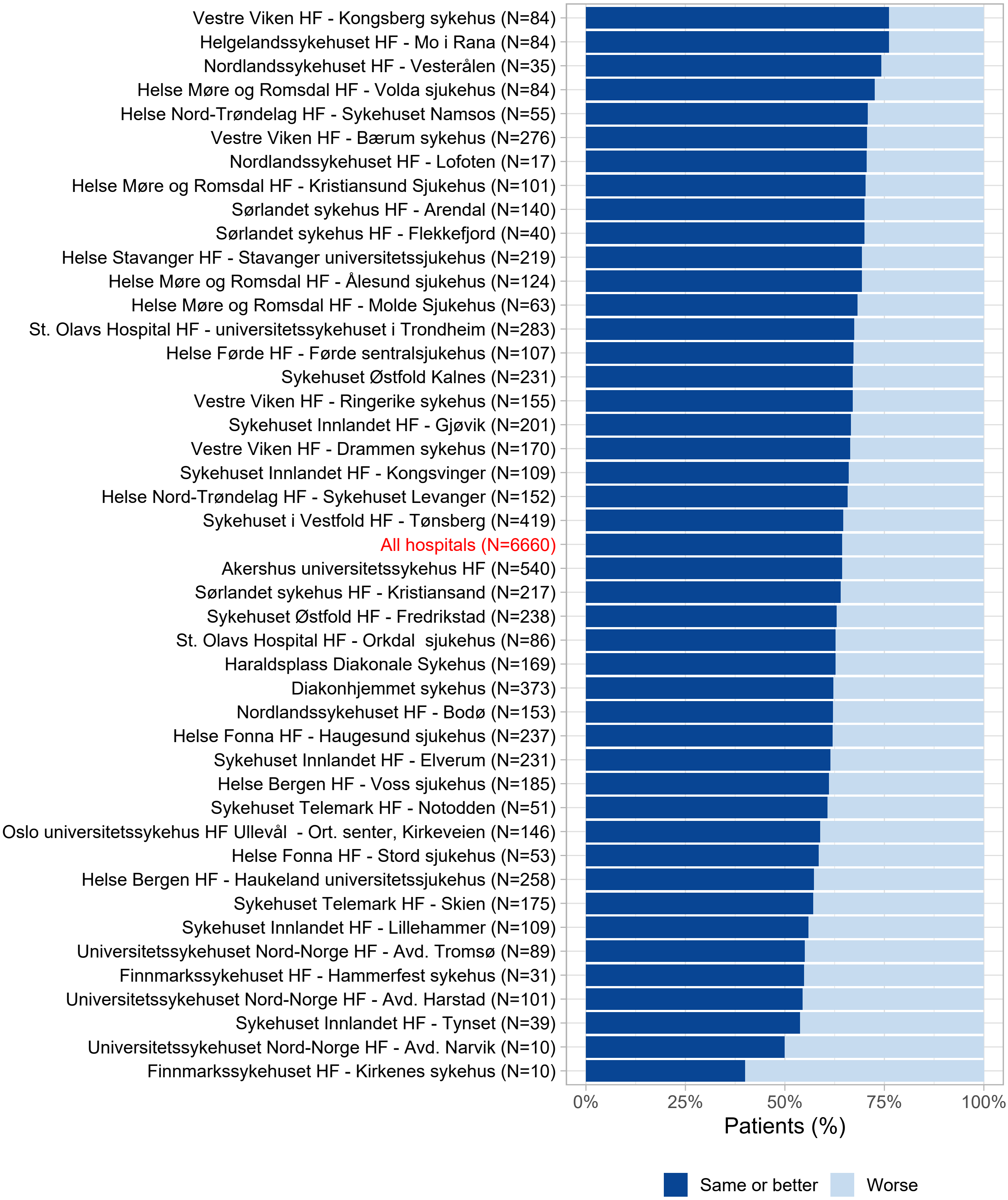
The figure shows the proportion of patients who report unchanged or improved walking ability from preoperatively to 4 months postoperatively assessed on the basis of the 1st dimension of EQ-5D-3L. Only hospitals with 10 or more patients are displayed.

Figure D.14: Walking ability after hip fracture, 2013-2018 - undisplaced fracture



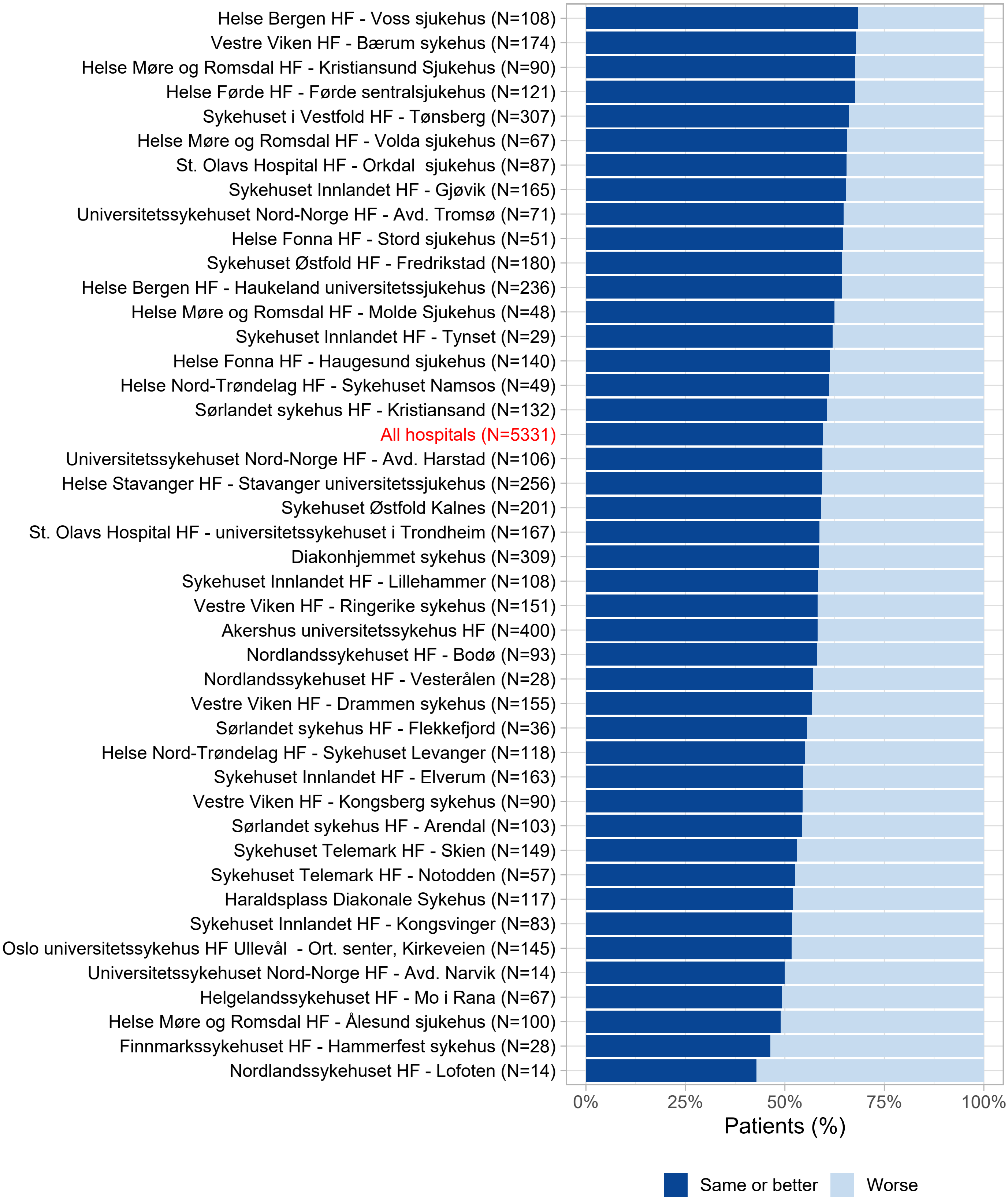
The figure shows the proportion of patients who report unchanged or improved walking ability from preoperatively to 4 months postoperatively assessed on the basis of the 1st dimension of EQ-5D-3L. Only hospitals with 10 or more patients are displayed.

Figure D.15: Walking ability after hip fracture, 2013-2018 - displaced fracture



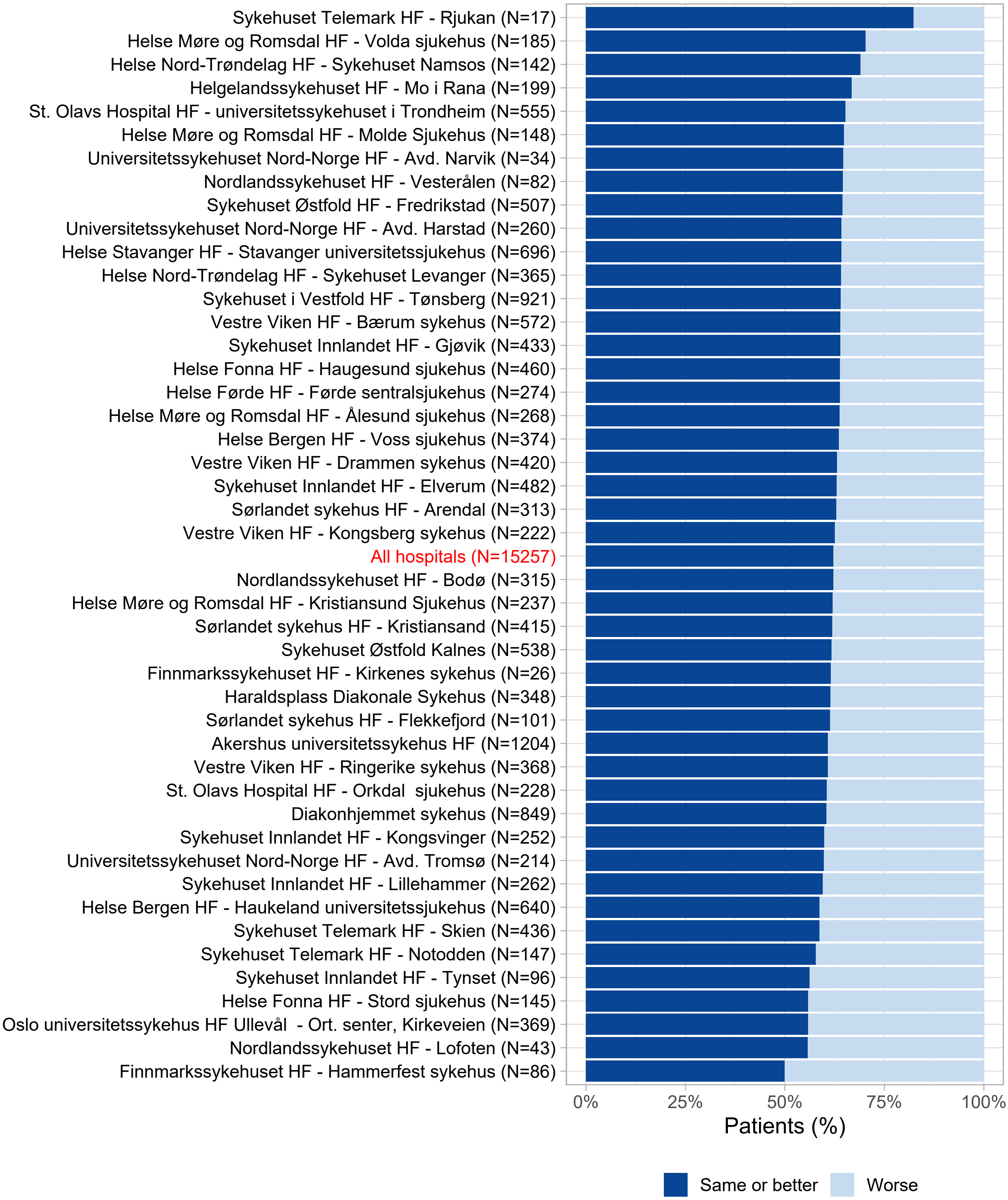
The figure shows the proportion of patients who report unchanged or improved walking ability from preoperatively to 4 months postoperatively assessed on the basis of the 1st dimension of EQ-5D-3L. Only hospitals with 10 or more patients are displayed.

Figure D.16: Walking ability after hip fracture, 2013-2018 - pertrochanteric/Subtrochanteric fracture



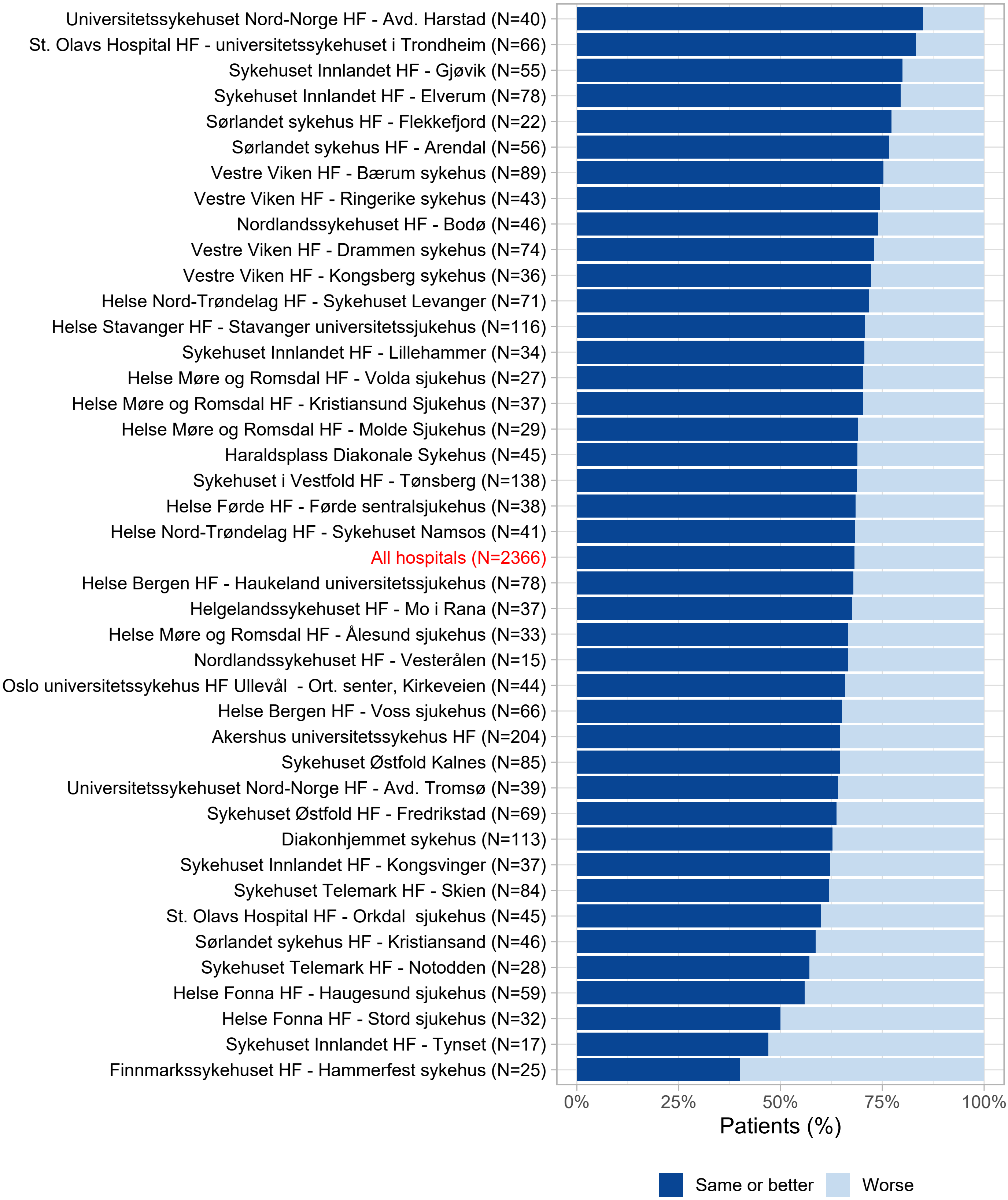
The figure shows the proportion of patients who report unchanged or improved walking ability from preoperatively to 4 months postoperatively assessed on the basis of the 1st dimension of EQ-5D-3L. Only hospitals with 10 or more patients are displayed.

Figure D.17: Usual activities after hip fracture, 2013-2018 - all types of hip fracture



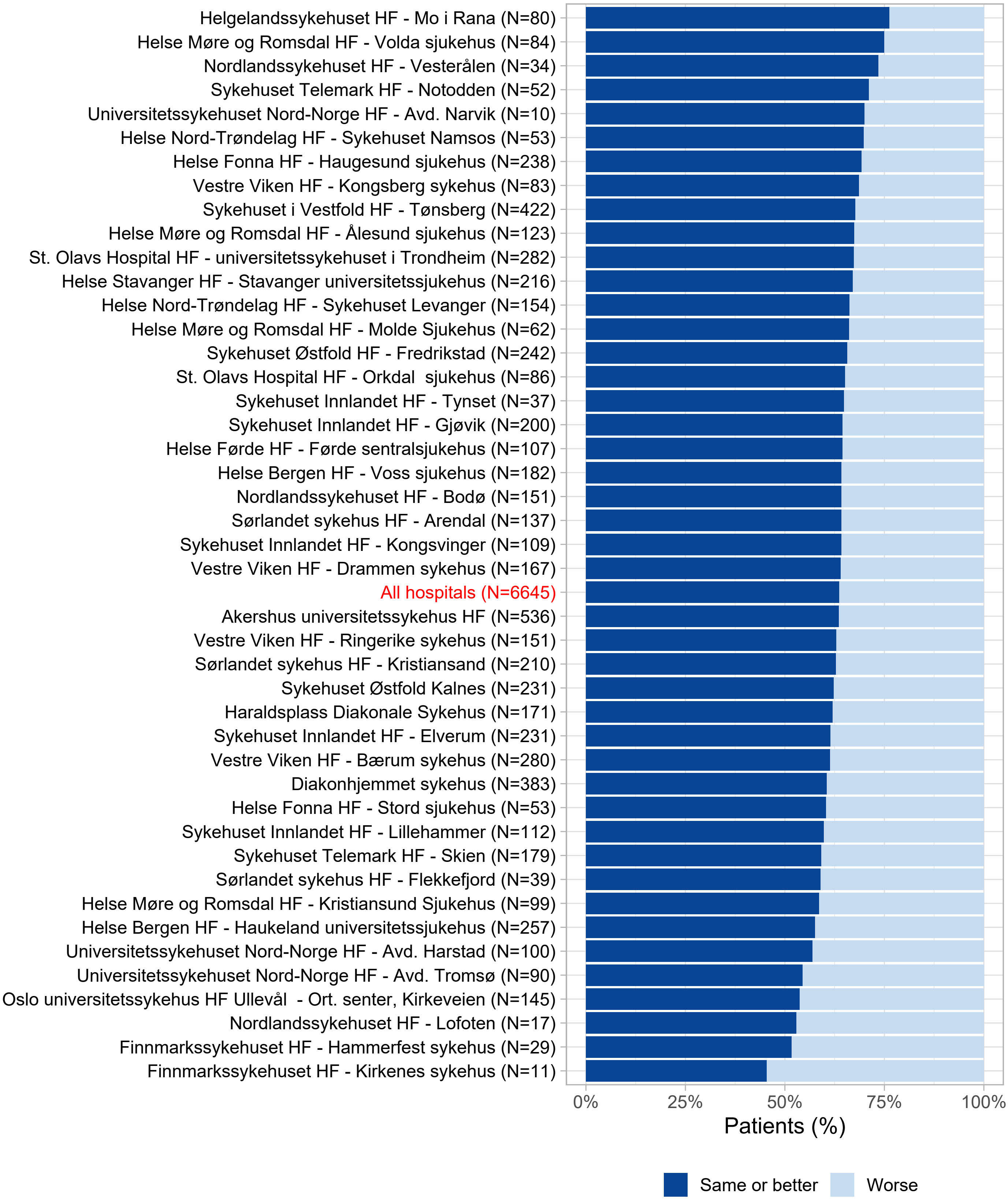
The figure shows the proportion of patients who report unchanged or improved ability to perform usual activities from preoperatively to 4 months postoperatively assessed on the basis of the 1st dimension of EQ-5D-3L. Only hospitals with 10 or more patients are displayed.

Figure D.18: Usual activities after hip fracture, 2013-2018 - undisplaced fracture



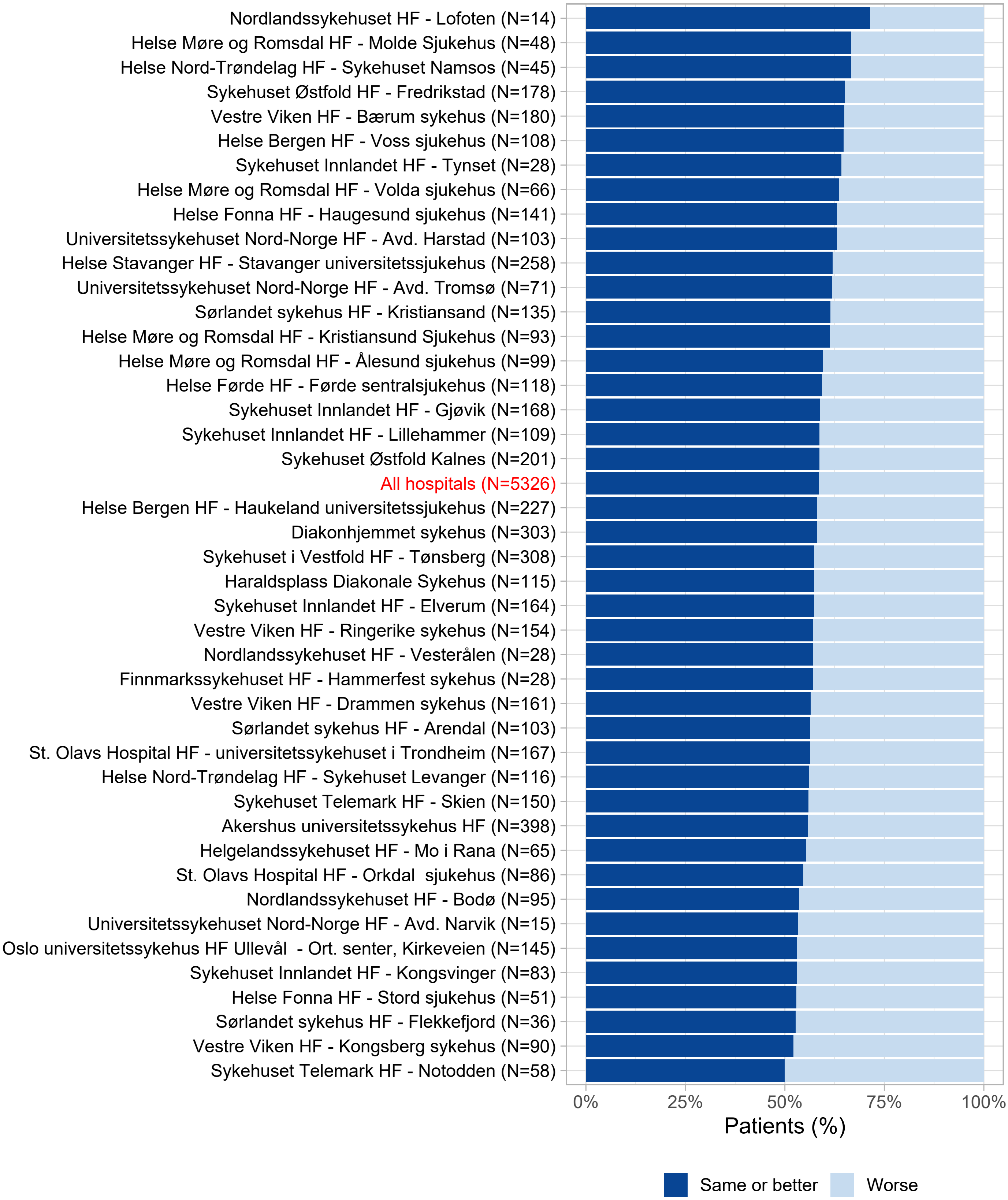
The figure shows the proportion of patients who report unchanged or improved ability to perform usual activities from preoperatively to 4 months postoperatively assessed on the basis of the 1st dimension of EQ-5D-3L. Only hospitals with 10 or more patients are displayed.

Figure D.19: Usual activities after hip fracture, 2013-2018 - displaced fracture



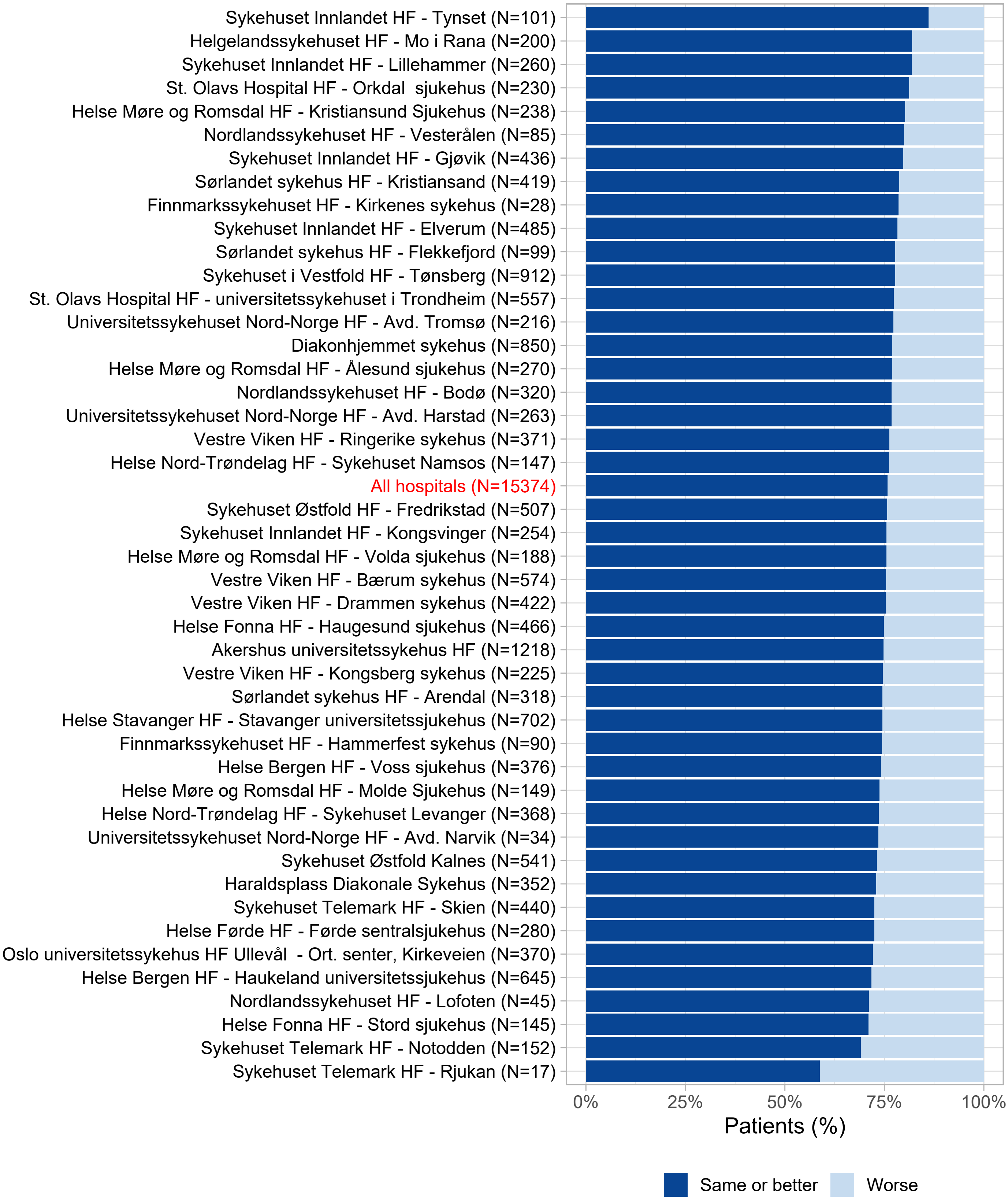
The figure shows the proportion of patients who report unchanged or improved ability to perform usual activities from preoperatively to 4 months postoperatively assessed on the basis of the 1st dimension of EQ-5D-3L. Only hospitals with 10 or more patients are displayed.

Figure D.20: Usual activities after hip fracture, 2013-2018 - pertrochanteric/Subtrochanteric fracture



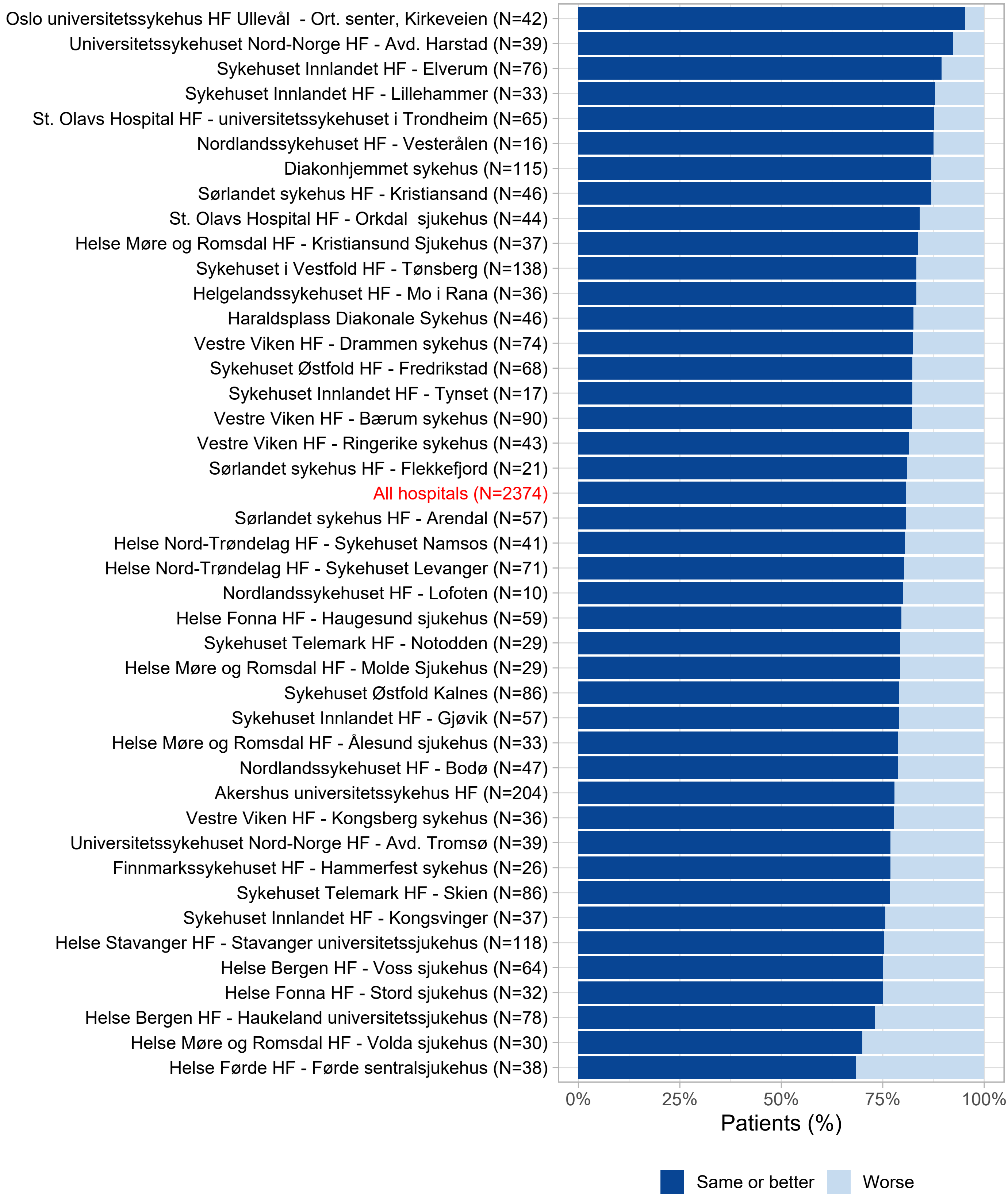
The figure shows the proportion of patients who report unchanged or improved ability to perform usual activities from preoperatively to 4 months postoperatively assessed on the basis of the 1st dimension of EQ-5D-3L. Only hospitals with 10 or more patients are displayed.

Figure D.21: Self-care after hip fracture, 2013-2018 - all types of hip fracture



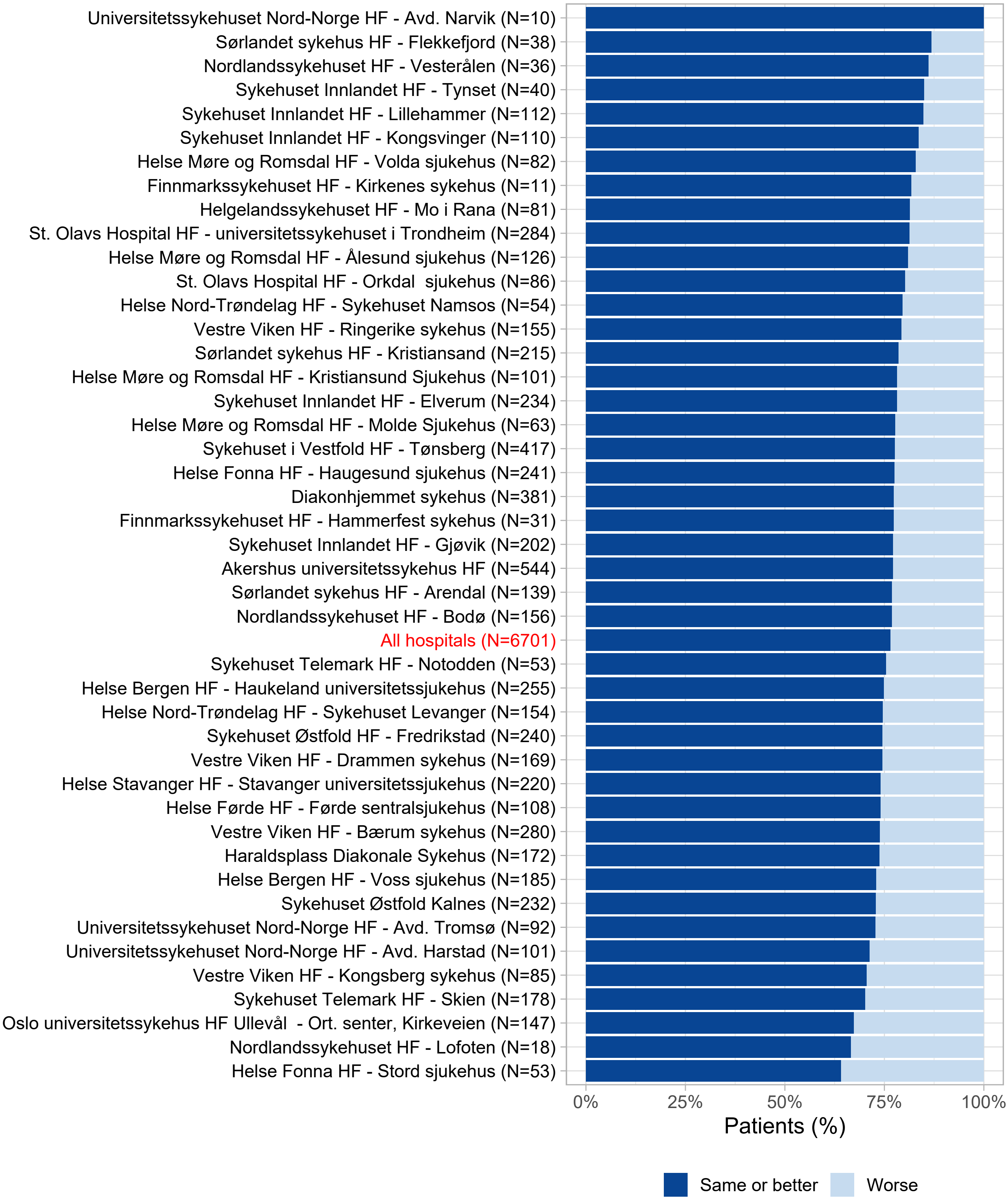
The figure shows the proportion of patients who report unchanged or improved ability to perform self-care from preoperatively to 4 months postoperatively assessed on the basis of the 1st dimension of EQ-5D-3L. Only hospitals with 10 or more patients are displayed.

Figure D.22: Self-care after hip fracture, 2013-2018 - undisplaced fracture



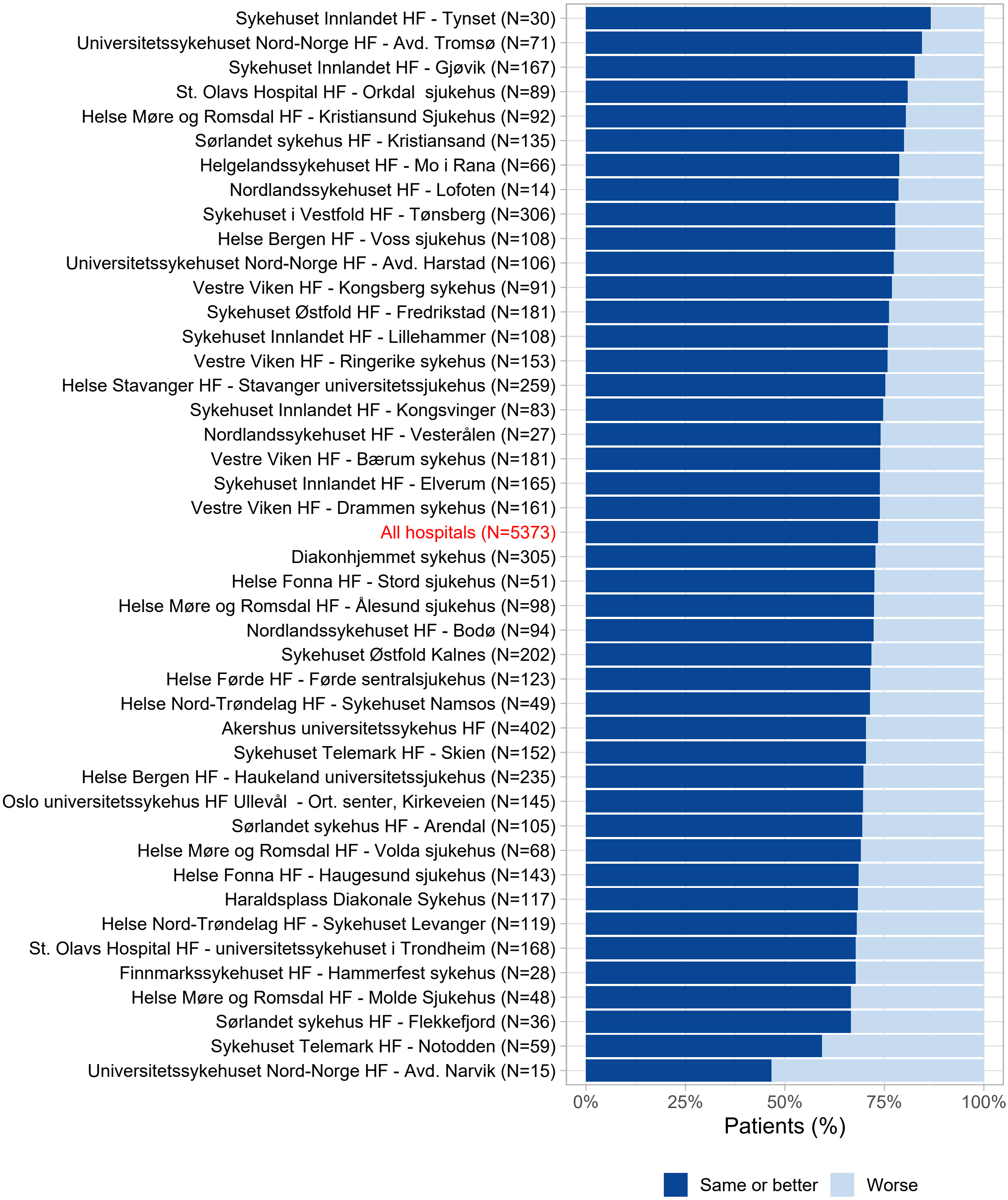
The figure shows the proportion of patients who report unchanged or improved ability to perform self-care from preoperatively to 4 months postoperatively assessed on the basis of the 1st dimension of EQ-5D-3L. Only hospitals with 10 or more patients are displayed.

Figure D.23: Self-care after hip fracture, 2013-2018 - displaced fracture



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 1st dimension of EQ-5D-3L. Only hospitals with 10 or more patients are displayed.

Figure D.24: Self-care after hip fracture, 2013-2018 - pertrochanteric/Subtrochanteric fracture



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 1st dimension of EQ-5D-3L. Only hospitals with 10 or more patients are displayed.

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.26 to D.30 present updated results for the different hospitals for operations performed in the period 2017-2019.

Figure D.25: Number of primary operations in 2019 at each hospital

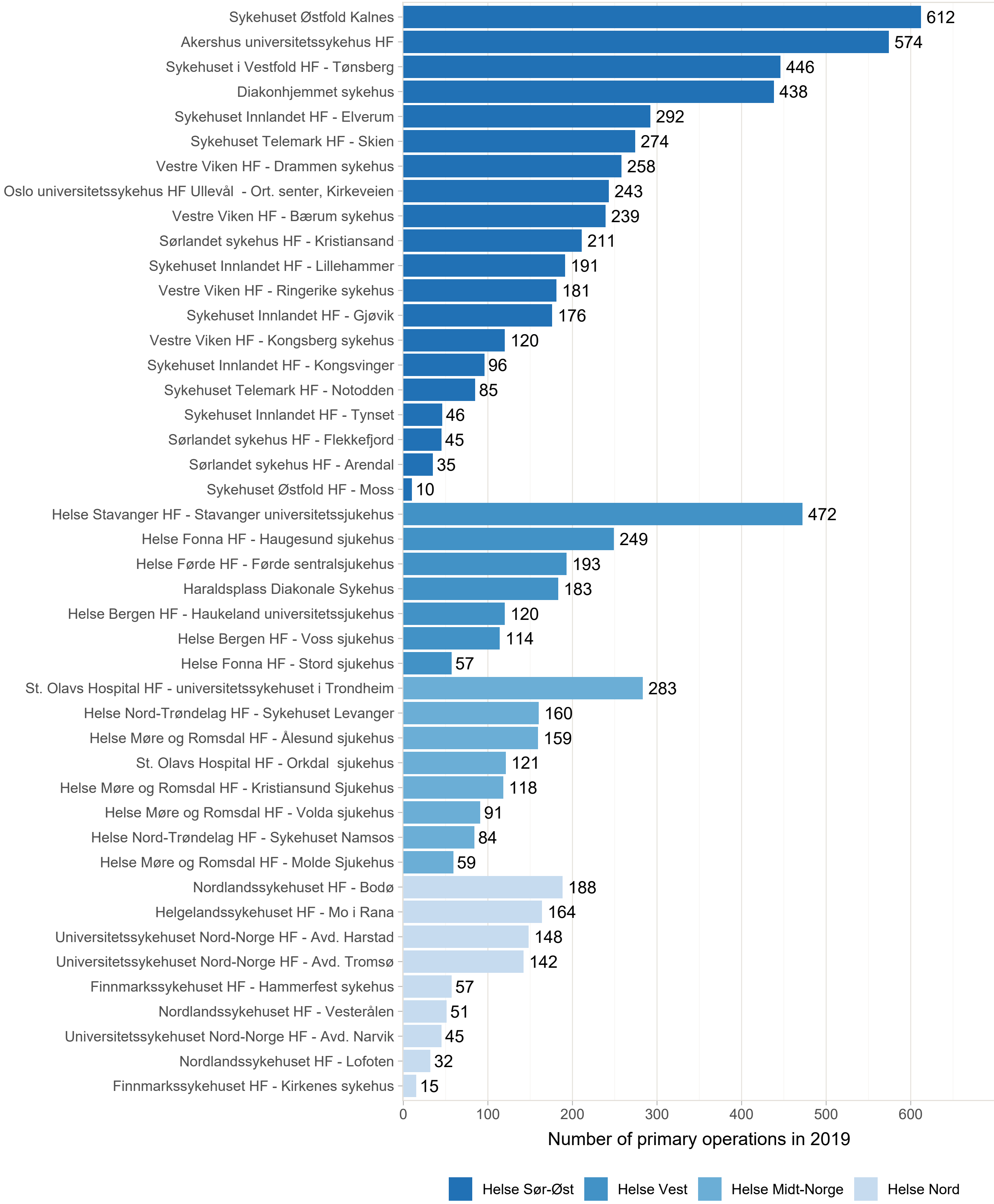


Figure D.26: Treatment of displaced femoral neck fracutres in patients over 70 years of age

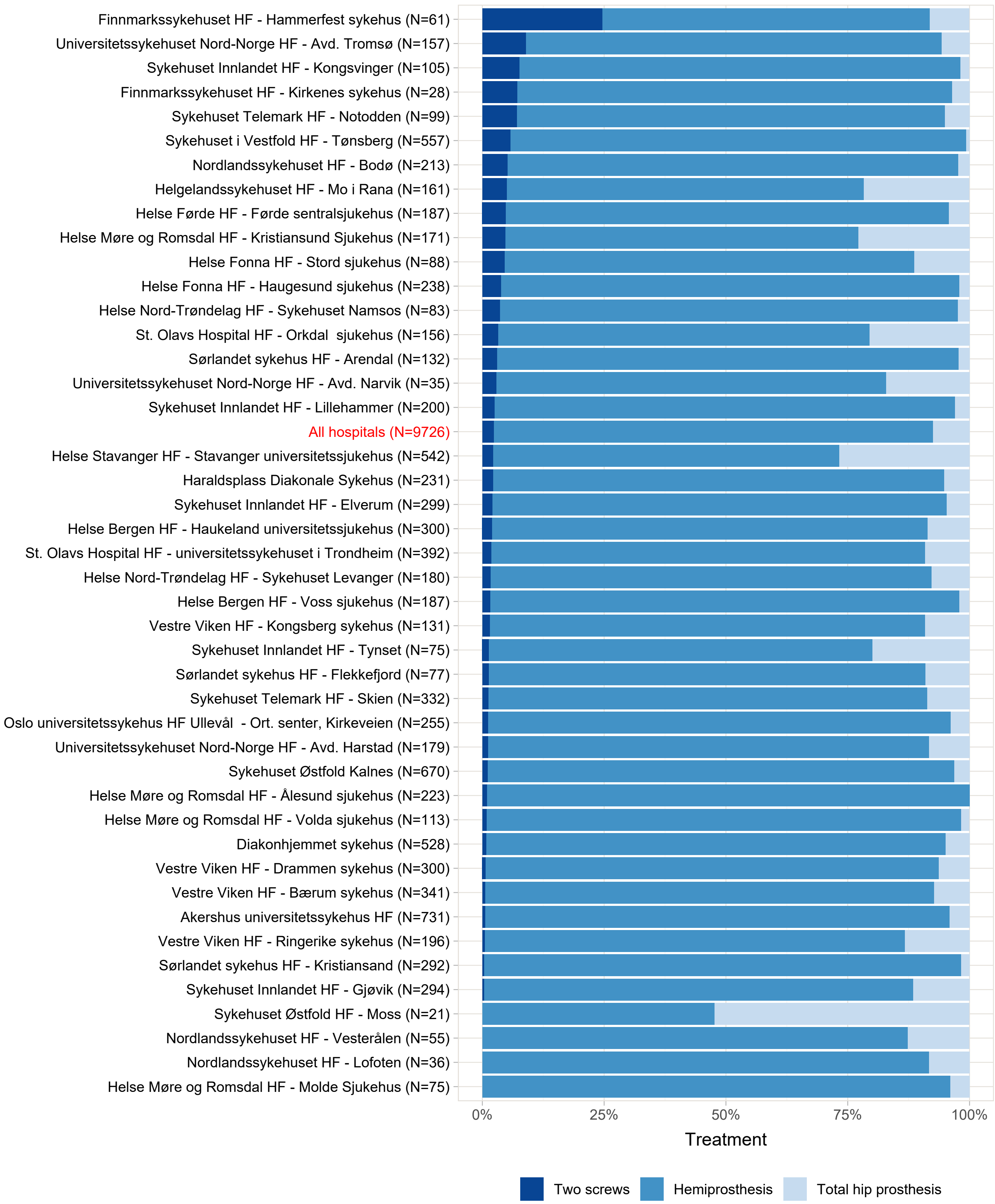


Figure D.26 shows the proportion of patients treated with screw osteosynthesis/hemiprosthesis/total hip prosthesis at each hospital in the period 2015-2017. Hospitals with n<10 have been excluded.

Figure D.27: Fixation of hemiprosthesis in patients over 70 years of age

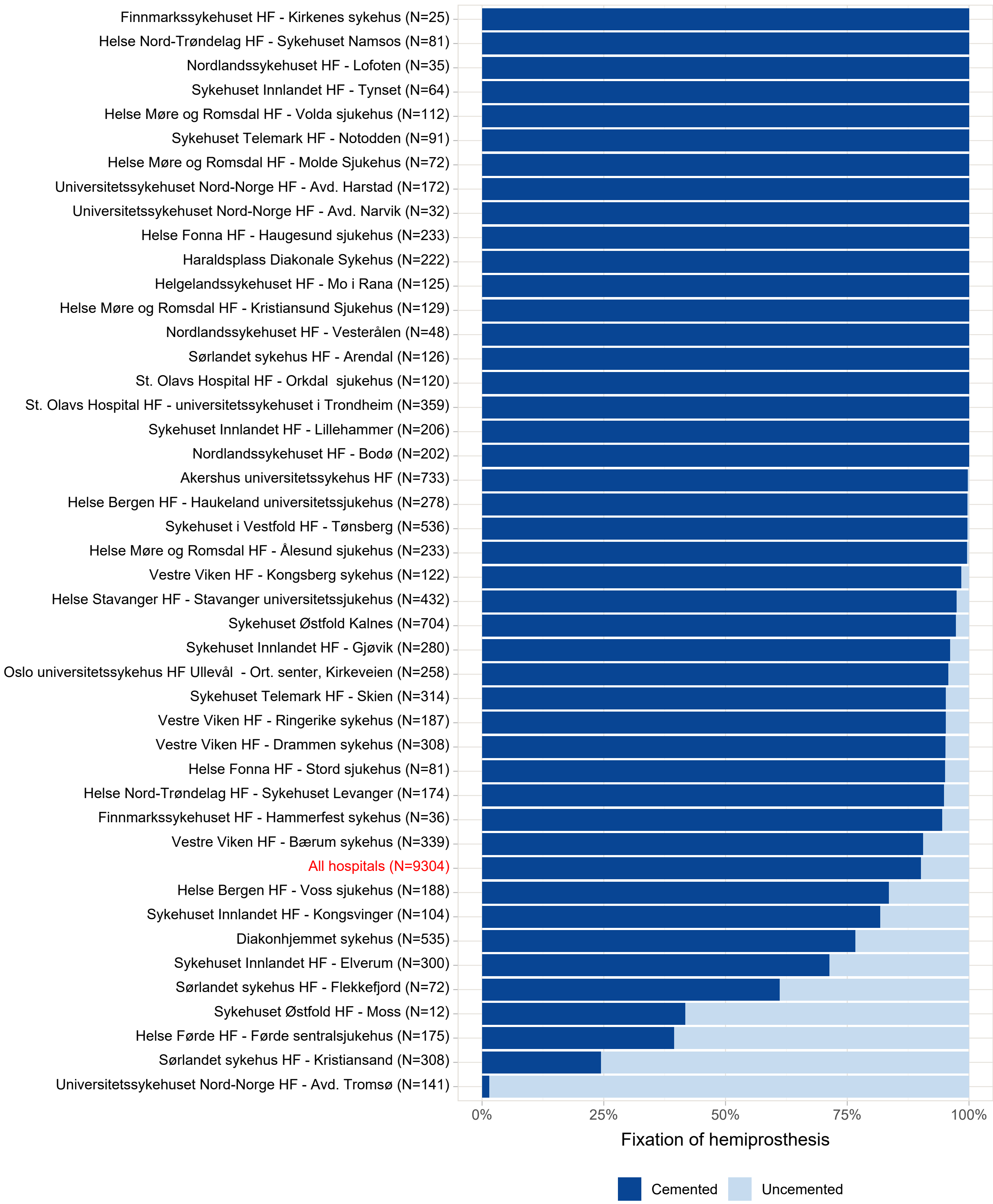


Figure D.27 shows the proportion of patients treated with uncemented/cemented hemiprosthesis at each hospital in the period 2015-2017. Hospitals with n<10 have been excluded.

Figure D.28: Waiting time from fracture to surgery

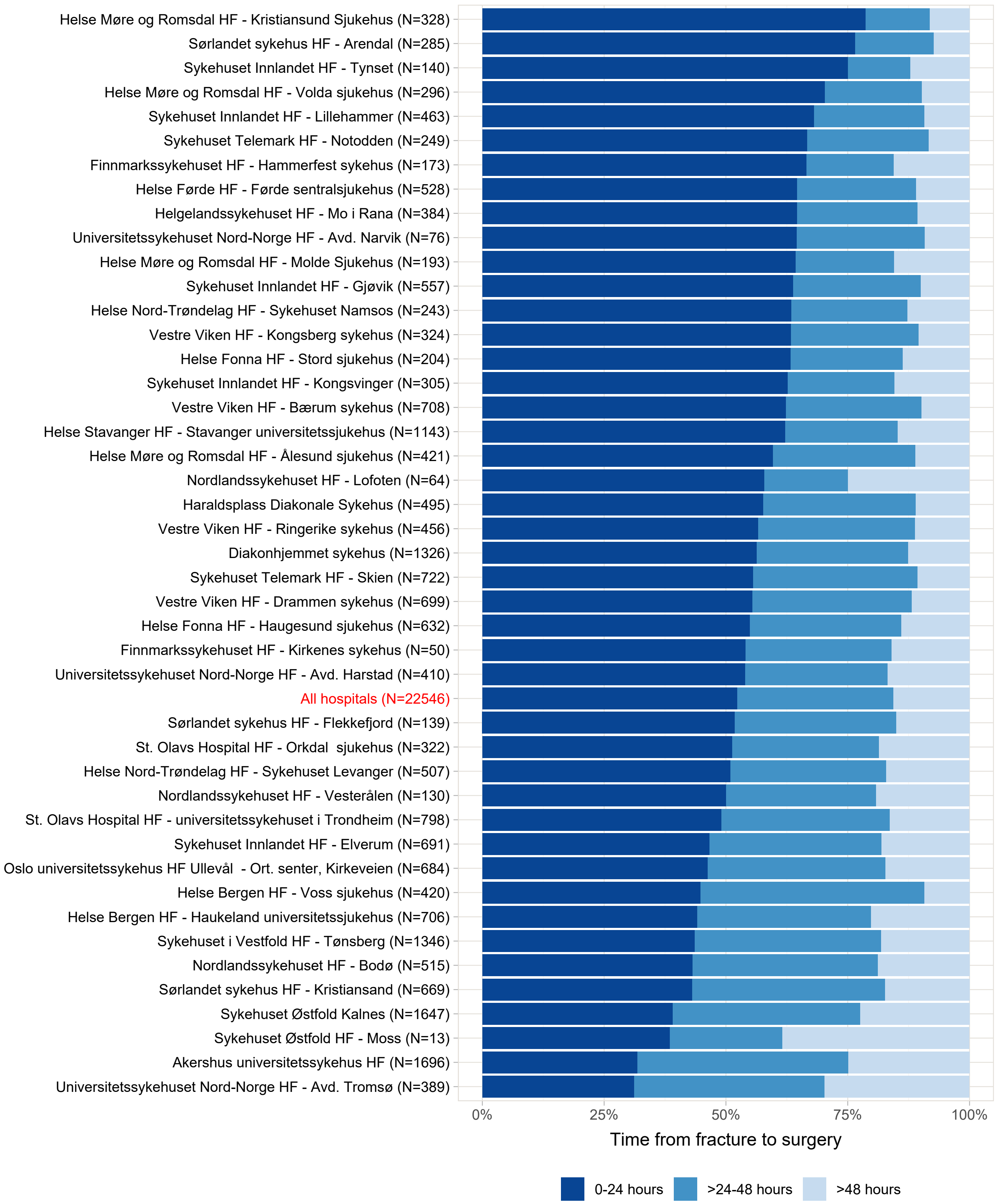


Figure D.28 shows waiting time, sorted by proportion of fractures treated within 24 hours after the fracture at the different hospitals in the period 2017-2019. Hospitals with n<10 have been excluded.

