Nasjonalt Register for Leddproteser

Nasjonalt Hoftebruddregister

Nasjonalt Korsbåndregister

Nasjonalt Barnehofteregister

NASJONAL KOMPETANSETJENESTE
for leddproteser og hoftebrudd

REPORT

June 2019

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: 978-82-91847-24-5
ISSN: 1893-8906 (Printed version)
1893-8914 (Online)

CONTENTS

NORWEGIAN NATIONAL ADVISORY UNIT ON ARTHROPLASTY AND HIP FRACTURES: ANNUAL REPORT 2019

This annual report presents results and descriptive statistics from our four 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 the results are included in this annual report.

This annual report is sent electronically to all orthopaedic surgeons in Norway. Paper copies can be obtained by contacting the Norwegian Arthroplasty Register (NRL). 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 from 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 (see the reference lists at the end of this annual report). We present percentages of three- and ten-year durability of the most commonly used hip and knee prostheses in Norway. This information is also available on the website of the National Service Centre https://www.kvalitetsregistre.no/.

Hospital-based annual reports, with data from each hospital, will as before be sent 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 recorded and the data for the hospital are correct. The reports should be used for local improvement work.

A coverage analysis is published for each of the registers. These analyses were conducted in cooperation with the National Service Centre and the Norwegian Patient Register (NPR). Hospitals with low reporting need to review their reporting procedures. Some hospitals have low reporting of revisions. We have completed an analysis of patients at Haukeland University Hospital who were reported as revisions to the NPR but not to the NRL. On the basis of this analysis, we have adjusted the coverage analysis for 2015-16 for the whole country. This resulted in an improvement in the coverage rates for hip arthroplasty revisions from 89% to 93%, and for knee arthroplasty revisions from 90% to 91%.

The Cruciate Ligament Register has developed electronic recording of the surgeon’s form in the medical registration system (MRS), and this is now being used in five hospitals. From November 2019, we will require electronic recording of information from the Cruciate Ligament Register. A bar code scanner is used to read information on implants. The Paediatric Hip Register has also started to record hip arthroplasty in both children and adults electronically. A corresponding system is now being developed for shoulder arthroplasty, which we hope will be used from autumn 2019. Electronic recording of patient-reported outcome measures (PROMs) for total hip arthroplasty is now operative in 15 hospitals and we have started recording PROMs for knee arthroplasty in 2019. We would ask hospitals to prepare for collection of PROM data from patients. The Hip Fracture Register has published interactive results online since 2017. These results have so far been well received and we hope that they will be used for local quality improvement work.

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.

Congratulations to Lars B. (Lasse) Engesæter and Leif Ivar Havelin for the award of Knight First Class of the Royal Norwegian Order of St. Olav for their work in orthopaedics.

The National Advisory Unit has its own Facebook page, which we hope you will visit and follow: https://www.facebook.com/leddregisteret/ or you can use the QR code on the back of this year's report.

We would like to thank all orthopaedic surgeons in Norway for good reporting. We are also grateful for good cooperation with the contact persons for the various registers, the Reference Group, the Norwegian Orthopaedic Association, Helse Bergen, Helse Vest, the Centre for Clinical Documentation and Evaluation (SKDE) via the National Service Centre for Medical Quality Registers, the equipment suppliers, the University of Bergen, the Norwegian Patient Register (NPR), the Norwegian Institute of Public Health, the Office of the Auditor General, the Norwegian Medicines Agency, the Norwegian Board of Health Supervision, the Directorate of Health and the Ministry of Health and Care Services.

Bergen, June 2019

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
Chief 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

Eva Dybvik
Biostatistician/Researcher

Gard Kroken
Biostatistician/Researcher

CONTENTS

Norwegian Arthroplasty Register

Total Hip Replacement

HIP ARTHROPLASTY REGISTER: ANNUAL REPORT 2019

The Register now has 233 142 hip arthroplasties in its database. The number of surgeries is gradually increasing each year, and in 2018, 9553 primary operations, 1422 revisions and 115 reoperations (without removal/replacement of prosthetic parts) were recorded. The revision rate for 2018 was 12.8%; this is the lowest rate recorded in the history of the Register, apart from the initial start-up years. So we are on the right track!

An increasing number of forms are incompletely filled out on certain points. In particular, information on bone loss and bone transplants in revisions is missing. One of the great advantages of the NRL over other registries is the amount of detail, and it is therefore important to have good reporting of details. We ask surgeons to be as accurate as possible when filling out the forms. The lack of information may be because of the form is not entirely clear on these points. Electronic recording is gradually being developed and we hope that this will make it simple and intuitive to record all the details, thus increasing the level of accuracy.

The year 2018 reveals the following statistics: two of every three surgeries were performed on women. The average woman receiving a prosthesis was 68.9 years old, while men were 67 years old on average. 79% of the patients were diagnosed with primary coxarthrosis. Other diagnoses, in decreasing order of frequency: sequelae after dysplasia (7%), acute femoral neck fracture (6% and increasing), sequelae after hip fracture (3%) and caput necrosis (3%). Rheumatoid arthritis is steadily decreasing as an indication, only accounting for 1% of patients.

Simultaneous bilateral hip arthroplasty has not been common in Norway, but we are now seeing an increase. This was performed on 66 patients in 2018, compared with scarcely over 20 per year about five years ago.

Results for prostheses inserted in different periods are shown in Figures A.1-A.6. The different periods are compared with 1987-1990 as a reference period. There has been a gradual improvement over time. We see an increase in early revisions in the most recent period compared to previous periods, and this is most pronounced for cemented prostheses. For THAs with a short-term follow-up period, these early revisions will have a greater impact than in the case of long-term follow-up periods. Cox regression analysis is not very suitable here and the risk estimates will probably change over time. The curves for 2013-2018 do not appear to differ negatively from earlier periods, apart from the decline due to early revisions. We will study this in more detail.

Fixation in primary THA. In 2018, 43% of patients received an uncemented prosthesis, 26% cemented, 22% reverse hybrid and 9% classical hybrid. In accordance with the aim of the quality improvement project of the Register, we see an increase in the use of cemented stems in patients over 75 years, especially women (A.25).
If we compare the results of the different methods of fixation in all patients in 2004-2018, we find no difference in risk of revision. However, for women over 75 years, there is still a 50% greater risk of revision with an uncemented stem than for fully cemented or classical hybrid fixation (A.17). For patients under 65, reverse hybrid THA seems to work best in the medium term, especially in men (see Figures A.12-A.17).

Surgical trends. Changes in surgical approach have continued, resulting in the following distribution for 2018: posterior 71%, anterior/anterolateral 22% and direct lateral 5%. For revisions, the direct lateral approach (22%) has decreased at the expense of the posterior approach (63%). A 32mm head is used in 80% of surgeries, 36mm (13%) has increased somewhat, while 28mm (6%) has decreased. The use of dual mobility articulation in primary THA has increased somewhat in recent years, but is still moderate (317 patients in 2018). NARA studies have shown that mid-term prosthetic survival is the same for these cups as for standard cups for both hip fracture and osteoarthritis (*Kreipke R et al. 2019*). Cross-linked polyethylene used with metal or ceramic heads dominate articulations completely. Ceramic-on-ceramic THA is less common than before, and only 150 patients received this articulation in 2018.

Electronic recording of PROMs for hip patients started on a small scale in western Norway in 2017, and is now being expanded to all hospitals in the country. By 1 January 2019, nine hospitals were providing PROMs, and this figure is steadily increasing (about 15 hospitals at the time of writing). We have hired a consultant, Mikal Solberg, to assist super users in hospitals when recording of PROMs commences. For hip arthroplasty, we include HOOS, EQ-5D, Charnley score, UCLA activity score and information on BMI, smoking, alcohol consumption, marital status and educational level (see further description). We are making efforts to avoid duplicating work for hospitals and patients; for hospitals that have already started recording PROMs, we try to ensure that these data can be imported directly. Recording of PROMs for knee replacement patients began in April.

In the same way as last year, a large number of results are published on the SKDE website (https://www.kvalitetsregistre.no/registers/nasjonalt-register-leddproteser). These are results for e.g. the most common prosthesis combinations, hospital results, coverage rates for hospitals and how well hospitals meet the quality indicators. Last year we measured the extent to which hospitals used well-documented femoral stems. This year, this is being repeated but supplemented with information on cups. Survival results in this report must be seen in the light of rates of reporting revisions. Hospitals with low reporting of revisions achieve better results than they deserve. Results from hospitals with coverage below 80% for revisions have been excluded from this analysis. Hospitals or regions can be compared in the interactive results portal.

We have examined coverage rates for 2015-2016. Here, we compared data from the Register with data from the NPR. In this connection, we conducted an attrition analysis at Haukeland University Hospital. This implied examining more closely the operations recorded in the NPR but not in the Hip Arthroplasty Register. We found that the vast majority of missing operations were not actually missing. Some patients were recorded twice in the NPR, mostly those who were transferred to another ward during their hospital stay. Some patients were incorrectly coded in the NPR. Furthermore, a number of missing patients had been correctly recorded in the Hip Fracture Register. Following these findings, we made some changes to the sample in the NPR, resulting in a more accurate (and higher) coverage rate than previously. We hope to conduct similar attrition analyses at other hospitals to further improve the method. The coverage rate between hospitals varies considerably. The national average for primary operations was 97.3% and for revisions 93.3%. These are very good figures, and far better than most national quality registers. Many thanks for good reporting!

PUBLICATIONS IN 2018

Hellevik AI et al. examined whether metabolic syndrome (abdominal and general obesity, hypertension, dyslipidaemia, insulin resistance) were risk factors for hip or knee arthroplasty

with an osteoarthritis diagnosis. NRL and HUNT. Men <50 years with hypertension and people <70 years with abdominal obesity had a higher risk of knee arthroplasty. Otherwise, no correlation between metabolic syndrome and knee and hip arthroplasty was found.
Magnusson K et al. examined whether familial confounding could explain the association between BMI and severe osteoarthritis/hip arthroplasty. NRL and the Twin Register. They found that BMI was associated with osteoarthritis requiring hip arthroplasty, and that familial confounding could explain this association in men, but not in women.

Furnes O wrote a commentary in Acta on international register collaboration, where he discussed various methods (meta-analysis vs. individual data) for handling data from several different registers. The commentary was based on an article by Paxton L et al. in the same issue.

Tsikandylakis G et al. studied prosthesis survival with different head sizes in NARA and found that 28mm and 32mm heads had a similar risk of revision, but some differences in causes of revision. 36mm had no advantages over 32mm, but a somewhat increased risk of revision overall. We recommend keeping a close eye on results of 36mm heads.

Kreipke R et al. studied the results of dual mobility cups in primary THA for osteoarthritis in NARA data and found an equal risk of revision with an average of three years of follow-up. The dual mobility cups resulted in fewer luxations, but more infections.

Gromov K et al. conducted a Nordic survey in which orthopaedic surgeons specified the standard procedures on their ward for postoperative restrictions following primary THA. They found that results varied between the countries. In Denmark, 50% of hospitals had no restrictions, while in Norway the figure was 19%. Two-thirds of hospitals had changed to a less restrictive protocol in the past five years.

MacInnes SJ et al. examined possible genetic causes of aseptic loosening. The study included 2624 hip arthroplasty patients from Norway and 890 from the UK. Five independent genetic signals were found.

Pedersen AB et al., in a study of the NPR, NRL and the Prescription Register, also involving Denmark, found no effect of the length of thrombosis prophylaxis or of whether it was commenced before or after surgery. The exception was that short-term prophylaxis (1-5 days) started after surgery was associated with increased 90-day mortality.

Please also consult the list of publications in this report and on our website
http://nrlweb.ihelse.net/

Bergen, June 2019

Geir Hallan
Chief Physician/Professor
Hip Arthroplasty

Anne Marie Fenstad
Biostatistician/Researcher

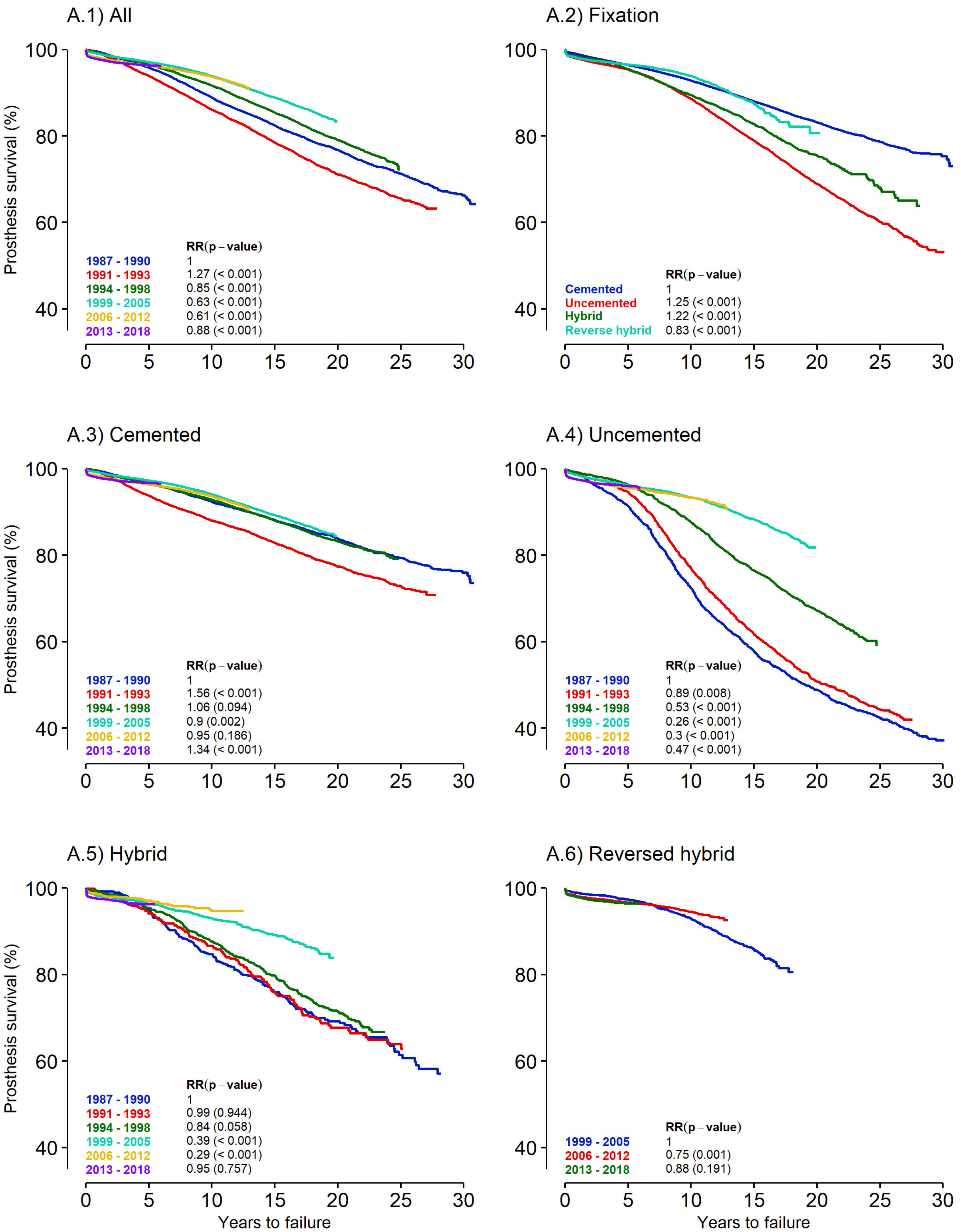
Irina Kvinnesland

Irina Kvinnesland
IT Consultant

Gard Kroken

Gard Kroken
Biostatistician/Researcher

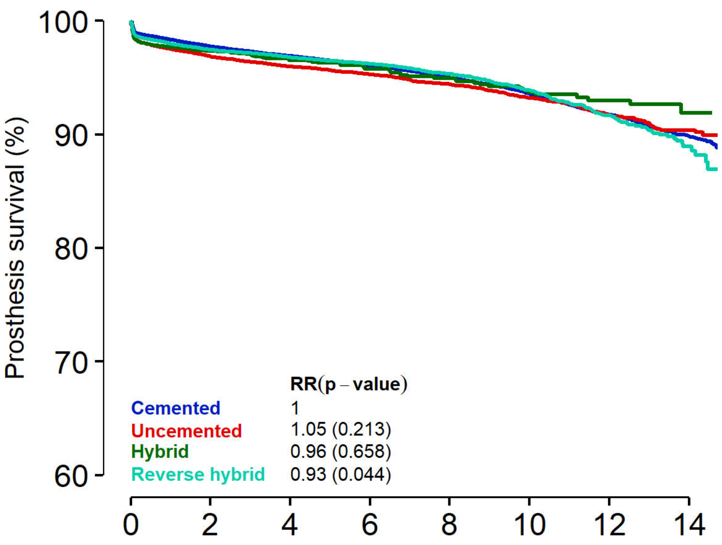
Survival of total hip prosthesis
1987-2018



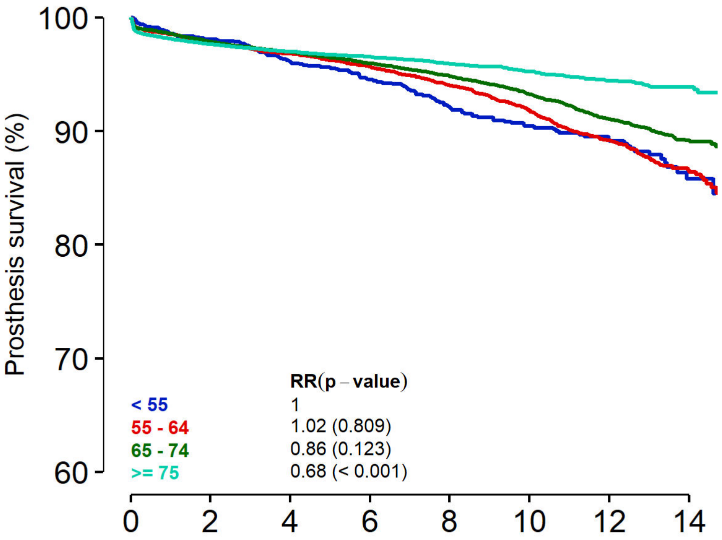
Kaplan-Meier survival curves. Risk ratio (RR) is adjusted for age, gender and diagnosis.
Survival estimate is given as long as more than 50 prostheses are at risk.

Survival of total hip prosthesis
2004-2018

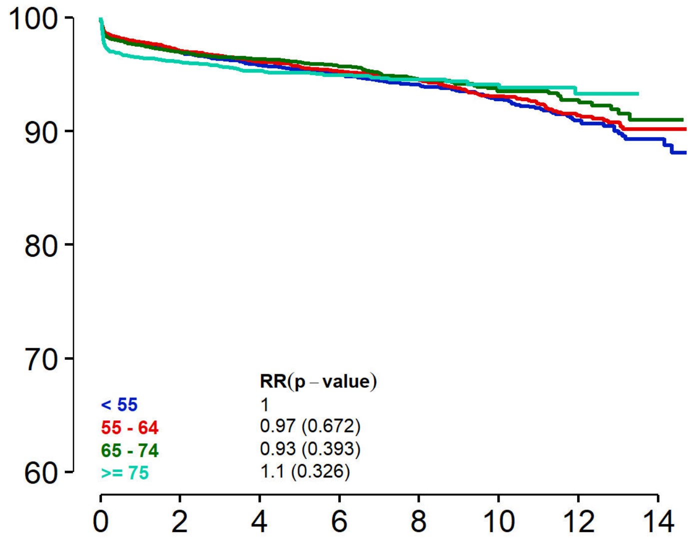
A.7) Fixation



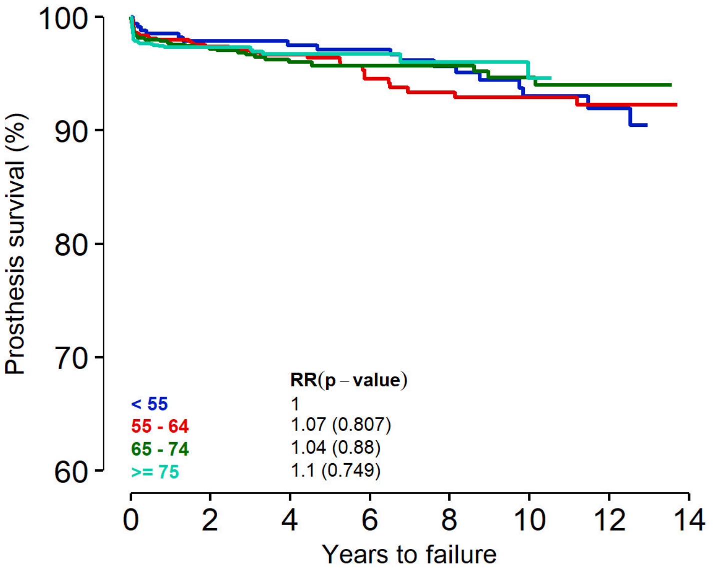
A.8) Cemented



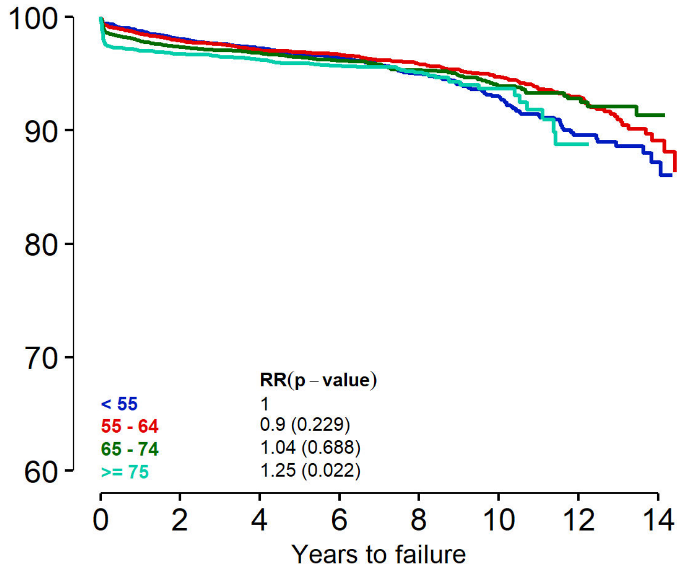
A.9) Uncemented



A.10) Hybrid

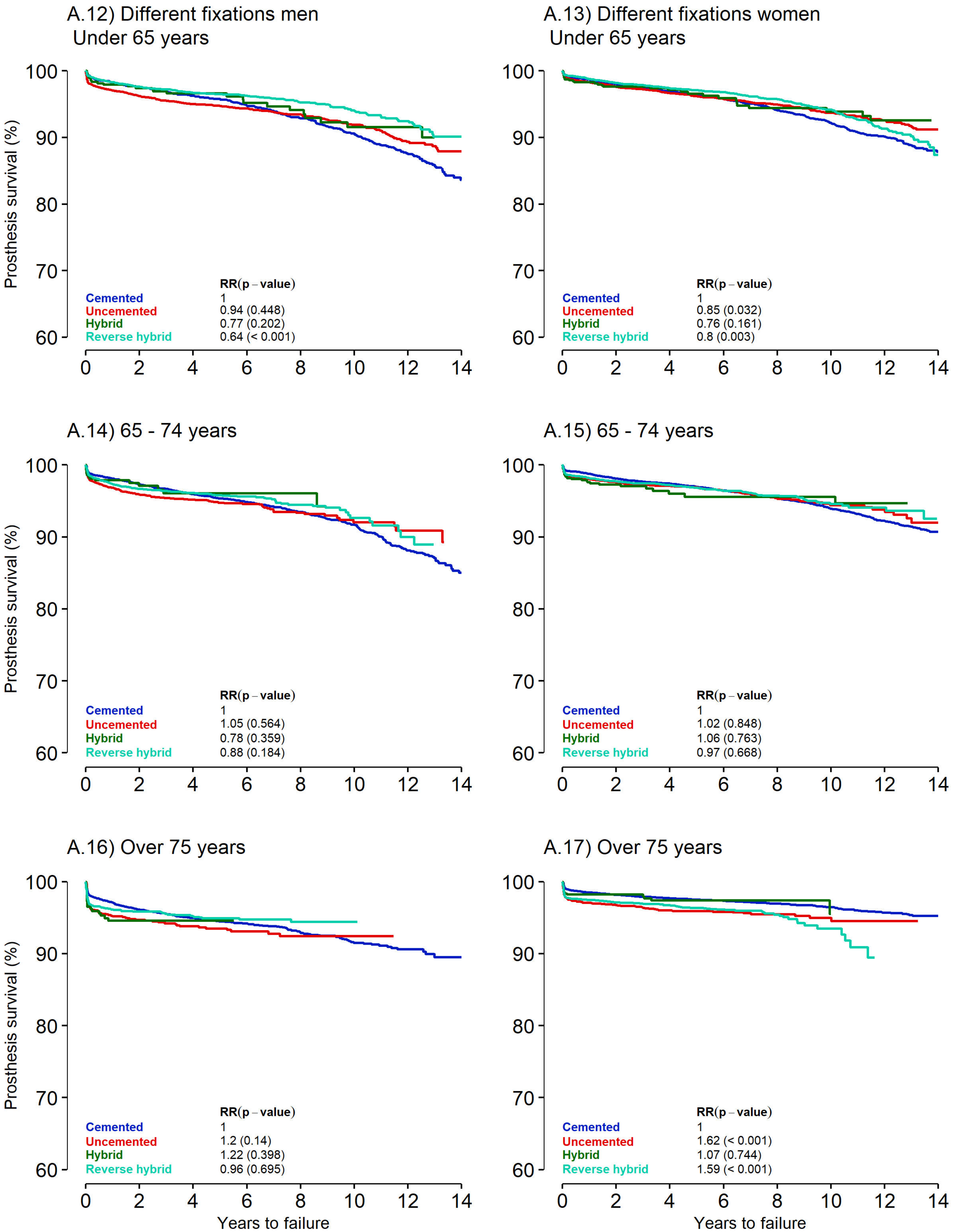


A.11) Reversed hybrid



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.

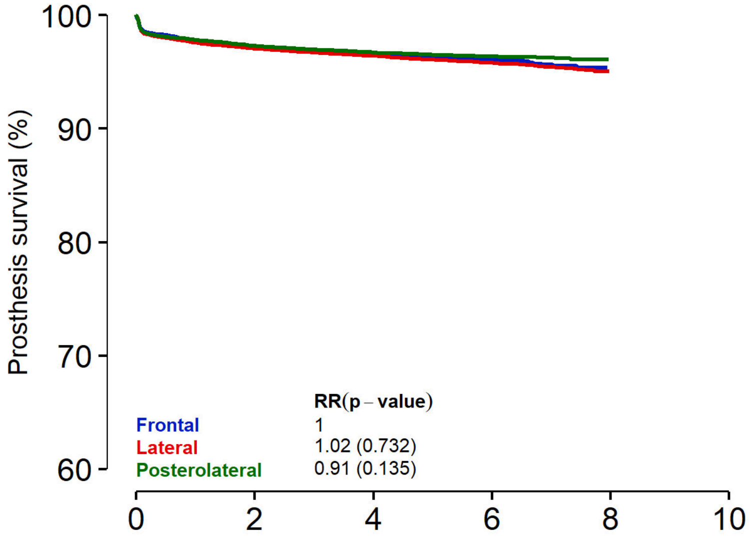
Survival of total hip prosthesis
2004-2018



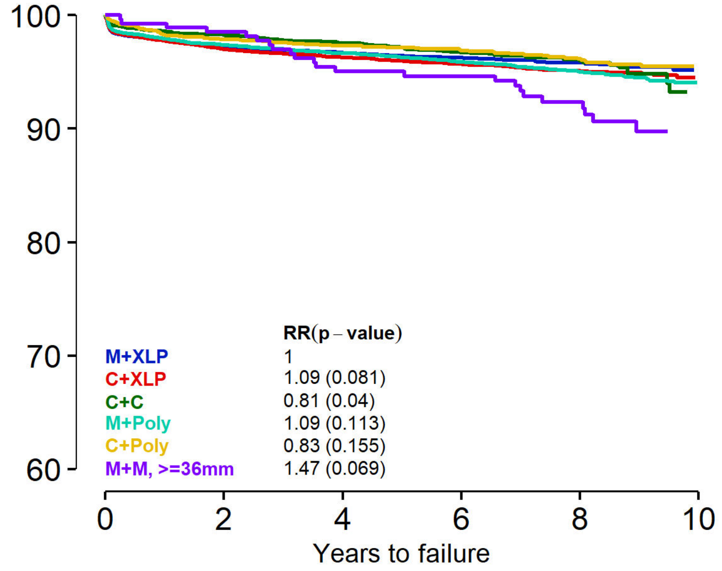
Kaplan-Meier survival curves. Risk ratio (RR) is adjusted for diagnosis.
Survival estimate is given as long as more than 50 prostheses are at risk.

Survival of total hip prosthesis
2009-2018

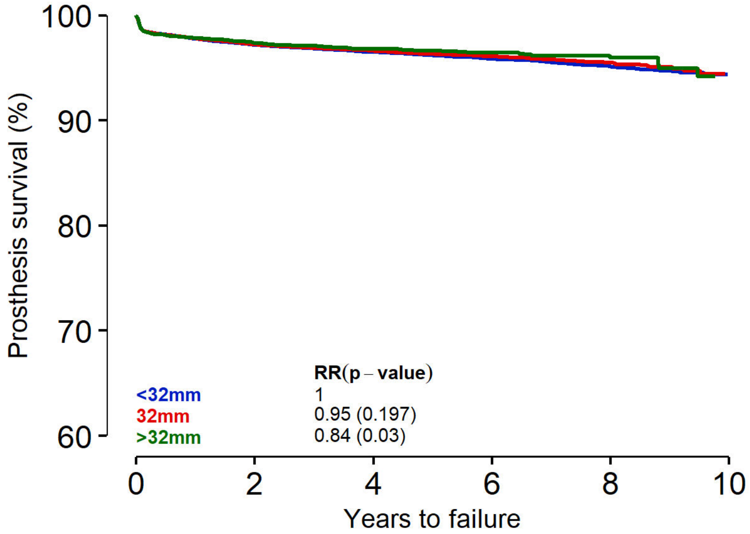
A.18) Access (from 2011)



A.19) Articulation (without dual mobility)



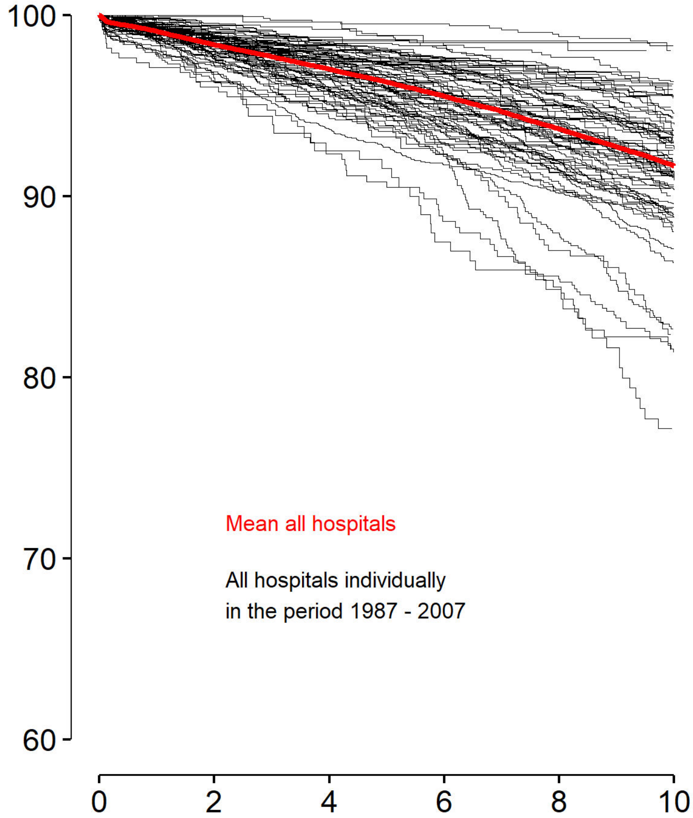
A.20) Head size (without dual mobility or metall on metall)



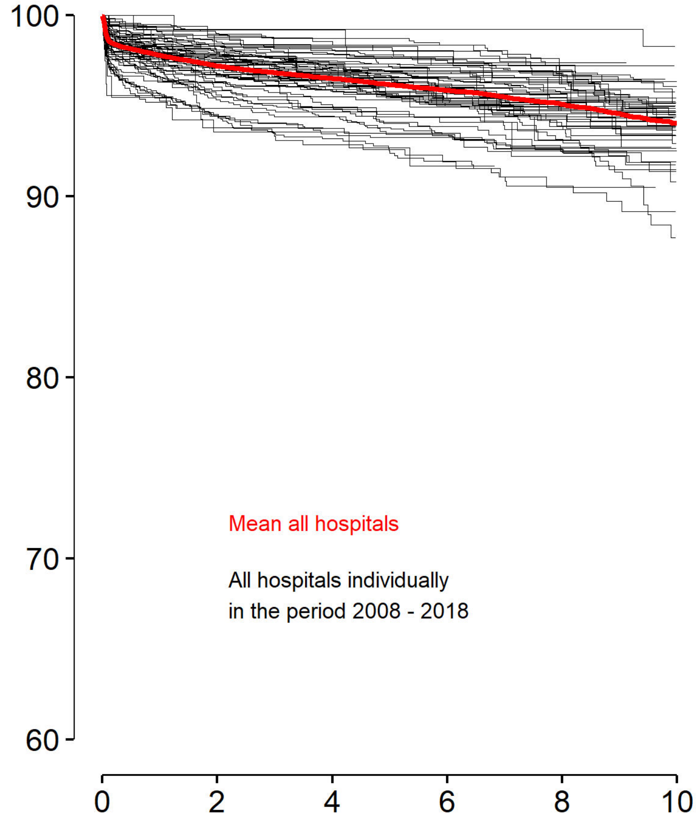
Kaplan-Meier survival curves. Risk ratio (RR) is adjusted for age, gender and diagnosis.
Survival estimate is given as long as more than 50 prostheses are at risk.

Total hip arthroplasty -
Last 10 years survival curves for all hospitals individually

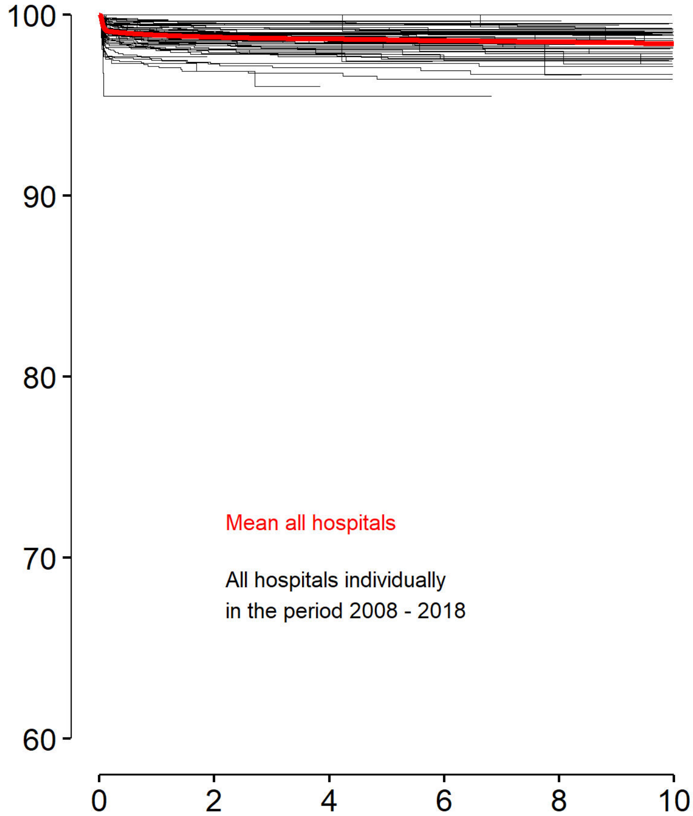
A.21) Endpoint all revisions, 1987 - 2007



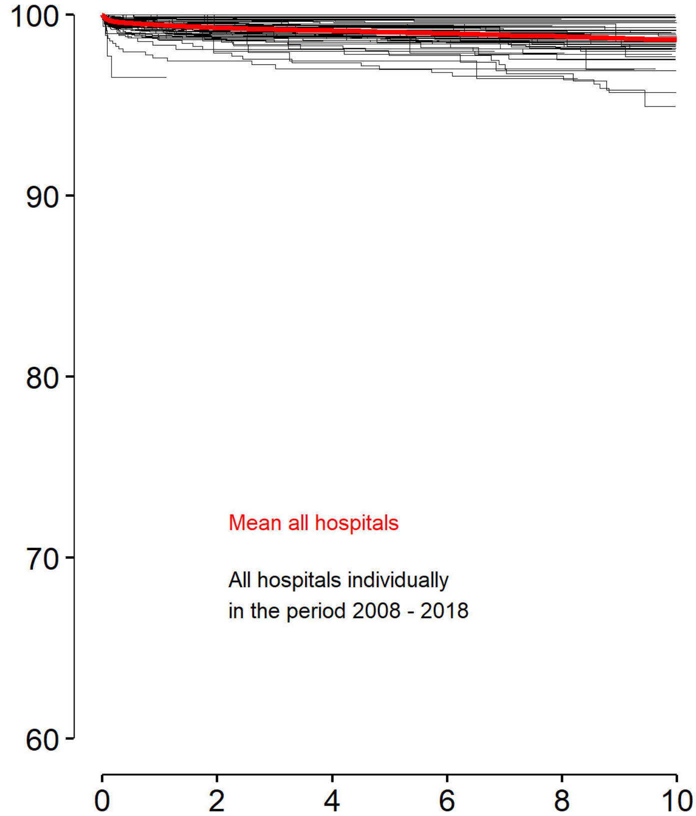
A.22) Endpoint all revisions, 2008 - 2018



A.23) Endpoint revision due to infection, 2008 - 2018



A.24) Endpoint revision due to dislocation, 2008 - 2018

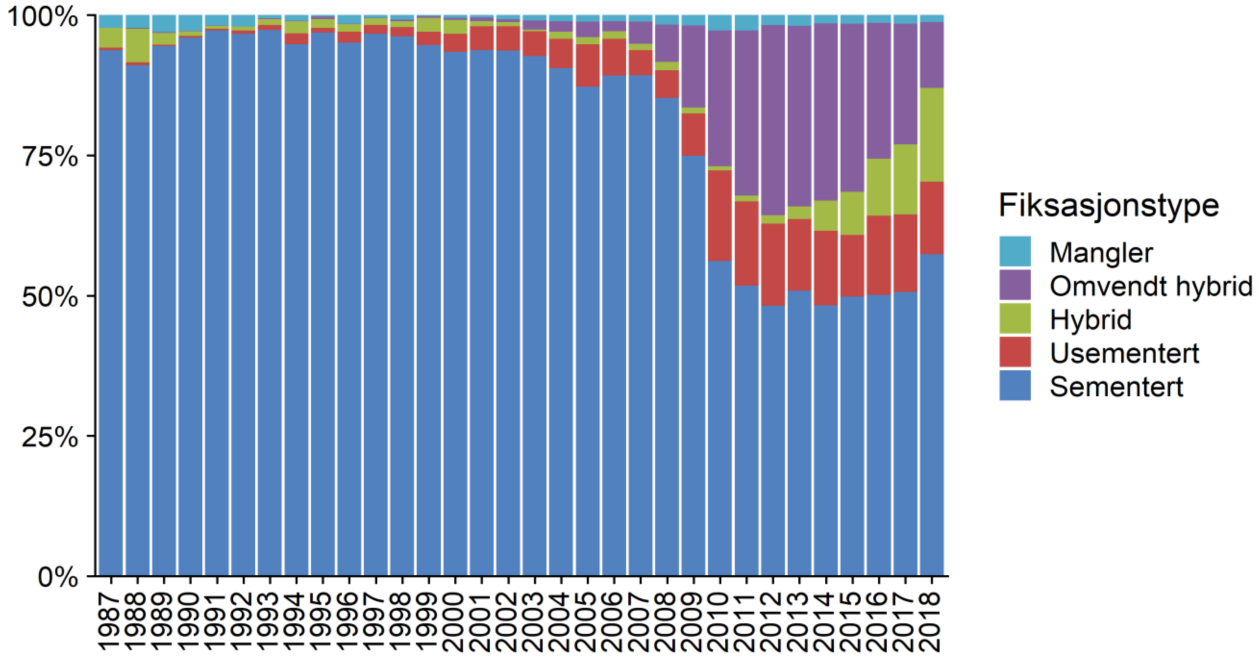


One stage bilateral hip prosthesis operations

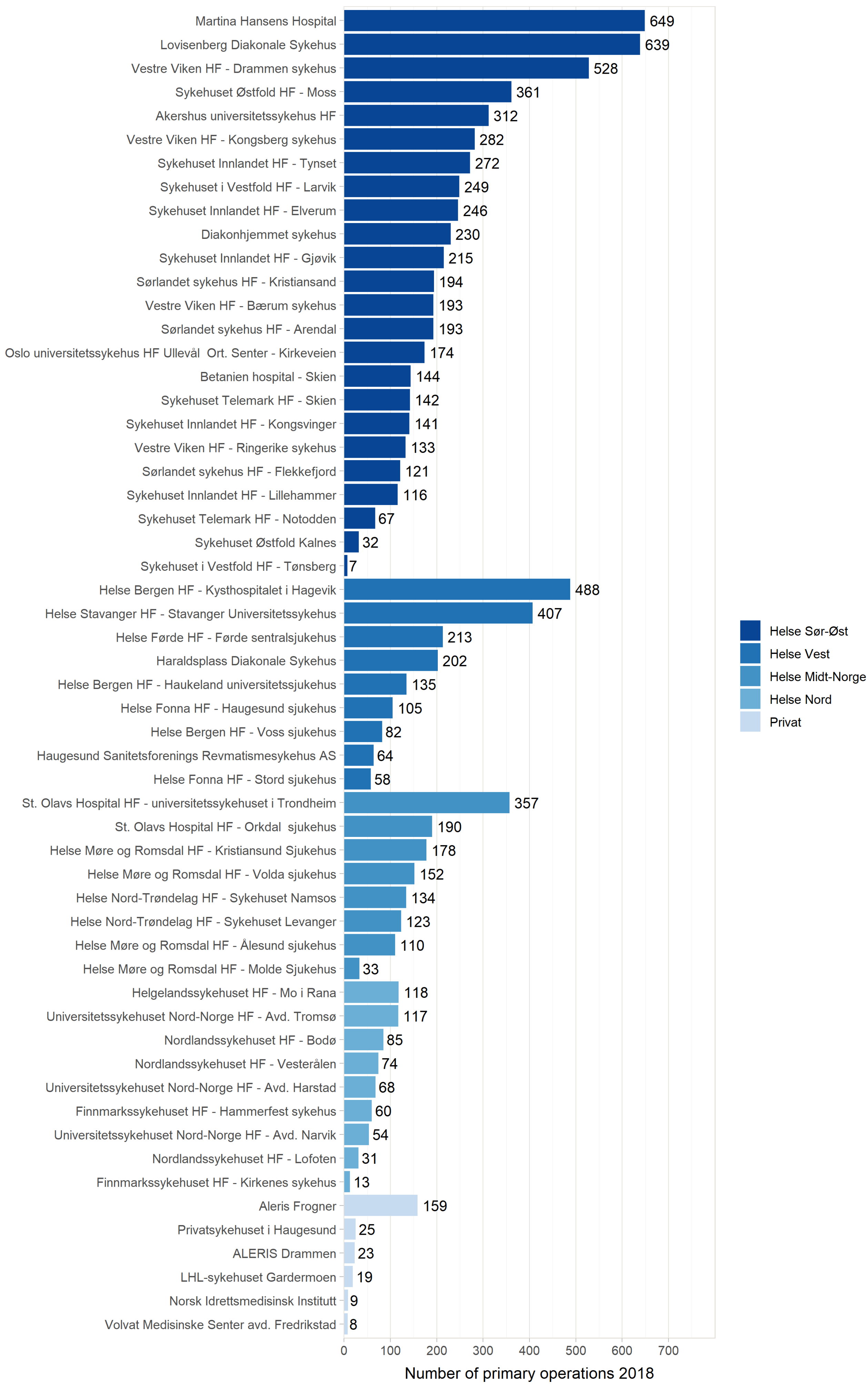
Year	1987-2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Sum:
Number of patients	159	15	13	19	15	15	18	26	23	22	28	32	47	66	498

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.

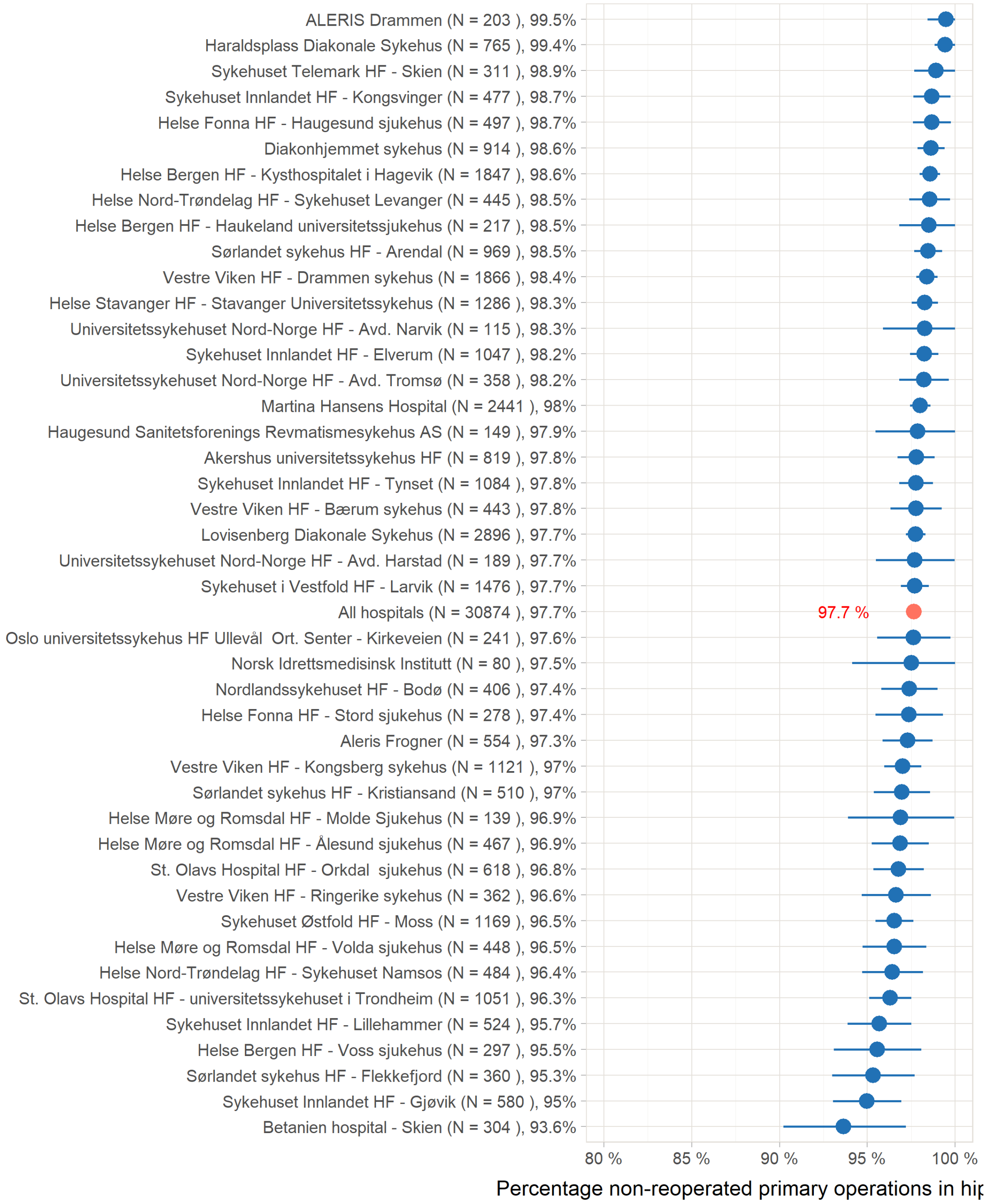
Figur A.25: Fixation for women over 75 years, 1987 to 2018:



FIGUR A.26: Number of primary THA operations, 2018

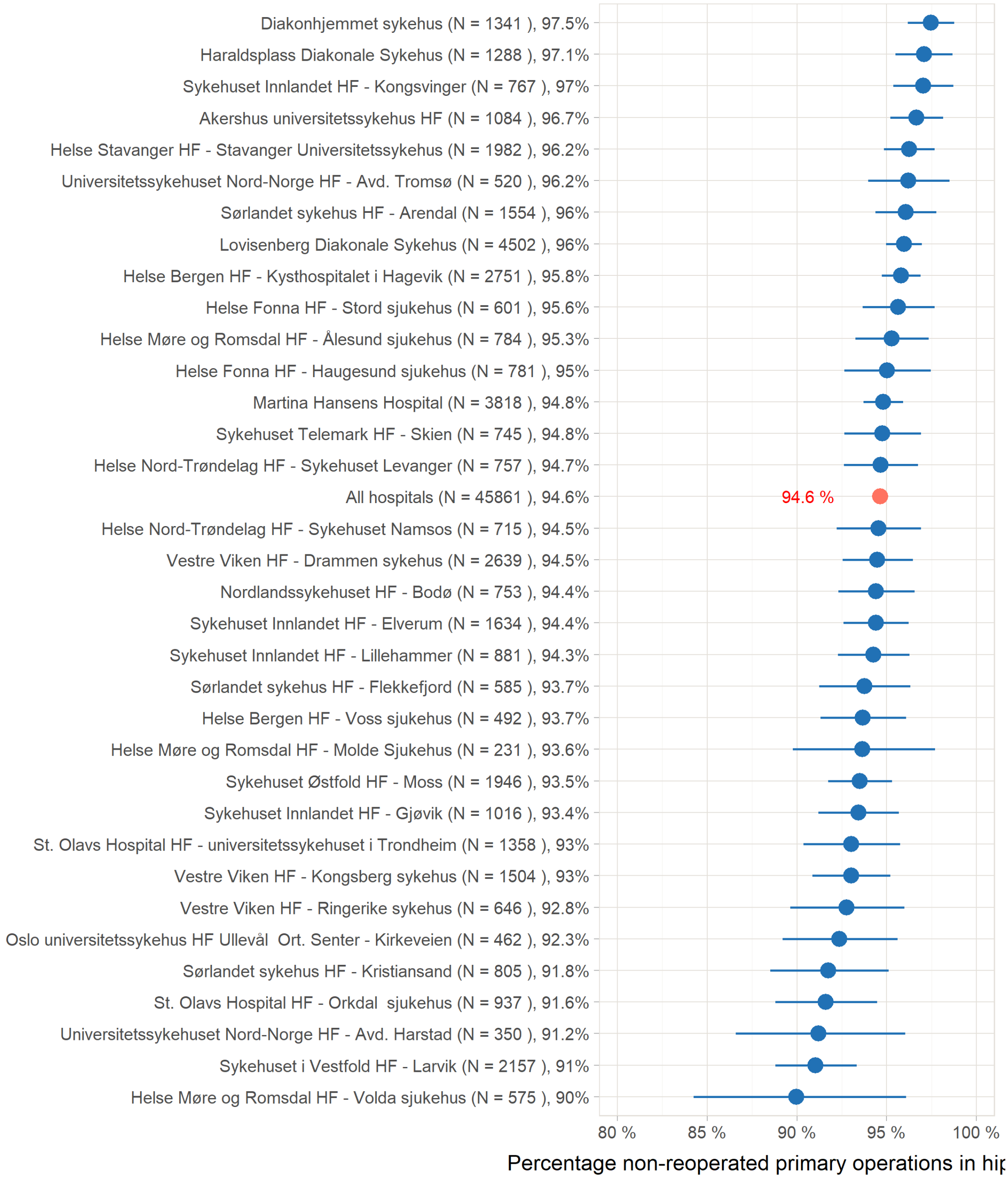


FIGUR A.27: Percentage non-revised standard patients two years after operations in 2012-2018



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 2012 to 2018. Only hospitals with operations in 2018 and with more than 50 operations from 2012 to 2018 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 2012 to 2016 are included.

FIGUR A.28: Percentage non-revised standard patients ten years after operations in 2007-2018



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 2007 to 2018. Only hospitals with operations in 2018 and with more than 50 operations from 2007 to 2018 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 2008 to 2016 are included.

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:

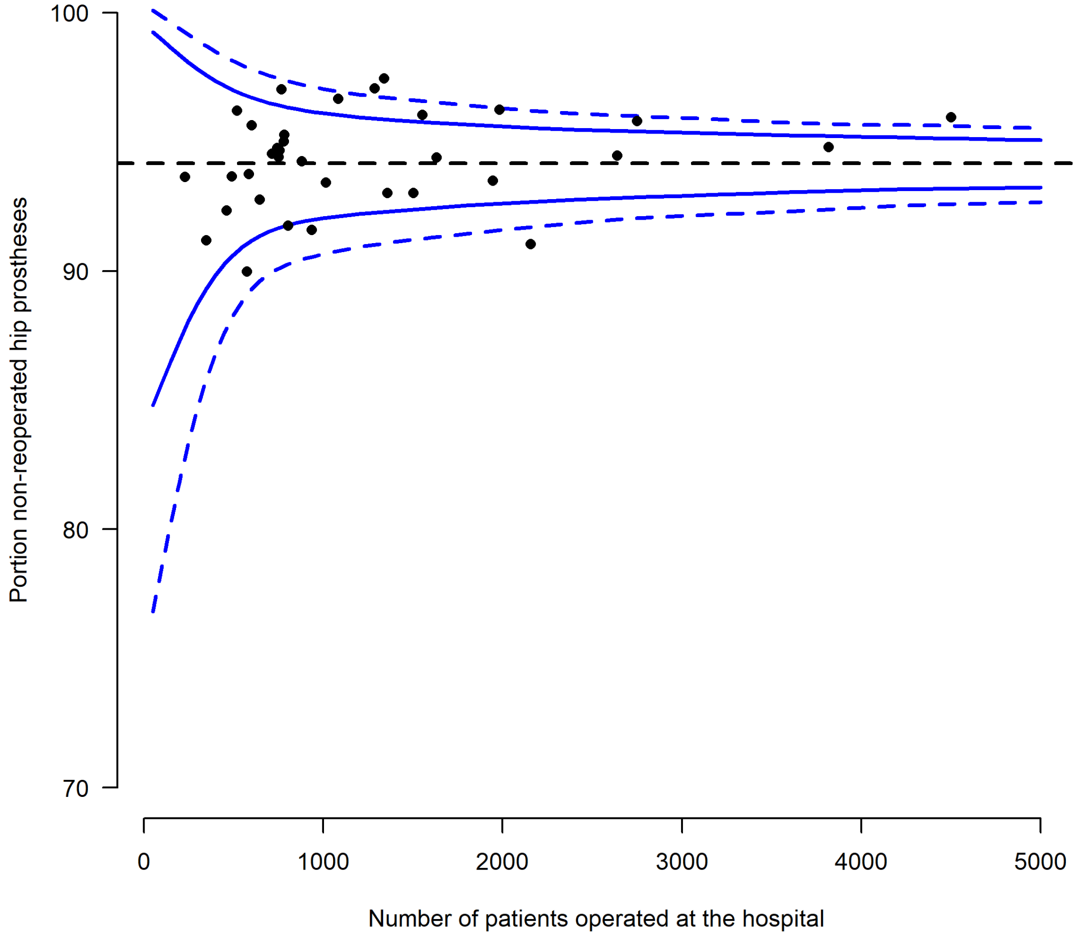
1. Hospitals that are more rigorous in reporting their complications and reoperations to the Register could have unfairly negative results in the analyses.
2. If surgeons at one hospital are more diligent in facilitating check-ups for patients than at other hospitals, and thus discover more complications, 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 16.7 % to 100 %. This issue is explained in detail in the following articles: Ranstam J, Wagner P, Robertsson O, Lidgren L. "Health-care quality register outcome-orientated ranking of hospitals is unreliable." J Bone Joint Surg Br. 2008 and Ranstam J, Wagner P, Robertsson O, Lidgren L. "Ranking in health care results in wrong conclusions". Läkartidningen. 2008 Aug 27-Sep 2;105(35):2313-4.

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

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

FIGUR A.29: Funnel plot, percentage non-revised standard patients ten years after operations in 2007-2018



Each point shows the percentage non-revised prostheses after 10 years for standard patients operated from 2007 to 2018 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 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 2018. 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 ø. 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 ø. The two hospitals with points below the dotted lines have used prostheses that have been shown to have inferior results (Titan/Titan cemented or Reflection all poly/Spectron EF cemented). The hospitals have now stopped using these implants.

FIGUR A.30: Durability of hip replacements 2007-2018.

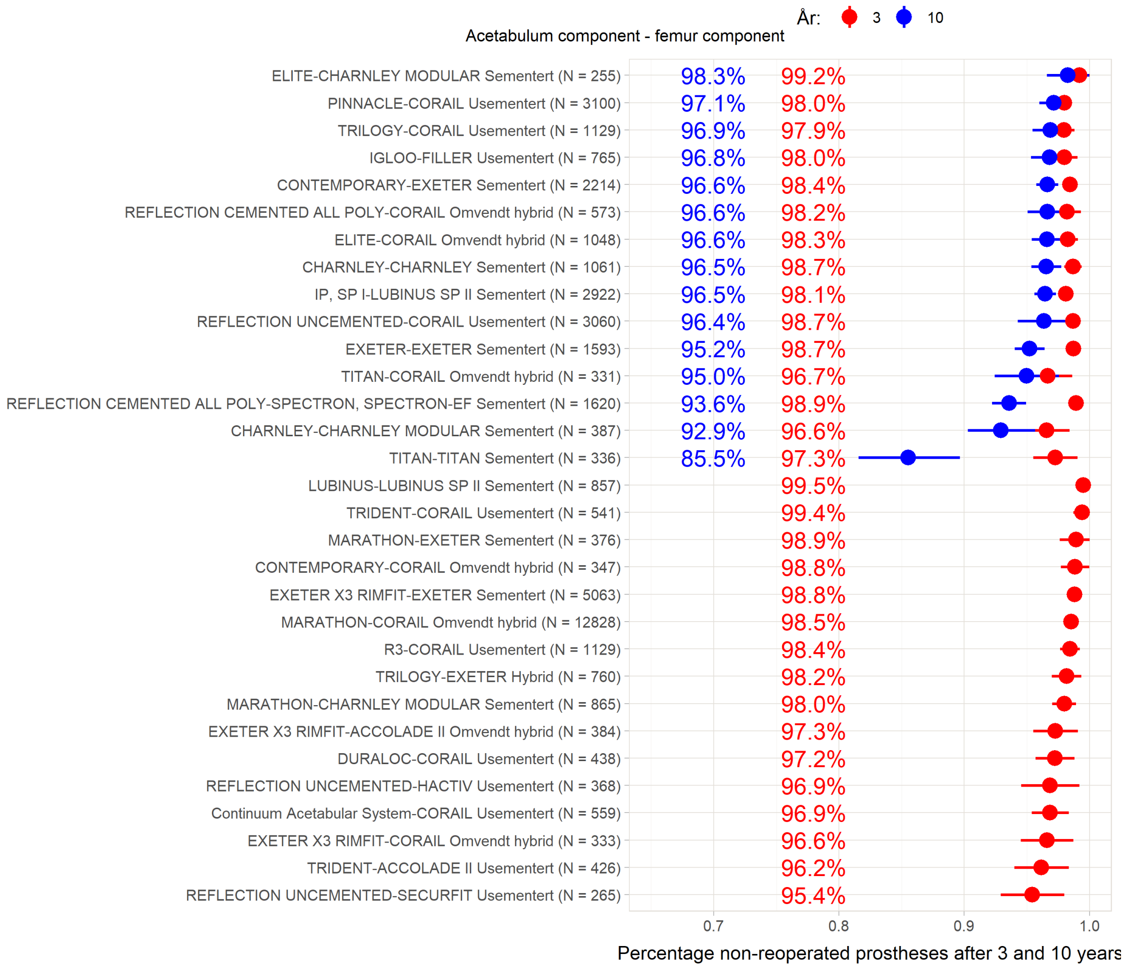


Figure A.30 shows the estimated Kaplan-Meier percentage at three and ten years for different combinations of hip prostheses. We have only included combinations used in 500 or more operations in 2007-2018. A further requirement for inclusion in the figure is that there must still be at least 50 examples of the combination at three and ten years respectively. Only standard patients from 2007 to 2018 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:

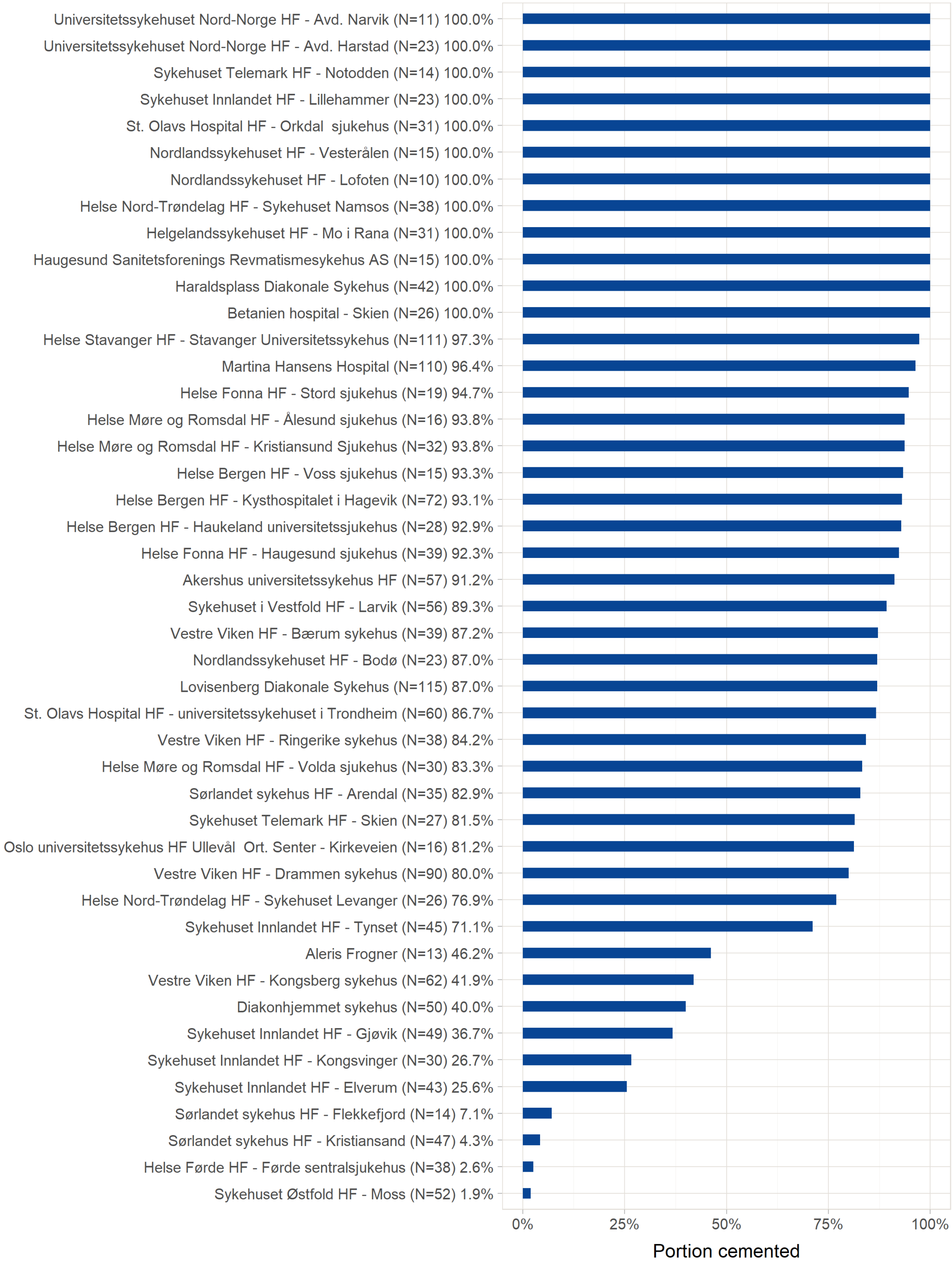
When prostheses are ranked by percentage of revisions, results must be interpreted with caution, as there may be many reasons for different revision percentages. We mainly publish prosthesis results in scientific journals and presentations where we account for materials and methods and discuss strengths 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).

Figur A.31: Portion of women over 75 years with cemented stem in 2018.



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.

FIGUR A.32: Portion of patients with strong cup materials (cross-linked polyethylene/ceramic) in 2018.

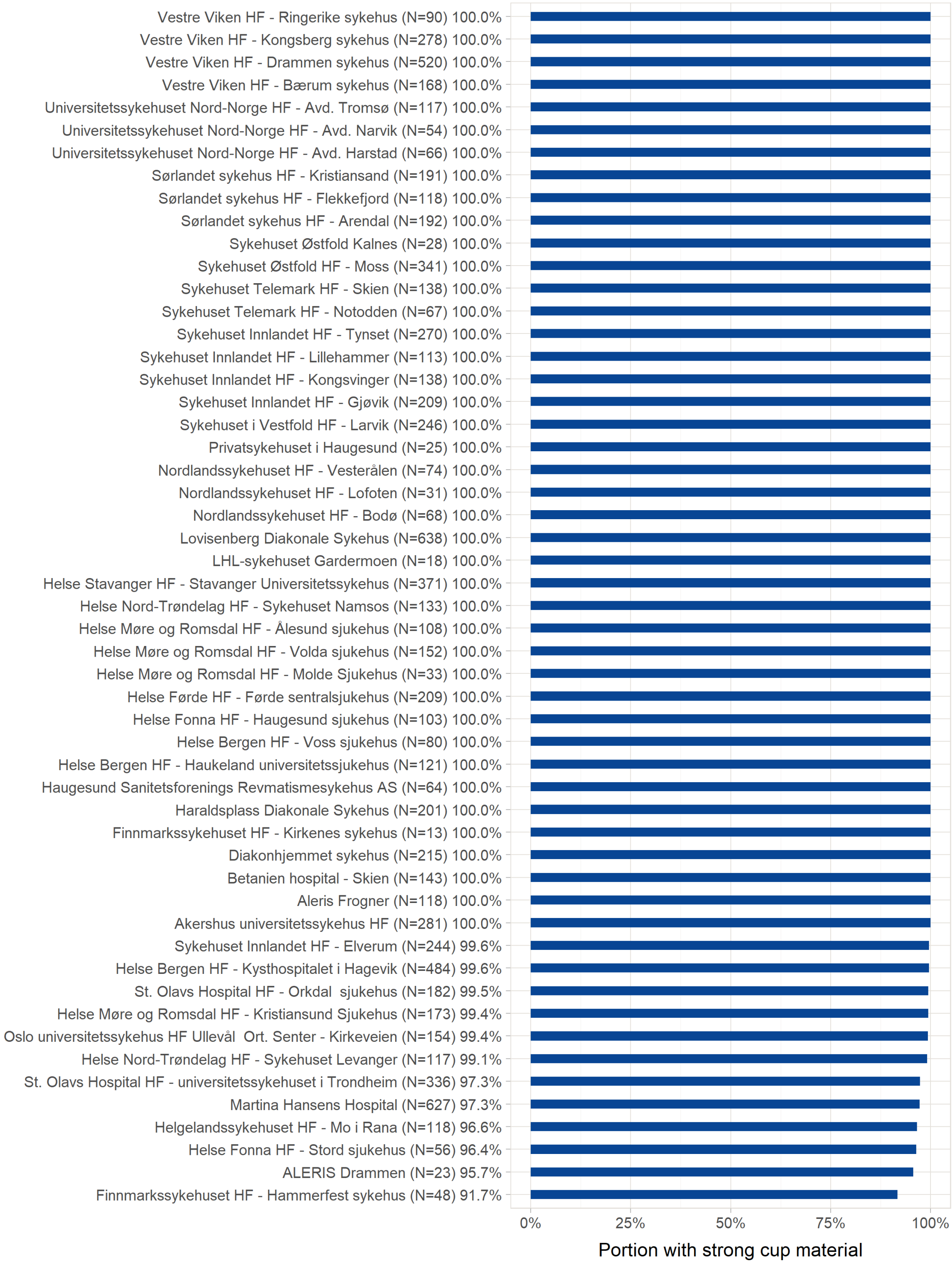
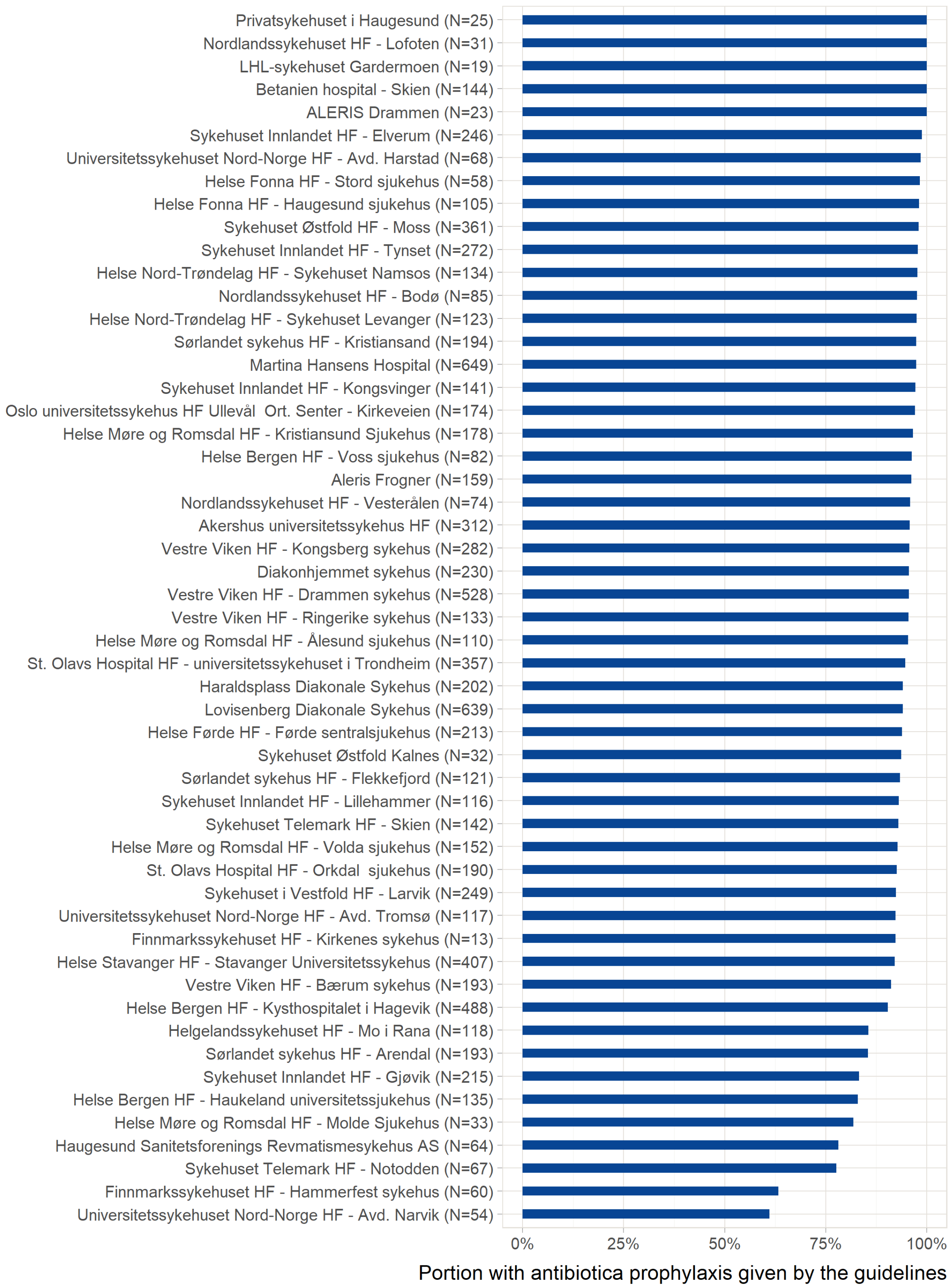


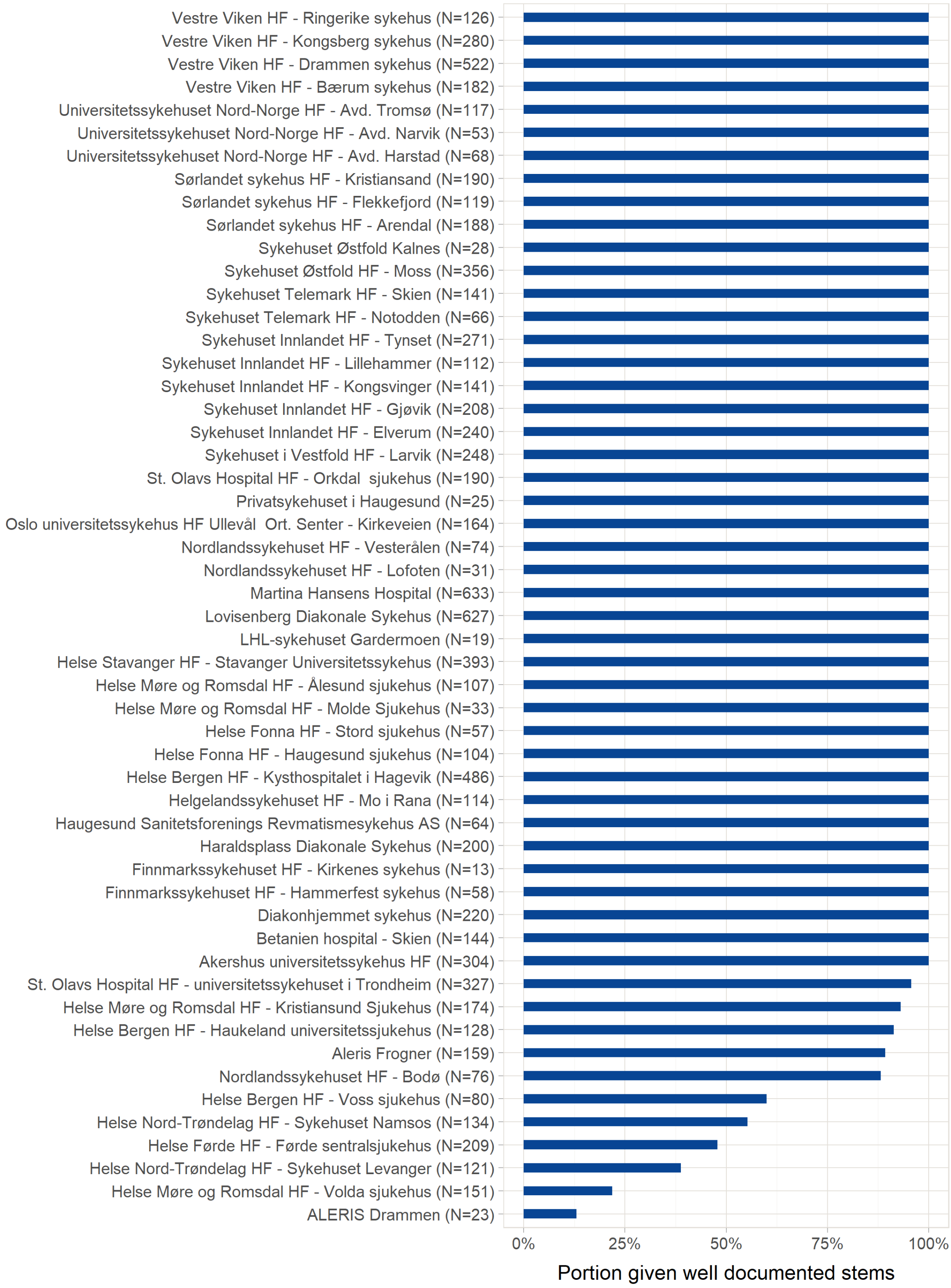
Figure A.32 shows that most patients at all hospitals receive hip prostheses with wear-resistant joint surfaces (crosslinked polyethylene or ceramic acetabular components). The use of ordinary polyethylene is justified in certain patients who do not need a prosthesis lasting longer than 10-15 years.

FIGUR A.33: Portion of patients with atibiotica prophylaxis as given by the guidelines in 2018.



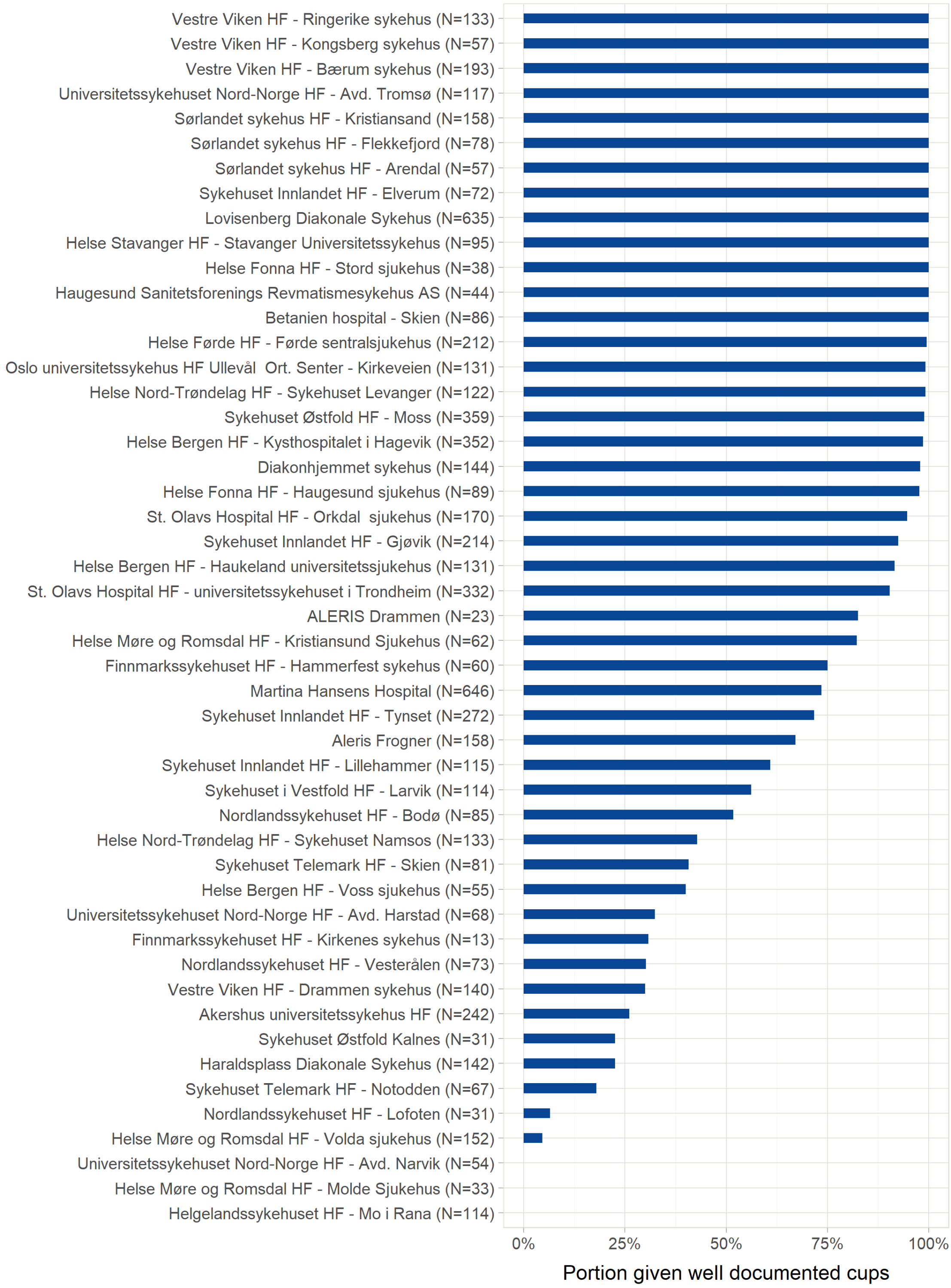
A low score (at the bottom of the figure) does not mean that patients have not received antibiotics; it generally means that they were given antibiotics in a manner contrary to the guidelines.

FIGUR A.34: Portion of patients recieving well documented hipstem in 2018.



The overwhelming majority of all inserted hipstems are well documented. 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.

FIGUR A.35: Portion of patients recieving well documented hipcups in 2018.



Most inserted hipcups are well documented. Many hospitals fall short of satisfying the requirements. This is mostly due to hospitals electing to use newer cups where the long-term results have yet to be documented. Some hospitals fall short of the requirements due to ongoing clinical trials on new implants.

Pasientrapporterte data i Hofteproteseregisteret

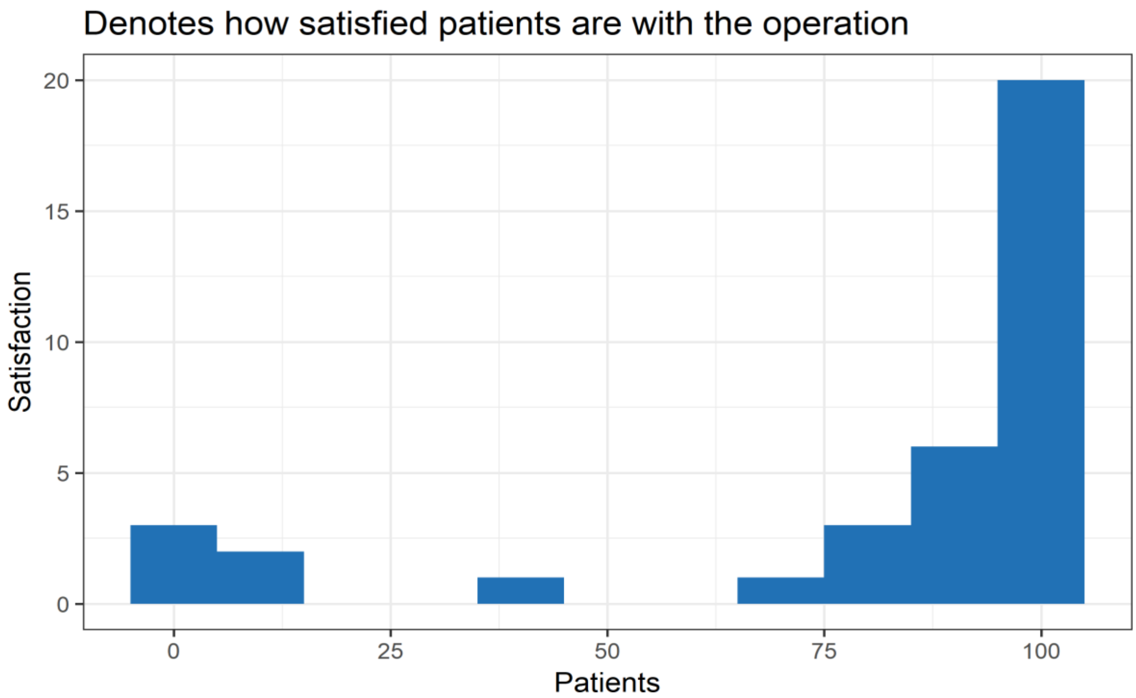
The Hip Arthroplasty Register started electronic collection of PROM data in 2017. We wish to focus more on patients' perceived quality of life and joint function before and after surgery. Patients complete an electronic questionnaire before surgery and 1, 6 and 10 years after surgery.

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.

Thus far, we have collected data from 351 patients (393 operations). 327 of the forms were filled out before the operation, while 66 were filled one year after the operation. 36 patients have filled out a form both before and one year after the operation. Currently 15 hospitals report to the register. All hospitals will receive an overview of their own results. Please contact our consultant Mikal Solberg (mikal.solberg@helse-bergen.no) with questions regarding electronic reporting of PROM.

Pasientdemografi	Før operasjon	Ett år etter	p-verdi
Antall (n)	321	64	
Menn (%)	38,3	40,6	
Alder median (min-maks)	66 (14-94)	67 (16-88)	
Kroppsmasseindeks (KMI)	28,1 (6,4)	28,3(5,4)	
Drikker alkohol n (%)	233 (72,6)	34 (53,1)	
Røyker n (%)	35 (10,9)	9 (14,1)	
Utdannelse videregående skole eller høyere	229 (71,3)	44 (68,8)	
I arbeid n (%)	166 (65,6)	37 (68,6)	
Bor alene n (%)	80 (31,6)	15 (27,8)	
Aktivtetsskår UCLA activity* mean (SD)	4,5 (2,0)	5,1 (1,9)	0,05
Helsetilstand** (VAS) mean (SD)	54,0 (20,5)	68,4 (19,8)	<<0,001
Smerteopplevelse*** mean (SD)	66,4 (17,9)	16,7 (24,5)	<<0,001

* Beste mulige skår er 10, ** Best mulig helse er 100, *** 100 er maksimal smerte



Figuren gir en oversikt over hvor fornøyd pasientene er ett år etter operasjon (100 er maks fornøyd). 28 pasienter rapporterer om bedret helsetilstand og 34 om mindre smerte ett år etter operasjon.

TOTAL HIP ARTHROPLASTY

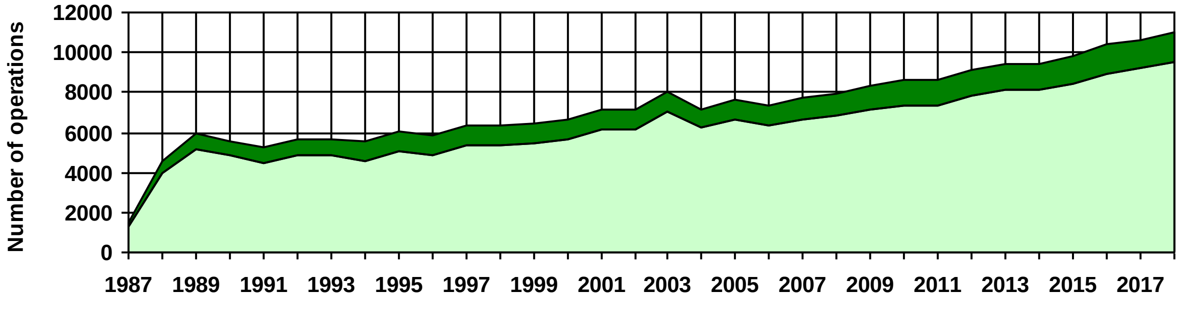
Table 1: Annual numbers of operations (Hemi prosthesis operations for hip fracture are not included here. These are found in tables of The Norwegian Hip Fracture Register)

Year	Primary operations *		Reoperations **		Revisions		Total
2018	9 553	(86,1%)	115	(1,0%)	1 422	(12,8%)	11 090
2017	9 174	(86,0%)	106	(1,0%)	1 392	(13,0%)	10 672
2016	8 953	(85,7%)	78	(0,7%)	1 419	(13,6%)	10 450
2015	8 451	(85,7%)	18	(0,2%)	1 391	(14,1%)	9 860
2014	8 141	(86,3%)	28	(0,3%)	1 266	(13,4%)	9 435
2013	8 104	(85,9%)	21	(0,2%)	1 306	(13,8%)	9 431
2012	7 849	(85,7%)	28	(0,3%)	1 287	(14,0%)	9 164
2011	7 360	(85,1%)	18	(0,2%)	1 269	(14,7%)	8 647
2010	7 330	(85,3%)	2	(0,0%)	1 257	(14,6%)	8 589
2009	7 115	(85,5%)			1 209	(14,5%)	8 324
2008	6 848	(85,9%)			1 122	(14,1%)	7 970
2007	6 660	(86,4%)	1	(0,0%)	1 051	(13,6%)	7 712
2006	6 319	(86,3%)	1	(0,0%)	1 006	(13,7%)	7 326
2005	6 597	(86,2%)	1	(0,0%)	1 056	(13,8%)	7 654
2000-04	31 297	(86,7%)			4 784	(13,3%)	36 081
1995-99	26 047	(83,9%)	2	(0,0%)	4 990	(16,1%)	31 039
1987-94	34 088	(85,9%)			5 610	(14,1%)	39 698
Total	**199 886**	**(85,7%)**	**419**	**(0,2%)**	**32 837**	**(14,1%)**	**233 142**

* In addition, there were reports 141 primary hemi prostheses done for other reasons than hip fractures.

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

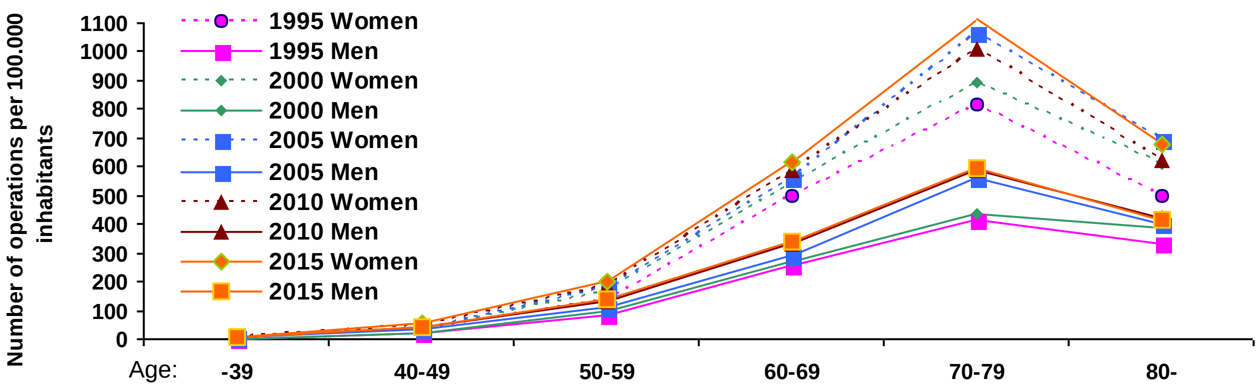
Figure 1: Annual numbers of operations



54,8 % of all operations were performed on the right side. 66,7 % performed in women.

Mean age at primary surgery was 68,9 years, 69,8 years for women and 67 years for men.

Figure 2: Incidence of primary hip prostheses



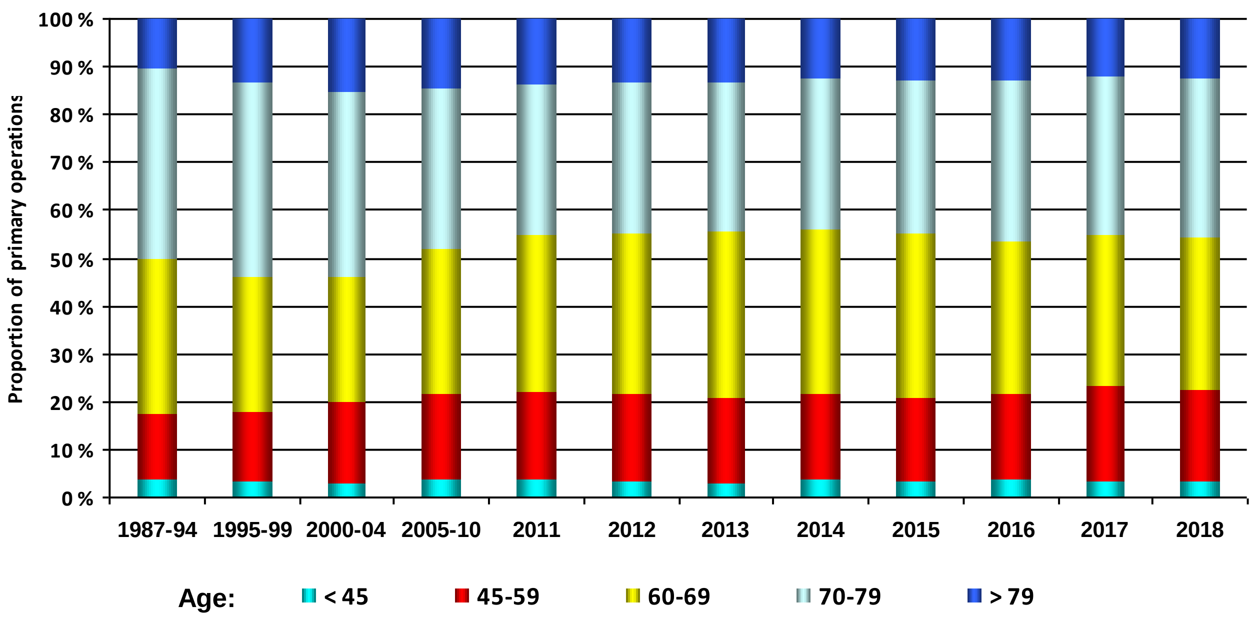
Reasons for primary operations

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
2018	7572	98	296	651	24	111	21	568	267	22	275	27
2017	7301	108	299	679	19	105	26	404	270	34	282	13
2016	7108	138	355	685	11	107	19	343	229	33	247	9
2015	6796	108	332	587	11	106	21	322	181	26	200	19
2014	6414	115	356	648	18	86	28	288	250	22	176	19
2013	6415	125	351	611	10	115	31	288	172	29	192	30
2012	6220	157	366	615	12	92	45	206	186	16	203	14
2011	5787	132	373	573	24	96	26	189	138	21	187	30
2010	5734	130	355	594	36	88	20	161	151	16	191	50
2009	5515	131	390	560	26	127	24	151	174	11	165	32
2008	5359	144	443	498	25	99	21	149	145	19	144	6
2007	5166	146	475	457	21	80	22	159	174	22	110	15
2006	4819	147	486	445	17	83	24	131	172	19	126	13
2005	5097	166	550	437	29	87	22	102	143	14	107	14
2000-04	23329	823	2768	2176	124	399	134	356	395	62	460	131
1995-99	18268	887	3169	1851	170	340	123	146	236	70	542	241
1987-94	23126	1297	4508	2768	518	453	154	93	115	116	623	318
Total	**150026**	**4852**	**15872**	**14835**	**1095**	**2574**	**761**	**4056**	**3398**	**552**	**4230**	**981**

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

Figure 3: Age by year of operation



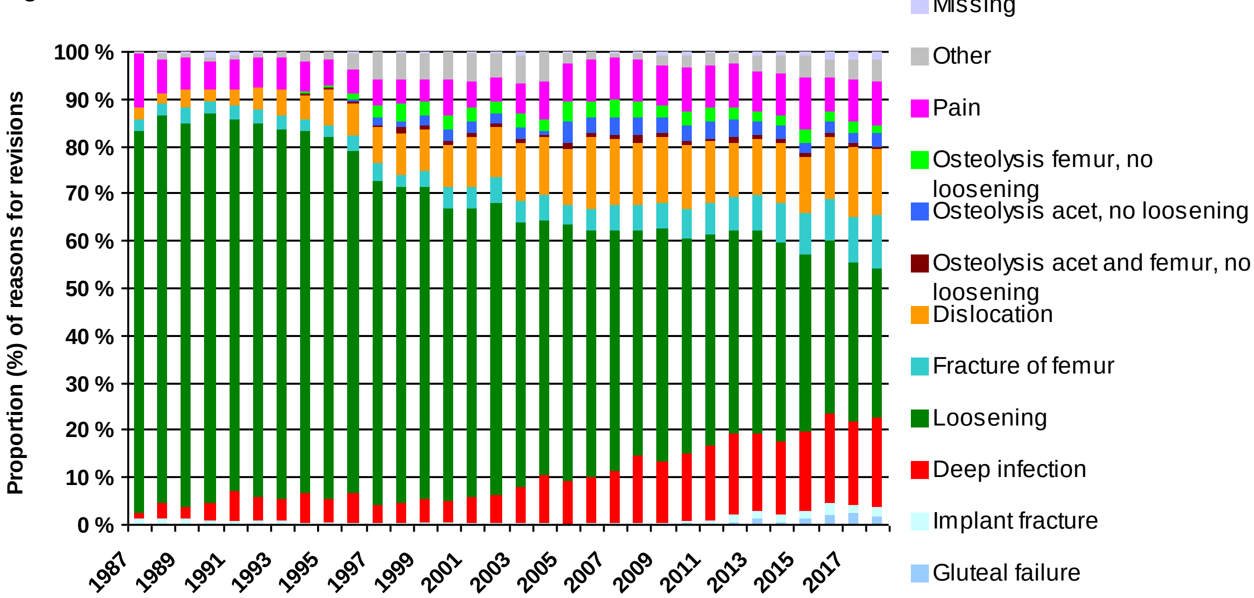
Reasons for revisions

Table 3:

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
2018	391	243	271	372	227	190	55	32	43	6	41	35	90	32
2017	415	238	285	342	188	176	41	43	37	10	34	51	77	35
2016	456	268	259	374	181	145	51	40	30	11	45	45	77	30
2015	433	292	228	315	163	211	46	56	49	9	32	28	84	17
2014	425	281	217	267	144	147	50	36	48	18	24	10	67	11
2013	450	323	213	292	140	146	53	43	55	13	30	24	60	18
2012	445	318	203	310	127	168	70	42	49	18	31	5	37	8
2011	443	323	220	274	118	146	63	52	66	22	13	3	49	5
2010	444	319	229	240	101	154	55	50	55	45	8	7	44	12
2009	443	316	215	203	85	131	52	41	80	29	4	3	35	10
2008	399	305	192	211	83	131	54	53	63	47	6	0	19	5
2007	409	282	187	149	77	120	53	48	66	28	3	1	15	3
2006	399	295	198	126	64	119	45	46	48	22	8	0	18	2
2005	423	337	164	129	59	113	63	57	65	29	1	0	32	3
2000-04	1963	1807	693	429	317	424	139	177	389	168	27	0	357	28
1995-99	2285	2627	558	341	225	352	82	161	187	199	27	0	310	19
1987-94	2965	3402	301	365	237	527	3	2	35	99	69	0	91	42
Total	**13188**	**11976**	**4633**	**4739**	**2536**	**3400**	**975**	**979**	**1365**	**773**	**403**	**212**	**1462**	**280**

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

Figure 4:



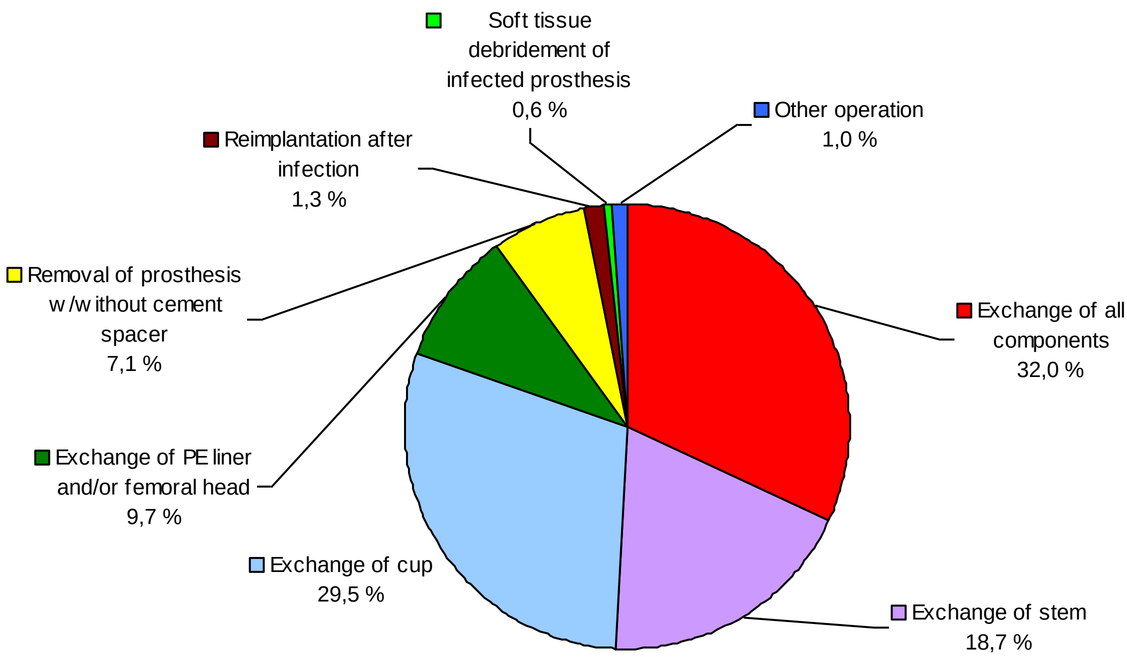
The graph is hierarchical, i.e. if a revision is marked both "Deep infection" and "Loosening", only "Deep infection" is counted.