Figure D.29: Reoperations in the period 2017-2019. All types of hip fractures.

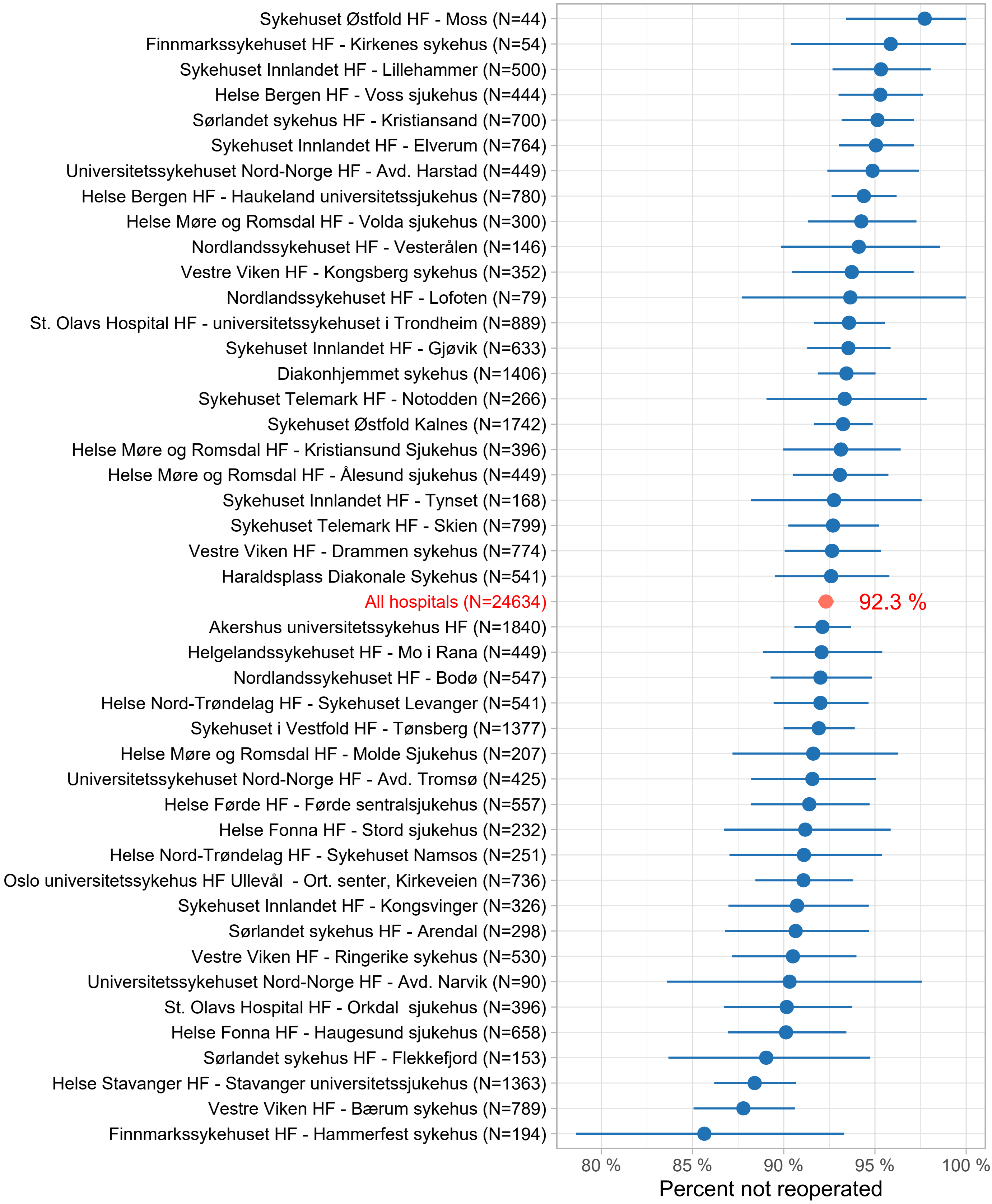


Figure D.29 shows proportion of patients not reoperated at each hospital. Hospitals with n<10 have been excluded.

Figure D.30: Reoperations in the period 2017-2019. Displaced femoral neck fractures in patients over 70 years of age, regardless of type of primary operation.

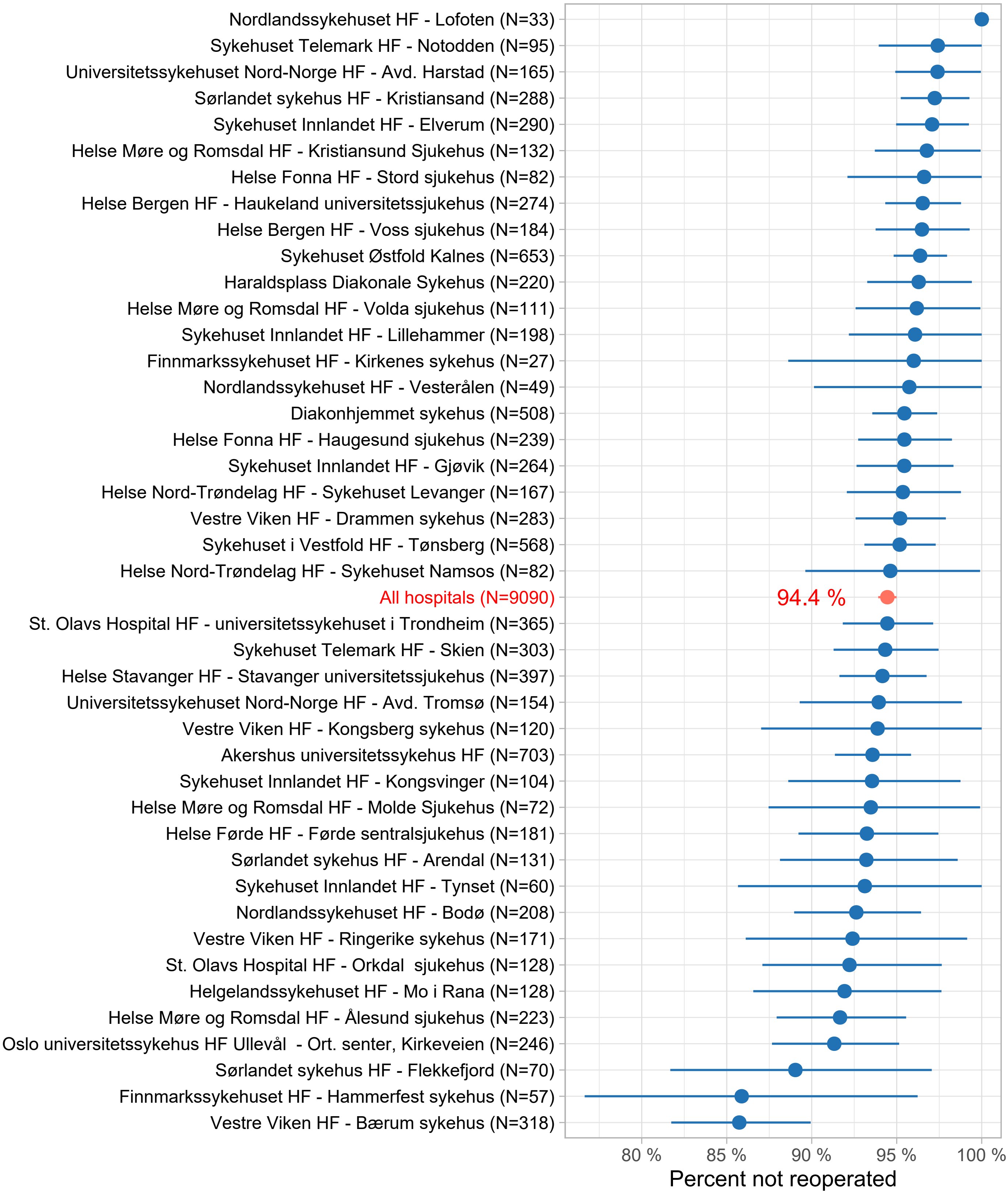


Figure D.30 shows proportion of patients not reoperated at each hospital. Hospitals with n<10 have been excluded.

Completeness analysis for the Norwegian Hip Fracture Register, 2017-2018
A completeness analysis has been conducted for the Norwegian Hip Fracture Register (NHFR) for primary operations (osteosynthesis, partial and total arthroplasty) and reoperations (following primary osteosynthesis, partial and total arthroplasty for hip fractures) performed in the period 2017-2018. A report and analysis have been prepared by the Norwegian Patient Register (NPR) in cooperation with the NHFR. A report on the implementation and results will be published at `www.helsedirektoratet.no`.

Formulae for completeness rates:

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

$$\text{Dekningsgrad NPR} = \frac{\text{only NPR} + \text{inclusion both registers}}{\text{only NPR} + \text{only NHFR} + \text{inclusion both registers}}$$

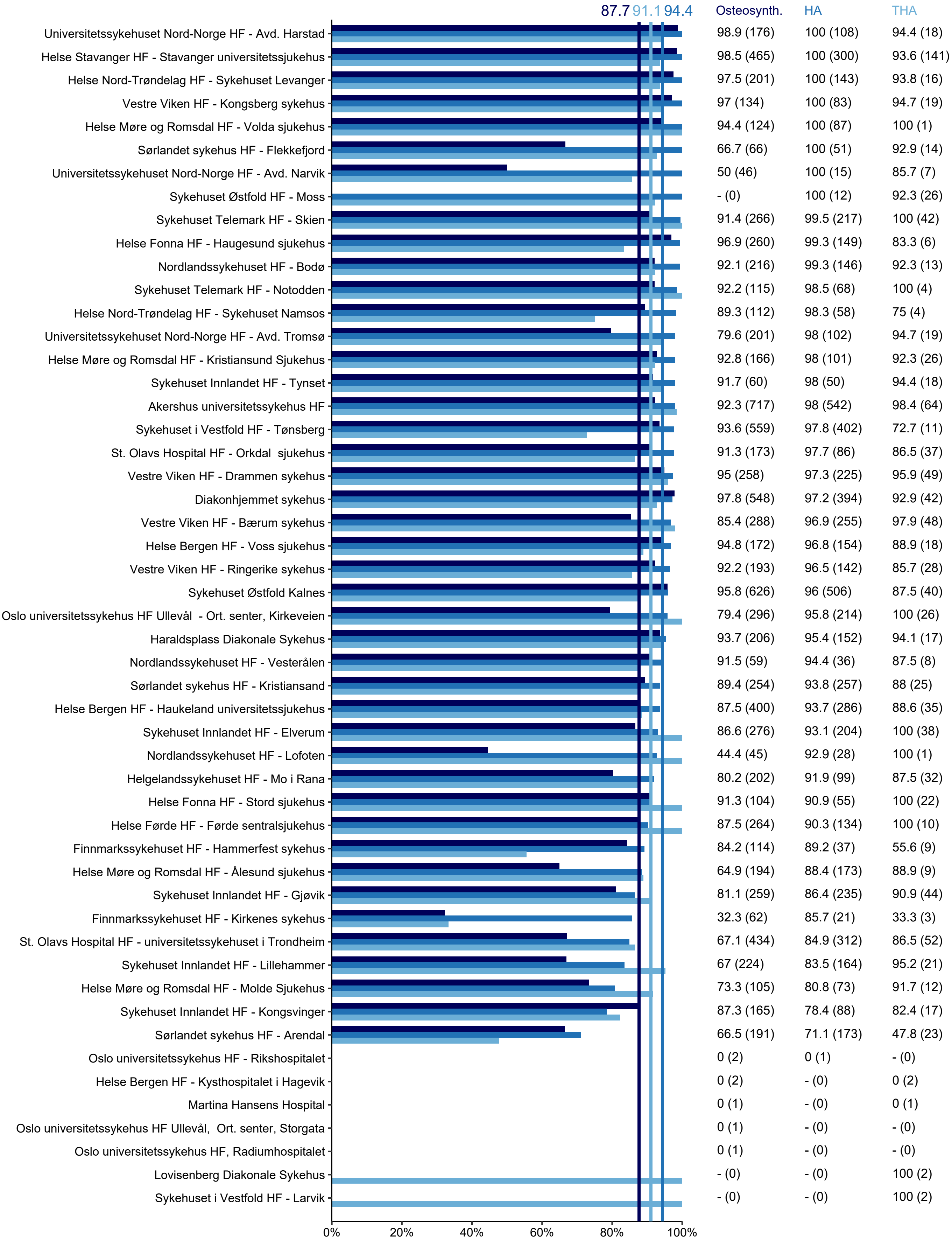
For details of the NSCP and ICD-10 codes used when extracting data from the NPR for comparison of primary operations and reoperations in the NHFR and for the complete results, please consult the Completeness Analysis Report, which will be published at`www.helsedirektoratet.no`.

Primary hip fracture surgery. Information in the NHFR showed a high degree of agreement with the information in the NPR. Completeness for osteosynthesis was 88 %, for hemiarthroplasty 94 % and for total arthroplasty 91 %. However, there are considerable variations in completeness between hospitals. Many of the hospitals have completeness under 80 %, which we consider very low. One explanation for low completeness rates in NHFR may be patients not giving consent to registration of the data. The differences between rates for primary osteosynthesis, hemiarthroplasty and total arthroplasty show that this cannot be the only cause and that hospitals must improve their reporting of primary hip fracture surgery with the correct diagnostic and procedure codes. Completeness for primary total hip arthroplasty for fractures is lower than completeness for all total arthroplasties reported to the Norwegian Arthroplasty Register (NAR). We believe that part of the reason is coding practices and we are currently investigating this further.

Reoperations. The information in the NHFR did not agree with NPR data as well as for primary surgery. Completeness for reoperations after osteosynthesis was 80 %, after hemiarthroplasty 73 %, and after total arthroplasty 84 %. It has been particularly challenging to perform completeness analyses for reoperations. The fact that the NPR does not specify left or right side leads to some uncertainty in the analysis. Furthermore, coding of reoperations reported to the NPR is often imprecise or incorrect. Low completeness may mean that the reoperation form was not sent to the NHFR or that the surgery was incorrectly coded in the NPR. We would like to point out that all reoperations of partial and total arthroplasty due to infection (including those where prosthetic parts are not changed or removed) must be reported on a form to the NHFR or NRL. These must be given the codes **NFS 19, NFS 49 or NFW 69**.

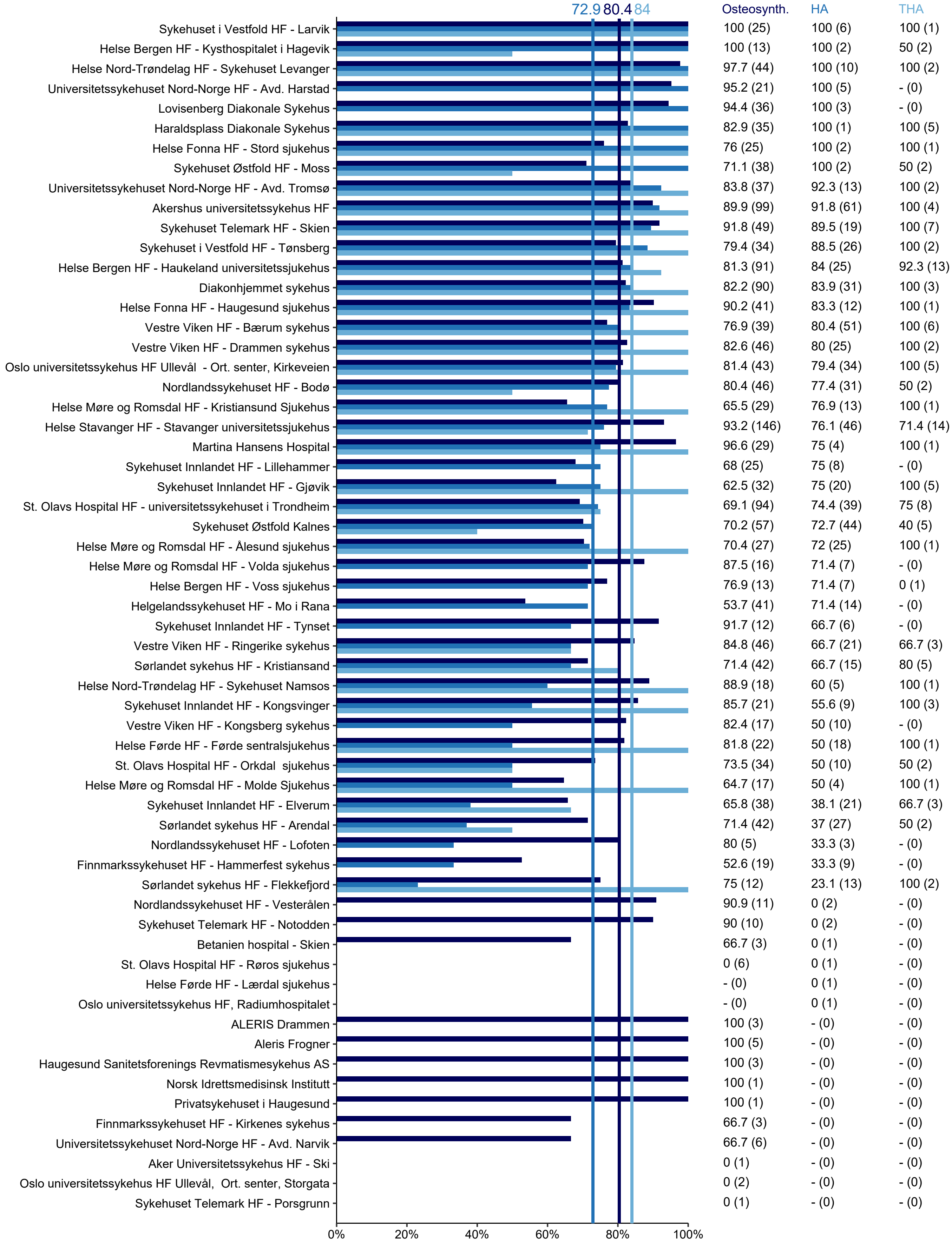
The following pages show the hospital-based completeness analysis for primary operations and reoperations. We urge hospitals with low completeness to review their coding practices and routines in reporting to the registers.

Completeness of reporting, primary hip fractures 2017-2018



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 2017-2018



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 Cruciate Ligament Register

Introduction 283

Covid-19, Number of operations by month, 2019 & 2020 286
Survival for cruciate ligament operations 287
KOOS by primary ACL reconstructions 288
KOOS by revisions 288
Annual numbers of operations for each hospital , 2019 289
Number of operations reported via electronic forms in 2020 290

All categories of operations
Annual numbers of operations 291
Distribution of hospitals by surgery volume 291
Incidence of primary reconstruction of cruciate ligament by sex and year 292
Distribution of other procedures 292
Intraoperative complications 294

Primary reconstrucion of cruciate ligament
Age by primary operation 295
Activity that lead to injury 295
Actual injury 296
Additional injuries 296
Choice of graft 297
Fixation 299
Meniscal lesion 300
Fixation 301
Cartilage lesion 302
Cartilage injuries 303
Outpatient surgery 304
Intraoperative complications 304
Systemic antibiotic prophylaxis 305
Thrombosis prophylaxis 306

Revision reconstruction
Age by revision 307
Activity that lead to injury 307
Actual injury 308
Additional injuries 308
Reason for revision reconstruction 309
Choice of graft 309
Fixation 311
Meniscal lesion 312
Fixation 313
Cartilage lesion 314
Cartilage injuries 315
Outpatient surgery 317
Intraoperative complications 317
Systemic antibiotic prophylaxis 317
Thrombosis prophylaxis 318

Completeness analysis 2017-18 319

CRUCIATE LIGAMENT REGISTER: ANNUAL REPORT 2020

The management and administration of the Cruciate Ligament Register are proud to present the 2020 report from the register. This report contains many of the same tables and figures as before. Data from the Cruciate Ligament Register are also presented in a report by SKDE (the Centre for Clinical Documentation and Evaluation) on their website, where the aim is to simplify the terminology to make it easier to read for patients as well.

We are very pleased to note the enthusiasm for ACL surgery and all the research in this field.

Our most important progress in 2020 was the publication of the "Best Clinical Practice for the Treatment of ACL Injuries" The aim of this work is to reach a national consensus on the definition of best clinical practice. There will always be some variation in practice in our field, but the ideal is as little variation as possible and the variation that occurs must be knowledge-based. This work stems from collaboration between the Cruciate Ligament Register and the Norwegian Arthroscopy Association. The health authorities want national medical quality registers to take an active role in enhancing the quality of treatment in Norway by using quality indicators. In the Cruciate Ligament Register, we have so far defined the revision rate after eight years and the use of antibiotics, and we are looking into the possibility of expanding this. A possible new quality indicator can be defined for the proportion of elective patients who have undergone physiotherapy.

New operation codes have been in effect since 1 January 2021 and are already available electronically in the coding system. The advantage of this is that revisions now have separate and more precise codes. This provides greater accuracy and in the longer term also increased differentiation in payment for complex surgery.

The COVID-19 pandemic made 2020 a difficult year for elective orthopaedic surgery. Some of us have spent the time on quality improvement projects while others have made efforts to rise to the challenge of using electronic forms. We would also like to point out that we would be pleased to help hospitals in any way possible with the transition to electronic forms. It is obligatory to submit the ACL form to the Cruciate Ligament Register. The 2017 and 2018 coverage analyses show the percentage of operations reported to the register. This was 85.5%, which is basically acceptable, but we would like to see over 90%. We conducted a data quality improvement project in 2020 at Haukeland University Hospital; this showed that there were no other sources of error than lack of reporting. New coverage analyses will be performed for 2019 and 2020 next year.

In 2020, 1622 primary ACL reconstructions and 84 revisions were recorded. This naturally represents a decline from the previous year's figures (1918 and 154). Last year we commented on the fact that the incidence of primary reconstructions is clearly increasing in girls aged 10-19 years. This has aroused media attention and is an area that requires greater focus.

The use of the patellar tendon graft continues to increase and now accounts for 69.4% of all operations.

In primary ACL reconstructions with meniscus repair, it has been commented in recent years that it has become more common to suture the damaged meniscus (Figure 7). In 2011, just

over 20% were sutured, but this has gradually increased to about 55.6% in 2020. The effects of this change have so far been difficult to measure, but it may result in a decrease in osteoarthritis in the long term. In the new electronic form, more details of root damage and ramp lesions of the meniscus will be easier to identify.
Reporting of patients who have been reoperated on the same knee after ACL surgery is still far too low. For the whole country, only two post-operative infections were reported in 2020. We therefore ask surgeons to please improve this practice.

In the past year, the register has transferred some variables from the surgeon's form to the patient's form. Patients themselves can now fill in the following information: height, weight, smoking/use of snuff, date of injury and activity at time of injury. This will make it easier for surgeons to use the forms.

RESEARCH
Research is important and much good research was again produced in 2020. We are very proud of having had a PhD based on the register in 2020:

Søreide E. On aspects of intra-articular ligament reconstruction. 2020 University of Oslo; Oslo, Norway

A number of good articles using figures from the register have also been published.

PUBLICATIONS
Krogsgaard MR, Brodersen J, Christensen KB, Siersma V, Jensen J, Hansen CF, Engebretsen L, Visnes H, Forssblad M, Comins JD. How to translate and locally adapt a PROM. Assessment of cross-cultural differential item functioning. Scand J Med Sci Sports. 2021 May; 31(5):999-1008.

Lind M, Strauss MJ, Nielsen T, Engebretsen L. Low surgical routine increases revision rates after quadriceps tendon autograft for anterior cruciate ligament reconstruction: results from the Danish knee ligament reconstruction registry. Knee Surg Sports Traumatol Arthrosc. 2021 Jun; 29(6):1880-1886.

Lind M, Strauss MJ, Nielsen T, Engebretsen L. Quadriceps tendon autograft for anterior cruciate ligament reconstruction is associated with high revision rates: results for the Danish knee ligament registry. Knee Surg Traumatol Arthrosc. 2020 Jul;28(7):2163-2169

Ekeland A, Engebretsen L, Fenstad AM, Heir S. Similar risk of ACL graft revision for alpine skiers, football and handball players: the graft revision rate is influenced by age and graft choice. Br J Sports Med. 2020 Jan; 54(1):33-37

The Cruciate Ligament Register is intended to be of benefit to surgeons. Each hospital receives its own figures, and we will be happy to answer any questions you may have. In 2020, the members of the Steering Committee were Jon Olav Drogset, Lars Engebretsen, Stig Heir, Mette Andersen, Ove Furnes, Jonas Meling Fevang and patient representative Jostein Bildøy.

A special thanks to all surgeons and patients who fill in the ACL forms.

Bergen, 20 May 2021

Jon Olav Drogset
Leder av Styringsgruppen

Håvard Visnes
Legespesialist
Daglig leder Korsbåndregisteret

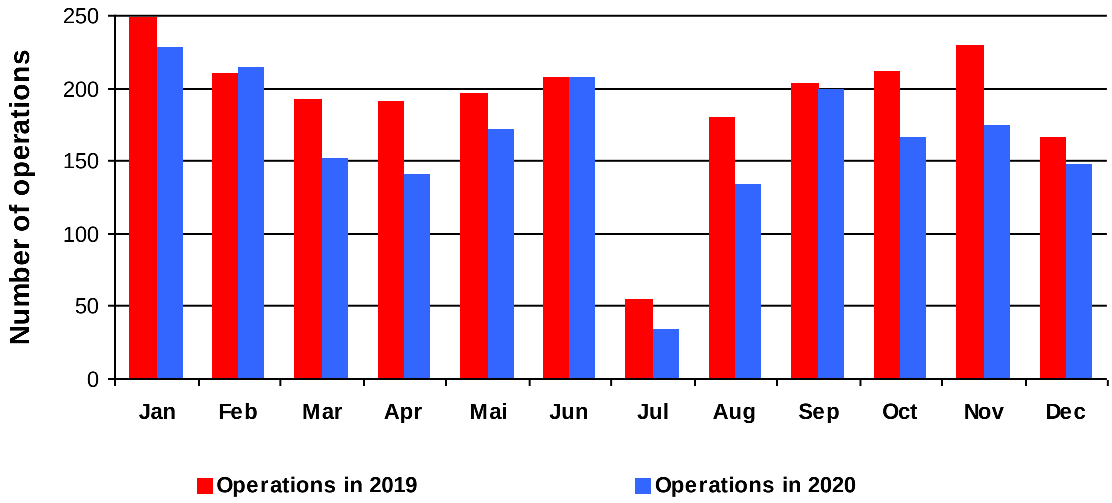
Irina Kvinnesland
IT-konsulent

Stein Håkon Låstad Lygre
Biostatistiker

Gard Kroken
Biostatistiker

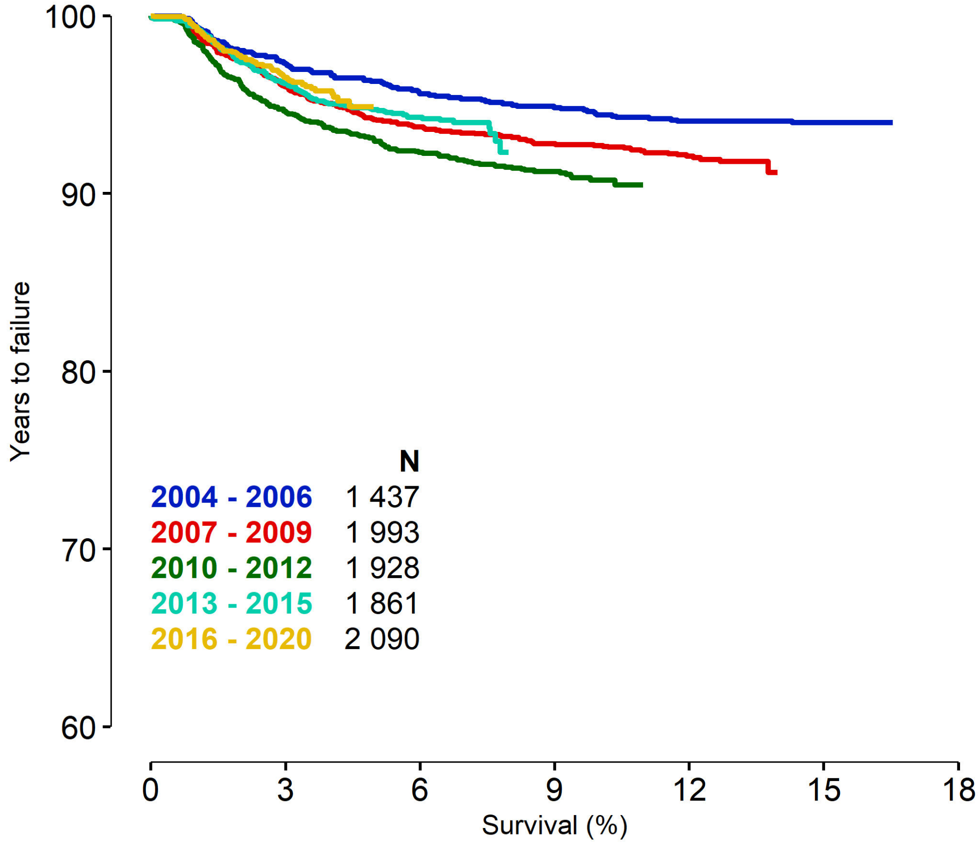
COVID-19

Figure 18: Monthly number of operations in 2019 - 2020

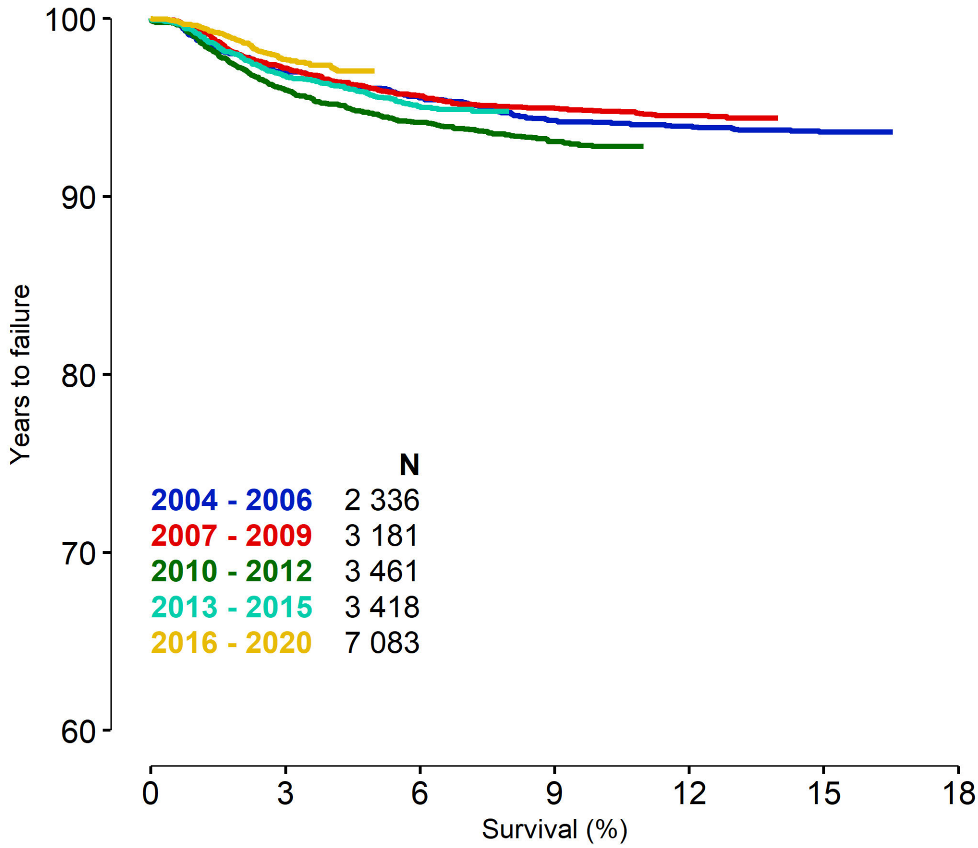


Survival of cruciate ligament operations
2004-2020

E.1) ACL reconstruction without additional injuries



E.2) ACL reconstruction without additional injuries



Survival estimate is given as long as >20 reconstructions remain at risk.

Figure E.3: KOOS with primary ACL reconstruction with additional injury

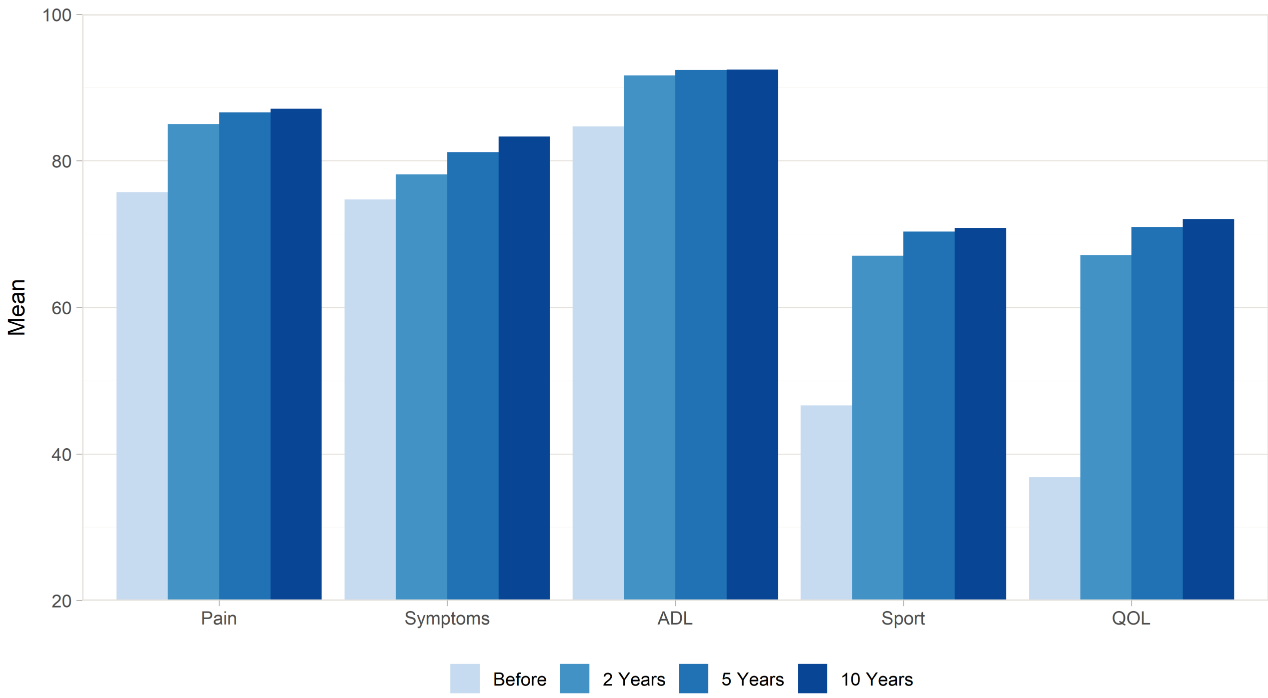


Figure E.4: KOOS with primary ACL reconstruction without additional injury

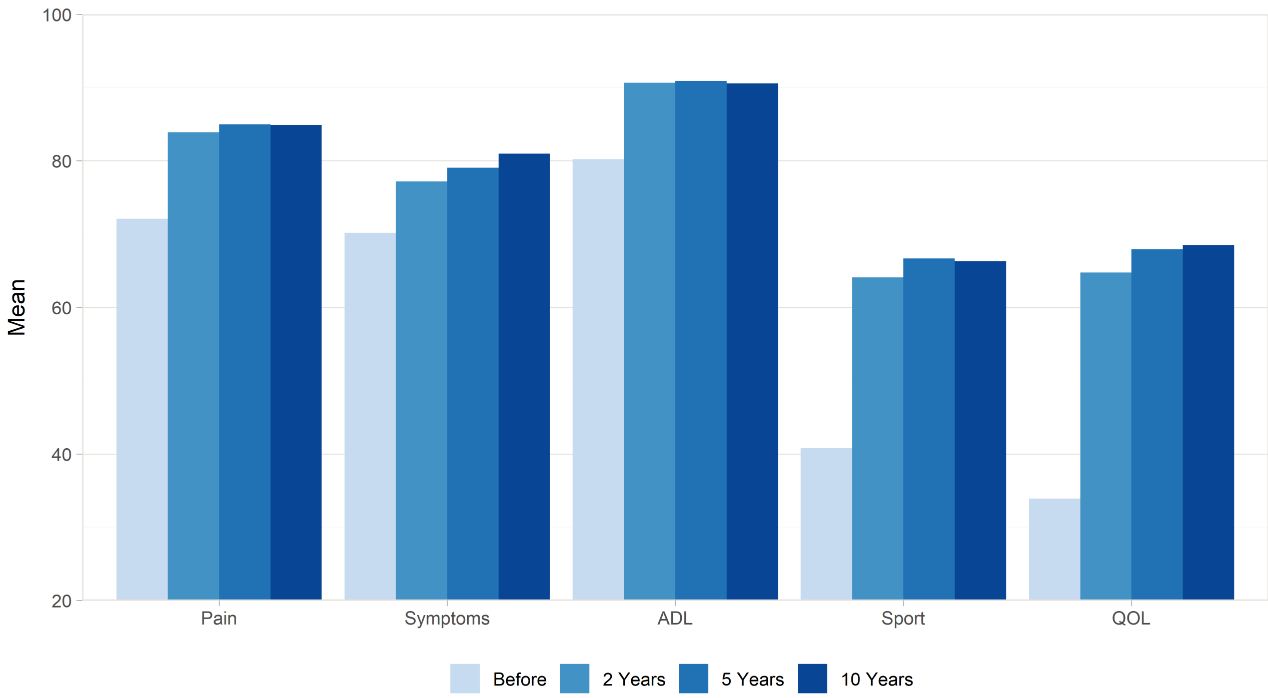


FIGURE E.5: Annual number of cruciate ligament primary reconstructions in 2020

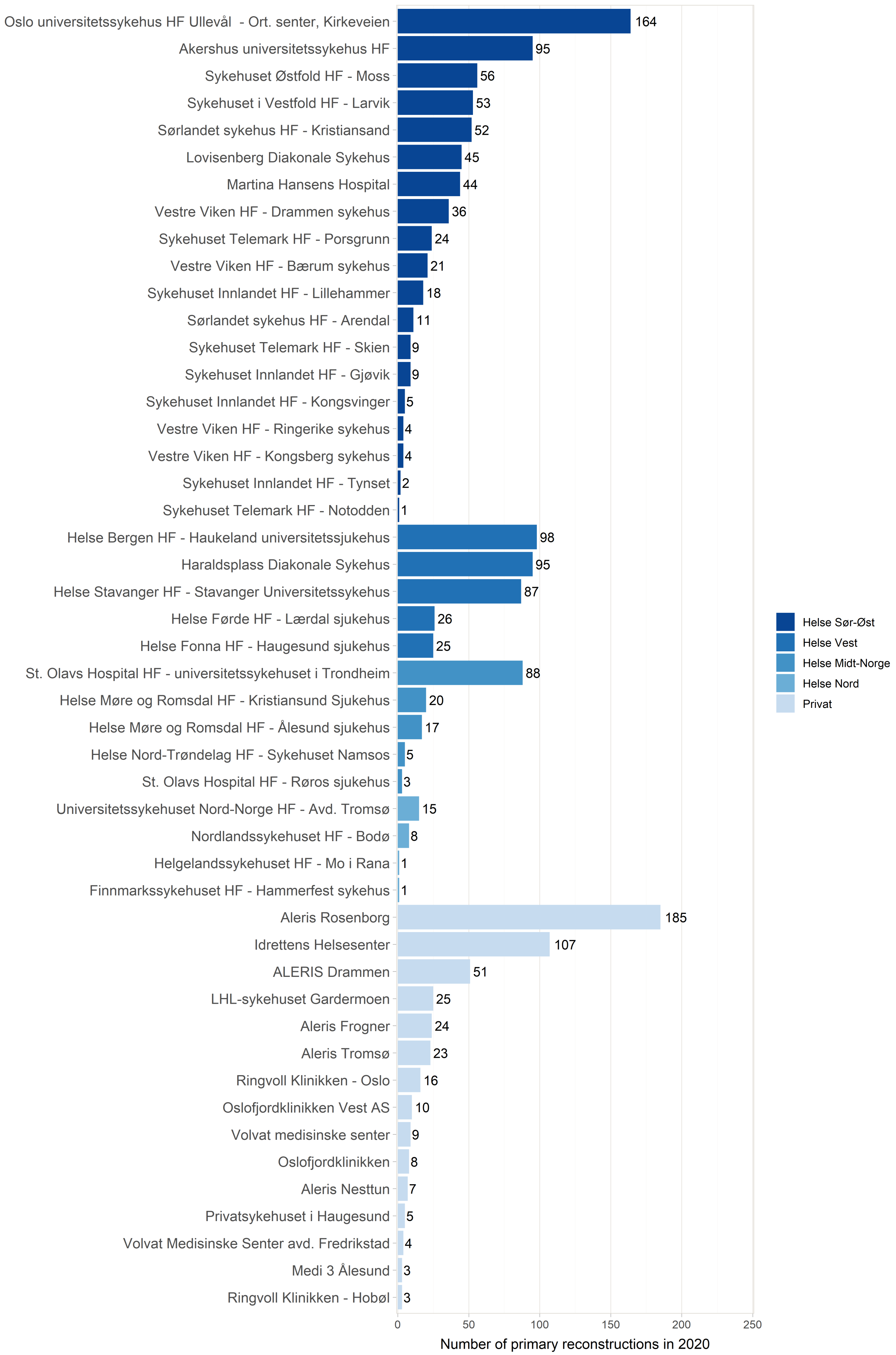
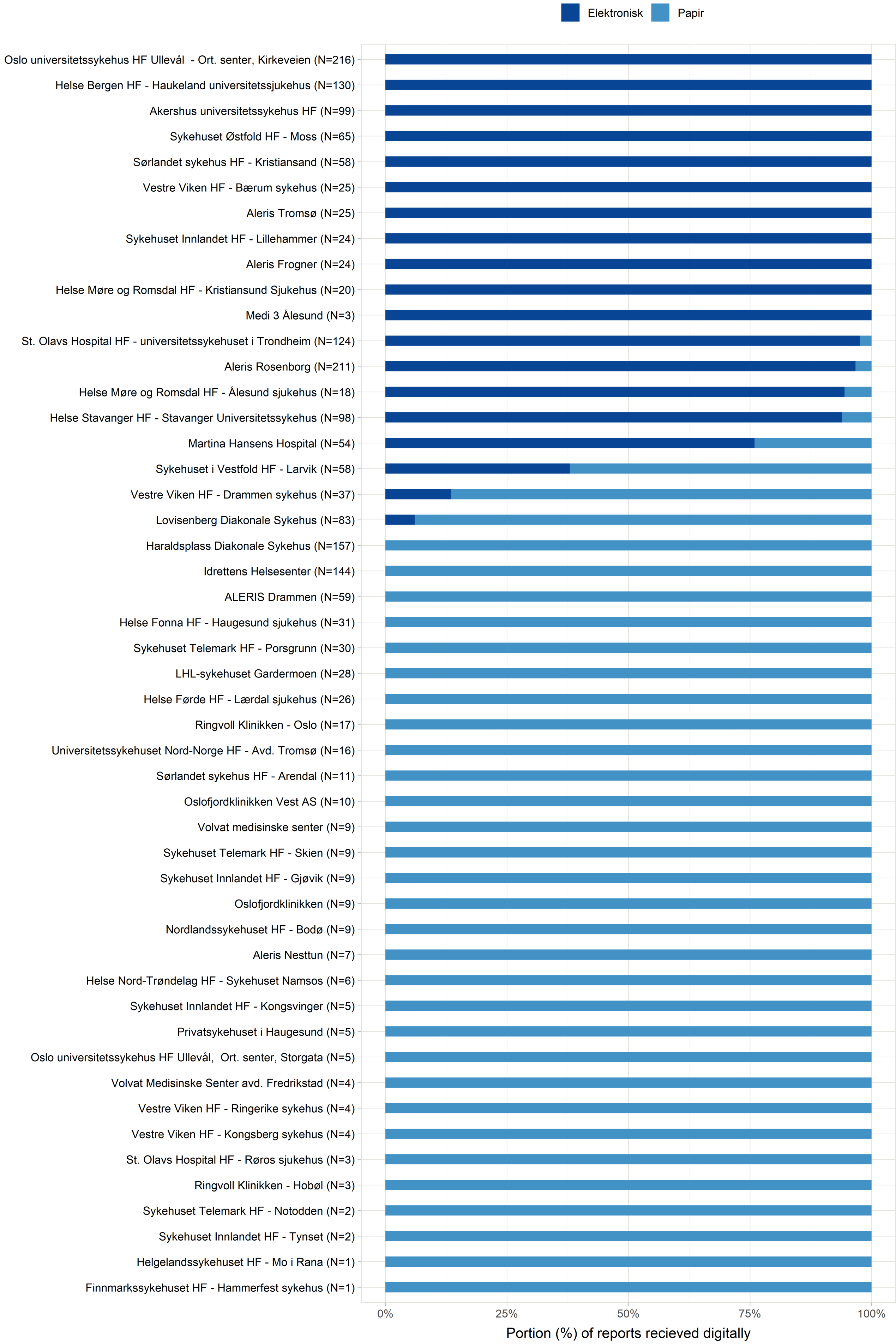


FIGURE E.6: Form registration by format in 2020



Cruciate Ligament

All categories of operations

Table 1: Annual numbers of operations

	Primary reconstruction		Revision reconstruction		Only other procedures		Total
2020	1 622	(82,3%)	145	(7,4%)	203	(10,3%)	**1 970**
2019	1 918	(83,7%)	184	(8,0%)	191	(8,3%)	**2 293**
2018	1 887	(81,4%)	212	(9,2%)	218	(9,4%)	**2 317**
2017	1 889	(82,3%)	217	(9,5%)	190	(8,3%)	**2 296**
2016	1 858	(81,7%)	203	(8,9%)	213	(9,4%)	**2 274**
2004-15	19 617	(85,9%)	1 875	(8,2%)	1 353	(5,9%)	**22 845**
Total	**28 791**	**(84,7%)**	**2 836**	**(8,3%)**	**2 368**	**(7,0%)**	**33 995**

Registration complete from 2005. 49,3% of the operations were performed on the right side. 44,8% of the operations were performed on females. 7,6% of the patients had a previous ACL/PCL-injury in the opposite knee. (9,8% was missing). Mean age was 28,3 years, 26,9 years for women and 29,4 years for men. Standard deviation of age was 10,6 years, 11,2 years for women and 9,9 years for men.
Median value for duration of primary ACL reconstruction was 72 minutes.

Figure 1: Distribution of hospitals by surgery volume, primary ACL reconstructions

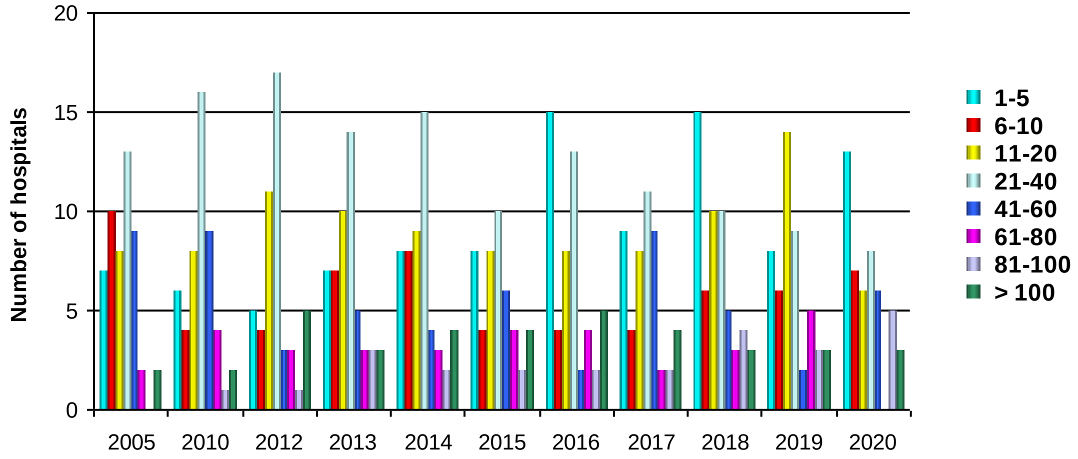


Figure 2: Distribution of hospitals by surgery volumes, revision reconstructions ACL

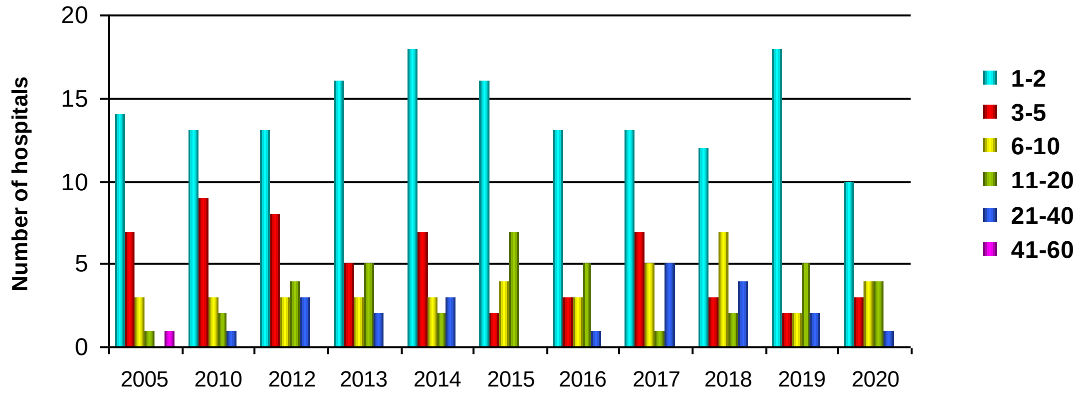
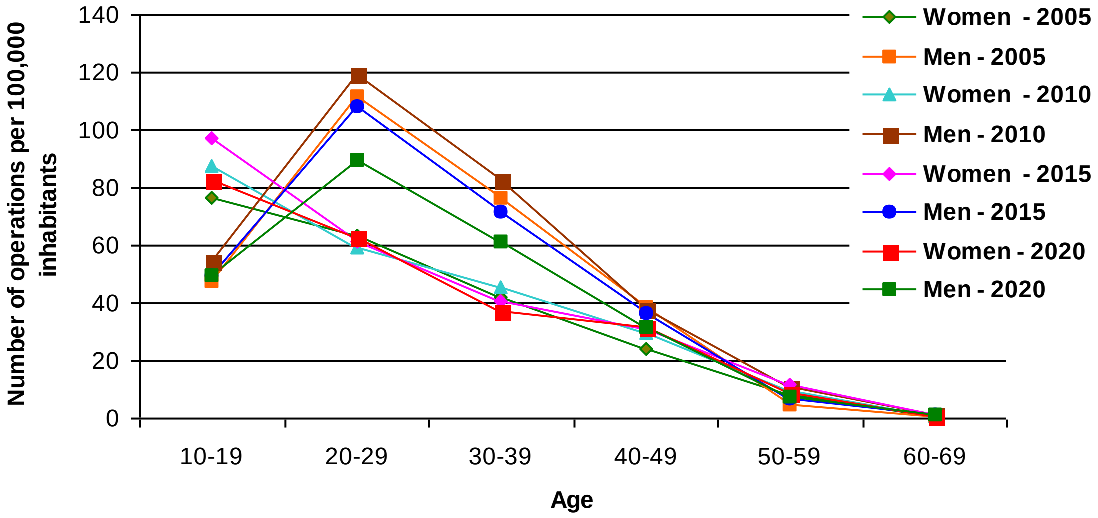


Figure 3: Incidence of primary reconstruction of cruciate ligament for 2005,2010,2015,2020



Distribution of other procedures

Table 2: 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
2020	470	21	21	44	5	6	47	18	8	27	1	1
2019	842	30	32	52	4	4	50	20	8	109	2	0
2018	1 082	23	44	69	8	6	47	27	5	99	0	0
2017	1 087	24	32	54	12	5	57	26	3	25	6	0
2016	1 044	51	47	67	11	9	57	19	2	27	2	0
2004-15	9 721	929	413	708	82	68	486	282	22	538	28	0
Total	**14 246**	**1 078**	**589**	**994**	**122**	**98**	**744**	**392**	**48**	**825**	**39**	**1**

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)
11 227	x					
433	x	x				
256		x				
254						x
244	x					x
93				x		
90	x		x			
87			x			
79	x			x		
30	x	x		x		
22	x			x		x
22					x	
21				x		x
16		x		x		
15	x	x				x
13		x				x
11	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 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)
711	x				
142			x		
103			x	x	
93				x	
59	x		x		
50		x			
37					x
35	x			x	
32	x		x	x	
31	x	x			
21	x				x
18			x		x
14	x		x		x
10		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
849	x							
237				x				
154							x	
90	x			x				
88			x					
67		x						
54						x		
54	x		x					
43				x	x			
36	x	x						
33			x	x				
27				x			x	
24							x	x
23	x						x	
21	x		x	x				
20		x		x				
20			x		x			
18				x			x	x
17					x			
16			x	x	x			
14				x		x		
12	x	x	x					
12								x
11	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.