Type of revision

Table 4:

Year	Exchange of femoral stem and head	Exchange of stem, PE liner, head	Exchange of acetabular cup	Exchange of femoral head	Exchange of femoral head and acetabular cup	Exchange of all components	Exchange of PE liner only	Exchange of PE liner and femoral head	Removal of prosthesis or cement spacer	Removal of prosthesis and insertion of cement spacer	Insertion of new prosthesis (after Girdlestone)	Soft tissue debridement of infected prosthesis	Muscle resonance and transposition	Osteosynthesis for fracture	Other operation	Missing information	Total
2018	179	38	178	117	258	263	14	113	30	136	1	26	24	67	86	7	**1537**
2017	168	39	219	124	258	256	7	111	29	104		26	33	46	71	7	**1498**
2016	144	25	163	135	302	298	3	93	17	138	4	26	22	35	86	6	**1497**
2015	177	29	203	118	261	290	11	97	44	96	5	20		1	53	4	**1409**
2014	157	30	200	99	246	272	8	80	38	92	1	25		1	39	6	**1294**
2013	176	20	168	114	260	309	4	75	30	102	5	17			41	6	**1327**
2012	169	18	187	113	229	323	6	67	39	106	2	25			21	10	**1315**
2011	177	21	196	114	249	313	6	77	58	34	3	13			20	6	**1287**
2005-10	906	96	942	439	1549	1814	34	310	469	2	67	2			40	36	**6706**
2000-04	882	88	642	137	831	1452	41	267	290	0	113				5	36	**4784**
1995-99	1110	55	546	57	615	1983	24	144	248	0	192	2			7	9	**4992**
1987-94	1410	5	883	14	56	2889	5	10	231	0	47				17	43	**5610**
Total	**5655**	**464**	**4527**	**1581**	**5114**	**10462**	**163**	**1444**	**1523**	**810**	**440**	**182**	**79**	**150**	**486**	**176**	**33256**

Figure 5:



Bone transplantation in revisions

Table 5: Acetabular cup

Year	Yes		No		Bone impaction[1]		Missing		Total
2018	50	(3,3 %)	953	(62 %)	75	(4,9 %)	459	(29,9 %)	**1 537**
2017	65	(4,3 %)	960	(64,1 %)	82	(5,5 %)	391	(26,1 %)	**1 498**
2016	72	(4,8 %)	942	(62,9 %)	96	(6,4 %)	387	(25,9 %)	**1 497**
2015	102	(7,2 %)	970	(68,8 %)	92	(6,5 %)	245	(17,4 %)	**1 409**
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**
2012	105	(8 %)	832	(63,3 %)	143	(10,9 %)	235	(17,9 %)	**1 315**
2011	112	(8,7 %)	807	(62,7 %)	181	(14,1 %)	187	(14,5 %)	**1 287**
2010	131	(10,4 %)	787	(62,5 %)	189	(15 %)	152	(12,1 %)	**1 259**
2009	111	(9,2 %)	715	(59,1 %)	245	(20,3 %)	138	(11,4 %)	**1 209**
2008	110	(9,8 %)	668	(59,5 %)	211	(18,8 %)	133	(11,9 %)	**1 122**
2007	132	(12,5 %)	594	(56,5 %)	193	(18,3 %)	133	(12,6 %)	**1 052**
2006	115	(11,4 %)	554	(55 %)	201	(20 %)	137	(13,6 %)	**1 007**
2005	161	(15,2 %)	526	(49,8 %)	230	(21,8 %)	140	(13,2 %)	**1 057**
2000-04	932	(19,5 %)	3 022	(63,2 %)	663	(13,9 %)	167	(3,5 %)	**4 784**
1995-99	1 201	(24,1 %)	3 150	(63,1 %)	521	(10,4 %)	120	(2,4 %)	**4 992**
1987-94	1 580	(28,2 %)	3 923	(69,9 %)	0	(0 %)	107	(1,9 %)	**5 610**
Total	**5 180**	**(15,6 %)**	**21 113**	**(63,5 %)**	**3 347**	**(10,1 %)**	**3 616**	**(10,9 %)**	**33 256**

Table 6: Femoral stem

Year	Yes		No		Bone impaction[1]		Missing		Total
2018	26	(1,7 %)	945	(61,5 %)	4	(0,3 %)	562	(36,6 %)	**1 537**
2017	44	(2,9 %)	955	(63,8 %)	7	(0,5 %)	492	(32,8 %)	**1 498**
2016	43	(2,9 %)	964	(64,4 %)	3	(0,2 %)	487	(32,5 %)	**1 497**
2015	70	(5 %)	981	(69,6 %)	11	(0,8 %)	347	(24,6 %)	**1 409**
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**
2012	81	(6,2 %)	838	(63,7 %)	21	(1,6 %)	375	(28,5 %)	**1 315**
2011	116	(9 %)	818	(63,6 %)	29	(2,3 %)	324	(25,2 %)	**1 287**
2010	119	(9,5 %)	798	(63,4 %)	44	(3,5 %)	298	(23,7 %)	**1 259**
2009	129	(10,7 %)	752	(62,2 %)	45	(3,7 %)	283	(23,4 %)	**1 209**
2008	144	(12,8 %)	677	(60,3 %)	69	(6,1 %)	232	(20,7 %)	**1 122**
2007	125	(11,9 %)	601	(57,1 %)	70	(6,7 %)	256	(24,3 %)	**1 052**
2006	145	(14,4 %)	598	(59,4 %)	81	(8 %)	183	(18,2 %)	**1 007**
2005	181	(17,1 %)	570	(53,9 %)	86	(8,1 %)	220	(20,8 %)	**1 057**
2000-04	809	(16,9 %)	3 175	(66,4 %)	631	(13,2 %)	169	(3,5 %)	**4 784**
1995-99	1 243	(24,9 %)	2 918	(58,5 %)	711	(14,2 %)	120	(2,4 %)	**4 992**
1987-94	1 102	(19,6 %)	4 401	(78,4 %)	0	(0 %)	107	(1,9 %)	**5 610**
Total	**4 524**	**(13,6 %)**	**21 757**	**(65,4 %)**	**1 823**	**(5,5 %)**	**5 152**	**(15,5 %)**	**33 256**

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
2018	310	171	93	47	47	20	849	**1 537**
2017	309	165	99	63	55	9	798	**1 498**
2016	267	219	103	82	54	29	743	**1 497**
2015	241	180	108	51	59	20	750	**1 409**
2014	197	171	93	70	41	31	691	**1 294**
2013	253	186	85	78	61	25	639	**1 327**
2012	209	238	111	88	73	18	578	**1 315**
2011	227	183	116	87	66	20	588	**1 287**
2010	236	176	103	77	62	20	585	**1 259**
2009	210	165	92	78	76	27	561	**1 209**
2008	196	181	83	96	67	27	472	**1 122**
2007	185	142	88	73	55	30	479	**1 052**
2006	210	136	78	65	59	24	435	**1 007**
2005	240	137	87	74	59	23	437	**1 057**

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
2018	293	122	58	14	9	1 041	**1 537**
2017	273	139	51	13	8	1 014	**1 498**
2016	253	153	70	24	4	993	**1 497**
2015	200	134	87	17	10	961	**1 409**
2014	162	149	67	13	3	900	**1 294**
2013	234	154	67	24	4	844	**1 327**
2012	205	190	70	18	6	826	**1 315**
2011	177	165	77	21	7	840	**1 287**
2010	196	150	70	18	8	817	**1 259**
2009	155	141	68	20	9	816	**1 209**
2008	156	177	81	11	10	687	**1 122**
2007	144	129	60	18	10	691	**1 052**
2006	167	151	58	22	5	604	**1 007**
2005	210	152	72	23	10	590	**1 057**

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.

Registration of bone loss started in 2005

Surgical approach

Table 9: In primary operations *

Year	Anterior		Anterolateral		Direct lateral		Posterior		Other		Missing information		Total
2018	747	(7,8 %)	1 245	(13 %)	463	(4,8 %)	6 776	(70,9 %)	43	(0,5 %)	279	(2,9 %)	**9 553**
2017	713	(7,8 %)	1 170	(12,8 %)	753	(8,2 %)	6 175	(67,3 %)	4	(0 %)	359	(3,9 %)	**9 174**
2016	718	(8 %)	1 164	(13 %)	1 437	(16,1 %)	5 170	(57,7 %)	5	(0,1 %)	459	(5,1 %)	**8 953**
2015	521	(6,2 %)	1 147	(13,6 %)	2 235	(26,4 %)	4 087	(48,4 %)	3	(0 %)	458	(5,4 %)	**8 451**
2014	337	(4,1 %)	1 059	(13 %)	3 177	(39 %)	3 021	(37,1 %)	17	(0,2 %)	530	(6,5 %)	**8 141**
2013	344	(4,2 %)	1 081	(13,3 %)	3 628	(44,8 %)	2 474	(30,5 %)	24	(0,3 %)	553	(6,8 %)	**8 104**
2012	438	(5,6 %)	1 024	(13 %)	3 920	(49,9 %)	2 192	(27,9 %)	12	(0,2 %)	263	(3,4 %)	**7 849**
2011	429	(5,8 %)	748	(10,2 %)	3 897	(52,9 %)	2 081	(28,3 %)	30	(0,4 %)	175	(2,4 %)	**7 360**
2010	625	(8,5 %)	470	(6,4 %)	3 918	(53,5 %)	2 154	(29,4 %)	48	(0,7 %)	115	(1,6 %)	**7 330**
2009	326	(4,6 %)	340	(4,8 %)	4 357	(61,2 %)	1 963	(27,6 %)	11	(0,2 %)	118	(1,7 %)	**7 115**
2008	68	(1 %)	387	(5,7 %)	4 360	(63,7 %)	1 927	(28,1 %)	8	(0,1 %)	98	(1,4 %)	**6 848**
2007	14	(0,2 %)	404	(6,1 %)	4 417	(66,3 %)	1 711	(25,7 %)	10	(0,2 %)	104	(1,6 %)	**6 660**
2006	2	(0 %)	452	(7,2 %)	4 270	(67,6 %)	1 482	(23,5 %)	3	(0 %)	110	(1,7 %)	**6 319**
2005	7	(0,1 %)	521	(7,9 %)	4 419	(67 %)	1 534	(23,3 %)	4	(0,1 %)	112	(1,7 %)	**6 597**
2000-04	55	(0,2 %)	2 319	(7,4 %)	1 544	(68,8 %)	7 224	(23,1 %)	36	(0,1 %)	119	(0,4 %)	**31 297**
1995-99	30	(0,1 %)	1 900	(7,3 %)	7 601	(67,6 %)	6 411	(24,6 %)	19	(0,1 %)	86	(0,3 %)	**26 047**
1987-94	112	(0,3 %)	2 041	(6 %)	2 814	(66,9 %)	8 848	(26 %)	27	(0,1 %)	246	(0,7 %)	**34 088**
Total	**5 486**	**(2,7 %)**	**17 472**	**(8,7 %)**	**07 210**	**(53,6 %)**	**65 230**	**(32,6 %)**	**304**	**(0,2 %)**	**4 184**	**(2,1 %)**	**199 886**

Figure 6: In primary operations *

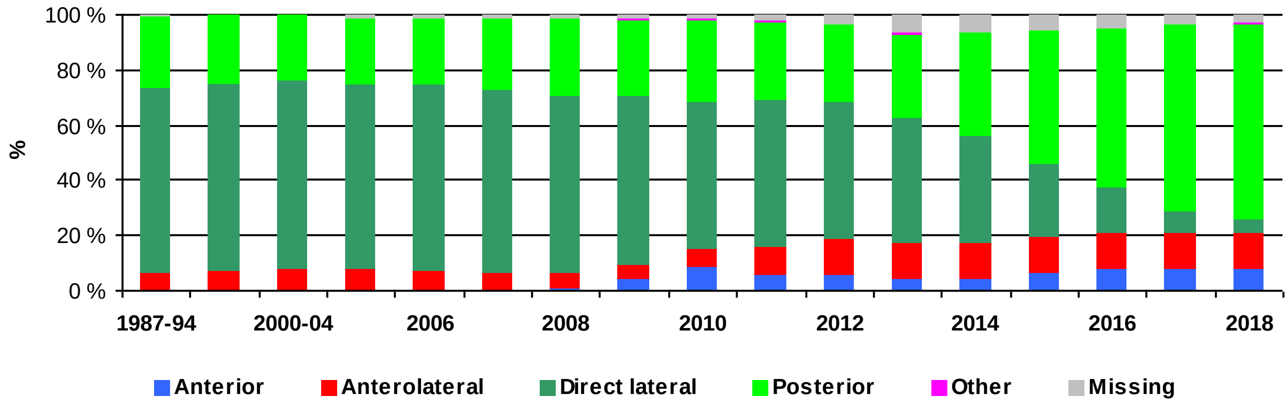


Table 10: Mini invasive surgery in primary surgery

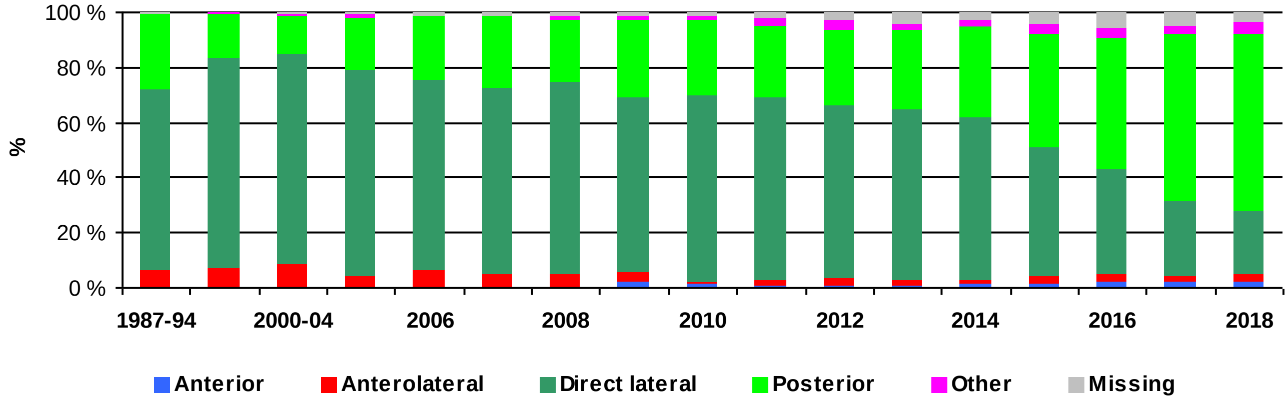
Year	Yes		No		Missing		Total
2018	2 068	(21,6%)	7 080	(74,1%)	405	(4,2%)	**9 553**
2017	1 943	(21,2%)	6 881	(75,0%)	350	(3,8%)	**9 174**
2016	1 818	(20,3%)	6 897	(77,0%)	238	(2,7%)	**8 953**
2015	1 594	(18,9%)	6 543	(77,4%)	314	(3,7%)	**8 451**
2014	1 337	(16,4%)	6 531	(80,2%)	273	(3,4%)	**8 141**
2013	1 409	(17,4%)	6 321	(78,0%)	374	(4,6%)	**8 104**
2012	1 328	(16,9%)	5 862	(74,7%)	659	(8,4%)	**7 849**
2011	1 000	(13,6%)	6 005	(81,6%)	355	(4,8%)	**7 360**
2010	934	(12,7%)	6 171	(84,2%)	225	(3,1%)	**7 330**
2009	398	(5,6%)	6 671	(93,8%)	46	(0,6%)	**7 115**
2008	65	(0,9%)	6 755	(98,6%)	28	(0,4%)	**6 848**
2007	4	(0,1%)	6 567	(98,6%)	89	(1,3%)	**6 660**
2006	58	(0,9%)	6 006	(95,0%)	255	(4,0%)	**6 319**
2005	144	(2,2%)	5 814	(88,1%)	639	(9,7%)	**6 597**

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

Table 11: In revisions *

Year	Anterior		Anterolateral		Direct lateral		Posterior		Other		Missing information		Total
2018	34	(2,2 %)	46	(3 %)	336	(21,9 %)	964	(62,7 %)	61	(4 %)	96	(6,2 %)	**1 537**
2017	29	(1,9 %)	35	(2,3 %)	407	(27,2 %)	898	(59,9 %)	40	(2,7 %)	89	(5,9 %)	**1 498**
2016	27	(1,8 %)	45	(3 %)	570	(38,1 %)	713	(47,6 %)	54	(3,6 %)	88	(5,9 %)	**1 497**
2015	24	(1,7 %)	35	(2,5 %)	662	(47 %)	572	(40,6 %)	50	(3,5 %)	66	(4,7 %)	**1 409**
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**
2012	11	(0,8 %)	35	(2,7 %)	828	(63 %)	353	(26,8 %)	46	(3,5 %)	42	(3,2 %)	**1 315**
2011	9	(0,7 %)	26	(2 %)	851	(66,1 %)	335	(26 %)	30	(2,3 %)	36	(2,8 %)	**1 287**
2010	14	(1,1 %)	17	(1,4 %)	844	(67 %)	347	(27,6 %)	19	(1,5 %)	18	(1,4 %)	**1 259**
2009	24	(2 %)	42	(3,5 %)	770	(63,7 %)	341	(28,2 %)	12	(1 %)	20	(1,7 %)	**1 209**
2008	3	(0,3 %)	52	(4,6 %)	787	(70,1 %)	251	(22,4 %)	10	(0,9 %)	19	(1,7 %)	**1 122**
2007	1	(0,1 %)	55	(5,2 %)	706	(67,1 %)	273	(26 %)	2	(0,2 %)	15	(1,4 %)	**1 052**
2006	1	(0,1 %)	61	(6,1 %)	699	(69,4 %)	231	(22,9 %)	2	(0,2 %)	13	(1,3 %)	**1 007**
2005	3	(0,3 %)	44	(4,2 %)	789	(74,6 %)	198	(18,7 %)	14	(1,3 %)	9	(0,9 %)	**1 057**
2000-04	13	(0,3 %)	377	(7,9 %)	3 605	(75,4 %)	645	(13,5 %)	35	(0,7 %)	109	(2,3 %)	**4 784**
1995-99	8	(0,2 %)	344	(6,9 %)	3 784	(75,8 %)	798	(16 %)	27	(0,5 %)	31	(0,6 %)	**4 992**
1987-94	17	(0,3 %)	330	(5,9 %)	3 695	(65,9 %)	1 526	(27,2 %)	12	(0,2 %)	30	(0,5 %)	**5 610**
Total	**241**	**(0,7 %)**	**1 600**	**(4,8 %)**	**20 917**	**(62,9 %)**	**9 252**	**(27,8 %)**	**471**	**(1,4 %)**	**775**	**(2,3 %)**	**33 256**

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 12:

	Primary operations						Revisions						
Year	**No**		**Yes**		**Missing**		**No**		**Yes**		**Missing**		**Total**
2018	8 972	(93,9 %)	26	(0,3 %)	555	(5,8 %)	1 318	(85,8 %)	90	(5,9 %)	129	(8,4 %)	**11 090**
2017	8 575	(93,5 %)	20	(0,2 %)	579	(6,3 %)	1 301	(86,8 %)	68	(4,5 %)	129	(8,6 %)	**10 672**
2016	8 457	(94,5 %)	25	(0,3 %)	471	(5,3 %)	1 306	(87,2 %)	91	(6,1 %)	100	(6,7 %)	**10 450**
2015	7 609	(90 %)	29	(0,3 %)	813	(9,6 %)	1 202	(85,3 %)	96	(6,8 %)	111	(7,9 %)	**9 860**
2014	7 402	(90,9 %)	21	(0,3 %)	718	(8,8 %)	1 112	(85,9 %)	66	(5,1 %)	116	(9 %)	**9 435**
2013	7 232	(89,2 %)	58	(0,7 %)	814	(10 %)	1 163	(87,6 %)	65	(4,9 %)	99	(7,5 %)	**9 431**
2012	7 045	(89,8 %)	37	(0,5 %)	767	(9,8 %)	1 078	(82 %)	111	(8,4 %)	126	(9,6 %)	**9 164**
2011	6 624	(90 %)	29	(0,4 %)	707	(9,6 %)	1 064	(82,7 %)	123	(9,6 %)	100	(7,8 %)	**8 647**
2010	6 690	(91,3 %)	38	(0,5 %)	602	(8,2 %)	1 062	(84,4 %)	106	(8,4 %)	91	(7,2 %)	**8 589**
2009	6 584	(92,5 %)	59	(0,8 %)	472	(6,6 %)	1 013	(83,8 %)	121	(10 %)	75	(6,2 %)	**8 324**
2008	6 248	(91,2 %)	59	(0,9 %)	541	(7,9 %)	954	(85 %)	106	(9,4 %)	62	(5,5 %)	**7 970**
2007	6 105	(91,7 %)	75	(1,1 %)	480	(7,2 %)	867	(82,4 %)	112	(10,6 %)	73	(6,9 %)	**7 712**
2006	5 718	(90,5 %)	87	(1,4 %)	514	(8,1 %)	836	(83 %)	104	(10,3 %)	67	(6,7 %)	**7 326**
2005	5 985	(90,7 %)	112	(1,7 %)	500	(7,6 %)	864	(81,7 %)	102	(9,6 %)	91	(8,6 %)	**7 654**
2000-04	30 049	(96 %)	815	(2,6 %)	433	(1,4 %)	4 113	(86 %)	538	(11,2 %)	133	(2,8 %)	**36 081**
1995-99	24 307	(93,3 %)	1 562	(6 %)	178	(0,7 %)	4 305	(86,2 %)	618	(12,4 %)	69	(1,4 %)	**31 039**
1987-94	27 629	(81,1 %)	6 074	(17,8 %)	385	(1,1 %)	4 438	(79,1 %)	1 106	(19,7 %)	66	(1,2 %)	**39 698**
Total	**181 231**	**(90,7 %)**	**9 126**	**(4,6 %)**	**9 529**	**(4,8 %)**	**27 996**	**(84,2 %)**	**3 623**	**(10,9 %)**	**1 637**	**(4,9 %)**	**233 142**

Antibiotic prophylaxis

Table 13:

	Primary operations						Revisions						
Year	**No**		**Yes**		**Missing**		**No**		**Yes**		**Missing**		**Total**
2018	3	(0 %)	9 511	(99,6 %)	39	(0,4 %)	101	(6,6 %)	1 393	(90,6 %)	43	(2,8 %)	**11 090**
2017	4	(0 %)	9 116	(99,4 %)	54	(0,6 %)	94	(6,3 %)	1 370	(91,5 %)	34	(2,3 %)	**10 672**
2016	3	(0 %)	8 898	(99,4 %)	52	(0,6 %)	83	(5,5 %)	1 386	(92,6 %)	28	(1,9 %)	**10 450**
2015	0	(0 %)	8 412	(99,5 %)	39	(0,5 %)	9	(0,6 %)	1 379	(97,9 %)	21	(1,5 %)	**9 860**
2014	2	(0 %)	8 101	(99,5 %)	38	(0,5 %)	9	(0,7 %)	1 277	(98,7 %)	8	(0,6 %)	**9 435**
2013	2	(0 %)	8 065	(99,5 %)	37	(0,5 %)	8	(0,6 %)	1 301	(98 %)	18	(1,4 %)	**9 431**
2012	2	(0 %)	7 813	(99,5 %)	34	(0,4 %)	11	(0,8 %)	1 291	(98,2 %)	13	(1 %)	**9 164**
2011	6	(0,1 %)	7 332	(99,6 %)	22	(0,3 %)	43	(3,3 %)	1 236	(96 %)	8	(0,6 %)	**8 647**
2010	6	(0,1 %)	7 297	(99,5 %)	27	(0,4 %)	46	(3,7 %)	1 203	(95,6 %)	10	(0,8 %)	**8 589**
2009	32	(0,4 %)	7 082	(99,5 %)	1	(0 %)	37	(3,1 %)	1 170	(96,8 %)	2	(0,2 %)	**8 324**
2008	39	(0,6 %)	6 804	(99,4 %)	5	(0,1 %)	38	(3,4 %)	1 077	(96 %)	7	(0,6 %)	**7 970**
2007	27	(0,4 %)	6 626	(99,5 %)	7	(0,1 %)	30	(2,9 %)	1 015	(96,5 %)	7	(0,7 %)	**7 712**
2006	37	(0,6 %)	6 282	(99,4 %)	0	(0 %)	28	(2,8 %)	979	(97,2 %)	0	(0 %)	**7 326**
2005	25	(0,4 %)	6 572	(99,6 %)	0	(0 %)	18	(1,7 %)	1 039	(98,3 %)	0	(0 %)	**7 654**
2000-04	30	(0,1 %)	31 261	(99,9 %)	6	(0 %)	33	(0,7 %)	4 735	(99 %)	16	(0,3 %)	**36 081**
1995-99	39	(0,1 %)	26 005	(99,8 %)	3	(0 %)	28	(0,6 %)	4 958	(99,3 %)	6	(0,1 %)	**31 039**
1987-94	1 789	(5,2 %)	32 253	(94,6 %)	46	(0,1 %)	176	(3,1 %)	5 411	(96,5 %)	23	(0,4 %)	**39 698**
Total	**2 046**	**(1 %)**	**197 430**	**(98,8 %)**	**410**	**(0,2 %)**	**792**	**(2,4 %)**	**32 220**	**(96,9 %)**	**244**	**(0,7 %)**	**233 142**

Fixation in primary operations

Figure 8a: All patients

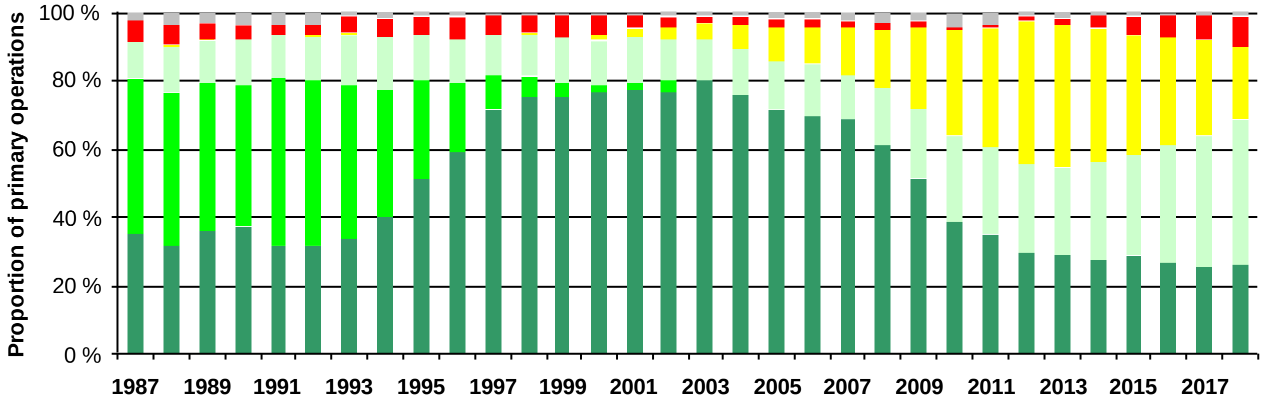
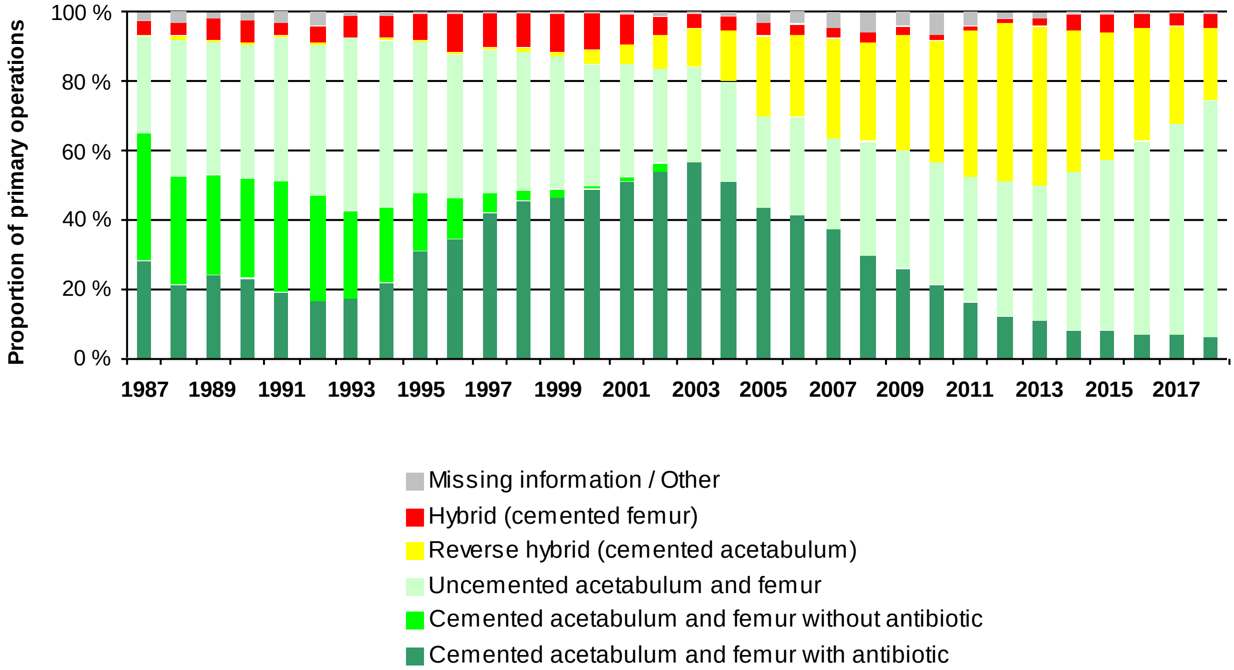


Figure 8b: Patients under 65 years old



Fixation in primary operations (cont.)

Figure 8c: Patients 65 years or older and under 75 years old

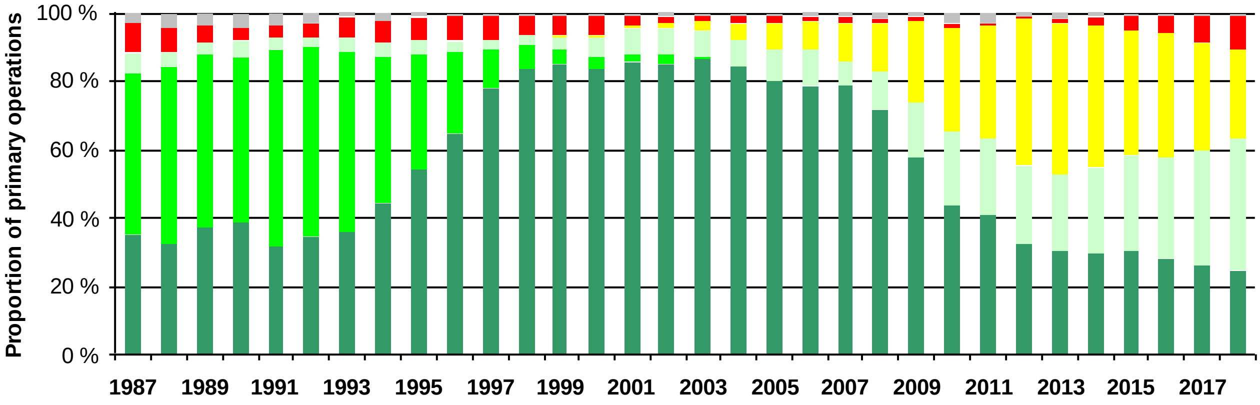
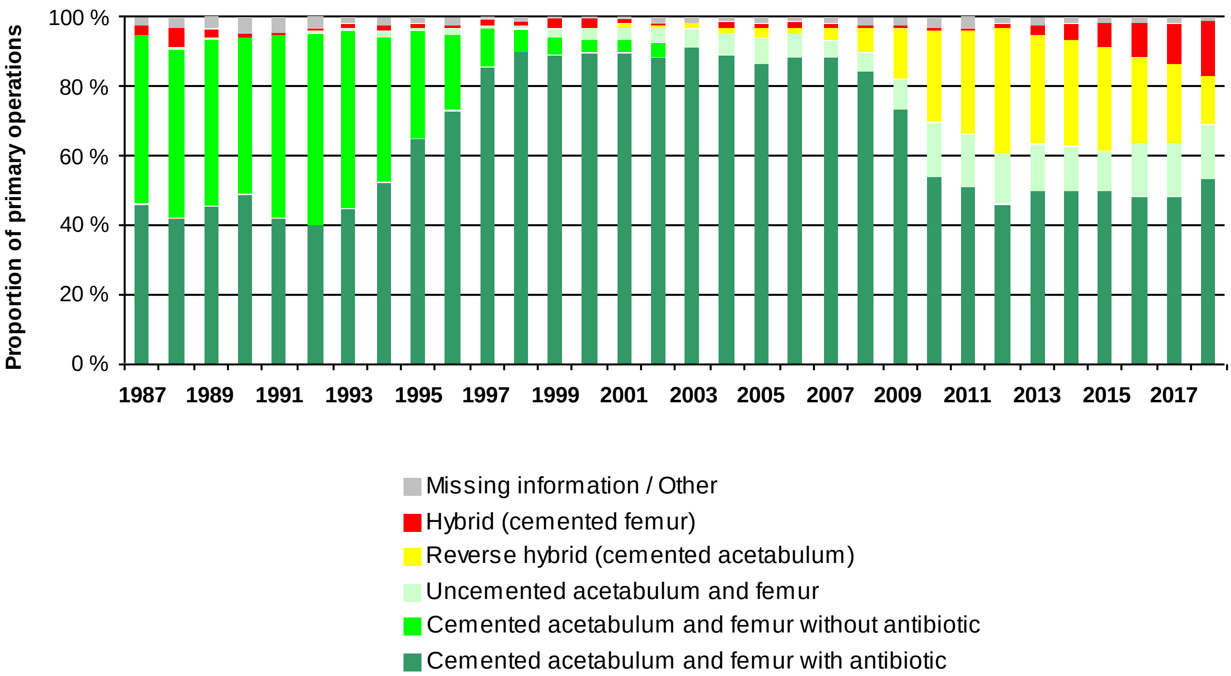


Figure 8d: Patients over 75 years old



Fixation in revisions

Figure 9: Acetabular cup - All patients

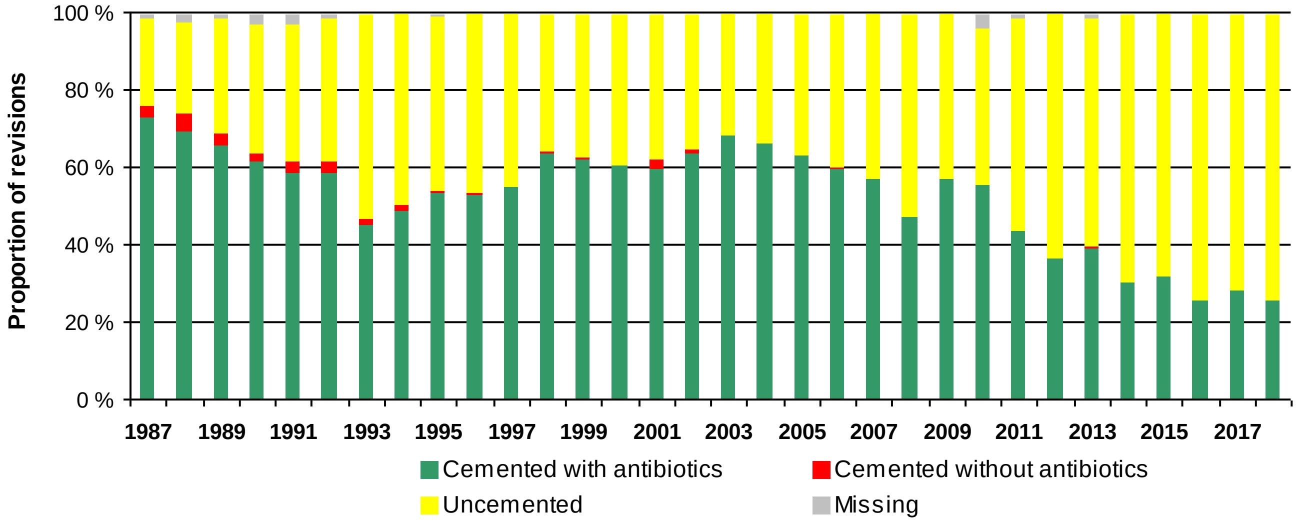
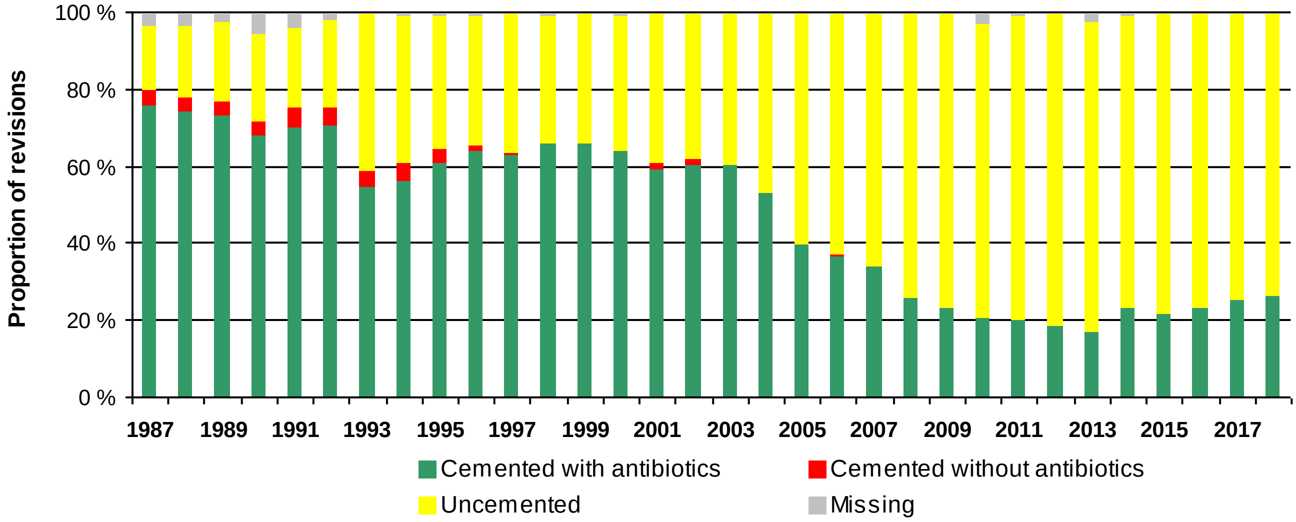


Figure 10: Femoral stem - All patients



Type of fixation and bone transplantation in revisions

Table 14: Acetabular cup

	Cemented					Uncemented				
	Bone impaction	Bone transpl.	No	Missing	Total	Bone impaction	Bone transpl.	No	Missing	Total
2018	11%	5%	61%	22%	236	7%	5%	65%	23%	689
2017	16%	7%	56%	20%	257	5%	7%	73%	16%	655
2016	16%	7%	58%	20%	233	6%	8%	70%	17%	698
2015	21%	9%	63%	7%	300	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%	523
2012	36%	8%	46%	10%	316	5%	14%	71%	11%	555
2011	42%	7%	44%	6%	377	4%	16%	67%	13%	471
2005-10	43%	9%	43%	6%	2 586	7%	24%	62%	7%	1 938
2000-04	30%	21%	48%	1%	2 011	5%	41%	52%	2%	1 102
1995-99	21%	23%	55%	1%	1 940	7%	51%	40%	1%	1 399
1987-94		25%	74%	1%	2 413		64%	34%	2%	1 470
Total	**24%**	**17%**	**55%**	**4%**	**11 276**	**5%**	**29%**	**57%**	**9%**	**10 731**

Table 15: Femoral stem

	Cemented					Uncemented				
	Bone impaction	Bone transpl.	No	Missing	Total	Bone impaction	Bone transpl.	No	Missing	Total
2018	1%		71%	28%	142	0%	4%	72%	23%	404
2017	3%	3%	76%	18%	130	0%	7%	74%	19%	392
2016		1%	77%	22%	126	1%	7%	75%	17%	412
2015	2%	4%	82%	12%	117	2%	9%	76%	14%	427
2014	3%	3%	63%	32%	114		13%	74%	14%	376
2013	6%	4%	62%	27%	95	0%	14%	72%	14%	458
2012	13%	4%	60%	23%	100	1%	15%	71%	13%	430
2011	20%	4%	56%	20%	100	2%	22%	65%	11%	389
2005-10	33%	7%	51%	8%	850	3%	30%	59%	8%	1 993
2000-04	35%	12%	53%	1%	1 523	8%	47%	43%	2%	1 001
1995-99	25%	22%	52%	1%	2 174	14%	58%	26%	1%	1 143
1987-94		10%	89%	1%	3 148		64%	35%	1%	1 162
Total	**16%**	**12%**	**67%**	**4%**	**8 619**	**4%**	**33%**	**55%**	**8%**	**8 587**

Registration of "Bone impaction" started in 1996

Cements used in the acetabulum and femur

Table 16: In primary- and revision surgeries

Cements	1987-10	2011	2012	2013	2014	2015	2016	2017	2018	Total
Boneloc	1352	1	0	0	0	0	0	0	0	**1353**
Cemex System Genta FAST	726	222	219	215	116	83	0	0	0	**1581**
Cemex system genta ID green	0	0	0	0	0	0	18	198	207	**423**
Cemex w/gentamicin	404	0	10	43	128	150	234	0	0	**969**
CMW I	5110	0	0	0	0	0	0	0	0	**5110**
CMW I w/gentamicin	3345	0	0	0	0	0	1	0	0	**3346**
CMW II	16	0	0	0	0	0	0	0	0	**16**
CMW III	1956	0	0	0	0	0	0	0	0	**1956**
CMW III w/gentamicin	189	0	0	0	0	0	0	0	0	**189**
Copal G+ V	0	0	0	4	7	13	11	25	32	**92**
Copal w/gentamicin+clindamycin	12	1	0	3	3	8	3	13	23	**66**
Optipac Refobacin Bonecement R	2440	1731	1938	1917	2110	2465	2206	1632	1176	**17615**
Optipac Refobacin Revision	0	3	12	14	8	21	17	13	1	**89**
Palacos	6990	1	2	0	0	1	0	0	0	**6994**
Palacos E-Flow (low viscosity)	99	0	0	0	0	0	0	0	0	**99**
Palacos R + G	16508	2255	2219	2606	2465	2506	2334	1661	1528	**34082**
Palacos R+G pro	0	0	0	1	2	1	58	790	2053	**2905**
Palacos w/gentamicin	62809	0	0	2	0	1	0	0	1	**62813**
Palamed G (gentamicin)	13	0	0	0	0	0	0	0	0	**13**
Refobacin Bone Cement R	6703	922	1131	988	694	384	632	912	55	**12421**
Refobacin Revision	111	77	85	38	38	36	24	70	24	**503**
Refobacin Revision-3	0	0	0	0	0	0	0	0	35	**35**
Refobacin-Palacos	2387	0	0	0	0	0	0	0	0	**2387**
Simplex	7148	0	0	0	0	0	0	0	0	**7148**
Simplex unknown	826	0	0	0	1	0	0	0	0	**827**
Simplex w/erythr.+colistin	2598	0	0	0	0	0	0	0	0	**2598**
Simplex w/Tobramycin	4915	536	514	503	511	527	534	488	491	**9019**
SmartSet GHV	163	0	0	0	0	0	0	0	0	**163**
SmartSet GHV Genta. Smartmix	185	0	0	2	2	25	157	176	96	**643**
SmartSet HV	15	0	0	0	0	0	0	0	0	**15**
Vancogenx	0	0	3	2	2	2	1	5	4	**19**
Other (n<10)	18	0	0	1	1	1	0	0	0	**21**
Missing information	176	31	7	9	6	9	18	35	47	**338**

Cemented primary prostheses

Table 17: (The 45 most common combinations of cup and stem)

Cup	Stem	1987-10	2011	2012	2013	2014	2015	2016	2017	2018	Total
CHARNLEY	CHARNLEY	40047	115	112	65	39					**40378**
EXETER	EXETER	12680	155	80	25						**12940**
REFLECTION CEM. ALL POLY	SPECTRON-EF	9503	112	85	33	1					**9734**
EXETER X3 RIMFIT	EXETER	54	604	982	1173	1158	1354	1308	975	1027	**8635**
TITAN	TITAN	6955									**6955**
IP	LUBINUS SP II	3576	525	471	415	282	307	263	218	203	**6260**
CONTEMPORARY	EXETER	3749	627	188	104	56	15	3	1		**4743**
SPECTRON	ITH	2405									**2405**
MARATHON	CHARNLEY MODULAR	513	282	203	196	225	135	45	25		**1624**
KRONOS	TITAN	1483									**1483**
ELITE	TITAN	1224									**1224**
LUBINUS	LUBINUS SP II	13			125	168	252	212	214	198	**1182**
MARATHON	EXETER	39	18	70	82	91	120	186	194	236	**1036**
ELITE	CHARNLEY	936	1								**937**
REFLECTION CEM. ALL POLY	ITH	926									**926**
REFLECTION CEM. ALL POLY	BIO-FIT	898									**898**
WEBER ALLO PRO	MS-30	813									**813**
ELITE	EXETER	777		1							**778**
ZCA	CPT	756									**756**
CHARNLEY	CHARNLEY MODULAR	657	1	1		1					**660**
IP	LUBINUS	587									**587**
ELITE	ELITE	579									**579**
CHARNLEY	EXETER	571									**571**
TITAN	FJORD	523									**523**
ELITE	CHARNLEY MODULAR	358	57	48	30	21					**514**
MARATHON	C-STEM	34					41	127	117	169	**488**
SPECTRON	SP I	432									**432**
MODULAR HIP SYSTEM	BIO-FIT	430									**430**
SPECTRON	TITAN	411									**411**
AVANTAGE	EXETER	50	37	41	47	61	37	37	32	62	**404**
CHARNLEY	C-STEM	378									**378**
CHARNLEY	ELITE	375									**375**
OPERA	SPECTRON-EF	356									**356**
MARATHON	LUBINUS SP II	12	8	11	20	44	65	110	40	41	**351**
ELITE	MS-30	331									**331**
PEARL	TITAN	285									**285**
MODULAR HIP SYSTEM	ITH	277									**277**
SPECTRON	BIO-FIT	226									**226**
EXCEED ABT RINGLOC-X	CPT								104	113	**217**
IP	SP I	214									**214**
MARATHON	MS-30						14	18	71	111	**214**
LMT	LMT	191									**191**
ELITE	CPT	181	1								**182**
ZCA	CPS-PLUS	168									**168**
MÜLLER TYPE	MÜLLER TYPE	166									**166**
Other	Other	2534	52	43	65	106	64	80	352	296	**3592**

Uncemented primary prostheses

Table 18: (The 45 most common combinations of cup and stem)

Cup	Stem	1987-10	2011	2012	2013	2014	2015	2016	2017	2018	Total
PINNACLE	CORAIL	444	296	455	358	320	384	490	1239	1659	**5645**
REFLECTION UNCEMENTED	CORAIL	1223	529	674	745	822	542	169	218	424	**5346**
IGLOO	FILLER	2209	228	249	210	171	124	165	108	117	**3581**
TRILOGY	CORAIL	1354	128	182	218	272	248	331	270	197	**3200**
TROPIC	CORAIL	2659									**2659**
R3	CORAIL		1	1			120	493	568	519	**1702**
ATOLL	CORAIL	1280									**1280**
TRIDENT	CORAIL	45	3	17	26	73	113	272	240	302	**1091**
DURALOC	CORAIL	691	238	72	62						**1063**
Continuum Acetabular System	CORAIL					187	302	332	88	40	**949**
TRIDENT	ACCOLADE II				42	75	174	127	116	173	**707**
REFLECTION UNCEMENTED	HACTIV	1			9	3	117	185	187	179	**681**
BICON-PLUS	ZWEYMÜLLER	586									**586**
REFLECTION UNCEMENTED	SECURFIT	244	146	91	32						**513**
TRILOGY	SCP/UNIQUE	508			1						**509**
R3	POLARSTEM	21	68	56	82	50	50	74	50	13	**464**
TRILOGY	HACTIV	425	4	12	7						**448**
R3	FILLER					30	89	90	114	95	**418**
GEMINI	PROFILE	407									**407**
BICON-PLUS	HACTIV	386									**386**
DURALOC	PROFILE	332									**332**
REFLECTION UNCEMENTED	OMNIFIT	272	22	6							**300**
DURALOC	SCP/UNIQUE	267									**267**
TRILOGY	FILLER	163	40	38	18		2				**261**
ENDLER	ZWEYMÜLLER	247									**247**
REFLECTION UNCEMENTED	SCP/UNIQUE	171	6	1	14	25	13	10	2		**242**
TRIDENT	POLARSTEM					43	58	21	60	59	**241**
EUROPEAN CUP SYSTEM	TAPERLOC	240									**240**
PLASMACUP	BICONTACT	232									**232**
LMT	TAPERLOC	224									**224**
TRIDENT	ABG II	6	22	29	52	81	22				**212**
TI-FIT	BIO-FIT	175									**175**
REFLECTION UNCEMENTED	SL-PLUS MIA	169									**169**
SECURFIT	OMNIFIT	166									**166**
ABG I	ABG I	165									**165**
AVANTAGE	CORAIL	72	12	16	4	2	2	30	10	13	**161**
HARRIS/GALANTE	HARRIS/GALANTE	158									**158**
ABG II	ABG II	155									**155**
COXA	FEMORA	155									**155**
PARHOFER	PARHOFER	152									**152**
BICON-PLUS	CORAIL	146	2			1	1				**150**
TRABECULAR METAL	CORAIL	3	1	11	7	19	21	36	26	26	**150**
REFLECTION UNCEMENTED	PROFEMUR GLADIATOR	3	37	60	37	1					**138**
TRIDENT	HACTIV					3	18	65	44	6	**136**
TRILOGY	OMNIFIT	134									**134**
Other	Other	2781	86	69	152	176	178	181	174	285	**4082**

Hybrid primary prostheses

Table 19: Hybrid primary prostheses. (The 20 most common)

Cup (uncemented)	Stem (cemented)	1987-10	2011	2012	2013	2014	2015	2016	2017	2018	Total
TRILOGY	EXETER	356	53	44	88	201	232	236	249	164	**1623**
TROPIC	TITAN	869									**869**
MORSCHER	MS-30	667									**667**
R3	LUBINUS SP II						41	141	134	138	**454**
TRILOGY	CHARNLEY	382									**382**
ENDLER	TITAN	336									**336**
TRIDENT	EXETER	87	1		1	10	22	30	12	169	**332**
REFLECTION UNCEMENTED	C-STEM					1	24	61	98	119	**303**
REFLECTION UNCEMENTED	LUBINUS SP II	4	1	2	32	62	78	1		21	**201**
AVANTAGE	EXETER	21	8	20	7	10	15	32	26	24	**163**
DURALOC	CHARNLEY	153									**153**
REFLECTION UNCEMENTED	BIO-FIT	142									**142**
TRILOGY	CPT	89							40	2	**131**
REFLECTION UNCEMENTED	SPECTRON-EF	120		1	1						**122**
ATOLL	TITAN	105									**105**
IP	SP I	101									**101**
HG II	ANATOMIC CC	80									**80**
GEMINI	CHARNLEY	77									**77**
PINNACLE	CPT				1				20	39	**60**
TI-FIT	BIO-FIT	53									**53**
Other	Other	1042	20	16	17	24	44	46	103	178	**1490**

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

Cup (cemented)	Stem (uncemened)	1987-10	2011	2012	2013	2014	2015	2016	2017	2018	Total
MARATHON	CORAIL	1524	1757	2738	2936	2766	2606	2390	2203	1808	**20728**
ELITE	CORAIL	2034	227	205	86	71	3	2			**2628**
REFLECTION CEM. ALL POLY	CORAIL	1135	15	25	21	22	30	29	31	5	**1313**
TITAN	CORAIL	881	48	1							**930**
CONTEMPORARY	CORAIL	436	236	6	2	1					**681**
KRONOS	CORAIL	626	7								**633**
EXETER X3 RIMFIT	ACCOLADE II				59	49	119	157	121	115	**620**
EXETER X3 RIMFIT	CORAIL	3	58	42	70	88	46	129	54	24	**514**
REFLECTION CEM. ALL POLY	HACTIV	314	49	91	20	1					**475**
REFLECTION CEM. ALL POLY	FILLER	152	12	23	26	19	1		2		**235**
IP	CORAIL	165	16	4	11	3	2	5	1	3	**210**
EXETER	CORAIL	171		2							**173**
EXETER	ABG II	172									**172**
AVANTAGE	CORAIL	26	23	11	15	20	13	14	14	20	**156**
REFLECTION CEM. ALL POLY	TAPERLOC	155									**155**
EXETER X3 RIMFIT	ABG II	10	69	60	8						**147**
EXETER X3 RIMFIT	FILLER		1		23	37	35	25	7		**128**
CHARNLEY	CORAIL	116			1						**117**
ELITE	SCP/UNIQUE	90	3	2	2	1	1				**99**
MARATHON	ACCOLADE II						15	48	28	1	**92**
Other	Other	937	71	93	86	85	88	89	98	92	**1639**

Acetabular cups in primary operations

Table 21: (The 45 most common)

Cup	1987-10	2011	2012	2013	2014	2015	2016	2017	2018	Total
CHARNLEY	42872	117	114	66	40					**43209**
MARATHON	2247	2139	3090	3318	3193	3045	2998	2762	2475	**25267**
REFLECTION CEM. ALL POLY	13486	193	234	108	53	36	33	34	6	**14183**
EXETER	13252	156	84	26	1					**13519**
EXETER X3 RIMFIT	72	745	1103	1370	1363	1571	1634	1177	1183	**10218**
REFLECTION UNCEMENTED	2955	767	848	933	970	798	435	520	825	**9051**
TITAN	8767	48	1							**8816**
ELITE	7071	304	261	118	95	5	2			**7856**
IP	4762	559	488	441	289	316	268	221	213	**7557**
TRILOGY	4055	243	292	351	509	517	582	576	372	**7497**
PINNACLE	545	326	468	386	331	398	519	1285	1797	**6055**
CONTEMPORARY	4248	889	195	111	58	15	3	1		**5520**
TROPIC	3823									**3823**
IGLOO	2434	230	249	211	174	124	169	110	117	**3818**
SPECTRON	3652									**3652**
R3	22	75	57	82	82	308	829	885	805	**3145**
TRIDENT	198	33	53	161	347	441	548	546	781	**3108**
KRONOS	2186	7								**2193**
DURALOC	1604	245	72	62						**1983**
AVANTAGE	441	109	119	103	119	98	158	189	181	**1517**
ATOLL	1491									**1491**
BICON-PLUS	1209	2			1	1				**1213**
LUBINUS	31		1	125	169	253	213	215	203	**1210**
ZCA	1062									**1062**
Continuum Acetabular System					191	320	348	98	49	**1006**
MODULAR HIP SYSTEM	878									**878**
MORSCHER	837	6								**843**
WEBER ALLO PRO	830									**830**
EXCEED ABT RINGLOC-X	50	7	8	20	39	66	37	206	274	**707**
ENDLER	662									**662**
POLARCUP	8	46	58	79	66	64	49	91	99	**560**
BIRMINGHAM HIP RESURFACING	455	42	21	2						**520**
GEMINI	510									**510**
OPERA	457									**457**
EUROPEAN CUP SYSTEM	332									**332**
TI-FIT	312									**312**
PEARL	287									**287**
PLASMACUP	283									**283**
LMT (Uncemented)	275									**275**
HARRIS/GALANTE	252									**252**
TRABECULAR METAL	5	7	14	17	33	35	54	41	44	**250**
PE-PLUS	247									**247**
MÜLLER TYPE	242									**242**
ABG II	236									**236**
COXA	220									**220**
Other	2193	31	4		6	31	66	196	120	**2647**

Acetabular cups in revisions

Table 22: (The 45 most common)

Cup	1987-10	2011	2012	2013	2014	2015	2016	2017	2018	Total
CHARNLEY	2847	9	5	3				1		**2865**
TROPIC	1885									**1885**
AVANTAGE	880	149	126	105	86	86	76	93	99	**1700**
ELITE	1530	33	19	12	6					**1600**
TRILOGY	1157	70	50	51	56	65	59	45	41	**1594**
TRABECULAR METAL	108	97	118	161	214	160	203	159	150	**1370**
PINNACLE	398	86	97	82	117	97	111	115	128	**1231**
MARATHON	205	130	164	138	66	94	66	59	45	**967**
EXETER	940	1	3						1	**945**
POLARCUP	53	50	84	122	116	133	117	129	113	**917**
REFLECTION CEM. ALL POLY	884	11	7	4	3	4	2			**915**
REFLECTION UNCEMENTED	165	62	78	94	83	74	35	40	27	**658**
TRIDENT	52	22	38	40	44	94	88	111	169	**658**
IGLOO	404	28	24	18	15	15	25	18	17	**564**
TITAN	527									**527**
ATOLL	396									**396**
IP	234	7	10	4	3	4	3	4	2	**271**
R3			7	6	6	20	61	79	67	**246**
CONTEMPORARY	181	45	9	3						**238**
KRONOS	225									**225**
Continuum Acetabular System					13	51	66	37	37	**204**
CHRISTIANSEN	196									**196**
SPECTRON	189									**189**
EXETER X3 RIMFIT	2	23	24	30	25	29	29	9	5	**176**
DURALOC	94	16	10	5	11	9	2	6	5	**158**
OPERA	101									**101**
HARRIS/GALANTE	99									**99**
ZCA	96									**96**
MODULAR HIP SYSTEM	95									**95**
CAPTIV	71						7			**78**
EUROPEAN CUP SYSTEM	73									**73**
LMT (Uncemented)	67									**67**
BICON-PLUS	48	1	2	3		2	1	5	4	**66**
ENDLER	66									**66**
HG II	53									**53**
MORSCHER	48	3								**51**
GEMINI	47									**47**
SECURFIT	45									**45**
OCTOPUS	40									**40**
REGENEREX RINGLOC	17	13	7	2						**39**
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	18	**398**

Femoral stems in primary operations

Table 23: (The 45 most common)

Stem	1987-10	2011	2012	2013	2014	2015	2016	2017	2018	Total
CORAIL	16035	3681	4495	4635	4712	4460	4759	5030	5137	**52944**
CHARNLEY	42206	117	116	67	43					**42549**
EXETER	18737	1558	1461	1570	1651	1850	1893	1552	1829	**32101**
TITAN	12185	3								**12188**
SPECTRON-EF	10394	119	92	37	10	3	1	2	6	**10664**
LUBINUS SP II	3892	558	519	621	590	780	787	671	681	**9099**
FILLER	2668	295	321	375	328	262	287	245	230	**5011**
ITH	3723									**3723**
CHARNLEY MODULAR	1576	352	258	237	261	154	46	28		**2912**
HACTIV	1219	58	108	38	9	150	281	242	199	**2304**
MS-30	1876	1				17	21	144	226	**2285**
BIO-FIT	1993									**1993**
CPT	1110	2		1	2	1	2	440	262	**1820**
ACCOLADE II				110	137	314	341	266	303	**1471**
SCP/UNIQUE	1263	23	15	33	36	28	35	11		**1444**
C-STEM	540			1	2	76	203	250	350	**1422**
ZWEYMÜLLER	1102									**1102**
ELITE	1024	2	3	1						**1030**
OMNIFIT	856	28	6							**890**
PROFILE	890									**890**
ABG II	467	105	94	78	81	23				**848**
POLARSTEM	23	101	83	108	103	110	97	111	111	**847**
TAPERLOC	787									**787**
SP I	780									**780**
FJORD	652									**652**
LUBINUS	624									**624**
SECURFIT	262	167	94	32						**555**
CPS-PLUS	496									**496**
BICONTACT	443									**443**
LMT (Cemented)	417									**417**
KAR/Corail Revision	138	12	20	32	22	29	42	38	24	**357**
ABG I	304									**304**
TI-FIT	221									**221**
MÜLLER TYPE	213									**213**
PROFEMUR GLADIATOR	4	48	71	38	4				33	**198**
FEMORA	182									**182**
BI-METRIC	128	15	5	2	3	7	16	1		**177**
SL-PLUS MIA	177									**177**
HARRIS/GALANTE	169									**169**
PARHOFER	159									**159**
KAREY	136									**136**
MÜLLER TYPE V	132									**132**
ECHELON	121									**121**
ECHO- Bi-Metric				7	32	59	22			**120**
FURLONG					40	16	19	23	18	**116**
Other	1134	24	26	29	34	68	53	60	83	**1511**

Femoral stems in revisions

Table 24: (The 45 most common)

Stem	1987-10	2011	2012	2013	2014	2015	2016	2017	2018	Total
KAR/Corail Revision	2096	157	138	147	120	138	103	98	87	**3084**
CHARNLEY	2972	6	1	1	2	1			1	**2984**
EXETER	1631	70	72	62	63	77	78	69	83	**2205**
CORAIL	1297	43	62	65	40	51	66	57	50	**1731**
RESTORATION	179	39	57	67	63	70	55	36	73	**639**
CPT	468	6	7	2	5	7	6	23	16	**540**
TITAN	537	1								**538**
FJORD	476									**476**
FILLER	299	19	15	17	16	10	19	19	16	**430**
TTHR	107	61	71	52	36	20	24	24	16	**411**
SPECTRON-EF	341	14	4	8	3	3	2	1		**376**
ELITE	351			1	1					**353**
REEF	316	3	5	2						**326**
LUBINUS SP II	164	2	9	8	30	15	9	17	31	**285**
MP RECONSTRUCTION	48	21	24	26	18	17	12	14	14	**194**
REVITAN	1		7	27	20	36	31	38	33	**193**
ANATOMIC BR	192									**192**
ITH	192									**192**
ARCOS		1	3	11	17	27	32	42	38	**171**
BIO-FIT	167									**167**
HACTIV	102		4	4		13	9	9	8	**149**
REACTIV	45	6	3	6	19	13	27	14	9	**142**
BI-METRIC	86	15	16	16	1		2	2		**138**
TAPERLOC	115									**115**
Securus				6	15	11	19	20	20	**91**
ZWEYMÜLLER	83									**83**
Profemur	31	16	11	14	5					**77**
ECHELON	67	1								**68**
SP I	66									**66**
RECLAIM			1	13	9	12	12	6	9	**62**
PRIUS					2	11	17	8	22	**60**
SCAN HIP	59									**59**
C-STEM	13				1	3	12	11	14	**54**
LUBINUS	51									**51**
HARRIS/GALANTE	44									**44**
MS-30	34						2	4	4	**44**
CHARNLEY MODULAR	22	3	3	3	3	3	5	1		**43**
FEMORA	43									**43**
PARHOFER	43									**43**
AURA	38									**38**
PROFEMUR GLADIATOR	1	6	19	9	3					**38**
LANDOS (Reconstruction)	33									**33**
MÜLLER TYPE	32									**32**
OMNIFIT	31	1								**32**
CPS-PLUS	26									**26**
Other	283	7	4	2	2	12	6	13	18	**347**

The 7 most common primary prostheses in last 5 years

Table 25a: Acetabular cup

2014	2015	2016	2017	2018
MARATHON (3193)	MARATHON (3045)	MARATHON (2998)	MARATHON (2762)	MARATHON (2475)
EXETER X3 RIMFIT (1363)	EXETER X3 RIMFIT (1571)	EXETER X3 RIMFIT (1634)	PINNACLE (1285)	PINNACLE (1797)
REFLECTION * (970)	REFLECTION * (798)	R3 (829)	EXETER X3 RIMFIT (1177)	EXETER X3 RIMFIT (1183)
TRILOGY (509)	TRILOGY (517)	TRILOGY (582)	R3 (885)	REFLECTION * (825)
TRIDENT (347)	TRIDENT (441)	TRIDENT (548)	TRILOGY (576)	R3 (805)
PINNACLE (331)	PINNACLE (398)	PINNACLE (519)	TRIDENT (546)	TRIDENT (781)
IP (289)	Continuum Acetabular System (320)	REFLECTION * (435)	REFLECTION * (520)	TRILOGY (372)

Table 25b: Femoral stem

2014	2015	2016	2017	2018
CORAIL (4712)	CORAIL (4460)	CORAIL (4759)	CORAIL (5030)	CORAIL (5137)
EXETER (1651)	EXETER (1850)	EXETER (1893)	EXETER (1552)	EXETER (1829)
LUBINUS SP II (590)	LUBINUS SP II (780)	LUBINUS SP II (787)	LUBINUS SP II (671)	LUBINUS SP II (681)
FILLER (328)	ACCOLADE II (314)	ACCOLADE II (341)	CPT (440)	C-STEM (350)
CHARNLEY ** (261)	FILLER (262)	FILLER (287)	ACCOLADE II (266)	ACCOLADE II (303)
ACCOLADE II (137)	CHARNLEY ** (154)	HACTIV (281)	C-STEM (250)	CPT (262)
POLARSTEM (103)	HACTIV (150)	C-STEM (203)	FILLER (245)	FILLER (230)

Table 25c: Combinations of cup and stem

2014	2015	2016	2017	2018
MARATHON + CORAIL (2784)	MARATHON + CORAIL (2616)	MARATHON + CORAIL (2410)	MARATHON + CORAIL (2215)	MARATHON + CORAIL (1834)
EXETER X3 RIMFIT + EXETER (1168)	EXETER X3 RIMFIT + EXETER (1361)	EXETER X3 RIMFIT + EXETER (1320)	PINNACLE + CORAIL (1240)	PINNACLE + CORAIL (1661)
REFLECTION * + CORAIL (823)	REFLECTION * + CORAIL (543)	R3 + CORAIL (493)	EXETER X3 RIMFIT + EXETER (991)	EXETER X3 RIMFIT + EXETER (1041)
PINNACLE + CORAIL (322)	PINNACLE + CORAIL (386)	PINNACLE + CORAIL (491)	R3 + CORAIL (568)	R3 + CORAIL (519)
IP + LUBINUS SP II (282)	IP + LUBINUS SP II (307)	Continuum Acetabular System + CORAIL (334)	TRILOGY + CORAIL (270)	REFLECTION * + CORAIL (424)
TRILOGY + CORAIL (278)	Continuum Acetabular System + CORAIL (303)	TRILOGY + CORAIL (331)	TRILOGY + EXETER (259)	TRIDENT + CORAIL (302)
TRILOGY + EXETER (230)	LUBINUS + LUBINUS SP II (252)	TRIDENT + CORAIL (272)	TRIDENT + CORAIL (242)	MARATHON + EXETER (241)

* UNCEMENTED

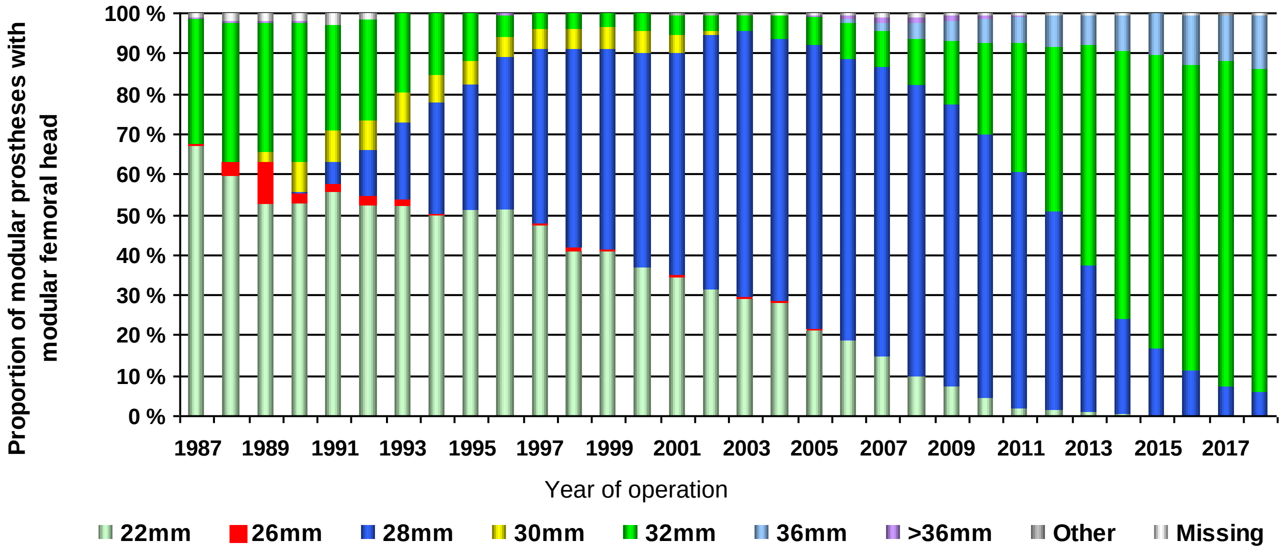
**' MODULAR

Femoral head diameter (without dual mobility)

Table 26: In primary operations and revisions

Year	22 mm	26 mm	28 mm	30 mm	32 mm	36 mm	>36 mm	Other	Missing	Total
2018	17		595		8 157	1 345	6	5	28	**10 153**
2017	7		721		7 866	1 134	9	3	22	**9 762**
2016	9		1 084	1	7 360	1 186	1	5	28	**9 674**
2015	22		1 508		6 745	948	5	3	11	**9 242**
2014	56		2 097	1	5 858	804	4	4	22	**8 846**
2013	83	2	3 223	1	4 846	675	3	6	26	**8 865**
2012	147		4 219	3	3 503	671	25	5	26	**8 599**
2011	158		4 782		2 606	522	52	1	27	**8 148**
2010	349		5 343	3	1 825	482	82	1	50	**8 135**
2009	598	2	5 529	4	1 241	385	115	2	50	**7 926**
2008	732	2	5 494	2	880	279	136	3	64	**7 592**
2007	1 081		5 316	2	666	148	111	2	62	**7 388**
2006	1 303	6	4 908	3	638	58	60	5	33	**7 014**
2005	1 564	9	5 170		522	4	41	2	25	**7 337**
2004	1 932	26	4 505	7	393		4	3	27	**6 897**
2003	2 258	24	5 115	13	309		3	14	14	**7 750**
2002	2 168	16	4 315	62	274		2	24	14	**6 875**
2001	2 383	18	3 809	317	342		1	3	15	**6 888**
2000	2 389	6	3 425	347	269			3	8	**6 447**
1999	2 546	26	3 104	337	198			2	7	**6 220**
1998	2 500	66	3 036	305	224			2	5	**6 138**
1997	2 860	24	2 627	297	226		6	1	7	**6 048**
1996	2 861	7	2 102	287	306	1	15		5	**5 584**
1995	3 011	4	1 821	342	673		7		5	**5 863**
1994	2 639	13	1 474	359	806		5		7	**5 303**
1993	2 805	70	1 043	390	1 045		2		11	**5 366**
1992	2 771	124	605	404	1 332		8		70	**5 314**
1991	2 707	102	274	380	1 264		12		133	**4 872**
1990	2 731	117	27	398	1 778	1	20		106	**5 178**
1989	2 875	566	5	151	1 757		23		100	**5 477**
1988	2 281	133	1	1	1 334		15		71	**3 836**
1987	778	1	1		359		6		13	**1 158**
Total	**50 621**	**1 364**	**87 278**	**4 417**	**65 602**	**8 643**	**779**	**99**	**1 092**	**219 895**

Figure 11: In primary operations and revisions



Femoral head prostheses

Table 27: In primary operations and revisions (The 50 most common)

Prosthesis	1987-10	2011	2012	2013	2014	2015	2016	2017	2018	Total
EXETER	20763	1140	867	744	653	793	744	563	566	**26833**
CORAIL	808	1253	2023	2401	2710	2895	3124	3454	3550	**22218**
LANDOS	20976	671	72	7	15					**21741**
CERAMTEC	3437	1797	2688	2582	2449	2218	2211	2108	2168	**21658**
UNIVERSAL	16597	175	149	108	50	39	35	63	59	**17275**
FJORD	11190	510	62	6	2	3		2		**11775**
LFIT ANATOMIC	314	677	878	1245	1433	1646	1717	1468	1830	**11208**
SP II	4173	605	566	680	649	825	836	735	770	**9839**
ELITE	3270	191	158	195	184	136	62	35	8	**4239**
IGLOO	2106	252	254	209	209	170	229	207	220	**3856**
SCANOS	1499	63	102	28	30	211	346	288	262	**2829**
PROTEK	1980	4	1					381	332	**2698**
PINNACLE	284	150	307	340	249	161	286	358	367	**2502**
PLUS ENDO	1484	38	29	34	30	14	16	15	14	**1674**
CPT	1607	11	7	9	2	1	4	3	2	**1646**
PROFILE	1414	14	1					1		**1430**
HIPBALL PREMIUM	133	143	188	236	166	137	116	66	53	**1238**
MALLORY-HEAD	679	43	34	42	65	107	93	63	57	**1183**
TAPERLOC	1088									**1088**
BIOTECHNI	921	56	44	29	4	2	1			**1057**
OXINIUM	742	73	68	68	47	5	10	6	8	**1027**
HARRIS/GALANTE	854	9	7	6		6	5		1	**888**
OMNIFIT	769	36	19	20	1	2	2	3	2	**854**
" OSTEONICS Hoder" , C-taper head	519	182	94	20						**815**
ZIRCONIA	763									**763**
VERSYS	63	45	41	38	29	80	81	140	164	**681**
BIOBALL	53	49	66	42	62	61	59	63	59	**514**
BICONTACT	483	3	1	3	6	2	2	2	2	**504**
BIRMINGHAM HIP RESURFACING	404	39	20	2					1	**466**
FURLONG				7	71	80	91	108	82	**439**
ABG I	380	9	7	3	7	6	3	3	2	**420**
SURGIVAL	372									**372**
ZWEYMÜLLER	342									**342**
STRYKER HODER	23	44	22	15	24	41	48	19	26	**262**
Zimmer Hoder					1			161	81	**243**
CERAMIC OSTEO	220									**220**
FEMORA	213									**213**
PARHOFER	183			1					1	**185**
TI-FIT	141									**141**
SMITH & NEPHEW KERAMIKKHODER	128								1	**129**
CHRISTIANSEN	126									**126**
PCA	104	2	1	1		2		1	1	**112**
BIOLOX DELTA			16	42	5	3	1	6	17	**90**
BIRMINGHAM HIP MODULÆR	54	3	1							**58**
ABG II	48									**48**
ASR MODULÆR	45									**45**
MUTARS	14		1	1	2	10	8	6	3	**45**
LINK Rippensystem	38									**38**
AURA II	27		2					1		**30**
HASTINGS HIP	29									**29**
Other	266	10	7	10	2	1	3	3	24	**326**

Dual Mobility articulation

Table 28 In primary operation

Prosthesis	1987-10	2011	2012	2013	2014	2015	2016	2017	2018	Total
AVANTAGE	441	109	119	104	118	98	158	189	175	**1511**
POLARCUP	8	46	58	79	66	64	49	91	95	**556**
TRIDENT			10	15	12	16	22	35	41	**151**
CAPTIV							18			**18**
Restoration Anatomic Cup		1	1	2	1		5	4	1	**15**
GYROS	2									**2**
Total	**451**	**156**	**188**	**200**	**197**	**178**	**252**	**319**	**312**	**2253**

Table 29 In revisions

Prosthesis	1987-10	2011	2012	2013	2014	2015	2016	2017	2018	Total
AVANTAGE	880	149	127	108	95	93	92	120	108	**1772**
POLARCUP	53	50	84	130	125	144	129	141	121	**977**
TRIDENT			10	11	23	48	33	44	89	**258**
Restoration Anatomic Cup		1	10	8	6	12	17	28	11	**93**
GYROS	10									**10**
CAPTIV							9			**9**
" OSTEONICS Hoder" , C-taper head								1		**1**
Total	**943**	**200**	**231**	**257**	**249**	**297**	**280**	**334**	**329**	**3120**

ASA classification

Figure 12: Primary operations

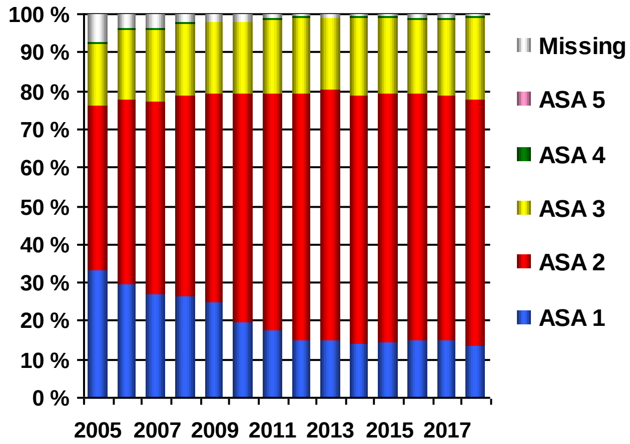
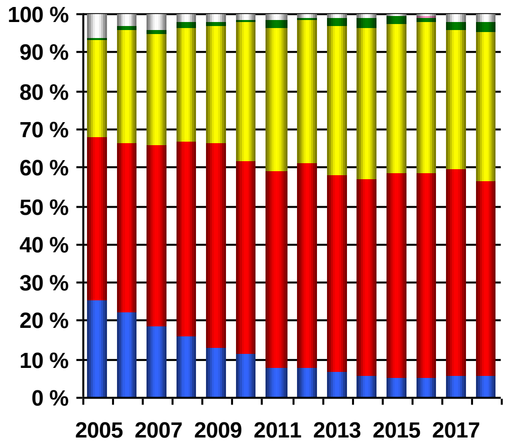


Figure 13: Revisions



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 30: Primary operations *

År	1		2		3		4		Missing		Total
2018	581	(6%)	7737	(81%)	1099	(12%)	91	(1%)	45	(0%)	**9553**
2017	626	(7%)	7457	(81%)	985	(11%)	65	(1%)	41	(0%)	**9174**
2016	799	(9%)	7055	(79%)	975	(11%)	72	(1%)	52	(1%)	**8953**
2015	1069	(13%)	6277	(74%)	959	(11%)	57	(1%)	89	(1%)	**8451**
2014	1116	(14%)	5952	(73%)	967	(12%)	31	(0%)	75	(1%)	**8141**
2013	1343	(17%)	5639	(70%)	1050	(13%)	10	(0%)	62	(1%)	**8104**
2012	1580	(20%)	4856	(62%)	1322	(17%)	9	(0%)	82	(1%)	**7849**
2011	2220	(30%)	4304	(58%)	795	(11%)	3	(0%)	38	(1%)	**7360**
2010	2365	(32%)	4308	(59%)	610	(8%)	4	(0%)	43	(1%)	**7330**
2009	2606	(37%)	3862	(54%)	578	(8%)	3	(0%)	66	(1%)	**7115**
2008	3132	(46%)	3059	(45%)	574	(8%)	8	(0%)	75	(1%)	**6848**
2005-2007	11866	(61%)	4655	(24%)	2301	(12%)	31	(0%)	723	(4%)	**19576**

Table 31: Revisions *

År	1		2		3		4		Missing		Total
2018	202	(13%)	1 104	(72%)	142	(9%)	65	(4%)	24	(2%)	**1 537**
2017	204	(14%)	1 103	(74%)	139	(9%)	24	(2%)	28	(2%)	**1 498**
2016	205	(14%)	1 076	(72%)	162	(11%)	27	(2%)	27	(2%)	**1 497**
2015	221	(16%)	1 019	(72%)	133	(9%)	12	(1%)	24	(2%)	**1 409**
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%)	683	(54%)	125	(10%)	2	(0%)	10	(1%)	**1 259**
2009	421	(35%)	649	(54%)	126	(10%)	5	(0%)	8	(1%)	**1 209**
2008	477	(43%)	531	(47%)	94	(8%)	5	(0%)	15	(1%)	**1 122**
2005-2007	1 794	(58%)	803	(26%)	390	(13%)	9	(0%)	120	(4%)	**3 116**

Figure 14: Primary operations

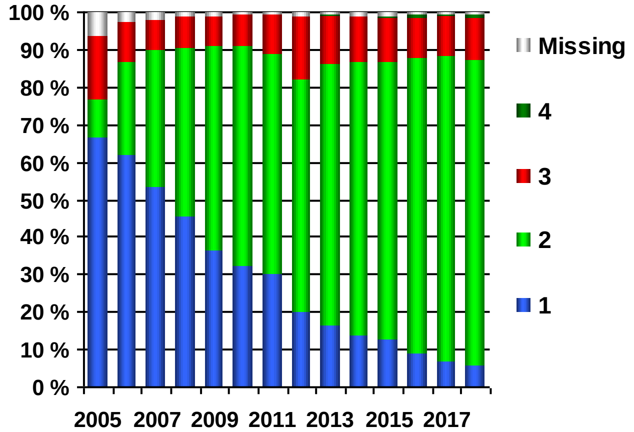
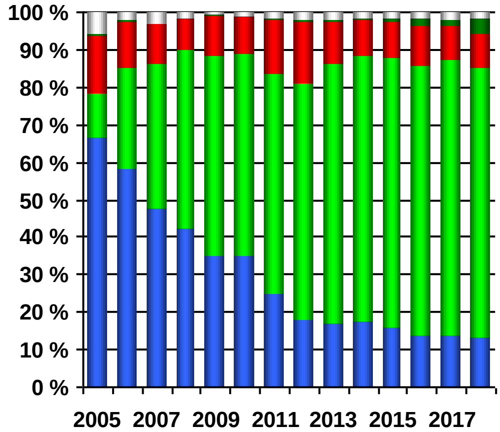


Figure 15: Revisions



*

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 32: All operations

Drugs	2005-09	2010	2011	2012	2013	2014	2015	2016	2017	2018
Acetylsalicylsyre (Albyl-E, Globoid, Acetyratio, Magnyl E)					0,1 %	0,4 %	0,6 %	0,8 %	0,8 %	1,0 %
Apixiban (Eliquis)				0,1 %	1,2 %	1,5 %	1,5 %	1,5 %	1,6 %	1,4 %
Dabigatranetixalat (Re-Novate, Pradaxa)	0,6 %					0,1 %	0,1 %			
Dalteparin (Fragmin)	52,2 %	63,2 %	65,1 %	63,2 %	56,1 %	51,6 %	58,5 %	61,6 %	64,0 %	64,9 %
Dekstran (Macrodex, Dextran)		0,1 %	0,3 %	0,1 %	0,1 %	0,1 %				
Enoksaparin (Klexane)	41,3 %	31,5 %	25,5 %	24,6 %	27,9 %	31,4 %	24,1 %	22,0 %	19,6 %	17,7 %
Rivaroksaban (Xarelto)		0,3 %	2,9 %	2,0 %	2,3 %	2,2 %	1,5 %	1,5 %	1,1 %	1,1 %
Warfarin (Marevan)	0,1 %	0,1 %		0,1 %			0,1 %			
Ximelagatran (Exanta, Malagatran)	0,5 %	0,1 %								
Other	0,1 %					0,1 %				
Combination of 2 drugs	1,5 %	3,9 %	5,1 %	8,4 %	10,7 %	10,6 %	11,5 %	10,0 %	10,2 %	10,9 %
Clinical study	0,8 %	0,1 %								
No drugs										
Missing/Unknown	2,7 %	0,7 %	0,9 %	1,5 %	1,4 %	2,0 %	2,2 %	2,6 %	2,5 %	3,0 %
Total	**38986**	**8592**	**8658**	**9178**	**9465**	**9458**	**9878**	**10465**	**10683**	**11102**

Figure 16: Drugs - All operations

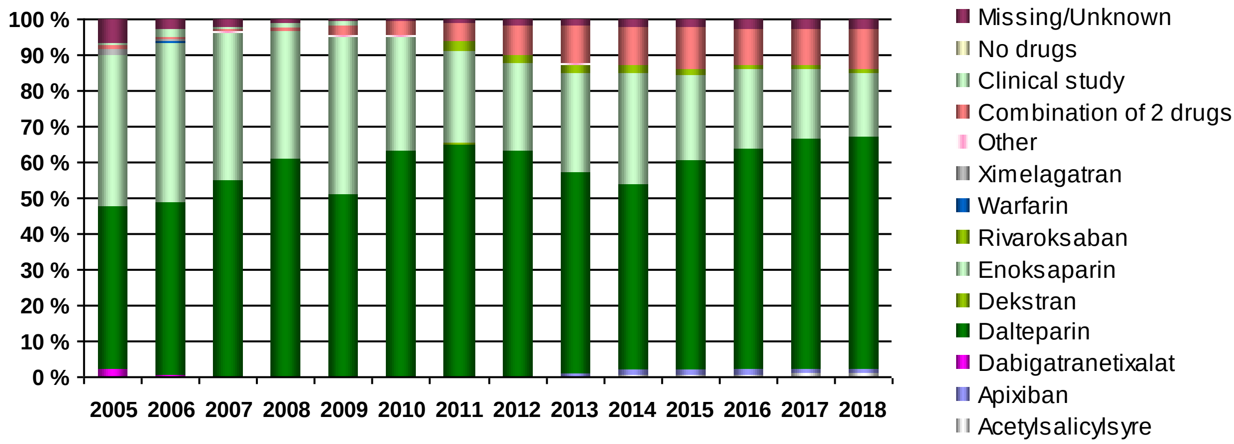


Table 33: Duration - All operations

Year	Days: 1-7	8-14	15-21	22-28	29-35	>35	No drugs	Missing	Total
2018	2138	4015	1025	175	1850	19	0	1880	11102
2017	1457	3926	1002	542	1908	25	0	1823	10683
2016	1427	3483	1114	732	2045	22	0	1642	10465
2015	1439	2882	725	943	2338	26	0	1525	9878
2014	1402	2279	578	904	2944	45	0	1306	9458
2013	1430	1408	598	1481	3231	63	0	1254	9465
2012	1163	1595	703	1496	3091	34	0	1096	9178
2011	700	1744	695	1397	3197	40	1	884	8658
2010	758	2174	636	1078	3154	44	2	746	8592
2009	880	2405	668	785	2637	37	6	906	8324
2008	837	2479	787	701	2166	124	5	871	7970
2007	847	2222	1230	388	2044	44	6	931	7712
2006	978	2096	1093	276	1738	111	0	1034	7326
2005	1036	2073	1203	363	1416	231	0	1332	7654

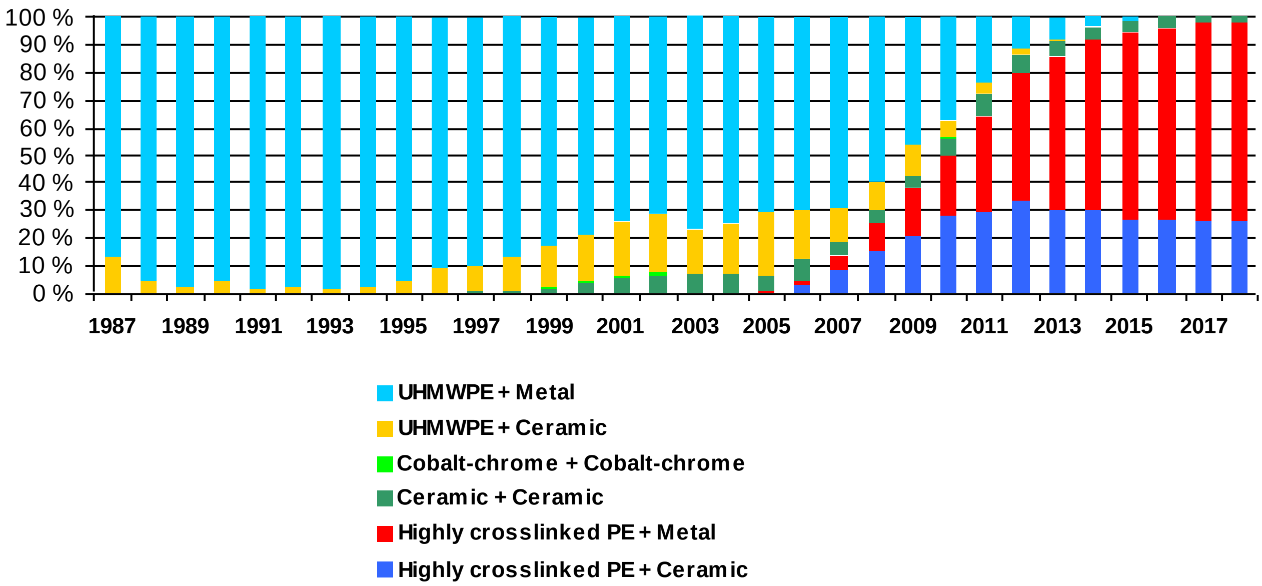
Registration of thrombosis prophylaxis started in 2005

Articulations (dual mobility was excluded)

Table 34: In primary operations - All patients

Cup + Femoral head	1987-10	2011	2012	2013	2014	2015	2016	2017	2018	Total
Highly crosslinked PE + Cobalt-chrome	3036	1885	2745	3559	4163	4780	5242	5772	6157	37339
UHMWPE + Cobalt-chrome	27919	1007	637	526	239	109	12	13	9	30471
UHMWPE + Steel	24743	622	228	88	30	5	0	0	0	25716
Highly crosslinked PE + Alumina	3929	1508	2011	1917	1772	1524	1421	860	693	15635
UHMWPE + Alumina	7837	293	146	44	8	4	2	0	0	8334
Highly crosslinked PE + Alumina/Zirconium[1]	742	512	481	427	554	634	904	1423	1678	7355
Highly crosslinked PE + Steel	440	531	642	715	703	797	683	496	427	5434
Alumina + Alumina	2858	368	246	201	108	7	0	1	0	3789
Alumina/Zirconium + Alumina/Zirconium[1]	377	146	244	225	207	342	372	203	164	2280
UHMWPE + Zirconium	1313	0	0	0	0	0	0	0	0	1313
Highly crosslinked PE + Oxinium	559	56	61	51	39	3	2	2	2	775
UHMWPE + Titanium	434	0	0	0	0	0	0	0	0	434
Cobalt-chrome + Cobalt-chrome	264	20	10	2	0	1	0	0	0	297
UHMWPE + Alumina/Zirconium[1]	258	18	0	3	1	0	0	0	0	280
UHMWPE + Oxinium	76	0	0	0	0	0	0	0	0	76
Missing	56897	225	197	136	109	62	56	78	107	57867
Other (n<50)	164	10	8	10	8	4	6	6	11	227
Total	**131846**	**7201**	**7656**	**7904**	**7941**	**8272**	**8700**	**8854**	**9248**	**197622**

Figure 17: In primary operations



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

Completeness of reporting analysis for the Hip Arthroplasty Register, 2015-2016

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
Revision (level 1)	**NFC 2***	Secondary implantation of total prosthesis in hip joint not using cement
	NFC 3*	Secondary implantation of total prosthesis in hip joint using hybrid technique
	NFC 4*	Secondary implantation of total prosthesis in hip joint using cement
	NFC 99	Other secondary prosthetic replacement in hip joint
	NFU 1*	Removal of total prosthesis from hip joint

The completeness of reporting rate for the Hip Arthroplasty Register was calculated as follows:

$$\frac{(Only\ NAR + Inclusion\ in\ both\ registers)}{(Only\ NPR + Only\ NAR + Inclusion\ in\ both\ registers)}$$

Completeness of reporting for the NPR was calculated in a similar way:

$$\frac{(Only\ NPR + Inclusion\ in\ both\ registers)}{(Only\ NAR + Only\ NPR + Inclusion\ in\ both\ registers)}$$

Primary operations. In 2015 and 2016, 17 863 primary hip replacements were reported to one or both of the registers. 97.3% of these were reported to the NAR while 95.6% 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 2015 and 2016, 3251 revisions were reported to one or both of the registers. 93.3% of these were reported to the NAR while 89.4% 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 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.

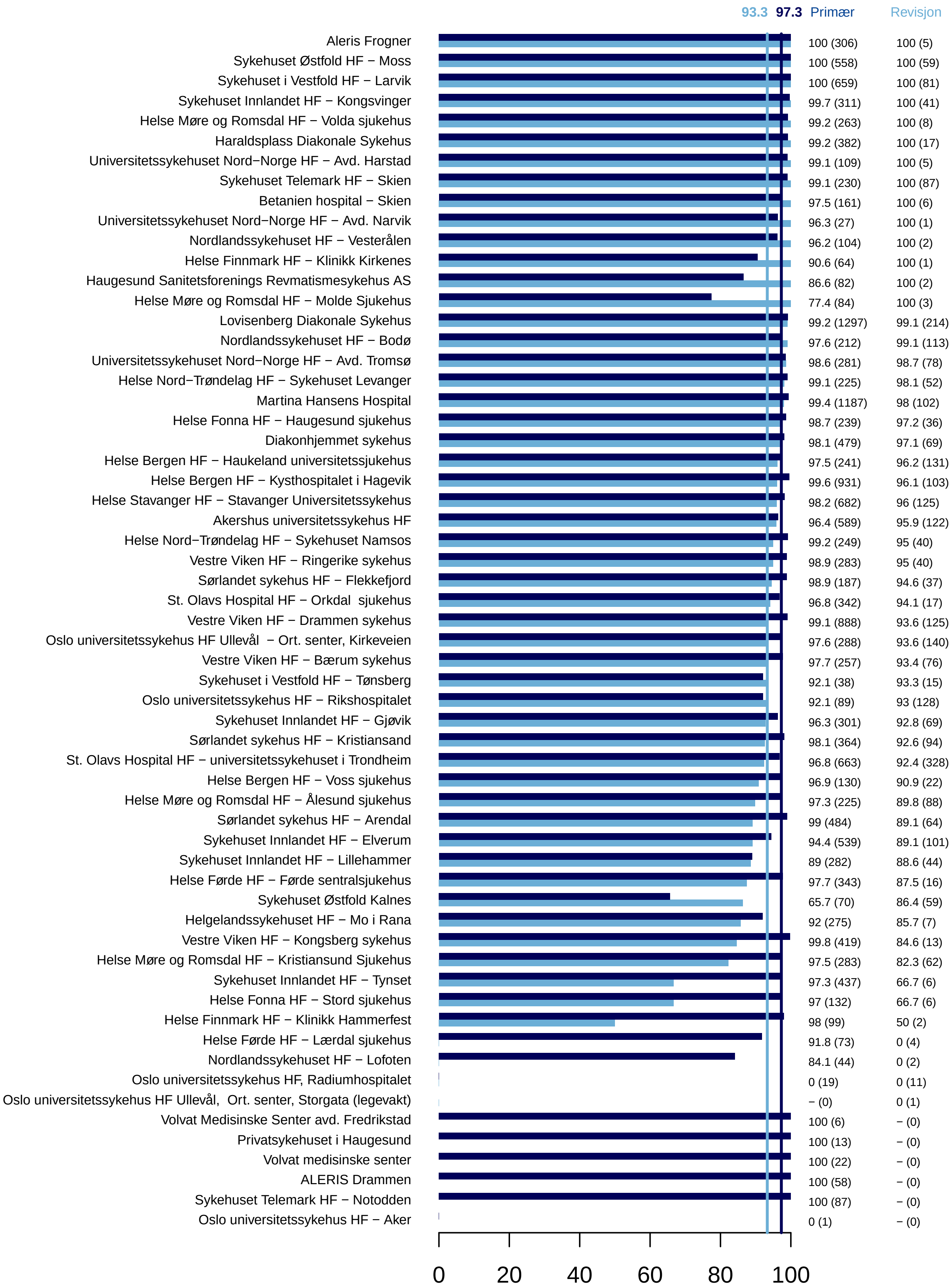
Procedure codes to be used for revision operations:

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.**

New: An investigation was carried out in 2018 which found that a number of operations had been reported twice or more to the NPR. The NPR has thus filtered their data more thoroughly resulting in a higher completeness rate than reported in earlier reports.

Completeness of reporting for primary and revision operations, hip prosthesis, 2015−2016



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

KNEE AND OTHER JOINTS REGISTER: ANNUAL REPORT 2019

In the period 1994-2018, 97 022 knee replacements, 9428 shoulder replacements and 10 416 replacements of other joints than the hip, knee and shoulder were recorded. There has been an increase of 5% in primary knee replacements since 2017. The number of unicondylar knee replacements is increasing and now makes up 14.5% of all primary knee replacements. Osteoarthritis is the dominant cause of knee arthroplasty (88%). The number of primary shoulder prostheses has increased considerably, by 17.3%, since 2017.

Changes in the reporting form. Reoperations for periprosthetic fracture without replacement of the prosthesis should now also be reported for prostheses of the knee and other joints. The use of torniquet in knee replacement surgery should be reported.

Patella components in total knee arthroplasty have increased from 104 in 2014 to 504 in 2018. This is probably due to an ongoing RCT and the results of a Norwegian RCT (Aunan et al.) showing a slightly better functional result in knee replacement with a patella component when a NexGen prosthesis was used. The NRL studies on the use of a patella component showed increased risk of infection and revision for loosening when a patella component was used (Furnes et al. 2002, Lygre et al. 2011). We also found no difference in function or pain (Lygre et al. 2010). It has also been shown that the risk of patella fracture increases with the use of a patella component. Possible slight functional improvement associated with a patellar component must be weighed against an increased risk of complications.

Infection, instability, aseptic loosening of the tibial component, axial deviation including malrotation and pain are still the most frequent *causes of revision of total knee arthroplasty*. 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 proper cementation technique. If pain is the only indication, revisions should be avoided.

QUALITY OF ARTHROPLASTY IN NORWAY

Survival curves show a gradual improvement since 1994 in results of total knee arthroplasty, when the endpoint is revision surgery. In a study based on our register data, hospitals that performed more than 100 knee arthroplasties per year had fewer reoperations than hospitals performing a lower number of such operations (Badawy et al. 2013). Unicondylar knee replacements should be concentrated at a smaller number of hospitals (Badawy et al. 2014) to reduce the risk of revision. In the period 2012-2018, results of unicondylar knee replacements were better than those of the preceding years.

In a recent study, we have shown an improvement in results in the latest ten-year period for total knee replacements (Dyrhovden et al. 2017). However, there is still room for improvement in both prosthesis design and surgical techniques.

Ankle prostheses used for osteoarthritis, sequelae fractures and ligament instability have a ten-year survival rate of around 60% (Figure C.2). This is considerably poorer than for knee and hip replacement and patients should be informed of this.
Survival curves for shoulder arthroplasty show that the youngest patients (<60 years) still have the poorest prosthesis survival. This applies to hemiprostheses, total anatomical prostheses and reverse prostheses. A study from the Nordic Arthroplasty Register Association (NARA) that includes our register data shows that particularly younger males have a high risk of revision with a reverse prosthesis, primarily due to infection (Lehtimäki 2018). A total anatomical prosthesis with a stem still has the highest survival rate and should be the first choice for osteoarthritis (Rasmussen 2018), and we also see a tendency towards improved survival of total anatomical prostheses in recent years. Reverse prosthesis surgery continues to increase, and is particularly prevalent for acute fractures and fracture sequelae (75% of acute fractures in 2018).

KNEE ARTHROPLASTY REVISIONS

There were 648 knee arthroplasty revisions reported to the Register in 2018. A new figure (B.21) shows results of all knee arthroplasty revisions, including revisions for infection. Almost 25% of knees had been re-revised after 10 years. In 2017, Tesfaye Leta completed his PhD on revisions of knee arthroplasty. The first publication (Leta T et al. 2015), showed a trend towards improved results in the most recent period (not statistically significant). Revision of the whole prosthesis yielded better results than revision of individual components. 22% of the revisions were operated again after 10 years, and half of the re-revisions took place within two years. Most early revisions are due to infection and instability (Leta T et. al 2015). Reoperations have significantly inferior results to primary operations.