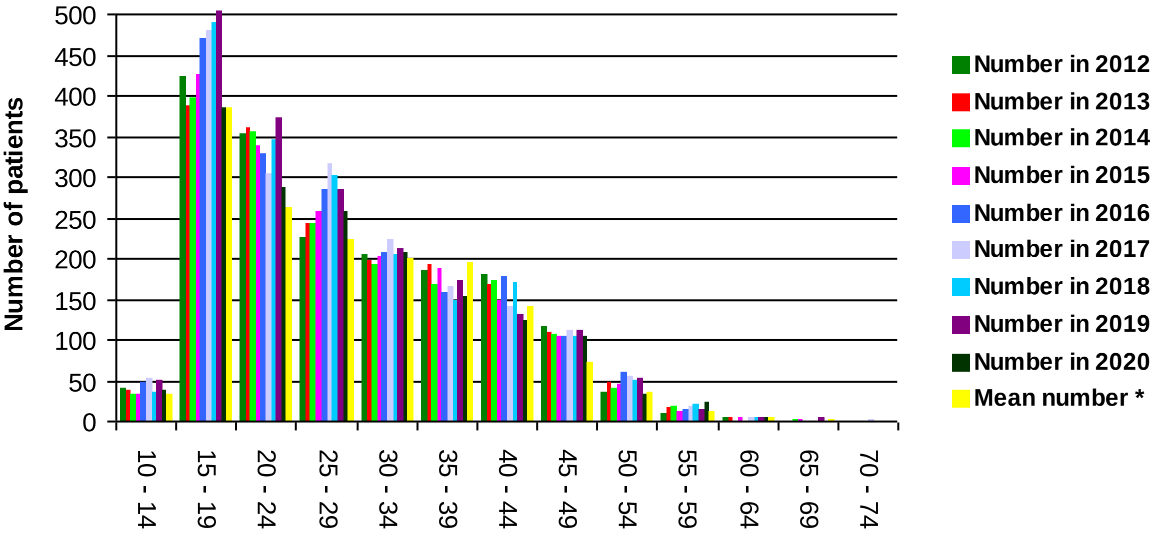
Intraoperative complications

Table 6: Intraoperative complications for all categories of surgeries

	Yes		No		Missing		Total
2020	38	(1,9%)	1 909	(96,9%)	23	(1,2%)	**1 970**
2019	44	(1,9%)	2 212	(96,5%)	36	(1,6%)	**2 293**
2018	46	(2,0%)	2 214	(95,6%)	57	(2,5%)	**2 317**
2017	64	(2,8%)	2 181	(95,0%)	50	(2,2%)	**2 296**
2016	51	(2,2%)	2 157	(94,9%)	65	(2,9%)	**2 274**
2004-15	693	(3,0%)	21 616	(94,6%)	536	(2,3%)	**22 845**
Total	**936**	**(2,8%)**	**32 289**	**(95,0%)**	**767**	**(2,3%)**	**33 995**

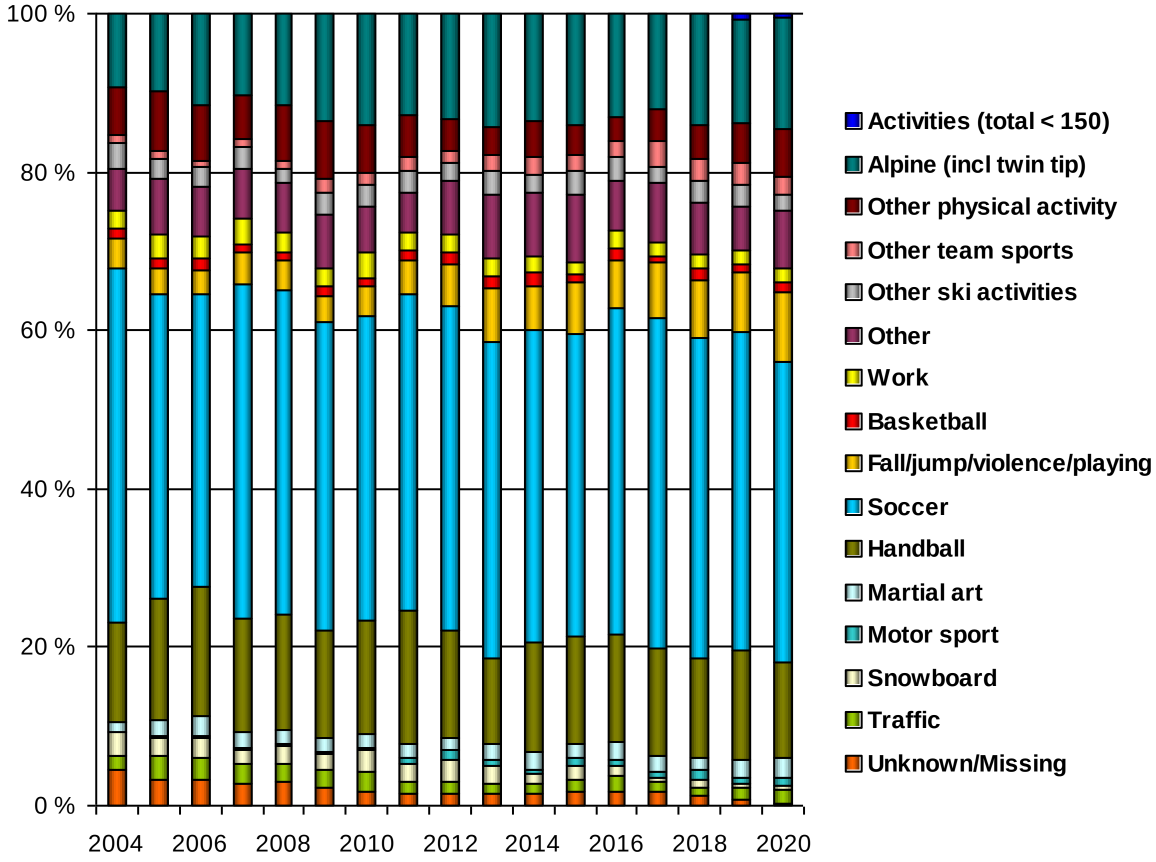
Primary reconstruction of cruciate ligament

Figure 4: Age by primary operation



* Mean number of primary operations for 2004 - 2011

Figure 5: Activity that lead to injury



Actual injury

Table 7: Actual injury*

	ACL	PCL	MCL	LCL	PLC	Cartilage	Meniscus
2020	1 601	40	98	23	9	432	1 066
2019	1 890	59	197	51	27	480	1 245
2018	1 862	59	229	56	23	507	1 186
2017	1 873	33	179	39	17	444	1 120
2016	1 832	47	189	52	20	416	1 059
2004-15	19 410	520	1 456	339	223	4 610	9 856
Total	**28 468**	**758**	**2 348**	**560**	**319**	**6 889**	**15 532**

* 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
9 946	x					x	
9 762	x						
4 097	x					x	x
1 783	x						x
694	x		x				
635	x		x			x	
404	x		x			x	x
201	x		x				x
109	x			x			
102	x	x	x				
59	x			x	x		
54	x	x	x				x
34	x			x			x
34	x	x					
29	x			x		x	
27	x				x		
23	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 where 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
132		x					
102	x	x	x				
54	x	x	x				x
42		x					x
38	x	x	x			x	
34	x	x					
33	x	x	x			x	x
31		x	x				
24	x	x				x	
23	x	x		x	x		
18	x	x				x	x
17		x				x	
14	x	x			x		
13	x	x		x	x	x	
12	x	x		x	x		x
12		x	x				x
12		x				x	x
12	x	x		x	x	x	x
11		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 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
2020	1 189	0	0	1	0
2019	1 318	0	1	0	0
2018	1 310	4	1	1	0
2017	1 131	0	0	0	0
2016	1 126	0	0	0	0
2004-15	6 347	27	1	0	0
Total	**12 421**	**31**	**3**	**2**	**0**

Table 11: HAMSTRING

	ACL	PCL	MCL	LCL	PLC
2020	311	10	28	2	0
2019	421	11	47	8	6
2018	428	6	32	6	2
2017	595	5	11	9	2
2016	592	23	23	15	5
2004-15	12 880	302	168	35	26
Total	**15 227**	**357**	**309**	**75**	**41**

Table 12: ALLOGRAFT

	ACL	PCL	MCL	LCL	PLC
2020	7	22	4	5	6
2019	4	34	0	9	10
2018	8	28	2	7	10
2017	3	15	5	1	5
2016	4	20	7	4	6
2004-15	44	81	18	63	77
Total	**70**	**200**	**36**	**89**	**114**

Table 13: Suture

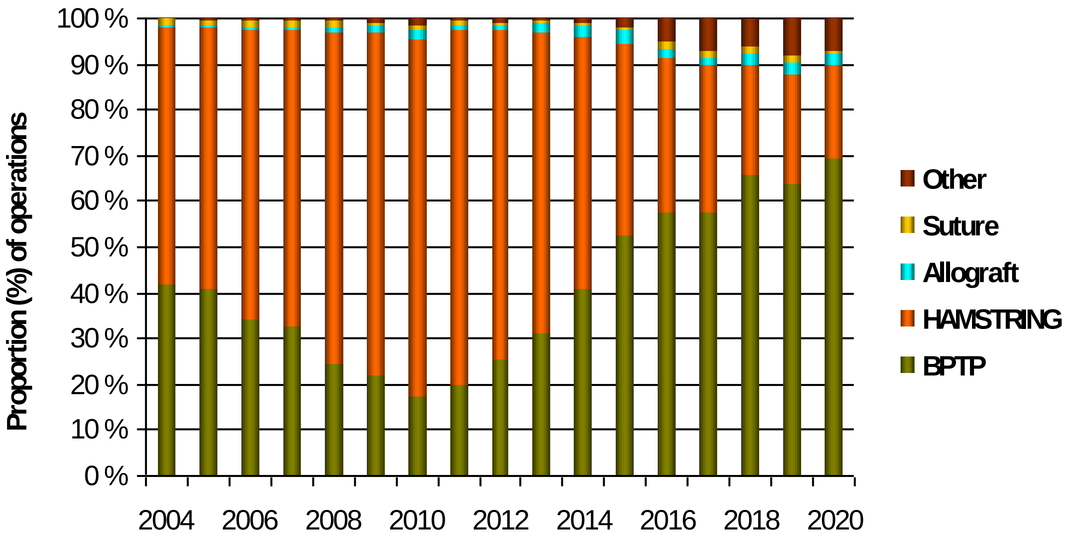
	ACL	PCL	MCL	LCL	PLC
2020	0	0	2	3	0
2019	4	4	7	7	6
2018	4	6	10	4	6
2017	19	4	9	3	1
2016	10	1	6	4	4
2004-15	4	9	92	62	49
Total	**41**	**24**	**126**	**83**	**66**

Table 14: Other

	ACL	PCL	MCL	LCL	PLC
2020	94	6	18	6	0
2019	142	6	19	3	1
2018	111	8	4	1	0
2017	125	1	9	1	1
2016	99	0	4	0	1
2004-15	112	36	8	8	5
Total	**683**	**57**	**62**	**19**	**8**

There are 22 forms where there are registered product for ACL and 23 forms 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	2004-15	2016	2017	2018	2019	2020	Total
Endobutton CL Ultra	6 091	438	403	281	252	206	**7 671**
SoftSilk	2 173	428	420	444	460	333	**4 258**
Endobutton CL BTB	536	309	227	218	343	259	**1 892**
Sheated Cannulated Int	138	126	174	212	172	128	**950**
ACL TightRope	196	49	75	87	92	65	**564**

Table 16: Tibia ACL (The 5 most common for the last 5 years)

Product	2004-15	2016	2017	2018	2019	2020	Total
SoftSilk	2 429	576	511	540	752	646	**5 454**
RCI Screw	3 875	230	231	183	169	136	**4 824**
Biosure HA Interferenc	1 793	178	139	81	83	21	**2 295**
Peek Interference Scre	231	69	99	102	100	110	**711**
Full Thread Interference	13	12	119	130	134	174	**582**

Table 17: Femur PCL (The 5 most common for the last 5 years)

Product	2004-15	2016	2017	2018	2019	2020	Total
Endobutton CL Ultra	187	16	7	7	6	4	**227**
SoftSilk	52	18	4	21	27	12	**134**
RCI Screw	33	15	4	7	6	2	**67**
ACL TightRope	1	1	2	4	6	5	**19**
Ultrabutton						10	**10**

Table 18: Tibia PCL (The 5 most common for the last 5 years)

Product	2004-15	2016	2017	2018	2019	2020	Total
RCI Screw	225	17	2	23	18	14	**299**
AO Skrue	69	8	1	1	3		**82**
Biosure HA Interferenc	21	2	6	3	6	1	**39**
Peek Interference Scre	3			3	3	4	**13**
BioComposite SwiveLo			2	4	5	2	**13**

Table 19: Femur and tibia ACL (The 5 most common for the last 5 years)

Femur	Tibia	2004-15	2016	2017	2018	2019	2020	Total
SoftSilk	SoftSilk	1 921	359	335	369	397	271	**3 652**
Endobutton CL Ultra	RCI Screw	1 910	171	161	131	111	94	**2 578**
Endobutton CL Ultra	Biosure HA Interference screw	1 631	162	132	73	74	20	**2 092**
Endobutton CL BTB	SoftSilk	385	188	134	129	263	241	**1 340**
Sheated Cannulated Interference Screw	Sheated Cannulated Interference Screw	116	96	84	124	66	50	**536**

Meniscal lesion

Table 20: Actual treatment of meniscal lesion

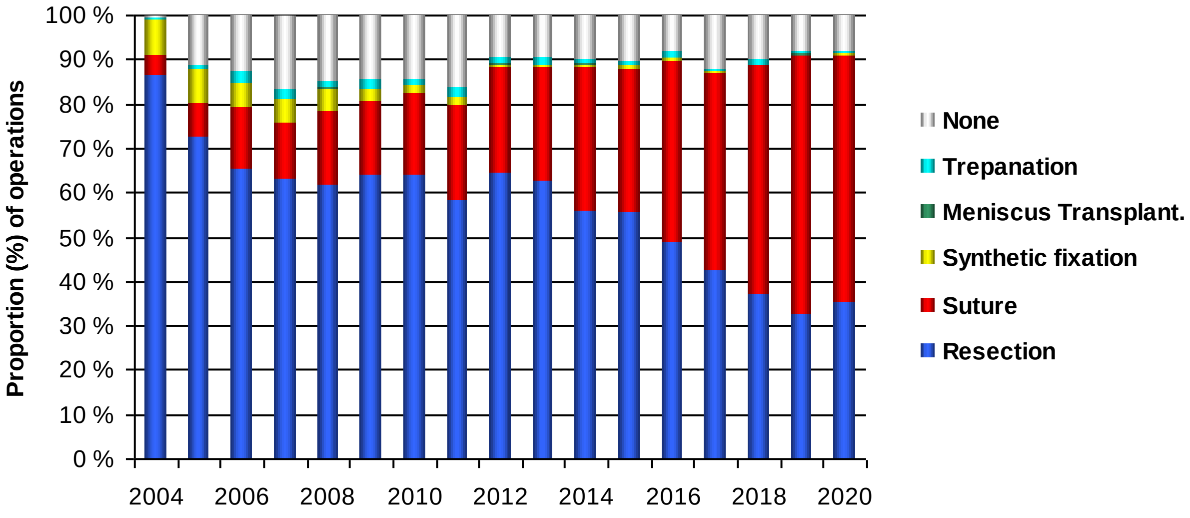
		Resection				Synthetic	Meniscus			
		OLD	Total	Partial	Suture	fixation	Transplant.	Trepanation	None	Total
2020	Lateral			212	277	1		8	53	**551**
2020	Medial		5	230	423	2		1	48	**709**
2019	Lateral		1	237	356		1	3	62	**660**
2019	Medial		11	233	494	2	1	4	58	**803**
2018	Lateral		1	274	306			10	80	**671**
2018	Medial		8	248	427		1	10	62	**756**
2017	Lateral		2	311	255	1		4	81	**654**
2017	Medial		5	288	380	3	1	3	91	**771**
2016	Lateral		2	315	205	8	2	10	59	**601**
2016	Medial		9	319	334	6		8	45	**721**
2004-15	Lateral	2 040	10	1 399	818	75	3	103	750	**5 198**
2004-15	Medial	2 371	28	1 534	1 595	256	4	84	689	**6 561**
Total		**4 411**	**82**	**5 600**	**5 870**	**354**	**13**	**248**	**2 078**	**18 656**

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 the new forms were introduced in autumn 2011. Total and Partial Resection values are the new forms were introduced in autumn 2011.

Figure 7: Treatment of meniscal lesions in primary reconstructions



Meniscal fixation

Table 21: Synthetic

Product	2004-08	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Contour Meniscus arrow	134	8	1											**143**
FAST-FIX			1	6	3		1		4	1			1	**17**
Meniscal Dart	19													**19**
Meniscal Dart Stick	18	5		1										**24**
Meniscus arrow	25	2	1	2		1								**31**
TRUESPAN Meniscal Repair System PEEK 12												1		**1**
Unknown	14	2		11	4	4	7	10	9					**61**
Total	**210**	**17**	**3**	**20**	**7**	**5**	**8**	**10**	**13**	**1**		**1**	**1**	**296**

Table 22: Suture

Product	2004-08	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
2-0 ORTHOCORD w/Double-Armed Meniscal Needles											1	29	10	**40**
2-0 FiberStitch Implant SUTURE													11	**11**
BioComposite SwiveLock C w Fiber Tape										9	7	11	7	**34**
Bio-Tenodesis Screw System													1	**1**
ENDOBUTTON (BOX OF 1) STR											1	14	5	**20**
Endobutton CL Ultra												4	2	**6**
ENDOBUTTON TAPE POLYESTER													1	**1**
FAST-FIX	233	118	126	192	208	203	280	320	405	457	534	604	514	**4 194**
MENISCAL CINCH												7	5	**12**
Meniscal Dart Stick			1								1			**2**
Meniscus arrow			3	4										**7**
PDS II (polydioxanone) sutur										8			1	**9**
Rapidloc	70	2				2								**74**
SCR SOFTSLK													1	**1**
SUTUR VICRYL											1			**1**
SUTURE WASHER STER. BOX OF 1											4	10	7	**21**
SutureButton												12	6	**18**
SutureTape												1		**1**
TIGHTROPE ABS BUTTON ROUND 11MM CONCAVE												2	2	**4**
TRUESPAN Meniscal Repair System PEEK 12												21	27	**48**
Unknown	4	3	3	48	40	43	49	54	65	23	12	1	3	**348**
Total	**307**	**123**	**133**	**244**	**248**	**248**	**329**	**374**	**470**	**497**	**561**	**716**	**603**	**4 853**

Cartilage lesion all localizations

Table 23: 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
2020	40,3%	41,3%	15,3%	2,4%	0,8%
2019	43,0%	38,5%	15,1%	2,2%	1,2%
2018	44,3%	37,9%	13,5%	2,7%	1,5%
2017	44,0%	36,2%	15,7%	2,5%	1,6%
2016	37,5%	44,4%	14,3%	3,1%	0,7%
2004-15	35,2%	42,5%	16,5%	4,6%	1,3%

Table 24: Treatment codes for all localizations

	Debridement	Micro fracture	No treatment	Other	Missing
2020	5,9%	0,9%	87,3%	1,0%	4,9%
2019	5,3%	0,7%	87,8%	0,5%	5,8%
2018	6,3%	1,3%	84,6%	0,5%	7,3%
2017	6,9%	1,1%	81,6%	0,3%	10,0%
2016	9,3%	2,0%	76,9%		11,9%
2004-15	12,1%	3,3%	64,2%	1,0%	19,4%

Cartilage injuries registered in primary reconstructions

Figure 8: All Cartilage injuries (total)

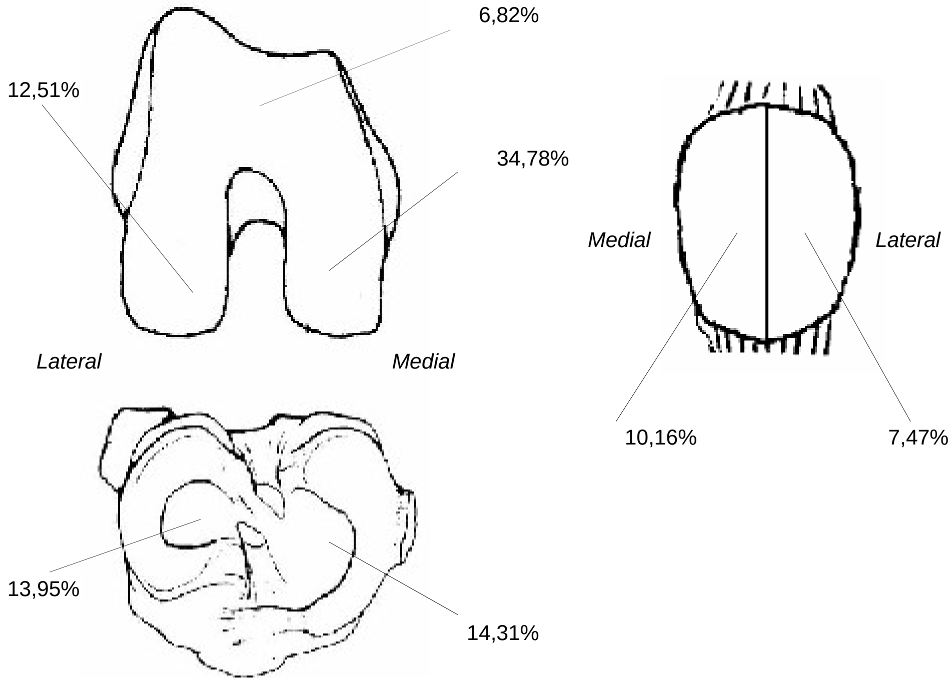
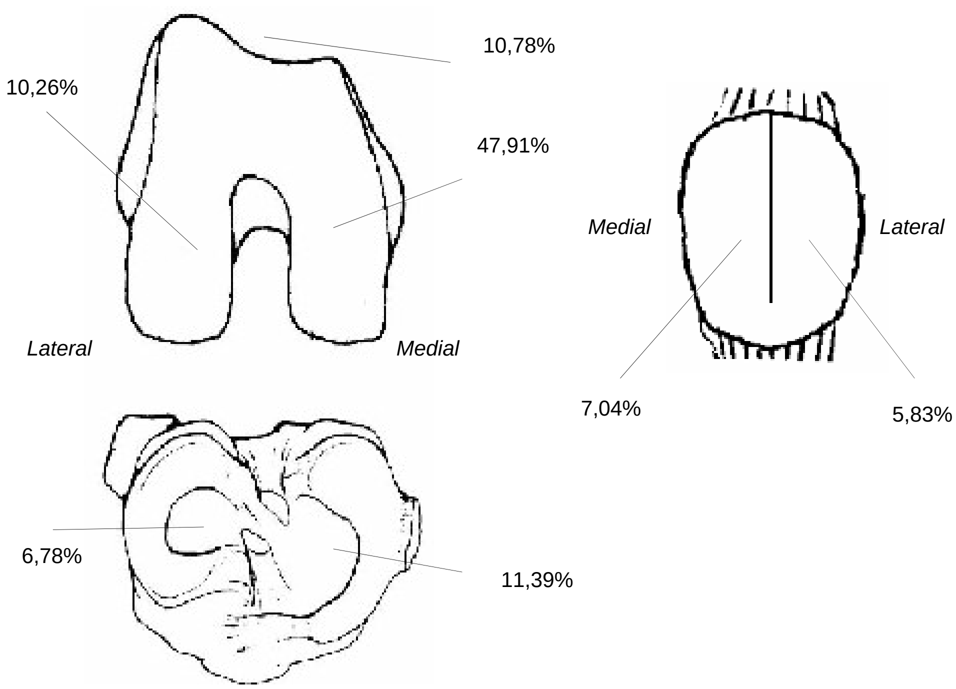


Figure 9: All Cartilage injuries with area greater than 2 cm² and ICRS equal 3 or 4 (total)



Outpatient surgery

Table 25: Outpatient surgery

	Yes		No		Missing		Total
2020	1 357	(83,7%)	255	(15,7%)	10	(0,6%)	**1 622**
2019	1 405	(73,3%)	506	(26,4%)	7	(0,4%)	**1 918**
2018	1 390	(73,7%)	491	(26,0%)	6	(0,3%)	**1 887**
2017	1 429	(75,6%)	456	(24,1%)	4	(0,2%)	**1 889**
2016	1 327	(71,4%)	521	(28,0%)	10	(0,5%)	**1 858**
2004-15	10 558	(53,8%)	8 955	(45,6%)	104	(0,5%)	**19 617**
Total	**17 466**	**(60,7%)**	**11 184**	**(38,8%)**	**141**	**(0,5%)**	**28 791**

Intraoperative complications

Table 26: Intraoperative complications

	Yes		No		Missing		Total
2020	34	(2,1%)	1 566	(96,5%)	22	(1,4%)	**1 622**
2019	35	(1,8%)	1 853	(96,6%)	29	(1,5%)	**1 918**
2018	43	(2,3%)	1 803	(95,5%)	41	(2,2%)	**1 887**
2017	50	(2,6%)	1 802	(95,4%)	36	(1,9%)	**1 889**
2016	43	(2,3%)	1 763	(94,9%)	52	(2,8%)	**1 858**
2004-15	625	(3,2%)	18 569	(94,7%)	423	(2,2%)	**19 617**
Total	**830**	**(2,9%)**	**27 356**	**(95,0%)**	**603**	**(2,1%)**	**28 791**

Systemic antibiotic prophylaxis

Table 27: Systemic antibiotic prophylaxis

	Yes		No		Missing		Total
2020	1 613	(99,4%)	8	(0,5%)	1	(0,1%)	**1 622**
2019	1 913	(99,7%)	4	(0,2%)	1	(0,1%)	**1 918**
2018	1 876	(99,4%)	7	(0,4%)	4	(0,2%)	**1 887**
2017	1 884	(99,7%)	2	(0,1%)	3	(0,2%)	**1 889**
2016	1 856	(99,9%)	0	(0,0%)	2	(0,1%)	**1 858**
2004-15	19 465	(99,2%)	102	(0,5%)	50	(0,3%)	**19 617**
Total	**28 607**	**(99,4%)**	**123**	**(0,4%)**	**61**	**(0,2%)**	**28 791**

Table 28: Drug

	2004-15	2016	2017	2018	2019	2020
Benzylpenicillin (Penicillin G)	0,02%		0,05%			
Cefaleksin (Keflex, Cefalexin)	0,02%					
Cefalotin (Keflin)	91,15%	97,04%	92,68%	68,18%	19,03%	11,90%
Cefazolin (Cephazolin)			4,03%	28,94%	70,26%	82,64%
Cefotaksim (Claforan)	0,02%					
Cefuroksim (Zinacef, Cefuroxim, Lifurox)	1,42%	0,05%			0,47%	
Ciprofloksasin (Ciproxin)	0,01%					
Dikloksacillin (Diclocil, Dicillin)	2,85%	0,16%	0,16%		0,05%	0,12%
Doksysyklin (Vibramycin, Dumoxin, Doxylin)	0,01%					
Erytromycin (Ery-max, Abboticin)	0,02%					
Gentamicin (Garamycin, Gensumycin)	0,01%	0,16%	0,16%			
Klindamycin (Dalacin, Clindamycin)	2,38%	1,99%	2,49%	2,24%	2,04%	2,79%
Kloksacillin (Ekvacillin)	1,81%	0,32%	0,21%		7,68%	2,36%
Linkomycin (Lincocin)	0,01%				0,05%	
Oxacillin (Unspecified)	0,03%					
Piperacillin\Tazobactam (Tazocin)				0,05%		
Tobramycin (Nebcina, Nebcin, Tobi)	0,01%					
Missing	0,25%	0,27%	0,21%	0,59%	0,42%	0,19%

Thrombosis prophylaxis

Table 29: Thrombosis prophylaxis

	Yes		No		Missing		Total
2020	906	(55,9%)	714	(44,0%)	2	(0,1%)	**1 622**
2019	1 273	(66,4%)	640	(33,4%)	5	(0,3%)	**1 918**
2018	1 438	(76,2%)	447	(23,7%)	2	(0,1%)	**1 887**
2017	1 480	(78,3%)	406	(21,5%)	3	(0,2%)	**1 889**
2016	1 522	(81,9%)	328	(17,7%)	8	(0,4%)	**1 858**
2005-15	15 350	(81,6%)	3 247	(17,3%)	251	(1,3%)	**18 848**
Total	**21 969**	**(78,4%)**	**5 782**	**(20,6%)**	**271**	**(1,0%)**	**28 022**

There are 33 old forms that are filled out so that thrombosis prophylaxis can not be registered. These are added to missing.

Table 30: Use of drugs

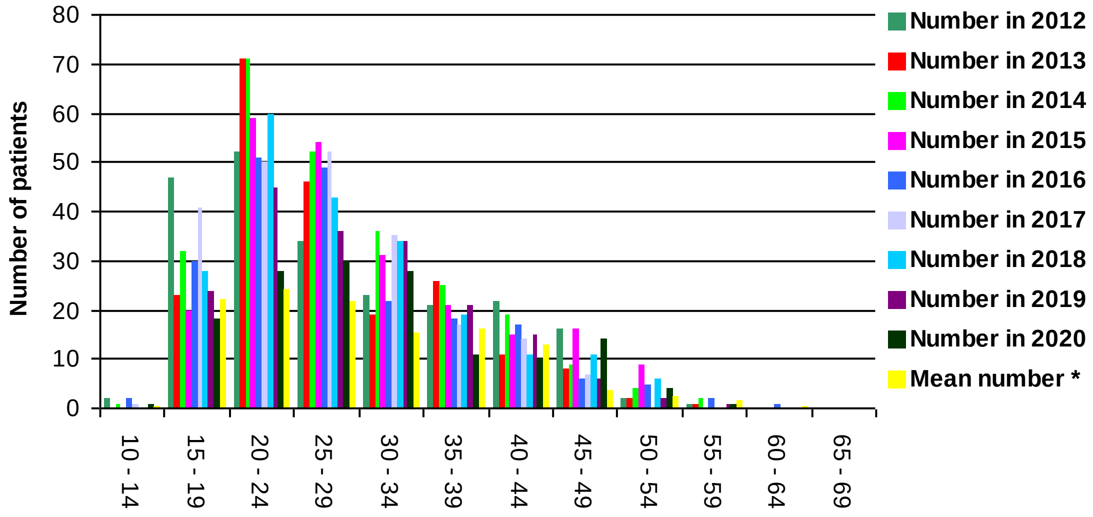
	One drug		Two drugs		Total
2020	713	(78,7%)	193	(21,3%)	**906**
2019	1 194	(93,8%)	79	(6,2%)	**1 273**
2018	1 412	(98,2%)	26	(1,8%)	**1 438**
2017	1 471	(99,4%)	9	(0,6%)	**1 480**
2016	1 504	(98,8%)	18	(1,2%)	**1 522**
2005-15	15 250	(99,3%)	100	(0,7%)	**15 350**
Total	**21 544**	**(98,1%)**	**425**	**(1,9%)**	**21 969**

Table 31: Drug

	2004-15	2016	2017	2018	2019	2020
Acetylsalicylsyre (Albyl-E, Globoid, Acetyratio, Magnyl E)	0,01%	0,07%			0,24%	0,44%
Apixiban (Eliquis)				0,14%	0,24%	0,22%
Dabigatranetixalat (Re-Novate, Pradaxa)	0,01%			0,07%		
Dalteparin (Fragmin)	60,79%	60,78%	59,39%	57,86%	54,28%	49,67%
Dekstran (Macrodex, Dextran)	0,10%	0,07%	0,07%			
Enoksaparin (Klexane)	35,53%	37,25%	39,26%	39,57%	38,18%	27,92%
Heparin (Heparin)	0,01%					
Rivaroksaban (Xarelto)	0,05%	0,07%	0,07%	0,07%	0,16%	0,11%
Ticagrelor (Brilique)				0,07%		
Warfarin (Marevan)	0,02%	0,20%	0,07%			0,11%
Ximelagatran (Exanta, Malagatran)	0,20%					
Unknown	0,01%					
No drugs	2,38%					
Missing	0,25%	0,39%	0,54%	0,42%	0,71%	0,22%
Two drugs	0,65%	1,18%	0,61%	1,81%	6,21%	21,30%

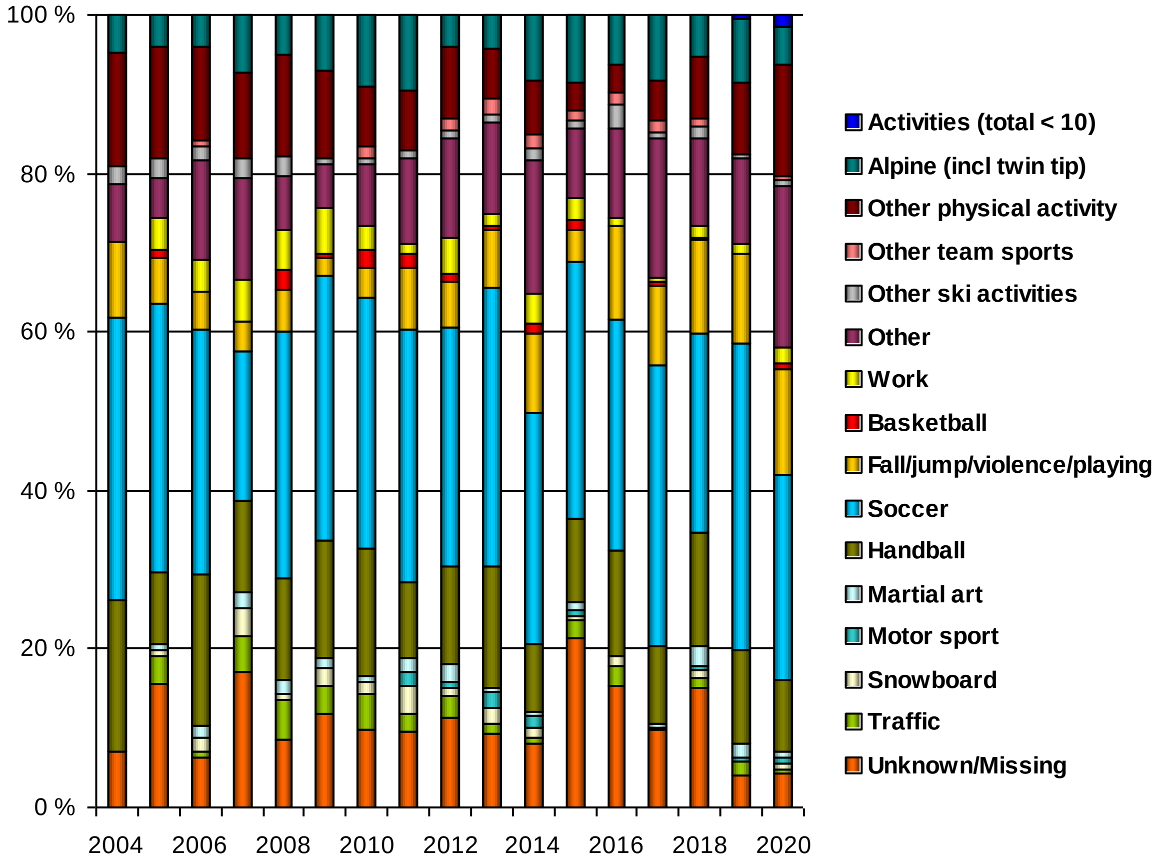
Revision reconstruction

Figure 10: Age by revision reconstruction



* Mean number of revision reconstructions for 2004 - 2011

Figure 11: Activity that lead to injury



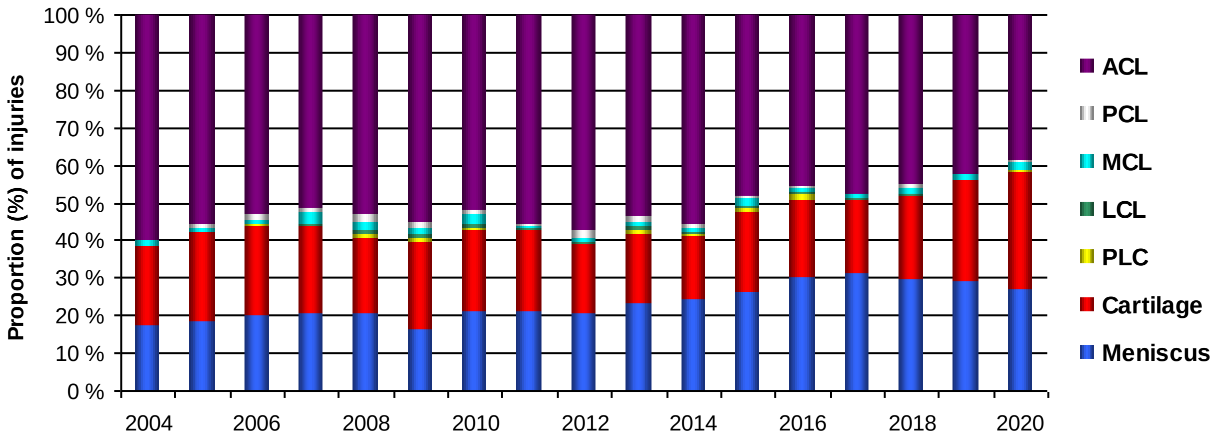
Actual injury

Table 32: Actual injury*

	ACL	PCL	MCL	LCL	PLC	Cartilage	Meniscus
2020	139	2	7	1	1	63	97
2019	177	1	5			84	122
2018	203	3	8	1	1	91	134
2017	207	1	5	1	1	80	136
2016	155	2	3	3	4	71	103
2004-15	1 664	40	48	18	18	644	667
Total	**2 545**	**49**	**76**	**24**	**25**	**1 033**	**1 259**

* More than one type of injury can be given for each form

Figure 12: Actual injury



Additional injuries

Table 33: ACL with additional injuries

Number	ACL	PCL	MCL	LCL	PLC	Meniscus	Cartilage
961	x						
589	x					x	
528	x					x	x
360	x						x
19	x		x				
8	x		x				x
7	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 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 34: PCL with additional injuries

Number	ACL	PCL	MCL	LCL	PLC	Meniscus	Cartilage
13		x					
7		x					x
5	x	x					x
4	x	x	x				x
3	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 35: Reason for revision reconstruction

	Cause 1	Cause 2	Cause 3	Cause 4	Cause 5	Cause 6	Other	Total
2020	1	6	1	50	75	2		133
2019	2	5	2	72	90	10		171
2018	3	9	3	92	94	5		201
2017	3	7	1	106	97	8		214
2016	4	9	5	110	78	4	1	207
2004-15	27	69	15	681	621	21	34	1 447
Total	**40**	**105**	**27**	**1 111**	**1 055**	**50**	**35**	**2 423**

Cause 1: Infection
Cause 2: Fixation failure
Cause 3: Untreated ligamentinjury
Cause:4: Graft failure
Cause 5: New trauma
Cause 6: Pain

Choice of graft for injuries registered in revision reconstructions

Table 36: BPTB

	ACL	PCL	MCL	LCL	PLC
2020	67	0	0	0	0
2019	79	0	0	0	0
2018	94	0	0	0	0
2017	108	0	0	0	0
2016	87	0	0	0	0
2004-15	756	2	0	0	0
Total	**1 191**	**2**	**0**	**0**	**0**

Table 37: HAMSTRING

	ACL	PCL	MCL	LCL	PLC
2020	40	1	3	0	0
2019	47	0	1	0	0
2018	41	0	2	0	0
2017	39	1	1	0	1
2016	38	1	0	1	1
2004-15	700	7	16	3	1
Total	**905**	**10**	**23**	**4**	**0**

Table 38: ALLOGRAFT

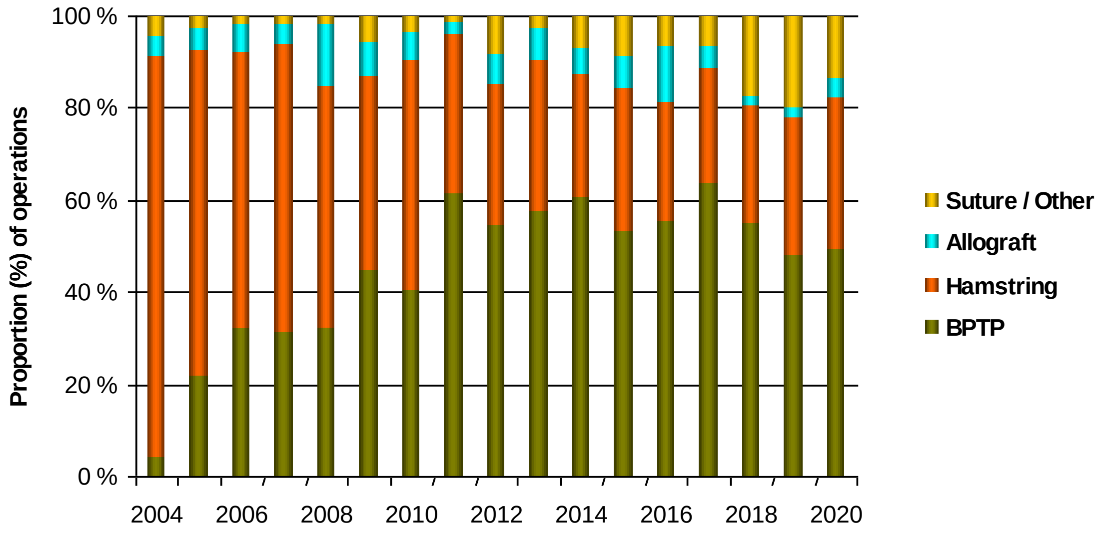
	ACL	PCL	MCL	LCL	PLC
2020	5	1	0	0	0
2019	3	1	0	0	0
2018	4	0	0	0	0
2017	6	0	2	0	0
2016	12	1	1	2	3
2004-15	53	24	9	8	11
Total	**83**	**27**	**12**	**10**	**14**

Table 39: Suture / Other

	ACL	PCL	MCL	LCL	PLC
2020	16	0	1	1	0
2019	30	0	2	0	0
2018	27	1	1	0	0
2017	11	0	0	0	0
2016	10	0	0	0	0
2004-15	65	4	3	1	1
Total	**159**	**5**	**7**	**2**	**1**

There were 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 40: Femur ACL (The 5 most common for the last 5 years)

Product	2004-15	2016	2017	2018	2019	2020	Total
SoftSilk	378	48	50	43	47	33	**599**
Endobutton CL Ultra	335	36	37	38	34	32	**512**
Endobutton CL BTB	67	15	10	14	13	13	**132**
Sheated Cannulated Int	37	16	22	20	8	1	**104**
Peek Interference Scre	20	1	9	6	9	7	**52**

Table 41: Femur PCL (The 5 most common for the last 5 years)

Product	2004-15	2016	2017	2018	2019	2020	Total
Endobutton CL Ultra	13					1	**14**
RCI Screw	11	1					**12**
SoftSilk	5	2	1		1		**9**
EndoButton CL	2						**2**
Propel Cannulated	2						**2**

Table 42: Tibia ACL (The 5 most common for the last 5 years)

Product	2004-15	2016	2017	2018	2019	2020	Total
SoftSilk	341	48	51	44	60	49	**593**
RCI Screw	308	15	16	21	18	21	**399**
Biosure HA Interferenc	168	24	17	25	11	9	**254**
Biosure PK	23	9	4	6	11	9	**62**
Peek Interference Scre	22	2	8	7	13	9	**61**

Table 43: Tibia PCL (The 5 most common for the last 5 years)

Product	2004-15	2016	2017	2018	2019	2020	Total
RCI Screw	22	2	1		1		**26**
AO Skrue	5	2					**7**
Biosure HA Interferenc	2					1	**3**
Propel Cannulated	3						**3**
Tightrope ABS	2						**2**
Endobutton CL Ultra						1	**1**

Table 44: Femur and tibia ACL (The 5 most common for the last 5 years)

Femur	Tibia	2004-15	2016	2017	2018	2019	2020	Total
SoftSilk	SoftSilk	309	43	43	30	43	25	**493**
Endobutton CL Ultra	Biosure HA Interference screw	116	21	14	21	8	8	**188**
Endobutton CL Ultra	RCI Screw	112	7	9	14	14	16	**172**
Peek Interference Screw	Peek Interference Screw	19	1	7	6	8	7	**48**
Endobutton CL BTB	SoftSilk	14	1	3	7	7	13	**45**

Meniscal lesion

Table 45: Actual treatment of meniscal lesion

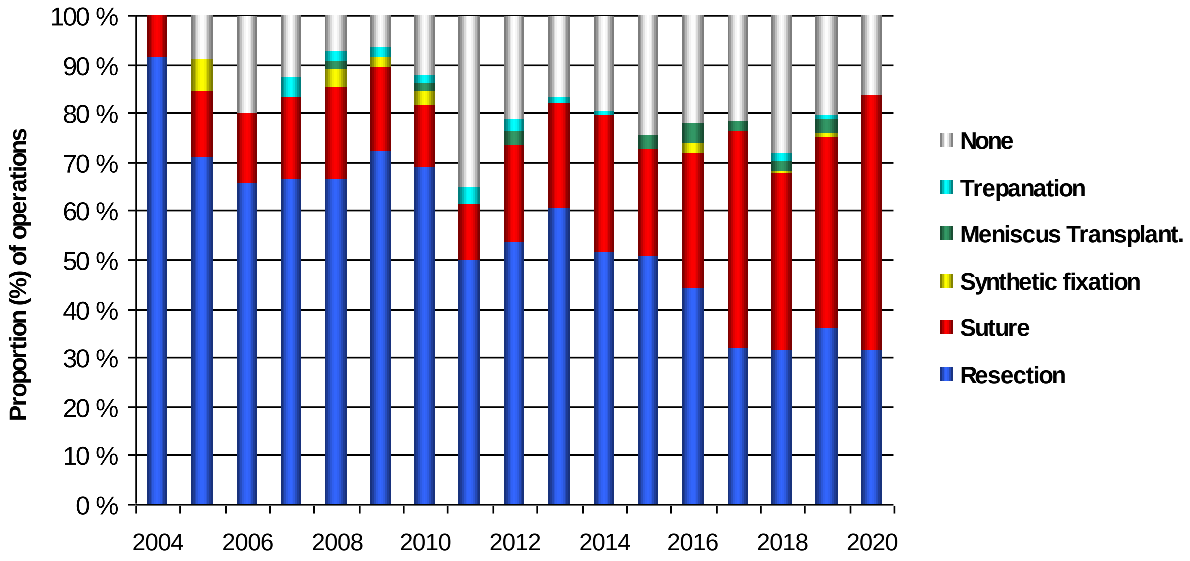
		Resection				Synthetic	Meniscus			
		OLD	Total	Partial	Suture	fixation	Transplant.	Trepanation	None	Total
2020	Lateral			12	24				7	**43**
2020	Medial		1	22	33				11	**67**
2019	Lateral			17	26		1	1	11	**56**
2019	Medial		1	32	28	1	3		17	**82**
2018	Lateral			22	32			2	14	**70**
2018	Medial		1	30	29	1	3	1	33	**98**
2017	Lateral		1	22	30				14	**67**
2017	Medial			29	42		3		21	**95**
2016	Lateral			20	22	1	1		11	**55**
2016	Medial		2	36	14	2	4		18	**76**
2004-15	Lateral	85	1	93	45	4	2	7	67	**304**
2004-15	Medial	149	4	146	104	4	5	5	78	**495**
Total		**234**	**11**	**481**	**429**	**13**	**22**	**16**	**302**	**1 508**

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 32: 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 the new forms were introduced in autumn 2011. Total and Partial Resection values are the new forms were introduced in autumn 2011.

Figure 14: Treatment of meniscal lesions in revision reconstructions



Meniscal fixation

Table 46: Synthetic

Product	2004-08	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Contour Meniscus arrow	3													**3**
FAST-FIX											1	1		**2**
Meniscus arrow	1													**1**
Unknown		1							3					**4**
Total	**4**	**1**							**3**		**1**	**1**		**10**

Table 47: Suture

Product	2004-08	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
2-0 ORTHOCORD w/Double-Armed Meniscal Needles												1		**1**
BioComposite SwiveLock C w Fiber Tape										2		2	1	**5**
ENDOBUTTON (BOX OF 1) STR												3	2	**5**
FAST-FIX	19	5	4	5	14	16	19	16	15	42	33	36	37	**261**
Meniscus arrow			1											**1**
PDS II (polydioxanone) sutur										1	1			**2**
Rapidloc	4													**4**
SUTURE WASHER STER. BOX OF 1											1	1	1	**3**
SutureButton												2		**2**
TRUESPAN Meniscal Repair System PEEK 12												1		**1**
Unknown		1		4	1	5	6	9	13	1	2	2		**44**
Total	**23**	**6**	**5**	**9**	**15**	**21**	**25**	**25**	**28**	**46**	**37**	**48**	**41**	**329**

Cartilage lesion all localizations

Table 48: ICRS Grade

<u>Definitjon av ICRS Grade:</u>

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
2020	40,7%	43,3%	12,9%	3,1%	
2019	31,5%	44,5%	16,1%	5,9%	2,0%
2018	41,9%	39,3%	11,8%	2,9%	4,0%
2017	43,9%	35,2%	13,3%	4,1%	3,6%
2016	33,3%	40,4%	18,2%	7,6%	0,5%
2004-15	21,1%	50,7%	22,5%	4,5%	1,3%

Table 49: Treatment codes for all localizations

	Debridement	Micro fracture	No treatment	Other	Missing
2020	3,0%		96,6%		0,5%
2019	5,5%		87,8%	0,8%	5,9%
2018	5,2%	1,9%	82,5%	0,7%	9,7%
2017	7,7%	1,0%	75,5%	1,5%	14,3%
2016	8,6%	2,0%	85,9%		3,5%
2004-15	9,0%	2,3%	70,8%	1,3%	16,8%

Cartilage injuries registered in revision reconstructions

Figure 15: All Cartilage injuries (total)

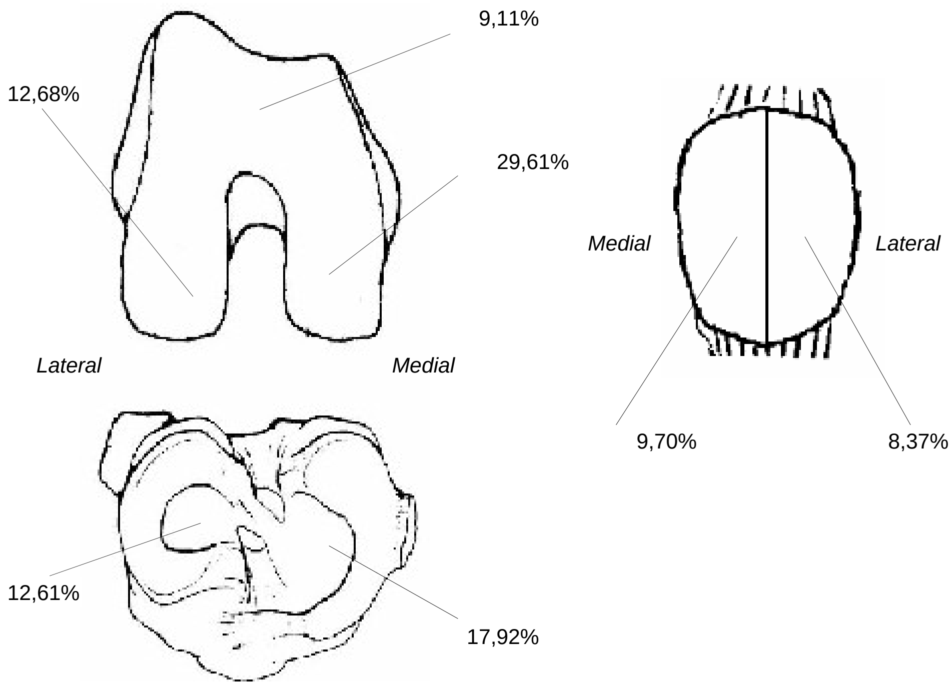


Figure 16: All Cartilage injuries with area greater than 2 cm² (total)

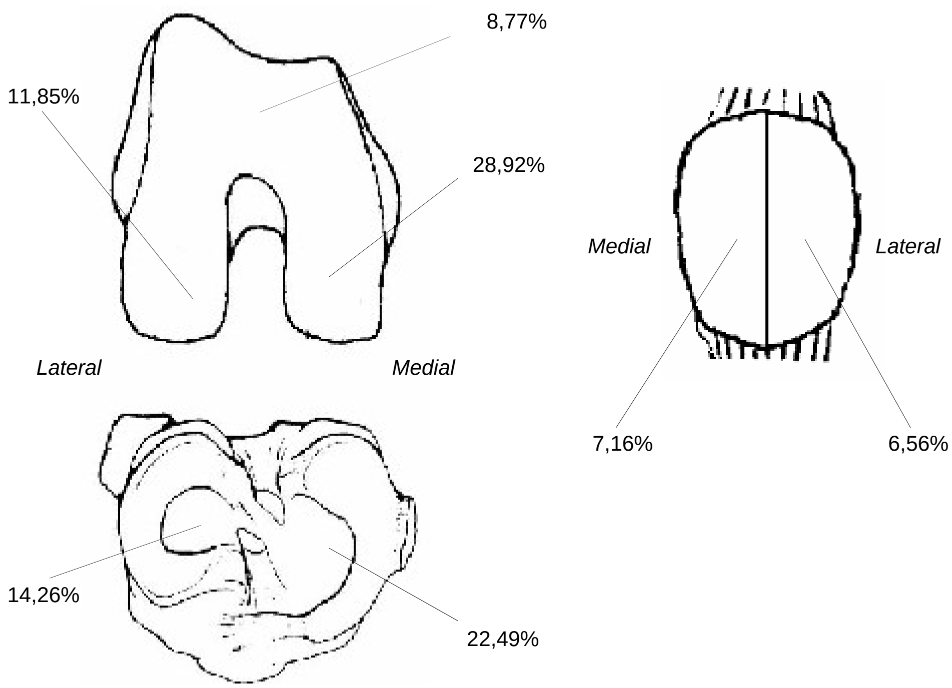
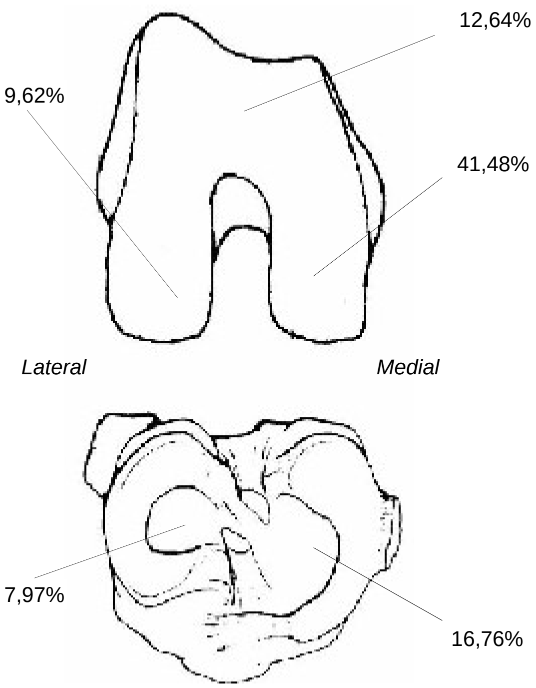
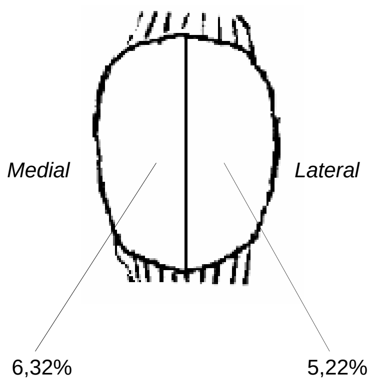


Figure 17: All Cartilage injuries with area greater than 2 cm² and ICRS equal 3 or 4 (total)





Outpatient surgery

Table 50: Outpatient surgery

	Yes		No		Missing		Total
2020	91	(62,8%)	54	(37,2%)			**145**
2019	94	(51,1%)	88	(47,8%)	2	(1,1%)	**184**
2018	116	(54,7%)	94	(44,3%)	2	(0,9%)	**212**
2017	95	(43,8%)	119	(54,8%)	3	(1,4%)	**217**
2016	93	(45,8%)	109	(53,7%)	1	(0,5%)	**203**
2004-15	814	(43,4%)	1 043	(55,6%)	18	(1,0%)	**1 875**
Total	**1 303**	**(45,9%)**	**1 507**	**(53,1%)**	**26**	**(0,9%)**	**2 836**

Intraoperative complications

Table 51 : Intraoperative complications

	Yes		No		Missing		Total
2020	3	(2,1%)	142	(97,9%)			**145**
2019	7	(3,8%)	175	(95,1%)	2	(1,1%)	**184**
2018	3	(1,4%)	200	(94,3%)	9	(4,2%)	**212**
2017	13	(6,0%)	197	(90,8%)	7	(3,2%)	**217**
2016	7	(3,4%)	192	(94,6%)	4	(2,0%)	**203**
2004-15	63	(3,4%)	1 749	(93,3%)	63	(3,4%)	**1 875**
Total	**96**	**(3,4%)**	**2 655**	**(93,6%)**	**85**	**(3,0%)**	**2 836**

Systemic antibiotic prophylaxis

Table 52: Systemic antibiotic prophylaxis

	Yes		No		Missing		Total
2020	145	(100,0%)					**145**
2019	181	(98,4%)	2	(1,1%)	1	(0,5%)	**184**
2018	209	(98,6%)	3	(1,4%)			**212**
2017	213	(98,2%)	3	(1,4%)	1	(0,5%)	**217**
2016	194	(95,6%)	6	(3,0%)	3	(1,5%)	**203**
2004-15	1 848	(98,6%)	21	(1,1%)	6	(0,3%)	**1 875**
Total	**2 790**	**(98,4%)**	**35**	**(1,2%)**	**11**	**(0,4%)**	**2 836**

Table 53: Drug

	2004-15	2016	2017	2018	2019	2020
Benzylpenicillin (Penicillin G)	0,05%					
Cefalotin (Keflin)	92,05%	98,45%	92,96%	67,46%	14,36%	6,90%
Cefazolin (Cephazolin)			3,76%	30,14%	76,80%	88,28%
Ceftriakson (Rocefalin)	0,05%					
Cefuroksim (Zinacef, Cefuroxim, Lifurox)	0,49%					
Ciprofloksasin (Ciproxin)	0,05%					
Dikloksacillin (Diclocil, Dicillin)	1,57%					
Gentamicin (Garamycin, Gensumycin)	0,05%					
Imipenem (Tienam)				0,48%		
Klindamycin (Dalacin, Clindamycin)	2,81%	1,55%	2,35%	1,91%	3,31%	3,45%
Kloksacillin (Ekvacillin)	2,16%		0,47%		5,52%	0,69%
Oxacillin (Unspecified)	0,05%					
Vankomycin (Vancomycin, Vancocin)	0,05%					
Missing	0,60%		0,47%			0,69%

Thrombosis prophylaxis

Table 54: Thrombosis prophylaxis

	Yes		No		Missing		Total
2020	87	(60,0%)	58	(40,0%)			**145**
2019	116	(63,0%)	67	(36,4%)	1	(0,5%)	**184**
2018	150	(70,8%)	61	(28,8%)	1	(0,5%)	**212**
2017	164	(75,6%)	51	(23,5%)	2	(0,9%)	**217**
2016	141	(69,5%)	58	(28,6%)	4	(2,0%)	**203**
2005-15	1 475	(80,7%)	335	(18,3%)	20	(1,1%)	**1 830**
Total	**2 133**	**(76,4%)**	**630**	**(22,6%)**	**28**	**(1,0%)**	**2 791**

There are 2 old forms that are filled out so that thrombosis prophylaxis can not be registered. These are added to missing.
There are 31 forms with two drugs and 2102 forms with one drug.