In knee arthroplasty revisions involving only insertion of the patellar component due to pain, patients' quality of life improved slightly. The effect was most pronounced in those patients with the most pain before the revision. In one-third of patients, the surgery had no effect (Leta T et al. 2015).

No differences were found in pain, quality of life, functioning or prosthetic survival between total and unicondylar revisions (Leta T et al. 2016). Total arthroplasty revision was technically more challenging than revision of unicondylar knee prostheses to total knee arthroplasty, using more bone packing and stems, and with a higher infection rate.

We find that the use of a stem is often not checked on the reporting form. When a stem is used, it must be indicated 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.

COVERAGE ANALYSIS

In this report, we show coverage rates for primary operations and revisions for 2015-2016. The figures have been updated since last year's report. The national average is good for primary knee arthroplasties (97.1%), which is an improvement on the figure of 95.3% for 2013-2014. For revisions, the coverage rate was 91.1%, compared to 89.0% in 2013-2014. We are pleased to note these improved figures. Some hospitals have low reporting of revisions. This may result in too positive revision 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% coverage of revisions. Please note that hand, finger, back and toe arthroplasty must also be reported; these operations have a lower reporting rate than the other joints. Next year, we will conduct new coverage analyses for 2017 and 2018. We encourage hospitals to review their reporting procedures if their coverage is low.

HOSPITAL RESULTS

We present some hospital results. Proportion of non-revised total knee arthroplasties after two and ten years for standard patients in 2007-2018. Standard patients are 55-85 years old, ASA class 1-2, with primary osteoarthritis. We also present funnel plots for the proportion of standard patients operated in 2008-2018 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.

KNEE PROSTHESIS RESULTS

We present three- and ten-year durability for the most commonly used knee prostheses in Norway (more than 500 prostheses in use). None of those used today have poor results, but some prosthesis combinations lack ten-year results from Norway. We are currently conducting analyses to demonstrate the degree to which hospitals use well-documented prostheses.

SHOULDER ARTHROPLASTY

There is considerable activity in our collaboration with NARA. Data from the Finnish Register have been included in the common dataset, which now contains data on 35 253 primary shoulder arthroplasties and 2004 revisions from 2004 to 2016. In 2018, this work resulted in two articles, one showing that for osteoarthritis, total anatomical prostheses had a higher survival rate than hemiprostheses (Rasmussen et al. 2018), while the second article focuses on risk and causes of revision in reverse shoulder arthroplasty (Lehtimäki et al. 2018). Much work has been done to harmonise recording procedures in the Nordic countries, and there will soon be updates for recording in Norway to ensure that we collect the same data as our partners in NARA. Several new articles are in preparation; the topics include arthroplasty for fracture sequelae, infections in reverse shoulder arthroplasty and the risk of revision of stemless prostheses.

We have an exciting time ahead of us. A final draft of the electronic recording procedure is complete, and we are planning to run a pilot scheme soon after the summer break. We hope that nationwide electronic recording of shoulder arthroplasty will commence in autumn 2019. The new recording procedure implies that surgeons will need to record more variables than previously, since recording of shoulder arthroplasty has not been well adapted to the particular features of the shoulder. We hope that shoulder surgeons around the country will see the value of a more detailed, shoulder-adapted method of recording, and will support us in this.

ELBOW ARTHROPLASTY

The number of total elbow replacements has never been lower than in 2018, but a few hemiprostheses have been inserted. However, the total number of elbow arthroplasties is still decreasing. A hemiprosthesis is used instead of a total prosthesis in supracondylar humerus fractures.
The humeral component was fixed with cement in all patients except one, while the ulnar component was fixed with cement in fewer than half. In the past four years, Nexel has been most used, providing relatively short follow-up information.
The number of revisions of elbow arthroplasty has decreased somewhat.

Use of the radial head prosthesis has increased steadily over the past 10 years, and a record number of these prostheses was recorded in 2017 and 2018. This type is predominantly used for acute fractures.

FINGER AND HAND ARTHROPLASTY

The number of finger prostheses inserted is still declining and 40% of the operations were revisions.

The wrist (radiocarpal) prosthesis is still seldom used and only three primary operations were recorded in 2018, all of which were Motec Wrist. This is a decrease from recent years. In distal radioulnar joints, the use of a prosthesis has increased the last two years, with 14 inserted in 2017 and 10 in 2018.

The use of a carpal (CMC I) prosthesis increased somewhat in 2017 (13 primary prostheses), following the lowest number ever in 2016 (5 primary prostheses). In 2018, the figure decreased again to 8.

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.

Lehtimäki et al. (2018) showed that the risk of revision after reverse shoulder arthroplasty for cuff tear arthroplasty is low (5%), while the most common cause of early revision is infection. There is a significantly higher risk of revision in male patients. It is important to provide this information to patients when planning reverse shoulder arthroplasty.

Rasmussen et al. (2018) have explored the use of hemi and total arthroplasty for osteoarthritis of the shoulder. The most important finding was that total arthroplasty has a significantly better survival rate. Younger patients (<60 years) have poorer prosthesis survival than older patients, regardless of prosthesis type, and treatment of young patients with osteoarthritis remains a challenge.

Krukhaug et al. (2018) showed that 5, 10, 15 and 20 year results of elbow prostheses were 92%, 81%, 71% and 61%. These are relatively good results, but not as good as for hip and knee replacement. Risk factors for revision were trauma sequelae and uncemented ulnar component.

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

Bergen, June 2019

Ove Furnes
Chief Physician/Professor
Knee Surgery

Anne Marie Fenstad
Biostatistician/Researcher

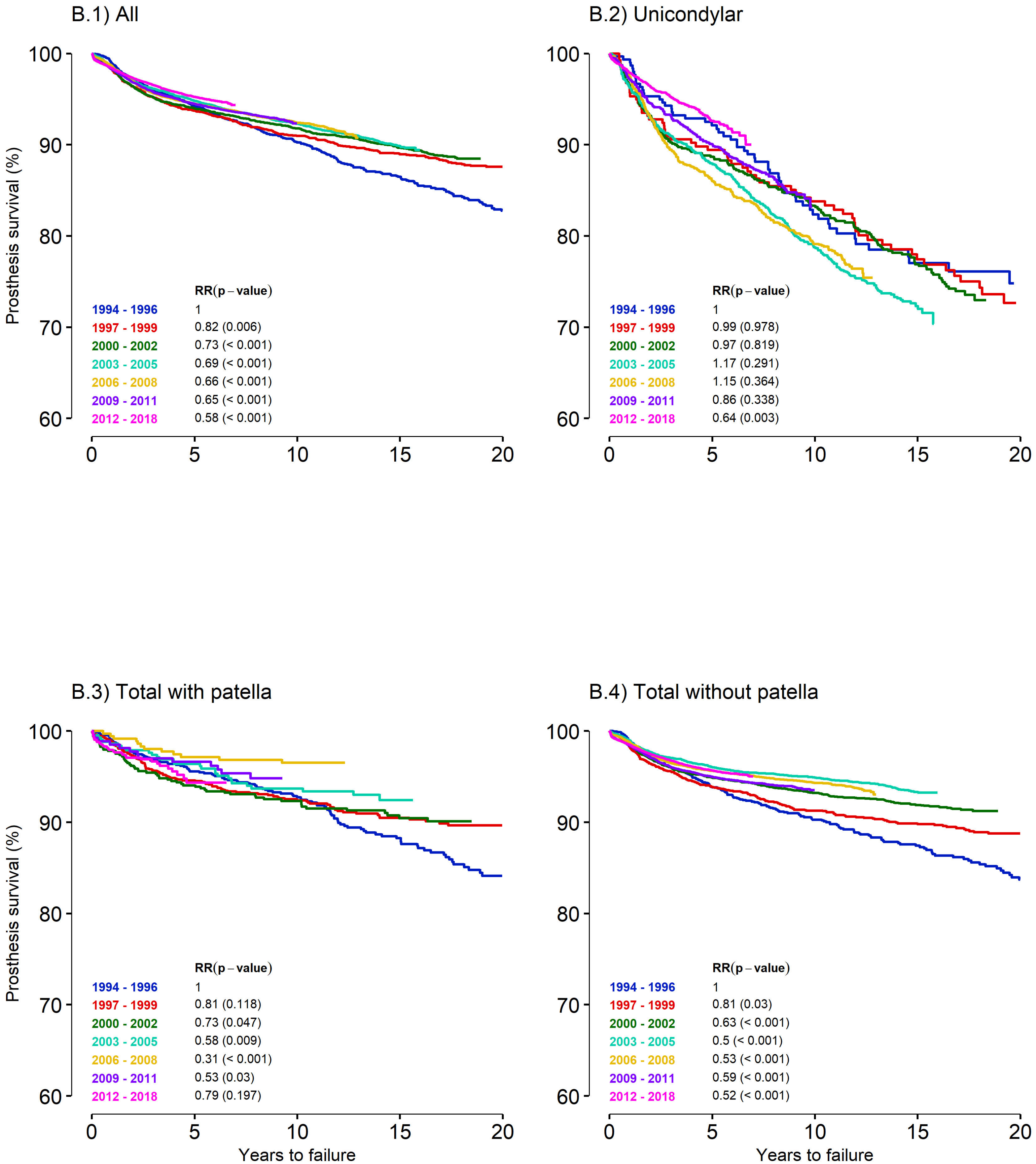
Yngvar Krukhaug
Chief Physician
Hand and Finger Surgery

Irina A Kvinnesland
IT Consultant

Gard Kroken
Biostatistician/Researcher

Randi Hole
Chief Physician
Shoulder Surgery

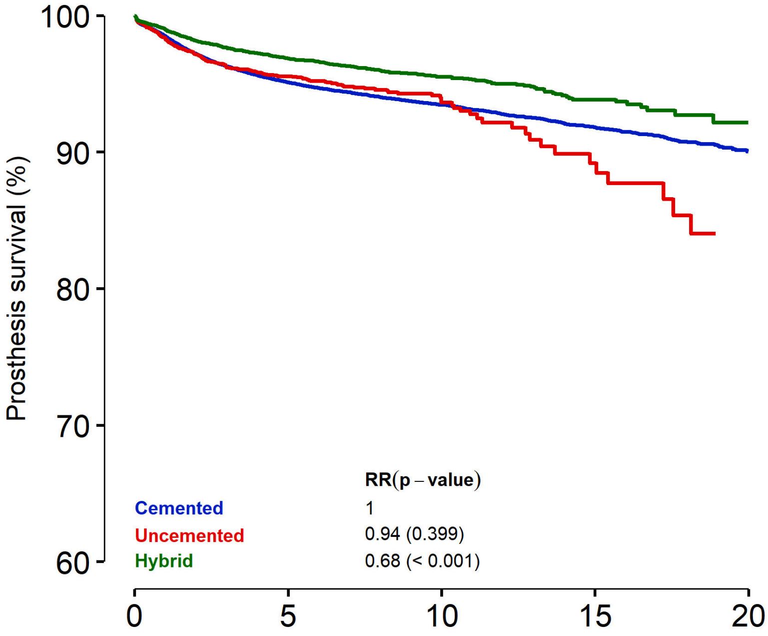
Survival curves for knee prosthesis
1994-2018



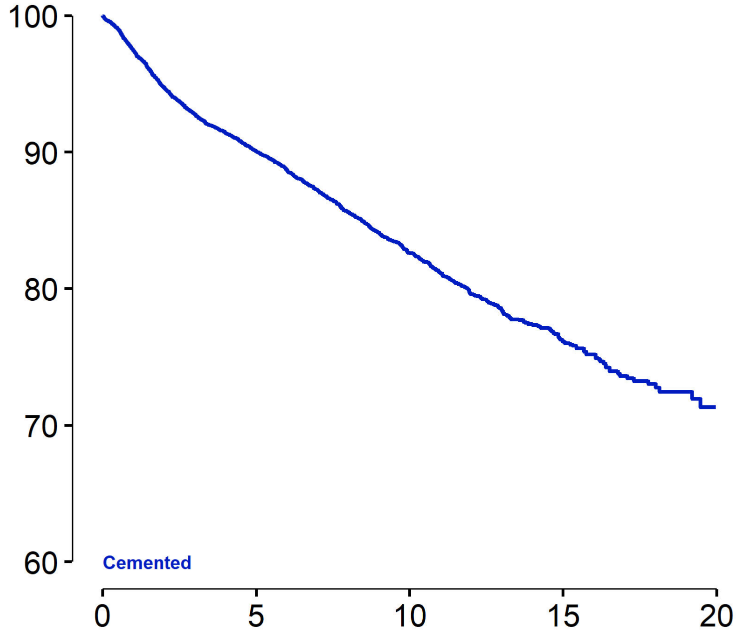
Kaplan-Meier survival curves. Survival estimate is given as long as > 50 prostheses are at risk.
Risk ratio (RR) estimates adjusted for age, sex and diagnosis.

Survival curves for knee prosthesis - Fixation
1994 - 2018

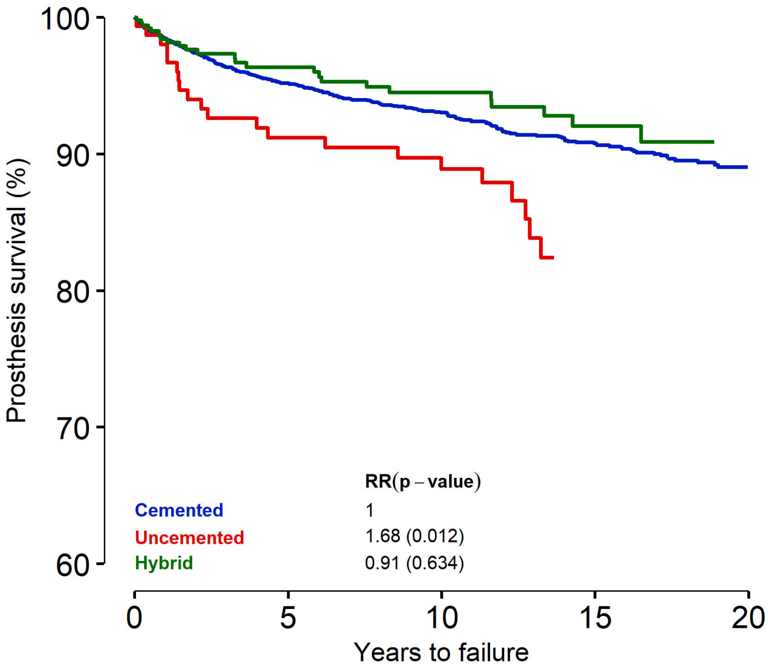
B.5) Total prosthesis



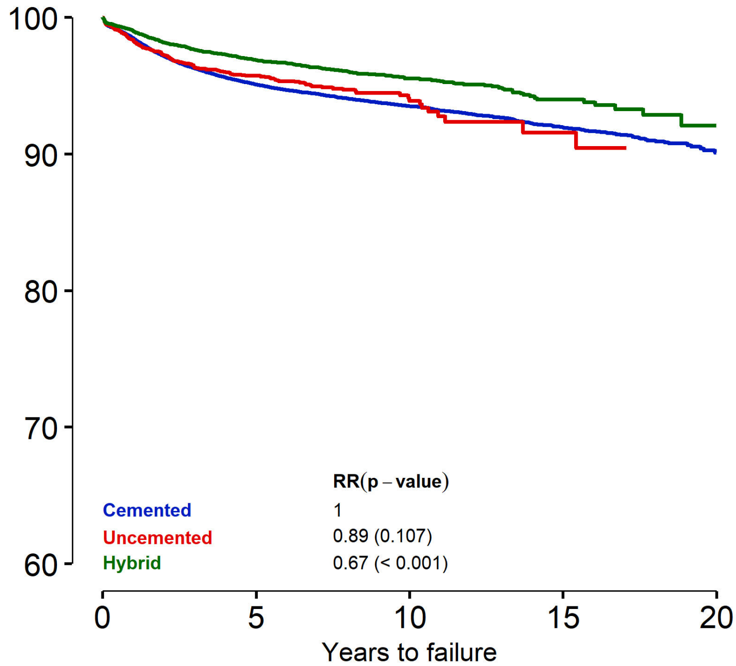
B.6) Unicondylar



B.7) Total with patella



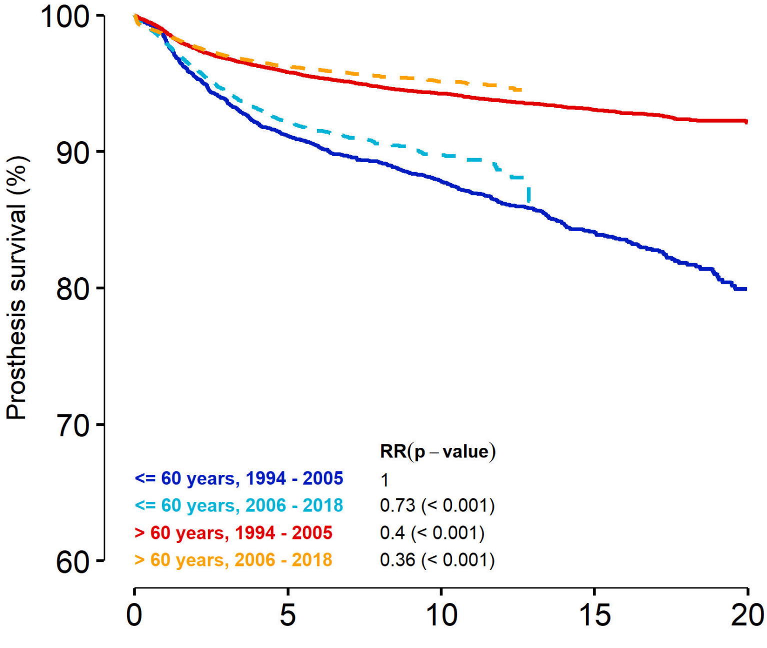
B.8) Total without patella



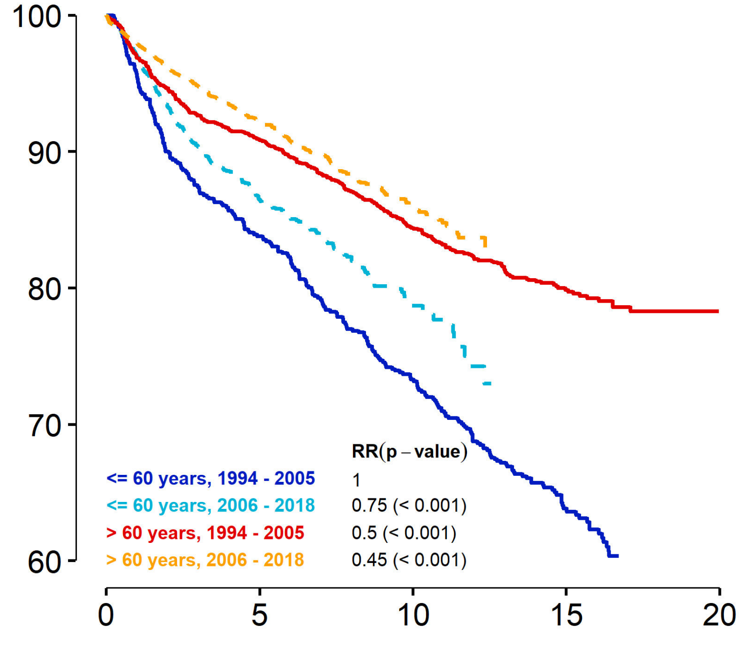
Kaplan-Meier survival curves. Survival estimate is given as long as > 50 prostheses are at risk.
Risk ratio (RR) estimates adjusted for age, sex and diagnosis.

Survival curves for knee prosthesis - Age
1994 - 2018

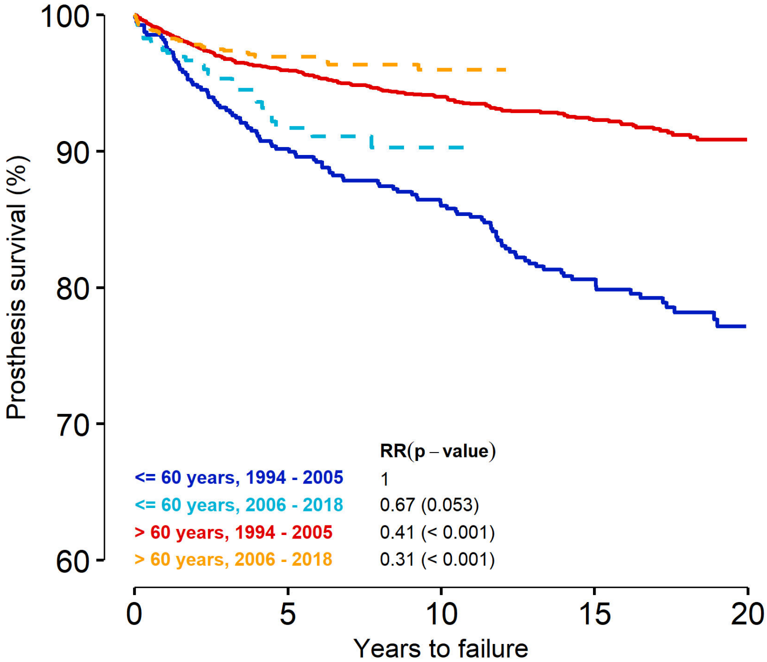
B.9) Total prosthesis



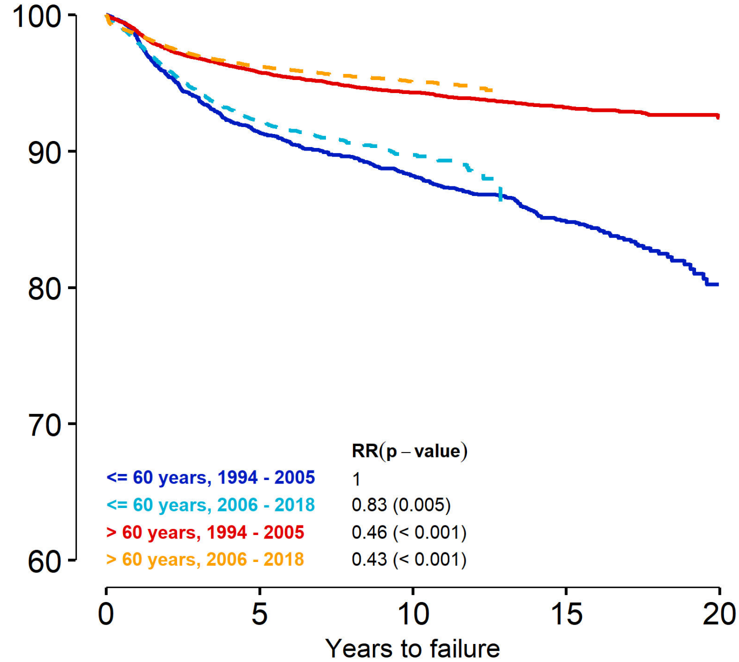
B.10) Unicondylar



B.11) Total with patella

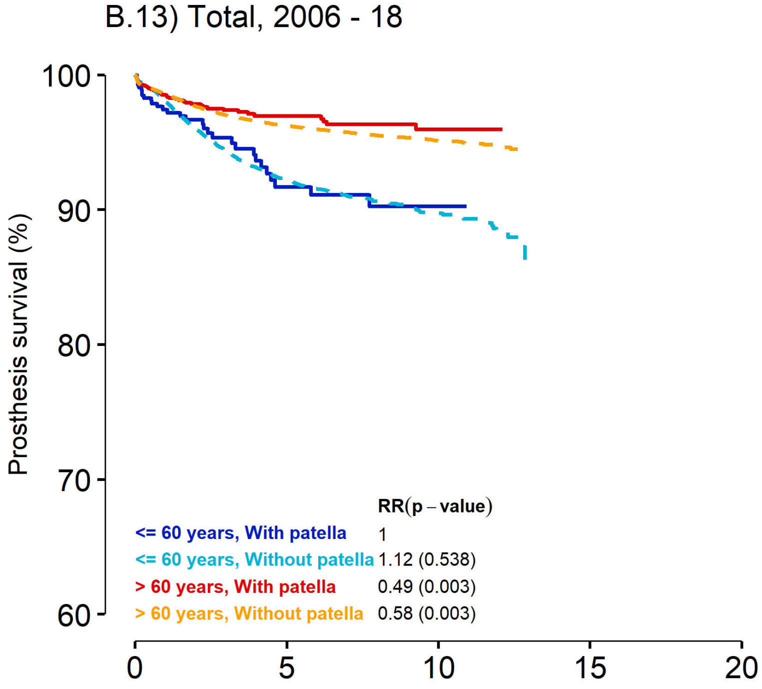


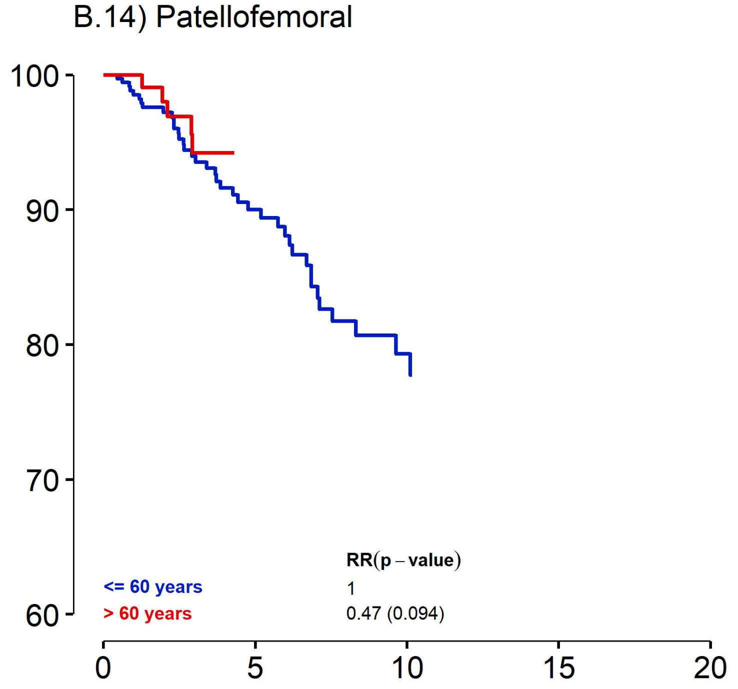
B.12) Total without patella

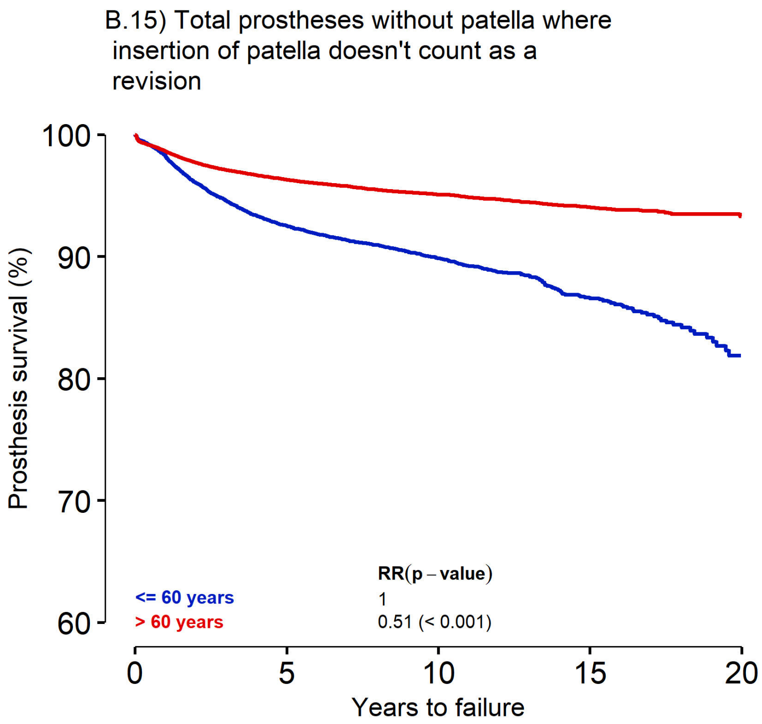


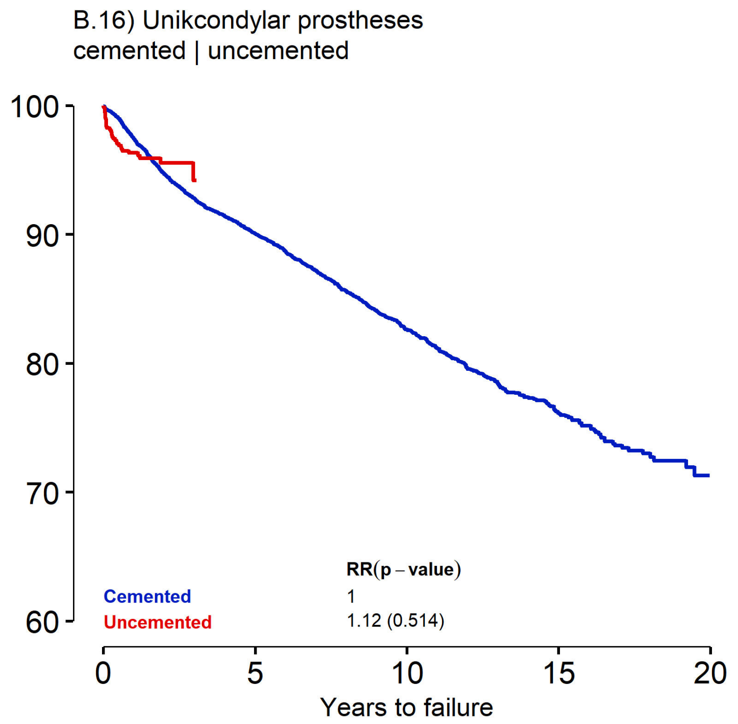
Kaplan-Meier survival curves. Survival estimate is given as long as > 50 prostheses are at risk.
Risk ratio (RR) estimates adjusted for age, sex and diagnosis.

Survival curves for knee prostheses
1994 - 2018





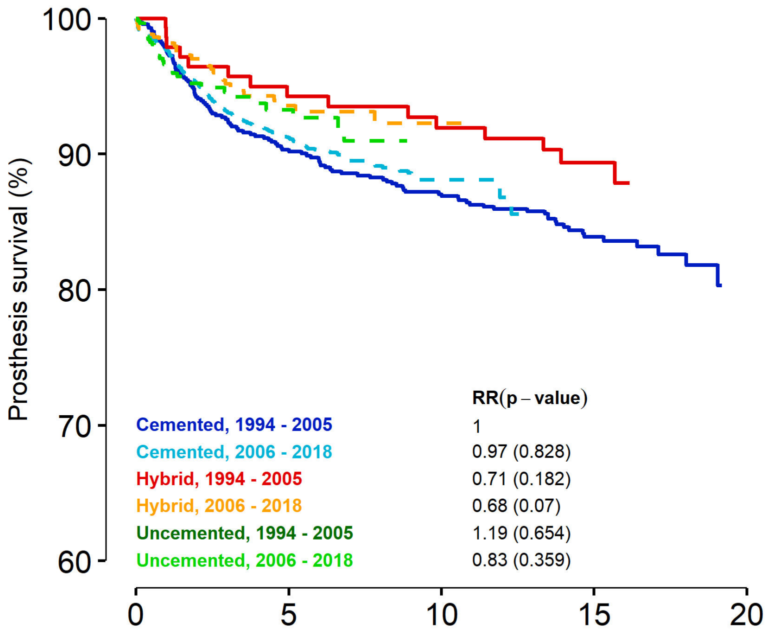




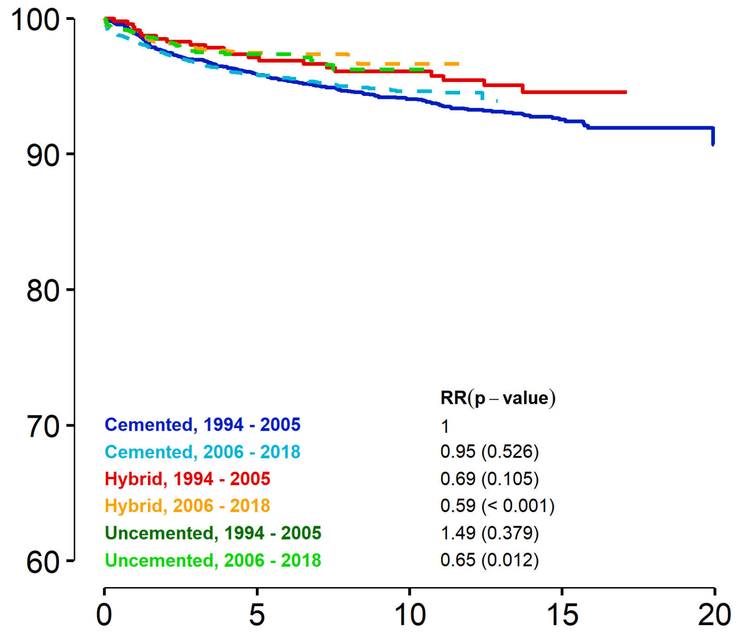
Kaplan-Meier survival curves. Survival estimate is given as long as > 50 prostheses are at risk.
Risk ratio (RR) estimates adjusted for age, sex and diagnosis.

Survival curves for total prostheses in knee without patella
1994 - 2018

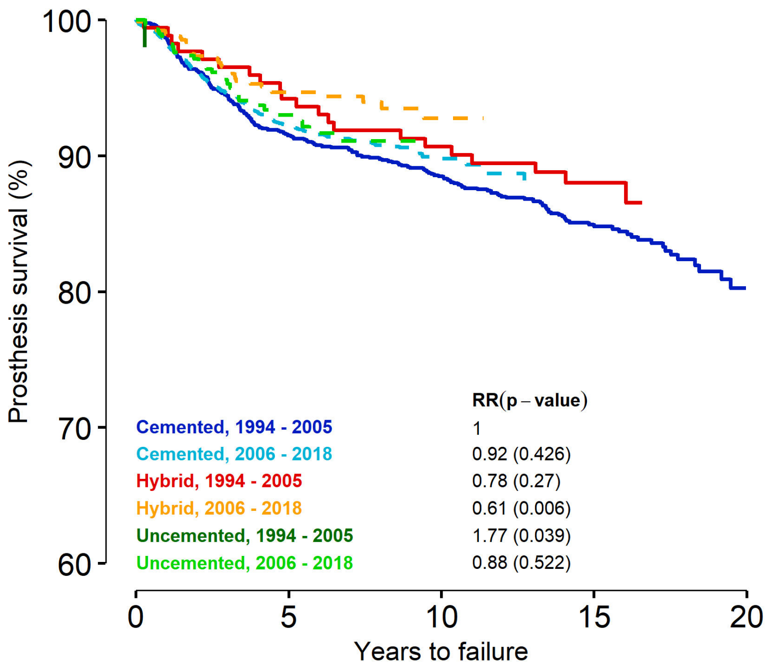
B.17) Men, under 60 years



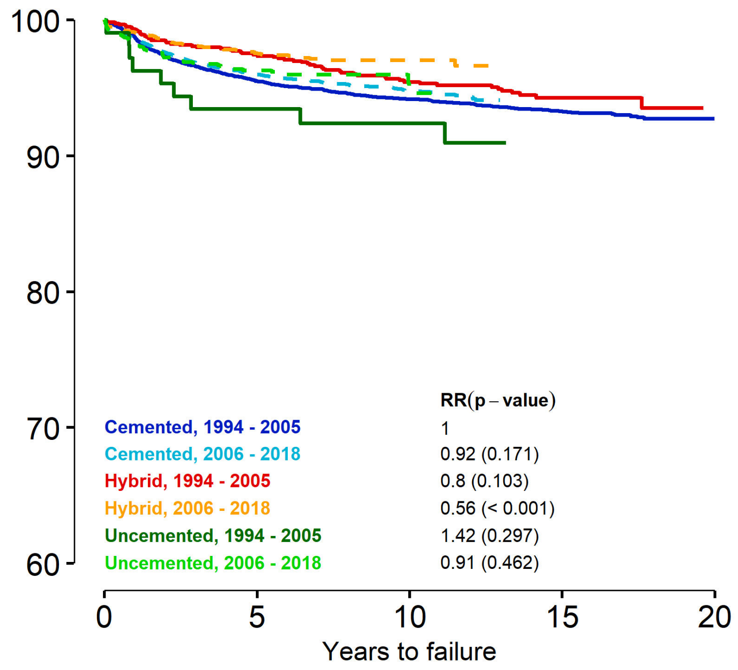
B.18) Men, over 60 years



B.19) Women, under 60 years



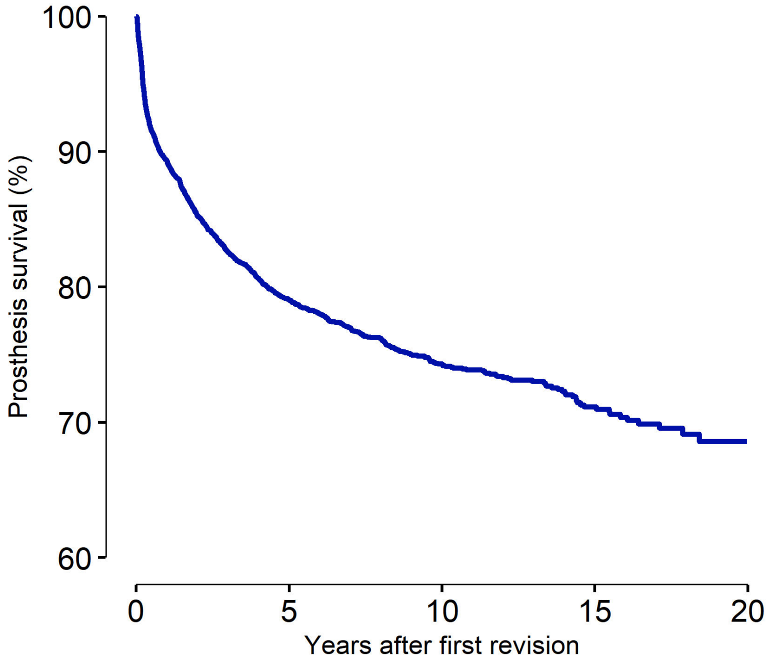
B.20) Women, over 60 years



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.

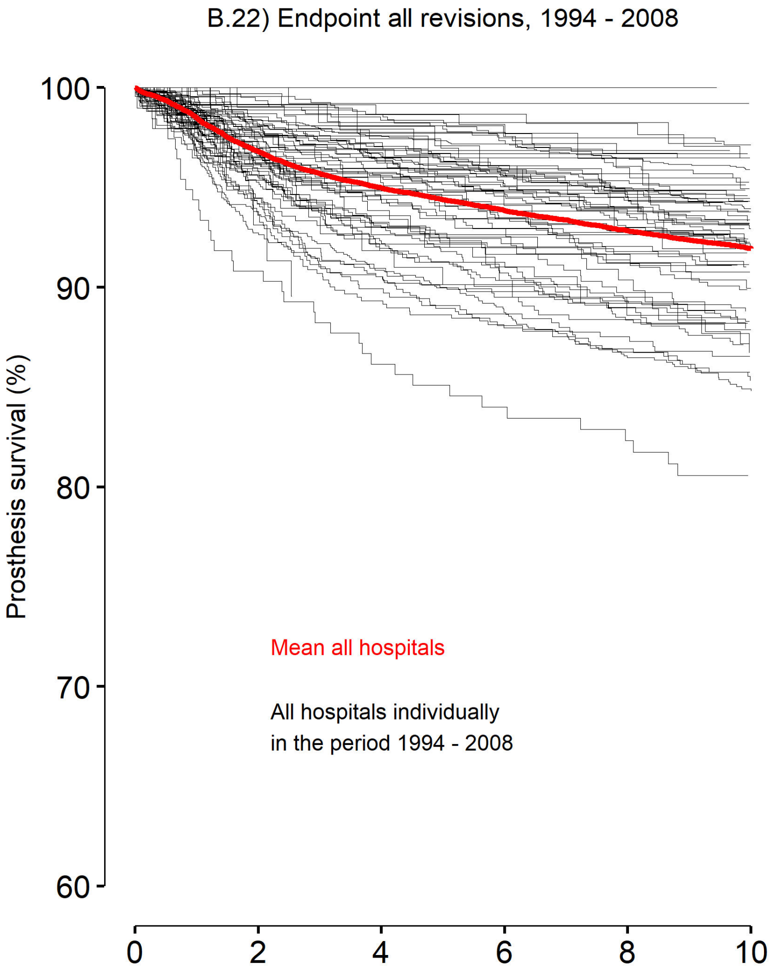
Survival curves for revisions of knee prostheses
1994 - 2018

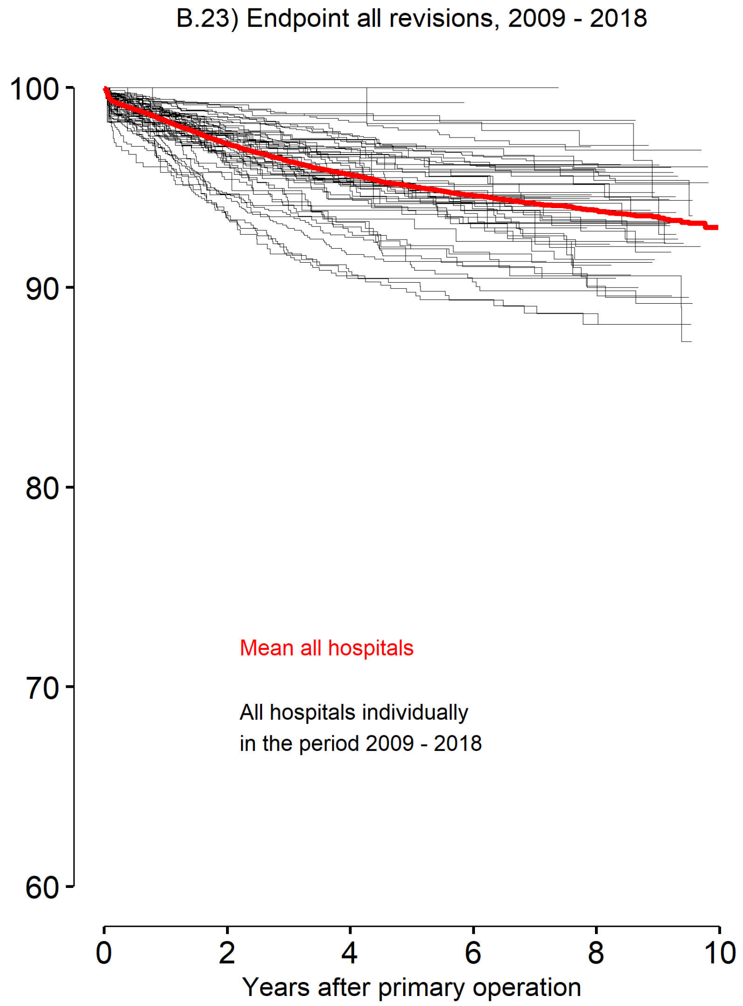
B.21) Alle

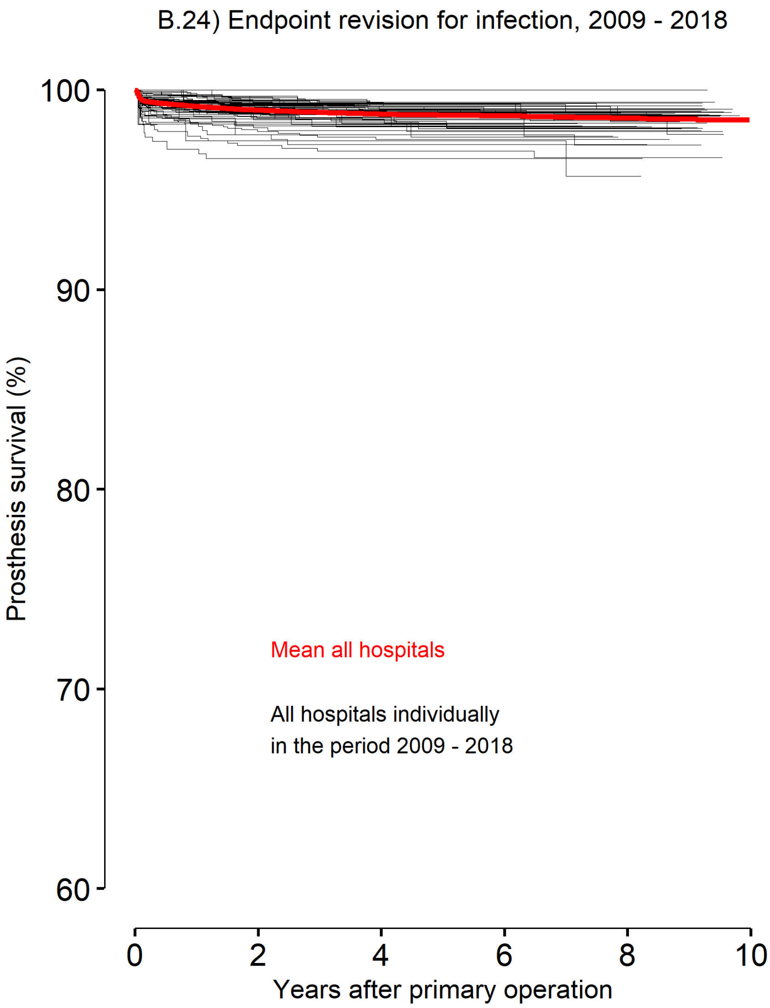


Kaplan-Meier survival curves. Survival estimate is given as long as > 50 prostheses are at risk.
Risk ratio (RR) estimates adjusted for age, sex and diagnosis.

Survival curves for total and unicondylar kneeprostheses





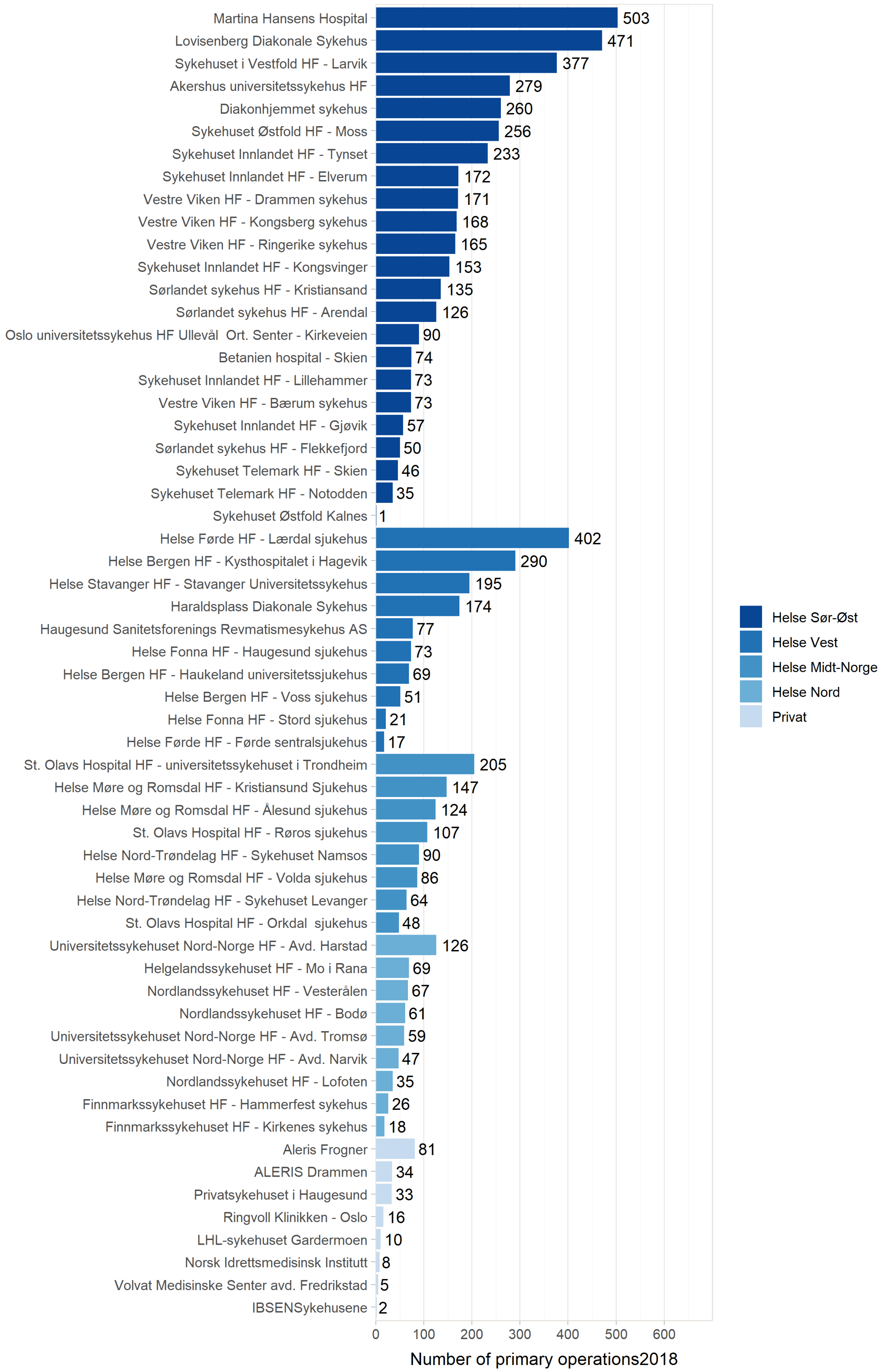


One stage bilateral knee prosthesis operations

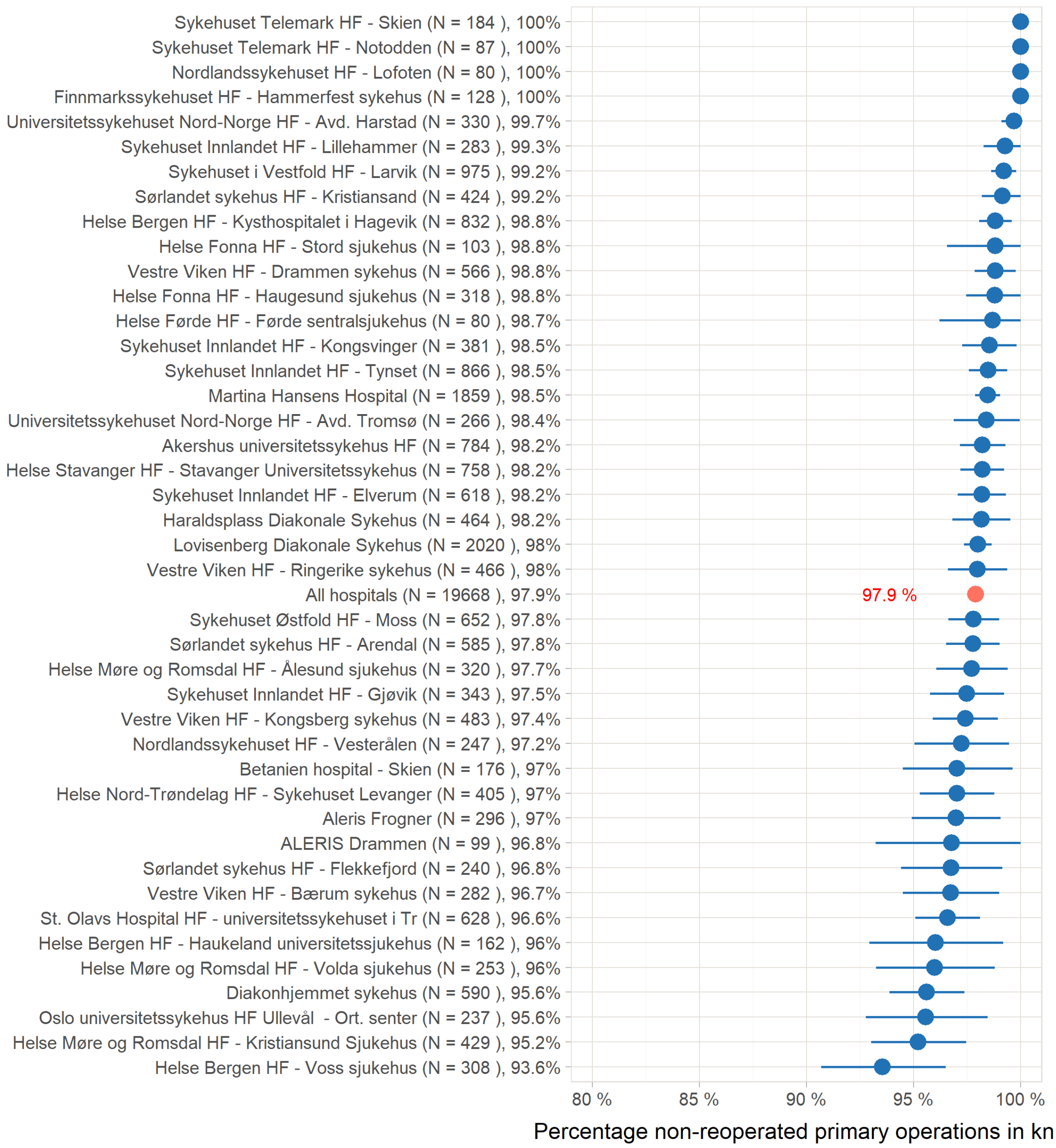
Year	1994-2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Sum:
Number of patients	42	6	3	8	8	8	6	21	21	42	49	79	74	74	441

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

FIGUR B.25: Number of primary operations in knee, 2018

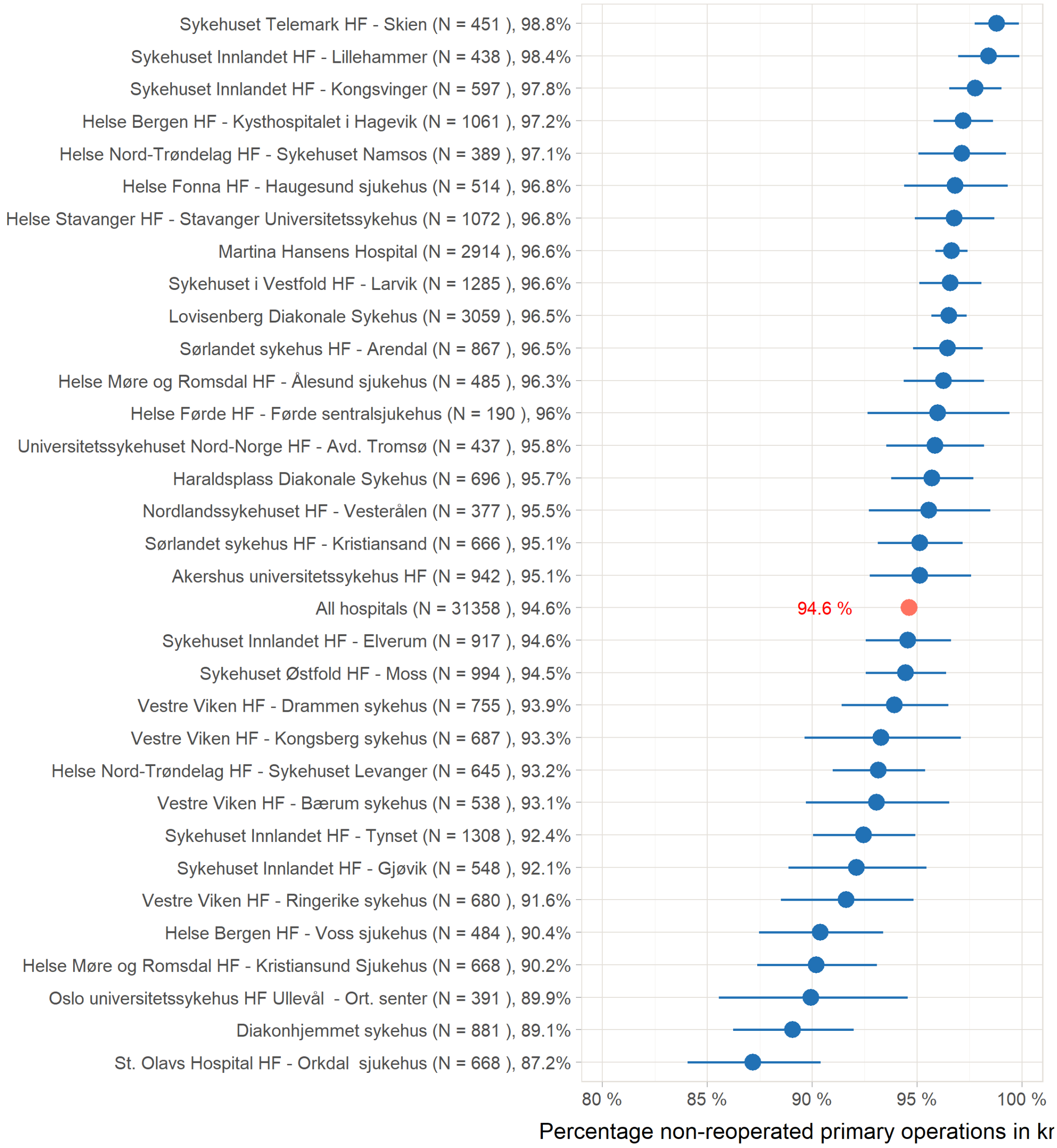


FIGUR B.26: Percentage non-revised standard patients two years after operations in 2012-2018



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 2012 to 2018. Only hospitals with operations in 2018 and with more than 50 operations from 2012 to 2018 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 2012 to 2016 are included.

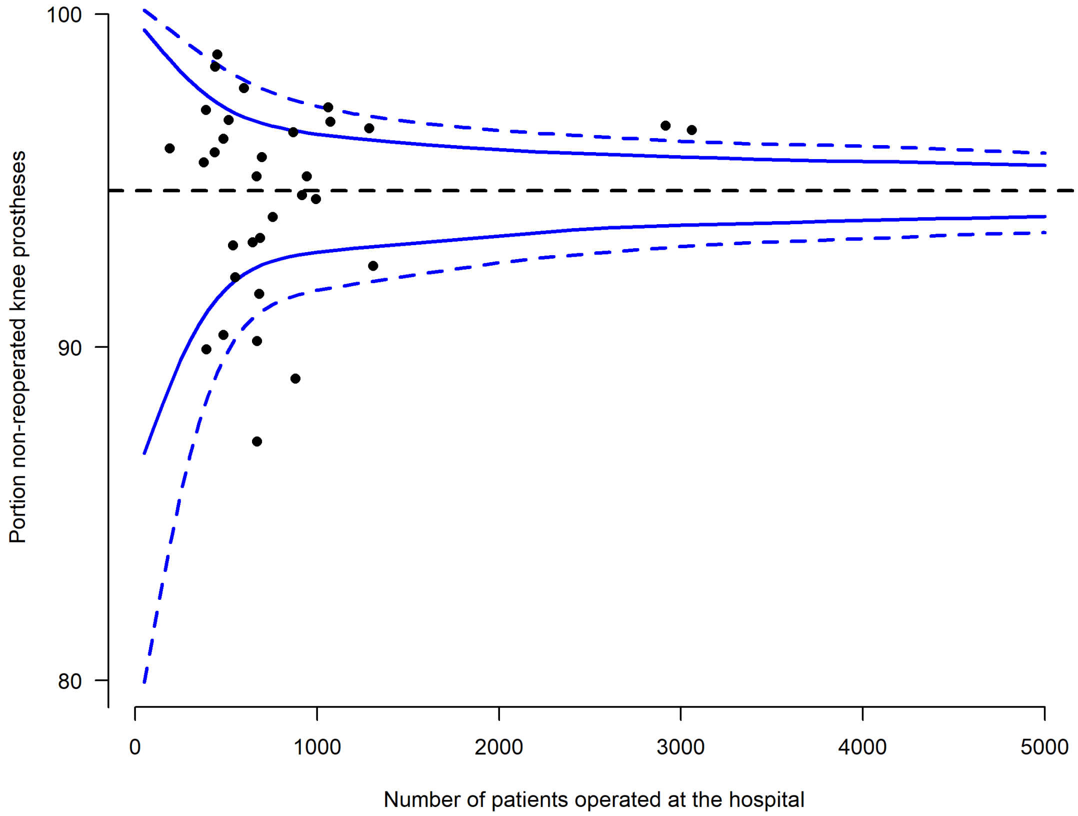
FIGUR B.27: Percentage non-revised standard patients ten years after operations in 2007-2018



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 2007 to 2018. Only hospitals with operations in 2018 and with more than 50 operations from 2007 to 2018 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 2008 to 2016 are included.

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

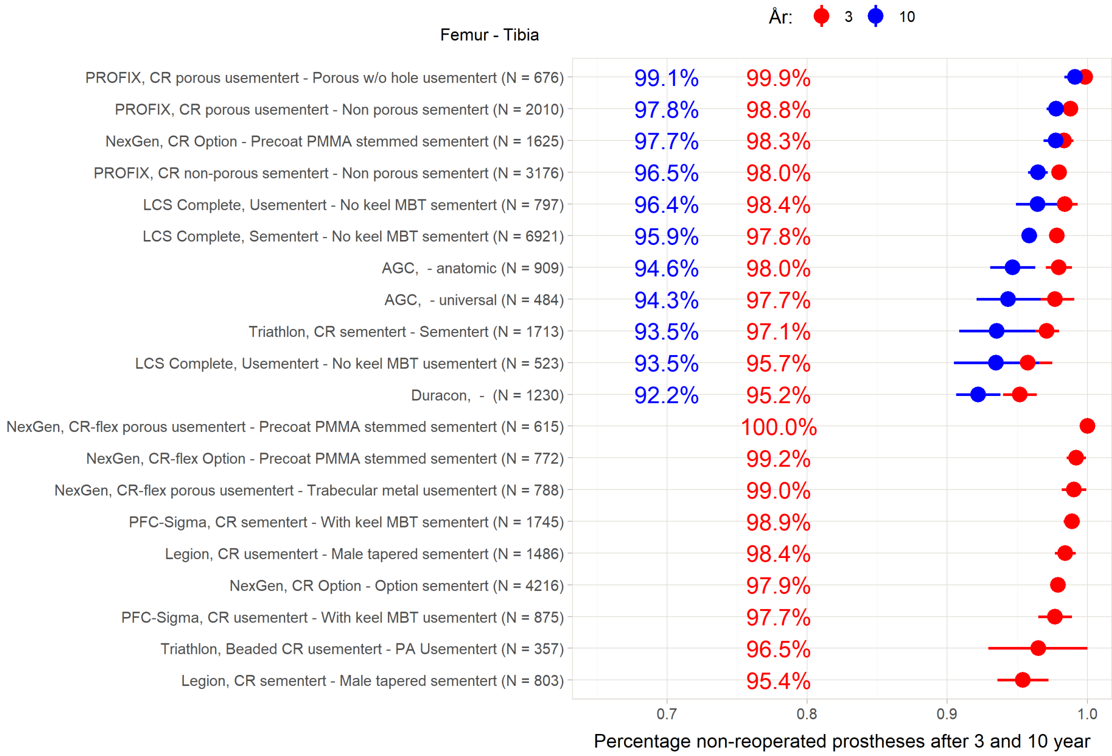
FIGUR B.28: Funnel plot, percentage non-revised standard patients ten years after operations in 2007-2018



Each point shows the percentage non-revised prostheses after 10 years for standard patients operated from 2007 to 2018 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 2018. 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.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 B.28. 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.

FIGUR B.29: Percentage non-reoperated total prostheses in knee after 3 and 10 years, 2007-2018.



FIGUR B.30: Percentage non-reoperated uni prostheses in knee after 3 and 10 years, 2007-2018.

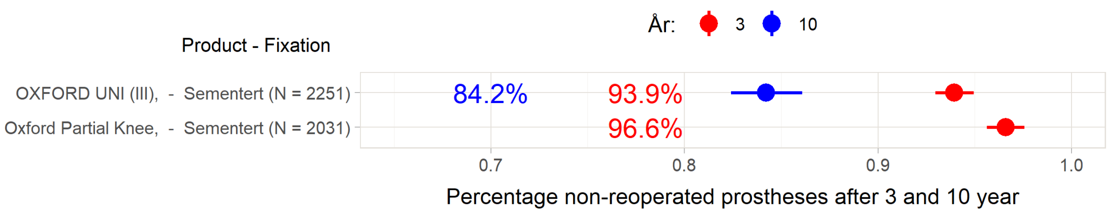


Figure B.29 and B.30 shows the estimated Kaplan-Meier percentage at three and ten years for different combinations of knee prostheses. We have only included combinations used in 500 or more operations in 2007-2018. A further requirement for inclusion in the figure is that there must still be at least 50 examples of the combination at three and ten years respectively. Only standard patients from 2007 to 2018 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 knee prosthesis is no longer in use (Gøthesen Ø 2013)

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

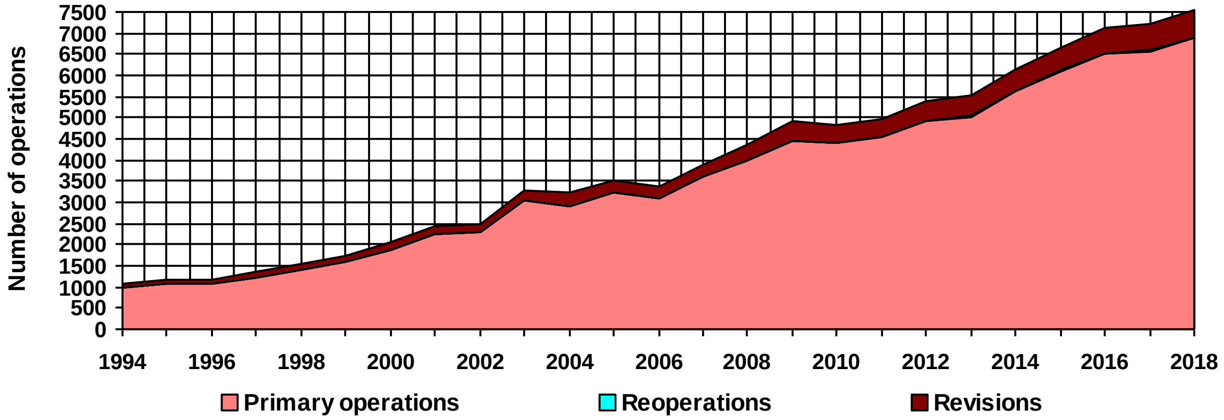
KNEE PROSTHESES

Table 1: Annual numbers of operations

Year	Primary operations		Reoperations *		Revisions		Total
2018	6 905	(91,3%)	14	(0,19%)	648	(8,6%)	**7 567**
2017	6 575	(91,2%)	15	(0,21%)	616	(8,5%)	**7 206**
2016	6 514	(91,5%)	16	(0,22%)	588	(8,3%)	**7 118**
2015	6 112	(91,7%)	8	(0,12%)	548	(8,2%)	**6 668**
2014	5 634	(91,9%)	7	(0,11%)	491	(8,0%)	**6 132**
2013	5 035	(91,3%)	5	(0,09%)	477	(8,6%)	**5 517**
2012	4 917	(90,9%)	7	(0,13%)	486	(9,0%)	**5 410**
2011	4 548	(91,3%)	2	(0,04%)	429	(8,6%)	**4 979**
2010	4 400	(91,5%)			411	(8,5%)	**4 811**
2009	4 473	(91,1%)			438	(8,9%)	**4 911**
2008	3 996	(91,6%)			367	(8,4%)	**4 363**
2007	3 588	(92,3%)			301	(7,7%)	**3 889**
2006	3 109	(92,1%)			267	(7,9%)	**3 376**
2005	3 255	(92,8%)			251	(7,2%)	**3 506**
2004	2 907	(90,2%)			317	(9,8%)	**3 224**
2003	3 037	(92,4%)			250	(7,6%)	**3 287**
1994-02	13 796	(91,6%)			1 262	(8,4%)	**15 058**
Total	**88 801**	**(91,5%)**	**74**	**(0,08%)**	**8 147**	**(8,4%)**	**97 022**

* 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



53,3 % of all operations were performed on the right side.   62,5 % performed in women.

Mean age at primary surgery was 68,5 years, 69,1 years for women and 67,5 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 68,2 years in 2018, 68,4 years for women and 67,9 years for men.

Figure 2: Incidence of primary knee prostheses

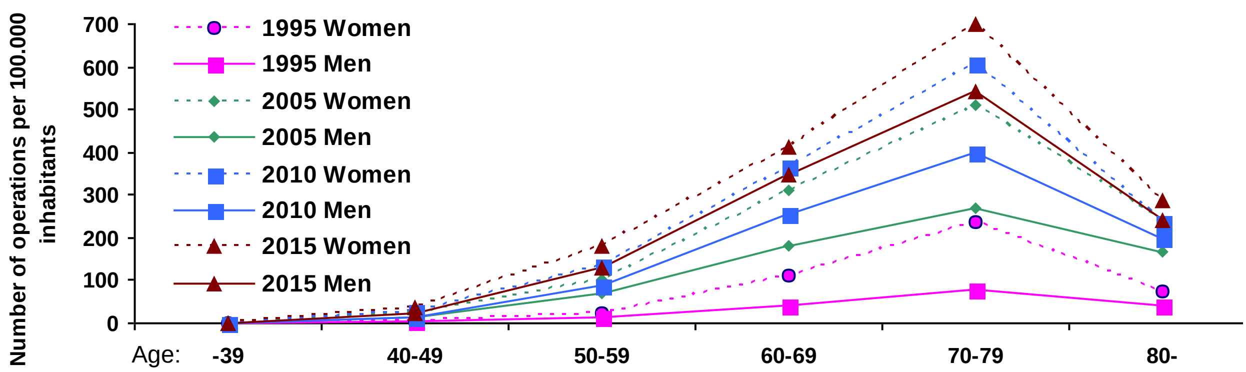


Figure 3: Age at the insertion of primary total knee prostheses

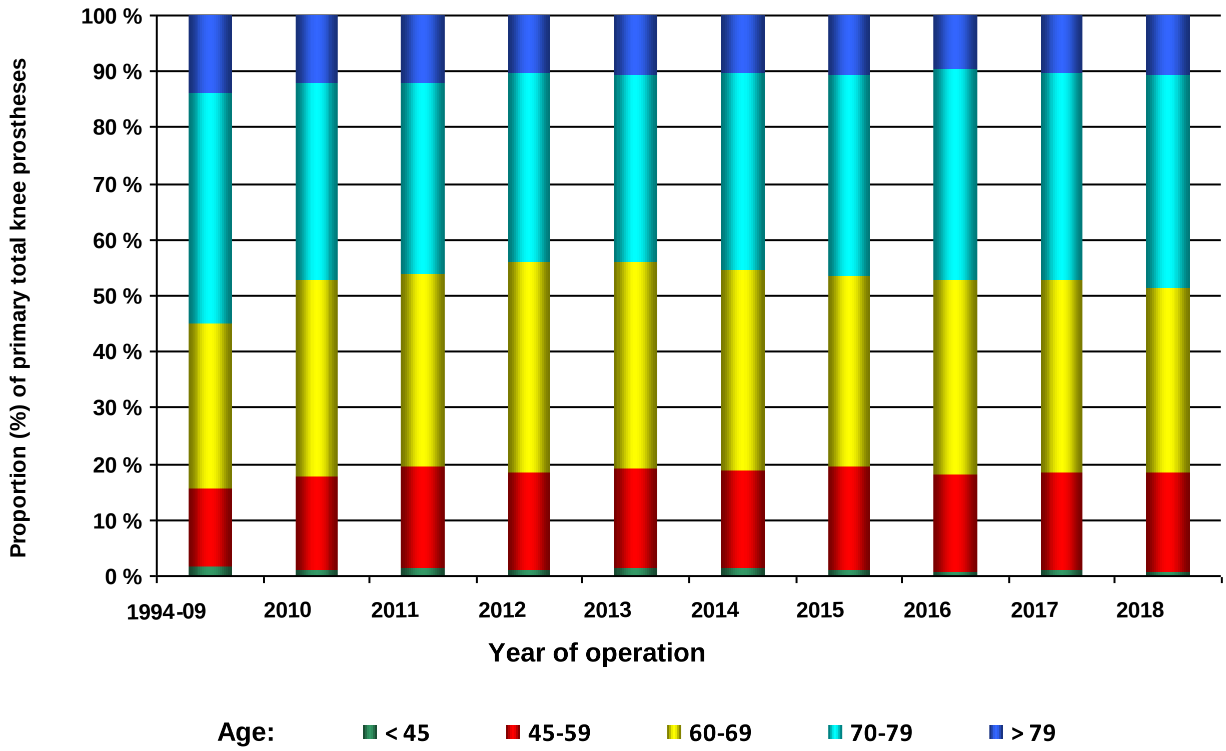


Figure 4: Age at the insertion of primary unicondylar knee prostheses

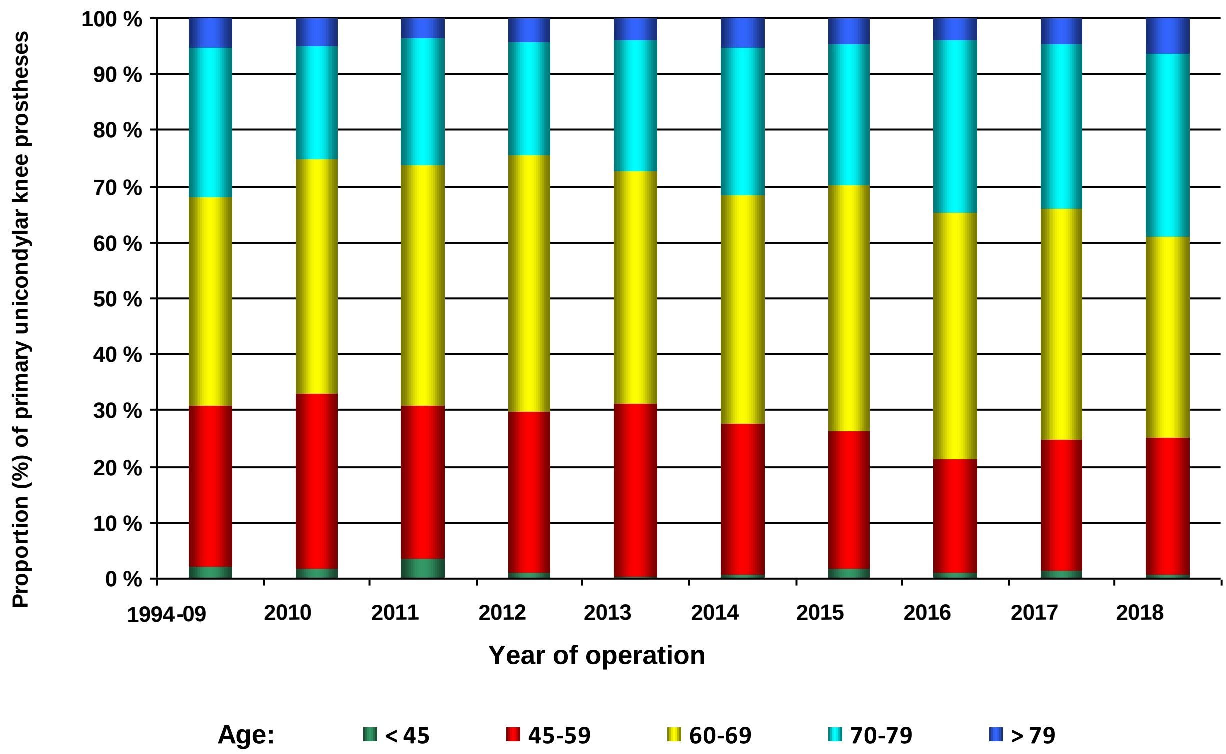


Figure 5: Age and sex at the insertion of primary total knee prostheses

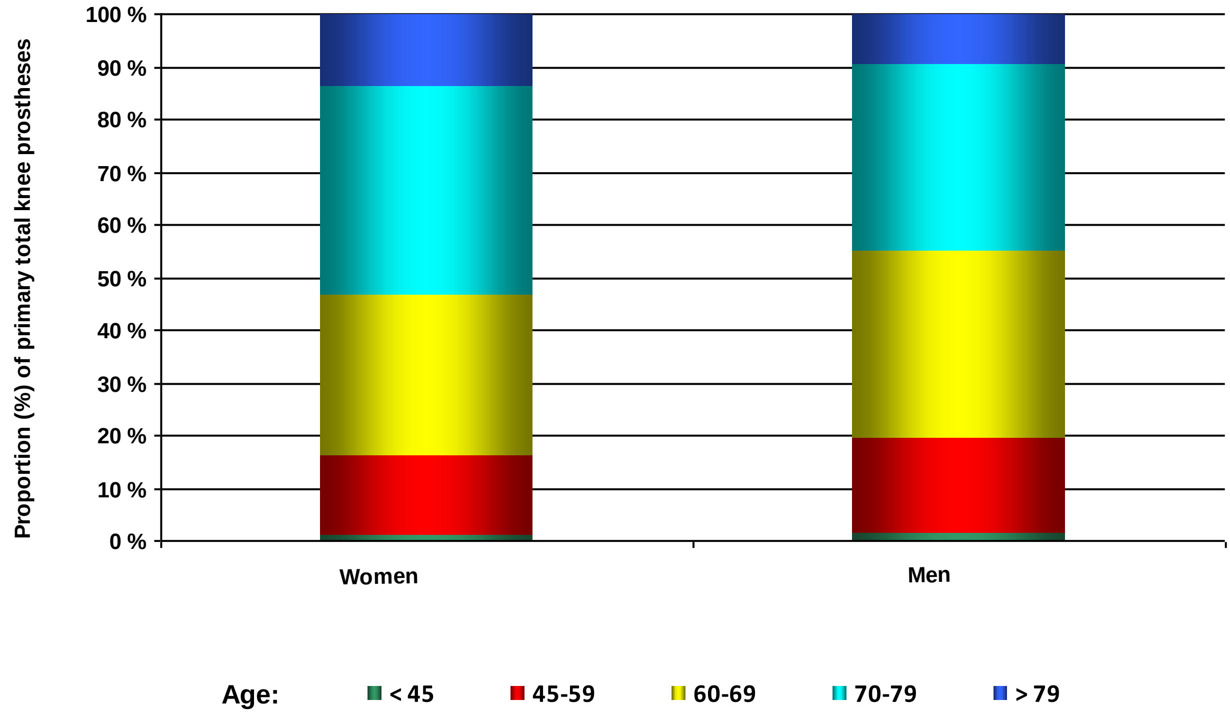
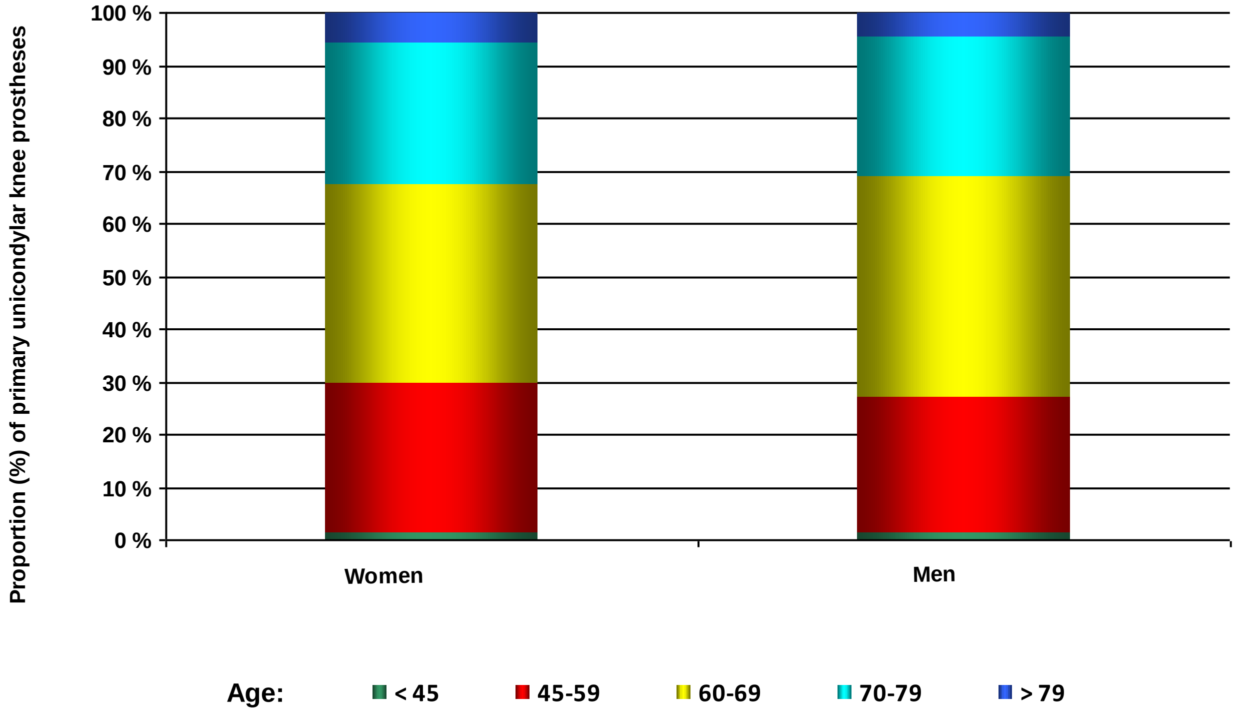


Figure 6: Age and sex at the insertion of primary unicondylar knee prostheses



Types of knee prostheses

Table 2: Primary operations

Year	Total with patella	Total without patella	Unicondylar	Patello-femoral	Bicompart-mental	Hinged * prostheses	Missing	Total
2018	504 (7,3%)	5 311 (76,9%)	999 (14,5%)	58 (0,8%)		31 (0,4%)		**6 905**
2017	450 (6,8%)	5 147 (78,3%)	867 (13,2%)	79 (1,2%)		32 (0,5%)		**6 575**
2016	221 (3,4%)	5 329 (81,8%)	863 (13,2%)	67 (1,0%)		32 (0,5%)		**6 514**
2015	160 (2,6%)	5 129 (83,9%)	750 (12,3%)	39 (0,6%)		33 (0,5%)	1 (0,0%)	**6 112**
2014	108 (1,9%)	4 859 (86,2%)	605 (10,7%)	41 (0,7%)		20 (0,4%)		**5 634**
2013	97 (1,9%)	4 412 (87,6%)	477 (9,5%)	38 (0,8%)		9 (0,2%)	2 (0,0%)	**5 035**
2012	98 (2,0%)	4 292 (87,3%)	474 (9,6%)	34 (0,7%)		17 (0,3%)	2 (0,0%)	**4 917**
2011	87 (1,9%)	3 974 (87,4%)	439 (9,7%)	29 (0,6%)		19 (0,4%)		**4 548**
2010	88 (2,0%)	3 857 (87,7%)	414 (9,4%)	23 (0,5%)		18 (0,4%)		**4 400**
1994-09	3 969 (10,4%)	29 515 (77,3%)	4 521 (11,8%)	96 (0,3%)	2 (0,0%)	57 (0,1%)	1 (0,0%)	**38 161**
Total	**5 782 (6,5%)**	**71 825 (80,9%)**	**10 409 (11,7%)**	**504 (0,6%)**	**2 (0,0%)**	**268 (0,3%)**	**6 (0,0%)**	**88 801**

* Indicated by the surgeon on the report form

Figure 7: Primary operations

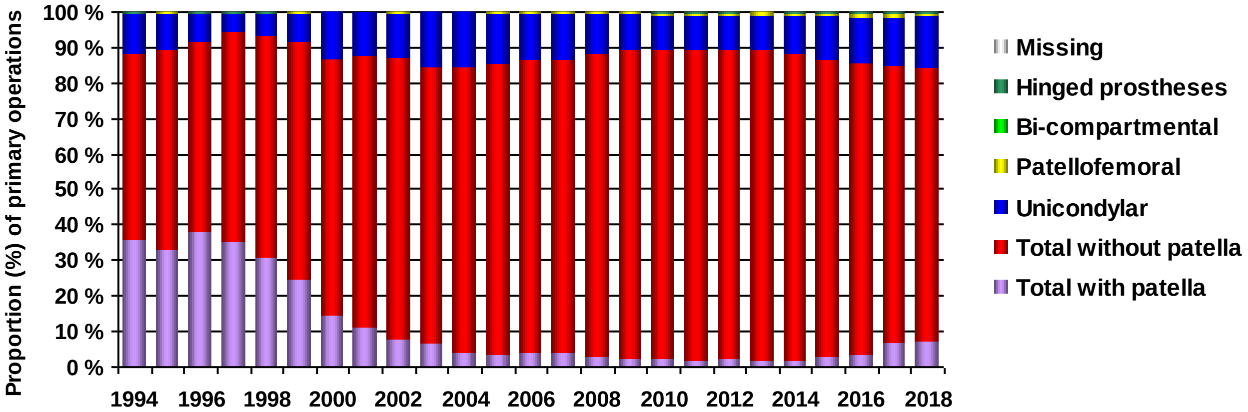


Table 3a: Classification of stability and modularity in primary total prostheses (with and without patella component)

	---------- MS ----------		----------- PS -----------					
Year	**All poly**	**MT**	**All poly**	**MT**	**CCK**	**Rotating platform**	**Hinged * prostheses**	**Total**
2018	1	3983	1	565	26	1 237	31	**5 844**
2017	0	3672	0	539	42	1 343	32	**5 628**
2016	4	3688	0	465	19	1 370	32	**5 578**
2015	2	3531	0	330	22	1 403	33	**5 321**
2014	2	3390	0	131	22	1 416	20	**4 981**
2013	2	3171	0	55	25	1 254	9	**4 516**
2012	5	2855	0	21	16	1 490	17	**4 404**
2011	5	2541	0	14	9	1 490	19	**4 078**
2010	3	2486	0	19	5	1 427	18	**3 958**
2009	3	2542	0	7	8	1 417	5	**3 982**
2008	1	2173	0	22	3	1 324	8	**3 531**
2007	0	1927	0	14	2	1 162	7	**3 112**
2006	0	1637	0	8	2	1 047	2	**2 696**
2005	0	1623	0	6	0	1 156	3	**2 788**
2004	1	1519	0	0	3	922	1	**2 446**
2003	4	1769	0	5	0	778	1	**2 557**
1994-02	6	9502	0	22	12	2 783	31	**12 356**

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**
2018	1	150	0	112	109	91	43	**506**
2017	0	124	0	134	66	88	65	**477**
2016	0	110	0	96	67	80	79	**432**
2015	0	129	0	100	50	75	66	**420**
2014	0	120	0	57	65	90	62	**394**
2013	1	132	0	61	75	87	32	**388**
2012	0	151	0	39	46	102	30	**368**
2011	1	142	0	19	58	98	23	**341**
2010	0	154	0	11	62	94	12	**333**
2009	0	147	0	12	44	119	21	**343**
2008	0	126	0	8	23	121	12	**290**
2007	0	103	0	6	14	99	9	**231**
2006	0	91	0	8	7	83	8	**197**
2005	0	112	0	2	3	71	4	**192**
2004	1	121	0	2	9	89	3	**225**
2003	0	101	0	6	3	54	7	**171**
1994-02	1	595	0	36	36	122	24	**814**

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

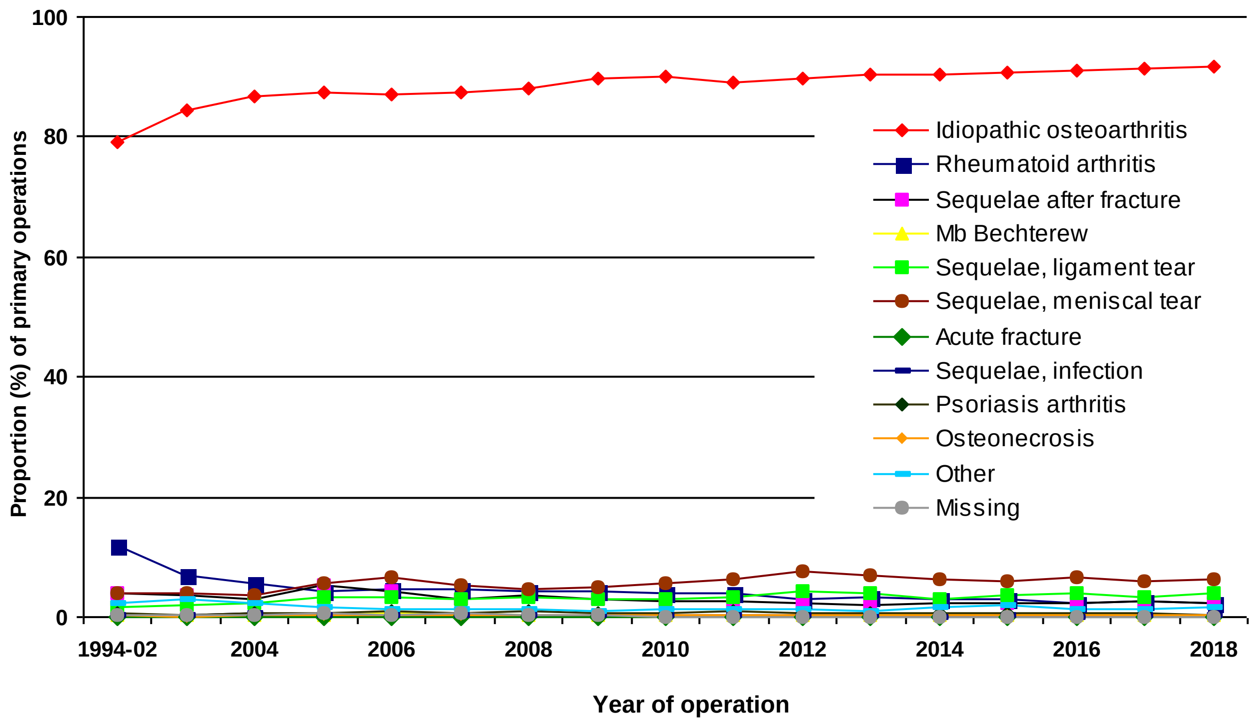
Reasons for primary operations - Total knee prostheses

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
2018	5 335	143	132	13	223	363	4	10	28	13	94	0
2017	5 108	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	4 790	165	114	16	199	321	1	17	36	10	99	2
2014	4 492	140	122	22	140	308	3	6	30	15	89	2
2013	4 080	144	94	11	173	308	1	16	29	9	41	4
2012	3 944	125	106	15	182	332	2	13	33	11	60	4
2011	3 617	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
2004	2 130	138	76	6	59	89	0	15	14	6	53	10
2003	2 167	174	94	9	49	98	2	11	8	1	78	5
1994-02	9 765	1 456	510	50	215	484	16	49	80	33	278	41
Total	**68 223**	**3 799**	**2 322**	**273**	**2 410**	**4 350**	**46**	**247**	**511**	**189**	**1 262**	**125**

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

Figure 8:



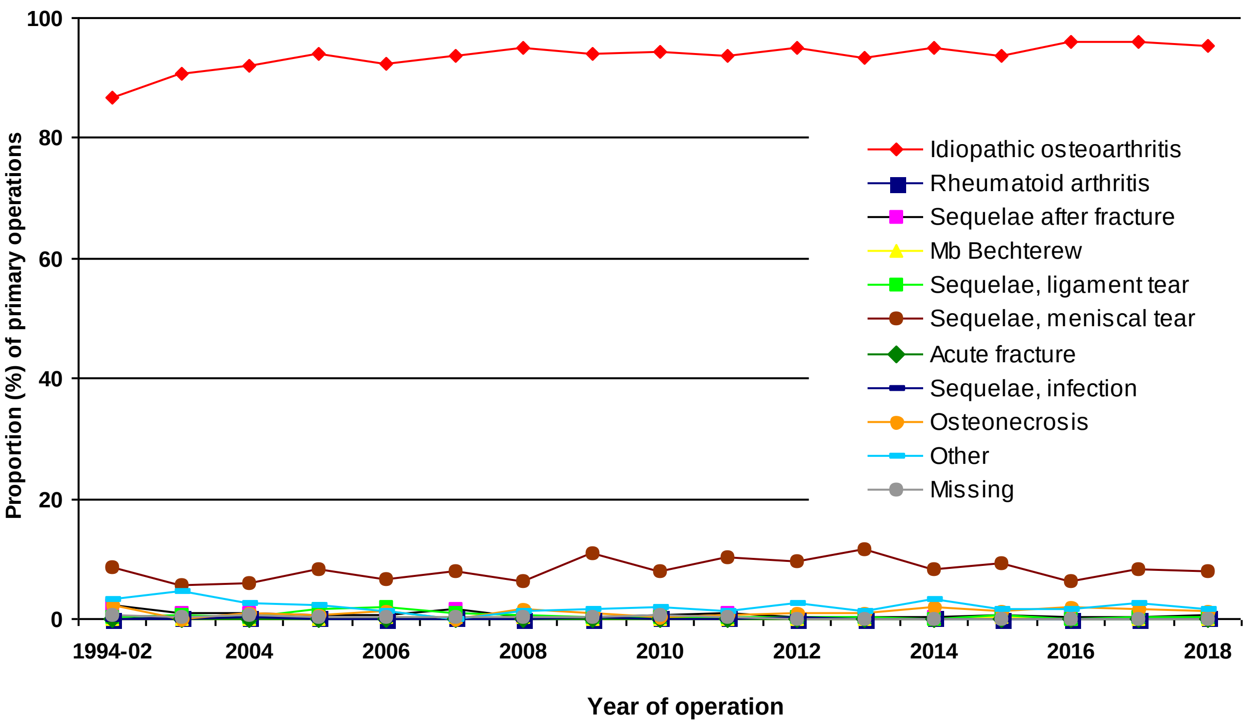
Reasons for primary operations - Unicondylar knee prostheses

Table 5:

Year	Idiopathic osteoarthritis	Rheumatoid arthritis	Sequelae after fracture	Mb. Bechterew	Sequelae, ligament tear	Sequelae, meniscal tear	Sequelae, infection	Osteonecrosis	Other	Missing
2018	953	2	7	0	2	80	0	14	18	0
2017	832	1	4	0	3	71	0	13	22	0
2016	830	1	2	1	1	54	1	16	13	0
2015	703	0	4	2	5	70	0	11	13	0
2014	575	2	2	0	0	50	0	13	20	0
2013	446	0	1	0	1	55	0	4	6	0
2012	451	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
2004	411	1	4	0	1	27	2	5	12	3
2003	426	2	5	0	3	27	0	0	21	1
1994-02	1 200	2	30	1	5	119	1	31	45	7
Total	**9 717**	**18**	**82**	**7**	**48**	**855**	**6**	**136**	**226**	**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

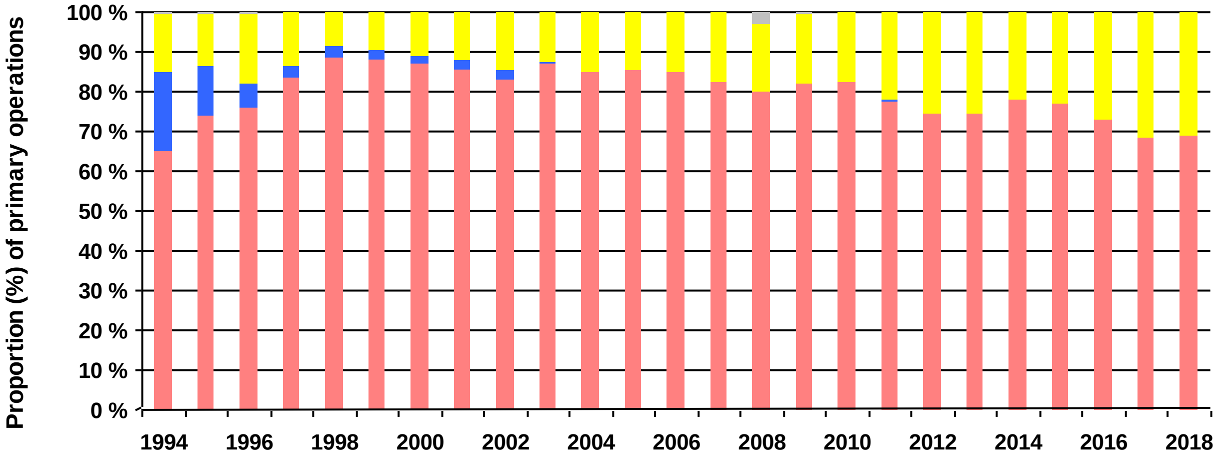


Figure 11: Tibia

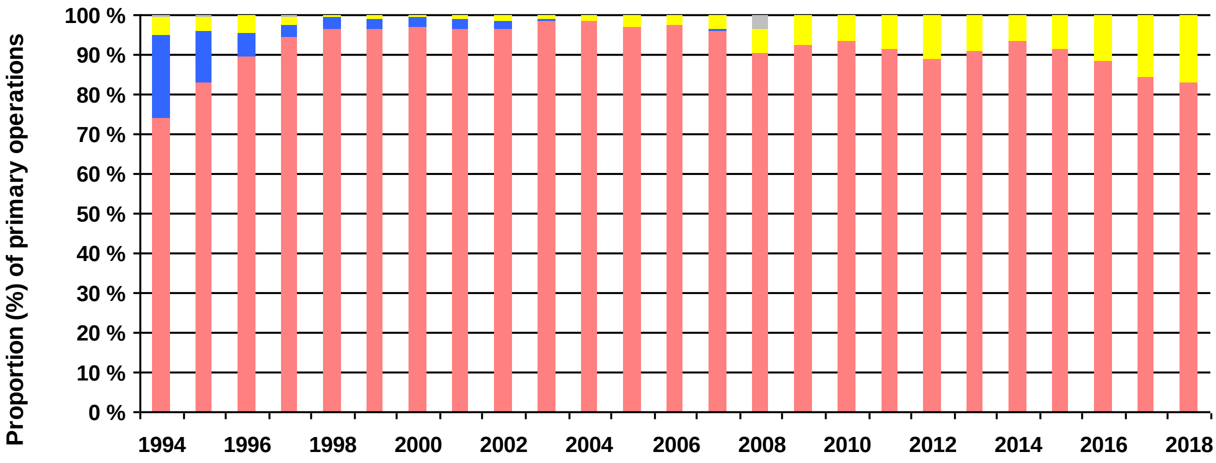
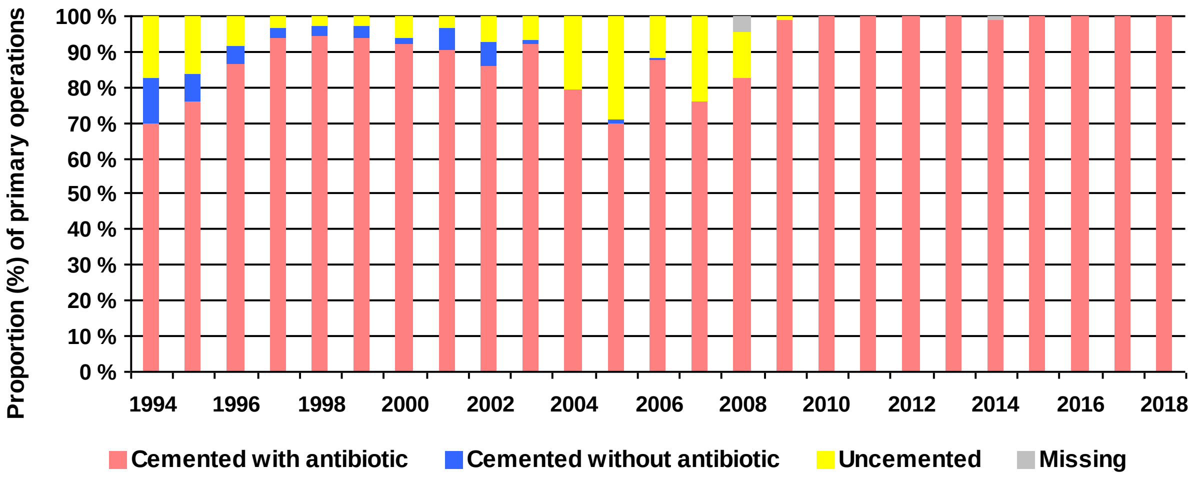