Table 55: Drug

	2004-15	2016	2017	2018	2019	2020
Apixiban (Eliquis)	0,07%					
Dalteparin (Fragmin)	64,27%	60,28%	68,90%	62,67%	63,79%	42,53%
Dekstran (Macrodex, Dextran)	0,14%					
Enoksaparin (Klexane)	33,63%	38,30%	29,27%	36,00%	33,62%	33,33%
Rivaroksaban (Xarelto)	0,07%					
Ticagrelor (Brilique)						1,15%
Warfarin (Marevan)	0,07%					
Ximelagatran (Exanta, Malagatran)	0,20%					
No drugs	0,95%					
Missing	0,20%	0,71%	1,22%	0,67%	0,86%	
Two drugs	0,14%	0,71%	0,61%	0,67%	1,72%	22,99%

PROM (Patient Reported Outcome Measures)

Table 56: Number of issued and answered patient questionnaires

	2 years *			5 years *			10 years *			Total		
	Issued	Answered (%)		Issued	Answered (%)		Issued	Answered (%)		Issued	Answered (%)	
2020	1 883	1 082	(57,5%)	1 745	909	(52,1%)	1 708	889	(52,0%)	**5 336**	**2 880**	(54,0%)
2019	1 860	983	(52,8%)	1 697	886	(52,2%)	1 797	1 021	(56,8%)	**5 354**	**2 890**	(54,0%)
2018	1 863	1 021	(54,8%)	1 722	913	(53,0%)	1 646	831	(50,5%)	**5 231**	**2 765**	(52,9%)
2017	1 764	1 002	(56,8%)	1 745	943	(54,0%)	1 602	888	(55,4%)	**5 111**	**2 833**	(55,4%)
2016	1 719	1 034	(60,2%)	1 818	1 009	(55,5%)	1 426	811	(56,9%)	**4 963**	**2 854**	(57,5%)
2015	1 749	1 058	(60,5%)	1 717	964	(56,1%)	1 515	935	(61,7%)	**4 981**	**2 957**	(59,4%)
2014	1 749	1 035	(59,2%)	1 823	1 053	(57,8%)	899	554	(61,6%)	**4 471**	**2 642**	(59,1%)
2013	1 851	1 163	(62,8%)	1 688	989	(58,6%)				**3 539**	**2 152**	(60,8%)
2012	1 917	1 215	(63,4%)	1 800	959	(53,3%)				**3 717**	**2 174**	(58,5%)
2011	1 669	1 095	(65,6%)	1 303	717	(55,0%)				**2 972**	**1 812**	(61,0%)
2010	1 864	1 232	(66,1%)	1 694	1 126	(66,5%)				**3 558**	**2 358**	(66,3%)
2009	1 632	1 130	(69,2%)	762	527	(69,2%)				**2 394**	**1 657**	(69,2%)
2008	1 452	914	(62,9%)							**1 452**	**914**	(62,9%)
2007	1 351	723	(53,5%)							**1 351**	**723**	(53,5%)
2006	896	549	(61,3%)							**896**	**549**	(61,3%)
Total	25 219	15 236	(60,4%)	19 514	10 995	(56,3%)	10 593	5 929	(56,0%)	**55 326**	**32 160**	(58,1%)

* The register sends questionnaires to patients 2, 5 and 10 years post-operatively

Completeness analysis for the Cruciate Ligament Register, 2017-2018

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

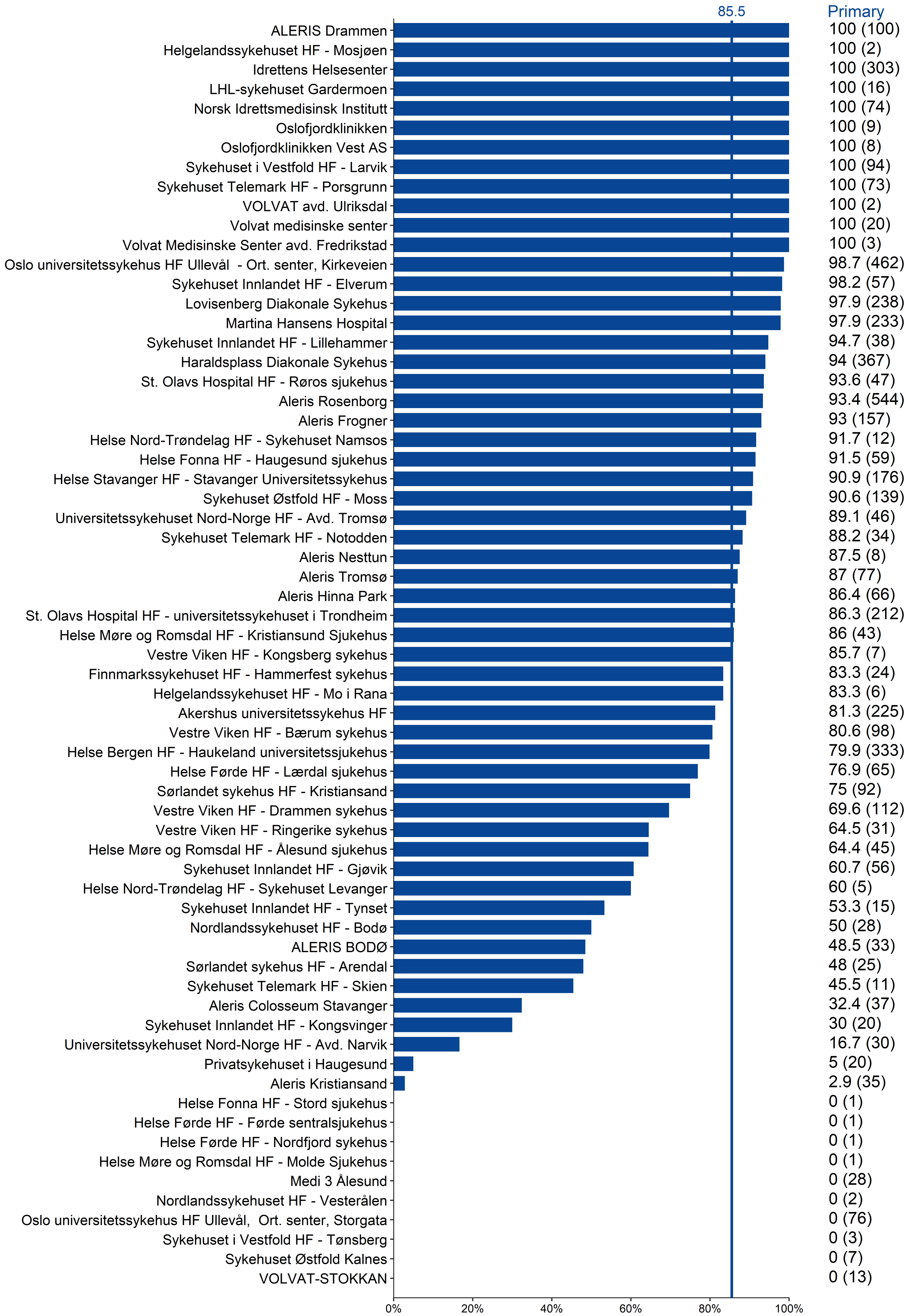
Formulae for completeness rates:

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

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

In 2017-2018, 5205 cruciate ligament operations were reported to one or both of the registers. 85.5% of these were reported to the Cruciate Ligament Register, while 75.5% 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 primary cruciate ligament operations 2017-2018



Vertical line shows the national averages. The numbers in brackets gives the number of operations registered at both NAR and NPR.

CONTENTS

Norwegian Paediatric Hip Register

Introduction 323

Covid-19, number of operations by month, 2019 & 2020 325
Number of treated patients........ 326
Number of operations divided by diagnosis 326
Hip dysplasia 327
Epifysiolysis Capitis Femoris 331
Perthes disease 333
Adult hips........ 335

Completeness analysis 2017-18 336

NORWEGIAN PAEDIATRIC HIP REGISTER: ANNUAL REPORT 2020

The year 2020 saw a great deal of activity in our register. All hospitals are now reporting via the electronic solution in the MRS, which suggests that they have put in place solutions for reporting. We have also specifically asked our contact persons at each hospital to register those patients who are missing at the end of the year. We hope that this will enable us to include most of the children to be registered.

At this year's autumn meeting, we had an excellent symposium with very good attendance. This included a review of national recommendations for diagnosis, treatment and follow-up of children with hip dysplasia, Calvé-Legg Perthes' disease (CLP) and epiphysiolysis of the hip. Members of our Advisory Committee had made great efforts in advance to arrive at good recommendations and we had some useful discussions during the symposium. We aim eventually to publish the recommendations in a national guideline for paediatric orthopaedic treatment and we are very pleased that the register can now be used to draw up such recommendations.

It has long been our aim to collect Patient Reported Outcome Measurement (PROM) data on patients. It has taken time to have the PROMIS-25-Ped version translated and validated, but this has now been completed. We were therefore able to send out our first batch of questionnaires on PROM data in November. Due to some problems with electronic delivery, this first batch was in paper form, but we received many responses. In the future, PROM data will be sent out directly from MRS, and if you have submitted the form in recent months you will have noticed a new field in the form where you must enter the parent or guardian who is to receive the electronic questionnaire. During May 2021, the questionnaires will be automatically sent to the registered parent or guardian. We are one of the first national registers to use this solution, and some changes may therefore occur later. We are pleased that this is finally in place, and we believe it will provide much new information about these patients.

Towards the end of 2020, the Paediatric Hip Register was notified that it would lose its status as a national quality register. However, we were able to defend our position in the Interregional Working Group. The group concluded that we would be allowed to retain our status as a quality register, but on the condition that we worked more actively on quality improvement. In 2021, we will therefore work with every hospital to reduce the time from symptom to diagnosis and treatment for CLP and epiphysiolysis. Our goal is less than six weeks, and to achieve this, we will work more closely with our contact persons in each hospital, examining factors that increase the time. We will also work with primary health care to encourage them to refer relevant patients to us as soon as possible. We hope everyone will take a positive view of this work.

Adult hip surgery also had its first full year of registration. The figures show increasing reporting of both arthroscopic and open hip surgery in young adults. Open surgery in this patient group is limited to a few centres, and the greatest challenge is therefore to include all arthroscopic procedures. Some of these surgeries are performed at private clinics, and we also aim to include these. The MRS solution for collecting PROM data for this patient group has been completed and will be sent out electronically via the MRS as soon as it is available.

Bergen, 20 May 2021

Trude Gundersen

Trude Gundersen
Chief Physician/Associate Professor
Head of Paediatric Hip Register

COVID-19

Figure 1: Monthly total number of operations and treatment in 2019 - 2020

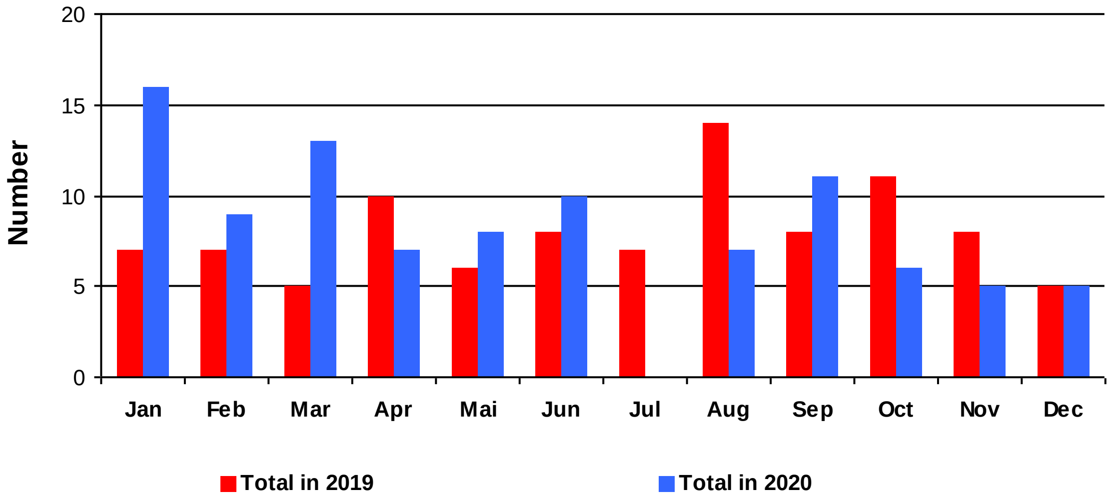


FIGURE F.1: Number of treated patients in the Pediatric Hip Register

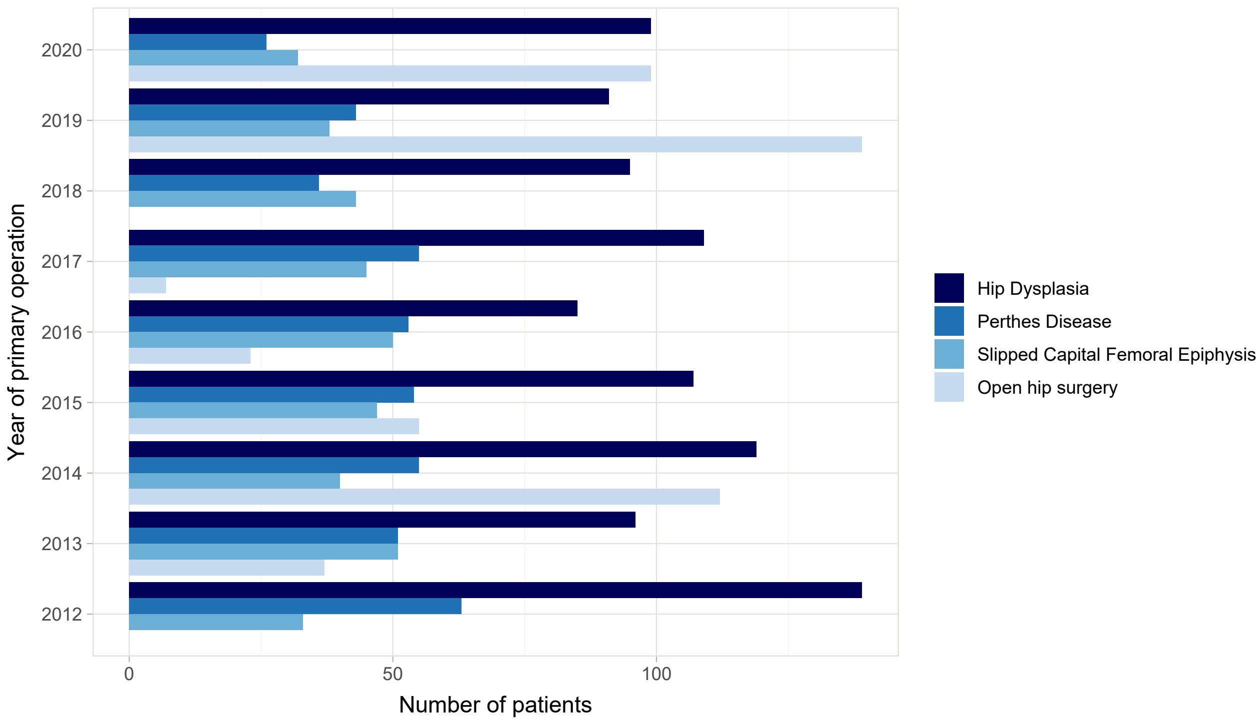
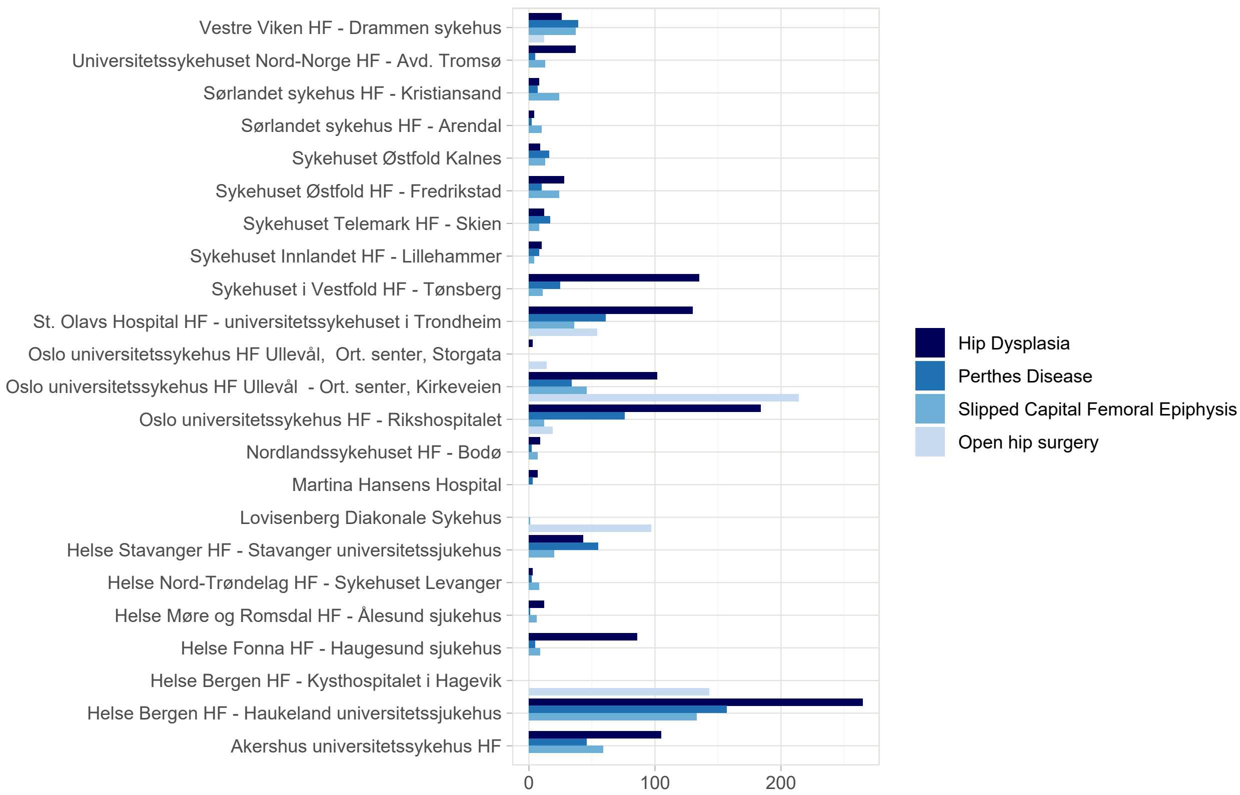


FIGURE F.2: Number of cases by diagnosis at each reporting hospital*



*Only hospitals with more than 10 operations in total are included

PAEDIATRIC HIP DISEASE

Hip Dysplasia

Table 1: HD - New cases per year

Year diagnosed	Unilateral	Bilateral	Missing	Total
2020	22	15	0	**37**
2019	38	25	0	**63**
2018	29	8	0	**37**
2017	43	12	0	**55**
2016	37	17	0	**54**
2015	42	16	0	**58**
2014	63	26	1	**90**
2013	57	19	0	**76**
2012	78	30	0	**108**
2011	68	19	0	**87**
2010	95	20	0	**115**
Unknown	18	5	8	**31**
Total	**590**	**212**	**9**	**811**

Table 2: HD - Diagnosis duration (in months)

Year diagnosed	< 3 mth	> 3 mth	Total
2020	12	41	**53**
2019	36	55	**91**
2018	24	23	**47**
2017	21	47	**68**
2016	28	47	**75**
2015	24	53	**77**
2014	48	67	**115**
2013	37	58	**95**
2012	58	81	**139**
2011	42	65	**107**
2010	46	86	**132**
Total	**376**	**623**	**999**

Table 3: HD - Earlier treatment

Year treated	None	Abd. orthosis	Other	Missing	Total
2020	39	33	8	7	**87**
2019	46	29	8	2	**85**
2018	23	20	8	3	**54**
2017	36	33	15	3	**87**
2016	32	37	9	6	**84**
2015	39	25	15	28	**107**
2014	38	40	14	27	**119**
2013	30	16	9	41	**96**
2012	6	6	0	127	**139**
2011	1	1	0	96	**98**
2010	3	3	0	121	**127**
Total	**293**	**243**	**86**	**461**	**1 083**

More than one form for patient per side is possible.

Table 4: HD - Hip status

Year treated	Normally located	Subluxated	Dislocated	Missing	Total
2020	55	23	7	3	**88**
2019	55	13	15	2	**85**
2018	39	12	2	1	**54**
2017	51	16	19	1	**87**
2016	43	12	21	8	**84**
2015	55	26	17	9	**107**
2014	67	15	35	2	**119**
2013	50	19	18	9	**96**
2012	69	21	35	14	**139**
2011	56	14	23	5	**98**
2010	65	24	29	9	**127**
Total	**605**	**195**	**221**	**63**	**1 084**

More than one form for patient per side is possible

Table 5: HD - Acetabular index

Year diagnosed	< 30°	< 40°	>= 40°	Missing	Total
2020	2	16	18	1	**37**
2019	5	20	34	4	**63**
2018	5	18	7	7	**37**
2017	9	22	14	10	**55**
2016	7	16	22	9	**54**
2015	3	21	25	9	**58**
2014	13	34	29	14	**90**
2013	10	29	22	15	**76**
2012	16	38	41	13	**108**
2011	16	35	28	8	**87**
2010	33	39	27	16	**115**
Unknown	3	6	3	19	**31**
Total	**122**	**294**	**270**	**125**	**811**

Mean number used for both hips for bilateral HD,

Table 6: HD - Pelvic osteotomy

Treatment year	Salter	Dega	Other	Total
2020	2	2	0	**4**
2019	4	4	0	**8**
2018	1	9	0	**10**
2017	3	12	1	**16**
2016	2	8	2	**12**
2015	5	6	3	**14**
2014	8	2	0	**10**
2013	7	0	0	**7**
2012	3	0	0	**3**
2011	1	1	3	**5**
2010	1	1	0	**2**
Total	**37**	**45**	**9**	**91**

Table 7: HD - Femoral osteotomy

Treatment year	Varus osteotomy	Rotational osteotomy	Shortening	Total
2020	3	2	0	**5**
2019	4	2	1	**7**
2017	5	3	2	**10**
2016	7	5	0	**12**
2015	5	3	2	**10**
2014	1	0	0	**1**
2013	5	4	3	**12**
2012	2	2	0	**4**
2011	3	2	1	**6**
2010	1	3	1	**5**
Total	**36**	**26**	**10**	**72**

Table 8a: HD - Ultrasound Screened at birth

Year diagnosed	Yes	No	Total
2020	21	20	**41**
2019	35	49	**84**
2018	6	9	**15**
2017	3	4	**7**
2016	1	1	**2**
2015	1	1	**2**
2014		1	**1**
Total	**67**	**85**	**152**

Table 8b: HD - Ultrasound Screened at birth

Year treated	Yes	No	Total
2020	40	37	**77**
2019	24	48	**72**
Total	**64**	**85**	**149**

Slipped Capital Femoral Epiphysis (SCFE)

Table 9: SCFE - New cases per year

Year diagnosed	Unilateral	Bilateral	Total
2020	19	2	**21**
2019	14	8	**22**
2018	16	4	**20**
2017	26	10	**36**
2016	25	10	**35**
2015	24	7	**31**
2014	25	3	**28**
2013	18	18	**36**
2012	21	5	**26**
2011	29	10	**39**
2010	22	6	**28**
Unknown	15	12	**27**
Total	**254**	**95**	**349**

Table 10: SCFE - Classification

Year diagnosed	Acute	Chronic	Acute on chronic	Stable (Able to bear weight)	Unstable (Unable to ambulate)
2020	4	11	5	13	8
2019	2	15	5	17	4
2018	2	14	3	13	6
2017	4	23	5	24	10
2016	6	20	8	22	12
2015	5	22	2	25	4
2014	1	19	6	13	11
2013	4	21	5	26	5
2012	4	11	5	10	7
2011	7	16	7	23	4
2010	4	15	3	18	7
Unknown	1	11	0	10	0
Total	**44**	**198**	**54**	**214**	**78**

Table 11: SCFE - Symptoms duration

Year diagnosed	< 6 weeks	6 - 26 weeks	> 26 weeks	Total
2020	6	8	6	**20**
2019	4	12	6	**22**
2018	3	13	3	**19**
2017	9	17	7	**33**
2016	6	21	7	**34**
2015	5	22	2	**29**
2014	3	19	4	**26**
2013	6	18	7	**31**
2012	6	12	2	**20**
2011	11	12	9	**32**
2010	8	16	2	**26**
Unknown	2	10	0	**12**
Total	**69**	**180**	**55**	**304**

Table 12: SCFE - Degree of slip

Year diagnosed	< 30°	30 - 50°	> 50°	Total
2020	8	5	6	**19**
2019	13	7	2	**22**
2018	13	4	4	**21**
2017	13	8	8	**29**
2016	13	10	9	**32**
2015	15	9	5	**29**
2014	8	7	10	**25**
2013	17	11	5	**33**
2012	9	4	5	**18**
2011	11	10	6	**27**
2010	16	4	7	**27**
Unknown	5	1	3	**9**
Total	**141**	**80**	**70**	**291**

Table 13: SCFE - Primary operation

Year treated	Screw osteosynthesis	Femoral osteotomy	Pin osteosynthesis	Total
2020	25	2	1	**28**
2019	28	2	6	**36**
2018	28	0	2	**30**
2017	32	1	3	**36**
2016	32	0	7	**39**
2015	24	1	10	**35**
2014	30	1	4	**35**
2013	36	0	12	**48**
2012	19	0	9	**28**
2011	26	1	15	**42**
2010	25	1	13	**39**
Total	**305**	**9**	**82**	**396**

Table 14a: SCFE - Implants that allow further growth

Year diagnosed	Yes	No	Total
2020	13	3	**16**
2019	12	11	**23**
2018		2	**2**
2017	4	3	**7**
2016	4		**4**
Total	**33**	**19**	**52**

Table 14b: SCFE - Implants that allow further growth

Year treated	Yes	No	Total
2020	20	6	**26**
2019	13	16	**29**
Total	**33**	**22**	**55**

Perthes disease

Table 15: Perthes - Number of new cases per year

Year diagnosed	Unilateral	Bilateral	Total
2020	14	1	**15**
2019	29	2	**31**
2018	21	5	**26**
2017	29	5	**34**
2016	27	2	**29**
2015	29	7	**36**
2014	37	1	**38**
2013	44	3	**47**
2012	43	5	**48**
2011	30	4	**34**
2010	62	12	**74**
Unknown	40	5	**45**
Total	**405**	**52**	**457**

Table 16: Perthes - Catterall classification

Year diagnosed	I/II	III/IV	Missing	Total
2020	5	10	0	**15**
2019	10	20	1	**31**
2018	7	21	0	**28**
2017	10	20	4	**34**
2016	6	18	5	**29**
2015	11	22	4	**37**
2014	7	25	6	**38**
2013	12	27	8	**47**
2012	16	26	6	**48**
2011	11	22	1	**34**
2010	22	44	8	**74**
Unknown	1	17	33	**51**
Total	**118**	**272**	**76**	**466**

I/II = < 50 % caput necrosis III/IV = < 50 % caput necrosis

Table 17: Perthes - Symptoms duration (in months)

Year diagnosed	< 1 mth	1 - 10 mth	11 -30 mth	31-50 mth	> 50 mth	Total
2020	0	12	3	0	0	**15**
2019	2	24	3	2	0	**31**
2018	0	22	0	2	0	**24**
2017	0	28	3	0	0	**31**
2016	0	22	2	0	0	**24**
2015	0	29	4	0	0	**33**
2014	0	29	5	1	0	**35**
2013	0	24	9	2	0	**35**
2012	2	23	10	1	0	**36**
2011	1	26	5	1	1	**34**
2010	1	48	11	0	1	**61**
Unknown	0	8	7	0	0	**15**
Total	**6**	**295**	**62**	**9**	**2**	**374**

Table 18: Perthes - Treatment

Year treated	None/ physiotherapy	Abduction orthosis	Femoral osteotomy	Pelvic osteotomy	Total
2020	14	0	4	0	**18**
2019	24	0	13	0	**37**
2018	23	0	6	1	**30**
2017	35	0	8	2	**45**
2016	22	0	21	1	**44**
2015	31	0	12	2	**45**
2014	37	2	11	0	**50**
2013	36	0	14	0	**50**
2012	38	0	4	4	**46**
2011	34	0	15	1	**50**
2010	46	0	10	0	**56**
Total	**340**	**2**	**118**	**11**	**471**

Table 19: Perthes - Plates

Year treated	Prebent plate	Angel plate	Special plate
2020	0	2	3
2019	2	2	9
2018	0	2	4
2017	0	1	7
2016	2	2	14
2015	1	2	8
2014	0	0	10
2013	2	1	10
2012	1	0	8
2011	0	0	19
2010	1	7	3
Total	**9**	**19**	**95**

Table 20: Perthes - Operated / not operated versus catterall classification

Year treated	Operated		Non Operated		
	I/II	III/IV	I/II	III/IV	Total
2020	0	12	5	9	26
2019	1	17	11	12	41
2018	0	6	8	16	30
2017	0	8	12	21	41
2016	0	8	7	16	31
2015	0	8	11	19	38
2014	0	9	10	24	43
2013	0	11	12	20	43
2012	0	10	15	20	45
2011	1	18	16	20	55
2010	0	13	20	23	56
Ukjent	0	0	0	0	0
Total	**2**	**120**	**127**	**200**	**449**

I/II = < 50 % caput necrosis III/IV = > 50 % caput necrosis

Adult hips *

Table 21: AH - Annual numbers of all operations

Year	Primary operation		Reoperation		Total
2019	114	(82,0%)	25	(18,0%)	**139**
2020	78	(86,7%)	12	(13,3%)	**90**
Total	**192**	**(83,8%) ***	**37**	**(16,2%) ****	**229**

Table 22: AH - Annual numbers of intervention types

Year	Open procedure		Scopy		Total
2019	59	(42,4%)	80	(57,6%)	**139**
2020	41	(45,6%)	49	(54,4%)	**90**
Total	**100**	**(43,7%) ***	**129**	**(56,3%) ****	**229**

Table 23: AH - Annual numbers of all operations in the different age groups

Year	10-20		21-30		31-40		41-50		> 50		Total
	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	
2019	28	10	21	32	22	12	7	5	2	0	**139**
2020	11	8	19	19	12	6	6	7	2	0	**90**
Total	**39**	**18**	**40**	**51**	**34**	**18**	**13**	**12**	**4**	**0**	**229**

* Registration started in 2019

Completeness analysis for the Norwegian Pediatric Hip Register, 2019-2020

A completeness analysis has been conducted for the Norwegian Pediatric Hip Register (NPHR) for primary operations (osteosynthesis, partial and total arthroplasty) performed in the period 2019-2020. A report and analysis have been prepared by the Norwegian Patient Register (NPR) in cooperation with the NPHR. A report on the implementation and results will be published at `www.helsedirektoratet.no`.

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

Operation	Code	Description
CLP	NEK 59	Angulation, rotation or displacement osteotomy of pelvis
	NFK 49	Epiphysiodesis of femur
	NFK 59	Angulation, rotation or displacement osteotomy of femur
	TNF 31	Prefabricated orthosis of hip joint or thigh
	TNF 32	Splint of malleable material on hip or thigh
	TNF 33	Circular plaster cast on hip or thigh
HD	NEK 59	Angulation, rotation or displacement osteotomy of pelvis
	NFH 00	Closed reduction of dislocation of hip joint
	NFH 02	Open reduction of dislocation of hip joint
	NFK 59	Angulation, rotation or displacement osteotomy of femur
	NFL 39	Myotomy or tenotomy of hip or thigh
	TNE 34	Large plaster dressing on pelvis
	TNF 32	Splint of malleable material on hip or thigh
	TNF 33	Circular plaster cast on hip or thigh
	TNF 34	Large plaster dressing on hip or thigh
SCFE	NEK 59	Angulation, rotation or displacement osteotomy of pelvis
	NFJ 40	Osteosynthesis of fracture of femur using wire, cerclage or pin
	NFJ 70	Osteosynthesis of fracture of femur using screws
	NFK 49	Epiphysiodesis of femur
	NFK 59	Angulation, rotation or displacement osteotomy of femur

Formler for dekningsgrad (DG)

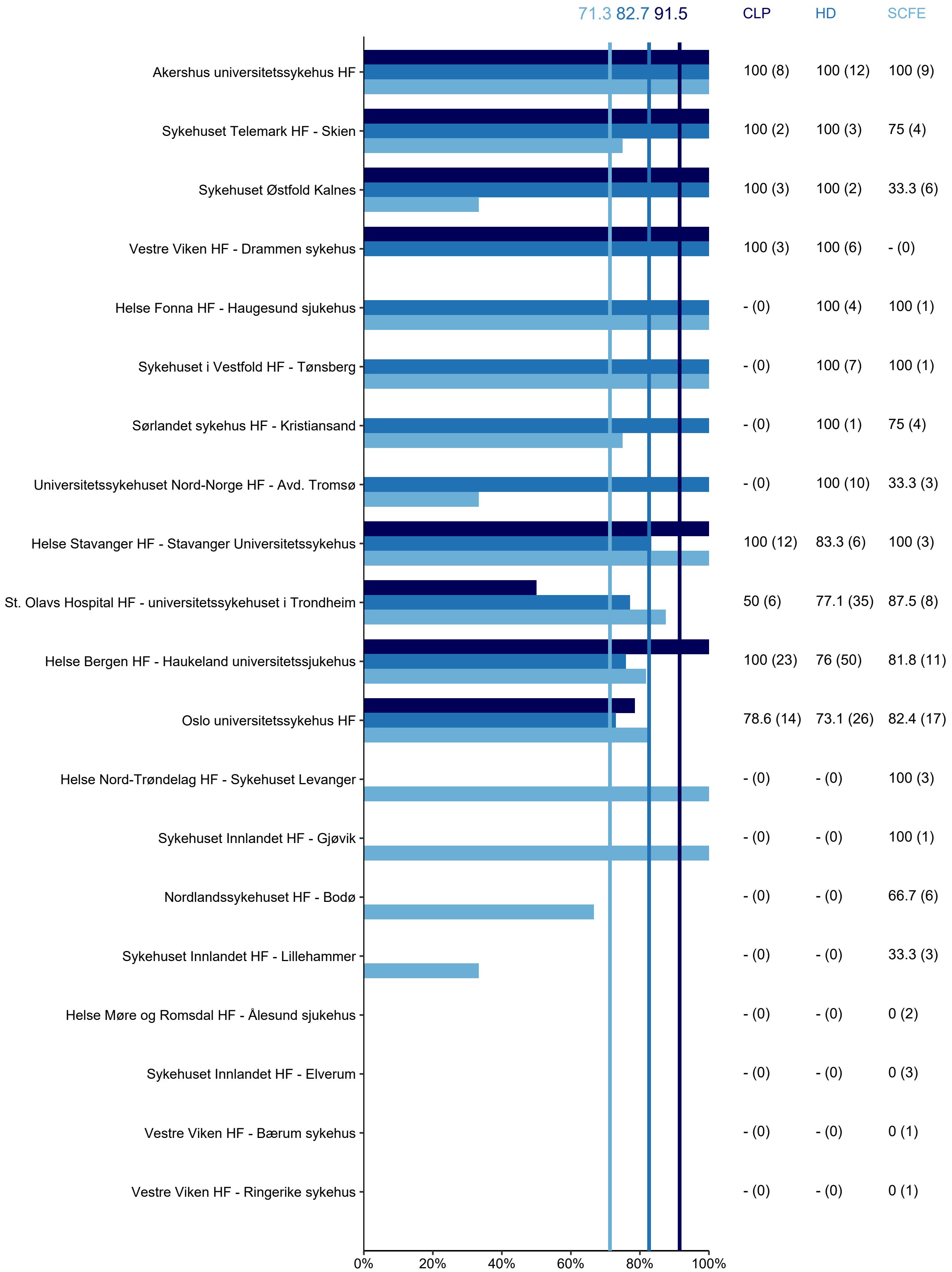
$$\text{Completeness rate NPHR} = \frac{\text{only NPHR} + \text{inclusion both registers}}{\text{only NPR} + \text{only NPHR} + \text{inclusion both registers}}$$

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

Information in the NPHR showed a high degree of agreement with the information in the NPR. Completeness for Perthes disease was 92 %, for Hip dysplasia 83 % and Slipped Capital Femoral Epiphysis 71 %. However, there are considerable variations in completeness between hospitals. Many of the hospitals have completeness under 80 %, which we consider very low. One explanation for low completeness rates in NPHR may be patients not giving consent to registration of the data. The differences between rates for primary CLP, HD and SCFE show that this cannot be the only cause and that hospitals must improve their reporting of primary hip fracture surgery with the correct diagnostic and procedure codes.

The following pages show the hospital-based completeness analysis for the Norwegian Pediatric Hip Register. We urge hospitals with low completeness to review their coding practices and routines in reporting to the registers.

Completeness of reporting, Norwegian Pediatric Hip Register 2019-2020



Dark blue bars and first number to the right of the bars gives completensess of reporting for CLP. Medium blue bars and second number to the right of the bars gives completensess of reporting for HD. Light blue bars and third number to the right of the bars gives completensess of reporting for SCFE. The numbers in paranthesis gives the number of operations registered at both NPHR and NPR. Vertical lines shows the national averages.

PUBLIKASJONER

Doktoravhandlinger (52 stk)

Nasjonalt Register for Leddproteser (30 stk)

Langvatn H. Infected total hip arthroplasty. Bacteriology and the role of operating room ventilation in the reduction of postoperative infection. The Norwegian Arthroplasty Register [dissertation]. 2020 University of Bergen; Bergen, Norway

Dyrhovden GS. Computer navigation and revision causes in knee arthroplasty [dissertation]. 2019 University of Bergen; Bergen, Norway

Petursson G. Computernavigation and fixation in total knee replacements: A registry based and randomized clinical trial study including radiostereometric analysis [dissertation]. 2019 University of Oslo; Oslo, Norway

Nystad TW. Orthopaedic surgery in patients with inflammatory rheumatic joint disease [dissertation]. 2019 University of Bergen; Bergen, Norway

Borgen PO. Clinical outcomes with preoperative and postoperative start of thromboprophylaxis in total hip arthroplasty [dissertation]. 2018 University of Oslo; Oslo, Norway

Hellevik AI. Systemic risk factors for severe osteoarthritis in the hip and knee: An epidemiological study from HUNT and the Norwegian Arthroplasty Register [dissertation]. 2018 NTNU; Trondheim, Norway

Blågestad T. Less pain- better sleep and mood? Interrelatedness of pain, sleep and mood in total hip arthroplasty patients [dissertation]. 2017 University of Bergen; Bergen, Norway

Johnsen MB. Leisure time physical activity and smoking as potential risk factors for severe hip and knee osteoarthritis [dissertation]. 2017 University of Oslo; Oslo, Norway

Leta TH. Revision knee arthroplasty in Norway 1994-2011 [dissertation]. 2017 University of Bergen; Bergen, Norway.

MacInnes S. The genetics of osteolysis and heterotopic ossification after total hip arthroplasty. 2016 University of Sheffield; Sheffield, UK.

Badawy M. Influence of hospital procedure volume on the risk of revision in knee arthroplasty surgery [dissertation]. 2016 University of Bergen; Bergen, Norway.

Dybvik E. Cancer and total hip replacement [dissertation]. 2015 University of Bergen; Bergen, Norway.

Apold H. Modifiable risk factors for severe osteoarthritis in the hip and knee [dissertation]. 2015 University of Oslo; Oslo, Norway

Pankewitsch K. Modellierung eines Monitoringsystems zur Risikosteuerung in der Hűftendoprothetik [dissertation]. 2014 der Juristischen und Wirtschaftswissenschaftlichen

Fakultät, der Martin-Luther-Universität; Halle-Wittenberg, Deutschland. ISBN 978-3-86386-772-0.

Schrama JC. Infected hip and knee arthroplasties in rheumatoid arthritis [dissertation]. 2014 University of Bergen; Bergen, Norway.

Gillam MH. Time to event analysis of arthroplasty registry data [dissertation]. 2013 The University of Adelaide; Australia.

Lindalen E. Reverse hybrid total hip replacement: Wear, fixation and bone remodeling [dissertation]. 2013 University of Oslo; Oslo, Norway.

Gøthesen Ø. Computer navigation in total knee replacement surgery. Effect on outcome [dissertation]. 2013 University of Bergen; Bergen, Norway.

Engesæter IØ. Hip dysplasia in young adults [dissertation]. 2013 University of Bergen; Bergen, Norway.

Dale H. Infection after primary hip arthroplasty. Epidemiology, time trends and risk factors in data from national health registers [dissertation]. 2013 University of Bergen; Bergen, Norway.

Lehmann TG. Slipped capital femoral epiphysis. Diagnostics, treatment and long-term outcome [dissertation]. 2013 University of Bergen; Bergen, Norway.

Lygre SH. Pain, function and risk of revision after primary knee arthroplasty [dissertation]. 2010 University of Bergen; Bergen, Norway.

Arthursson AJ. Surgical approach and muscle strength in total hip arthroplasty [dissertation]. Bergen, Norway: University of Bergen, 2008.

Monstad K. Essays on the Economics of health and fertility [dissertation]. Bergen, Norway: The Norwegian school of economics and business administration, 2007.

Hallan G. Wear, fixation, and revision of total hip prostheses [dissertation]. Bergen, Norway: University of Bergen, 2007.

Flugsrud GB. Risk factors for disabling osteoarthritis of the hip and for revision hip surgery. An epidemiological investigation [dissertation]. Oslo, Norway: University of Oslo, 2005.

Lie SA. Survival studies of total hip replacements and postoperative mortality [dissertation]. Bergen, Norway: University of Bergen, 2002.

Furnes O. Hip and knee replacement in Norway 1987-2000. The Norwegian Arthroplasty Register [dissertation]. Bergen, Norway: University of Bergen, 2002.

Espehaug B. Quality of total hip replacements in Norway 1987-1996. The Norwegian Arthroplasty Register [dissertation]. Bergen, Norway: University of Bergen, 1998.

Havelin LI. Hip arthroplasty in Norway 1987-1994. The Norwegian Arthroplasty Register [dissertation]. Bergen, Norway: University of Bergen, 1995.

Nasjonalt Hoftebruddregister (5 stk)

Kristensen TB. Hemiarthroplasty for femoral neck fracture. Results of surgical approach, fixation method, and stem design reported to the Norwegian hip fracture register [dissertation]. 2019 University of Bergen; Bergen, Norway

Talsnes O. Femoral neck fractures treated with hemiprosthesis: Comorbidity, organ affection and bone cement. On the quest for factors affecting mortality [dissertation]. 2016 University of Oslo; Oslo, Norway.

Bakken M. Barriers for improving medication in older adults [dissertation]. 2015 University of Bergen; Bergen, Norway

Matre K. Treatment of trochanteric and subtrochanteric hip fractures. Sliding hip screw or intramedullary nail? [dissertation]. 2013 University of Bergen; Bergen, Norway.

Gjertsen JE. Surgical treatment of hip fractures in Norway [dissertation]. Bergen, Norway: University of Bergen, 2009.

Nasjonalt Korsbåndregister (11 stk)

Søreide E. On aspects of intra-articular ligament reconstruction [dissertation]. 2020 University of Oslo; Oslo, Norway

Ulstein S. Prognosis and treatment of focal cartilage lesions of the knee joint. Medium to long-term results [dissertation]. 2019 University of Oslo; Oslo, Norway

Persson A. Risk factors for revision after anterior cruciate ligament reconstruction [dissertation]. 2019 University of Bergen; Bergen, Norway

Aga C. The effect of an anatomic double-bundle surgical technique on the outcome of anterior cruciate ligament reconstructions [dissertation]. 2019 University of Oslo; Oslo, Norway

Ingelsrud LH. Patient-reported outcome measurement threshold values in patients undergoing elective knee surgery [dissertation]. 2018 University of Southern Denmark; Odense, Denmark

Owesen C. Symptoms, diagnosis and outcomes in PCL injuries [dissertation]. 2017 University of Oslo; Oslo, Norway.

Røtterud JH. Focal cartilage lesions in anterior cruciate ligament-injured knees. Incidence, risk, prognosis and treatment [dissertation]. 2015 University of Oslo; Oslo, Norway.

Gifstad T. Results after ACL reconstruction – Clinical and registry-based studies [dissertation]. 2014 University of Trondheim; Trondheim, Norway.

Moksnes H. Functional and radiological outcomes following a non-operative treatment algorithm after ACL injuries in skeletally immature children [dissertation]. 2013 University of Oslo; Oslo, Norway.

Heir S. Focal Cartilage defects in the knee [dissertation]. 2011 University of Oslo; Oslo, Norway.

Granan LP. Development of a national knee ligament registry [dissertation]. 2009 University of Oslo; Oslo, Norway.

Kompetansetjeneste for leddproteser og hoftebrudd (6 stk)

Chokotho L. Quality of life, functional status and cost-effectiveness of treatment after femoral shaft fractures in Malawi [dissertation]. 2021 University of Bergen; Bergen, Norway

Blomquist J. Surgical treatment of shoulder instability in Norway [dissertation]. 2016 University of Bergen; Bergen, Norway.

Kadar TK. Wear and migration in cemented total hip arthroplasty [dissertation]. 2014 University of Bergen; Bergen, Norway.

Young S. Orthopaedic trauma surgery in low-income countries. Follow-up, infections and HIV [dissertation]. 2014 University of Bergen; Bergen, Norway.

Laborie LB. Hip Dysplasia and femoroacetabular impingement. Studies in newborns and young adults with focus on radiology and clinical epidemiology [dissertation]. 2013 University of Bergen; Bergen, Norway.

Figved PW. Hemiarthroplasty and femoral neck fractures [dissertation]. 2010 University of Oslo; Oslo, Norway.

Artikler (388stk)

Nasjonalt Register for Leddproteser (213 stk)

Hole RM, Fenstad AM, Gjertsen JE, Lie SA, Furnes O. Thromboprophylaxis in primary shoulder arthroplasty does not seem to prevent death: a report from the Norwegian Arthroplasty Register 2005-2018. Acta Orthop. 2021 Apr 6;[Epub ahead of print]

Silman AJ, Combescure C, Ferguson RJ, Graves SE, Paxton EW, Frampton C, Furnes O, Fenstad AM, Hooper G, Garland A, Spekenbrink-Spooren A, Wilkinson JM, Mäkelä K, Lübbeke A, Rolfson O. International variation in distribution of ASA class in patients undergoing total hip arthroplasty and its influence on mortality: data from an international consortium of arthroplasty registries. Acta Orthop. 2021 Mar 1;[Epub ahead of print]

Irmola T, Ponkilainen V, Mäkelä KT, Robertsson O, W-Dahl A, Furnes O, Fenstad AM, Pedersen AB, Schrøder HM, Eskelinen A, Niemeläinen MJ. Association between fixation type and revision risk in total knee arthroplasty patients aged 65 years and older: a cohort study of 265,877 patients from the Nordic arthroplasty register association 2000-2016. Acta Orthop. 2021 Feb;92(1):91-96

Pedersen AB, Mailhac A, Garland A, Overgaard S, Furnes O, Lie SA, Fenstad AM, Rogmark C, Kärrholm J, Rolfson O, Haapakoski J, Eskelinen A, Mäkelä K, Hailer NP. Similar early mortality risk after cemented compared with cementless total hip arthroplasty for primary osteoarthritis: data from 188,606 surgeries in the Nordic arthroplasty register associoation database. Acta Orthop. 2021 Feb;92(1):47-53

Van Steenbergen LN, Mäkelä KT, Kärrholm J, Rolfson O, Overgaard S, Furnes O, Pedersen AB, Eskelinen A, Hallan G, Schreurs BW, Nelissen RG. Total hip arthroplasties in the Dutch arthroplasty register (LROI) and the Nordic arthroplasty register associaton (NARA): comparison of patient and procedure characteristics in 475,685 cases. Acta Orthop. 2021 Feb;92(1):15-22

Leta TH, Gjertsen JE, Dale H, Hallan G, Lygre SHL, Fenstad AM, Dyrhovden GS, Westberg M, Wik TS, Jakobsen RB, Aamodt A, Röhrl SM, Gøthesen ØJ, Lindalen E, Heir S, Ludvigsen J, Bruun T, Hansen AK, Aune KEM, Warholm M, Skjetne JP, Badawy M, Høvding P, Husby OS, Karlsen ØE, Furnes O. Antibiotic-loaded bone cement in prevention of periprosthetic joint infections in primary total knee arthroplasty: A register- based multicentre randomised controlled non- inferiority trial (ALBA trial) BMJ Open. 2021 Jan 28;11(1):e041096

Aae TF, Jakobsen RB, Bukholm IRK, Fenstad AM, Furnes O, Randsborg PH. Compensation claims after hip arthroplasty surgery in Norway 2008-2018. Acta Orthop. 2021 Jan 18;[Epub ahead of print]

Randsborg PH, Aae TF, Bukholm IRK, Fenstad AM, Furnes O, Jakobsen RB. Compensation claims after knee arthroplasty surgery in Norway 2008-2018. Acta Orthop. 2021 Jan 13;[Epub ahead of print]

Vakalopoulos K, Arner M, Denissen G, Rodrigues J, Schädel-Höpfner M, Krukhaug Y, Page R, Lübbeke A. Current national hand surgery registries worldwide. J Hand Surg Eur Vol. 2021 Jan;46(1):103-106

Pollmann CT, Gjertsen JE, Dale H, Straume-Næsheim TM, Dybvik E, Hallan G. Operative approach influences functional outcome after DAIR for infected total hip arthroplasty. Bone Joint J. 2020 Dec;102-B(12):1662-1669

Gjertsen JE. CORR Insights: Is the survivorship of Birmingham hip resurfacing better than selected conventional hip arthroplasties in men younger than 65 years of age? A study from the Australian orthopaedic association national joint replacement registry. Clin Orthop Relat Res. 2020 Nov;478(11):2637-2639

Dale H, Høvding P, Tveit SM, Graff JB, Lutro O, Schrama JC, Wik TS, Skråmm I, Westberg M, Fenstad AM, Hallan G, Engesæter LB, Furnes O. Increasing but levelling out risk of revision due to infection after total hip arthroplasty: a study on 108,854 primary THAs in the Norwegian arthroplasty register from 2005 to 2019. Acta Orthop. 2020 Nov 24;[Epub ahead of print]

Halvorsen V, Fenstad AM, Röhrl SM, Engesæter LB, Nordsletten L, Terjesen T, Furnes O, Hallan G. Hoftelidelser hos barn og unge- utredning og behandling av senfølger. Tidsskr Nor Laegeforen. 2020 Nov 23;140(17)

Trela-Larsen L, Kroken G, Bartz-Johannessen C, Sayers A, Aram P, McCloskey E, Kadirkamanathan V, Blom AW, Lie SA, Furnes O, Wilkinson JM. Personalized estimation of one-year mortality risk after elective hip or knee arthroplasty for osteoarthritis. Jointcalc model development and validation using the National joint registry and the Norwegian arthroplasty register. Bone Joint Res. 2020 Nov 11;9(11):808-820

Dybvik E, Furnes O, Havelin LI, Fosså SD, Trovik C, Lie SA. A prospective study on cancer risk after total hip replacements for 41,402 patients linked to the cancer registry of Norway. BMC Musculoskelet Disord. 2020 Sep 8;21(1):599

Unbehaun D, Rasmussen S, Hole R, Fenstad AM, Salomonsson B, Demir Y, Jensen SL, Brorson S, Äärimaa V, Mechlenburg I, Rasmussen JV. Low arthroplasty survival after treatment for proximal humerus fracture sequelae: 3,245 shoulder replacemets from the Nordic arthroplasty register association. Acta Orthopaedica. 2020 Jul 17;[Epub ahead of print]

Hallan G, Fenstad AM, Furnes O. What is the frequency of fracture of ceramic components in THA? Results from the Norwegian arthroplasty register from 1997 to 2017. Clin Orthop Relat Res. 2020 Apr 22;478(6):1254-1261

Lewis PL, Tudor F, Lorimer M, McKie J, Bohm E, Robertsson O, Mäkelä KT, Haapakoski J, Furnes O, Bartz-Johannessen C, Nelissen RGHH, Van Steenbergen LN, Fithian DC, Prentice HA. Short-term revision risk of patellofemoral arthroplasty is high: An analysis from eight large arthroplasty registries. Clin Orthop Relat Res. 2020 Apr 17;478(6):1222-1231

Niemeläinen MJ, Mäkelä KT, Robertsson O, W-Dahl A, Furnes O, Fenstad AM, Pedersen AB, Schrøder HM, Reito A, Eskelinen A. The effect of fixation type on the survivorship of contemporary total knee arthroplasty in patients younger than 65 years of age: a register-based study of 115,177 knees in the Nordic arthroplasty register association (NARA) 2000-2016. Acta Orthop. 2020 Apr;91(2):184-190.