Figure 12: Patella



Use of cement in total knee prostheses

Figure 13: Primary operations

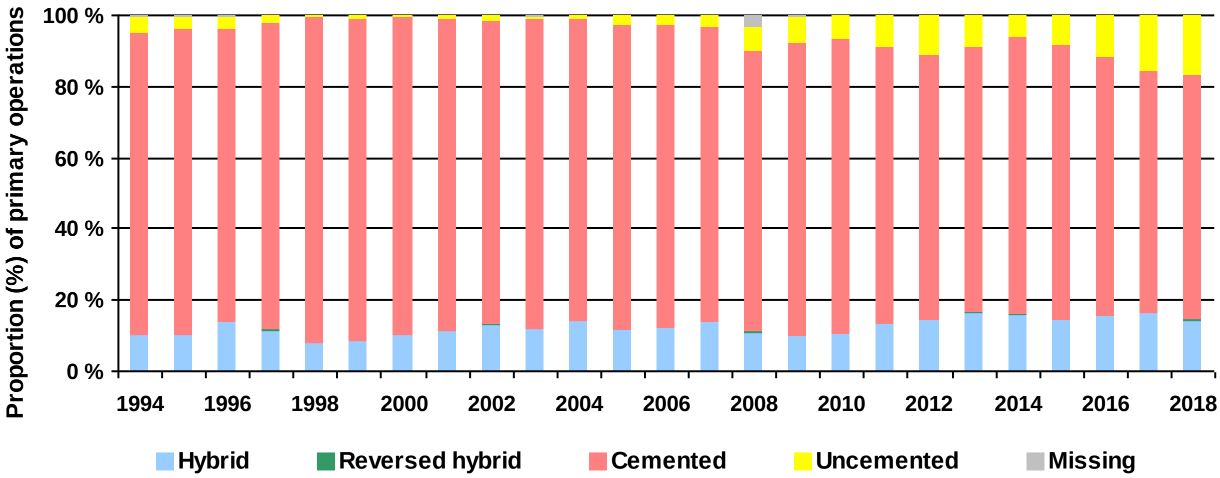
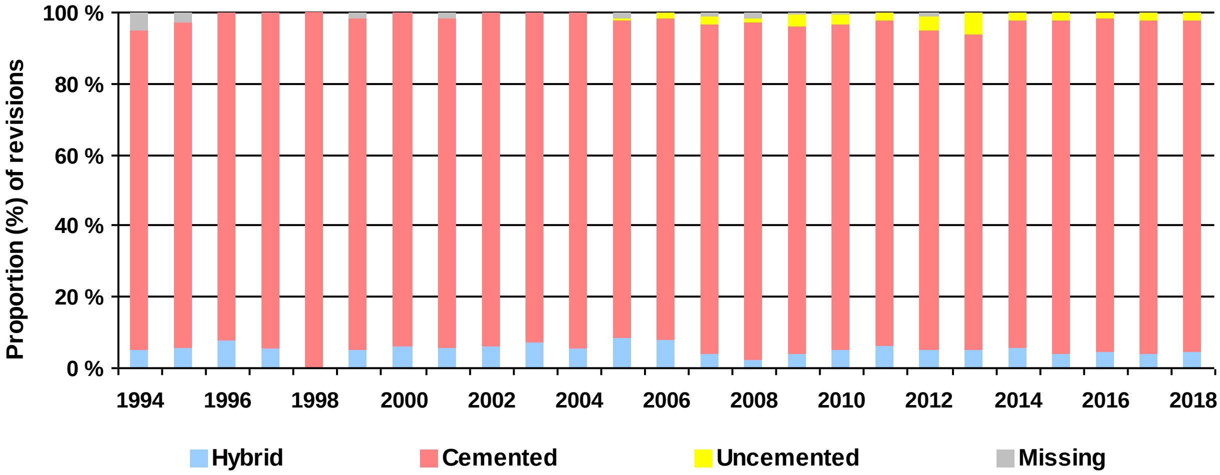
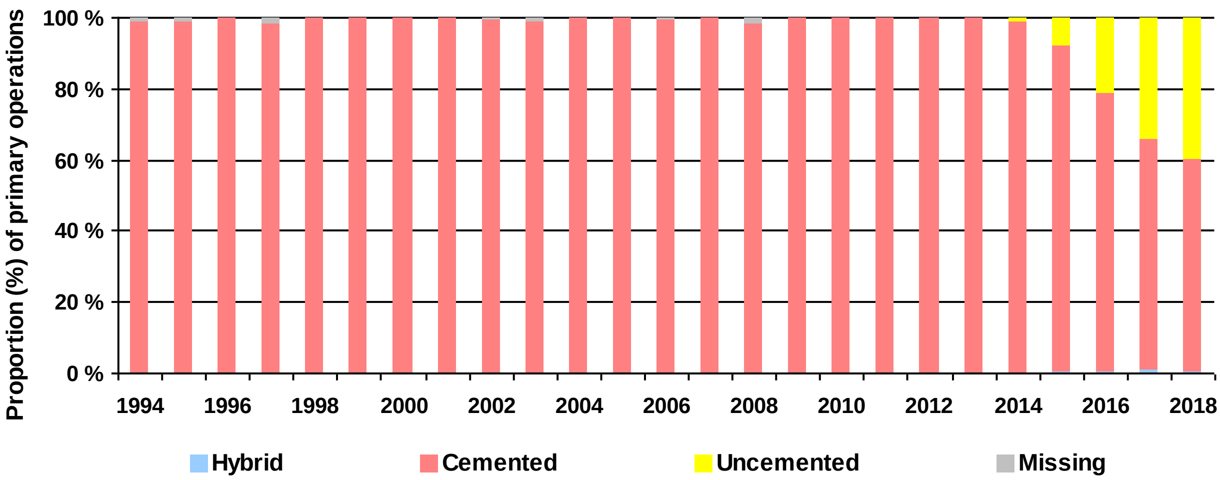


Figure 14: Revisions



Use of cement in unicondylar knee prostheses

Figure 15: Primary operations



The 7 most common primary total prostheses without patella component in 2013-2018

Table 6:

Product	Cemented *	Uncemented *	Hybrid	All poly	Rotating platform	HXLPE	Stabilization MS	PS	CCK	Total
NexGen	10 899	1 474	1 586	0	0	1 600	12567	1335	149	**13 969**
PFC-Sigma	2 584	1 418	212	0	4 208	0	4210	5	4	**4 219**
LCS Complete	3 235	60	484	0	3 782	0	3774	7	2	**3 782**
Legion	1 313	7	1 963	0	0	77	3193	98	10	**3 286**
Triathlon	1 851	503	151	0	0	2 477	2437	49	31	**2 508**
PROFIX	702	147	319	2	0	0	1169	0	0	**1 169**
Vanguard TM	300	0	0	0	0	0	299	17	0	**300**

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

Table 6 A: Femur component

Product: NexGen (31)

Product Category	Cemented *	Uncemented *	Stabilization MS	PS	CCK	Total
CR Option	8 019	2	8025	0	0	**8 025**
CR-flex porous uncemented	69	2 041	2112	0	0	**2 112**
CR-flex Option	1 088	0	1089	0	0	**1 089**
CR-flex gender	679	0	679	0	0	**679**
LPS-flex porous standard	3	582	0	586	0	**586**
LPS Option	496	0	0	496	0	**496**
CR Porous uncemented	35	307	342	0	0	**342**
CR Precoat	215	1	216	0	0	**216**
LCCK Option	148	0	0	0	148	**148**
LPS-flex Option	130	14	0	144	0	**144**
CR-flex porous	4	90	94	0	0	**94**
LPS-flex	7	0	0	7	0	**7**
LPS-Flex Tivanium	6	0	0	6	0	**6**
Other	10	5	1	14	0	**15**
Unknown	9	5	0	0	0	**14**

Product: PROFIX (35)

Product Category	Cemented *	Uncemented *	Stabilization MS	PS	CCK	Total
CR non-porous cemented	597	3	600	0	0	**600**
CR porous uncemented	98	458	556	0	0	**556**
Other	6	0	6	0	0	**6**
Unknown	5	1	0	0	0	**7**

Product: LCS Complete (48)

Product Category	Cemented *	Uncemented *	Stabilization MS	PS	CCK	Total
Cemented	3 163	1	0	0	0	**3 166**
Uncemented	61	543	0	0	0	**604**
Revision	7	0	0	0	2	**7**
Unknown	5	0	0	5	0	**5**

Product: PFC-Sigma (49)

Product Category	Cemented*	Uncemented *	Stabilization MS	PS	CCK	Total
CR cemented	2 582	1	2587	0	0	**2 587**
CR uncemented	7	1 613	1620	0	0	**1 620**
PS	5	0	0	5	0	**5**
Other	3	0	0	0	0	**3**
Unknown	5	0	0	0	0	**5**

Product: Triathlon (58)

Product Category	Cemented*	Uncemented *	Stabilization MS	PS	CCK	Total
CR cemented	1 769	4	1776	0	0	**1 776**
Beaded CR uncemented	9	646	655	0	0	**655**
PS cemented	40	0	0	40	0	**40**
TS cemented	27	0	0	0	27	**27**
Unknown	10	0	0	0	0	**10**

Product: Legion (62)

Product Category	Cemented*	Uncemented *	Stabilization MS	PS	CCK	Total
CR uncemented	18	1 963	1982	0	0	**1 982**
CR cemented	1 192	0	1193	0	0	**1 193**
PS cemented	66	4	0	70	0	**70**
PS Oxinium cemented	20	0	0	21	0	**21**
CR Oxinium cemented	19	1	20	0	0	**20**
Femur cemented	5	0	0	5	0	**5**
Other	2	1	0	0	3	**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	297	0	297	0	0	**297**
PS Anatomic interlok cemented	14	0	0	14	0	**14**
Other	3	0	2	1	0	**3**
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	8 025	9	0	**8 034**
Precoat PMMA stemmed cemented	4 222	1	0	**4 224**
Trabecular metal uncemented	9	1 481	0	**1 490**
Precoat AP wedge stemmed	193	1	0	**194**
Other	0	4	0	**4**
Unknown	24	2	0	**27**

Product: PROFIX (35)

Product Category	Cemented *	Uncemented *	All poly	Total
Non porous cemented	980	3	0	**983**
Porous w/o hole uncemented	1	148	0	**149**
Porous uncemented	31	0	0	**31**
Other	2	0	2	**2**
Unknown	3	0	0	**3**

Table 6 B: Tibia

Product: LCS Complete (48)

Product Category	Cemented *	Uncemented *	All poly	Total
No keel MBT* cemented	3 688	3	0	**3 692**
No keel MBT* uncemented	1	56	0	**57**
MBT* revision	24	0	0	**24**
Other	4	2	0	**6**
Unknown	5	0	0	**5**

* MBT = Mobile bearing tray

Product: PFC-Sigma (49)

Product Category	Cemented *	Uncemented *	All poly	Total
With keel MBT* cemented	2 732	6	0	**2 739**
With keel MBT* uncemented	12	1 415	0	**1 427**
MBT* revision	16	10	0	**26**
No keel MBT* cemented	14	3	0	**17**
Unknown	8	1	0	**9**

* MBT = Mobile bearing tray

Product: Triathlon (58)

Product Category	Cemented *	Uncemented *	All poly	Total
Cemented	1 925	4	0	**1 929**
PA uncemented	8	497	0	**505**
Universal cemented	60	0	0	**60**
Tritanium baseplate	0	5	0	**5**
Unknown	8	1	0	**9**

Product: Legion (62)

Product Category	Cemented *	Uncemented *	All poly	Total
Male tapered cemented	3 273	7	0	**3 280**
All poly CR	9	0	9	**9**
Other	0	2	0	**2**
Unknown	6	0	0	**6**

Product: Vanguard TM (67)

Product Category	Cemented *	Uncemented *	All poly	Total
Highly polished modular PCR	296	0	0	**296**
Interlok Monobloc PCR cemented	14	0	0	**14**
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	10903	0	0	**10 903**
CR-Prolong	0	1 586	1586	0	0	**1 586**
LPS-FlexFixed	0	0	0	1311	0	**1 311**
LCCK	0	0	0	0	105	**105**
LPS-flex	0	14	0	14	0	**14**
CR	0	0	10	0	0	**10**
Unknown	0	0	0	0	0	**40**

Product: PROFIX (35)

Product Category	Rotating platform	HXLPE	Stabilization MS	PS	CCK	Total
Conforming PCR	0	0	1019	0	0	**1 019**
Conforming+	0	0	141	0	0	**141**
Unknown	0	0	8	0	0	**8**

Product: LCS Complete (48)

Product Category	Rotating platform	HXLPE	Stabilization MS	PS	CCK	Total
Rotating platform RP	3 774	0	3774	0	0	**3 774**
Other	2	0	0	0	2	**2**
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	4 199	0	4199	0	0	**4 199**
Revision STB	5	0	0	5	0	**5**
Other	4	0	1	0	4	**5**
Unknown	0	0	0	0	0	**10**

Product: Triathlon (58)

Product Category	Rotating platform	HXLPE	Stabilization MS	PS	CCK	Total
CR-X3 HXLPE	0	1 948	1948	0	0	**1 948**
CS-X3 HXLPE	0	475	475	0	0	**475**
PS-X3 HXLPE	0	24	0	24	0	**24**
TS-X3 HXLPE	0	23	0	0	23	**23**
PS	0	0	0	22	0	**22**
CR	0	0	9	0	0	**9**
Unknown	0	7	0	0	0	**7**

Product: Legion (62)

Product Category	Rotating platform	HXLPE	Stabilization MS	PS	CCK	Total
CR standard	0	0	1833	0	0	**1 833**
Dished	0	0	1347	0	0	**1 347**
PS high flex	0	65	0	65	0	**65**
PS	0	0	0	23	0	**23**
Constrained	0	0	0	0	7	**7**
CR-highflex HXLPE	0	7	7	0	0	**7**
Other	0	1	1	0	0	**1**
Unknown	0	4	0	0	0	**4**

Product: Vanguard TM (67)

Product Category	Rotating platform	HXLPE	Stabilization MS	PS	CCK	Total
Arcom CR	0	0	286	0	0	**286**
Arcom PS	0	0	0	13	0	**13**
Other	0	0	0	1	0	**1**
Unknown	0	0	0	0	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	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
NexGen	1332	241	203	606	1434	2201	2313	2047	1794	1844	**14015**
LCS Complete	4389	1196	1154	1113	625	589	587	567	558	313	**11091**
Profix	7090	697	650	739	598	112		1			**9887**
LCS	4164										**4164**
AGC Universal	2638	144	148	155	27						**3112**
Genesis I	3100										**3100**
Triathlon	278	164	263	286	183	195	257	449	404	377	**2856**
PFC-Sigma	1		3	1	288	428	428	473	450	543	**2615**
Duracon	1608	470	396	101							**2575**
AGC Anatomic	1410	146	99	69							**1724**
Legion				3	10	252	350	324	342	397	**1678**
Tricon -C with Pro-Fit	1079										**1079**
Vanguard TM	69	144	199	149	146	65	65	42	2		**881**
Attune								44	122	424	**590**
E-motion	451	10									**461**
Kinemax	411										**411**
Advance	132	29	43	43	51	12					**310**
NexGen Rotating Hinge	14	10	16	10	4	19	29	25	29	25	**181**
Journey II BCS						7	69	57	31	6	**170**
Persona								12	78	60	**150**
Scorpio	110	12	2	2							**126**
Evolution Medial-Pivot							10	19	26	42	**97**
Tricon M	47										**47**
AGC Dual	43										**43**
Search	40										**40**
GMK Sphere								18	16	3	**37**
Interax I.S.A.	24										**24**
RT-Plus Modular	1	4	1	6	4						**16**
Other (n<15)	55	2	2	5	2	2	4	7	4	5	**88**
Total	**28486**	**3269**	**3179**	**3288**	**3372**	**3882**	**4112**	**4085**	**3856**	**4039**	**61568**

Table 7b: Uncemented femoral prostheses in primary operations *

Prosthesis	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Profix	2687	458	520	650	442	19			1		**4777**
NexGen	3	10	18	50	171	228	377	652	814	814	**3137**
LCS Complete	799	223	337	375	177	121	88	51	55	52	**2278**
Legion					126	421	401	448	417	366	**2179**
PFC-Sigma					165	278	300	280	283	314	**1620**
Triathlon			24	43	62	33	41	57	203	256	**719**
LCS	652										**652**
Tricon M	288										**288**
Genesis I	192										**192**
Duracon	163										**163**
Interax I.S.A.	81										**81**
Kotz	29										**29**
Other (n<15)	17	2	2	1		1					**23**
Total	**4911**	**693**	**901**	**1119**	**1143**	**1101**	**1207**	**1488**	**1773**	**1802**	**16138**

* Surgeon checks for use of cement

Total prostheses

Table 8: Femoral prostheses in revisions

Prosthesis	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Profix	458	52	45	38	42	4					**639**
NexGen LCCK Option	36	12	25	46	84	72	80	80	79	85	**599**
LCS Complete	225	52	47	43	32	18	11	18	24	25	**495**
NexGen	113	17	17	14	23	30	42	27	45	47	**375**
NexGen Rotating Hinge	40	9	12	17	18	47	53	53	39	26	**314**
Genesis I	211										**211**
Legion					2	23	39	35	50	58	**207**
LCS	181										**181**
Triathlon TS	1	7	14	13	26	13	12	6	20	28	**140**
PFC-Sigma					12	21	24	30	19	32	**138**
Triathlon		3	3	16	8	11	11	12	11	13	**88**
LCS Complete VVS	12	9	13	14	10	13	5	5	1	4	**86**
Scorpio TS	36	19	14	7							**76**
Duracon	54	5	4	4							**67**
Vanguard TM	18	23	21	3	2						**67**
AGC Dual	62										**62**
AGC Universal	53	3	2	3	1						**62**
Profix constrained	36	2	2	2	1	2					**45**
S-ROM Rotat. Hinge	5		7	2	1	4	1	4	8	8	**40**
Legion constrained	9	7		1	4	3	2	3	1	2	**32**
Dual Articular 2000	30										**30**
Legion Hinge Knee						1	7	8	9	5	**30**
RT-Plus Modular	3	1	1	9	9	1					**24**
Tricon -C with Pro-Fit	20										**20**
AGC Anatomic	18			1							**19**
Scorpio	10	6	2								**18**
E-motion	15	1									**16**
Kinemax	16										**16**
Other (n<15)	86	3	8	7	2	2		6	10	4	**128**
Total	**1748**	**231**	**237**	**240**	**277**	**265**	**287**	**287**	**316**	**337**	**4225**

Table 9a: Cemented tibial prostheses in primary operations

Prosthesis	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
NexGen	1335	241	204	615	1541	2361	2508	2363	2205	2213	**15586**
Profix	9445	1024	1053	1213	908	113		1			**13757**
LCS Complete	4667	1295	1293	1247	744	712	674	618	615	364	**12229**
AGC Universal	3768	267	235	213	26						**4509**
LCS	4351										**4351**
Legion				3	136	671	751	772	760	759	**3852**
Genesis I	3284										**3284**
Triathlon	276	164	267	301	228	229	294	458	408	395	**3020**
PFC-Sigma	1		3	1	321	477	473	505	460	558	**2799**
Duracon	1737	470	396	101							**2704**
Tricon II	1346										**1346**
Vanguard TM	70	144	199	147	145	65	65	42	2		**879**
Attune								44	122	424	**590**
E-motion	458	10									**468**
Kinemax	411										**411**
LCS Universal	372										**372**
AGC Anatomic	284	21	13	11	1						**330**
Advance	132	29	43	43	51	12					**310**
NexGen Rotating Hinge	13	10	16	10	4	19	29	25	29	26	**181**
Journey II BCS						7	70	57	31	6	**171**
Persona								12	78	61	**151**
Scorpio	110	12	2	2							**126**
Interax I.S.A.	106										**106**
Evolution Medial-Pivot							10	19	26	42	**97**
Search	40										**40**
GMK Sphere								18	16	3	**37**
AGC Dual	28										**28**
RT-Plus Modular	1	4	1	6	4						**16**
Other (n<15)	62	4		6	3	3	3	7	3	4	**95**
Total	**32297**	**3695**	**3725**	**3919**	**4112**	**4669**	**4877**	**4941**	**4755**	**4855**	**71845**

Table 9b: Uncemented tibial prostheses in primary operations

Prosthesis	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
NexGen		10	17	41	66	66	182	340	402	447	**1571**
PFC-Sigma					132	230	257	247	273	300	**1439**
LCS Complete	472	124	198	241	58			1		2	**1096**
Profix	329	130	117	176	133	18					**903**
Triathlon			20	28	17		4	50	199	238	**556**
LCS	141										**141**
Tricon II	66										**66**
Duracon	28										**28**
Kotz	27										**27**
Other (n<15)	8	2	2	1		2	1	2		4	**22**
Total	**1071**	**266**	**354**	**487**	**406**	**316**	**444**	**640**	**874**	**991**	**5849**

Table 10a Tibial prostheses in revisions

Prosthesis	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
NexGen	148	30	42	61	111	109	124	115	125	133	**998**
LCS Complete	310	73	81	68	55	46	25	25	33	37	**753**
Profix	498	53	45	45	44	7	1	1	1		**695**
NexGen Rotating Hinge	40	8	12	16	18	47	51	51	39	24	**306**
Genesis I	258		1								**259**
Legion	9	7		1	6	26	40	38	48	64	**239**
Triathlon	1	10	18	31	35	24	24	21	31	44	**239**
LCS	236										**236**
PFC-Sigma					12	20	24	33	28	38	**155**
Duracon	74	12	14	11	7						**118**
Scorpio	46	26	17	8			1				**98**
AGC Universal	69	4	2	4							**79**
Tricon II	71										**71**
Vanguard TM	17	22	21	4	3						**67**
AGC Dual	59										**59**
Legion Hinge Knee						1	7	8	9	5	**30**
Dual Articular 2000	29										**29**
RT-Plus Modular	3	1	1	9	9	1					**24**
Maxim	21	1									**22**
E-motion	16	1		1							**18**
Kinemax	17										**17**
Other (n<15)	48	3	6	11	3	4		8	11	5	**99**
Total	**1970**	**251**	**260**	**270**	**303**	**285**	**297**	**300**	**325**	**350**	**4611**

Table 10b: Material in Tibia Insert for total prostheses in primary operations

Prosthesis	Material	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Advance	Uhmwpe	132	29	43	42	51	12					**309**
AGC	Uhmwpe	4057	289	248	223	27						**4844**
AGC Dual	Uhmwpe	36										**36**
Attune	HXLPE								44	122	424	**590**
Dual Articular 2000	Uhmwpe	4										**4**
Duracon	Uhmwpe	1772	470	396	101							**2739**
E-motion	Uhmwpe	457	10									**467**
Evolution Medial-Pivot	Uhmwpe							10	19	26	42	**97**
Freemann/Samuelson	Uhmwpe	4										**4**
Genesis I	Uhmwpe	3280										**3280**
GMK Sphere	Uhmwpe								18	16	3	**37**
INTERAX I.S.A.	Uhmwpe	103										**103**
Journey II BCS	HXLPE						7	70	57	31	6	**171**
Kinemax	Uhmwpe	410										**410**
LCS	Uhmwpe	4469										**4469**
LCS Complete	Uhmwpe	5160	1417	1490	1488	802	712	675	618	613	365	**13340**
LCS Universal	Uhmwpe	383										**383**
Legion	HXLPE					7	13	29	18	44	62	**173**
Legion	Uhmwpe				2	129	657	721	752	716	699	**3676**
MAXIM	Uhmwpe	5										**5**
MG II	Uhmwpe	1										**1**
Mutars	Uhmwpe	4	3	1	1	1	1				1	**12**
NexGen	HXLPE		18	5	9	54	119	150	292	493	495	**1635**
NexGen	Uhmwpe	1342	233	216	647	1553	2310	2540	2411	2115	2161	**15528**
NexGen Rotating Hinge	Uhmwpe	14	10	16	10	4	19	29	24	29	25	**180**
Persona	Uhmwpe								12	78	61	**151**
PFC-Sigma	Uhmwpe	1		3		453	707	729	753	733	858	**4237**
PROFIX	Uhmwpe	9798	1150	1166	1385	1041	131		1			**14672**
RT-Plus Modular	Uhmwpe	1	4	1	6	4						**16**
Scan Knee	Uhmwpe	8										**8**
Scorpio	HXLPE	14	1	1	2							**18**
Scorpio	Uhmwpe	97	11	1								**109**
Search	Uhmwpe	40										**40**
S-ROM Rotating Hinge	Uhmwpe			1				1		2	1	**5**
Triathlon	HXLPE	230	127	209	284	241	222	295	499	601	628	**3336**
Triathlon	Uhmwpe	46	37	78	45	4	7	3	9	6	5	**240**
Tricon II	Uhmwpe	1414										**1414**
Vanguard 360 Revision	Uhmwpe				2							**2**
Vanguard TM	Uhmwpe	6	51	80	99	134	62	65	42	2		**541**
Total		**33288**	**3860**	**3955**	**4346**	**4505**	**4979**	**5317**	**5569**	**5627**	**5836**	**77282**

Table 10c: Material in Tibia Insert for unicondylar knee prostheses in primary operations

Prosthesis	Material	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Genesis Uni	Uhmwpe	230										**230**
iBalance UKA	Uhmwpe										12	**12**
Journey Uni	Uhmwpe						3	2	6	2		**13**
MILLER-GALANTE UNI(unicondylar)	Uhmwpe	6										**6**
Oxford Partial Knee	Uhmwpe	1		1	108	206	374	521	634	556	762	**3163**
OXFORD UNI (III)	Uhmwpe	3398	400	412	331	232	204	191	202	292	204	**5866**
OXFORD UNI II	Uhmwpe	46										**46**
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		**3750**	**400**	**421**	**445**	**452**	**587**	**723**	**845**	**851**	**983**	**9457**

Unicondylar knee prostheses

Table 11a: Cemented femoral prostheses in primary operations *

Prosthesis	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Oxford UNI (III)	3401	400	411	333	233	197	136	18	1		**5130**
Oxford Partial Knee			1	106	205	374	515	631	550	575	**2957**
Genesis UNI	332										**332**
Miller-Galante UNI	294										**294**
MOD III uni	198										**198**
Preservation Uni	155	11									**166**
LINK Schlitten UNI	9		3	14	21	15	17	17	14	8	**118**
Journey Uni			7	14	3	6	12	7	2		**51**
Duracon uni	50										**50**
Sigma High Performance Uni			8	6	11	6	9	3	1	5	**49**
Oxford UNI II	45										**45**
ZUK (Unicondylar)	15	3	8	1							**27**
Other (n<15)	17				3					12	**32**
Total	**4516**	**414**	**438**	**474**	**476**	**598**	**689**	**676**	**568**	**600**	**9449**

Table 11b: Uncemented femoral prostheses in primary operations *

Prosthesis	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Oxford Partial Knee	1		1			7	61	187	299	399	**955**
Total	**1**	**0**	**1**	**0**	**0**	**7**	**61**	**187**	**299**	**399**	**955**

Table 12a: Cemented tibial prostheses in primary operations *

Prosthesis	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Oxford UNI (III)	3400	400	411	333	232	198	131	24	3	1	**5133**
Oxford Partial Knee			1	106	206	373	519	628	544	573	**2950**
Genesis UNI	332										**332**
Miller-Galante UNI	282										**282**
MOD III uni	199										**199**
Preservation Uni	154	11									**165**
LINK Schlitten UNI	9		3	14	21	15	17	17	14	8	**118**
Journey Uni			7	14	3	6	12	7	2		**51**
Duracon uni	49										**49**
Sigma High Performance Uni			8	6	11	6	9	3	1	5	**49**
Oxford UNI II	46										**46**
ZUK (Unicondylar)	16	2	8	1							**27**
Other (n<15)	16				3					12	**31**
Total	**4503**	**413**	**438**	**474**	**476**	**598**	**688**	**679**	**564**	**599**	**9432**

Table 12b: Uncemented tibial prostheses in primary operations *

Prosthesis	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Oxford Partial Knee			1			7	62	184	303	400	**957**
Total	**0**	**0**	**1**	**0**	**0**	**7**	**62**	**184**	**303**	**400**	**957**

* Surgeon checks for use of cement

Patellofemoral prostheses

Table 13: Femoral prostheses in primary operations

Prosthesis	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
NexGen PFJ Gender		2	4	20	16	19	32	49	53	45	**240**
Journey PFJ	37	21	25	14	18	22	7	18	17	10	**189**
Patella Mod III / II	33										**33**
LCS PFJ	18										**18**
Legion									9		**9**
Other (n<5)	8				4					3	**15**
Total	**96**	**23**	**29**	**34**	**38**	**41**	**39**	**67**	**79**	**58**	**504**

Table 14: Patella prostheses in primary operations

Prosthesis	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
NexGen PFJ Gender		2	4	20	16	19	31	48	53	45	**238**
Journey PFJ	35	21	25	14	18	22	7	18	26	10	**196**
Patella Mod III / II	33										**33**
LCS PFJ	17										**17**
Other (n<5)	9				4		1	1		2	**17**
Total	**94**	**23**	**29**	**34**	**38**	**41**	**39**	**67**	**79**	**57**	**501**

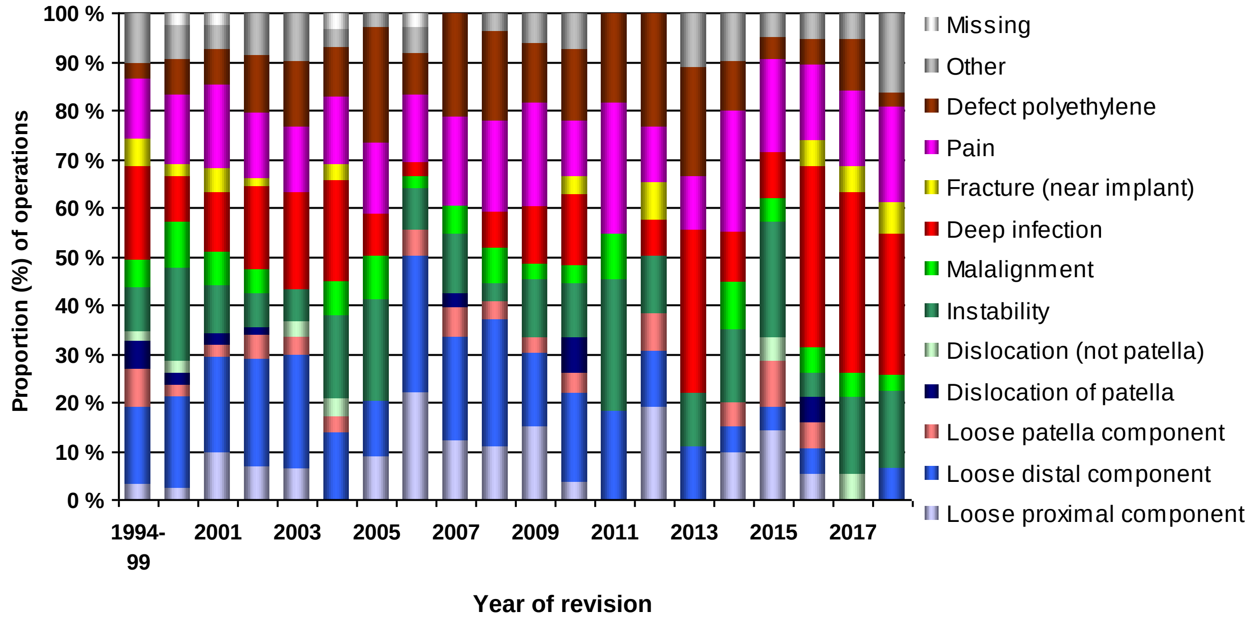
Reasons for revisions

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
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
2001	4	8	1	1	0	4	3	5	2	7	3	2	1
2000	1	8	1	1	1	8	4	4	1	6	3	3	1
1994-99	3	14	7	5	2	8	5	17	5	11	3	9	0
Total	**49**	**103**	**27**	**12**	**7**	**77**	**34**	**94**	**17**	**99**	**71**	**42**	**4**

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

Figure 16: Reasons for revisions of total knee prostheses with patella



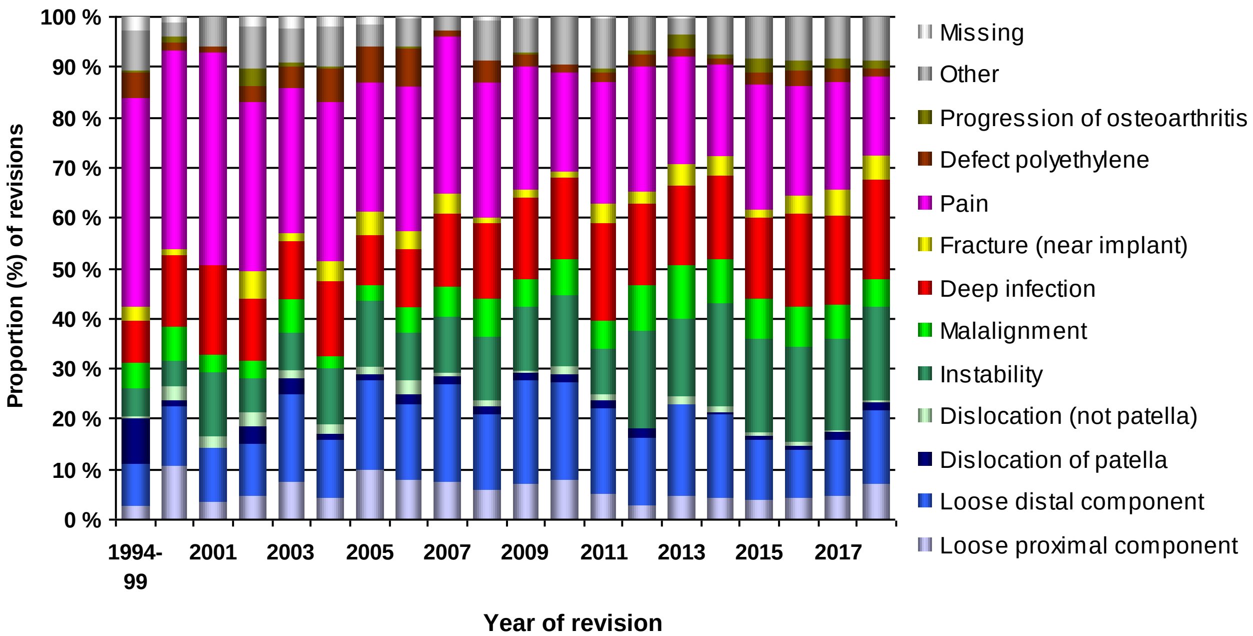
Reasons for revisions

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
2018	32	67	7	1	84	26	90	15	5	73	7	6	40
2017	20	49	6	3	78	30	77	20	3	92	13	8	36
2016	19	39	3	3	81	33	78	9	5	92	13	8	37
2015	15	47	3	3	73	30	63	7		97	9	10	33
2014	16	60	2	4	75	31	61	14		67	4	2	28
2013	15	58	1	5	49	34	51	14		68	6	8	11
2012	8	42	7	0	60	28	51	7		77	8	2	21
2011	16	54	5	3	29	17	62	12		76	6	3	31
2010	21	51	4	4	38	19	43	3		52	4		25
2009	20	60	4	2	36	16	47	5		71	6	1	20
2008	15	39	4	3	32	19	39	3		69	11		20
2007	13	33	3	1	19	10	25	7		53	2		5
2006	14	26	3	5	16	9	20	6		50	13	1	9
2005	13	23	2	2	17	4	13	6		34	9		6
2004	7	19	2	3	18	4	24	7		51	11	1	13
2003	10	23	4	2	10	9	15	2		38	6	1	9
2002	5	11	4	3	7	4	13	6		36	3	4	9
2001	3	9	0	2	11	3	15	0		36	1		5
2000	8	9	1	2	4	5	11	1		30	1	1	2
1994-99	5	15	16	1	10	9	15	5		74	9	1	14
Total	**275**	**734**	**81**	**52**	**747**	**340**	**813**	**149**	**13**	**1 236**	**142**	**57**	**374**

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

Figure 17: Reasons for revisions of total knee prostheses without patella



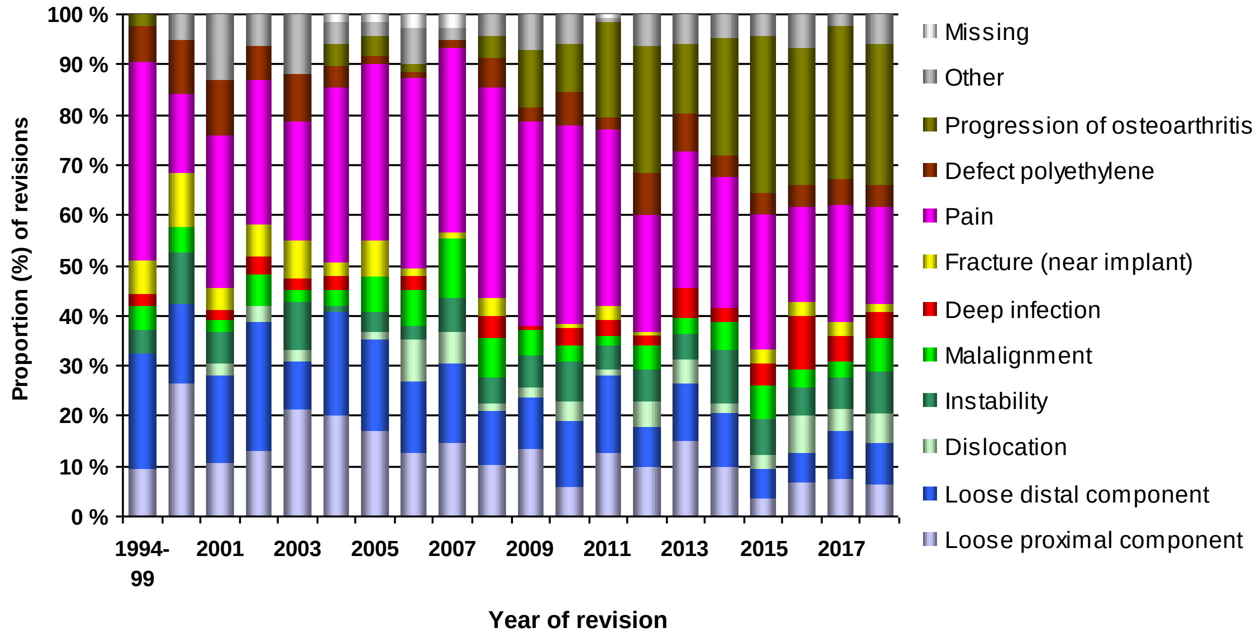
Reasons for revisions

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
2018	12	15	11	16	12	10	3	36	8	52	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
2001	5	8	1	3	1	1	2	14	5		6	0
2000	5	3	0	2	1	0	2	3	2		1	0
1994-99	4	10	0	2	2	1	3	17	3	1	0	0
Total	**209**	**226**	**74**	**124**	**99**	**74**	**45**	**584**	**98**	**324**	**101**	**7**

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

Figure 18: Reasons for revisions of unicondylar knee prostheses

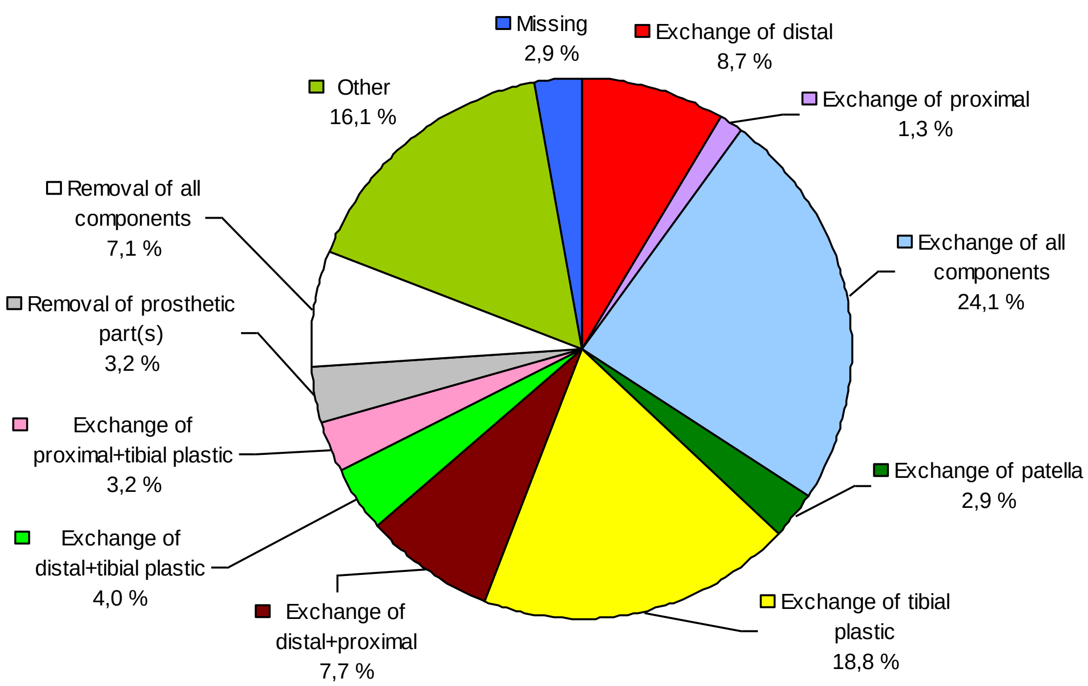


Type of revision

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
2018		1				4							**5**
2017						5		1			3	1	**10**
2016		1		1		6					3		**11**
2015					2	1					1		**4**
2014		2				3					1	1	**7**
2013				1		2						1	**4**
2012		1	1	1		1							**4**
2011						3							**3**
2010				1		1					1		**3**
2009						3		1			2		**7**
2008				1		1		1	1			1	**5**
2007				1		2				1			**4**
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		2		**14**
2001	6			3	1	2	2		3	1	1		**19**
2000	3		4	6		4		1	3	1	2		**24**
1994-99	19	6	23	64	5	26	3	6	17	8	40	6	**223**
Total	**33**	**15**	**29**	**91**	**11**	**71**	**5**	**12**	**27**	**12**	**61**	**11**	**379**

Figure 19: Total knee prostheses with patella

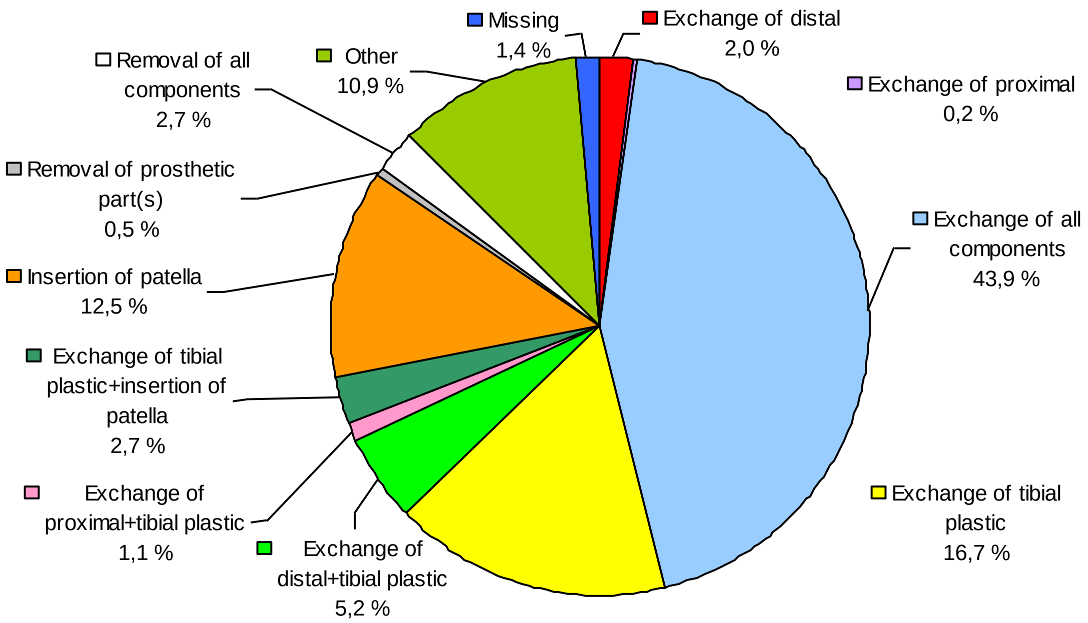


Type of revision

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
2018		2	10	1	42		3					8	1	**67**
2017		14	36	2	51	1	4			4		18	4	**134**
2016		8	71	9	51		2	2		7	3	41	6	**200**
2015		7	73	9	63	1	3			27		38	3	**224**
2014		14	93	16	52	2	1	9	1	20		24	4	**236**
2013	1	10	128	9	44	2	5	2	1	21	1	22	5	**251**
2012	1	21	153	10	49			5	1	17	1	29	6	**293**
2011	1	23	161	10	58	3	2	8		29	2	35	6	**338**
2010	2	23	151	4	46		2	5	2	34	1	23	2	**295**
2009	4	20	157	1	51		6	9	1	26	2	27	2	**306**
2008	2	19	119	9	48	2	2	9	2	23		20	1	**256**
2007	2	13	128	6	31	2	2	6	2	21		22	2	**237**
2006	6	11	101	4	16		2	9	1	25	2	17	1	**195**
2005	6	11	74	2	15		2	7		26		24		**167**
2004	9	11	76	4	28	2	5	9		24		16	3	**187**
2003	5	7	78	1	29	1	2	12		30		17	2	**184**
2002	9	11	67	7	22		2	5	1	26		9	1	**160**
2001	15	4	56	9	12		4	6	1	41		11	2	**161**
2000	6	3	68	2	15		1	1	4	24		12		**136**
1994-99	33	8	219	10	43	1	2	19	8	150	1	60	14	**568**
Total	**102**	**240**	**2019**	**125**	**766**	**17**	**52**	**123**	**25**	**575**	**13**	**473**	**65**	**4595**

Figure 20: Total knee prostheses without patella

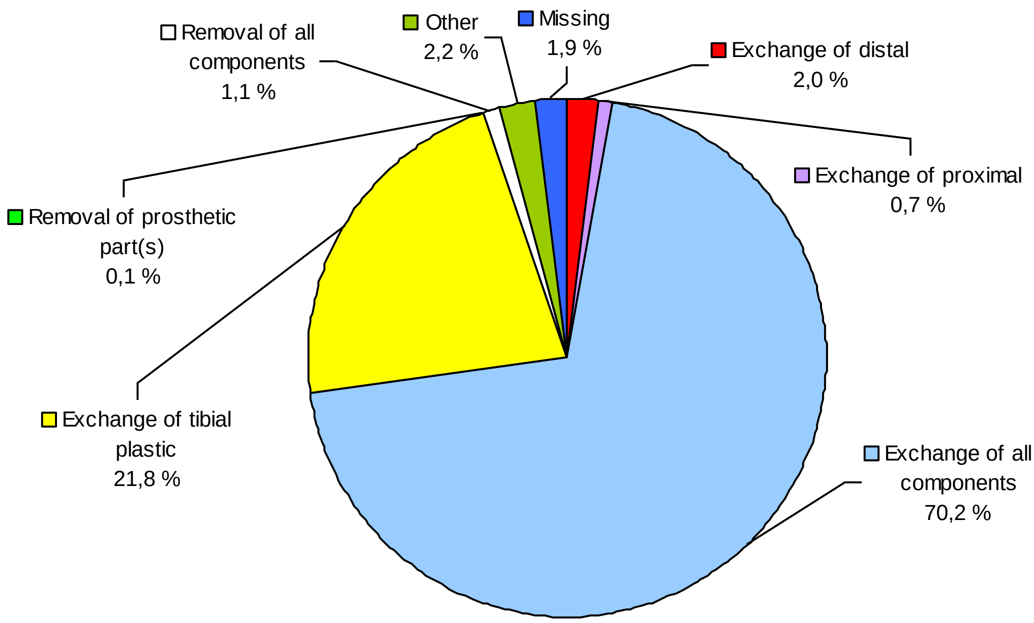


Type of revision

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
2018		6	18					1	**25**
2017	1	7	20					1	**29**
2016	1	17	22				5	1	**46**
2015	1	29	24				1	1	**56**
2014	2	22	8		1		3		**36**
2013		23	22		1				**46**
2012	2	34	22	1	1			1	**61**
2011	1	37	14	1			2	1	**56**
2010		52	22				1	1	**76**
2009		58	24		1		1		**84**
2008	1	69	16		2				**88**
2007		91	14	1	2		4	2	**114**
2006	1	80	14	1	1		3	2	**102**
2005	2	82	22				1	4	**111**
2004		96	14		2			2	**114**
2003	4	112	16	1			8	5	**146**
2002	1	40	14	2	2	1			**60**
2001	7	44	14		2		2	1	**70**
2000	1	57	10		1		1	1	**71**
1994-99	5	105		3	1		2	5	**121**
Total	**30**	**1061**	**330**	**10**	**17**	**1**	**34**	**29**	**1512**

Figure 21: 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
2018	706	4 593	1 433	7		166	**6 905**
2017	667	4 406	1 275	13		214	**6 575**
2016	707	4 391	1 236	12		168	**6 514**
2015	680	4 149	1 189	7		87	**6 112**
2014	587	3 906	1 058	8		75	**5 634**
2013	550	3 517	894	5	1	68	**5 035**
2012	667	3 276	902	8		64	**4 917**
2011	582	3 022	873	6		65	**4 548**
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**
2007	747	2 060	709			72	**3 588**
2006	769	1 718	541	10	1	70	**3 109**
2005	913	1 567	559	2		214	**3 255**

Table 22: Revisions

Year	ASA 1	ASA 2	ASA 3	ASA 4	ASA 5	Missing	Total
2018	39	363	222	11		27	**662**
2017	50	354	192	5	1	29	**631**
2016	27	358	184	2		33	**604**
2015	35	314	180	7		20	**556**
2014	50	296	137	2		13	**498**
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**
2007	73	141	69	2		16	**301**
2006	57	134	57	4		15	**267**
2005	61	94	70			26	**251**