Dale H, Børsheim S, Kristensen TB, Fenstad AM, Gjertsen JE, Hallan G, Lie SA, Furnes O. Perioperative, short, and long-term mortality related to fixation in primary total hip arthroplasty: a study on 79,557 patients in the Norwegian arthroplasty register. Acta Orthop. 2020 Apr;91(2):152-158

Tsikandylakis G, Kärrholm JN, Hallan G, Furnes O, Eskelinen A, Mäkelä K, Pedersen AB, Overgaard S, Mohaddes M. Is there a reduction in risk of revision when 36-mm heads instead of 32 mm are used in total hip arthroplasty for patients with proximal femur fractures? Acta Orthop. 2020 Apr 14;91(4):401-407

Langvatn H, Schrama JC, Cao G, Hallan G, Furnes O, Lingaas E, Walenkamp G, Engesæter LB, Dale H. Operating room ventilation and the risk of revision due to infection after total hip arthroplasty: assessment of validated data in the Norwegian arthroplasty register. J Hosp Infect. 2020 Apr 11;105(2):216-224

Dale H, Børsheim S, Kristensen TB, Fenstad AM, Gjertsen JE, Hallan G, Lie SA, Furnes O. Fixation, sex, and age: highest risk of revision for uncemented stems in elderly women- data from 66,995 primary total hip arthroplasties in the Norwegian arthroplasty register. Acta Orthop. 2020 Feb;91(1):33-41

Øhrn FD, Gøthesen Ø, Låstad Lygre SH, Peng Y, Lian ØB, Lewis PL, Furnes O, Röhrl SM. Decreased survival of medial pivot designs compared with cruciate-retaining designs in TKA without patellar resurfacing. Clin Orthop Relat Res. 2020 Jan 17;478(6):1207-1218

Lehtimäki K, Rasmussen JV, Kukkonen J, Salomonsson B, Arverud ED, Hole R, Fenstad AM, Brorson S, Lund Jensen S, Äärimaa V. Low risk of revision after reverse shoulder arthroplasty for acute proximal humeal fractures. JSES int. 2020 Jan 2;4(1):151-155

Weldingh E, Johnsen MB, Hagen KB, Østerås N, Risberg MA, Natvig B, Slatkowsky-Christensen B, Fenstad AM, Furnes O, Nordsletten L, Magnusson K. The maternal and paternal effects on clinically and surgically defined osteoarthritis. Arthritis Rheumatol. 2019 Nov;71(11):1844-1848

Langvatn H, Bartz-Johannessen C, Schrama JC, Hallan G, Furnes O, Lingaas E, Walenkamp G, Engesæter LB, Dale H. Operating room ventilation-validation of reported data on 108 067 primary total hip arthroplasties in the Norwegian arthroplasty register. J Eval Clin Pract. 2019 Oct 9;26(3):1022-1029

Bartz-Johannessen C, Furnes O, Fenstad AM, Lie SA, Pedersen AB, Overgaard S, Kärrholm J, Malchau H, Mäkelä K, Eskilinen A, Wilkinson JM. Homogeneity in prediction of survival probabilities for subcategories of hipprosthesis data: the Nordic arthroplasty register association, 2000-2013. Clin Epidem. 2019 Jul 29;11:519-524

Badawy M, Fenstad AM, Furnes O. Primary constrained and hinged total knee arthroplasty: 2- and 5- year revision risk compared with unconstrained total knee arthroplasty: a report on

401 cases from the Norwegian arthroplasty register 1994-2017. Acta Ortop. 2019 Jun 18;90(5):467-472

Jobory A, Kärrholm J, Overgaard S, Becic Pedersen A, Hallan G, Gjertsen JE, Mäkelä K, Rogmark C. Reduced revision risk for dual-mobility cup in total hip replacement due to hip fracture: A matched-pair analysis of 9,040 cases from the Nordic arthroplasty register association (NARA). J Bone Joint Surg AM. 2019 Jul 17;101(14):1278-1285

Leta TH, Lygre SHL, Schrama JC, Hallan G, Gjertsen JE, Dale H, Furnes O. Outcome of revision surgery for infection after total knee arthroplasty: Results of 3 surgical strategies. JBJS Rev. 2019 Jun 11;7(6):e4

Varnum C, Pedersen AB, Rolfson O, Rogmark C, Furnes O, Hallan G, Mäkelä K, de Steiger R, Porter M, Overgaard S. Impact of hip arthroplasty registers on orthopaedic practice and perspectives for the future. EFORT open Rev. 2019 Jun 3;4(6):368-376

Mäkelä KT, Furnes O, Hallan G, Fenstad AM, Rolfson O, Kärrholm J, Rogmark C, Pedersen AB, Robertsson O, W-Dahl A, Eskelinen A, Schrøder HM, Äärimaa V, Rasmussen JV, Salomonsson B, Hole R, Overgaard S. The benefits of collaboration: the Nordic Arthroplasty Register Association. EFORT open rev. 2019 Jun 3;4(6):391-400

Pijls BG, Meessen JMTA, Tucker K, Stea S, Steenbergen L, Fenstad AM, Mäkelä K, Stoica IC, Goncharov M, Overgaard S, De La Torre JA, Lübbeke A, Rolfson O, Nelissen RGHH. MoM total hip replacements in Europe: a NORE report. EFORT open Rev. 2019 Jun 3;4(6):423-429

Moeini S, Rasmussen JV, Salomonsson B, Domeij-Arverud E, Fenstad AM, Hole R, Jensen SL, Brorson S. Reverse shoulder arthroplasty has a higher risk of revision due to infection than anatomical shoulder arthroplasty: 17 730 primary shoulder arthroplasties from the Nordic Arthroplasty Register Association. Bone Joint J 2019 Jun;101-B(6):702-707.

Halvorsen V, Fenstad AM, Engesæter LB, Nordsletten L, Overgaard S, Pedersen AB, Kärrholm J, Mohaddes M, Eskelinen A, Mäkelä KT, Röhrl SM. Outcome of 881 total hip arthroplasties in 747 patients 21 years younger: data from the Nordic arthroplasty register associaton (NARA) 1995-2016. Acta Orthop. 2019 May 15;90(4):331-337

Pedersen AB, Andersen IT, Overgaard S, Fenstad AM, Lie SA, Gjertsen JE, Furnes O. Optimal duration of anticoagulant thromboprophylaxis in total hip arthroplasty: new evidence in 55,540 patients with osteoarthritis from the Nordic Arthroplasty Register Association (NARA) group. Acta Orthop. 2019 May 7;90(4):298-305

Rasmussen JV, Harjula J, Arverud ED, Hole R, Jensen SL, Brorson S, Fenstad AM, Salomonsson B, Äärimaa V. The short-term survival of total shoulder arthroplasty for osteoarthritis is comparable to that of total stemmed shoulder arthroplasty: a Nordic arthroplasty register association study. J Shoulder Elbow Surg. 2019 Apr 28;28(8):1578-1586

MacInnes SJ, Hatzikotoulas K, Fenstad AM, Shah K, Southam L, Tachmazidou I, Hallan G, Dale H, Panoutsopoulou K, Furnes O, Zeggini E, Wilkinson JM. Erratum to: The 2018 Otto Aufranc Award: How does genome-wide variation affect osteolysis risk after THA? Clin Orthop Relat Res. 2019 Mar;477(3):668

MacInnes SJ, Hatzikotoulas K, Fenstad AM, Shah K, Southam L, Tachmazidou I, Hallan G, Dale H, Panoutsopoulou K, Furnes O, Zeggini E, Wilkinson JM. The 2018 Otto Aufrac award: How does genome-wide variation affect osteolysis risk after THA? Clin Orthop Relat Res. 2019 Feb;477(2):297-309

Gromov K, Troelsen A, Modaddes M, Rolfson O, Furnes O, Hallan G, Eskelinen A, Neuvonen P, Husted H. Varying but reduced use of postoperative mobilization restrictions after primary total hip arthroplasty in Nordic countries: a questionnaire-based study. Acta Orthop. 2019 Apr;90(2):143-147.

Kreipke R, Rogmark C, Pedersen AB, Kärrholm J, Hallan G, Havelin LI, Mäkelä K, Overgaard S. Dual mobility cups: Effect on risk of revision of primary total hip arthroplasty due to osteoarthritis. J Bone Joint Surg AM. 2019 Jan 16;101(2):169-176

Tsikandylakis G, Kärrholm J, Hailer NP, Eskelinen A, Mäkelä KT, Hallan G, Furnes O, Pedersen AB, Overgaard S, Mohaddes M. No increase in survival for 36-mm versus 32-mm femoral heads in metal-on-polyethylene THA: A registry study. Clin Orthop Relat Res. 2018 Sep 25;476(12):2367-2378

Lehtimäki K, Rasmussen JV, Mokka J, Salomonsson B, Hole R, Jensen SL, Äärimaa V. Risk and risk factors for revision after primary reverse shoulder arthroplasty for cuff tear arthroplasty an osteoarthritis: a Nordic arthroplasty register association study. J Shoulder Elbow Surg. 2018 Sep;27(9):1596-1601

Furnes O. International registry collaboration and statistical approaches. Acta Orthop. 2018 Aug;89(4):367

Rasmussen JV, Hole R, Methlie T, Brorson S, Äärimaa V, Demir Y, Salomonsson B, Jensen SL. Anatomical total shoulder arthroplasty used for glenohumeral osteoarthritis has higher survival rates than hemiarthroplasty: a Nordic registry-based study. Osteoarthritis Cartilage. 2018 Feb 21;26(5):659-665

Magnusson K, Scurrah KJ, Ørstavik RE, Nilsen TS, Furnes O, Hagen KB. Is the association between obesity and hip osteoarthritis surgery explained by familial confounding? Epidemiology. 2018 Jan 29;29(3):414-420

Krukhaug Y, Hallan G, Dybvik E, Lie SA, Furnes O. A survivorship study of 838 total elbow replacements: a report from the Norwegian Arthroplasty Register 1994-2016. J Shoulder Elbow Surg. 2018 Jan;27(2):260-269

Hellevik AI, Johnsen MB, Langhammer A, Baste V, Furnes O, Storheim K, Zwart JA, Flugsrud GB, Nordsletten L. Metabolic syndrome as a risk factor for total hip or knee replacement due to primary osteoarthritis: a prospective cohort study (the HUNT study and the Norwegian Arthroplastry Register) Clinical Epidemiology. 2018 Jan 10;10:83-96

Johnsen MB, Hellevik AI, Småstuen MC, Langhammer A, Furnes O, Flugsrud GB, Nordsletten L, Zwart JA, Storheim K. The mediating effect of body mass index on the relationship between smoking and hip or knee replacement due to primary osteoarthritis. A population-based cohort study (the HUNT study). Plos One. 2017 Dec 28;12(12):e0190288

Badawy M, Espehaug B, Fenstad AM, Indrekvam K, Dale H, Havelin LI, Furnes O. Patient and surgical factors affecting procedure duration and revision risk due to deep infection in primary total knee arthroplasty. BMC Musculoskelet Disord. 2017 Dec 21;18(1):544

Ackerman IN, Bohensky MA, De Steiger R, Brand CA, Eskelinen A, Fenstad AM, Furnes O, Graves SE, Haapakoski J, Mäkelä K, Mehnert F, Nemes S, Overgaard S, Pedersen AB, Garellick G. Lifetime risk of primary total hip replacement surgery for osteoarthritis from 2003 to 2013: A multinational analysis using national registry data. Arthritis Care Res. 2017 Nov;69(11):1659-1667

Hellevik AI, Nordsletten L, Johnsen MB, Fenstad AM, Furnes O, Storheim K, Zwart JA, Flugsrud G, Langhammer A. Corrigendum to «Age of menarche is associated with knee joint replacement due to primary osteoarthritis (The HUNT study and the Norwegian Arthroplasty Register)». Osteoarthritis Cartilage. 2017 Oct 21;25(12):2148-2149

Borgen PO, Pripp AH, Dybvik E, Leistad L, Dahl OE, Reikerås O. Similar clinical outcomes with preoperative and postoperative start of thromboprophylaxis in THA: A register-based study. Clin Orthop Relat Res. 2017 Sep;475(9):2245-2252

Gøthesen Ø, Lygre SHL, Lorimer M, Graves S, Furnes O. Increased risk of aseptic loosening for 43,525 rotating-platform vs.fixed-bearing total knee replacements. Acta Ortop. 2017 Sep 20;88(6):649-656

Badawy M, Fenstad AM, Bartz-Johannessen CA, Indrekvam K, Havelin LI, Robertsson O, W-Dahl A, Eskelinen A, Mäkelä K, Pedersen AB, Schrøder HM, Furnes O. Hospital volume and the risk of revision in Oxford unicompartmental knee arthroplasty in the Nordic countries- an observational study of 14,496 cases. BMC Musculoskelet Disord. 2017 Sep 7;18(1):388

Lazarinis S, Mäkelä KT, Eskelinen A, Havelin L, Hallan G, Overgaard S, Pedersen AB, Kärrholm J, Hailer NP. Does hydroxyapatite coating of uncemented cups improve long-term survival? An analysis of 28,605 primary total hip arthroplasty procedures from the Nordic arthroplasty register association (NARA). Osteoarthritis Cartilage. 2017 Aug 9;25(12):1980-1987

Hellevik AI, Nordsletten L, Johnsen MB, Fenstad AM, Furnes O, Storheim K, Zwart JA, Flugsrud G, Langhammer A. Age of menarche is associated with knee joint replacement due to primary osteoarthritis (The HUNT study and the Norwegian Arthroplasty Register). Osteoarthritis Cartilage. 2017 Jul 10;25(10):1654-1662

Hellevik AI, Johnsen MB, Langhammer A, Fenstad AM, Furnes O, Storheim K, Zwart JA, Flugsrud G, Nordsletten L. Incidence of total hip or knee replacement due to osteoarthritis in relation to thyroid function: a prospective cohort study (The Nord-Trøndelag Health Study). BMC Musculoskelet Disord. 2017 May 18;18(1):201

Mjaaland KE, Svenningsen S, Fenstad AM, Havelin LI, Furnes O, Nordsletten L. Implant survival after minimally invasive anterior or anteriolateral Vs. conventional posterior or direct lateral approach: An analysis of 21,860 total hip arthroplasties from the Norwegian Arthroplasty Register (2008 to 2013). J Bone Joint Surg Am. 2017 May 17;99(10):840-847

Johanson PE, Furnes O, Havelin LI, Fenstad AM, Pedersen AB, Overgaard S, Garellick G, Mäkelä K, Kärrholm J. Outcome in design-specific comparisons between highly crosslinked and conventional polyethylene in total hip arthroplasty. Acta Orthop. 2017 Apr 4;88(4):363-369

Brorson S, Salomonsson B, Jensen SL, Fenstad AM, Demir Y, Rasmussen JV. Revision after shoulder replacement for acute fracture of the proximal humerus. Acta Orthop. 2017 Mar 28;88(4):446-450

Dyrhovden GS, Lygre SH, Badawy M, Gøthesen Ø, Furnes O. Have the causes of revision for total and unicompartmental knee arthroplasties changed during the past two decades? Clin Orthop Relat Res. 2017 Jul;475(7):1874-1886

Wangen H, Havelin LI, Fenstad AM, Hallan G, Furnes O, Pedersen AB, Overgaard S, Kärrholm J, Garellick G, Mäkelä K, Eskelinen A, Nordsletten L. Reverse hybrid total hip arthroplasty. Acta Orthop. 2017 Jun;88(3):248-254

Niemelälnen MJ, Mäkelä KT, Robertsson O, W-Dahl A, Furnes O, Fenstad AM, Pedersen AB, Schrøder HM, Huhtala H, Eskelinen A. Different incidences of knee arthroplasty in the Nordic countries. Acta Orthop. 2017 Apr;88(2):173-178

Johnsen MB, Vie GÅ, Winsvold BS, Bjørngaard JH, Åsvold BO, Gabrielsen ME, Pedersen LM, Hellevik AI, Langhammer A, Furnes O, Flugsrud GB, Skorpen F, Romundstad PR, Storheim K, Nordsletten L, Zwart JA. The causal role of smoking on the risk of hip or knee replacement due to primary osteoarthritis: a Mendelian randomisation analysis of the HUNT study. Osteoarthritis Cartilage. 2017 Jun;25(6):817-823

Magnusson K, Scurrah K, Ystrom E, Ørstavik RE, Nilsen T, Steingrimsdòttir ÒA, Ferreira P, Fenstad AM, Furnes O, Hagen KB. Genetic factors contribute more to hip than knee surgery due to osteoarthritis – a population-based twin registry study of joint arthropalsty. Osteoarthritis Cartilage. 2016 Dec 13;25(6):878-884

Ackerman IN, Bohensky MA, de Steiger R, Brand CA, Eskelinen A, Fenstad AM, Furnes O, Garellick G, Graves SE, Haapakoski J, Havelin LI, Mäkelä K, Mehnert F, Becic Pedersen A, Robertsson O. Substantial rise in the lifetime risk of primary total knee replacement surgery for osteoarthritis from 2003 to 2013: an international, population-level analysis. Osteoarthritis Cartilage. 2016 Nov 14;25(4):455-461

Birkeland Ø, Espehaug B, Havelin LI, Furnes O. Bone cement product and failure in total knee arthroplasty. Acta Orthop. 2017 Feb;88(1):75-81

Dyrhovden GS, Fenstad AM, Furnes O, Gøthesen Ø. Survivorship and relative risk of revision in computer-navigated versus conventional total knee replacement at 8 –year follow-up. Acta Orthop. 2016 Dec;87(6):592-599

Junnila M, Laaksonen I, Eskelinen A, Pulkkinen P, Havelin LI, Furnes O, Fenstad AM, Pedersen AB, Overgaard S, Kärrholm J, Garellick G, Malchau H, Mäkelä KT. Implant survival of the most common cemented total hip devices from the Nordic arthroplasty register association database. Acta Orthop. 2016 Dec;87(6):546-553

Tsukanaka M, Halvorsen V, Nordsletten L, Engesæter I.Ø, Engesæter L.B, Fenstad A.M, RöhrlS.M. Implant survival and radiographic outcome of total hip replacement in patients less than 20 years old Acta Orthop. 2016 Dec ; 87(5):479-84

Rasmussen JV, Brorson S, Hallan G, Dale H, Äärimaa V, Mokka J, Jensen SL, Fenstad AM, Salomonsson B. Is it feasible to merge data from national shoulder registries? A new collaboration within the Nordic arthroplasty register association. J shoulder elbow surg. 2016 Dec;25(12):369-377

Leta TH, Lygre SH, Skredderstuen A, Hallan G, Gjertsen JE, Rokne B, Furnes O. Outcomes of unicompartmental knee arthroplasty after aseptic revision to total knee arthroplasty: A comparative study of 768 TKAs and 578 UKAs revised to TKAs from the Norwegian arthroplasty register (1994 to 2011). JBJS. 2016 Mar 16;98(6):431-40

Johnsen MB, Hellevik AI, Baste V, Furnes O, Langhammer A, Flugsrud G, Nordsletten L, Zwart JA, Storheim K. Leisure time physical activity and the risk of hip or knee replacement due to primary osteoarthritis: a population based cohort study (The HUNT study). BMC Musculoskelet Disord. 2016 Feb 16;17(1):86

Busch VJ, Verschueren J, Adang EM, Lie SA, Havelin LI, Schreurs BW. A cementeted cup with acetabular impaction bone grafting is more cost-effective than an uncemented cup in patientes under 50 years. Hip Int. 2016 Jan-Feb;26(1):43-9

Petursson G, Fenstad AM, Havelin LI, Gøthesen Ø, Lygre SH, Röhrl SM, Furnes O. Better survival of hybrid knee arthroplasty compared to cemented arthroplasty. A report from the Norwegian Arthroplasty Register 1999-2012. Acta Orthop. 2015 Nov;86(6):714-20

Blågestad T, Nordhus IH, Grønli J, Engesæter LB, Ruths S, Ranhoff AH, Bjorvatn B, Pallesen S. Prescription trajectories and effect of total hip arthroplasty on the use of analgesics, hypnotics, antidepressants and anxiolytics: Results from a population of total hip arthroplasty patients. Pain. 2016 Mar;157(3):643-51

Leta TH, Lygre SH, Skredderstuen A, Hallan G, Gjertsen JE, Rokne B, Furnes O. Secondary patella resurfacing in painful non-resurfaced total knee arthroplasties: A study of survival and clinical outcome from the Norwegian Arthroplasty Register (1994-2011). Int Orthop (SICOT). 2016 Apr;40(4):715-22

Glassou EN, Hansen TB, Mäkelä K, Havelin LI, Furnes O, Badawy M, Kärrholm J, Garrelic G, Eskelinen A, Pedersen AB. Association between hospital procedure volume and risk of revision after total hip arthroplasty: a population-based study within the Nordic Arthroplasty Register Association database. Osteoarthritis Cartilage. 2016 Mar;24(3):419-26

Langvatn H, Lutro O, Dale H, Schrama JC, Hallan G, Espehaug B, Sjursen H, Engesæter LB. Bacterial and hematological findings in infected total hip arthroplasties in Norway assessment of 278 revisions due to infection in the Norwegian arthroplasty register. 2015 sep 30;9:445-449

Nystad TW, Fenstad AM, Furnes O, Havelin LI, Skredderstuen AK, Fevang BT. Reduction in orthopaedic surgery in patients with rheumatoid arthritis: a Norwegian register-based study. Scand J Rheumatol. 2016,45(1):1-7

Cafri G, Banerjee S, Sedrakyan A, Paxton L, Furnes O, Graves S, Marinac-Dabic D. Meta-analysis of survival curve data using distributed health data networks: application to hip arthroplasty studies of the International Consortium of Orthopaedic Registries. Res Synth Methods. 2015 June 29;6(4):347-56.

Badawy M, Fenstad AM, Indrekvam K, Havelin LI, Furnes O. The risk of revision in total knee arthroplasty is not affected by previous high tibial osteotomy. A 15- year follow-up of 32,476 total knee arthroplasties in the Norwegian Arthroplasty Register. Acta Orthop. 2015 Nov;86(6):734-9.

Schrama JC, Fenstad AM, Dale H, Havelin LI, Hallan G, Overgaard S, Pedersen AB, Kärrholm G, Garellick G, Pulkkinen P, Eskelinen A, Mäkelä K, Engesæter LB, Fevang BT. Increased risk of revision for infection in rheumatoid arthritis patients with total hip replacement. A study of 390,671 primary arthroplasties from the Nordic-Arthroplasty Register Association. Acta Ortop. 2015 Aug;86(4):469-76.

Varnum C, Pedersen AB, Mäkelä K, Eskelinen A, Havelin LI, Furnes O, Kärrholm G, Garellick G, Overgaard S. Increased risk of revision of cementless stemmed total hip arthroplasty with metal-on-metal bearings. Data from the Nordic Arthroplasty Register Association. Acta Orthop. 2015 Aug;86(4):491-97.

Leta TH, Lygre SHL, Skredderstuen A, Hallan G, Furnes O. Failure of aseptic revision total knee arthroplasties. 145 revision failures from the Norwegian Arthroplasty Register, 1994-2011. Acta Orthop. 2015 Feb;86(1):48-57.

Lie SA, Havelin LI, Fenstad AM, Espehaug B, Dybvik E, Baste V, Engesæter LB, Skredderstuen A, Dale H, Fevang JM, Fevang BT, Hallan G, Gjertsen JE, Furnes O. Re: a statistical analysis of ankle prosthesis from the Norwegian Arthroplasty Register. Arch Orthop Trauma Surg. 2015 Jan;135(1):17-8.

Fevang BT, Nystad TW, Skredderstuen A, Furnes O, Havelin LI. Improved survival for anatomic total shoulder prostheses. Results of 4,173 shoulder arthroplasties reported to the Norwegian Arthroplasty Register from 1994 through 2012. Acta Ortop. 2015 Feb;86(1):63-70.

Hailer NP, Lazarinis S, Mäkelä KT, Eskelinen A, Fenstad AM, Hallan G, Havelin LI, Overgaard S, Pedersen AB, Mehnert F, Kärrholm J. Hydroxyapatite coating does not improve uncemented stem survival after total hip arthroplasty! An analysis of 116,069 THAs in the Nordic Arthroplasty Register Association (NARA) database. Acta Orthop. 2015 Feb;86(1):18-25.

Lutro O, Langvatn H, Dale H, Schrama JC, Hallan G, Espehaug B, Sjursen H, Engesæter LB. Increasing resistance of coagulase-negative staphylococci in total hip arthroplasty infections: 278 THA-revisions due to infection reported to the Norwegian Arthroplasty Register from 1993 to 2007. Adv Orthop. 2014 Oct 9;2014:580359.

Paxton E, Cafri G, Havelin L, Stea S, Palliso F, Graves S, Hoeffel D, Sedrakyan A. Risk of revision following total hip arthroplasty: Metal-on-conventional polyethylene compared with metal-on-highly cross-linked polyethylene bearing surfaces. J Bone Joint Surg Am. 2014 Dec 17;96 Suppl 1:19-24.

Allepuz A, Havelin LI, Barber T, Sedrakyan A, Graves S, Bordini B, Hoeffel D, Cafri G, Paxton E. Effect of femoral head size on metal-on-HXLPE hip arthroplasty outcome in a combined analysis of six national and regional registries. J Bone Joint Surg Am. 2014 Dec 17;96 Suppl 1:12-8.

Sedrakyan A, Graves S, Bordini B, Pons M, Havelin LI, Mehle S, Paxton E, Barber T, Cafri G. Comparative effectiveness of ceramic-on-ceramic implants in stemmed hip replacement. J Bone Joint Surg Am. 2014 Dec 17;96 Suppl 1:34-41.

Furnes O, Paxton E, Cafri G, Graves S, Bordini B, Comfort T, Rivas MC, Banerjee S, Sedrakyan. Distributed analysis of hip implants using six national and regional registries: comparing metal-on-metal with metal-on-highly crossed-linked polyethylene bearings in cementless total hip arthroplasty in young patients. J Bone Joint Surg Am. 2014 Dec 17;96 Suppl 1:25-33.

Stea S, Comfort T, Sedrakyan A, Havelin LI, Marinelli M, Barber T, Paxton E, Isaacs AJ, Graves S. Multinational comprehensive evaluation of the fixation method used in hip replacement: interaction with age in context. J Bone Joint Surg Am. 2014 Dec 17;96 Suppl 1:42-51.

Namba R, Graves S, Robertsson O, Furnes O, Stea S, Puig-Verdié L, Hoeffel D, Cafri F, Paxton E, Sedrakyan A. International comparative evaluation of knee replacement with fixed or mobile non-posterior-stabilized implants. J Bone Joint Surg Am. 2014 Dec 17;96 Suppl 1:52-8.

Graves S, Sedrakyan A, Baste V, Gioe TJ, Namba R, Cruz OM, Paxton E, Banerjee S, Isaacs AJ, Robertsson O. International comparative evaluation of knee replacement with fixed or mobile-bearing posterior-stabilized prostheses. J Bone Joint Surg Am. 2014 Dec 17;96 Suppl 1:59-64.

Comfort T, Baste V, Froufe MA, Namba R, Bordini B, Robertsson O, Cafri G, Paxton E, Sedrakyan A, Graves S. International comparative evaluation of fixed-bearing non- posterior-stabilized and posterior-stabilized total knee replacements. J Bone Joint Surg Am. 2014 Dec 17;96 Suppl 1:65-72.

Thien TM, Chatziagorou G, Garellick G, Furnes O, Havelin LI, Mäkelä K, Overgaard S, Pedersen A, Eskelinen A, Pulkkinen P, Kärrholm J. Periprosthetic femoral fracture within two years after total hip replacement. Analysis of 437,629 operations in the Nordic Arthroplasty Register Assosiation database. J Bone Joint Surg Am. 2014 Oct 1;96(19):e167.

Dybvik E, Furnes O, Fosså SD, Trovik C, Lie SA. Pelvic irradiation does not increase the risk of hip replacement in patients with gynecological cancer. A cohort study based on 8,507 patients. Acta Orthop. 2014 Dec;85(6):652-6.

Amlie E, Havelin LI, Furnes O, Baste V, Nordsletten L, Høvik Ø, Dimmen S. Worse patient-reported outcome after lateral approach than after anterior and posterolateral approach in primary hip arthroplasty. A cross-sectional questionnaire study of 1,476 patients 1-3 years after surgery. Acta Orthop. 2014 Sep;85(5):463-9.

Borgquist L, Dahl AW, Dale H, Lidgren L, Stefánsdóttir A. Prosthetic joint infections a need for health economy studies. Guest editorial. Acta Orthop. 2014;85(3)218-220.

Apold H, Meyer HE, Nordsletten L, Furnes O, Baste V, Flugsrud GB. Risk factors for knee replacement due to primary osteoarthritis, a population based prospective cohort study of 315,495 individuals. BMC Musculoskeletal Disord. 2014;15:217.

Badawy M, Espehaug B, Indrekvam K, Havelin LI, Furnes O. Higher revision risk for unicompartmental knee arthroplasty in low-volume hospitals. Data from 5,791 cases in the Norwegian Arthroplasty Register. Acta Orthop. 2014 May 21;85(4):342-7.

Pedersen AB, Mehnert F, Havelin LI, Furnes O, Herberts P, Kärrholm J, Garellick G, Mäkela, Eskelinen A, Overgaard S. Association between fixation technique and revision risk in total hip arthroplasty patients younger than 55 years of age. Results from the Nordic Arthroplasty Register Association. Osteoarthitis Cartilage. 2014 May;22(5):659-67.

Krukhaug Y, Lie SA, Havelin LI, Furnes O, Hove LM, Hallan G. The result of 479 thumb carpometacarpal joint replacements reported in the Norwegian Arthroplasty Register. The Journal of Hand Surgery 2014 Oct;39(8):819-25.

Apold H, Meyer HE, Nordsletten L, Furnes O, Baste V, Flugsrud GB. Weight gain and the risk of knee replacement due to primary osteoarthritis. –a population based, prospective cohort study of 225,908 individuals. Osteoarthritis Cartilage;2014 May;22(5):652-8.

Mäkelä K, Matilainen M, Pulkinnen P, Fenstad AM, Havelin LI, Engesæter LB, Furnes O, Overgaard S, Pedersen AB, Kärrholm J, Malchau H, Garellick G, Ranstam J, Eskelinen A. Countrywise results of total hip replacement. An analysis of 438,733 hips based on the Nordic Arthroplasty register Association database. Acta Orthop 2014 Apr;85(2):107-116.

Mäkelä KT, Matilainen M, Pulkkinen P, Fenstad AM, Havelin L, Engesæter LB, Furnes O, Pedersen AB, Overgaard S, Kärrholm J, Malchau H, Garellick G, Ranstam J, Eskelinen A. Failure rate of cemented and uncemented total hip replacements: register study of combined Nordic database of four nations. BMJ 2014 Jan 13;348:f7592.

Bergh C, Fenstad AM, Furnes O, Garellick G, Havelin LI, Overgaard S, Pedersen AB, Mäkelä K, Pulkkinen P, Mohaddes M, Kärrholm J. Increased risk of revision in patients with non-traumatic femoral head necrosis. Acta Orthop. 2014 Feb;85(1):11-7.

Nystad TW, Furnes O, Havelin LI, Skreddertsuen AK, Lie SA, Fevang BT. Hip replacement surgery in patients with ankylosing spondylitis. Ann Rheum Dis. 2014 Jun;73(6):1194-7.

Sudmann E, Ramstad KR, Engesæter LB. Christiansen`s artificial hip joints—what went wrong? Tidsskr Nor Lægeforen. 2013 Dec 10;133(23-24):2513-8

Badawy M, Espehaug B, Indrekvam K, Engesæter LB, Havelin LI, Furnes O. Influence of hospital volum on revision rate after total knee arthroplasty with cement. J Bone Joint Surg Am 2013;95:e131:1-6.

Gøthesen Ø, Slover J, Havelin LI, Askildsen JE, Malchau H, Furnes O. An economic model to evaluate the cost-effectiveness of computer assisted knee replacement surgery in Norway. BMC Musculoskeletal Disord. 2013;14:202.

Gøthesen Ø. Espehaug B, Havelin LI, Petursson G, Lygre SH, Ellison P, Hallan G, Furnes O. Survival rates and causes of revision in cemented primary total knee replacement. A report from the Norwegian Arthroplasty Register 1994-2009. Bone Joint J 2013;95-B:636-42.

Monstad K, Engesæter LB, Espehaug B. Waiting time and socioeconomic status – an individual-level analysis. Health Econ 2013:1-16.

Gillam MH, Lie SA, Salter A, Furnes O, Graves SE, Havelin LI, Ryan P. The progression of end-stage osteoarthritis: analysis of data from the Australian and Norwegian joint replacements registries using a multi-state model. Osteoarthritis Cartilage. 2013 Mar;21(3):405-12.

Fevang BT, Lygre SH, Bertelsen G, Skreddertstuen A, Havelin LI, Furnes O. Pain and function in eight hundred and fifty nine patients comparing shoulder hemiprostheses, resurfacing prostheses, reversed total and conventional total prostheses. Int Orthop 2013 Jan;37(1):59-66.

Schrama JC, Lutro O, Langvatn H, Hallan G, Espehaug B, Sjursen H, Engesæter LB, Fevang BT. Bacterial findings in infected hip joint replacements in patients with rheumatoid arthritis and osteoarthritis: A study of 318 revisions for infection reported to the Norwegian Arthroplasty Register. International Scholarly Research Network Vol. 2012; Oct 17;2012:437675.

Dale H, Fenstad AM, Hallan G, Havelin LI, Furnes O, Overgaard S, Pedersen AB, Kärrholm J, Garellick G, Pulkkinen P, Eskelinen A, Mäkelä K, Engesæter LB.Increasing risk of prosthetic joint infection after total hip arthroplasty. 2,778 revisions due to infection after 432,168 primary THAs in the Nordic Arthroplasty Register Association (NARA). Acta Orthop 2012;83(5):449-458.

Engesæter LB, Engesæter IØ, Fenstad AM, Havelin LI, Kärrholm J, Garellick G, Pedersen AB, Overgaard S. Low revision rate after total hip arthroplasty in patients with pediatric hip diseases. Evaluation of 14,403 THAs due to DDH, SCFE or Perthes` disease and 288,435 THAs due to primary osteoarthritis in the Danish, Norwegian and Swedish Hip Arthroplasty Registers (NARA). Acta Orthop 2012;83(5):436-41.

Fevang BT, Lygre SH, Bertelsen G, Skredderstuen A, Havelin LI, Furnes O. Good function after shoulder arthroplasty. 1,107 patients with 4 different diagnoses from the Norwegian Arthroplasty Register. Acta Orthop 2012;83(5):467-73.

Kadar T, Dybvik E, Hallan G, Furnes O, Havelin LI. Head material influences of a cemented total hip prosthesis in the Norwegian Arhthroplasty Register. Clin Orthop Relat Res. 2012 Nov;470(11):3007-13.

Rasmussen JV, Olsen BS, Fevang BT, Furnes O, Skytta ET, Rahme H, Salomonsen B, Mohammed KD, Page RS, Carr AJ. A review of national shoulder and elbow joint replacement registries. J Shoulder Elbow Surg 2012 Oct;21(10):1328-35.

Ellison P, Hallan G, Høl PJ, Gjerdet NR, Havelin LI. Coordinating retrieval and register studies improves postmarket surveillance. Clin Orthop Relat Res. 2012 Nov;470(11):2995-3002.

Hallan G, Espehaug B, Furnes O, Wangen H, Høl PJ, Ellison P, Havelin LI. Is there still a place for the cemented titanium femoral stem? 10,108 cases from the Norwegian Arthroplasty Register. Acta Orthop 2012;83(1):1-6.

Havelin LI, Robertsson O, Fenstad AM, Overgaard S, Garellick G, Furnes O. A Scandinavian experience of register collaboration: The Nordic Arthroplasty Register Assosiation (NARA). J Bone Joint Surg Am 2011;93:Suppl 3(E):13-9.

Paxton EW, Furnes O, Namba RS, Inacio MCS, Fenstad AM, Havelin LI. Comparison of the Norwegian Knee Arthroplasty Register and a United States Arthroplasty Registry. J Bone Joint Surg Am 2011;93:Suppl 3(E):20-30.

Lehmann T, Engesæter IØ, Laborie LB, Lie SA, Rosendahl K, Engesæter LB. Total hip arthroplasty in young adults, with focus on Perthes` disease and slipped capital femoral epiphysis. Acta Orthop 2011;83(2):159-64.

Dale H, Skråmm I, Løwer HL, Eriksen HM, Espehaug B, Furnes O, Skjeldestad FE, Havelin LI, Engesæter LB. Infection after primary hip arthroplasty. A comparison of 3 Norwegian health registers. Acta Orthop 2011 Dec;82(6):646-54.

Lindalen E, Havelin LI, Nordsletten L, Dybvik E, Fenstad AM, Hallan G, Furnes O, Høvik Ø, Röhrl SM. Is reverse hybrid hip replacement the solution? 3,963 primary hip replacements with cemented cup and uncemented stem, from the Norwegian Arthroplasty Register. Acta Orthop 2011 Dec;82(6):639–645.

Engesæter LB, Dale H, Schrama JC, Hallan G, Lie SA. Surgical procedures in the treatment of 784 infected THAs reported to the Norwegian Arthroplasty Register. Best survival with 2-stage exchange revision, but also good results with debridement and retention of the fixed implant. Acta Orthop 2011;(5):530-37.

Espehaug B, Furnes O, Engesæter LB, Havelin LI. Hip arthroplasty in Norway 1989-2008. Tidsskr Nor Legeforen 2011 131:1543-6.

Krukhaug Y, Lie SA, Havelin LI, Furnes O, Hove LM. Results of 189 wrist replacements. A report from the Norwegian Arthroplasty Register. Acta Orthop 2011 June 10;82(4):405-9.

Lygre SH, Espehaug B, Havelin LI, Vollset SE, Furnes O. Failure of total knee arthroplasty with or without patella resurfacing. A study from the Norwegian Arthroplasy Register with 0-15 years of follow-up. Acta Orthop 2011 Jun;82(3):282-92.

Ranstam J, Kärrholm J, Pulkkinen P, Mäkelä K, Espehaug, B, Pedersen AB, Mehnert F, Furnes O. Statistical analysis of arthroplasty data. II. Guidelines. Acta Orthop 2011 May;82(3):258-67.

Ranstam J, Kärrholm J, Pulkkinen P, Mäkelä K, Espehaug, B, Pedersen AB, Mehnert F, Furnes O. Statistical analysis of artrhoplasty data. I. Introduction and background. Acta Orthop 2011 May;82(3):253-57.

Engesæter LB, Dale H, Schrama JC, Hallan G, Lie SA. Surgical procedures in the treatment of 784 infected THAs reported to the Norwegian Arthroplasty Register. Best survival with 2-stage exchange revision, but also good results with debridement and retention of the fixed implant. Acta Orthop 2011;82(5):530-37.

Apold H, Meyer HE, Espehaug B, Nordsletten B, Havelin LI, Flugsrud GB. Weight gain and the risk of total hip replacement. A population-based prospective cohort study of 265,725 individuals. Osteoarthritis Cartilage 2011 Jul;19(7):809-15.

Gøthesen Ø, Espehaug B, Havelin LI, Petursson G, Furnes O. Short-term outcome of 1,465 computer-navigated primary total knee replacements 2005-2008. Acta Orthop 2011 May;82(3):293-300.

Engesæter IØ, Lehmann T, Laborie LB, Lie SA, Rosendahl K, Engesæter LB. Total hip replacement in young adults with hip dysplasia. Age at diagnosis, previous treatment, quality of life, and validation of diagnoses reported to the Norwegian Arthroplasty Register between 1987 and 2007. Acta Orthop 2011 Apr;82(2):149-54.

Lygre SH, Espehaug B, Havelin LI, Furnes O, Vollset SE. Pain and function in patients after primary unicompartmental and knee arthroplasty. J Bone Joint Surg Am 2010;92:2890-97.

Fevang BT, Lie SA, Havelin LI, Engesæter LB, Furnes O. Improved results of primary total hip replacement. Results from the Norwegian Arthroplasty Register, 1987-2007. Acta Orthop 2010;81(6):649-59.

Jämsen E, Furnes O, Engesæter LB, Konttinen YT, Odgaard A, Stefánsdóttir A, Lidgren L. Prevention of deep infection in joint replacement surgery. Acta Orthop 2010;81(6):660-66.

Johanson P-E, Fenstad AM, Furnes O, Garellick G, Havelin LI, Overgaard S, Pedersen AB, Kärrholm. Inferior outcome after hip resurfacing arthroplasty than after conventional arthroplasty. Evidence from the Nordic Arthroplasty Register Association (NARA) database, 1995 to 2007. Acta Orthop 2010;81(5):535-41.

Schrama JC, Espehaug B, Hallan G, Engesæter LB, Furnes O, Havelin LI, Fevang BT. Risk of revision for infection in primary total hip and knee arthroplasty in patients with rheumatoid arthritis: A prospective, population-based study on 108,786 hip and knee joint arthroplasties from the Norwegian Arthroplasty Register. Arthritis Care & Research 2010 April;62(4):473-79.

Robertsson O, Bizjajeva S. Fenstad AM, Furnes O, Lidgren L, Mehnert F, Odgaard A, Pedersen AB, Havelin LI. Knee arthroplasty in Denmark, Norway and Sweden. Acta Orthop 2010;81(1):82-89.

Lygre SH, Espehaug B, Havelin LI, Vollset SE, Furnes O. Does patella resurfacing really matter? Pain and function in 972 patients after primary total knee arthoplasty. An observational study from the Norwegian Arthroplasty Register. Acta Orthop 2010 Feb;81(1):99-107.

Hallan G, Dybvik E, Furnes O, Havelin LI. Metal-backed acetabular components with conventional polyethylene: A review of 9113 primary components with a follow-up of 20 years. J Bone Joint Surg Br 2010 Feb;92(2):196-201

Lie SA, Pratt N, Ryan P, Engesæter LB, Havelin LI, Furnes O, Graves S. Duration of the increase in early postoperative mortality after elective hip and knee replacement. J Bone Joint Surg Am 2010;92(1):58-63

Dale H, Hallan G, Espehaug B, Havelin LI, Engesæter LB. Increasing risk of revision due to deep infection after hip Arthroplasty. Acta Orthop 2009;80(6):639-45

Dybvik E, Furnes O, Fosså SD, Trovik C, Lie SA. Long-term risk of receiving a total hip replacement in cancer patients. Cancer Epidemiol 2009 Oct;33(3-4):235-41.

Havelin LI, Fenstad AM, Salomonsson R, Mehnert F, Furnes O, Overgaard S, Pedersen AB, Herberts P, Kärrholm J, Garellick G. The Nordic Arthroplasty Register Association. A unique collaboration between 3 national hip arthroplasty registries with 280, 201 THRs. Acta Orthop 2009;80:4,393-401.

Espehaug B, Furnes O, Engesæter LB, Havelin LI. 18 years of results with cemented primary hip prostheses in the Norwegian Arthroplasty Register: concerns about some newer implants. Acta Orthop 2009;80:4,402-12.

Cummins JS, Tomek IM, KantorSR, Furnes O, Engesæter LB, Finlayson SR. Cost-effectiveness of antibiotic-impregnated bone cement used in primary total hip arthroplasty. J Bone Joint Surg Am. 2009;91(3):634-41.

Fevang BT, Lie SA, Havelin LI, Skredderstuen A, Furnes O. Results after 562 total elbow replacements: A report from the Norwegian Arthroplasty Register. J Shoulder Elbow Surg. 2009 May-June;18(3):449-56.

Fevang BT, Lie SA, Havelin LI, Skredderstuen A, Furnes O. Risk factors for revision after shoulder arthroplasty. 1825 shoulder arthroplasties from the Norwegian Arthroplasty Register. Acta Orthop 2009;80:1,83-91.

Hulleberg G, Aamodt A, Espehaug B, Benum P. A clinical and radiographic 13-year follow-up study of 138 Charnley hip arthroplasties in patients 50-70 years old. Comparison of university hospital data and registry data. Acta Orthop 2008; 79:1-9.

Engesæter IØ, Lie SA, Lehmann TG, Furnes O, Vollset SE, Engesæter LB. Neonatal hip instability and risk of total hip replacement in younger adulthood. Follow-up of 2,218,596 newborns from the Medical Birth Registry of Norway in the Norwegian Arthroplasty Register. Acta Orthop 2008 Jun;79(3):321-26.

Reigstad O, Siewers P, Røkkum M, Espehaug B. Excellent long-term survival of an uncemented press-fit stem and screw cup in young patients. Follow-up of 75 hips for 15-18 years. Acta Orthop 2008;79:194-202.

Engesæter LB, Furnes O, Havelin LI. Developmental dysplasia of the hip – good results of later total hip Arthroplasty: 7135 primary total hip arthroplasties after developmental dysplasia of the hip compared with 59774 total hip arthroplasties in idiopathic coxarthrosis followed for 0 to 15 years in the Norwegian Arthroplasty Register. J Arthroplasty 2008;23:235-40.

Hallan G, Furnes O, Lie SA, Engesæter LB, Havelin LI. Medium and long-term performance of 11 516 uncemented primary femoral stems from the Norwegian Arthroplasty register. J Bone Joint Surg 2007;89-B:1574-80.

Arthursson A, Furnes O, Espehaug B, Havelin LI, Søreide JA. Prosthesis survival after total hip arthroplasty - does surgical approach matter? Analysis of 19304 Charnley and 6002 Exeter primary total hip arthroplasties reported to the Norwegian Arthroplasty Register. Acta Orthop 2007;78:719-29.

Figved W, Dybvik E, Frihagen F, Furnes O, Madsen JE, Havelin LI, Nordsletten L. Conversion from failed hemiarthroplasties to total hip arthroplasty. A Norwegian Arthroplasty Register analysis of 595 hips with previous femoral neck fractures. Acta Orthop 2007;78:711-8.

Fevang BT, Lie SA, Havelin LI, Brun JG, Skredderstuen A, Furnes O. 257 ankle arthroplasties performed in Norway between 1994 to 2005. Acta Orthop 2007;78:575-83.

Kurtz S, Ong K, Scheimer J, Mowat F, Kaled S, Dybvik E, Kärrholm J, Garellick G, Havelin LI, Furnes O, Malchaug H, Lau E. Future clinical and economic impact of revision THA and TKA. J Bone Joint Surg 2007;89-B(Suppl 3):144-51.

Lie SA, Hallan G, Engesæter LB, Havelin LI, Furnes O. Isolated acetabular liner exchange compared with complete acetabular component revision in revision of primary uncemented acetabular components. A study of 1649 revisions from the Norwegian Arthroplasty register. J Bone Joint Surg 2007;89-B:591-4.

Flugsrud GB, Nordsletten L, Espehaug B, Havelin LI, Meyer HE. The effect of middle-age body weight and physical activity on the risk for early revision hip arthroplasty. A cohort study in 1535 persons. Acta Orthop 2007 Feb;78(1):99-107.

Fevang BT, Lie SA, Havelin LI, Engesæter LB, Furnes O. Reduction in orthopedic surgery among patients with chronic inflammatory joint disease in Norway, 1994-2004. Arthritis Rheum 2007;57:529-32.

Furnes O, Espehaug B, Lie SA, Vollset SE, Engesæter LB, Havelin LI. Failure mechanisms after unicompartmental and tricompartmental primary knee replacement with cement. J Bone Joint Surg 2007;89-A:519-525.

Slover J, Espehaug B, Havelin LI, Engesæter LB, Furnes O, Tomek I, Tosteson A. Cost-effectiveness of unicompartmental and total knee arthroplasty in elderly low-demand patients. J Bone Joint Surg 2006;88-A:2348-55.

Lohmander LS, Engesæter LB, Herberts P, Ingvarsson T, Lucht U, Puolakka TJS. Standardized incidence rates of total hip replacement for primary hip osteoarthritis in the 5 Nordic countries:similarities and differences. Acta Orthop 2006;77:733-40

Engesæter LB, Espehaug B, Lie SA, Furnes O, Havelin LI. Does cement increase the risk for infection in primary total hip arthroplasty. Revision rates in 56275 cemented and uncemented primary THAs followed for 0-16 years in the Norwegian Arthroplasty register. Acta Orthop 2006; 77:351-8.

Lie SA. Early mortality after elective hip surgery [guest editorial]. Acta Orthop 2006;77:345-6.

Flugsrud GB, Nordsletten L, Espehaug B, Havelin LI, Engeland A, Meyer HE. The impact of body mass index on later osteoarthritis of the hip varies with age at screening. A cohort study in 1.2 million persons. Arthritis Rheum 2006;54:802-7.

Espehaug B, Furnes O, Havelin LI, Engesæter LB, Vollset SE, Kindseth O. Registration completeness to the Norwegian Arthroplasty Register. Acta Orthop 2006;77:49-56.

Arthursson AJ, Furnes O, Espehaug B, Havelin LI, Søreide JA. Validation of data in the Norwegian Arthroplasty Register and the Norwegian Patient Register. 5134 primary total hip arthroplasties and revisions operated at a single hospital between 1987 and 2003. Acta Orthop 2005;76:823-828.

Aamodt A, Nordsletten L, Havelin LI, Indrekvam K, Utvåg SE, Hviding K. Documentation of hip prostheses used in Norway. A critical review of the literature from 1996-2000. Acta Orthop Scand 2004;75:663-76.

Furnes O. Hofteproteser og sementer. Tidsskr Nor Lægeforen 2004;124:2455.

Småbrekke A, Espehaug B, Havelin LI, Furnes O. Operating time and survival of primary total hip replacements. A review of 31,745 primary cemented and uncemented total hip replacements from local hospitals reported to the Norwegian Arthroplasty Register 1987-2001. Acta Orthop Scand 2004;75:524-32.

Lie SA, Havelin LI, Engesæter LB, Gjessing HK, Vollset SE. Dependency issues in survival analyses of 55782 primary hip replacements from 47355 patients. Stat Med 2004;23:3227-40.

Lie SA, Furnes O, Havelin LI, Espehaug B, Engesæter LB, Vollset SE. [The Norwegian Arthroplasty Register. Beneficial for the patients and the Norwegian health care system]. The Norwegian Journal of Epidemiology 2004;14:57-63.

Lie SA. Havelin LI, Engesæter LB, Furnes O, Vollset SE. Failure rates for 4762 revision total hip arthroplasties in the Norwegian Arthroplasty Register. J Bone Joint Surg 2004;86-B:504-9.

Byström S, Espehaug B, Furnes O, Havelin LI. Femoral head size is a risk factor for total hip luxation: a study of 42,987 primary hip arthroplasties from the Norwegian Arthroplasty Register. Acta Orthop Scand 2003;74:514-24.

Engesæter LB, Lie SA, Espehaug B, Furnes O, Vollset SE, Havelin LI. Antibiotic prophylaxis in total hip arthroplasty: effects of antibiotic prophylaxis systemically and in bone cement on the revision rate of 22,170 primary hip replacements followed 0-14 years in the Norwegian Arthroplasty Register. Acta Orthop Scand 2003;74:644-51.

Furnes O, Havelin LI, Espehaug B, Engesæter LB, Lie SA, Vollset SE. [The Norwegian registry of joint prostheses--15 beneficial years for both the patients and the health care]. Tidsskr Nor Lægeforen 2003;123:1367-9.

Flugsrud GB, Nordsletten L, Espehaug B, Havelin LI, Meyer HE. Weight change and the risk of total hip replacements. Epidemiology 2003;14:578-84.

Lie SA. [Patients in the Norwegian Arthroplasty Register]. Revmatikeren 2003;5:18-9.

Havelin LI, Espehaug B, Engesæter LB. The performance of two hydroxyapatite- coated acetabular cups compared with Charnley cups. From the Norwegian Arthroplasty Register. J Bone Joint Surg 2002;84-B:839-45.

Lie SA, Engesæter LB, Havelin LI, Furnes O, Vollset SE. Early postoperative mortality after 67,548 total hip replacements. Causes of death and tromboprophylaxis in 68 hospitals in Norway from 1987 to 1999. Acta Orthop Scand 2002;73:392-9.

Furnes O, Espehaug B, Lie SA, Vollset SE, Engesæter LB, Havelin LI. Early failures among 7174 primary total knee replacements. A follow-up study from The Norwegian Arthroplasty Register 1994-2000. Acta Orthop Scand 2002;73:117-29.

Flugsrud GB, Nordsletten L, Espehaug B, Havelin LI, Meyer HE. Risk factors for total hip replacement due to primary osteoarthritis: a cohort study in 50,034 persons. Arthritis Rheum 2002;46:675-82.

Espehaug B, Furnes O, Havelin LI, Engesæter LB, Vollset SE. The type of cement and failure of total hip replacements. J Bone Joint Surg 2002;84-B:832-8.

Furnes O, Lie SA, Espehaug B, Vollset SE, Engesæter LB, Havelin LI. Hip disease and the prognosis of total hip replacements. A review of 53 698 primary total hip replacements reported to the Norwegian Arthroplasty Register 1987-1999. J Bone Joint Surg 2001;83-B:579-86.

Lie SA. [Mortality after total hip replacements]. Nordisk Geriatrik 2000;4:72.

Lie SA, Havelin LI, Engesæter LB, Gjessing HK, Vollset SE. Mortality after total hip replacement: 0-10 year follow-up of 39,543 patients in the Norwegian Arthroplasty Register. Acta Orthop Scand 2000;71:19-27.

Havelin LI, Espehaug B, Lie SA, Engesæter LB, Furnes O, Vollset SE. The Norwegian Arthroplasty Register. 11 years and 73,000 arthroplasties. Acta Orthop Scand 2000;71:337-53.

Havelin LI. The Norwegian Joint Registry. Bull Hosp Jt Dis. 1999;58:139-48.

Espehaug B, Havelin LI, Engesæter LB, Vollset SE. The effect of hospital-type and operating volume on the survival of hip replacements. A review of 39,505 primary total hip replacements reported to the Norwegian Arthroplasty Register, 1988-1996. Acta Orthop Scand 1999;70:12-8.

Espehaug B, Havelin LI, Engesæter LB, Langeland N, Vollset SE. Patient satisfaction and function after primary and revision total hip replacement. Clin Orthop 1998;351:135-48.

Furnes O, Lie SA, Havelin LI, Vollset SE, Engesæter LB. Exeter and Charnley arthroplasties with Boneloc or high viscosity cement. Comparison of 1127 arthroplasties followed for 5 years in the Norwegian Arthroplasty Register. Acta Orthop Scand 1997;68:515-20.

Espehaug B, Engesæter LB, Vollset SE, Havelin LI, Langeland N. Antibiotic prophylaxis in total hip arthroplasty. Review of 10,905 primary cemented total hip replacements reported to the Norwegian Arthroplasty Register, 1987-1995. J Bone Joint Surg 1997;79-B:590-5.

Espehaug B, Havelin LI, Engesæter LB, Langeland N, Vollset SE. Patient-related risk factors for early revision of total hip replacements - A population register-based case-control study. Acta Orthop Scand 1997;68:207-15.

Reigstad A. [Joint prostheses-development, quality and public regulation]. Tidsskr Nor Lægefor 1996 Oct 20;116(25):2990-1.

Furnes A, Lie SA, Havelin LI, Engesæter LB. [Quality control of prosthetic replacements of knee, ankle, toe, shoulder, elbow and finger joints in Norway 1994. A report after the first year of registration of joint prostheses in the national registry.] Tidsskr for Nor Lægefor 1996;116:1777-81.

Furnes A, Lie SA, Havelin LI, Engesæter LB, Vollset SE. The economic impact of failures in total hip replacement surgery. The Norwegian Arthroplasty Register 1987-1993. Acta Orthop Scand 1996;67:115-21.

Skeide BE, Lie SA, Havelin LI, Engesæter LB. [Total hip arthroplasty after femoral neck fractures. Results from the national registry on joint prostheses.] Tidsskr Nor Lægefor 1996;116:1449-51.

Engesæter LB, Furnes A, Havelin LI, Lie SA, Vollset SE. [The hip registry. Good economy for society.] Tidsskr Nor Lægefor 1996;116:3025-7.

Espehaug B, Havelin LI, Engesæter LB, Vollset SE, Langeland N. Early revision among 12,179 hip prostheses. A comparison of 10 different prosthesis brands reported to the Norwegian Arthroplasty Register, 1987-1993. Acta Orthop Scand 1995;66:487-93.

Havelin LI, Vollset SE, Engesæter LB. Revision for aseptic loosening of uncemented cups in 4.352 primary total hip prostheses. A report from the Norwegian Arthroplasty Register. Acta Orthop Scand 1995;66:494-500.

Havelin LI, Espehaug B, Vollset SE, Engesaeter LB. The effect of cement type on early revision of Charnley total hip prostheses. A review of 8,579 primary arthroplasties from the Norwegian Arthroplasty Register. J Bone Joint Surg 1995;77-A:1543-50.

Havelin LI, Espehaug B, Vollset SE, Engesæter LB. Early aseptic loosening of uncemented femoral components in primary total hip replacement. A review based on the Norwegian Arthroplasty Register. J Bone Joint Surg 1995;77-B:11-7.

Havelin LI, Espehaug B, Vollset SB, Engesæter LB. Early failures among 14,009 cemented and 1,326 uncemented prostheses for primary coxarthrosis. The Norwegian Arthroplasty Register, 1987-1992. Acta Orthop Scand 1994;65:1-6.

Havelin LI, Espehaug B, Vollset SE, Engesæter LB, Langeland N. The Norwegian Arthroplasty Register. A survey of 17,444 total hip replacements. Acta Orthop Scand 1993;64:245-51.

Engesæter LB, Havelin LI, Espehaug B, Vollset SE. [Artificial hip joints in Norway. A national registry of total hip arthroplasties.] Tidsskr Nor Laegefor 1992;112:872-5.

Nasjonalt Hoftebruddregister (46 stk)

Alm CE, Frihagen F, Dybvik E, Matre K, Madsen JA, Gjertsen JE. Implants for trochanteric fractures in Norway: the role of the trochanteric stabilizing plate- a study on 20,902 fractures from the Norwegian hip fracture register 2011-2017. Journal of Orthopaedic Surgery and Research. 2021 Jan 7;16(1):26

Kjærvik C, Stensland E, Byhring HS, Gjertsen JE, Dybvik E, Søreide O. Hip fracture treatment i Norway. Deviation from evidence-based treatment guidelines: Data from the Norwegian hip fracture register, 2014 to 2018. BoneJointOpen;2020;1-10:644-653

Lian T, Dybvik E, Gjertsen JE, Dale H, Westberg M, Nordsletten L, Figved W. Compliance with national guidelines for antibiotic prophylaxis in hip fracture patients: a quality assessment study of 13 329 patients in the Norwegian hip fracture register. BMJ. 2020 May 20;10(5):e035598

Horner NS, Grønhaug Larsen KM, Svantesson E, Samuelsson K, Ayeni OR, Gjertsen JE, Östman B. Timing of hip hemiarthroplasty and the influence on prosthetic joint infection. PLoS One. 2020 Mar 12;15(3):e0229947

Kristensen TB, Gjertsen JE. Valg av protese ved lårhalsbrudd. Tidsskr Nor Legeforen. 2020 Mar 9;140(4)

Boutera A, Dybvik E, Hallan G, Gjertsen JE. Is there a weekend effect after hip fracture surgery? A study of 74,410 hip fractures reported to the Norwegian hip fracture register. Acta Orthop. 2020 feb;91(1):63-68

Kristensen TB, Dybvik E, Kristoffersen M, Dale H, Engesæter LB, Furnes O, Gjertsen JE. Reply to the letter to the editor: Cemented or uncemented hemiarthroplasty for femoral neck fracture? Data from the Norwegian hip fracture register. Clin Orthop Relat Res. 2020 Jan 29;478:1-3

Pollmann CT, Dahl FA, Røtterud JHM, Gjertsen JE, Årøen A. Surgical site infection after hip fracture- mortality and risk factors: an observational cohort study of 1,709 patients. Acta Orthop. 2020 Jan 24;91(3):347-352

Kristoffersen MH, Dybvik E, Steihaug OM, Kristensen TB, Engesæter LB, Ranhoff AH, Gjertsen JE. Cognitive impairment influences the risk of reoperation after hip fracture surgery: results of 87,573 operations reported to the Norwegian hip fracture register. Acta Orthop. 2020 Jan 13;91(2):146-151

Kristensen TB, Dybvik E, Kristoffersen M, Dale H, Engesæter LB, Furnes O, Gjertsen JE. Cemented or uncemented hemiarthroplasty for femoral neck fracture? Data from the Norwegian hip fracture register. Clin Orthop Relat Res. 2020 Jan;478(1):90-100

Gjertsen JE. Should total hip arthroplasty be used for hip fracture? N. Engl J Med. 2019 Dec 5;381(23):2261-2262

Leer-Salvesen S, Engesæter LB, Dybvik E, Furnes O, Kristensen TB, Gjertsen JE. Does time from fracture to surgery affect mortality and intraoperative medical complications for hip fracture patients? Bone Joint J. 2019 Sep;101-B(9):1129-1137

Kristoffersen MH, Dybvik E, Steihaug OM, Bartz-Johannesen CA, Martinsen MI, Ranhoff AH, Engesæter LB, Gjertsen JE. Validation of orthopaedic surgeons’ assessment of cognitive function in patients with acute hip fracture. BMC Musculoskelet Disord. 2019 Jun 1;20(1):268.

Pollmann CT, Røtterud JH, Gjertsen JE, Dahl FA, Lenvik O, Årøen A. Fast track hip fracture care and mortality- an observational study of 2230 patients. BMC Musculoskeletal Disorders. 2019 May 24;20(1):248

Bartels S, Gjertsen JE, Frihagen F, Rogmark C, Utvåg S. Correspondence: High failure rate after internal fixation and beneficial outcome after arthroplasty in treatment of displaced femoral neck fractures in patients between 55 and 70 years. Acta Orthop. 2019 Feb;90(1):94-95

Kristensen TB, Dybvik E, Furnes O, Engesæter LB, Gjertsen JE. More reoperations for periprosthetic fracture after cemented hemiarthroplasty with polished taper-slip stems than after anatomical and straight stems in the treatment of hip fractures. Bone Joint J. 2018 Dec;100-B(12):1565-1571

Leer-Salvesen S, Dybvik E, Engesæter LB, Dahl OE, Gjertsen JE. Low-molecular-weight heparin for hip fracture patients treated with osteosynthesis: should thromboprophylaxis start before or after surgery? An observational study of 45,913 hip fractures reported to the Norwegian hip fracture register. Acta Ortop. 2018 Dec;89(6):615-621

Authen AL, Dybvik E, Furnes O, Gjertsen JE. Surgeon`s experience level and risk of reoperation after hip fracture surgery: an observational study on 30,945 patients in the Norwegian hip fracture register 2011-2015. Acta Ortop. 2018 4 Jun;89(5):496-502

Bartels S, Gjertsen JE, Frihagen F, Rogmark C, Utvåg SE. High failure rate after internal fixation and beneficial outcome after arthroplasty in treatment of displaced femoral neck fractures in patients between 55 and 70 years. Acta Orthop. 2017 Sep 15;89(1):53-58

Johansen A, Golding D, Brent L, Close J, Gjertsen JE, Holt G, Hommel A, Pedersen AB, Röck ND, Thorngren KG. Using national hip fracture registries and audit databases to develop an international perspective. Injury. 2017 Aug 2;48(10):2174-2179

Gjertsen JE, Dybvik E, Furnes O, Fevang JM, Havelin LI, Matre K, Engesæter LB. Improved outcome after hip fracture surgery in Norway. Acta Ortop. 2017 Jul 6;88(5):505-511

Kristensen TB, Vinje T, Havelin LI, Engesæter LB, Gjertsen JE. Correspondence. Posterior approach compared to direct lateral approach resulted in better patient-reported outcome after hemiarthroplasty for femoral neck fracture. Acta Ortop. 2017 Jun;88(3):361-362

Kristensen TB, Vinje T, Havelin LI, Engesæter LB, Gjertsen JE. Correspondence. Posterior approach compared to direct lateral approach resulted in better patient-reported outcome after hemiarthroplasty for femoral neck fracture. Acta Ortop. 2017 Apr;88(2):234-234

Leer-Salvesen S, Dybvik E, Dahl OE, Gjertsen JE, Engesæter LB. Correspondence. Thromboprophylaxis for venous thromboembolism prevention in hip fracture patients. Acta Orthop. 2017 Jan 9;88(2):236-237

Ruths S, Baste V, Bakken MS, Engesæter LB, Lie SA, Haugland S. Municipal resources and patient outcomes through the first year after a hip fracture. BMC Health Serv Res. 2017 Feb 16;17(1):144

Kristensen TB, Vinje T, Havelin LI, Engesæter LB, Gjertsen JE. Posterior approach compared to direct lateral approach resulted in better patient-reported outcome after hemiarthroplasty for femoral neck fracture. Acta Orthop. 2017 Feb;88(1):29-34

Leer-Salvesen S, Dybvik E, Dahl OE, Gjertsen JE, Engesæter LB. Postoperative start compared to preoperative start of low-molecular-weight heparin increases mortality in patients with femoral neck fractures. Acta Orthop. 2017 Feb;88(1):48-54

Gjertsen JE, Baste V, Fevang JM, Furnes O, Engesæter LB. Quality of life following hip fractures: results from the Norwegian hip fracture register. BMC Musculoskelet Disord. 2016 Jul 7;17:265

Bakken MS, Schjøtt J, Engeland A, Engesæter LB, Ruths S. Antipsychotic drugs and risk of hip fracture in people aged 60 and older in Norway. J Am Geriatr Soc 2016 Jun;64(6):1203-9

Ruths S, Bakken MS, Ranhoff AH, Hunskaar S, Engesæter LB, Engeland A. Risk of hip fracture among older people using antihypertensive drugs: a nationwide cohort study. BMC Geriatr. 2015 Dec 1;15:153.

Bakken MS, Engeland A, Engesæter LB, Ranhoff AH, Hunskaar S, Ruths S. Risk of hip fracture among older people using anxiolytic and hypnotic drugs: a nationwide prospective cohort study. Eur J Clin Pharmacol. 2014;70:873-880.

Gjertsen JE, Fenstad AM, Leonardsson O, Engesæter LB, Kärrholm J, Furnes O, Garellick G, Rogmark C. Hemiarthroplasties after hip fractures in Norway and Sweden: a collaboration between the Norwegian and Swedish national registries. Hip Int 2014 May-Jun;24(3):223-30.

Pripp AH, Talsnes O, Reikerås O, Engesæter LB, Dahl OE. The proportion of perioperative mortalities attributed to cemented implantation in hip fracture patients treated by hemiarthroplasty. Hip Int. 2014 Jul-Aug;24(4):363-8

Rogmark C, Fenstad AM, Leonardsson O, Engesæter LB, Kärrholm J, Furnes O, Garellick G, Gjertsen JE. Posterior approach and uncemented stems increases the risk of reoperations after hemiarthroplasties in elderly hip fracture patients. An analysis of 33,205 procedures in the Norwegian and Swedish national registries. Acta Orthop. 2014;85(1):18-25.

Gjertsen JE, Lie SA, Vinje T, Engesæter LB, Hallan G, Matre K, Furnes O. Authors` reply Cobb correspondence: J-E Gjertsen, SA. Lie , T. Vinje, et al. More re-operations after uncemented than cemented hemiarthroplasty used in the treatment of displaced fractures of the femoral neck: An observational study of 11 116 hemiarthroplasties from a national register. Bone Joint J. 2013 Jun;95-B(6):862.

Talsnes O, Vinje T, Gjertsen JE, Dahl OE, Engesæter LB, Baste V, Pripp AH, Reikerås O. Perioperative mortality in hip fracture patients treated with cemented and uncemented hemiprosthesis: a register study of 11,210 patients. Int Orthop. 2013 Jun;37(6)1135-40.

Bakken MS, Engeland A, Engesæter LB, Ranhoff AH, Hunskaar S, Ruths S. Increased risk of hip fracture among older people using antidepressant drugs: data from the Norwegian Prescription Database and the Norwegian Hip Fracture Registry. Age and Ageing 2013 Jul;42(4):514-20.

Matre K, Havelin LI, Gjertsen JE, Espehaug B, Fevang JM. Reply to letter to the editor: Intramedullary nails result in more reoperations than sliding hip screws in two-part interochanteric fractures. Clin Orthop Relat Res. 2013 May;471(5):1735

Matre K, Havelin LI, Gjertsen JE, Vinje T, Espehaug B, Fevang JM. Sliding hip screw versus IM nail in reverse oblique trochanteric and subtrochanteric fractures. A study of 2716 patients in the Norwegian Hip Fracture Register. Injury, Int. J. Care Injur. 2013 Jun;44(6)735-42.

Matre K, Havelin LI, Gjertsen JE, Espehaug B, Fevang JM. Intramedullary nails result in more reoperations than sliding hip screws in two-part intertrochanteric fractures. Clin Orthop Relat Res. 2013 Apr;471(4):1379-86.

Gjertsen JE, Lie SA, Vinje T, Engesæter LB, Hallan G, Matre K, Furnes O. More re-operations after uncemented than cemented hemiarthroplasty used in the treatment of displaced fractures of the femoral neck. An observational study of 11 116 hemiarthroplasties from a national register. J Bone Joint Surg Br 2012;94-A:1113-19.

Gjertsen JE, Fevang JM, Matre K, Vinje T, Engesæter LB. Clinical outcome after undisplaced femoral neck fractures. A prospective comparison of 14,757 undisplaced and displaced fractures reported to the Norwegian Hip Fracture Register. Acta Orthop 2011;82(3):268-74.

Gjertsen JE, Vinje T, Engesæter LB, Lie SA, Havelin LI, Furnes O, Fevang JM. Internal screw fixation compared with bipolar hemiarthroplasty for treatment of displaced femoral neck fractures in elderly patients. A national register based study on 1,031 patients. J Bone Joint Surg Am 2010 Mar;92-A(3):619-628.

Gjertsen JE, Vinje T, Lie SA, Engesæter LB, Havelin LI, Furnes O, Fevang J. Patient satisfaction, pain and quality of life 4 months after displaced femoral neck fracture. Acta Orthop 2008;79:594-601

Gjertsen JE, Engesæter LB, Furnes O, Havelin LI, Steindal K, Vinje T, Fevang J. The Norwegian Hip Fracture Register. Experiences after the first 2 years and 15 576 reported operations. Acta Orthop. 2008;79:583-593

Gjertsen JE, Lie SA, Fevang J, Vinje T, Engesæter LB, Havelin LI, Furnes O. Total hip replacement after femoral neck fractures in elderly patients: results of 8,577 fractures reported to the Norwegian Arthroplasty Register. Acta Orthop 2007;78:491-7.

Gjertsen JE, Fevang J, Vinje T, Engesæter LB, Steindal K, Furnes O. Nasjonalt hoftebruddregister. Norsk Epidemiologi 2006;16:89-94.

Nasjonalt Korsbåndregister (71 stk)

Krogsgaard MR, Brodersen J, Christensen KB, Siersma V, Jensen J, Hansen CF, Engebretsen L, Visnes H, Forssblad M, Comins JD. How to translate and locally adapt a PROM. Assessment of cross-cultural differential item functioning. Scand J Med Sci Sports. 2021 May;31(5):999-1008

Lind M, Strauss MJ, Nielsen T, Engebretsen L. Low surgical routine increases revision rates after quadriceps tendon autograft for angerior cruciate ligament reconstruction: results from the Danish knee ligament reconstruction registry. Knee Surg Sports Traumatol Arthrosc. 2020 Sep 4[Epub ahead of print]

Lind M, Strauss MJ, Nielsen T, Engebretsen L. Quadriceps tendon autograft for anterior cruciate ligament reconstruction is associated with high revision rates: results for the Danish knee ligament registry. Knee Surg Traumatol Arthrosc. 2020 Jul;28(7):2163-2169

Ekeland A, Engebretsen L, Fenstad AM, Heir S. Similair risk of ACL graft revision for alpine skiers, football and handball players: the graft revision rate is influenced by age and graft choice. Br J Sports Med. 2020 Jan;54(1):33-37

Snaebjörnsson T, Hamrin Senorski E, Svantesson E, Westin O, Persson A, Karlsson J, Samuelsson K. Graft fixation and timing of surgery are predictors of early anterior cruciate ligament revision: A cohort study from the Swedish and Norwegian knee ligament registries based on 18,425 patients. JB JS Open Access. 2019 Dec 12;4(4):e0037

Snaebjörnsson T, Svantesson E, Sundemo D, Westin O, Sansone M, Engebretsen L, Hamrin-Senorski E. Young age and high BMI are predictors of early revision surgery after primary anterior cruciate ligament reconstruction: a cohort study from the Swedish and Norwegian knee ligament registries based on 30,747 patients. Knee Surg Sports Traumatol Arthrosc. 2019 Nov;27(11):3583-3591

Snaebjörnsson T, Hamrin-Senorski E, Svantesson E, Karlsson L, Engebretsen L, Karlsson J, Samuelsson K. Graft diameter and graft type as predictors of anterior cruciate ligament revision: A cohort study including 18,425 patients from the Swedish and Norwegian national knee ligament registries. J Bone Joint Surg Am. 2019 Oct 16;101(20):1812-1820

Lie MM, Risberg MA, Storheim K, Engebretsen L, Øiestad BE. What`s the rate of knee osteoarthritis 10 years after anterior cruciate ligament injury? An updated systematic review. Br J Sports Med. 2019 Sep;53(18):1162-1167

Vap AR, Persson A, Fenstad AM, Moatshe G, LaPrade RF, Engebretsen L. Re-revision anterior cruciate ligament reconstruction: An evaluation from the Norwegian knee ligament registry. Arthroscopy. 2019 Apr 30;35(6):1695-1701

Hamrin Senorski E, Svantesson E, Engebretsen L, Lind M, Forssblad M, Karlsson J, Samuelsson K. 15 years of the Scandinavian knee ligament registries: lessons, limitations and likely prospects. Br J Sports Med. 2019 Apr 9;53(20):1259-1260

Inderhaug E, Drogseth JO, Lygre SHL, Gifstad T. No effect of graft size or body mass index on risk of revision after ACL reconstruction using hamstrings autograft. Knee Surg Sports Traumatol Arthrosc. 2019 Feb 7;28(3):707-713

Owesen C, Røtterud JH, Engebretsen L, Årøen A. Effect of activity at time of injury and concomitat ligament injuries on patient-reported outcome after posterior cruciate ligament reconstruction. Orthop J Sports Med. 2018 Dec 28;6(12):2325967118817297

Ulstein S, Årøen A, Engebretsen L, Forssblad M, Lygre SHL, Røtterud JH. A controlled comparison of microfracture, debridement, and no treatment of concomitant full-thickness cartilage lesion in anterior cruciate ligament-reconstructed knees: A nationwide prospective cohort study from Norway and Sweden of 368 patients with 5-year follow-up. Orthop J Sports Med. 2018 Aug 1;6(8):2325967118787767

Aga C, Risberg MA, Fagerland MW, Johansen S, Trøan I, Heir S, Engebretsen L. No difference in the KOOS quality of life subscore between anatomic double-bundle and anatomic single-bundle anterior cruciate ligament reconstruction of the knee: A prospective randomized controlled trial with 2 yeas follow-up. Am J Sports Med. 2018 Aug;46(10):2341-2354

Ulstein S, Årøen A, Engebretsen L, Forssblad M, Lygre SHL, Røtterud JH. Effect of concomitant cartilage lesions on patient-reported outcomes after anterior cruciate ligament reconstruction: A nationwide cohort study from Norway and Sweden of 8470 patients with 5-year follow-up. Orthop J Sports Med. 2018 Jul 24;6(7):2325967118786219

Hamrin SE, Svantesson E, Baldari A, Ayeni OR, Engebretsen L, Franceschi F, Karlsson J, Samuelsson K. Factors that affect patient reported outcome after anterior cruciate ligament reconstruction- a systematic review of the Scandinavian knee ligament registers. Br J Sports Med. 2018 Jul 20;53(7):410-417

Svantesson E, Hamrin SE, Baldari A, Ayeni OR, Engebretsen L, Franceschi F, Karlsson J, Samuelsson K. Factors associated with additional anterior cruciate ligament reconstruction and register comparison: a systematic review on the Scandinavian knee ligament registers. Br J Sports Med. 2018 Jul 17;53(7):418-425

Prentice HA, Lind M, Mouton C, Persson A, Magnusson H, Gabr A, Seil R, Engebretsen L, Samuelsson K, Karlsson J, Forssblad M, Haddad FS, Spalding T, Funahashi TT, Paxton LW, Maletis GB. Patient demographic and surgical characteristics in anterior cruciate ligament reconstruction; a description of registries from six countries. Br J Sports Med. 2018 Jun;52(11):716-722

Orchard JW, Engebretsen L, Feller JA. The rate of anterior cruciate ligament reconstruction in Australia is high: a national registry is needed. Med J Aust. 2018 May 7;208(8):341-342

Ingelsrud LH, Terwee CB, Terluin B, Granan LP, Engebretsen L, Mills KAG, Roos EM. Meaningful change scores in the knee injury and osteoarthritis outcome score in patients undergoing anterior cruciate ligament reconstruction. Am J Sports Med. 2018 Apr;46(5):1120-1128

Randsborg PH, Bukholm IRK, Jakobsen RB. Compensation after treatment for anterior cruciate ligament injuries: a review of compensation claims in Norway from 2005 to 2015. Knee Surg Sports Traumatol Arthrosc. 2018 Feb;26(2):628-633

Persson A, Gifstad T, Lind M, Engebretsen L, Fjeldsgaard K, Drogset JO, Forssblad M, Espehaug B, Kjellsen AB, Fevang JM. Graft fixation influences revision risk after ACL reconstruction with hamstring tendon autografts. Acta Orthop. 2017 Nov 24;89(2):204-210

Owesen C, Aas E, Årøen A. Surgical reconstruction is a cost-efficient treatment option for isolated PCL injuries. Knee Surg Sports Traumatol Arthrosc. 2017 Jul 14;26(4):1053-1058

Engen CN, Årøen A, Engebretsen L. Development of a pilot cartilage surgery register. BMC Musculoskelet Disord. 2017 Jun 30;18(1):282

Aga C, Kartus JT, Lind M, Lygre SHL, Granan LP, Engebretsen L. Risk of revision was not reduced by a double-bundle ACL reconstruction technique: Results from the Scandinavian registers. Clin Orthop Relat Res. 2017 oct;475(10):2503-2512

Soreide E, Granan LP, Hjorthaug GA, Espehaug B, Dimmen S, Nordsletten L. The effect of limited perioperative nonsteroidal anti-inflammatory drugs on patients undergoing anterior cruciate ligament reconstruction. Am J Sports Med. 2016 Dec;44(12):3111-3118.

Ulstein S, Bredland K, Årøen A, Engebretsen L, Røtterud JH. No negative effect on patient-reported outcome of concomitant cartilage lesions 5-9 years after ACL reconstruction. Knee Surg Sports Traumatol Arthrosc. 2016 May 19;25(5):1482-1488

Moksnes H, Engebretsen L, Seil R. The ESSKA paediatric anterior cruciate ligament monitoring initiative. Knee Surg Sports Traumatol Arthrosc. 2016 Mar;24(3):680-7.

Røtterud JH, Sivertsen EA, Forssblad M, Engebretsen L, Årøen A. Effect on patient-reported outcomes of debridement or microfracture of concomitant full-thickness cartilage lesions in anterior curciate ligamet-reconstructed knees: A nationwide cohort study from Norway and Sweden of 357 patients with 2-year follow-up. Am J Sports Med. 2016 Feb;44(2):337-44

Persson A, Kjellsen AB, Fjeldsgaard K, Engebretsen L, Espehaug B, Fevang JM. Registry data highlight increased revision rates for endobutton/biosure HA in ACL reconstruction with hamstring tendon autograft. A nationwide cohort study from the Norwegian Knee Ligament Registry, 2004-2013. Am J Sports Med. 2015 Sep;43(9):2182-8.

Owesen C, Sandven-Thrane S, Lind M, Forssblad M, Granan LP, Årøen A. Epidemiology of surgically treated posterior cruciate ligament injuries in Scandinavia. Knee Surg Sports Traumatol Arthrosc. 2015 Sep 19;25(8):2384-2391

Magnussen RA, Trojani C, Granan LP, Neyret P, Colombet P, Engebretsen L, Wright RW, Kaeding CC, MARS Group, SFA Revision ACL Group. Patient demographics and surgical characteristics in ACL revision: a comparison of French, Norwegian and North American cohorts. Knee Surg Sports Traumatol Arthrosc. 2015 Aug;23(8):2339-48.

Owesen C, Sivertsen EA, Engebretsen L, Granan LP, Årøen A. Patients with isolated PCL injuries improve from surgery as much as patients with ACL injuries after 2 years. Ortop J Sports Med. 2015 Aug 19;3(8):2325967115599539.

Ingelsrud LH, Granan LP, Engebretsen L, Roos E. Proportion of patients reporting acceptable symptoms or treatment failure and their associated KOOS values at 6 to 24 months after anterior cruciate ligament reconstruction. Am J Sports Med. 2015 Aug;43(8):1902-7.

LaPrade CM, Dornan GJ, Granan LP, LaPrade RF, Engebretsen L. Outcomes after anterior cruciate ligament reconstruction using the Norwegian knee ligament registry of 4691 patients: How does meniscal repair or resection affect short-term outcomes? Am J Sports Med. 2015 Jul;43(7):1591-7.

Engebretsen L, Forssblad M, Lind M. Why registries analysing cruciate ligament surgery are important. Br J Sports Med. 2015 May;49(10):636-8

Granan LP, Baste V, Engebretsen L, Inacio MC. Associations between inadequate knee function detected by KOOS and prospective graft failure in an anterior cruciate ligament-reconstructed knee. Knee Surg Sports Traumatol Arthrosc. 2015 Apr;23(4):1135-40.

Lynch AD, Logerstedt D, Grindem H, Eitzen I, Hicks GE, Axe MJ, Engebretsen L, Risberg MA, Snyder-Mackler L. Consensus criteria for defining 'successful outcome' after ACL injury and reconstruction: a Delaware-Oslo ACL cohort investigation. Br J Sports Med. 2015 Mar;49(5):335-42.

Grindem H, Granan LP, Risberg MA, Engebretsen L, Snyder-Mackler L, Eitzen I. How does a combined preoperative and postoperative rehabilitation programme influence the outcome of ACL reconstruction 2 years after surgery? A comparison between patients in the Deleware-Oslo ACL Cohort and the Norwegian National Knee Ligament Registry. Br J Sports Med. 2015 Mar;49(6):385-9.

Gifstad T, Foss OA, Engebretsen L, Lind M, Forssblad M, Albrektsen G, Drogset JO. Lower risk of revision with patellar tendon autografts compared with hamstring autografts: a registry study based on 45,998 primary ACL reconstructions in Scandinavia. Am J Sports Med. 2014 Oct;42(10):2319-28.

Persson A, Fjeldsgaard K, Gjertsen JE, Kjellsen AB, Engebretsen L, Hole RM, Fevang JM. Increased risk of revision with hamstring tendon grafts compared with patellar tendon grafts after anterior cruciate ligament reconstruction. A study of 12,643 patients from the Norwegian Cruciate Ligament Registry, 2004-2012. Am J Sports Med. 2014 Feb;42(2):285-91.

Engebretsen L. ACL surgery is not for all patients, nor for all surgeons. Knee Surg Sports Traumatol Arthrosc. 2014 Jan;22(1):1-2.

Wijdicks CA, Michalski MP, Rasmussen MT, Goldsmith MT, Kennedy NI, Lind M, Engebretsen L, LaPrade RF. Superficial medial collateral ligament anatomic augmented repair versus anatomic reconstruction: an in vitro biomechanical analysis. Am J Sports Med. 2013 Dec;41(12):2858-66.

Wijdicks CA, Kennedy NI, Goldsmith MT, Devitt BM, Michalski MP, Årøen A, Engebretsen L, LaPrade RF. Kinematic analysis of the posterior cruciate ligament, part 2 : A comparison of anatomic single- versus double-bundle reconstruction. Am J Sports Med. 2013 Dec;41(12):2839-48.

Kennedy NI, Wijdicks CA, Goldsmith MT, Michalski MP, Devitt BM, Årøen A, Engebretsen L, LaPrade RF. Kinematic analysis of the posterior cruciate ligament, part 1: The individual and collective function of the anterolateral and posteromedial bundles. Am J Sports Med. 2013 Dec;41(12):2828-38.

Granan LP, Inacio MC, Maletis GB, Funahashi TT, Engebretsen L. Sport-spesific injury pattern recorded during anterior cruciate ligament reconstruction. Am J Sports Med. 2013 Dec;41(12):2814-8.

Andersen CA, Clarsen B, Johansen TV, Engebretsen L. High prevalence of overuse injury among iron-distance triathletes. Br J Sports Med. 2013 Sep;47(13):857-61.

Moksnes H, Engebretsen L, Risberg MA. Prevalence and incidence of new meniscus and cartilage injuries after a nonoperative treatment algorithm for ACL tears in skeletally immature children : A prospective MRI study. Am J Sports Med. 2013 Aug;41(8):1771-9.

Goldsmith MT, Jansson KS, Smith SD, Engebretsen L, LaPrade RF, Wijdicks CA. Biomechanical comparison of anatomic single- and double-bundle anterior cruciate ligament reconstructions: an in vitro study. Am J Sports Med. 2013 Jul;41(7):1595-604.

Moksnes H, Engebretsen L, Eitzen I, Risberg MA. Functional outcomes following a non-operative treatment algorithm for anterior cruciate ligament injuries in skeletally immature children 12 years and younger : A prospective cohort with 2 years follow-up. Br J Sports Med. 2013 May;47(8):488-94.

Arøen A, Sivertsen EA, Owesen C, Engebretsen L, Granan LP. An isolated rupture of the posterior cruciate ligament results in reduced preoperative knee function in comparison with an anterior cruciate ligament injury. Knee Surg Sports Traumatol Arthrosc. 2013 May;21(5):1017-22.

Aga C, Rasmussen MT, Smith SD, Jansson KS, LaPrade RF, Engebretsen L, Wijdicks CA. Biomechanical comparison of interference screws and combination screw and sheath devices for soft tissue anterior cruciate ligament reconstruction on the tibial side. Am J Sports med. 2013 Apr;41(4):841-8.

Øiestad BE, Holm I, Engebretsen L, Aune AK, Gunderson R, Risberg MA. The prevalence of patellofemoral osteoarthritis 12 years after anterior cruciate ligament reconstruction. Knee Surg Sports Traumatol Arthrosc. 2013 Apr;21(4):942-9.

Røtterud JH, Sivertsen E, Forssblad M, Engebretsen L, Årøen A. Effect of meniscal and focal cartilage lesions on patient-reported outcome after anterior cruciate ligament reconstruction : A aationwide cohort study from Norway and Sweden of 8476 patients with 2-Year follow-up. Am J Sports Med. 2013 Mar;41(3):535-43.

Getgood A, Collins B, Slynarski K, Kurowska E, Parker D, Engebretsen L, MacDonald PB, Litchfield R. Short-term safety and efficacy of a novel high tibial osteotomy system: a case controlled study. Knee Surg Sports Traumatol Arthrosc. 2013 Jan;21(1):260-9.

Granan LP, Inacio MC, Maletis GB, Funahashi TT, Engebretsen L. Intraoperative findings and procedures in culturally and geographically different patient and surgeon populations: an anterior cruciate ligament reconstruction registry comparison between Norway and the USA. Acta Orthop. 2012 Dec;83(6):577-82.

Ytterstad K, Granan LP, Ytterstad B, Steindal K, Fjeldsgaard K, Furnes O, Engebretsen L. Registration rate in the Norwegian Cruciate Ligament Register: large-volume hospitals perform better. Acta Orthop. 2012 Apr;83(2):174-8.

Røtterud JH, Risberg MA, Engebretsen L, Arøen A. Patients with focal full-thickness cartilage lesions benefit less from ACL reconstruction at 2-5 years follow-up. Knee Surg Sports Traumatol Arthrosc. 2012 Aug;20(8):1533-9.

Røtterud JH, Sivertsen EA, Forssblad M, Engebretsen L, Årøen A. Effect of gender and sports on the risk of full-thickness articular cartilage lesions in anterior cruciate ligament - injured knees: a nationwide cohort study from Sweden and Norway of 15 783 patients. Am J Sports Med. 2011 Jul;39(7):1387-94.

Maletis GB, Granan LP, Inacio MCS, Funahashi TT, Engebretsen L. Comparison of community-based ACL Reconstruction Registries in the U.S and Norway. J Bone Joint Surg Am 2011;93:Suppl 3(E):31-6.

Ytterstad K, Granan LP, Engebretsen L. The Norwegian Cruciate Ligament Registry has a high degree of completeness. Tidsskr Nor Legeforen 2011 Feb;131(3):248-50.

Hjermundrud V, Bjune TK, Risberg MA, Engebretsen L, Arøen A. Full-thickness cartilage lesion do not affect knee function in patients with ACL injury. Knee Surg Sports Traumatol Arthrosc 2010 Mar;18(3):298-303.

Heir S, Nerhus TK, Røtterud JH, Løken S, Ekeland A, Engebretsen L, Årøen A. Focal cartilage defects in the knee impair quality of life as much as severe osteoarthritis: a comparison of knee injury and osteoarthritis outcome score in 4 patient categories scheduled for knee surgery. Am J Sports Med 2010 Feb; 38(2);231-7.

Magnussen RA, Granan LP, Dunn WR, Amendola A, Andrish JT, Brophy R, Carey JL,Flanigan D, Huston LJ, Jones M, Kaeding CC, McCarty EC, Marx RG, Matava MJ, Parker RD, Vidal A, Wolcott M, Wolf BR, Wright RW, Spindler KP, Engebretsen L. Cross-cultural comparison of patients undergoing ACL reconstruction in the United States and Norway. Knee Surg Sports Traumatol Arthrosc 2010 Jan;18(1):98-105.

Granan LP, Forssblad M, Lind M, Engebretsen L. The Scandinavian ACL registries 2004-2007: baseline epidemiology. Acta Orthop 2009 Oct;80(5):563-7.

Granan LP, Bahr R, Lie SA, Engebretsen L. Timing of anterior cruciate ligament reconstructive surgery and risk of cartilage lesions and meniscal tears: a cohort study based on the Norwegian National Knee Ligament Registry. Am J Sports Med 2009 May;37(5):955-61.

Engebretsen L, Forssblad M. Why knee ligament registries are important. Kne Surg Sports Traumatol Arthrosc 2009 Feb;17(2):115-6.

Årøen A, Hjermundrud V, Kvist T, Engebretsen L, Risberg MA. Preoperatively no significant difference in functional scoring (KOOS) in anterior cruciate ligament-injured knees with and without a full-thickness cartilage lesion. BJSM The Journal of Sport and Exercise Medicine, June 2008; Vol. 42, No.6.

Moksnes H, Engebretsen L, Risberg MA. Performance-baced functional outcome for children 12 years or younger following anterior cruciate ligament injury: a two to nine-year follow-up study. Knee Surg Sports Traumatol Arthrosc, 2008 Mar;16(3):214-223.

Granan LP, Bahr R, Steindal K, Furnes O, Engebretsen L. Development of a national cruciate ligament surgery registry – the Norwegian National Knee Ligament registry. Am J Sports Med 2008;36:308-15.

Solumshengslet K, Granan LP, Furnes O, Steindal K, Engebretsen L. Registreringsgrad i Nasjonalt Korsbåndregister. Norsk Idrettsmedisin 2007;2:7,9-11.

Granan LP, Engebretsen L, Bahr R. Kirurgi ved fremre korsbåndskader i Norge - sett fra et idrettsmedisinsk perspektiv. Norsk Idrettsmedisin 2004;4:3-4.

Granan LP, Engebretsen L, Bahr R. Kirurgi ved fremre korsbåndskader i Norge. Tidsskr Nor Legeforen 2004;124:928-30.

Kliniske studier knyttet til Nasjonal kompetansetjeneste for Leddproteser og hoftebrudd (58 stk)

Chokotho L, Donnelley CA, Young S, Lau BC, Wu HH, Mkandawire N, Gjertsen JE, Hallan G, Agarwal-Harding KJ, Shearer D. Cost utility analysis of intramedullary nailing and skeletal traction treatment for patients with femoral shaft fractures in Malawi. Acta Orthop. 2021 Mar 24;[Epub ahead of print]

Høl PJ, Hallan G, Indrekvam K. Metal ion levels in the blood of patients with metal-on-metal hip prostheses. Tidsskr Nor Laegeforen. 2021 Jan 11;141(1)

Ngoie LB, Dybvik E, Hallan G, Gjertsen JE, Mkandawire N, Varela C, Young S. Prevalence, causes and impact of musculoskeletal impairment in Malawi: A national cluster randomized survey. PLOS ONE. 2021 Jan 6;16(1):e0243536

Chokotho L, Wu HH, Shearer D, Lau BC, Nyengo M, Gjertsen JE, Hallan G, Young S. Outcome at 1 year in patients with femoral shaft fractures treated with intramedullary nailing or skeletal traction in a low-income country: a prospective observational study of 187 patients in Malawi. Acta Orthopaedica. 2020 Dec;91(6):724-731

Hjelle AM, Gjertsen JE, Apalset EM, Nilsen RM, Lober A, Tell GS, Mielnik P. No association between osteoporosis and AO classification of distal radius fractures: an observational study of 289 patients. BMC Musculoskelet Disord. 2020 Dec 4;21(1):811

Olsen U, Lindberg MF, Denison EM, Rose CJ, Gay CL, Aamodt A, Brox JI, Skare Ø, Furnes O, Lee KA, Lerdal A. Predictors of chronic pain and level of physical function in total knee arthroplasty: a protocol for a systematic review and meta-analysis. BMJ Open. 2020 Sep 10;10(9):e037674

Nystad TW, Fenstad AM, Fevang BT. Major differences in medical and surgical treatment of psoriatic arthritis and rhematoid arthritis: a comparison of two historic cohorts. Scand J Rheumatol. 2020 Jul;49(4):267-270

Gøthesen Ø, Skaden Ø, Dyrhovden GS, Petursson G, Furnes O. Computerized Navigation. A useful tool in total knee replacement. JBJS Essential Surgical Techniques. 2020 June 12;10(2):e0022

Leer-Salvesen S, Dybvik E, Ranhoff AH, Husebø BL, Dahl OE, Engesæter LB, Gjertsen JE. Do direct oral anticoagulants (DOACs) cause delayed surgery, longer length of hospital stay, and poorer outcome for hip fracture patients? European Geriatric Medicine. 2020 Mar 31;11(4):563-569

Borgen TT, Bjørnerem Å, Solberg LB, Andreasen C, Brunborg C, Stenbro MB, Hübschle LM, Figved W, Apalset EM, Gjertsen JE, Basso T, Lund I, Hansen AK, Stutzer JM, Dahl C, Nordsletten L, Frihagen F, Eriksen EF. Determinants of trabecular bone score and prevalent vertebral fractures in women with fragility fractures: a cross-sectional sub-study of NoFRACT. Osteoporos Int. 2020 Mar;31(3):505-514

Lie SA, Lygre GB, Reichhelm I, Eggum E, Bull VH, Gjengedal H. Data fra Helfo og Norsk pasientskadeerstatning gir liten informasjon om kvalitet og omfang av behandling med tannimplantater i Norge. Nor Tannlegeforen Tid. 2019;129:776-82

Refsum AM, Nguyen UV, Gjertsen JE, Espehaug B, Fenstad AM, Lein RK, Ellison P, Høl PJ, Furnes O. Cementing technique for primary knee arthroplasty: a scoping review. Acta Orthop. 2019 Aug 27;90(6):582-589

Bartels S, Gjertsen JE, Frihagen F, Rogmark C, Utvåg SE. Low bone density and high morbidity in patients between 55 and 70 years with displaced femoral neck fractures: a case-control study of 50 patients vs 150 normal controls. BMC Musculoskelet Disord. 2019 Aug 14;20(1):371

Borgen TT, Bjørnerem Å, Solberg LB, Andreasen C, Brunborg C, Stenbro MB, Hübschle LM, Froholdt A, Figved W, Apalset EM, Gjertsen JE, Basso T, Lund I, Hansen AK, Stutzer JM, Omsland TK, Nordsletten L, Frihagen F, Eriksen EF. Post-fracture risk assessment: Target central sited fractures first! A substudy of NoFRACT. J Bone Miner Res. 2019 Aug 16;34(11):2036-2044

Chokotho L, Lau BC, Conway D, Wu HH, Shearer D, Hallan G, Gjertsen JE, Mkandawire N, Young S. Validation of Chichewa short musculoskeletal function assessment (SMFA) questionnaire: A cross-sectional study. Malawi Med J. 2019 Mar;31(1):65-70

Borgen TT, Bjørnerem Å, Solberg LB, Andreasen C, Brunborg C, Stenbro MB, Hübschle LM, Froholdt A, Figved W, Apalset EM, Gjertsen JE, Basso T, Lund I, Hansen AK, Stutzer JM, Dahl C, Omsland TK, Nordsletten L, Frihagen F, Eriksen EF. High prevalence of vertebral fractures and low trabecular bone score in patients with fragility fractures: A cross-sectional sub-study of NoFRACT. Bone. 2019 Feb 8;122:14-21

Andreasen C, Solberg LB, Basso T, Borgen TT, Dahl C, Wisløff T, Hagen G, Apalset EM, Gjertsen JE, Figved W, Hübschle LM, Stutzer JM, Elvenes J, Joakimsen RM, Syversen U, Eriksen EF, Nordsletten L, Frihagen F, Omsland TK, Bjørnerem Å. Effect of a fracture Liaison service on the rate of subsequent fracture among patients with a fragility fracture in the Norwegian capture the fracture initiative (NoFRACT): A trial protocol. JAMA Netw open. 2018 Dec 7;1(8):e185701

Nystad TW, Husum YS, Furnes ON, Fevang BS. Incidence and predictive factors for orthopedic surgery in patients with psoriatic arthritis. J Rheumatol. 2018 Nov;45(11):1532-1540

Petursson G, Fenstad AM, Gøthesen Ø, Dyrhovden GS, Hallan G, Röhrl SM, Aamodt A, Furnes O. Computer-Assisted compared with conventional total knee replacement: A multicenter parallel-group randomized controlled trial. J Bone Joint Surg AM. 2018 Aug 1;100(15):1265-1274

Parker M, Raval P, Gjertsen JE. Nail or plate fixation for A3 trochanteric hip fractures: A systematic review of randomised controlled trials. Injury. 2018 May 22;49(7):1319-1323

Steihaug OM, Gjesdal CG, Bogen B, Kristoffersen MH, Lien G, Hufthammer KO, Ranhoff AH. Does sarcopenia predict change in mobility after hip fracture? A multicenter observational study with one-year follow-up. BMC Geriatr. 2018 Mar 5;18(1):65

Nystad TW, Fenstad AM, Furnes O, Fevang BT. Predictors for orthopaedic surgery in patients with rheumatoid arthritis: results from a retrospective cohort study of 1010 patients diagnosed from 1972 to 2009 and followed up until 2015. Scandinavian Journal of Rheumatology. 2018 Feb 15;47(4):282-290

Kutzner I, Hallan G, Høl PJ, Furnes O, Gøthesen Ø, Figved W, Ellison P. Early aseptic loosening of a mobile-bearing total knee replacement. Acta Orthop 2017 Nov 6;89(1):77-83

Steihaug OM, Gjesdal CG, Bogen B, Kristoffersen MH, Lien G, Ranhoff AH. Sarcopenia in patients with hip fracture: A multicenter cross-sectional study. Plos One. 2017 Sep 13;12(9):e0184780

Chokotho L, Mkandawire N, Conway D, Wu HH, Shearer DD, Hallan G, Gjertsen JE Gjertsen, Young S, Lau BC. Validation and reliability of the Chichewa translation of the EQ-5D quality of life questionnaire in adults with orthopaedic injuries in Malawi. Malawi medical journal 2017 June;29(2):84-88

Furnes O. Fibrose i kneleddet. BestPractice 2017 Mai:24-25

Wangen H, Nordsletten L, Boldt JG, Fenstad AM, Beverland DE. The Corail stem as a reverse hybrid – survivorship and x-ray analysis at 10 years. Hip Int. 2017 Feb 8;27(4):354-360

Petursson G, Fenstad AM, Gøthesen Ø, Haugan K, Dyrhovden GS, Hallan G, Röhrl SM, Aamodt A, Nilsson KG, Furnes O. Similar migration in computer-assisted and conventional total knee arthroplasty. Acta Orthop. 2017 Apr;88(2):166-172

Kalson NS, Borthwick LA, Mann DA, Deehan DJ, Lewis P, Mann C, Mont MA, Morgan-Jones R, Oussedik S, Williams FM, Toms A, Argenson JN, Bellemans J, Bhave A, Furnes O, Gollwitzer H, Haddad FS, Hofmann S, Krenn V. International consensus on the definition and classification of fibrosis of the knee joint. Bone Joint J. 2016 Nov;98-B(11):1479-88.

Strand LI, Olsen AL, Nygard H, Furnes O, Magnussen LH, Lygren H, Sundal MA, Skjaerven LH. Basic body awareness therapy and patient education in hip osteoarthritis: a multiple case study. European journal of physiotherapy. 2016; Volume 18(2):116-125.

Jonsson BA, Kadar T, Havelin LI, Haugan K, Espehaug B, Indrekvam K, Furnes O, Hallan G. Oxinium modular femoral heads do not reduce polyethylene wear in cemented total hip arthroplasty at five years: a randomised trial of 120 hips using radiostereometric analysis. Bone Joint J.2015 Nov;97-B(11):1463-9.

Nygard H, Matre K, Fevang JM. Evaluation of timed up and go test as a tool to measure postoperative function and prediction of one year walking ability for patients with hip fracture. Clin Rehabil. 2015 Jun 24;30(5):472-80.

Løwer HL, Dale H, Eriksen HM, Aavitsland P, Skjeldestad FE. Response to letter to the editor regarding: «Surgical site infections after hip arthroplastry in Norway, 2005-2011: Influence of duration and intensity of postdischarge surveillance». American journal of infection control 2015;43:1022-5.

Løwer HL, Dale H, Eriksen HM, Aavitsland P, Skjeldestad FE. Surgical site infections after hip arthroplasty in Norway, 2005-2011: Influence of duration and intensity of postdischarge surveillance. American journal of infection control 2015;43:323-8.

Grosse S, Haugland HK, Lilleng P, Ellison P, Hallan G, Høl PJ. Wear particles and ions from cemented and uncemented titanium-based hip prostheses – a histological and chemical analysis of retrieval material. J Biomed Mater Res B Appl Biomater. 2015 Apr;103(3):709-17.

Hermansen E, Moen G, Fenstad AM, Birketvedt R, Indrekvam K. Spinous process osteotomy to facilitate the access to the spinal canal when decompressing the spinal canal in patients with lumbar spinal stenosis. Asian spine J 2014;8(2):138-144.

Laborie LB, Lehmann TG, Engesæter IØ, Engesæter LB, Rosendahl K. The alpha angle in cam-type femoroacetabular impingement – New reference intervals based on 2038 healthy young adults. Bone Joint J. 2014 Apr;96-B(4):449-54.

Gøthesen Ø, Espehaug B, Havelin LI, Petursson G, Hallan G, Strøm E, Dyrhovden G, Furnes O. Functional outcome and alignment in computer-assisted and conventionally operated total knee replacement. Bone Joint J 2014;96-B:609-18.

Laborie LB, Markestad TJ, Davidsen H, Brurås KR, Aukland SM, Bjørlykke JA, Reigstad H, Indrekvem K, Lehmann TG, Engesæter IØ, Engesæter LB, Rosendahl K. Selective ultrasound screening for developmental hip dysplasia: effect on management and late detected cases. A prospective survey during 1991-2006. Pediatr Radiol. 2014 Apr;44(4):410-24.

Laborie LB, Engesæter IØ, Lehmann TG, Eastwood DM, Engesæter LB, Rosendahl K. Screening strategies for hip dysplasia: long-term outcome of a randomized controlled trial. Pediatrics. 2013 Sept;132(3):492-501.

Dyrhovden GS, Gøthesen Ø, Lygre SH, Fenstad AM, Sørås TE, Halvorsen S, Jellestad T, Furnes O. Is the use of computer navigation in total knee arthroplasty improving implant positioning and function? A comparative study of 198 knees operated at a Norwegian district hospital. BMC musculoskeletal Disord. 2013;14:321.

Young S, Banza LN, Hallan G, Beniyasi F, Kumbukani GM, Munthali BS, Dybvik E, Engesæter LB, Havelin LI. Complications after intramedullary nailing of femoral fractures in low-income country. A prospective study of follow-up, HIV infection, and microbial infection rates after IM nailing of 141 femoral fractures at a central hospital in Malawi. Acta Orthop. 2013;84(5):460-467.

Laborie LB, Lehmann TG. Engesæter IØ, Engesæter LB, Rosendahl K. Is a positive femoroacetabular impingement test a common finding in healthy young adults? Clin Orthop Relat Res.2013 Jul;471(7):2267-77.

Laborie LB, Engesæter IØ, Lehmann TG, Sera F, Dezateux C, Engesæter LB, Rosendahl K. Radiographic measurements of hip dysplasia at skeletal maturity-new reference intervals based on 2,038 19-year-old Norwegians. Skeletal Radiol 2013 Jul;42(7):925-35.

Østerås N, Risberg MA, Kvien TK, Engebretsen L, Nordsletten L, Bruusgaard D, Skjervheim UB, Haugen IK, Hammer HB, Provan SA, Øiestad BE, Semb AG, Rollefstad SCG, Hagen KB, Uhlig T, Slatkowsky-Christensen B, Flugsrud GB, Kjeken I, Grotle M, Sessing S, Edvardsen H, Natvig B. Hand, hip and knee osteoarthritis in a Norwegian population-based study - The MUST protocol. BMC Musculoskelet Disord. 2013 Jul 5;14:201.

Matre K, Vinje T, Havelin LI, Gjertsen JE, Furnes O, Espehaug B, Kjellevold SH, Fevang JM. Trigen intertan intramedullary nail versus sliding hip screw. A prospective, randomized multicenter study on pain, function and complications in 684 patients with an intertrochanteric or subtrochanteric fracture and one year of follow-up. J Bone Joint Surg A. 2013;95:200-8.

Lehmann TG, Engesæter IØ, Laborie LB, Lie SA, Rosendahl K, Engesæter LB. Radiological findings that may indicate a prior silent slipped capital femoral epiphysis in a cohort of 2072 young adults. Bone Joint J. 2013 Apr;95-B(4):452-8.

Young S, Lie SA, Hallan G, Zirkle LG, Engesæter LB, Havelin LI. Risk factors for infection after 46,113 intramedullary nail operations in low- and middle-income countries. World J Surg. 2013 Feb;37(2):349-55.

Lehmann TG, Vetti N, Laborie LB, Engesæter IØ, Engesæter LB, Rosendahl K. Intra- and inter-observer repeatability of radiographic measurements for previously slipped capital femoral epiphysis at skeletal maturity. Acta Radiol 2013 Feb:1-5.

Engesæter IØ, Laborie LB, Lehmann TG, Fevang JM, Lie SA, Engesæter LB, Rosendahl K. Prevalence of radiographic findings associated with hip dysplasia in a population-based cohort of 208119-year-old Norwegians. Bone Joint J 2013 Feb;95-B(2):279-85.

Blomquist J, Solheim E, Liavaag S, Schroeder CP, Espehaug B, Havelin LI. Shoulder instability surgery in Norway. The first report from a multicentre register, with 1-year follow-up. Acta Orthop 2012;83(2):165-170.

Kadar T, Furnes O, Aamodt A, Indrekvam K, Havelin LI, Haugan K, Espehaug B, Hallan G. The influence of acetabular inclination angle on the penetration of polyethylene and migration of the acetabular component. A prospective, radiostereometric study on cemented acetabular components. J Bone Joint Surg Br 2012;94-B:302-7.

Kadar T, Hallan G, Aamodt A, Indrekvam K, Badawy M, Havelin LI, Stokke T, Haugan K, Espehaug B, Furnes O. A randomized study on migration of the Spectron EF and the Charnley flanged 40 cemented femoral components using radiostereometric analysis at 2 years. Acta Orthop 2011 Oct;82(5):538-44.

Young S, Lie SA, Hallan G, Lewis GZ, Engesæter LB, Havelin LI. Low infection rates after 34,361 intramedullary nail operations in 55 low- and middle-income countries. Validation of the Surgical Implant Generation Network (SIGN) Online Surgical Database. Acta Orthop 2011;82(6):737-743.

Engesæter IØ, Laborie LB, Lehmann TG, Sera F, Fevang JM, Pedersen D, Morcuende J, Lie SA, Engesæter LB, Rosendahl K. Radiological findings for hip dysplasia at skeletal maturity. Validation of digital and manual measurement techniques. Skeletal Radiol 2011;41(7):8-85.

Laborie LB, Lehmann TG, Engesæter IØ, Eastwood, DM, Engesæter LB, Rosendahl K. Prevalence of radiographic findings thought to be associated with femoroacetabular impingement in a population-based cohort of 2081 healthy young adults. Radiology 2011 Aug;260(2):494-502.

Ravnskog FA, Espehaug B, Indrekvam K. Randomised clinical trial comparing Hydrofiber and alginate dressings post-hip replacement. J Wound Care. 2011 Mar;20(3):136-42.

Kadar T, Hallan G, Aamodt A, Indrekvam K, Badawy M, Skredderstuen A, Havelin LI, Stokke T, Haugan K, Espehaug B, Furnes O. Wear and migration of highly crossed-linked and conventional cemented polyethylene cups with cobalt chrome or Oxinum femoral heads: a randomized radiostereometric study of 150 patients. J Orthop Res 2011 Aug;29(8):1222-9.

Hallan G, Aamodt A, Furnes O, Skredderstuen A, Haugan K, Havelin LI. Palamed G compared with Palacos R with gentamicin in Charnley total hip replacement. A randomised, radiostereometric study of 60 hips. J Bone Joint Surg 2006;88-B:1143-8

Hallan G, Lie SA, Havelin LI. High wear rates and extensive osteolysis in 3 types of uncemented total hip arthroplasty: a review of the PCA, the Harris Galante and the Profile/Tri-Lock Plus arthroplasties with a minimum of 12 years median follow-up in 96 hips. Acta Orthop 2006;77:575-84.

Foredrag/Abstrakt/Postere fra 2019-2020 (85stk)

Nasjonalt Register for Leddproteser (47stk)

Furnes O. Leddproteseregisteret. NORSMAN; 2021 3. mars; Lunsjwebinar

Fenstad AM, Lygre SHL, Lie SA, Hallan G, Furnes O. Up to thirty years follow up of uncemented femoral components in primary total hip replacement from the Norwegian arthroplasty register- performance and statistical methods. 9th Annual Congress of Arthroplasty Registries (1th Annual virtual congress), 13-15 November 2020; Sydney, Australia

Lygre SHL, Fenstad AM, Lie SA, Hallan G, Furnes O. Twenty-five years of follow up on total knee arthroplasty from the Norwegian arthroplasty register- performance and statistical methods. 9th Annual Congress of Arthroplasty Registries (1th Annual virtual congress), 13-15 November 2020; Sydney, Australia

Lie SA, Fenstad AM, Lygre SHL, Hallan G, Furnes O. Kaplan-Meier and Cox-regression is favourable, compared to competing risk analysis, in the analyses of risk for revision for joint replacements. Primary cemented and uncemented total hip replacements, operated between 1987 and 2000 in the Norwegian arthroplasty register. 9th Annual Congress of Arthroplasty Registries (1th Annual virtual congress), 13-15 November 2020; Sydney, Australia

Furnes O, Fenstad AM, Haug SCD, Melbye SM, Hallan G. The Corail femoral stem: Results with different stem variants from the Norwegian arthroplasty register. 9th Annual Congress of Arthroplasty Registries (1th Annual virtual congress), 13-15 November 2020; Sydney, Australia

Venäläinen MS, Panula VJ, Eskelinen AP, Fenstad AM, Furnes O, Hallan G, Rolfson O, Kärrholm J, Pedersen AB, Overgaard S, Mäkelä K, Elo LL. Development of risk prediction models for revision and death following total hip arthroplasty using the NARA dataset. 9th Annual Congress of Arthroplasty Registries (1th Annual virtual congress), 13-15 November 2020; Sydney, Australia

Pedersen AB, Mailhac A, Andersen IT, Overgaard S, Fenstad AM, Lie SA, Gjertsen JE, Furnes O. The association between duration of anticoagulant thromboprophylaxis in primary total hip arthroplasty and revision rate: A cohort study based on 50,482 patients with osteoarthritis from the Nordic registries. 9th Annual Congress of Arthroplasty Registries (1th Annual virtual congress), 13-15 November 2020; Sydney, Australia

Langvatn H, Dale H. Luftkvalitet på operasjonsstuer. Høstmøtet i Norsk Ortopedisk Forening; 2020 21.-23. oktober; Nettevent

Furnes O, Hallan G. Dokumentasjon av hofte og kneproteser. Høstmøtet i Norsk Ortopedisk Forening; 2020 21.-23. oktober; Nettevent

Hole RM, Fenstad AM, Gjertsen JE, Lie SA, Furnes O. Forebygger tromboseprofylakse død ved primær skulderprotese? Høstmøtet i Norsk Ortopedisk Forening; 2020 21.-23. oktober; Nettevent

Leta TH, Hallan G, Gjertsen JE, Lygre SHL, Heggestad T, Bjørnestad E, Furnes O. Forekomst, årsaker og risikofaktorer for reinnleggelse i sykehus etter primær totalprotese i kne i Norge (2008-2014) Høstmøtet i Norsk Ortopedisk Forening; 2020 21.-23-. oktober; Nettevent

Lygre SHL, Fenstad AM, Lie SA, Hallan G, Furnes O. Tjuefem års oppfølging av primære totale kneproteser fra Nasjonalt Register for Leddproteser- resultater og statistiske metoder. Høstmøtet i Norsk Ortopedisk Forening; 2020 21.-23. oktober; Nettevent

Dybvik E, Kroken G, Solberg M, Fenstad AM, Hallan G, Warholm M, Furnes O. Elektronisk registrering av pasientrapporterte data i Nasjonalt Register for Leddproteser. Høstmøtet i Norsk Ortopedisk Forening; 2020 21.-23. oktober; Nettevent

Thoen PS, Lygre SHL, Nordsletten L, Furnes O, Stigum H, Hallan G, Röhrl SM. Factors associated with dislocation after primary total hip arthroplasty- A study from the Norwegian Arthroplasty register. Høstmøtet i Norsk Ortopedisk Forening; 2020 21.-23. Oktober; Nettevent

Fenstad AM, Lygre SHL, Lie SA, Hallan G, Furnes O. 25 års oppfølging av usementerte femurkomponenter i primære totale hofteproteser fra Nasjonalt Register for Leddproteser-resultater og statisiske metoder. Høstmøtet i Norsk Ortopedisk Forening; 2020 21.-23.oktober; Nettevent

Furnes O. Hvilken dokumentasjon har vi tilgjengelig? Høstmøtet i Norsk Ortopedisk Forening; 2019 23.-25.oktober; Oslo

Dale H, Børsheim S, Kristensen T, Fenstad AM, Gjertsen JE, Hallan G, Lie SA, Furnes O. Perioperativ, kort- og langtids mortalitet relatert til fiksasjonsmåte ved primær total hofteprotese. Høstmøtet i Norsk Ortopedisk Forening; 2019 23.-25.oktober; Oslo

Dale H, Høvding P, Lutro O, Langvatn H, Schrama JC, Skråmm I, Wik TS, Westberg M, Fenstad AM, Engesæter LB. Trend og status presens for revisjoner på grunn av infeksjon i hofteproteseregisteret. Høstmøtet i Norsk Ortopedisk Forening; 2019 23.-25.oktober; Oslo

Dale H, Børsheim S, Kristensen T, Fenstad AM, Gjertsen JE, Hallan G, Lie SA, Furnes O. Implantatoverlevelse av primære totale hofteproteser for ulike fiksasjonsmåter, og innvirkning av alder og kjønn. Høstmøtet i Norsk Ortopedisk Forening; 2019 23.-25.oktober; Oslo

Øhrn FD, Gøthesen Ø, Lygre SH, Peng Y, Lian ØB, Lewis P, Furnes O, Röhrl SM. Increased risk for revision of medial pivot compared to minimally stabilized design in total knee replacement. Høstmøtet i Norsk Ortopedisk Forening; 2019 23.-25.oktober; Oslo

Skåden Ø, Furnes O, Lygre SH, Badawy M, Gøthesen Ø. Korttidsresultater for sementert og usementert Oxford UNI kneprotese fra Nasjonalt register for leddproteser 2012-2018. Høstmøtet i Norsk Ortopedisk Forening; 2019 23.-25.oktober; Oslo

Nguyen UV, Refsum AM, Gjertsen JE, Espehaug B, Fenstad AM, Lein RK, Ellison P, Høl PJ, Furnes O. Sementeringsteknikk ved primær kneprotese. En kunnskapsoppsummering. Høstmøtet i Norsk Ortopedisk Forening; 2019 23.-25.oktober; Oslo

Badawy M, Fenstad AM, Westberg M, Furnes O. Re-revisjoner etter primær totalprotese kne-registerdata for perioden 1994-2018. Høstmøtet i Norsk Ortopedisk Forening; 2019 23.-25.oktober; Oslo

Hallan G, Fenstad AM, Furnes O. Keramikkfrakturer; en sjelden komplikasjon. Resultater fra hofteregisteret. Høstmøtet i Norsk Ortopedisk Forening; 2019 23.-25.oktober; Oslo

Hallan G, Fenstad AM, Gjertsen JE, Furnes O. Dual mobility kopper i pasienter med artrose og lårhalsbrudd; resultater fra 2 NARA-studier. Høstmøtet i Norsk Ortopedisk Forening; 2019 23.-25.oktober; Oslo

Haug SC, Melbye SM, Fenstad AM, Furnes O, Hallan G. Corail-stammen; resultater med ulike stammetyper. 51 281 stammer fra perioden 1987-2018. Høstmøtet i Norsk Ortopedisk Forening; 2019 23.-25.oktober; Oslo

Fenstad AM, Hallan G, Dybvik E, Gjertsen JE, Furnes O. De første pasientrapporterte data fra hofteregisteret. Høstmøtet i Norsk Ortopedisk Forening; 2019 23.-25.oktober; Oslo

Leta TH, Lygre SH, Fenstad AM, Westberg M, Knutsen G, Dale H, Hallan G, Dyrhovden G, Furnes O. Antibiotika i beinsement ved kneprotesekirurgi for å forebygge leddproteseinfeksjon i Norge: En register basert multisenter randomisert kontrollert studie (2019-2024). Høstmøtet i Norsk Ortopedisk Forening; 2019 23.-25.oktober; Oslo

Dybvik E, Solberg M, Fenstad AM, Hallan G, Gjertsen JE, Warholm M, Furnes O. Elektronisk registrering av pasientrapporterte data (PROM) i Nasjonalt regster for leddproteser. Høstmøtet i Norsk Ortopedisk Forening; 2019 23.-25.oktober; Oslo

Hole R, Rasmussen JV, Methlie T, Brorson S, Äärimaa V, Demir Y, Jensen SL, Harjula J, Arverud ED, Fenstad AM, Salomonsson B. Skulderproteser ved glenohumeral artrose. Resultater fra Nordic arthroplasty register association (NARA). Høstmøtet i Norsk Ortopedisk Forening; 2019 23.-25.oktober; Oslo

Hole R, Lehtimäki K, Moeini S, Rasmussen JV, Mokka J, Jensen SL, Arverud ED, Fenstad AM, Salomonsson B, Brorson S, Äärimaa V. Reversert skulderprotese- risiko og årsaker til revisjon. En studie fra Nordic Arthroplasty Register Association (NARA). Høstmøtet i Norsk Ortopedisk Forening; 2019 23.-25.oktober; Oslo

Furnes O. Innlegg om forskning. 2019 30 okt; Styremøte i Helse Bergen, Haukeland Universitetssjukehus: Bergen

Furnes O. Bruk av registerdata til forskning- Nasjonalt register for leddproteser. 2019 18 juni; Bikuben, Haukeland Universitetssjukehus: Bergen

Pedersen AB, Andersen IT, Overgaard S, Fenstad AM, Lie SA, Gjertsen JE, Furnes O. Optimal duration of anticoagulant thromboprophylaxix in total hip osteoarthritis replacement patients- New evidence from the Nordic arthroplasty register associaton (NARA) group. 20th EFORT Congress. 2019 5.-7. June; Lisbon, Portugal

Ferguson R, Silman A, Combescure C, Graves S, Mäkelä K, Paxton L, Cafri G, Frampton C, Hooper G, Furnes O, Fenstad AM, Garland A, Spekenbrink-Spooren A, Wilkinson M, Lübbeke A, Rolfson O. International variation and influence on mortality of ASA class: Data from an international consortium of total hip arthroplasty registries. 8th ISAR Congress. 2019 1.-3. juni; Leiden, Nederland

Steenbergen LN, Mäkelä KT, Kärrholm J, Rolfson O, Overgaard S, Furnes ON, Pedersen AB, Eskelinen A, Hallan G, Schreurs BW, Nelissen RGHH. Total hip arthroplasties in the Dutch Arthroplasty Register (LROI) and the Nordic Arthroplasty Register Association (NARA) – a first comparison of patient and procedure characteristics. 8th ISAR Congress. 2019 1.-3. juni; Leiden, Nederland

Tudor F, Lewis P, Lorimer M, McKie J, Boehm E, Bella J, Robertssson O, Mäkelä K, Furnes O, Bartz-Johannessen C, Nelissen R, Steenbergen LN, Fithian D, Paxton E. Patellofemoral arthroplasty: a mulity-registry analysis. 8th ISAR Congress. 2019 1.-3. juni; Leiden, Nederland

Leta TH, Lygre SHLL, Fenstad AM, Westberg M, Wik TS, Knutsen G, Gjertsen JE, Dale H, Hallan G, Dyrhovden GS, Furnes O. Antibiotic loaded bone cement (ALBC) in prevention of periprosthetic join infections (PJI) in primary total knee arthroplasty (TKA) in Norway – A register based multicenter randomized controlled non-inferiority trial (A project protocol). . 8th ISAR Congress. 2019 1.-3. juni; Leiden, Nederland

Hallan G, Fenstad AM, Furnes O. Fracture of ceramic bearings in primary total hip arthroplasty. A study of 44 cases from a national arthroplasty register with up to 20 years follow-up. 8th ISAR Congress. 2019 1.-3. juni; Leiden, Nederland

Øhrn F, Gøthesen Ø, Lygre SH, Røhrl SM, Lewis P, Furnes O. Medial pivot compared to minimally stabilized design in total knee replacement – A report from the Australian and Norwegian joint replacement registries, 2005-2017. 8th ISAR Congress. 2019 1.-3. juni; Leiden, Nederland

Badawy M, Fenstad AM, Furnes O. Primary constrained and hinged total knee arthroplasty – short and mid-term revision risk compared to unconstrained total knee arthroplasty. A report on 401 cases from the Norwegian Arthroplasty Register. 8th ISAR Congress. 2019 1.-3. juni; Leiden, Nederland

Skåden Ø, Furnes O, Lygre SH, Badawy M, Gøthesen Ø. The new Oxford unicompartmental knee replacement. Results from The Norwegian Arthroplasty Register 2012-2017. 8th ISAR Congress. 2019 1.-3. juni; Leiden, Nederland

Trela-Larsen L, Bartz-Johannessen C, Sayers A, Aram P, McCloskey E, Kadirkamanathan V, Blom A, Lie SA, Furnes O, Wilkinson JM. Predicting patient-specific mortality after hip or kne replacement: An algorithm developed using the National Joint Registry and independently validated using the Norwegian Arthroplasty Regiser. 8th ISAR Congress. 2019 1.-3. juni; Leiden, Nederland

Fenstad AM, Dybvik E. Hvordan bruke interaktiv resultattjeneste i forbedringsarbeid? Helse Vest kvalitets- og registerkonferanse 2019, 9.-10. mai, Flesland, Bergen

Tiulpin A, Saarakkala S, Mathiessen A, Hammer H.B, Furnes O, Fenstad AM, Nordsletten L, Englund M, Magnnusson K. Predicting total knee replacement from ultrasound using machine learning. Poster presentet at OARSI. 2019 May 2-5; Toronto, Canada

Furnes O. Medical devices vigilance and post marketing surveillance- The Norwegian hip registry. 6TH Nordic Pharmacovigilance Conference; 2019 9. April; Oslo, Norway

Wilkinson JM, Trela-Larsen L, Bartz-Johannessen C, Sayers A, Aram P, McCloskey E, Kadirkamanathan V, Blom A, Lie SA, Furnes O. Poster presentation: Predicting patient-specific mortality after hip or knee replacement: An algorithm developed and valiated using the English/Welsh and Norwegian national datasets. ORS Annual meeting; 2019 2.-5. Feb; Austin, USA

Nasjonalt Hoftebruddregister (14 stk)

Gjertsen JE, Kristensen TB, Kristoffersen MH, Hallan G, Furnes O, Dybvik E. Total hip arthroplasty versus hemiarthroplasty for femoral neck fracture? 9th Annual Congress of Arthroplasty Registries (1th Annual virtual congress), 13-15 November 2020; Sydney, Australia

Kristoffersen MH, Dybvik E, Steihaug OM, Kristensen TB, Engesæter LB, Ranhoff AH, Gjertsen JE. Cognitive impairment influences the risk of reoperation after hip fracture surgery: Results of 87,573 operations reported to the Norwegian hip fracture register. 9th Annual Congress of Arthroplasty Registries (1th Annual virtual congress), 13-15 November 2020; Sydney, Australia

Gjertsen JE. Periprostetiske frakturer i vektbærende ledd hos eldre. Høstmøtet i Norsk Ortopedisk Forening; 2020 21.-23. oktober; Nettevent

Kjærvik C, Gjertsen JE, Stensland E, Dybvik E, Byhring HS, Søreide O. Effekt av etterlevelse av retningslinjer for behandling av dislokerte lårhalsbrudd. Høstmøtet i Norsk Ortopedisk Forening; 2020 21.-23. oktober; Nettevent

Kjærvik C, Gjertsen JE. Stensland E, Dybvik E, Byhring HS, Søreide O. Betydelig variasjon i etterlevelse etter retningslinjer for behandling av dislokerte lårhalsbrudd. Høstmøtet i Norsk Ortopedisk Forening; 2020 21.-23. oktober; Nettevent

Kristoffersen MH, Dybvik E, Steihaug OM, Kristensen TB, Engesæter LB, Ranhoff AH, Gjertsen JE. Pasientrapporterte utfallsmål hos hoftebruddpasienter med kognitiv svikt- en studie fra Nasjonalt Hoftebruddregister. Høstmøtet i Norsk Ortopedisk Forening; 2020 21.-23. oktober; Nettevent

Kristensen T, Dybvik E, Dale H, Furnes O, Engesæter LB, Gjertsen JE. Sementerte hemiproteser med rett, anatomisk eller kileformet design eller usementert hemiprotese ved lårhalsbrudd? Høstmøtet i Norsk Ortopedisk Forening; 2019 23.-25.oktober; Oslo

Boutera A, Dybvik E, Gjertsen JE. Betyr utskrivelsesdag fra sykehus noe for mortaliteten etter hoftebrudd? Høstmøtet i Norsk Ortopedisk Forening; 2019 23.-25.oktober; Oslo

Kjærvik C, Stensland E, Dybvik E, Gjertsen JE, Søreide O. Sykehusegenskaper påvirker overlevelse etter hoftebrudd. Høstmøtet i Norsk Ortopedisk Forening; 2019 23.-25.oktober; Oslo

Gjertsen JE. The Norwegian National Hip Fracture Registry. 20th EFORT Congress; 2019 5.-9. juni; Lisboa, Portugal

Leer-Salvesen S, Gjertsen JE, Kristensen T, Furnes O, Dybvik E, Engesæter LB. Does time to surgery influence mortality after hip fracture? An observational study of 48,970 patients reported to the Norwegian hip fracture register. 20th EFORT Congress; 2019 5.-9. juni; Lisboa, Portugal

Boutera A, Dybvik E, Gjertsen JE. Is there a weekend effect after hip fracture surgery at Norwegian hospitals? Results from 74,410 patients in the Norwegian Hip Fracture Register. 8th ISAR Congress. 2019 1.-3. juni; Leiden, Nederland

Kristensen TB, Kristoffersen M, Dybvik E, Dale H, Engesæter LB, Furne O, Gjertsen JE. Cemented or uncemented hemiarthroplasty for femoral neck fractures? Mortality, reoperations, and patient reported outcome after 30,178 operations reported to the Norwegian Hip Fracture Register 2005-2017. 8th ISAR Congress. 2019 1.-3. juni; Leiden, Nederland

Leer-Salvesen S, Gjertsen JE, Dybvik E, Furnes O, Kristensen TB, Engesæter LB. Does preoperative delay affect mortality and risk of reoperations for hip fracture patients? An observational study of 73,557 patients reported to the Norwegian Hip Fracture Register. 8th ISAR Congress. 2019 1.-3. juni; Leiden, Nederland

Nasjonalt Korsbåndregister (5 stk)

Jacobsen R. Hvordan behandle fremre korsbåndsskader best- pragmatiske registerbaserte randomiserte studier i korsbåndregisteret. Høstmøtet i Norsk Ortopedisk Forening; 2020 21.-23. oktober; Nettevent

Sailer M, Årøen A, Skråmm I, Fenstad AM. Bruk av lokal antibiotika ved rekonstruksjon av fremre korsbånd i Norge. Høstmøtet i Norsk Ortopedisk Forening; 2019 23.-25.oktober; Oslo

Straume-Næsheim T, Persson A, Årøen A. Patellaintabilitetsregister- noe å bruke tid og ressurser på? Høstmøtet i Norsk Ortopedisk Forening; 2019 23.-25.oktober; Oslo

Zegzdryn M, Moatshe G, Engebretsen L, Drogset JO, Lygre SH, Visnes H, Persson A. Økt revisjonsrisiko med quadricepsgraft etter primær ACL rekonstruksjon- en studie fra Nasjonalt korsbåndregister. Høstmøtet i Norsk Ortopedisk Forening; 2019 23.-25.oktober; Oslo

Moatshe G, Martin K, Persson A, Fenstad AM, Engebretsen L, Visnes H. The effect of surgical center volume on outcome following anterior cruciate ligament reconstruction. Høstmøtet i Norsk Ortopedisk Forening; 2019 23.-25.oktober; Oslo

Kliniske studier knyttet til Nasjonal kompetansetjeneste for leddproteser og hoftebrudd (16 stk)

Birkenes T, Furnes O, Årøen A, Solheim E, Knutsen G, Drogset JO, Løken S, Engebretsen L, Lygre SHL, Visnes H. Langtidsresultater etter fokal bruskskade i kne. Høstmøtet i Norsk Ortopedisk Forening; 2020 21.-23. oktober; Nettevent

Gøthesen Ø. Computer navigation in TKA- an introduction. Høstmøtet i Norsk Ortopedisk Forening; 2020 21.-23. oktober; Nettevent

Grønhaug KML, Dybvik E, Gjertsen JE, Samuelsson K, Ayeni OR, Östman B. Intramedullære nagler i behandlingen av trokantære og subtrokantære frakturer: Uheldig, heldig eller begge deler? Høstmøtet i Norsk Ortopedisk Forening; 2020 21.-23. oktober; Nettevent

Khan M, Gjertsen JE, Refsum A, Nguyen UV, Høl PJ, Fenstad AM, Furnes O. En spørreundersøkelse om sementeringsteknikker som brukes ved total kneprotesekirurgi ved Norske sykehus. Høstmøtet i Norsk Ortopedisk Forening; 2020 21.-23. oktober; Nettevent

Lindemann KO, Hop KR, Grant KS, Lysne RK, Høl PJ, Aaslund MK, Jellestad T, Furnes O, Badawy M. Aktivitetsmåling av pasienter før og etter kneproteseoperasjon. Høstmøtet i Norsk Ortopedisk Forening; 2020 21.-23. oktober; Nettevent

Johannessen HG, Kadar T, Hallan G, Fenstad AM, Haugan K, Høl PJ, Badawy M, Stokke T, Jonsson B, Indrekvam K, Aamodt A, Furnes O. Plastslitasje etter 10 år. RSA-resultater fra studien Charnley vs Reflection/Spectron EF. Høstmøtet i Norsk Ortopedisk Forening; 2020 21.-23. oktober; Nettevent

Høl PJ, Hallan G, Furnes O, Fenstad AM, Indrekvam K, Kadar T. Metallionenivåer i blod etter 10 år med hofteproteser med ulike hodematerialer. Høstmøtet i Norsk Ortopedisk Forening; 2020 21.-23. oktober; Nettevent

Brekke S, Fenstad AM, Indrekvam K, Badawy M. Resultater etter acetabulær takplastikk med caputgraft ved Kysthospitalet i Hagevik i perioden 1999-2015. Høstmøtet i Norsk Ortopedisk Forening; 2019 23.-25.oktober; Oslo

Gifstad T, Fenstad AM, Foss OA. Proteseoperasjon etter gjennomført artroseskole. Høstmøtet i Norsk Ortopedisk Forening; 2019 23.-25.oktober; Oslo

Hansen VB, Ahmad N, Hellum C, Austevoll I, Otsuki B, Ikeda N, Shimizu T, Strömquist F, Sigmundsson FG, Furnes O, Röhrl SM. Indication and treatment of adult kyphoscoliosis

(Intraks study)-study protocol. Høstmøtet i Norsk Ortopedisk Forening; 2019 23.-25.oktober; Oslo

Øilo M, Høl PJ, Gjerdet NR, Furnes O, Hallan G. Bruddmekanisk analyse av hofteprotesefraktur, retrieval-analyse. Høstmøtet i Norsk Ortopedisk Forening; 2019 23.-25.oktober; Oslo

Djuv A, Fosse L, Paulsen A, Gjertsen JE. Retrospektiv pilotstudie for komplikasjoner ved ustabile trokantære frakturer operert med margnagle eller protese. Høstmøtet i Norsk Ortopedisk Forening; 2019 23.-25.oktober; Oslo

Ludvigsen T, Vetti N, Kristoffersen PM, Toppe MK, Krukhaug Y, Gudmundsdottir RS, Matre K, Dybvik E, Fevang J. Er det korrelasjon mellom funksjonelt resultat og radiologiske målinger hos pasienter operert for distal radiusfraktur? Høstmøtet i Norsk Ortopedisk Forening; 2019 23.-25.oktober; Oslo

Jonsson BA, Gjertsen JE, Stokke T, Haugan K, Furnes O, Hallan G. Migrasjon av corail stamme med og uten krage. En RSA- studie med 61 pasienter fulgt i 2 år. Høstmøtet i Norsk Ortopedisk Forening; 2019 23.-25.oktober; Oslo

Høl PJ, Ellison P, Wolf S, Rogg K, Furnes O, Hallan G. Mekanismer for aseptisk løsning av sementert spectron EF hoftestamme med reflection kopp- En retrievalstudie. Høstmøtet i Norsk Ortopedisk Forening; 2019 23.-25.oktober; Oslo

Ludvigsen T, Fevang JM, Matre K, Gudmundsdottir RS, Krukhaug Y, Dybvik E. Surgical treatment of wrist fractures – External fixation or volar locked plateing? A randomized controlled trial. 20th EFORT Congress; 2019 5.-9. juni; Lisboa, Portugal

Nasjonalt Barnehofteregister (3 stk)

Gundersen T. Epifysiolysis capitis femoris. Behandling og oppfølgning. Høstmøtet i Norsk Ortopedisk Forening; 2020 21.-23. oktober; Nettevent

Gundersen T. Presentasjon av barnehofteregisteret. Høstmøtet i Norsk Ortopedisk Forening; 2020 21.-23. oktober; Nettevent

Gundersen T, Pedersen DR, Holen K, Rasmussen H, Hunstock S, Wiig O, Kroken G. Symptomvarighet før diagnose ved Calvè-Legg-Perthes og Epifysiolyse i hoften- tall fra Barnehofteregisteret. Høstmøtet i Norsk Ortopedisk Forening; 2020 21.-23. oktober; Nettevent

Opertation forms (in Norwegian only)
Data from these forms is the basis of this report.

Nasjonalt Register for Leddproteser
Ortopedisk klinikk, Helse Bergen HF
Haukeland universitetssjukehus, Postboks 1400
Møllendalsbakken 11, 5021 BERGEN
Tlf 55973742/55973743

F.nr. (11 sifre)...
Navn:..
(Skriv tydelig ev. pasientklistrelapp – **spesifiser sykehus**.)

Sykehus:..

HOFTEPROTESER

Alle totale hofteproteseoperasjoner og hemiproteser på annen indikasjon enn fraktur/fraktursekvele registreres her (hemiprotese for fraktur/fraktursekvele registreres på Hoftebruddskjema). Alle reoperasjoner skal registreres: skifte/fjerning av protesedeler, kantplastikk, bløtdelsdebridement, og operasjoner for protesenær fraktur eller gluteal svikt.

TIDLIGERE OPERASJON I AKTUELLE HOFTE (ev. flere kryss)
☐0 Nei
☐1 Osteosyntese for fraktur i prox. femurende
☐2 Hemiprotese pga. fraktur
☐3 Osteotomi
☐4 Artrodese
☐5 Totalprotese(r)
☐6 Annen operasjon ………………………………………………….

AKTUELLE OPERASJON (ett kryss)
☐1 Primæroperasjon (også hvis hemiprotese tidligere)
☐2 Reoperasjon (totalprotese tidligere)
☐3 Primær hemiprotese for annen indikasjon enn fraktur/fraktursekvele

OPERASJONSDATO (dd.mm.åå) |__|__| |__|__| |__|__|

AKTUELLE SIDE (ett kryss) (Bilateral opr.= 2 skjema)
☐1 Høyre ☐2 Venstre

ÅRSAK TIL AKTUELLE OPERASJON (KRYSS AV ENTEN I A ELLER B)

A. Primæroper. pga (ev. flere kryss)
☐1 Idiopatisk coxartrose
☐2 Rheumatoid artritt
☐3 Sekvele etter frakt. colli. fem.
☐4 Sekv. dysplasi
☐5 Sekv. dysplasi med total luksasjon
☐6 Sekv. Perthes
☐7 Sekv. epifysiolyse
☐8 Mb. Bechterew
☐9 Akutt fraktura colli femoris
☐10 Annet…………………………………..
(f.eks caputnekrose, tidl. artrodese o.l)

B. Reoper. pga (ev. flere kryss)
☐1 Løs acetabularkomponent
☐2 Løs femurkomponent
☐3 Luksasjon
☐4 Dyp infeksjon
☐5 Fraktur i acetabulum
☐6 Fraktur av femur
Vancouverklassifikasjon, se bakside.
☐A ☐B1 ☐B2 ☐ B3 ☐C
☐7 Smerter
☐8 Osteolyse i acetab. uten løsning
☐9 Osteolyse i femur uten løsning
☐10 Implantatfraktur femurdel
☐11 Implantatfraktur caput
☐12 Implantatfraktur kopp
☐13 Implantatfraktur liner
☐14 Implantatfraktur annet: ....
....
☐15 Gluteal svikt
☐16 Annet……………………………….
(f.eks Girdlestone etter tidl. infisert protese)

REOPERASJONSTYPE (ev. flere kryss)
☐1 Bytte av femurkomponent
☐2 Bytte av acetabularkomponent
☐3 Bytte av hele protesen
☐4 Fjernet protese og satt inn sementspacer
☐5 Fjernet sementspacer og satt inn ny protese
☐6 Fjernet protese (Girdlestone eller fjerning av sementspacer)
Angi hvilke deler som ble fjernet…………………………………………………
☐7 Bytte av plastforing
☐8 Bytte av caput
☐9 Bløtdelsdebridement
☐10 Ny protese etter Girdlestone
☐11 Resutur av muskel
☐12 Transposisjon av muskel
☐13 Osteosyntese for fraktur
☐14 Konvertering til hemiprotese
☐15 Andre operasjoner ……………………………………………………………….

TILGANG (ett kryss)
☐1 Fremre (Mellom sartorius og tensor)
☐2 Anterolateral (Mellom glut. medius og tensor)
☐3 Direkte lateral (Transgluteal)
☐4 Bakre (Bak gluteus medius)
☐5 Annen ………………………………………………………………………………

MINIINVASIV KIRURGI (MIS) ☐0 Nei ☐1 Ja
LEIE ☐0 Sideleie ☐1 Rygg
TROCHANTEROSTEOTOMI ☐0 Nei ☐1 Ja

BENTRANSPLANTASJON (ev. flere kryss)
Acetabulum ☐0 Nei ☐1 Ja ☐2 Benpakking
Femur ☐0 Nei ☐1 Ja ☐2 Benpakking a.m. Ling/Gie

BENTAP VED REVISJON (Paprosky's klassifikasjon se baksiden)
Acetabulum ☐1 I ☐2 IIA ☐3 IIB ☐4 IIC ☐5 IIIA ☐6 IIIB
Femur ☐1 I ☐2 II ☐3 IIIA ☐4 IIIB ☐5 IV

PROTESEKOMPONENTER (Bruk klistrelapp på baksiden, eller skriv REF.NR.)

Acetabulum
Navn/Type ………………………………………………………………………………
ev. REF.NR. … ……………………………………………………………………..
☐ Med hydroksylapatitt ☐ Uten hydroksylapatitt
☐1 Sement med antibiotika – Navn ………………………………………………………
☐2 Sement uten antibiotika – Navn ………………………………………………………
☐3 Usementert

Femur (+ ev. trokanterdel)
Navn/Type ……………………………………………………………………………...
ev. REF.NR. .. ……………………………………………………………………...
☐ Med hydroksylapatitt ☐ Uten hydroksylapatitt
☐1 Sement med antibiotika – Navn ………………………………………………………
☐2 Sement uten antibiotika – Navn ………………………………………………………
☐3 Usementert

Caput (+ ev. halsdel)
☐1 Fastsittende caput
☐2 Separat caput - Navn/Type ……………………………………………………………
ev. REF. NR. .. ……………………………………………………………………
Diameter ………………………………………………………………………………..

ANTIBIOTIKAPROFYLAKSE ☐0 Nei ☐1 Ja

Navn	*Dosering*	*Varighet i timer*
Medikament 1…………………………………………………		………..timer
Medikament 2…………………………………………………		………..timer
Medikament 3…………………………………………………		………..timer

TROMBOSEPROFYLAKSE
☐0 Nei ☐1 Ja: Første dose ☐1 Preoperativt ☐2 Postoperativt
Medikament 1…………………..Dosering opr.dag…………………………………
Dosering videre……….Varighet……………….døgn
Medikament 2………………….. Dosering…………………Varighet……………….døgn

FAST TROMBOSEPROFYLAKSE
☐0 Nei ☐1 Ja, type: ………………………………………………………………………..

FIBRINOLYSEHEMMER
☐0 Nei ☐1 Ja, medikament: ………………………………….. Dosering………………

OPERASJONSSTUE
☐1 "Green house"
☐2 Operasjonsstue med laminær luftstrøm
☐3 Vanlig operasjonsstue

OPERASJONSTID (hud til hud) ………………………..min

PEROPERATIV KOMPLIKASJON
☐0 Nei
☐1 Ja,hvilke(n) ....

ASA KLASSE (se baksiden for definisjon)
☐1 Frisk
☐2 Asymptomatisk tilstand som gir økt risiko
☐3 Symptomatisk sykdom
☐4 Livstruende sykdom
☐5 Moribund

Lege ....
Legen som har fylt ut skjemaet (navnet registreres ikke i databasen).

2025016 Bergen Grafisk AS 04.2016

RETTLEDNING TIL HOFTEPROTESER

Registreringen gjelder innsetting, skifting og fjerning av totalproteser i hofteledd, samt kantplastikk, bløtdelsrevisjon for infisert protese og hemiproteser på annen indikasjon enn fraktur/fraktursekvele. Hemiprotese for fraktur/ fraktursekvele registreres på Hoftebruddskjema. Ett skjema fylles ut for hver operasjon. Fødselsnummer (11sifre) og sykehusnavn må påføres. Aktuelle ruter markeres med kryss. På eget Samtykkeskjema skal pasienten gi samtykke til rapportering til Leddregisteret.

AKTUELLE OPERASJON

Primæroperasjoner: Første totalproteseoperasjon, og første hemiprotese hvis denne settes inn på annen indikasjon enn fraktur. Hemiprotese for fraktur/fraktursekvele registreres på Hoftebruddskjema.

Reoperasjon (totalprotese tidligere): Fjerning av protesedeler (f.eks. Girdlestone) må registreres. Kantplastikk (f. eks. PLAD), bløtdelsrevisjoner for infeksjon, osteosyntese, resutur av muskel og muskeltransposisjon registreres selv om protesedeler ikke skiftes.

ÅRSAK TIL AKTUELLE OPERASJON

Kryss av under A ved primæroperasjoner og under B ved reoperasjoner. I B må du krysse av for alle årsakene til reoperasjon, eller forklare med fritekst.

REOPERASJONSTYPE

Fjerning av protesedeler (f.eks. Girdlestone) må registreres. Kantplastikk (f. eks. PLAD), bløtdelsrevisjoner for infeksjon, osteosyntese, resutur av muskel og muskeltransposisjon registreres selv om protesedeler ikke skiftes.

BENTRANSPLANTASJON Benpropp som sementstopper regnes ikke som bentransplantat. Vi skiller mellom benpakking og transplantasjon.

PROTESEKOMPONENTER: Acetabulum - Femur - Caput - Trokanterdel og hals hvis disse er separate deler

Bruk klistrelappene som følger med protesen. Lim disse på baksiden av skjema. Alternativt, skriv inn protesenavn + REF.NR., materiale, overflatebelegg og design. Sementnavn må anføres (bruk klistrelapp).

KOMPLIKASJONER Også operasjoner hvor pasienter dør på operasjonsbordet eller rett etter operasjon skal meldes. Ved stor blødning, angi mengde**.**

ASA-KLASSE (ASA=American Society of Anesthesiologists)

ASA-klasse 1: Friske pasienter som røyker mindre enn 5 sigaretter daglig.

ASA-klasse 2: Pasienter med en asymptomatisk tilstand som behandles medikamentelt (f.eks hypertensjon) eller med kost (f.eks diabetes mellitus type 2) og ellers friske pasienter som røyker 5 sigaretter eller mer daglig.

ASA-klasse 3: Pasienter med en tilstand som kan gi symptomer, men som holdes under kontroll medikamentelt (f.eks moderat angina pectoris og mild astma).

ASA-klasse 4: Pasienter med en tilstand som ikke er under kontroll (f.eks hjertesvikt og astma).

ASA-klasse 5: Moribund/døende pasient.

MINIINVASIV KIRURGI (MIS = Minimally Invasive Surgery**)** når det er brukt spesialinstrument laget for MIS.

ANTIBIOTIKAPROFYLAKSE Før på antibiotikum som er benyttet i forbindelse med operasjonen, f.eks.: Medikament 1: Keflin 2g x 4, med varighet 4,5 timer.

TROMBOSEPROFYLAKSE

Medikament, dose og antatt varighet av profylaksen skal angis separat for operasjonsdagen og senere. Det skal også oppgis om pasienten står fast på tromboseprofylakse (AlbylE, Marevan, Plavix ol).

FIBRINOLYSEHEMMER Her føres det på om en benytter blødningsreduserende legemidler i forbindelse med operasjonen (f.eks. Cyklokapron).

BEINTAP VED REVISJON

Femur (Paprosky`s klassifikasjon)

Type I: Minimalt tap av metafysært ben og intakt diafyse.

Type II: Stort tap av metafysært ben, men intakt diafyse.

Type IIIA: Betydelig tap av metafysært ben uten mulighet for proximal mekanisk støtte. Over 4 cm intakt corticalis i isthmusområdet.

Type IIIB: Betydelig tap av metafysært ben uten mulighet for proximal mekanisk støtte. Under 4 cm intakt corticalis i isthmusområdet.

Type IV: Betydelig tap av metafysært ben uten mulighet for proximal mekanisk støtte. Bred isthmus med liten mulighet for cortical støtte.

Acetabulum (Paprosky`s klassifikasjon)

Type I: Hemisfærisk acetabulum uten kantdefekter. Intakt bakre og fremre kolonne. Defekter i forankringshull som ikke ødelegger subchondral benplate.

Type IIA: Hemisfærisk acetabulum uten store kantdefekter, intakt bakre og fremre kolonne, men med lite metafysært ben igjen.

Type IIB: Hemisfærisk acetabulum uten store kantdefekter, intakt bakre og fremre kolonne, men med lite metafysært ben igjen og noe manglende støtte superiort.

Type IIC: Hemisfærisk acetabulum uten store kantdefekter, intakt bakre og fremre kollonne, men med defekt i medial vegg.

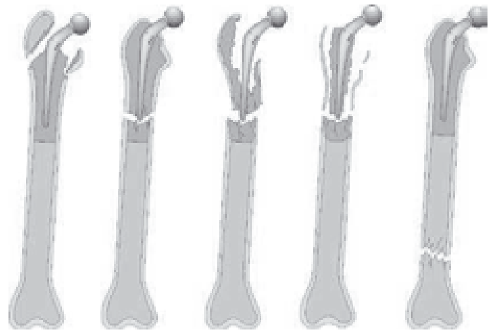
Type IIIA: Betydelig komponentvandring, osteolyse og bentap. Bentap fra kl.10 til 2.

Type IIIB: Betydelig komponentvandring, osteolyse og bentap. Bentap fra kl. 9 til 5.

Kopi beholdes til pasientjournalen, originalen sendes Haukeland universitetssjukehus.

PROTESENÆR FRAKTUR

Vancouverklassifikasjon



Type A Type B1 Type B2 Type B3 Type C

Kontaktpersoner vedrørende registreringsskjema er

Seksjonsoverlege Geir Hallan, tlf. 55 97 56 81 og overlege Ove Furnes, tlf. 55 97 56 90

Ortopedisk klinikk, Haukeland universitetssjukehus. Besøksadresse: Møllendalsbakken 11.

Sekretærer i Nasjonalt Register for Leddproteser, Ortopedisk klinikk, Helse Bergen:

Merete Husøy, tlf. 55 97 37 43 og Randi Furnes, tlf. 55 97 37 42

Epost nrl@helse-bergen.no Internett: http://nrlweb.ihelse.net/

Skjema revidert i november 2015.

HOOS
Spørreskjema for hoftepasienter

Dato: ______________________ Personnummer: ___________________________

Navn: ____

Instruksjoner: Dette spørreskjemaet inneholder spørsmål om hvordan du opplever hofteleddet ditt. Informasjonen skal hjelpe til med å kartlegge hvordan du har det og hvordan du fungerer i dagliglivet. Besvar spørsmålene ved å krysse av for det alternativet du synes passer best for deg (kun ett kryss for hvert spørsmål). Er du usikker, kryss likevel av for det alternativet som føles riktigst.

Symptomer
Tenk på symptomene og vanskelighetene du har hatt fra hoften din den siste uken når du besvarer følgende spørsmål

S1. Har du kjent murringer eller hørt knepping eller andre lyder fra hoften?

Aldri	Sjelden	Iblant	Ofte	Alltid
☐	☐	☐	☐	☐

S2. Har du vanskeligheter med å spre bena langt ut til siden?

Ingen	Lette	Moderate	Store	svært store
☐	☐	☐	☐	☐

S3. Har du vanskeligheter med å ta steget fullt ut når du går?

Ingen	Lette	Moderate	Store	svært store
☐	☐	☐	☐	☐

Stivhet
Følgende spørsmål omhandler leddstivhet. Stivhet innebærer vanskeligheter med å komme i gang, eller økt motstand ved bevegelser i hofteleddet. Angi graden av stivhet du har opplevd i hoften din den siste uken.

S4. Hvor stiv har hoften din vært rett etter at du har våknet om morgenen?

Ikke i det hele tatt	Noe	Moderat	Meget	Ekstremt
☐	☐	☐	☐	☐

S5. Hvor stiv har hoften din vært etter at du har sittet eller ligget og hvilt, senere på dagen?

Ikke i det hele tatt	Noe	Moderat	Meget	Ekstremt
☐	☐	☐	☐	☐

Smerter
P1. Hvor ofte har du vondt i hoften?

Aldri	Hver måned	Hver uke	Hver dag	Alltid
☐	☐	☐	☐	☐

Følgende spørsmål handler om de hoftesmertene du eventuelt har opplevd den siste uken. Angi graden av smerte du har kjent i følgende situasjoner.

P2. Strekke hoften helt

Ingen	Lette	Moderate	Store	svært store
☐	☐	☐	☐	☐

P3. Bøye hoften helt

Ingen	Lette	Moderate	Store	svært store
☐	☐	☐	☐	☐

P4. Gå på jevnt underlag

Ingen	Lette	Moderate	Store	svært store
☐	☐	☐	☐	☐

P5. Gå opp eller ned trapper

Ingen	Lette	Moderate	Store	svært store
☐	☐	☐	☐	☐

P6. Om natten, i sengeleie (smerte som forstyrrer søvnen)

Ingen	Lette	Moderate	Store	svært store
☐	☐	☐	☐	☐

P7. Sittende eller liggende

Ingen	Lette	Moderate	Store	svært store
☐	☐	☐	☐	☐

P8. Stående

Ingen	Lette	Moderate	Store	svært store
☐	☐	☐	☐	☐

P9. Gå på hardt underlag f.eks. asfalt, betong

Ingen	Lette	Moderate	Store	svært store
☐	☐	☐	☐	☐

P10. Gå på ujevnt underlag

Ingen	Lette	Moderate	Store	svært store
☐	☐	☐	☐	☐

Fysisk funksjon

Følgende spørsmål handler om din fysiske funksjon. Angi graden av vanskeligheter du har opplevd den siste uken under følgende aktiviteter på grunn av dine hofteproblemer.

A1. Gå ned trapper

Ingen	Lette	Moderate	Store	svært store
☐	☐	☐	☐	☐

A2. Gå opp trapper

Ingen	Lette	Moderate	Store	svært store
☐	☐	☐	☐	☐

Angi graden av vanskeligheter du har opplevd den siste uken på grunn av dine hofteproblemer.

A3. Reise deg opp fra sittende

Ingen	Lette	Moderate	Store	svært store
☐	☐	☐	☐	☐

A4. Stå stille

Ingen	Lette	Moderate	Store	svært store
☐	☐	☐	☐	☐

A5. Bøye deg, for å for eksempel plukke opp noe fra gulvet

Ingen	Lette	Moderate	Store	svært store
☐	☐	☐	☐	☐

A6. Gå på jevnt underlag

Ingen	Lette	Moderate	Store	svært store
☐	☐	☐	☐	☐

A7. Gå inn og ut av en bil

Ingen	Lette	Moderate	Store	svært store
☐	☐	☐	☐	☐

A8. Handle/ gjøre innkjøp

Ingen	Lette	Moderate	Store	svært store
☐	☐	☐	☐	☐

A9. Ta på sokker/strømper

Ingen	Lette	Moderate	Store	svært store
☐	☐	☐	☐	☐

A10. Stå opp fra sengen

Ingen	Lette	Moderate	Store	svært store
☐	☐	☐	☐	☐

A11. Ta av sokker/strømper

Ingen	Lette	Moderate	Store	svært store
☐	☐	☐	☐	☐

A12. Ligge i sengen (snu deg, holde hoften i samme stilling over lengre tid)

Ingen	Lette	Moderate	Store	svært store
☐	☐	☐	☐	☐

A13. Gå opp i, og ut av, et badekar/ dusj

Ingen	Lette	Moderate	Store	svært store
☐	☐	☐	☐	☐

A14. Sitte

Ingen	Lette	Moderate	Store	svært store
☐	☐	☐	☐	☐

A15. Sette deg og reise deg fra toalettet

Ingen	Lette	Moderate	Store	svært store
☐	☐	☐	☐	☐

A16. Utføre tungt husarbeid (snømåking, gulvvask, støvsuging etc.)

Ingen	Lette	Moderate	Store	svært store
☐	☐	☐	☐	☐

A17. Utføre lett husarbeid (matlaging, støvtørking etc.)

Ingen	Lette	Moderate	Store	svært store
☐	☐	☐	☐	☐

Funksjon, fritid og idrett

Følgende spørsmål handler om din fysiske funksjon. Angi graden av vanskeligheter du har opplevd den siste uken under følgende aktiviteter på grunn av dine hofteproblemer.

SP1. Sitte på huk

Ingen	Lette	Moderate	Store	svært store
☐	☐	☐	☐	☐

SP2. Løpe

Ingen	Lette	Moderate	Store	svært store
☐	☐	☐	☐	☐

SP3. Snu deg på belastet ben

Ingen	Lette	Moderate	Store	svært store
☐	☐	☐	☐	☐

SP4. Gå på ujevnt underlag

Ingen	Lette	Moderate	Store	svært store
☐	☐	☐	☐	☐

Livskvalitet

Q1. Hvor ofte gjør hoften din seg bemerket?

Aldri	Hver måned	Hver uke	Hver dag	Alltid
☐	☐	☐	☐	☐

Q2. Har du forandret levemåte for å unngå å belaste hoften?

Ikke i det hele tatt	Noe	Moderat	Meget	Ekstremt
☐	☐	☐	☐	☐

Q3. I hvor stor grad kan du stole på hoften din?

Fullstendig	I stor grad	Moderat	Delvis	Ikke i det hele tatt
☐	☐	☐	☐	☐

Q4. Hvor store problemer har du med hoften din generelt sett?

Ingen	Lette	Moderate	Store	svært store
☐	☐	☐	☐	☐

Takk for at du tok deg tid til å besvare samtlige spørsmål!

Nasjonalt Register for Leddproteser
Ortopedisk klinikk, Helse Bergen HF
Haukeland universitetssjukehus, Postboks 1400
Møllendalsbakken 11, 5021 BERGEN
Tlf 55973742/55973743

F.nr. (11 sifre)..
Navn:...
(Skriv tydelig ev. pasientklistrelapp – **spesifiser sykehus**.)
Sykehus:...

KNEPROTESER og andre leddproteser

Innsetting, skifting eller fjerning av protese eller protesedeler, samt bløtdelsrevisjoner for infisert protese og protesenære frakturer.

LOKALISASJON, AKTUELL OPERASJON
☐1 Kne ☐6 Håndledd
☐2 Ankel ☐7 Fingre (angi ledd) ....
☐3 Tær (angi ledd) .... ☐8 Annet ....
☐4 Skulder ☐9 Rygg (angi nivå).......................
☐5 Albue

AKTUELLE SIDE (ett kryss) (Bilateral opr. = 2 skjema)
☐1 Høyre ☐2 Venstre

TIDLIGERE OPERASJON I AKTUELLE LEDD (ev. flere kryss)
☐0 Nei
☐1 Osteosyntese for intraartikulær/leddnær fraktur
☐2 Osteotomi
☐3 Artrodese
☐4 Protese
☐5 Synovectomi
☐6 Annet (f.eks menisk og leddbåndsop.)...

AKTUELLE OPERASJON (ett kryss)
☐1 Primæroperasjon ☐2 Reoperasjon (protese tidligere)

OPERASJONSDATO (dd.mm.åå) |__|__| |__|__| |__|__|

ÅRSAK TIL AKTUELLE OPERASJON (KRYSS AV ENTEN I A ELLER B)

A. Primæroper. pga (ev. flere kryss)	**B. Reoper. pga (ev. flere kryss)**
☐1 Idiopatisk artrose	☐1 Løs prox.protesedel
☐2 Rheumatoid artritt	☐2 Løs distal protesedel
☐3 Fraktursequele..............	☐3 Løs patellaprotese
☐4 Mb. Bechterew	☐4 Luksasjon av patella
☐5 Sequele ligamentskade	☐5 Luksasjon (ikke patella)
☐6 Sequele meniskskade	☐6 Instabilitet
☐7 Akutt fraktur	☐7 Aksefeil
☐8 Infeksjonssequele	☐8 Dyp infeksjon
☐9 Spondylose	☐9 Fraktur av bein (nær protesen)
☐10 Sequele prolaps kirurgi	☐10 Smerter
☐11 Degenerativ skivesykdom	☐11 Slitt eller defekt plastforing
☐12 Rotarcuff artropati	Hvilken...........................
☐13 Annet	☐12 Progresjon av artrose
	☐13 Annet (f.eks tidl fjernet protese)
	....

REOPERASJONSTYPE (ev. flere kryss)
☐1 Bytte el. innsetting av distal komponent
☐2 Bytte el. innsetting av proximal protesedel
☐3 Bytte el. innsetting av hele protesen
☐4 Innsetting av patellakomp.
☐5 Bytte av patellaprotese
☐6 Bytte av plastforing
☐7 Artrodese
☐8 Amputasjon
☐9 Fjernet protesedeler (inkl. sementspacer)
Angi hvilke deler ....
....
☐10 Bløtdelsdebridement for infisert protese
☐11 Osteosyntese av protesenær fraktur. Angi hvilket ben ....
☐12 Annet..............................

BENTRANSPLANTASJON / BENERSTATNING (ev. flere kryss)

Proximalt	☐0 Nei	☐1 Ja	☐2 Benpakking	☐3 Kjegler (cones)
Distalt	☐0 Nei	☐1 Ja	☐2 Benpakking	☐3 Kjegler (cones)

ANTIBIOTIKAPROFYLAKSE ☐0 Nei ☐1 Ja

	Navn	*Dosering*	*Varighet i timer*
Medikament 1	....		...........timer
Medikament 2	....		...........timer

TROMBOSEPROFYLAKSE
☐0 Nei ☐1 Ja: Første dose ☐1 Preoperativt ☐2 Postoperativt
Medikament 1.......................Dosering opr.dag......................................
Dosering videre............Varighet...........døgn
Medikament 2...................... Dosering.....................Varighet...........døgn

FAST TROMBOSEPROFYLAKSE
☐0 Nei ☐1 Ja, type: ....

FIBRINOLYSEHEMMER
☐0 Nei ☐1 Ja, medikament: .... Dosering............

DREN ☐0 Nei ☐1 Ja. Antatt varighet ....døgn

OPERASJONSTID (hud til hud) ....minutter

BLODTOMHET ☐0 Nei ☐1 Ja **BLODTOMHETSTID**.................. minutter
BLODTOMHET UNDER SEMENTERING ☐0 Nei ☐1 Ja

PEROPERATIV KOMPLIKASJON
☐0 Nei ☐1 Ja,hvilke(n): ....

MINI INVASIV KIRURGI (MIS) ☐0 Nei ☐1 Ja
COMPUTERNAVIGERING (CAOS) ☐0 Nei ☐1 Ja Type:......................
PASIENTTILPASSEDE INSTRUMENTER ☐0 Nei ☐1 Ja Type:......................
ASA KLASSE (se baksiden for definisjon)
☐1 Frisk
☐2 Asymptomatisk tilstand som gir økt risiko
☐3 Symptomatisk sykdom
☐4 Livstruende sykdom
☐5 Moribund

PROTESE KNE (Bruk klistrelapper på baksiden, eller spesifiser nøyaktig)

PROTESETYPE
☐1 Totalprot. m/patella . ☐4 Patellofemoralledd prot.
☐2 Totalprot. u/patella ☐5 Bi-compartmental ☐6 Hengslet protese
☐3 Unicondylær prot ☐ Medial ☐ Lateral ☐7 Annet ....

FEMURKOMPONENT
Navn/Type/Str / evt. Katalognr...
ev. katalognummer ....
Sentral stamme ☐0 Nei ☐1 Ja, ev. lengde ....mm
Sementert stamme ☐0 Nei ☐1 Ja
Metallforing (Wedge) ☐0 Nei ☐1 Ja
Stabilisering ☐0 Nei ☐1 Ja, bakre ☐2 Ja, annen
☐1 Sement med antibiotika – Navn ....
☐2 Sement uten antibiotika – Navn ....
☐3 Usementert

TIBIAKOMPONENT (metallplatå)
Navn/Type/Str / ev. katalognummer ....
Forlenget sentral stamme ☐0 Nei ☐1 Ja, ev. lengde ....mm
Sementert stamme ☐0 Nei ☐1 Ja
Metallforing (Wedge) ☐0 Nei ☐1 Ja
☐1 Sement med antibiotika – Navn ....
☐2 Sement uten antibiotika – Navn ....
☐3 Usementert

TIBIAKOMPONENT (plastkomponent)
Navn/Type/Str / ev. katalognummer...
Tykkelse .... mm
Stabilisering ☐0 Nei ☐1 Ja, bakre ☐2 Ja, annen

PATELLAKOMPONENT
Navn/Type/Str / ev. katalognummer..
Metallrygg ☐0 Nei ☐1 Ja
☐1 Sement med antibiotika – Navn ....
☐2 Sement uten antibiotika – Navn ....
☐3 Usementert

KORSBÅND

Intakt fremre korsbånd før operasjon	☐0 Nei	☐1 Ja
Intakt fremre korsbånd etter operasjon	☐0 Nei	☐1 Ja
Intakt bakre korsbånd før operasjon	☐0 Nei	☐1 Ja
Intakt bakre korsbånd etter operasjon	☐0 Nei	☐1 Ja

PROTESE ANDRE LEDD (Bruk klistrelapper på baksiden, eller spesifiser nøyaktig)

PROTESETYPE
☐1 Totalprotese ☐2 Hemiprotese ☐3 Enkomponentprotese ☐4 Annet .....

PROKSIMAL KOMPONENT
Navn/Type/Str / ev. katalognummer..
☐1 Sement med antibiotika – Navn ....
☐2 Sement uten antibiotika – Navn ....
☐3 Usementert

DISTAL KOMPONENT
Navn/Type/Str / ev. katalognummer...
☐1 Sement med antibiotika – Navn ....
☐2 Sement uten antibiotika – Navn ....
☐3 Usementert

INTERMEDIÆR KOMPONENT (f.eks. caput humeri)
Navn/Type/Str/Diameter / ev. katalognummer..

Lege ....
Legen som har fylt ut skjemaet (navnet registreres ikke i databasen).

RETTLEDNING KNEPROTESER og andre leddproteser

Registreringen gjelder innsetting, skifting eller fjerning av protese i kne, skuldre og andre ledd med unntak av hofter som har eget skjema. Ett skjema fylles ut for hver operasjon. Pasientens fødselsnummer (11 sifre) og sykehus må være påført. Aktuelle ruter markeres med kryss.
På eget Samtykkeskjema skal pasienten gi samtykke til rapportering til Leddregisteret.

Kommentarer til de enkelte punktene

AKTUELLE OPERASJON
Primæroperasjon: Dette er første totalproteseoperasjon.
Kryss av enten i A eller i B. Kryss av for alle årsakene til operasjonen. Bløtdelsrevisjon for infeksjon skal registreres selv om protesedeler ikke skiftes.

REOPERASJONSTYPE
Fjerning av protesedeler må spesifiseres og føres opp, også fjerning ved infeksjon.

BENTRANSPLANTASJON
Påsmøring av benvev rundt protesen regnes ikke som bentransplantat.

ANTIBIOTIKAPROFYLAKSE
Medikament, dose og varighet av profylaksen skal angis f.eks. slik: Medikament: Keflin, Dosering: 2g x 4, med varighet 4,5 timer.

TROMBOSEPROFYLAKSE
Medikament, dose og antatt varighet av profylaksen skal angis separat for operasjonsdagen og senere. Det skal også oppgis om pasienten står fast på tromboseprofylakse (AlbylE, Marevan, Plavix ol).

FIBRINOLYSEHEMMER
Her føres det på om en benytter blødningsreduserende legemidler i forbindelse med operasjonen (f.eks. Cyklokapron).

PEROPERATIV KOMPLIKASJON
Dersom det foreligger komplikasjon i form av stor blødning, må mengden angis.
Dersom pasienten dør under eller like etter operasjonen, ønsker vi likevel melding om operasjonen.

ASA-KLASSE (ASA=American Society of Anesthesiologists)
ASA-klasse 1: Friske pasienter som røyker mindre enn 5 sigaretter daglig.
ASA-klasse 2: Pasienter med en asymptomatisk tilstand som behandles medikamentelt (f.eks. hypertensjon) eller med kost (f.eks. diabetes mellitus type 2) og ellers friske pasienter som røyker 5 sigaretter eller mer daglig.
ASA-klasse 3: Pasienter med en tilstand som kan gi symptomer, men som holdes under kontroll medikamentelt (f.eks. moderat angina pectoris og mild astma).
ASA-klasse 4: Pasienter med en tilstand som ikke er under kontroll (f.eks. hjertesvikt og astma).
ASA-klasse 5: Moribund/døende pasient

PROTESETYPE
Dersom det er gjort revisjon av totalprotese uten patellakomponent og REOPERASJONSTYPE er **innsetting av patellakomponent,** skal det krysses av for pkt. 1: Totalprotese med patellakomponent (dvs. protesen har nå blitt en totalprotese med patellakomponent). Ved revisjon av unicondylær protese til totalprotese brukes enten pkt. 1 eller 2.

PROTESEKOMPONENTER
Her anføres kommersielle navn, materiale, størrelse og design. Alternativt kan en føre opp protesenavn og katalognummer eller benytte klistrelapp som følger med de fleste protesene. **Denne kan limes på baksiden av skjemaet (vennligst ikke plasser klistrelapper på markeringskryss, som brukes ved scanning av skjema).**
Navnet på sementen som evt. brukes må anføres, f.eks. Palacos R+G. (Bruk helst klistrelapp)
Under femurkomponent skal evt. påsatt **femurstamme** anføres med lengde.
Med **metallforing** under femur- og tibiakomponent menes bruk av en eller flere separate metallkiler (wedges) som erstatning for manglende benstøtte.
Stabilisering er bruk av proteser med stabilisering som kompensasjon for sviktende båndapparat.
Forlenget sentral stamme under tibiakomponent (metallplatå) skal bare anføres ved bruk av en lengre påsatt stamme enn standardkomponenten.

ANDRE LEDD. PROTESETYPE
Ved bruk av hemiprotese med bare en komponent, f.eks. resurfacing i skulder, skrives dette på DISTAL KOMPONENT. Enkomponent-protese i finger/tå, skrives på PROKSIMAL KOMPONENT.

COMPUTERNAVIGERING (CAOS = Computer Aided Orthopaedic Surgery**)**
Angi firmanavn på computersystem.

MINIINVASIV KIRURGI (MIS = Minimally Invasive Surgery**)**
Her menes at kirurgen har brukt kort snitt og at det er brukt spesialinstrument laget for MIS.

PASIENTTILPASSEDE INSTRUMENTER
Her menes kutteblokker eller instrumenter som lages etter MR eller CT bilder tatt av pasienten før operasjonen. Oppgi navn på systemet.

Kopi beholdes til pasientjournalen, originalen sendes Haukeland universitetssjukehus.

Kontaktpersoner vedrørende registreringsskjema er
Seksjonsoverlege Ove Furnes, tlf. 55 97 56 90.
Overlege Randi Hole, kontaktperson (skulder), tlf. 55 97 56 79.
Overlege Yngvar Krukhaug, kontaktperson (albue/hånd), tlf. 55 97 56 88.
Ortopedisk klinikk, Haukeland universitetssjukehus. Besøksadresse: Møllendalsbakken 11.
Sekretærer i Nasjonalt Register for Leddproteser, Ortopedisk klinikk, Helse Bergen:
Randi Furnes, tlf. 55 97 37 42.
Epost: nrl@helse-bergen.no Internett: http://nrlweb.ihelse.net/
Skjema revidert i januar 2018.

NASJONALT HOFTEBRUDDREGISTER
Nasjonalt Register for Leddproteser
Helse Bergen HF, Ortopedisk klinikk
Haukeland universitetssjukehus
Møllendalsbakken 11
5021 BERGEN
Tlf: 55976452

F.nr. (11 sifre)..

Navn:...

(Skriv tydelig ev. pasientklistrelapp – **spesifiser sykehus**.)

Sykehus:...

HOFTEBRUDD

PRIMÆRE OPERASJONER PÅ BRUDD I PROKSIMALE FEMURENDE og ALLE REOPERASJONER, inkludert lukket reponering av hemiproteser. Ved primæroperasjon med totalprotese og ved reoperasjon til totalprotese brukes kun hofteproteseskjema. Alle produktklistrelapper settes i merket felt på baksiden av skjemaet.

AKTUELLE OPERASJON
☐[1] Primæroperasjon ☐ [2] Reoperasjon

SIDE (ett kryss) (Bilateral opr.= 2 skjema)
☐[1] Høyre ☐[2] Venstre

OPR TIDSPUNKT (dd.mm.åå) |__|__| |__|__| |__|__| kl |__|__|

BRUDD TIDSPUNKT (dd.mm.åå) |__|__| |__|__| |__|__| kl |__|__|
Dersom det er usikkerhet om bruddtidspunkt, fyll ut neste punkt.

TID FRA BRUDD TIL OPERASJON I TIMER
☐[1] 0-6 ☐[2] >6-12 ☐[3] >12-24 ☐[4] >24-48 ☐[5] >48

KOGNITIV SVIKT
☐[0] Nei ☐[1] Ja (Se test på baksiden) ☐[2] Usikker

ASA-KLASSE (se bakside av skjema for definisjon)
☐[1] Frisk
☐[2] Asymptomatisk tilstand som gir økt risiko
☐[3] Symptomatisk sykdom
☐[4] Livstruende sykdom
☐[5] Moribund

TYPE PRIMÆRBRUDD (ÅRSAK TIL PRIMÆROPERASJON) (Kun ett kryss)
Se baksiden for klassifikasjon
☐[1] Lårhalsbrudd udislokert (Garden 1 og 2)
☐[2] Lårhalsbrudd dislokert (Garden 3 og 4)
☐[3] Lateralt lårhalsbrudd
☐[4] Pertrokantært tofragment (AO klassifikasjon A1)
☐[5] Pertrokantært flerfragment (AO klassifikasjon A2)
☐[9] Intertrokantært (AO klassifikasjon A3)
☐[6] Subtrokantært
☐[7] Annet, spesifiser..

TYPE PRIMÆROPERASJON (Kun ett kryss)
(Fylles ut bare ved primæroperasjon - eget skjema for totalproteser)
(Fest produktklistrelapp på baksiden eller spesifiser nøyaktig produkt)
☐[1] To skruer eller pinner
☐[2] Tre skruer eller pinner
☐[3] Bipolar hemiprotese
☐[4] Unipolar hemiprotese
☐[5] Glideskrue og plate
☐[6] Glideskrue og plate med trokantær støtteplate
☐[7] Vinkelplate
☐[8] Kort margnagle uten distal sperre
☐[9] Kort margnagle med distal sperre
☐[10] Lang margnagle uten distal sperre
☐[11] Lang margnagle med distal sperre
☐[12] Annet, spesifiser..

Navn / størrelse og katalognummer...

ÅRSAK TIL REOPERASJON (Flere enn ett kryss kan brukes)
☐[1] Osteosyntesesvikt/havari
☐[2] Ikke tilhelet brudd (non-union/pseudartrose)
☐[3] Caputnekrose (segmentalt kollaps)
☐[4] Lokal smerte pga prominerende osteosyntesemateriale
☐[5] Brudd tilhelet med feilstilling
☐[6] Sårinfeksjon – overfladisk
☐[7] Sårinfeksjon – dyp
☐[8] Hematom
☐[9] Luksasjon av hemiprotese
☐[10] Osteosyntesematerialet skåret gjennom caput
☐[11] Nytt brudd rundt implantat
☐[12] Løsning av hemiprotese
☐[13] Annet, spesifiser..

TYPE REOPERASJON (Flere enn ett kryss kan brukes)
(Fest produktklistrelapp på baksiden eller spesifiser nøyaktig produkt)
☐[1] Fjerning av implantat (Brukes når dette er eneste prosedyre)
☐[2] Girdlestone (= fjerning av implantat og caput)
☐[3] Bipolar hemiprotese
☐[4] Unipolar hemiprotese
☐[5] Re-osteosyntese
☐[6] Debridement for infeksjon
☐[7] Lukket reposisjon av luksert hemiprotese
☐[8] Åpen reposisjon av luksert hemiprotese
☐[9] Annet, spesifiser..

Navn / størrelse og katalognummer...

FIKSASJON AV HEMIPROTESE
(For totalprotese sendes eget skjema til hofteproteseregisteret)
☐[1] Usementert ☐[1] med HA ☐[2] uten HA
☐[2] Sement med antibiotika Navn..
☐[3] Sement uten antibiotika Navn..

PATOLOGISK BRUDD (Annen patologi enn osteoporose)
☐[0] Nei ☐[1] Ja, type..

TILGANG TIL HOFTELEDDET VED HEMIPROTESE (Kun ett kryss)
☐[1] Fremre (mellom sartorius og tensor)
☐[2] Anterolateral (mellom gluteus medius og tensor)
☐[3] Direkte lateral (transgluteal)
☐[4] Bakre (bak gluteus medius)
☐[5] Annet, spesifiser..

ANESTESITYPE
☐[1] Narkose ☐[2] Spinal ☐[3] Annet, spesifiser...

PEROPERATIVE KOMPLIKASJONER
☐[0] Nei ☐[1] Ja, hvilke(n)...

OPERASJONSTID (hud til hud).......................minutter.

ANTIBIOTIKAPROFYLAKSE ☐[0] Nei ☐[1] Ja

	Navn	Dosering	Varighet i timer
Medikament 1	....	....	..............timer
Medikament 2	....	....	..............timer
Medikament 3	....	....	..............timer

TROMBOSEPROFYLAKSE
☐[0] Nei ☐[1] Ja: Første dose ☐[1] Preoperativt ☐[2] Postoperativt

Medikament 1 .... Dosering opr.dag......................................
Dosering videre .... Varighet ...... døgn

Medikament 2 .... Dosering .... Varighet ...... døgn

FAST TROMBOSEPROFYLAKSE
☐[0] Nei ☐[1] Ja, type: ....

FIBRINOLYSEHEMMER
☐[0] Nei ☐[1] Ja, medikament : .... Dosering ....

OPERATØRERFARING
Har en av operatørene mer enn 3 års erfaring i hoftebruddkirurgi? ☐[0] Nei ☐[1] Ja

Lege..
Legen som har fylt ut skjemaet (navnet registreres ikke i databasen).

202 038 Bergen Grafisk as - 01.2016

RETTLEDNING

Registreringen gjelder alle operasjoner for hoftebrudd (lårhals, pertrokantære og subtrokantære) og alle reoperasjoner, også reposisjoner, på pasienter som er primæroperert og reoperert for hoftebrudd. **Ved primæroperasjon med totalprotese og ved reoperasjon til totalprotese sendes bare skjema til hofteproteseregisteret.**
Ett skjema fylles ut for hver operasjon. Originalen sendes Haukeland universitetssjukehus og kopien lagres i pasientens journal. Pasientens fødselsnummer (11 sifre) og sykehuset må være påført. Aktuelle ruter markeres med kryss. Pasienten skal på eget skjema gi samtykke til registrering i Nasjonalt hoftebruddregister.

Kommentarer til enkelte punkt:
OPERASJONS- OG BRUDDTIDSPUNKT
Operasjonstidspunkt (dato og klokkeslett) må føres opp på alle primæroperasjoner. Det er også sterkt ønskelig at dato og klokkeslett for *bruddtidspunkt* føres opp. Dette bl.a. for å se om tid til operasjon har effekt på prognose. (Hvis en ikke kjenner klokkeslettet for bruddtidspunkt lar en feltet stå åpent. En må da prøve å angi omtrentlig tidsrom fra brudd til operasjon på neste punkt).
Ved reoperasjon er ikke klokkeslett nødvendig.

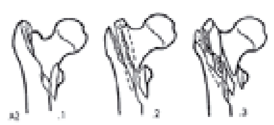
KOGNITIV SVIKT
Kognitiv svikt kan eventuelt testes ved å be pasienten tegne klokken når den er 10 over 11. En pasient med kognitiv svikt vil ha problemer med denne oppgaven.

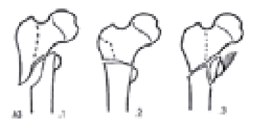
ASA-KLASSE (ASA=American Society of Anesthesiologists)
ASA-klasse 1: Friske pasienter som røyker mindre enn 5 sigaretter daglig.
ASA-klasse 2: Pasienter med en asymptomatisk tilstand som behandles medikamentelt (f.eks hypertensjon) eller med kost (f.eks diabetes mellitus type 2) og ellers friske pasienter som røyker 5 sigaretter eller mer daglig.
ASA-klasse 3: Pasienter med en tilstand som kan gi symptomer, men som holdes under kontroll medikamentelt (f.eks moderat angina pectoris og mild astma).
ASA-klasse 4: Pasienter med en tilstand som ikke er under kontroll (f.eks hjertesvikt og astma).
ASA-klasse 5: Moribund/døende pasient

GARDENS KLASSIFISERING AV LÅRHALSBRUDD
Garden 1: Ikke komplett brudd av lårhalsen (såkalt innkilt)
Garden 2: Komplett lårhalsbrudd uten dislokasjon
Garden 3: Komplett lårhalsbrudd med delvis dislokasjon. Fragmentene er fortsatt i kontakt, men det er feilstilling av lårhalsens trabekler. Caputfragmentet ligger uanatomisk i acetabulum.
Garden 4: Komplett lårhalsbrudd med full dislokasjon. Caputfragmentet er fritt og ligger korrekt i acetabulum slik at trabeklene er normalt orientert.

AO KLASSIFIKASJON AV TROKANTÆRE BRUDD


A1: Pertrokantært tofragment brudd


A2: Pertrokantært flerfragment brudd


A3: Intertrokantært brudd


Subtrokantært brudd*

*Subtrokantært brudd: Bruddsentrum er mellom nedre kant av trokanter minor og 5 cm distalt for denne.

REOPERASJONSÅRSAK
Dyp infeksjon defineres som infeksjon som involverer fascie, protese, ledd eller periprotetisk vev.

IMPLANTAT
Implantattype må angis entydig. Produktklistrelapp er ønskelig for å angi katalognummer for osteosyntesematerialet eller protesen som er brukt.

PEROPERATIVE KOMPLIKASJONER
Vi ønsker også å få meldt dødsfall på operasjonsbordet og peroperativ transfusjonstrengende blødning.

ANTIBIOTIKAPROFYLAKSE
Her føres det på hvilket antibiotikum som er blitt benyttet i forbindelse med operasjonen. Det anføres dose, antall doser og profylaksens varighet. F.eks. Medkament 1: Keflin 2g x 4, med varighet 4,5 timer.

TROMBOSEPROFYLAKSE
Medikament, dose og antatt varighet av profylaksen skal angis separat for oprerasjonsdagen og senere. Det skal også oppgis om pasienten står fast på tromboseprofylakse (AlbylE, Marevan, Plavix ol).

FIBRINOLYSEHEMMER
Her føres det på om en benytter blødningsreduserende legemidler i forbindelse med operasjonen (f.eks. Cyklokapron).

Kontaktpersoner vedrørende registreringsskjema er:
Overlege Jan-Erik Gjertsen, Ortopedisk klinikk, Haukeland universitetssjukehus. Tlf. 55 97 56 86 (email: jan-erik.gjertsen@helse-bergen.no)
Prosjektkoordinator Nasjonalt Hoftebruddregister: Lise B. Kvamsdal. Tlf. 55 97 64 52 (email: nrl@helse-bergen.no)
Internett: http://nrlweb.ihelse.net/

PRODUKTKLISTRELAPPER:

NASJONALT HOFTEBRUDDREGISTER
Nasjonalt Register for Leddproteser
Helse Bergen HF, Ortopedisk klinikk
Haukeland Universitetssykehus
Møllendalsbakken 11
5021 BERGEN

PASIENTSPØRRESKJEMA NASJONALT HOFTEBRUDDREGISTER

1. Dato for utfylling av skjema: |__|__| |__|__| |__|__|

2. Spørreskjemaet er besvart av:

☐ [1] Meg selv

eller ved hjelp av….(kryss av i ruten som gjelder)

☐ [2] Slektning (ektefelle, barn)
☐ [3] God venn eller annen nærstående
☐ [4] Annen privat person
☐ [5] Hjemmesykepleier/hjemmehjelp
☐ [6] Annen person, angi hvem:___________________________

NASJONALT HOFTEBRUDDREGISTER
Nasjonalt Register for Leddproteser
Helse Bergen HF, Ortopedisk klinikk
Haukeland Universitetssykehus
Møllendalsbakken 11
5021 BERGEN

I de neste 5 spørsmålene ønsker vi å vite hvordan livssituasjonen din var <u>FØR</u> du fikk hofte/lårhalsbruddet som du ble operert for.

3. Hvordan opplevde du gangevnen din?

- ☐ 1 Jeg hadde ingen problemer med å gå omkring
- ☐ 2 Jeg hadde litt problemer med å gå omkring
- ☐ 3 Jeg var sengeliggende

4. Hvordan klarte du personlig stell?

- ☐ 1 Jeg hadde ingen problemer med personlig stell
- ☐ 2 Jeg hadde litt problemer med å vaske meg eller kle meg
- ☐ 3 Jeg klarte ikke å vaske meg eller kle meg

5. Hvordan klarte du dine vanlige gjøremål (f.eks. arbeid, studier, husarbeid, familie- og fritidsaktiviteter)?

- ☐ 1 Jeg hadde ingen problemer med å utføre mine vanlige gjøremål
- ☐ 2 Jeg hadde litt problemer med å utføre mine vanlige gjøremål
- ☐ 3 Jeg var ute av stand til å utføre mine vanlige gjøremål

6. Smerter eller ubehag?

- ☐ 1 Jeg hadde verken smerte eller ubehag
- ☐ 2 Jeg hadde moderat smerte eller ubehag
- ☐ 3 Jeg hadde sterk smerte eller ubehag

7. Angst eller depresjon?

- ☐ 1 Jeg var verken engstelig eller deprimert
- ☐ 2 Jeg var noe engstelig eller deprimert
- ☐ 3 Jeg var svært engstelig eller deprimert

NASJONALT HOFTEBRUDDREGISTER
Nasjonalt Register for Leddproteser
Helse Bergen HF, Ortopedisk klinikk
Haukeland Universitetssykehus
Møllendalsbakken 11
5021 BERGEN

I de 5 neste spørsmålene ønsker vi å vite hvordan livssituasjonen din er NÅ:

8. Hvordan opplever du gangevnen din?

- ☐ 1 Jeg har ingen problemer med å gå omkring
- ☐ 2 Jeg har litt problemer med å gå omkring
- ☐ 3 Jeg er sengeliggende

9. Hvordan klarer du personlig stell?

- ☐ 1 Jeg har ingen problemer med personlig stell
- ☐ 2 Jeg har litt problemer med å vaske meg eller kle meg
- ☐ 3 Jeg klarer ikke å vaske meg eller kle meg

10. Hvordan klarer du dine vanlige gjøremål (f.eks. arbeid, studier, husarbeid, familie- og fritidsaktiviteter)?

- ☐ 1 Jeg har ingen problemer med å utføre mine vanlige gjøremål
- ☐ 2 Jeg har litt problemer med å utføre mine vanlige gjøremål
- ☐ 3 Jeg er ute av stand til å utføre mine vanlige gjøremål

11. Smerter eller ubehag?

- ☐ 1 Jeg har verken smerte eller ubehag
- ☐ 2 Jeg har moderat smerte eller ubehag
- ☐ 3 Jeg har sterk smerte eller ubehag

12. Angst eller depresjon?

- ☐ 1 Jeg er verken engstelig eller deprimert
- ☐ 2 Jeg er noe engstelig eller deprimert
- ☐ 3 Jeg er svært engstelig eller deprimert

NASJONALT HOFTEBRUDDREGISTER
Nasjonalt Register for Leddproteser
Helse Bergen HF, Ortopedisk klinikk
Haukeland Universitetssykehus
Møllendalsbakken 11
5021 BERGEN

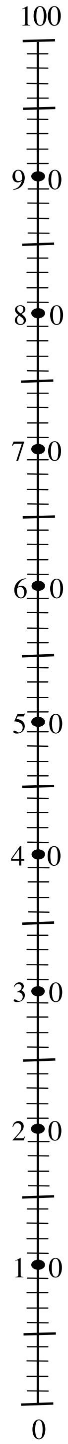
13. Din helsetilstand i dag.

For å hjelpe folk til å si hvor god eller dårlig en helsetilstand er, har vi laget en skala (omtrent som et termometer) hvor den beste tilstanden du kan tenke deg er merket 100 og den verste tilstanden du kan tenke deg er merket 0.

Vi vil gjerne at du viser på denne skalaen hvor god eller dårlig helsetilstanden din er i dag, etter din oppfatning. Vær vennlig å gjøre dette ved å trekke en linje fra boksen nedenfor til det punktet på skalaen som viser hvor god eller dårlig din helsetilstand er i dag.

Din egen helsetilstand i dag

Best tenkelige helsetilstand



Verst tenkelige helsetilstand

NASJONALT HOFTEBRUDDREGISTER
Nasjonalt Register for Leddproteser
Helse Bergen HF, Ortopedisk klinikk
Haukeland Universitetssykehus
Møllendalsbakken 11
5021 BERGEN

SMERTE

14. Sett ett kryss på den streken som du synes tilsvarer din gjennomsnittlige smerteopplevelse fra den opererte hoften den siste måneden:

Ingen smerte | Maksimal smerte

IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII

lett | moderat | middels | sterk | uutholdelig

TILFREDSHET

15. Sett ett kryss på den streken som du synes tilsvarer hvor fornøyd du er med operasjonsresultatet:

Fornøyd | Misfornøyd

IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII

svært fornøyd | fornøyd | middels fornøyd | misfornøyd | svært misfornøyd

NASJONALT HOFTEBRUDDREGISTER
Nasjonalt Register for Leddproteser
Helse Bergen HF, Ortopedisk klinikk
Haukeland Universitetssykehus
Møllendalsbakken 11
5021 BERGEN

16. Har du besvær fra den andre hoften?

☐ 1 Ja ☐ 2 Nei

17. Er det andre årsaker til at du har problemer med å gå? (For eksempel smerter fra andre ledd, ryggsmerter, hjerte-karsykdom eller andre sykdommer som påvirker gangevnen din)

☐ 1 Ja ☐ 2 Nei

18. Har du hatt nye operasjoner i den samme hoften som ble operert for hoftebrudd?

☐ 1 Ja ☐ 2 Nei

Takk for at du tok deg tid til å svare på spørsmålene. Dine svar er svært nyttige for oss. Vennligst send spørreskjemaet i retur til oss i den ferdig frankerte svarkonvolutten.

NASJONALT KORSBÅNDSREGISTER
Nasjonalt Register for Leddproteser
Helse Bergen HF, Ortopedisk klinikk
Haukeland universitetssjukehus
Møllendalsbakken 11, 5021 BERGEN
Tlf: 55 97 64 54

F.nr. (11 sifre)..
Navn...
Sykehus...
(Skriv tydelig evt. pasientklistrelapp – **spesifiser sykehus**.)

KORSBÅND

KORSBÅNDSOPERASJONER OG ALLE REOPERASJONER på pasienter som tidligere er korsbåndsoperert.

Alle klistrelapper (med unntak av pasientklistrelapp) settes i merket felt på baksiden av skjemaet.

(Bilateral operasjon = 2 skjema)

AKTUELLE SIDE (ett kryss) ☐⁰ Høyre ☐¹ Venstre

MOTSATT KNE ☐⁰ Normalt ☐¹ Tidligere ACL/PCL-skade

TIDLIGERE OPERASJON I SAMME KNE
☐⁰ Nei ☐¹ Ja

SKADEDATO FOR AKTUELL SKADE (mm.åå) |__|__| |__|__|

AKTIVITET SOM FØRTE TIL AKTUELLE SKADE
☐⁰ Fotball
☐¹ Håndball
☐² Snowboard
☐³ Alpint (inkl. twin tip)
☐⁴ Annen skiaktivitet
☐⁵ Kampsport
☐⁶ Basketball
☐⁹⁸ Annet....................................
☐⁷ Annen lagidrett
☐⁸ Motor- og bilsport
☐⁹ Annen fysisk aktivitet
☐¹⁰ Arbeid
☐¹¹ Trafikk
☐¹² Fall/hopp/vold/lek

AKTUELLE SKADE (Registrer **alle** skader – også de som ikke opereres)
☐ ACL ☐ MCL ☐ PLC ☐ Med. menisk
☐ PCL ☐ LCL ☐ Brusk ☐ Lat. menisk
☐ Annet..

YTTERLIGERE SKADER (evt. flere kryss) ☐ Nei, hvis ja spesifiser under

	Hvilken: ....
☐ Karskade	
☐ Nerveskade	☐ ⁰N. tibialis ☐ ¹ N. peroneus
☐ Fraktur	☐ ⁰Femur ☐ ¹Tibia ☐ ²Fibula ☐ ³Patella ☐ ⁴Usikker
☐ Ruptur i ekstensorapparatet	☐ ⁰Quadricepssenen ☐ ¹Patellarsenen

OPERASJONSDATO (dd.mm.åå) |__|__| |__|__| |__|__|

AKTUELLE OPERASJON (ett kryss)
☐⁰ Primær rekonstruksjon av korsbånd
☐¹ Revisjonskirurgi, 1. seanse
☐² Revisjonskirurgi, 2. seanse
☐³ Annen knekirurgi (Ved kryss her skal andre prosedyrer fylles ut)

ÅRSAK TIL REVISJONSREKONSTRUKSJON (evt. flere kryss)
☐ Infeksjon
☐ Fiksasjonssvikt
☐ Ubehandlede andre ligamentskader
☐ Annet ....
☐ Graftsvikt
☐ Nytt traume
☐ Smerte

ANDRE PROSEDYRER (evt. flere kryss) ☐ Nei, hvis ja spesifiser under
☐ Meniskoperasjon
☐ Synovektomi
☐ Mobilisering i narkose
☐ Fjerning av implantat
☐ Benreseksjon (Notch plastikk)
☐ Osteotomi
☐ Annet ....
☐ Osteosyntese
☐ Bruskoperasjon
☐ Artroskopisk debridement
☐ Operasjon pga infeksjon
☐ Bentransplantasjon
☐ Artrodese

GRAFTVALG

	ACL	PCL	MCL	LCL	PLC
☐ BPTB					
☐ Hamstring					
☐ Allograft					
☐ Direkte sutur					
☐ Annet					

GRAFTDIAMETER (oppgi største diameter på graftet) .. ..mm

Ved bruk av double bundle-teknikk: AM:.........mm PL:.........mm

TILGANG FOR FEMURKANAL
☐¹ Anteromedial ☐²Transtibial ☐³ Annet ....

FIKSASJON
Sett klistrelapp på merket felt på baksiden av skjemaet
Skill mellom femur og tibia

AKTUELL BEHANDLING AV MENISKLESJON

	Partiell reseksjon	Total reseksjon	Sutur	Syntetisk fiksasjon*	Menisk-transpl.	Trepanering	Ingen
Medial	☐	☐	☐	☐	☐	☐	☐
Lateral	☐	☐	☐	☐	☐	☐	☐

* Sett klistrelapp på merket felt på baksiden

BRUSKLESJON (evt. flere kryss)

	Areal (cm²) ≤2	>2	ICRS Grade* 1 2 3 4	Artrose Ja	Nei	Behandlings-kode** 1 2 3 4	Spesifiser annet
Patella MF	☐	☐	☐☐☐☐	☐	☐	☐☐☐☐	....
Patella LF	☐	☐	☐☐☐☐	☐	☐	☐☐☐☐	....
Trochlea fem.	☐	☐	☐☐☐☐	☐	☐	☐☐☐☐	....
Med.fem. cond.	☐	☐	☐☐☐☐	☐	☐	☐☐☐☐	....
Med. tib. plat.	☐	☐	☐☐☐☐	☐	☐	☐☐☐☐	....
Lat.fem. cond.	☐	☐	☐☐☐☐	☐	☐	☐☐☐☐	....
Lat. tib. plat.	☐	☐	☐☐☐☐	☐	☐	☐☐☐☐	....

***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.
****Behandlingskoder**: 1 Debridement; 2 Mikrofraktur; 3 Ingen behandling; 4 Annet.

DAGKIRURGISK OPERASJON ☐⁰ Nei ☐¹ Ja

PEROPERATIVE KOMPLIKASJONER ☐⁰ Nei ☐¹ Ja,
hvilke(n) ....

OPERASJONSTID (hud til hud)......................min

SYSTEMISK ANTIBIOTIKA
☐⁰ Nei ☐¹ Ja ☐¹ Profylakse ☐² Behandling

Medikament 1 .... Dosering ………….. Varighet ………timer

Eventuelt i kombinasjon med medikament 2 ....

TROMBOSEPROFYLAKSE
☐⁰ Nei ☐¹ Ja: Første dose ☐¹ Preoperativt ☐² Postoperativt

Medikament 1 .... Dosering opr.dag…………………………………..

Dosering videre .... Varighet …… døgn

Medikament 2 ....

Anbefalt total varighet av tromboseprofylakse...

NSAIDs
☐⁰ Nei ☐¹ Ja, hvilken type………………………………………………………..
Anbefalt total varighet av NSAIDs-behandling……………………………………

HØYDE ....cm

VEKT ....kg

RØYK ☐⁰ Nei ☐¹ Av og til ☐² Daglig

SNUS ☐⁰ Nei ☐¹ Av og til ☐² Daglig

Lege:..
Legen som har fylt ut skjemaet (navnet registreres ikke i databasen).

202 5007 Bergen Grafisk AS - 10.2017

RETTLEDNING

- Registreringen gjelder ALLE fremre og bakre korsbåndsoperasjoner.
- Registreringen gjelder ALLE kneoperasjoner på pasienter som tidligere er korsbåndsoperert.
- Ett skjema fylles ut for hvert kne som blir operert.
- Aktuelle ruter markeres med kryss. Stiplet linje fylles ut der dette er aktuelt.
- Pasienten skal på eget skjema gi samtykke til registrering.

KOMMENTARER TIL DE ENKELTE PUNKTENE

FORKORTELSER SOM ER BRUKT PÅ SKJEMAET

- ACL: Fremre korsbånd
- PCL: Bakre korsbånd
- MCL: Mediale kollateralligament
- LCL: Laterale kollateralligament
- PLC: Popliteus kompleks/bicepssene kompleks
- BPTB; Patellarsene autograft
- AM: Anteromediale bunt av ACL
- PL: Posterolaterale bunt av ACL

SKADEDATO Skriv inn skadedatoen så eksakt som mulig.
Ved ny skade av tidligere operert korsbånd, skriv inn den nye skadedatoen.

FIKSASJON Angi hvilken fiksasjonstype som er brukt ved å feste klistrelapp på baksiden.
Husk å skille mellom femur og tibia for graftfiksasjon, og mellom medial og lateral side for meniskfiksasjon.

PEROPERATIVE KOMPLIKASJONER

Ved en ruptur/kontaminering av høstet graft e.l. skal det opprinnelige graftet anføres her.
Andre peroperative komplikasjoner skal også fylles inn her.

SYSTEMISK ANTIBIOTIKA

Her føres det på hvilket antibiotikum som er blitt benyttet i forbindelse med operasjonen. Det anføres dose, antall doser og profylaksens varighet. F.eks. Medikament 1: Keflin 2g x 4, med varighet 12 timer.

TROMBOSEPROFYLAKSE

Type, dose og antatt varighet av profylaksen skal angis separat for operasjonsdagen og senere.

Kopi beholdes i pasientjournalen, originalen sendes til Nasjonalt Korsbåndsregister.

Kontaktpersoner vedrørende registreringsskjema er
Professor Lars Engebretsen, Ortopedisk avdeling, Oslo Universitetssykehus
e-post: lars.engebretsen@medisin.uio.no
Lege Håvard Visnes, Haukeland universitetssjukehus
e-post: haavard.visnes@helse-bergen.no
Sekretær i Nasjonalt Korsbåndsregister, Ortopedisk avd., Helse Bergen
Kate Vadheim, tlf.: 55 97 64 54 e-post: korsband@helse-bergen.no
Internett: http://nrlweb.ihelse.net/

GRAFTFIKSASJON		MENISKFIKSASJON	
FEMUR	TIBIA	MEDIAL	LATERAL

KOOS – Spørreskjema for knepasienter.

NASJONALT KORSBÅNDSREGISTER Nasjonalt Register for Leddproteser Helse Bergen HF, Ortopedisk klinikk Haukeland universitetssjukehus Møllendalsbakken 11 5021 BERGEN Tlf: 55976450	**DATO**: ____________ **OPERASJONSDATO**: __________ FØDSELSNR (11 siffer): ____________________________ NAVN: ____________________________________ SYKEHUS:______________________________

Veiledning: Dette spørreskjemaet inneholder spørsmål om hvordan du opplever kneet ditt før operasjonen. Informasjonen vil hjelpe oss til å følge med i hvordan du har det og fungerer i ditt daglige liv. Besvar spørsmålene ved å krysse av for det alternativ du synes stemmer best for deg (kun ett kryss ved hvert spørsmål). Hvis du er usikker, kryss likevel av for det alternativet som føles mest riktig.

KRYSS AV FOR RIKTIG KNE (NB: Ett skjema for hvert kne):☐[1] **VENSTRE** ☐[0] **HØYRE**

Røyker du? ☐[0] Nei ☐[1] Av og til ☐[2] Daglig Hvis du røyker daglig – hvor mange sigaretter per dag: _____	Vekt: _______ kg Høyde :_______ cm

Symptom

Tenk på **symptomene** du har hatt fra kneet ditt den **siste uken** når du besvarer disse spørsmålene.

S1. Har kneet vært hovent?

Aldri	Sjelden	I blant	Ofte	Alltid
☐[0]	☐[1]	☐[2]	☐[3]	☐[4]

S2. Har du følt knirking, hørt klikking eller andre lyder fra kneet?

Aldri	Sjelden	I blant	Ofte	Alltid
☐[0]	☐[1]	☐[2]	☐[3]	☐[4]

S3. Har kneet haket seg opp eller låst seg?

Aldri	Sjelden	I blant	Ofte	Alltid
☐[0]	☐[1]	☐[2]	☐[3]	☐[4]

S4. Har du kunnet rette kneet helt ut?

Alltid	Ofte	I blant	Sjelden	Aldri
☐[0]	☐[1]	☐[2]	☐[3]	☐[4]

S5. Har du kunnet bøye kneet helt?

Alltid	Ofte	I blant	Sjelden	Aldri
☐[0]	☐[1]	☐[2]	☐[3]	☐[4]

Stivhet

De neste spørsmålene handler om **leddstivhet.** Leddstivhet innebærer vanskeligheter med å komme i gang eller økt motstand når du bøyer eller strekker kneet. Marker graden av leddstivhet du har opplevd i kneet ditt den **siste uken.**

S6. Hvor stivt er kneet ditt når du nettopp har våknet om morgenen?

Ikke noe	Litt	Moderat	Betydelig	Ekstremt
☐[0]	☐[1]	☐[2]	☐[3]	☐[4]

S7. Hvor stivt er kneet ditt senere på dagen etter å ha sittet, ligget eller hvilt?

Ikke noe	Litt	Moderat	Betydelig	Ekstremt
☐[0]	☐[1]	☐[2]	☐[3]	☐[4]

Smerte

P1. Hvor ofte har du vondt i kneet?

Aldri	Månedlig	Ukentlig	Daglig	Hele tiden
☐0	☐1	☐2	☐3	☐4

Hvilken grad av smerte har du hatt i kneet ditt den **siste uken** ved følgende aktiviteter?

P2. Snu/vende på belastet kne

Ingen	Lett	Moderat	Betydelig	Svært stor
☐0	☐1	☐2	☐3	☐4

P3. Rette kneet helt ut

Ingen	Lett	Moderat	Betydelig	Svært stor
☐0	☐1	☐2	☐3	☐4

P4. Bøye kneet helt

Ingen	Lett	Moderat	Betydelig	Svært stor
☐0	☐1	☐2	☐3	☐4

P5.Gå på flatt underlag

Ingen	Lett	Moderat	Betydelig	Svært stor
☐0	☐1	☐2	☐3	☐4

P6. Gå opp eller ned trapper

Ingen	Lett	Moderat	Betydelig	Svært stor
☐0	☐1	☐2	☐3	☐4

P7. Om natten (smerter som forstyrrer søvnen)

Ingen	Lett	Moderat	Betydelig	Svært stor
☐0	☐1	☐2	☐3	☐4

P8. Sittende eller liggende

Ingen	Lett	Moderat	Betydelig	Svært stor
☐0	☐1	☐2	☐3	☐4

P9. Stående

Ingen	Lett	Moderat	Betydelig	Svært stor
☐0	☐1	☐2	☐3	☐4

Funksjon i hverdagen

De neste spørsmålene handler om din fysiske funksjon. **Angi graden av vanskeligheter du har opplevd den siste uken ved følgende aktiviteter på grunn av dine kneproblemer.**

A1. Gå ned trapper

Ingen	Lett	Moderat	Betydelig	Svært stor
☐0	☐1	☐2	☐3	☐4

A2. Gå opp trapper

Ingen	Lett	Moderat	Betydelig	Svært stor
☐0	☐1	☐2	☐3	☐4

A3. Reise deg fra sittende stilling

Ingen	Lett	Moderat	Betydelig	Svært stor
☐0	☐1	☐2	☐3	☐4

Angi graden av **vanskeligheter** du har opplevd ved hver aktivitet den **siste uken.**

A4. Stå stille

Ingen	Lett	Moderat	Betydelig	Svært stor
☐ 0	☐ 1	☐ 2	☐ 3	☐ 4

A5. Bøye deg, f.eks. for å plukke opp en gjenstand fra gulvet

Ingen	Lett	Moderat	Betydelig	Svært sto
☐ 0	☐ 1	☐ 2	☐ 3	☐ 4

A6. Gå på flatt underlag

Ingen	Lett	Moderat	Betydelig	Svært stor
☐ 0	☐ 1	☐ 2	☐ 3	☐ 4

A7. Gå inn/ut av bil

Ingen	Lett	Moderat	Betydelig	Svært stor
☐ 0	☐ 1	☐ 2	☐ 3	☐ 4

A8. Handle/gjøre innkjøp

Ingen	Lett	Moderat	Betydelig	Svært stor
☐ 0	☐ 1	☐ 2	☐ 3	☐ 4

A9. Ta på sokker/strømper

Ingen	Lett	Moderat	Betydelig	Svært stor
☐ 0	☐ 1	☐ 2	☐ 3	☐ 4

A10. Stå opp fra sengen

Ingen	Lett	Moderat	Betydelig	Svært stor
☐ 0	☐ 1	☐ 2	☐ 3	☐ 4

A11. Ta av sokker/strømper

Ingen	Lett	Moderat	Betydelig	Svært stor
☐ 0	☐ 1	☐ 2	☐ 3	☐ 4

A12. Ligge i sengen (snu deg, holde kneet i samme stilling i lengre tid)

Ingen	Lett	Moderat	Betydelig	Svært stor
☐ 0	☐ 1	☐ 2	☐ 3	☐ 4

A13. Gå inn/ut av badekar/dusj

Ingen	Lett	Moderat	Betydelig	Svært stor
☐ 0	☐ 1	☐ 2	☐ 3	☐ 4

A14. Sitte

Ingen	Lett	Moderat	Betydelig	Svært stor
☐ 0	☐ 1	☐ 2	☐ 3	☐ 4

A15. Sette deg og reise deg fra toalettet

Ingen	Lett	Moderat	Betydelig	Svært stor
☐ 0	☐ 1	☐ 2	☐ 3	☐ 4

A16. Gjøre tungt husarbeid (måke snø, vaske gulv, støvsuge osv.)

Ingen	Lett	Moderat	Betydelig	Svært stor
☐ 0	☐ 1	☐ 2	☐ 3	☐ 4

A17. Gjør lett husarbeid (lage mat, tørke støv osv.)

Ingen	Lett	Moderat	Betydelig	Svært stor
☐ 0	☐ 1	☐ 2	☐ 3	☐ 4

Funksjon, sport og fritid

De neste spørsmålene handler om din fysiske funksjon. **Angi graden av vanskeligheter du har opplevd den siste uken ved følgende aktiviteter på grunn av dine kneproblemer.**

SP1. Sitte på huk

Ingen	Lett	Moderat	Betydelig	Svært stor
☐0	☐1	☐2	☐3	☐4

SP2. Løpe

Ingen	Lett	Moderat	Betydelig	Svært stor
☐0	☐1	☐2	☐3	☐4

SP3. Hoppe

Ingen	Lett	Moderat	Betydelig	Svært stor
☐0	☐1	☐2	☐3	☐4

SP4. Snu/vende på belastet kne

Ingen	Lett	Moderat	Betydelig	Svært stor
☐0	☐1	☐2	☐3	☐4

SP5. Stå på kne

Ingen	Lett	Moderat	Betydelig	Svært stor
☐0	☐1	☐2	☐3	☐4

Livskvalitet

Q1. Hvor ofte gjør ditt kneproblem seg bemerket?

Aldri	Månedlig	Ukentlig	Daglig	Alltid
☐0	☐1	☐2	☐3	☐4

Q2. Har du forandret levesett for å unngå å overbelaste kneet?

Ingenting	Noe	Moderat	Betydelig	Fullstendig
☐0	☐1	☐2	☐3	☐4

Q3. I hvor stor grad kan du stole på kneet ditt?

Fullstendig	I stor grad	Moderat	Til en viss grad	Ikke i det hele tatt
☐0	☐1	☐2	☐3	☐4

Q4. Generelt sett, hvor store problemer har du med kneet ditt?

Ingen	Lette	Moderate	Betydelige	Svært store
☐0	☐1	☐2	☐3	☐4

Takk for at du tok deg tid og besvarte samtlige spørsmål!

BARNEHOFTEREGISTERET
Nasjonalt Register for Leddproteser
Helse Bergen HF, Ortopedisk klinikk
Haukeland universitetssjukehus
Møllendalsbakken 11, 5021 Bergen

F.nr. (11 sifre): ....
Navn: ....
Sykehus: ....
(Skriv tydelig eller bruk pasientklistrelapp. Husk sykehus!)

BARNEHOFTESYKDOM

HOFTEDYSPLASI (Dysplasi på rtg bekken hos barn eldre enn 3 mnd)

BEHANDLINGSDATO ..../........ 20....... **SIDE** Hø Ve *(Ett kryss. Bilateral = 2 skjema)*
FØRSTE GANG DIAGNOSTISERT ..../....... 20....... *(Fylles ut første gang det sendes inn skjema)*
TIDLIGERE BEHANDLING ☐ Ingen ☐ Pute/abduksjonsortose
☐ Annen, spesifiser: ....
BEHANDLINGSTRENGENDE DYSPLASI I FAMILIE N J
SYMPTOMVARIGHET (>12 år) .... mnd
IMPINGEMENT TEST (>12 år) Høyre: Neg. Pos. Venstre: Neg. Pos.
RØNTGEN FØR BEHANDLING
Acetabular indeks (<=12 år) Hø .... Ve .... CE vinkel (>12 år) Hø .... Ve ....
Cross-over tegn (>12 år) Hø: Neg. Pos. Ve: Neg. Pos.
Spina ischiadica projisert medialt for linea terminales? (>12 år) Hø: N J Ve: N J
Bruskhøyde (>12 år) *(mm i øvre vektbærende del av leddet i AP projeksjon)*: <2 2-3 >3
HOFTE ☐ I ledd ☐ Subluksert ☐ Luksert
LATERALE HJØRNE ☐ Normalt ☐ Avrundet/ defekt
CAPUTKJERNE ☐ Normal ☐ Forsinket ☐ Ikke tilstede ☐ Caputnekrose
BEHANDLING ☐ Ingen (obs.) ☐ Pute ☐ Abduksjonsortose ☐ Lukket repos. ☐ Hoftegips
ÅPEN REPOSISJON N J
TENOTOMI ☐ Psoastenotomi ☐ Adduktortenotomi
FEMUROSTEOTOMI ☐ Varisering ☐ Rotasjon ☐ Forkortning
PLATE ☐ Forbøyd plate ☐ Vinkelplate ☐ Spesialplate, fabrikat: ....
SKRUER ☐ Vanlige skruer ☐ Vinkelstabile skruer
BEKKENOSTEOTOMI ☐ Salter ☐ Dega ☐ Trippel ☐ Takplastikk
☐ Periacetabular osteotomi ☐ Annen: ....
TILGANG ☐ Fremre ☐ Lateral ☐ Annen: ....
POSTOPERATIV HOFTEGIPS N J Antall uker ....
POSTOPERATIV RØNTGEN (ETTER BEKKENOSTEOTOMI)
Acetabular indeks (<=12 år) Hø .... Ve .... CE vinkel (>12 år) Hø .... Ve ....
REOPERASJONSTYPE ☐ Reosteosyntese ☐ Bløtdelsrevisjon ☐ Fjerne ostemat.
☐ Annen: ....
REOPERASJONSÅRSAK ☐ Osteosyntesesvikt ☐ Infeksjon ☐ Pseudartrose
☐ Blødning ☐ Annen: ....
ANNEN OPERASJON N J Spesifiser: ....
KNIVTID FOR OPERATIV BEHANDLING: .... min.

EPIFYSIOLYSIS CAPITIS FEMORIS

OPERASJONSDATO ..../.......... 20......... **SIDE** Hø Ve *(Ett kryss. Bilateral 2 skjema)*
FØRSTE GANG DIAGNOSTISERT ..../....... 20....... *(Fylles ut første gang det sendes inn skjema)*
HØYDE OG VEKT Høyde: .... cm Vekt: .... kg
SYMPTOMVARIGHET ☐ Kronisk (> 3 uker) ☐ Akutt (< 3 uker) ☐ Akutt på kronisk
STABILITET ☐ Stabil (klarer belaste) ☐ Ustabil (klarer ikke belaste)
RØNTGEN ☐ < 30° ☐ 30-50° ☐ > 50° *(Glidningsvinkel i sideplan)*
OPERASJON ☐ Primæroperasjon ☐ Reoperasjon ☐ Profylaktisk
PRIMÆROPERASJONSTYPE Fiksasjon in-situ: N J Peroperativ reposisjon: N J
Kirurgisk hofte-dislokasjon: N J Collumosteotomi: N J
Femurosteotomi: N J Spesifiser: ....
Skrueosteosyntese: N J Antall skruer: .... Fabrikat: ....
Pinnefiksasjon: N J Antall pinner: .... Diameter: .... mm
Platefiksasjon: N J Spesifiser: ....
Annen operasjon: N J Spesifiser: ....
REOPERASJONSTYPE ☐ Reosteosyntese ☐ Bløtdelsrevisjon ☐ Fjerne ostemat.
☐ Annen, spesifiser: ....
REOPERASJONSÅRSAK ☐ Feilplass. av osteosynt. ☐ Osteosyntesesvikt ☐ Infeksjon
☐ Blødning ☐ Annen: ....
KNIVTID FOR OPERATIV BEHANDLING: .... min.

Ved operativ behandling (artroskopisk eller åpen) for impingement etter SCFE:
fyll ut rubrikken ÅPNE OG ARTROSKOPISKE HOFTEOPERASJONER

Dato: .... Lege: ....
Legen som har fylt ut skjemaet (Navnet registreres ikke i databasen)

CALVÉ-LEGG-PERTHES

BEHANDLINGSDATO ..../......... 20........ **SIDE** Hø Ve *(Ett kryss. Bilateral = 2 skjema)*
FØRSTE GANG DIAGNOSTISERT ..../........ 20......... *(Fylles ut første gang det sendes inn skjema)*
SYMPTOMVARIGHET .... mnd **HALTING** N J
SMERTE ☐ Ingen ☐ Lett ☐ Betydelig **CATTERALL** ☐ I / II ☐ III / IV
BEHANDLING ☐ Ingen (fysioterapi) ☐ Abduksjonsortose
FEMUROSTEOTOMI ☐ Varisering ☐ Valgisering ☐ Rotasjon
PLATE ☐ Forbøyd plate ☐ Vinkelplate ☐ Spesialplate, fabrikat: ....
SKRUER ☐ Vanlige skruer ☐ Vinkelstabile skruer
BEKKENOSTEOTOMI ☐ Salter ☐ Dega ☐ Takplastikk
☐ Annen, spesifiser: ....
ANNEN OPERATIV BEHANDLING ☐ Trochanter transposisjon ☐ Trochanter apofysiodese
☐ Annen, spesifiser: ....
REOPERASJONSTYPE ☐ Reosteosyntese ☐ Bløtdelsrevisjon ☐ Fjerne ostemat.
☐ Annen: ....
REOPERASJONSÅRSAK ☐ Osteosyntesesvikt ☐ Blødning ☐ Infeksjon
☐ Pseudartrose ☐ Annen: ....
KNIVTID FOR OPERATIV BEHANDLING: .... min.
Ved artroskopi eller hoftedislokasjon for sequele etter CLP:
fyll ut rubrikken ÅPNE OG ARTROSKOPISKE HOFTEOPERASJONER

ÅPNE OG ARTROSKOPISKE HOFTEOPERASJONER

BEHANDLINGSDATO ..../......... 20....... **SIDE** Hø Ve *(Ett kryss. Bilateral = 2 skjema)*
OPERASJON ☐ Primæroperasjon ☐ Reoperasjon ☐ Kun diagnostisk uten intervensjon
SYMPTOMVARIGHET .... mnd
TIDLIGERE HOFTELIDELSE N J ☐ SCFE ☐ CLP ☐ DDH
☐ Andre: ....
DIAGNOSE ☐ Cam impingement ☐ Pincer impingement ☐ Kombinert impingement
☐ Annen: ....
PREOPERATIVE FUNN Impingement test Høyre: Neg. Pos. Venstre: Neg. Pos.
Halting: N J Rtg Alfavinkel sideplan: Hø .... Ve .... frontplan: Hø .... Ve ....
CE-vinkel Hø .... Ve .... Cross-over tegn Hø: Neg. Pos. Ve: Neg. Pos.
Spina ischiadica projisert medialt for linea terminales? Hø: N J Ve: N J
Bruskhøyde *(mm i øvre vektbærende del av leddet i AP projeksjon)*: <2 2-3 >3
MR funn: ☐ Labrumskade ☐ Paralabral cyste ☐ Subchondral cyste
Effekt av lokalbedøvelse i leddet: N J ☐ Ikke aktuelt
KIRURGISK TILGANG ☐ Artroskopisk ☐ Kirurgisk dislokasjon ☐ Konvertering til åpen tilgang
Tilgang ved åpen kirurgi: ☐ Lateral ☐ Annen: ....
Fiksasjonsmetode ved trochanter osteotomi: ....
Portaler: ☐ Anterior ☐ Anterolateral ☐ Posterolateral ☐ Distal anterior ☐ Proximal anterior
☐ Perifere kompartment først ☐ Sentrale kompartment først
PEROPERATIVE FUNN
Labrum: ☐ Normal ☐ Degen. forandret ☐ Forbenet ☐ Partiell ruptur ☐ Gjennomgående ruptur
Bruskskade acetabulum: N J Grad: 0 1 2 3 4 Lokalisasjon: 1 2 3 4 5 6
Bruskskade caput femoris: N J Areal: .... mm² Dybde (ICRS): 1 2 3 4
Lokalisasjon: 1 2 3 4 5 6
Ligamentum teres skade: N J ☐ Partiell ruptur ☐ Total ruptur
Frie legemer: N J ☐ Perifert ☐ Sentralt
Os acetabuli: N J ☐ Som forbening av labrum ☐ Som del av leddflaten Synovitt: N J
KIRURGISK BEHANDLING Labrumruptur: ☐ Debridement ☐ Sutur. Antall ankre: ....
Type ankre: .... ☐ Labrumrekonstruksjon, spesifiser: ....
(Klistrelapp på baksiden)
Bruskskade: ☐ Ingen beha. ☐ Debridement ☐ Mikrofraktur ☐ Annen: ....
Pincerlesjon: ☐ Ingen beha. ☐ Reseksjon. Dybde max .... mm Lengde .... mm
Camlesjon: ☐ Ingen beha. ☐ Reseksjon
Ligamentum teres: ☐ Ingen beha. ☐ Debridement ☐ Annen: ....
Os acetabuli: ☐ Ingen beha. ☐ Fjerning ☐ Fiksering ☐ Annen: ....
Frie legemer fjernet: N J Synovectomi: N J Knivtid .... min.
Reoperasjonsårsak, spesifiser: ....

202 5023 Bergen Grafisk as - 03.2013

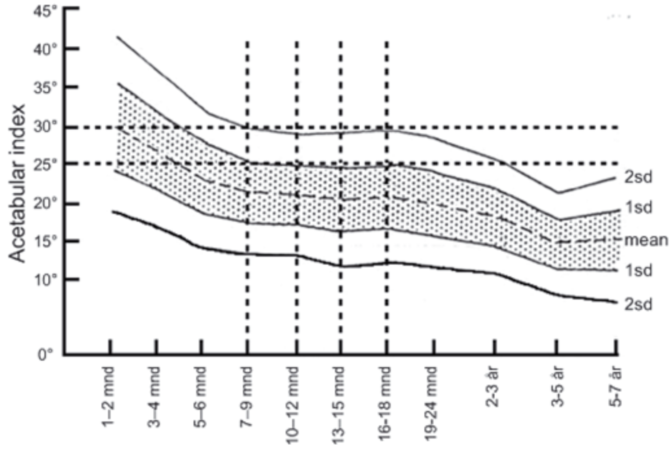
RETTLEDNING

1. HOFTEDYSPLASI

Kriterier: AI > mean + 2SD for aktuell alder (Se figur)

Alle barn som på røntgen bekken får påvist hoftedysplasi etter 3 måneders alder skal registreres. Barn som er diagnostisert før 3 måneders alder (putebehandlet) registreres hvis de fortsatt har dysplasi på røntgen bekken på kontroll etter 3 måneders alder. Barn med nevroortopediske lidelser skal ikke registreres.

- **Registreres første gang ved diagnose (røntgen bekken)/primærbehandling**
- **Registreres ved senere behandling som krever anestesi/ sedasjon** Lukket reposisjon/ hoftegips, åpen reposisjon, tenotomier, femur-/bekkenosteotomier, reoperasjoner. Operativ behandling (periacetabulære osteotomier, takplastikk og lignende) hos ungdommer og voksne skal også registreres.



CAPUTKJERNE: Ved unilateral – sammenlign med frisk side.

2. CALVÉ-LEGG-PERTHES

- **Registreres første gang ved diagnose/primærbehandling**
- **Registreres ved senere behandling som krever anestesi** (Femur-/bekkenosteotomier, reoperasjoner)

CATTERALL: **I/II** = <50 % caputnekrose. **III/IV** = >50 % caputnekrose

3. EPIFYSIOLYSIS CAPITIS FEMORIS

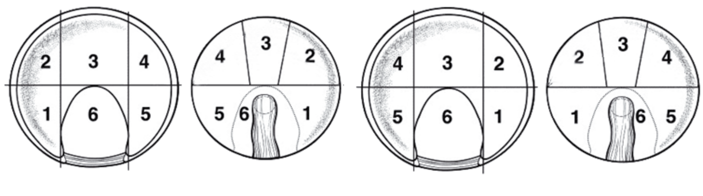
- **Registreres første gang ved diagnose/primærbehandling**
- **Registreres ved senere behandling som krever anestesi** Osteosyntese, femurosteotomier, reoperasjoner.

4. ÅPNE OG ARTROSKOPISKE HOFTEOPERASJONER

Alle pasienter (uavhengig av alder) som gjennomgår åpen eller artroskopisk hofteoperasjon, unntatt fraktur-, protese- og tumor-operasjoner, skal registreres.

Bruskskade i acetabulum – Grade:
0=Normal.
1=Loss of fixation to the subchondral bone resulting in a wave sign, defined as occuring when the capsular side of the labrum is pushed inwards with the probe resulting in bulging of the adjacent articular cartilage.
2=Presence of cleavage tear with obvious separation at the chondrolabral junction.
3=Delamination of the articular cartilage.
4=Presence of exposed bone in the acetabulum.

Bruskskade i acetabulum og på caput femoris – Lokalisasjon:
1-2: Fortil, 4-5: Baktil



Venstre hofte   Høyre hofte

Bruskskade på caput femoris – Dybde (ICRS):
1=Nearly normal: Superficial lesions, soft identation and/or superficial fissures and cracks.
2=Abnormal: Lesions extending down to <50% of cartilage depth.
3=Severely abnormal: Cartilage defects extending down to >50% of cartilage depth as well as down to calcified layer.
4=Severely abnormal: Osteochondral injuries, lesions extending just through the sub chondral boneplate or deeper defects down into trabecular bone.

KONTAKTPERSONER VEDRØRENDE REGISTRERINGSSKJEMA

Overlege Ola Wiig, Ortopedisk avd. Oslo universitetssykehus,
Tlf. 95 16 83 80, e-post: ola.wiig@ous-hf.no
Overlege Anders Wensaas, Ortopedisk avd, Oslo universitetssykehus,
Tlf: 97 15 83 39, e-post: anders.wensaas@ous-hf.no
Overlege Trude Gundersen, Ortopedisk klinikk, Haukeland universitetssjukehus,
Tlf: 92 85 38 13, e-post: trude.gundersen.lehmann@helse-bergen.no
Sekretær Kate Heidi Vadheim, Barnehofteregisteret,
Tlf. 55 97 64 54, e-post: kate.vadheim@helse-bergen.no
Internett: http://nrlweb.ihelse.net

Versjon 20130301