Figure 22: Primary operations

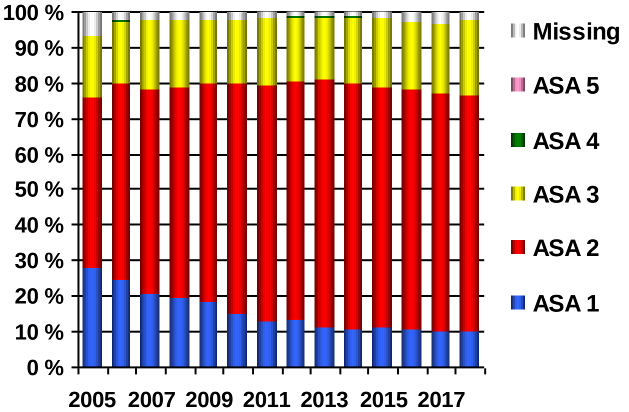
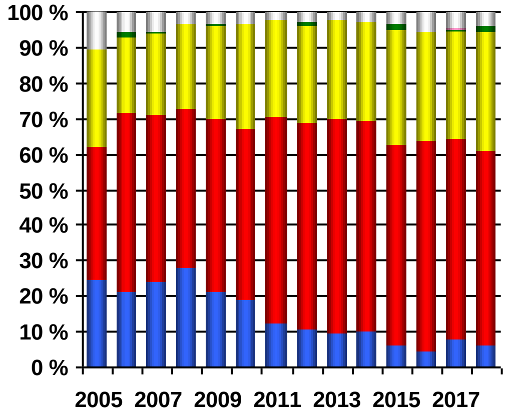


Figure 23: Revisions



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
2018	711	5 287	828	48	31	**6 905**
2017	778	4 890	826	51	30	**6 575**
2016	846	4 793	787	59	29	**6 514**
2015	925	4 297	816	29	45	**6 112**
2014	805	4 013	763	25	28	**5 634**
2013	905	3 350	716	10	54	**5 035**
2012	1 132	2 879	871	7	28	**4 917**
2011	1 270	2 289	952	8	29	**4 548**
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**
2007	1 876	1 259	416	5	32	**3 588**
2006	1 802	675	578	14	40	**3 109**
2005	2 022	388	702	8	135	**3 255**

Table 24: Revisions

Year	Preoperatively	Postoperatively	Unknown* pre / post	No	Missing	Total
2018	83	485	76	11	7	**662**
2017	84	460	75	7	5	**631**
2016	97	426	72	7	2	**604**
2015	65	407	68	11	5	**556**
2014	69	350	67	7	5	**498**
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**
2007	146	96	46	4	9	**301**
2006	139	62	54	3	9	**267**
2005	138	38	56	4	15	**251**

* Missing information on medication start

Figure 24: Primary operations

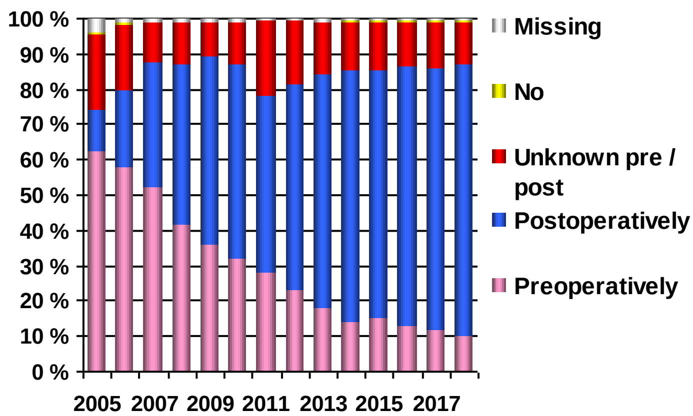
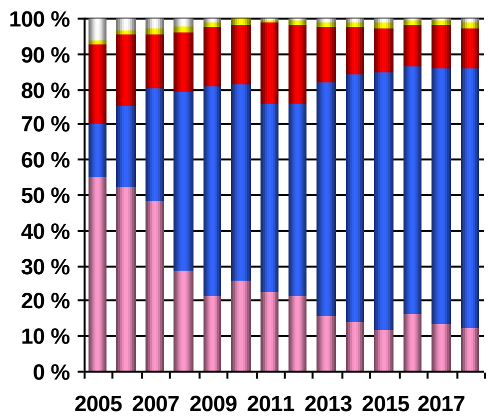


Figure 25: Revisions



Registration of thrombosis prophylaxis started in 2005

Thrombosis prophylaxis

Table 25: Drugs - All operations

Drugs	2005-08	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Acetylsalicylsyre (Albyl-E, Globoid, Acetyratio, Magnyl E)	0,1%			0,0%	0,0%		0,3%	0,4%	0,6%	0,9%	1,0%
Apixiban (Eliquis)						1,2%	1,1%	0,9%	1,0%	1,1%	1,3%
Dalteparin (Fragmin)	53,6%	52,6%	62,4%	64,4%	59,2%	54,2%	50,3%	56,3%	56,5%	60,6%	61,5%
Enoksaparin (Klexane)	40,6%	43,5%	32,8%	28,2%	29,3%	30,0%	32,2%	26,7%	24,4%	20,2%	19,2%
Rivaroksaban (Xarelto)			0,1%	2,2%	2,6%	2,4%	1,8%	1,4%	1,1%	1,1%	1,1%
Ximelagatran (Exanta, Malagatran)	0,8%										
No drugs	0,4%	0,3%	0,3%	0,2%	0,2%	0,3%	0,5%	0,6%	0,9%	0,8%	0,8%
Clinical study	0,6%										
Combination of 2 drugs	1,3%	2,1%	3,1%	3,5%	7,2%	10,1%	12,4%	12,2%	14,2%	13,9%	14,0%
Other	0,3%	0,1%	0,1%	0,0%	0,2%	0,2%	0,2%	0,1%	0,0%	0,1%	0,0%
Missing	2,3%	1,4%	1,1%	1,4%	1,2%	1,6%	1,2%	1,5%	1,2%	1,3%	1,1%

Figure 26: Drugs

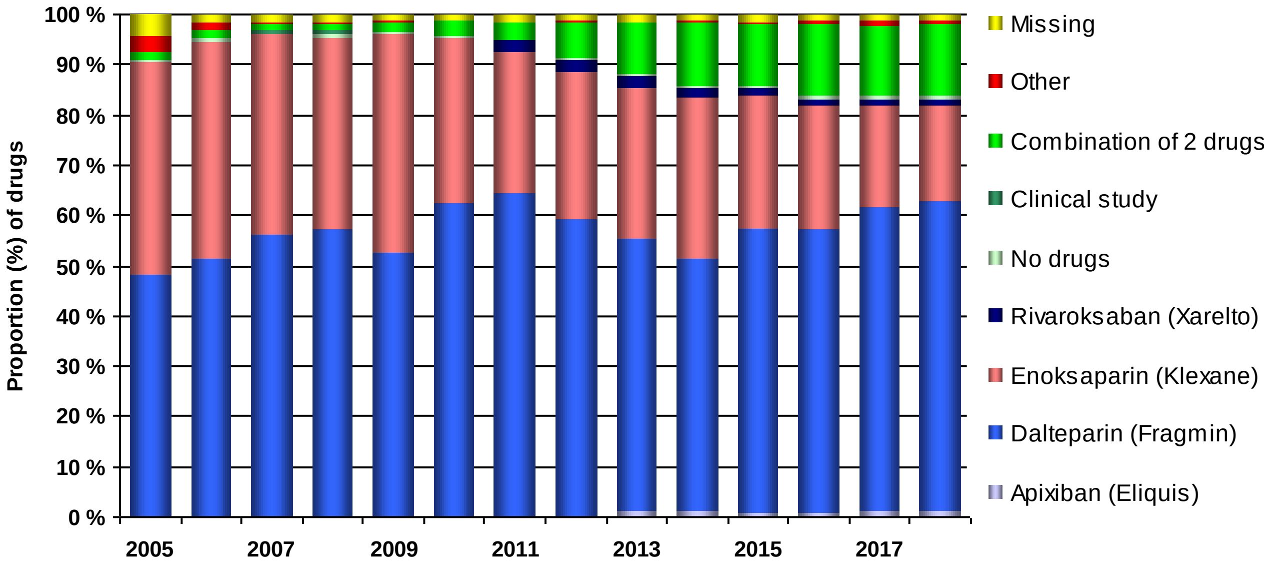


Table 26: Duration - All operations

Year	Days: 1-7	8-14	15-21	22-28	29-35	>35	No drugs	Missing	Total
2018	1 680	3 206	440	141	798	5	59	1 238	**7 567**
2017	1 180	3 201	502	281	781	13	58	1 190	**7 206**
2016	1 178	3 162	551	314	718	38	66	1 091	**7 118**
2015	1 013	2 388	977	326	866	143	40	915	**6 668**
2014	968	1 797	1 024	370	1 065	153	32	723	**6 132**
2013	727	1 595	1 005	398	1 002	120	16	654	**5 517**
2012	583	1 633	1 206	335	890	96	13	654	**5 410**
2011	289	1 345	1 380	403	799	101	10	652	**4 979**
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**
2007	488	1 178	797	119	743	8	9	547	**3 889**
2006	441	1 040	576	113	544	9	17	636	**3 376**
2005	547	1 060	622	111	530	69	12	555	**3 506**

Registration of thrombosis prophylaxis started in 2005

Fibrinolysis Inhibitor

Table 27: Drugs - Primary operations

Drugs	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Cyclokapron (Tranexamic acid)	2	1375	3490	3954	4722	5316	5755	5813	6163	36590
Missing		74	145	92	114	72	63	84	73	717
Total	**2**	**1449**	**3635**	**4046**	**4836**	**5388**	**5818**	**5897**	**6236**	**37307**

Registration of fibrinolysis inhibitor started in 2011

Perioperative complications

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

Type	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Fracture	78	10	17	11	10	8	12	12	10	7	175
Patella tendon rupture / Avulsion fractures / ligament rupture / tendon injury	67	1	13	12	10	21	17	15	6	11	173
Rupture / damage MCL (medial colateral ligament)	8	14	5	12	12	5	5	10	19	18	108
Technical problem with cement	25	6	10	5	6	5	4		1	5	67
Adm. failure (missing comp. etc.)	21		2	7	7	2		4	3	7	53
Failure of instruments	26	4	3	5	3	7	1	1		1	51
Blood torniquet failing	30	4	5	4	3		1			1	48
Problem due to difficult anatomy	12	5	3	6	3	5	5	3	2	4	48
Anesthesia problems	8	5	7	2	4	7	4	1	3	3	44
Violation of sterility routines	6	2	5	2	7	4	6	1		1	34
Other periop. compl.	130	22	20	26	26	30	34	26	22	22	358

Previous operation in relevant joint

Table 29: For primary total prostheses

Type	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Meniscus	3125	511	582	706	701	768	757	882	734	761	9527
Osteotomy	1718	121	110	116	111	134	119	137	111	107	2784
Arthroscopy (diagnostic)	737	112	106	111	97	183	205	194	166	148	2059
Osteosynthesis of intraarticular joint fracture	740	76	83	72	60	95	94	98	114	107	1539
Synovectomy	943	58	69	65	64	66	66	41	51	41	1464
Cruciate Ligament	363	57	70	101	105	104	125	188	119	139	1371
Artrodesis	21	1	1	2	2			2	1	1	31
Other previous op.	587	65	72	95	89	89	78	86	119	145	1425

Mini-invasive surgery

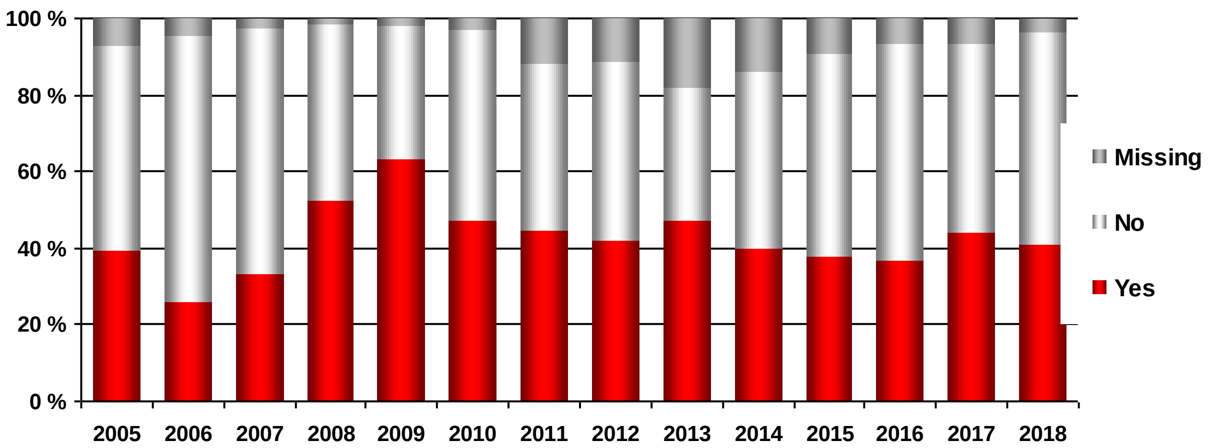
Table 30: Primary operations - Total knee prostheses

Year	Yes	No	Missing	Total
2018	14 (0%)	5 327 (92%)	474 (8%)	**5 815**
2017	9 (0%)	5 027 (90%)	561 (10%)	**5 597**
2016	10 (0%)	4 964 (89%)	576 (10%)	**5 550**
2015	5 (0%)	4 629 (88%)	655 (12%)	**5 289**
2014	2 (0%)	4 320 (87%)	645 (13%)	**4 967**
2013	10 (0%)	3 784 (84%)	715 (16%)	**4 509**
2012	16 (0%)	3 689 (84%)	685 (16%)	**4 390**
2011	15 (0%)	3 581 (88%)	465 (11%)	**4 061**
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**
2007	22 (1%)	2 955 (95%)	129 (4%)	**3 106**
2006	3 (0%)	2 579 (96%)	115 (4%)	**2 697**
2005	5 (0%)	2 483 (89%)	300 (11%)	**2 788**

Table 31: Primary operations - Unicondylar knee prostheses

Year	Yes	No	Missing	Total
2018	409 (41%)	554 (55%)	36 (4%)	**999**
2017	381 (44%)	429 (49%)	57 (7%)	**867**
2016	318 (37%)	486 (56%)	59 (7%)	**863**
2015	283 (38%)	398 (53%)	69 (9%)	**750**
2014	240 (40%)	280 (46%)	85 (14%)	**605**
2013	224 (47%)	167 (35%)	86 (18%)	**477**
2012	199 (42%)	221 (47%)	54 (11%)	**474**
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**
2007	155 (33%)	299 (64%)	12 (3%)	**466**
2006	104 (26%)	276 (69%)	19 (5%)	**399**
2005	179 (39%)	244 (54%)	33 (7%)	**456**

Figure 27: Primary operations - Unicondylar knee prostheses



Registration of MIS started in 2005

Computernavigation

Table 32: Primary operations - Total knee prostheses

Year	Yes		No		Missing		Total
2018	596	(10%)	4 770	(82%)	449	(8%)	**5 815**
2017	569	(10%)	4 513	(81%)	515	(9%)	**5 597**
2016	584	(11%)	4 413	(80%)	553	(10%)	**5 550**
2015	472	(9%)	4 167	(79%)	650	(12%)	**5 289**
2014	439	(9%)	3 882	(78%)	646	(13%)	**4 967**
2013	385	(9%)	3 402	(75%)	722	(16%)	**4 509**
2012	416	(9%)	3 292	(75%)	682	(16%)	**4 390**
2011	444	(11%)	3 170	(78%)	447	(11%)	**4 061**
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**
2007	374	(12%)	2 613	(84%)	119	(4%)	**3 106**
2006	254	(9%)	2 334	(87%)	109	(4%)	**2 697**
2005	185	(7%)	2 331	(84%)	272	(10%)	**2 788**

Figure 28: Primary operations - Total knee prostheses

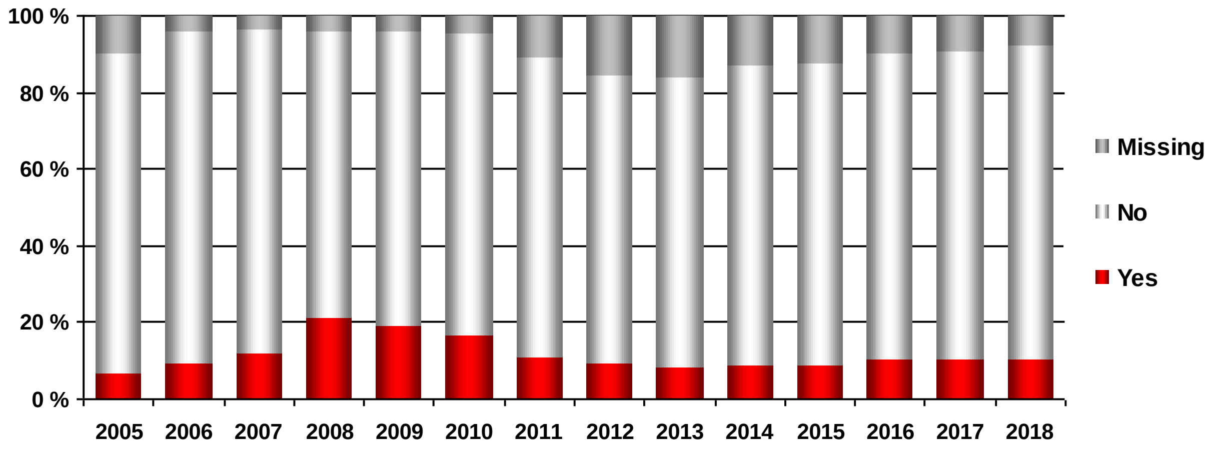


Table 33: Primary operations - Unicondylar knee prostheses

Year	Yes		No		Missing		Total
2018	1	(0%)	960	(96%)	38	(4%)	**999**
2017	0		809	(93%)	58	(7%)	**867**
2016	0		800	(93%)	63	(7%)	**863**
2015	3	(0%)	679	(91%)	68	(9%)	**750**
2014	0		518	(86%)	87	(14%)	**605**
2013	0		389	(82%)	88	(18%)	**477**
2012	0		418	(88%)	56	(12%)	**474**
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**
2007	4	(1%)	448	(96%)	14	(3%)	**466**
2006	15	(4%)	364	(91%)	20	(5%)	**399**
2005	2	(0%)	419	(92%)	35	(8%)	**456**

Registration of CAOS started in 2005

Cements used in total knee prostheses

Table 34: Primary operations - Femur

Cement	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Palacos R + G	5871	1659	1312	1271	1406	1444	1479	1429	1001	952	**17824**
Palacos w/gentamicin	14676										**14676**
Optipac Refobacin Bonecement R	840	1098	1326	1315	1322	1730	2150	1835	1451	1467	**14534**
Refobacin Bone Cement R	3642	366	409	397	349	353	158	551	882	49	**7156**
Cemex w/gentamicin	694	110	173	189	216	209	160	149	92	43	**2035**
Palacos R+G pro							5	15	359	1532	**1911**
SmartMix Cemvac + SmartSet GHV Genta	74		21	188	183	269	291	275	246	211	**1758**
Refobacin-Palacos	1577										**1577**
Simplex w/Tobramycin	596	78									**674**
Palacos	424										**424**
Cemex System Genta FAST	155	34	13								**202**
Simplex	184										**184**
CMW I w/gentamicin	169										**169**
CMW I	53										**53**
Other (n<50)	139		2	3	7	6	7	4	21	15	**204**
Missing information	54	8	15	4	2						**83**
Total	**29148**	**3353**	**3271**	**3367**	**3485**	**4011**	**4250**	**4258**	**4052**	**4269**	**63464**

Table 35: Primary operations - Tibia

Cement	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Palacos R + G	7601	2184	1950	1949	2132	2184	2224	2249	1142	1091	**24706**
Palacos w/gentamicin	17798										**17798**
Optipac Refobacin Bonecement R	909	1176	1416	1448	1475	1907	2318	1969	1520	1551	**15689**
Refobacin Bone Cement R	3859	393	446	472	394	374	171	566	931	47	**7653**
Palacos R+G pro					1		5	40	1129	2308	**3483**
Cemex w/gentamicin	817	112	181	190	214	222	165	150	91	43	**2185**
SmartMix Cemvac + SmartSet GHV Genta	84		21	188	182	270	293	277	246	211	**1772**
Refobacin-Palacos	1626										**1626**
Simplex w/Tobramycin	602	77									**679**
Palacos	452										**452**
Cemex System Genta FAST	231	38	13								**282**
CMW I w/gentamicin	193	1									**194**
Simplex	186										**186**
CMW I	54										**54**
Other (n<50)	157	1	3	5	9	6	12	5	30	17	**245**
Missing information	59	9	9	3	3	1	1				**85**
Total	**34628**	**3991**	**4039**	**4255**	**4410**	**4964**	**5189**	**5256**	**5089**	**5268**	**77089**

Cements used in unicondylar knee prostheses

Table 36: Primary operations - Femur

Cement	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Palacos R + G	851	234	220	255	288	390	426	364	168	130	**3326**
Palacos w/gentamicin	2211										**2211**
Optipac Refobacin Bonecement R	127	110	159	164	156	171	227	222	176	250	**1762**
Refobacin Bone Cement R	644	46	40	49	18	26	25	81	111		**1040**
Palacos R+G pro								6	110	214	**330**
Refobacin-Palacos	269										**269**
Simplex w/Tobramycin	201	14	4		2	2					**223**
Cemex w/gentamicin	63										**63**
Cemex System Genta FAST	56	7									**63**
SmartSet GHV	2		8	6	11	6	9	2	1	6	**51**
Simplex	40										**40**
Other (n<20)	65	3	7		2	3	2	1	2		**85**
Total	**4529**	**414**	**438**	**474**	**477**	**598**	**689**	**676**	**568**	**600**	**9463**

Table 37: Primary operations - Tibia

Cement	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Palacos R + G	858	236	221	255	289	391	425	366	169	129	**3339**
Palacos w/gentamicin	2205										**2205**
Optipac Refobacin Bonecement R	127	107	159	164	154	170	227	223	175	250	**1756**
Refobacin Bone Cement R	634	46	40	49	18	26	25	81	109		**1028**
Palacos R+G pro								6	108	214	**328**
Refobacin-Palacos	266										**266**
Simplex w/Tobramycin	196	14	4		2	2					**218**
Cemex w/gentamicin	63										**63**
Cemex System Genta FAST	55	7									**62**
SmartSet GHV	2		8	6	11	6	9	2	1	6	**51**
Simplex	39										**39**
Other (n<20)	60	3	7		2	3	2	1	2		**80**
Total	**4505**	**413**	**439**	**474**	**476**	**598**	**688**	**679**	**564**	**599**	**9435**

Antibiotic prophylaxis

Table 38: Primary operations

Drugs	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Cefalotin (Keflin)	30048	3628	3732	3941	4184	4893	5227	5640	5636	4704	**71633**
Cefuroksim (Zinacef, Cefuroxim, Lifurox)	3305	172	205	162	101	14		1			**3960**
Klindamycin (Dalacin, Clindamycin)	655	112	146	215	227	281	316	341	346	404	**3043**
Kloksacillin (Ekvacillin)	1107	249	235	265	185	134	208	23	1	1	**2408**
Cefazolin (Cephazolin)	38			1		1			339	1661	**2040**
Dikloksacillin (Diclocil, Dicillin)	1596	13	27	17	22	8	1	3	1	1	**1689**
Imipenem (Tienam)	51										**51**
Cefaleksin (Keflex, Cefalexin)	19			1		1					**21**
Benzylpenicillin (Penicillin G)	18				1	1					**20**
Erytromycin (Ery-max, Abboticin)	16				1						**17**
Vankomycin (Vancomycin, Vancocin)	3		2		1		1		3		**10**
Ciprofloksasin (Ciproxin)	7			1				2			**10**
Combination of 2 drugs	1075	175	157	271	277	242	306	462	223	107	**3295**
Other (n<10)	21		1	1	1	2	3	6	3		**38**
Missing	202	51	43	42	35	57	50	36	23	27	**566**
Total	**38161**	**4400**	**4548**	**4917**	**5035**	**5634**	**6112**	**6514**	**6575**	**6905**	**88801**

Table 39: Revisions

Drugs	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Cefalotin (Keflin)	2197	275	271	291	300	290	322	356	355	274	**4931**
Klindamycin (Dalacin, Clindamycin)	137	12	17	27	23	27	25	27	27	35	**357**
Cefuroksim (Zinacef, Cefuroxim, Lifurox)	297	8	6	12	2	1	1	1		1	**329**
Dikloksacillin (Diclocil, Dicillin)	184	3	8	12	8	3	6	5	4	9	**242**
Kloksacillin (Ekvacillin)	85	6	19	9	18	21	19	15	9	15	**216**
Cefazolin (Cephazolin)	1								25	158	**184**
Vankomycin (Vancomycin, Vancocin)	59	16	11	13	21	19	8	14	10	8	**179**
Benzylpenicillin (Penicillin G)	23	5	2		4	2	4	4	7	5	**56**
Ampicillin (Pentrexyl, Pondocillin, Doktacilin)	10		2		1				1	1	**15**
Ciprofloksasin (Ciproxin)	8					1		1	1		**11**
Cefotaksim (Claforan)	1	1				1	2		3	2	**10**
Combination of 2 drugs	306	63	71	123	98	122	158	139	150	104	**1334**
Other (n<10)	15	3	1	1	1	3	4	1	1	2	**32**
Missing	130	19	23	5	6	8	7	41	38	48	**325**
Total	**3453**	**411**	**431**	**493**	**482**	**498**	**556**	**604**	**631**	**662**	**8221**

Patient specific instruments

Table 40:

Year	Yes	No	Missing	Total
2018	7	7832	1 004	**8 843**
2017	1	7190	1 147	**8 338**
2016	5	7068	1 157	**8 230**
2015	14	6219	1 517	**7 750**
2014	22	5499	1 570	**7 091**
2013	25	4678	1 782	**6 485**
2012	88	4242	1 959	**6 289**
2011	65	1695	4 142	**5 902**

Registration started in 2011

Drain

Table 41:

Year	Yes	No	Missing	Total
2018	1 190	6773	880	**8 843**
2017	1 586	5706	1 046	**8 338**
2016	2 061	5160	1 009	**8 230**
2015	2 277	4688	785	**7 750**
2014	2 244	3923	924	**7 091**
2013	2 085	3347	1 053	**6 485**
2012	2 208	2841	1 240	**6 289**
2011	1 096	1128	3 678	**5 902**

Registration started in 2011

Torniquet

Table 42:

	Torniquet			Torniquet in cementing	
Year	Yes	No	Mean Time (min) *	Yes	No
2018	1 900	708	69,6	**1 309**	**790**

Registration started in 2018. There are 99 forms are missing registration

* Mean duration of torniquet time

Completeness of reporting analysis for the Knee Arthroplasty Register, 2015-2016

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. Some hospitals have few knee arthroplasty operations and the completeness of reporting rate must be seen in this light.

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

Type	Code	Description
Primary operation	**NGB 0***	Primary partial prosthetic replacement of knee joint not using cement
	NGB 1*	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
Revision level 1	**NGC 0***	Secondary implantation of partial prosthesis in knee joint not using cement
	NGC 1*	Secondary implantation of partial prosthesis in knee joint using cement
	NGC 2*	Secondary implantation of total prosthesis in knee joint not using cement
	NGC 3*	Secondary implantation of total prosthesis in knee joint using hybrid technique
	NGC 4*	Secondary implantation of total prosthesis in knee joint using cement
	NGC 99	Other secondary prosthetic replacement in knee joint
	NGU 0*	Removal of partial prosthesis from knee joint
	NGU 1*	Removal of total prosthesis from knee joint

The completeness of reporting rate for the Knee Arthroplasty Register was calculated as follows:

$$\frac{(Only\ NAR + Inclusion\ in\ both\ registers)}{(Only\ NPR + Only\ NAR + Inclusion\ in\ both\ registers)}$$

Completeness of reporting for the NPR was calculated in a similar way:

$$\frac{(Only\ NPR + Inclusion\ in\ both\ registers)}{(Only\ NAR + Only\ NPR + Inclusion\ in\ both\ registers)}$$

Primary operations. In 2015 and 2016, 12 884 primary knee replacements were reported to one or both of the registers. 97.0% of these were reported to the NAR, while 96.8% 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 in or other interventions than knee arthroplasties were incorrectly coded with NGB 0*/NGB 1*/NGB 20/NGB 30/NGB 40.

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

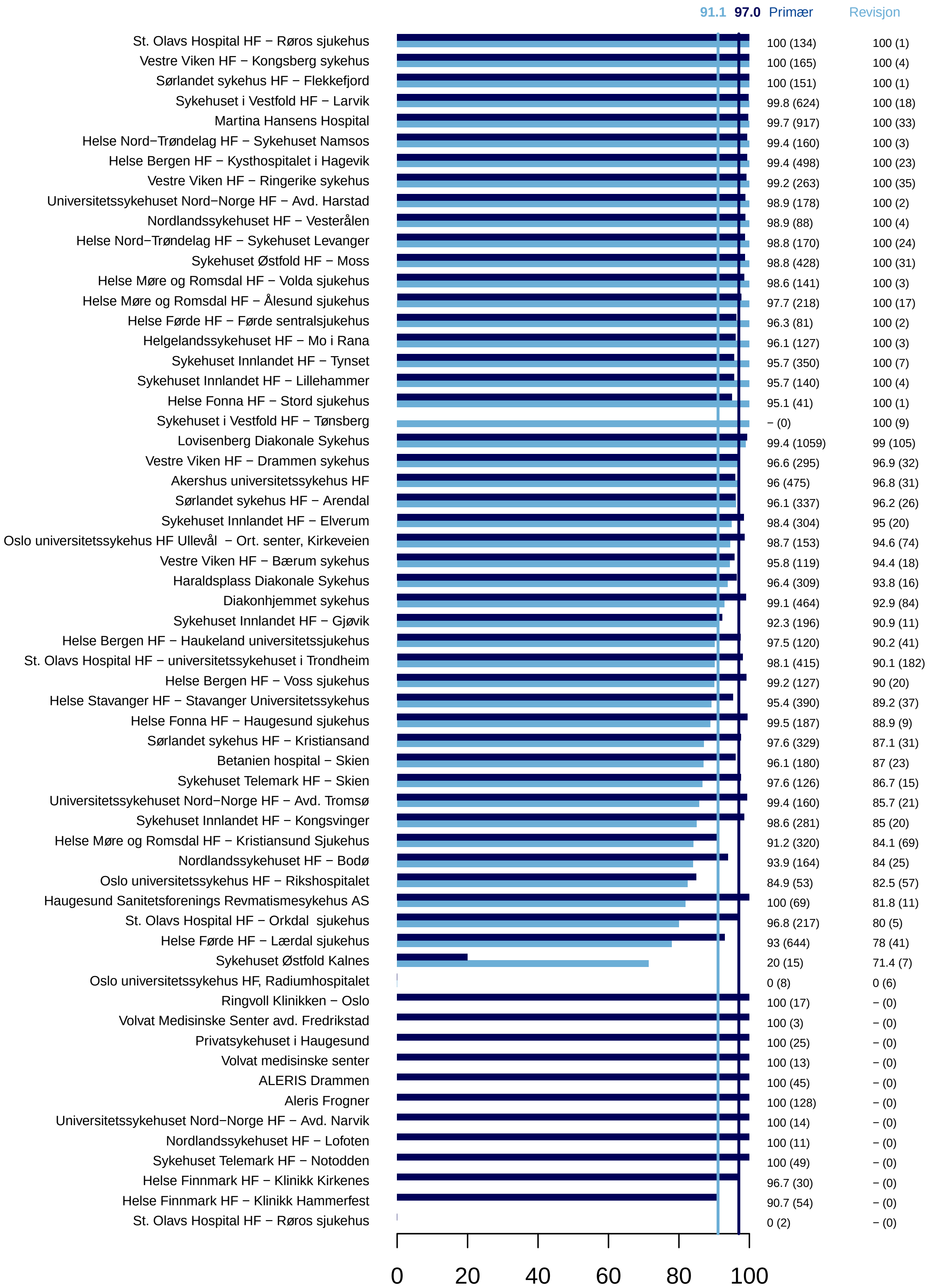
Revision operations. In 2015 and 2016, 1272 revisions were reported to one or both of the registers. 91.1% of these were reported to the NAR, while 91.1% were reported to the NPR (revision level 1). Completeness of reporting varies much between the different hospitals. A low completeness of reporting 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:

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 primary and revision operations knee prosthesis, 2015−2016



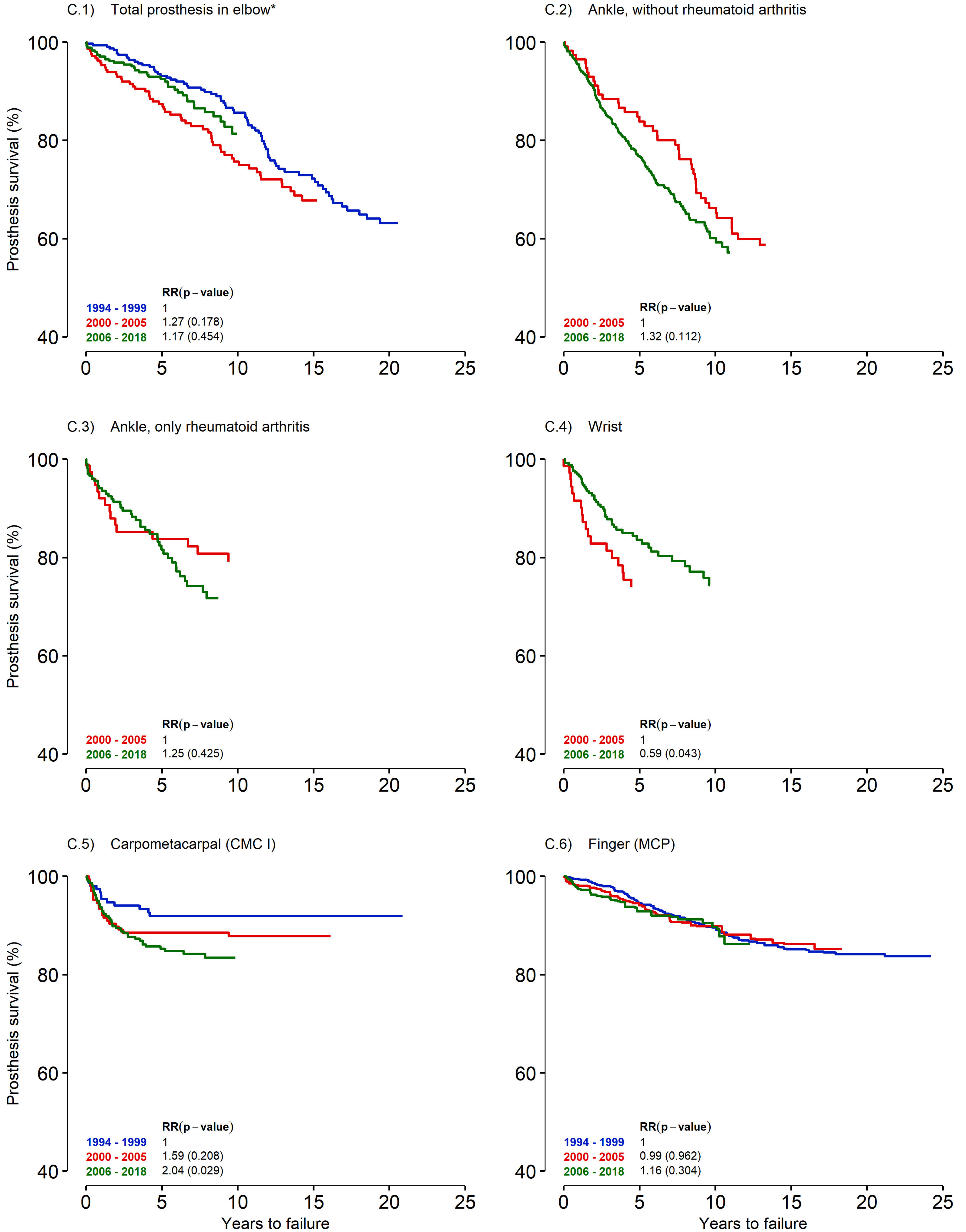
Dark blue bars and first number to the right of the bars gives completeness of reporting for primary operations. Light blue bars and second number to the right of the bars gives completeness of reporting for revision operations (level 1). The numbers in brackets gives the number of operations registered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

CONTENTS

Toe joint prostheses

Completeness analysis

Survival curves for joint prosthesis
1994-2018

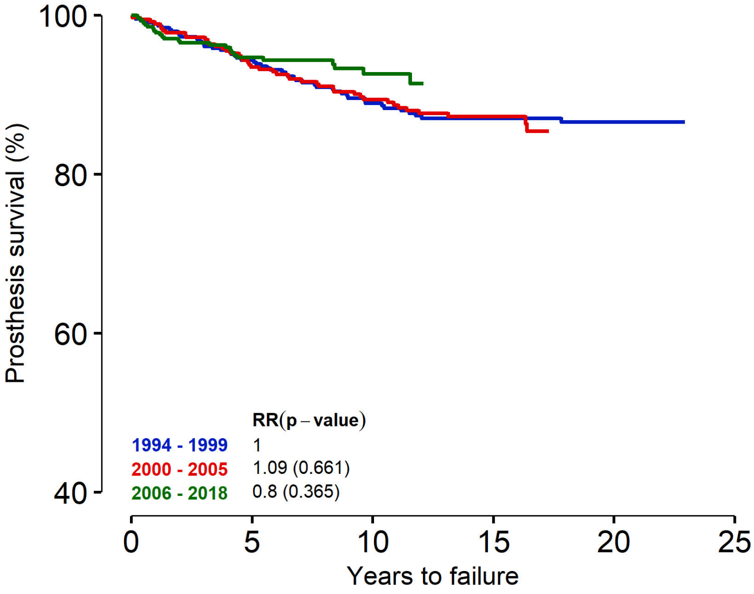


*Caput radii prosthesis for acute fracture is not included.

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

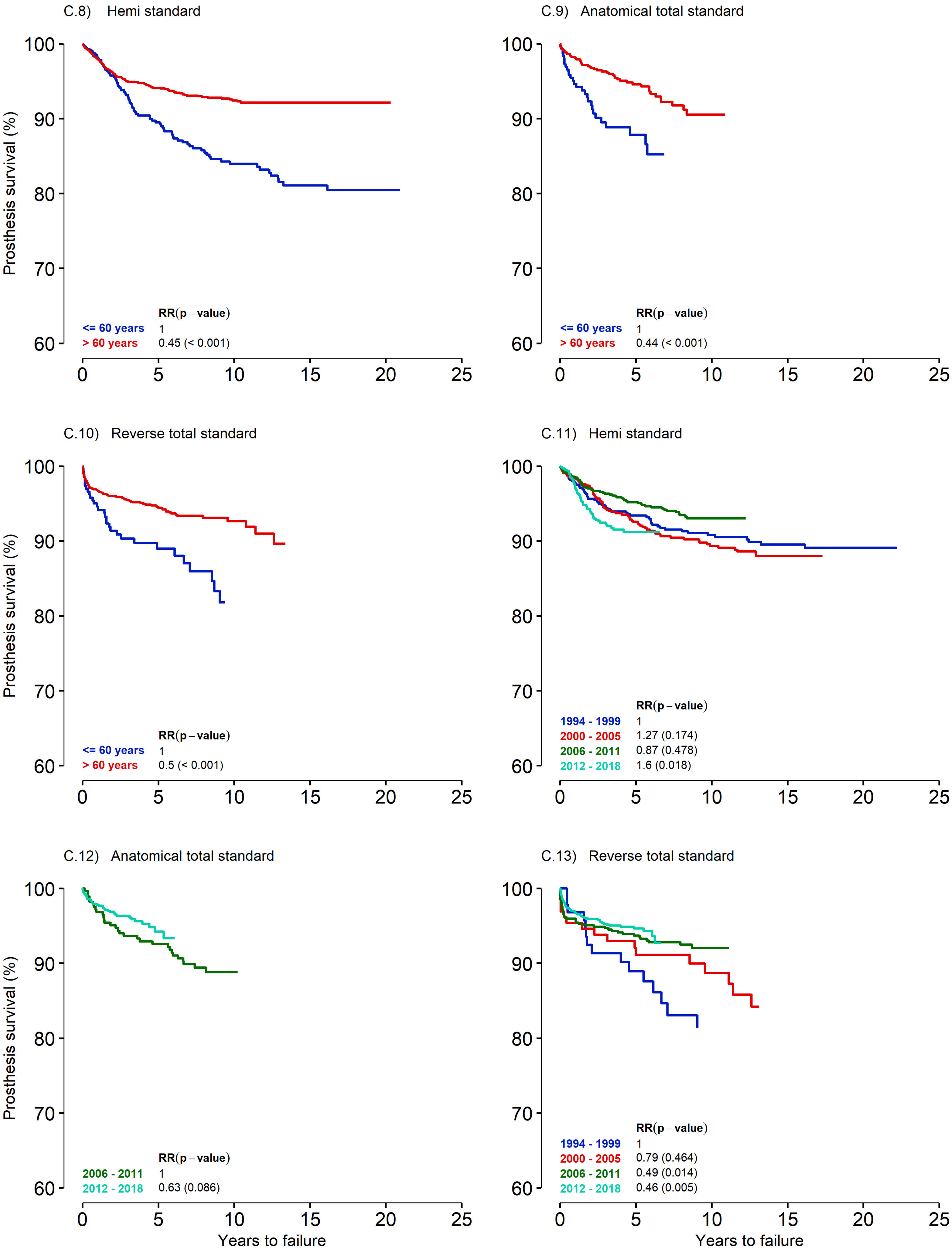
Survival curves for joint prosthesis
1994-2018

C.7) Toe



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

Survival curves for shoulder prosthesis
1994-2018



Kaplan-Meier survival curves. Survival estimate is given as long as > 50 prosthesis are in the risk set.

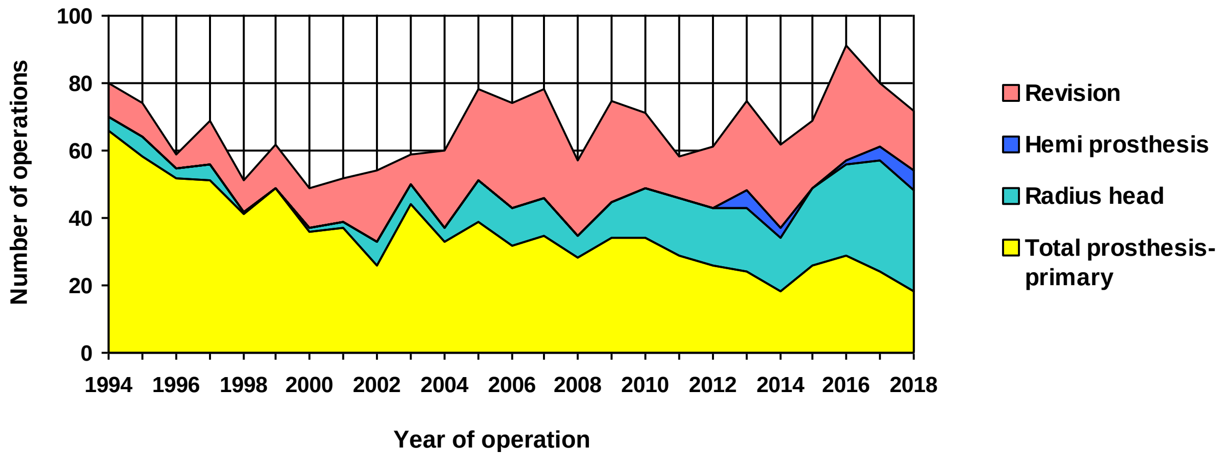
ELBOW PROSTHESES

Table 1: Annual number of prostheses

Year	Hemi prosthesis		Primary operations Total prosthesis		Radius head		Reoperations *		Revisions		Total
2018	6	(8,3%)	18	(25,0%)	30	(41,7%)	1	(1,4%)	17	(23,6%)	**72**
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	(29,0%)	16	(25,8%)			25	(40,3%)	**62**
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**
2004			33	(55,0%)	4	(6,7%)			23	(38,3%)	**60**
2003			44	(74,6%)	6	(10,2%)			9	(15,3%)	**59**
1994-02			416	(75,6%)	29	(5,3%)			105	(19,1%)	**550**
Total	**19**	**(1,1%)**	**889**	**(53,2%)**	**288**	**(17,2%)**	**3**	**(0,2%)**	471	(28,2%)	**1670**

* 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



52,7 % of all operations were performed on the right side. 74,1 % performed in women. Mean age: 62,1 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
2018	1	9	4			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	
2004	2	23	2	2		4		2	2
2003	5	32	6					3	
1994-02	13	384	13	1		5	1	13	5
Total	**53**	**667**	**99**	**6**	**3**	**67**	**3**	**47**	**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
2018	1		1			5			
2017						4			
2016						1			
2014		1				3			
2013			1			4			
Total	**1**	**1**	**2**	**0**	**0**	**17**	**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
2018			1			28		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
2004	1		1			2			
2003			1			5			
1994-02	1	13	8			7		4	
Total	**9**	**14**	**42**	**0**	**0**	**223**	**0**	**9**	**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
2018	24	(100,0%							**24**
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**
2004	16	(48,5%)			17	(51,5%)			**33**
2003	25	(56,8%)	3	(6,8%)	16	(36,4%)			**44**
1994-02	220	(52,9%)	92	(22,1%)	101	(24,3%)	3	(0,7%)	**416**
Total	**624**	**(68,6%)**	**95**	**(10,5%)**	**180**	**(19,8%)**	**10**	**(1,1%)**	**909**

Table 6: Primary operations - Ulna/radius

Year	Cement with antibiotics		Cement without antibiotics		Uncemented		Missing		Total
2018	21	(43,8%)			27	(56,3%)			**48**
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**
2004	30	(81,1%)			7	(18,9%)			**37**
2003	41	(82,0%)	4	(8,0%)	4	(8,0%)	1	(2,0%)	**50**
1994-02	312	(70,1%)	92	(20,7%)	39	(8,8%)	2	(0,4%)	**445**
Total	**839**	**(71,3%)**	**97**	**(8,2%)**	**225**	**(19,1%)**	**16**	**(1,4%)**	**1 177**

Prostheses used in elbow prostheses - Total prostheses

Table 7: Primary operations - Humerus

Prostheses	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Discovery	70	24	21	18	19	9	18	16	5	1	**201**
Norway	180										**180**
Kudo	162										**162**
IBP	125	5	2	3	1						**136**
GSB III	59	5	2	4	3	3	1				**77**
NES	54										**54**
Nexel							4	13	19	16	**52**
Mutars	3		1	1		1	2			1	**9**
IBP Reconstruction	5										**5**
Coonrad/Morrey	1		2			1	1				**5**
Other (n < 5)	2		1		1	4					**8**
Total	**661**	**34**	**29**	**26**	**24**	**18**	**26**	**29**	**24**	**18**	**889**

Table 8: Primary operations - Ulna/radius

Prostheses	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Discovery	70	24	21	18	19	9	18	16	5	1	**201**
Norway	179										**179**
Kudo	162										**162**
IBP	125	5	2	3	1						**136**
GSB III	59	5	2	4	3	3	1				**77**
NES	55										**55**
Nexel							4	13	19	16	**52**
Mutars	3		1	1		1	2			1	**9**
IBP Reconstruction	5										**5**
Coonrad/Morrey	1		2			1	1				**5**
Other (n < 5)	2		1		1	3					**7**
Total	**661**	**34**	**29**	**26**	**24**	**17**	**26**	**29**	**24**	**18**	**888**

Prostheses used in elbow prostheses - Hemiprostheses

Table 9: Primary operations - Humerus

Prostheses	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Latitude Anatomic hemi					5	3		1	4	6	**19**
Total					**5**	**3**	**0**	**1**	**4**	**6**	**19**

Prostheses used in elbow prostheses - Radius head prostheses

Table 10: Primary operations - Radius

Prostheses	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Acumed anatomic radial head	1		4	11	16	5	13	13	12	16	**91**
rHead	42	9	8	1		2		1	1		**64**
Explor			2	2	3	5	7	10	17	14	**60**
Radial Head	24	5									**29**
Silastic H.P. 100	20										**20**
Link radius			2	1		4	3				**10**
Evolve	3			2					3		**8**
Other (n < 5)	1	1	1					3			**6**
Total	**91**	**15**	**17**	**17**	**19**	**16**	**23**	**27**	**33**	**30**	**288**

Reasons for revisions in elbow prostheses

Table 11:

Year	Loose proximal comp.	Loose distal comp.	Dislocation	Instability	Malalignment	Deep infection	Fracture (near implant)	Pain	Defect polyethylene	Other	Missing
2018	4	4	2	3		3	4	3	7	4	
2017	6	3		3		6	7	2	7	5	
2016	10	10	1		1	12	3	2	6	5	
2015	4	5	1	1		6		1	7	3	
2014	5	5		1	1	6	3	4	6	5	
2013	4	3	1	2		8	2	1	10	8	
2012	1	3	2	1		7		1	5	8	
2011	3	5	2	1		1	2	2	3	3	1
2010	3	8	2	2	2	3	7	2	2	6	
2009	6	11		3	2	2	5	4	5	11	
2008	6	5		1	4	5	4	3	2	6	
2007	5	12	1	2	1	4	1	5	4	10	
2006	11	13	2	3	1	3	4	1	2	8	
2005	11	9	4	1	1	2	5	3	3		
2004	8	11	2	3		3	5	2	2	3	
2003	4	4	1			3	2	1		1	
1994-02	46	45	7	8	6	6	19	22	4	15	3
Total	**137**	**156**	**28**	**35**	**19**	**80**	**73**	**59**	**75**	**101**	**4**

More than one reason for revision is possible

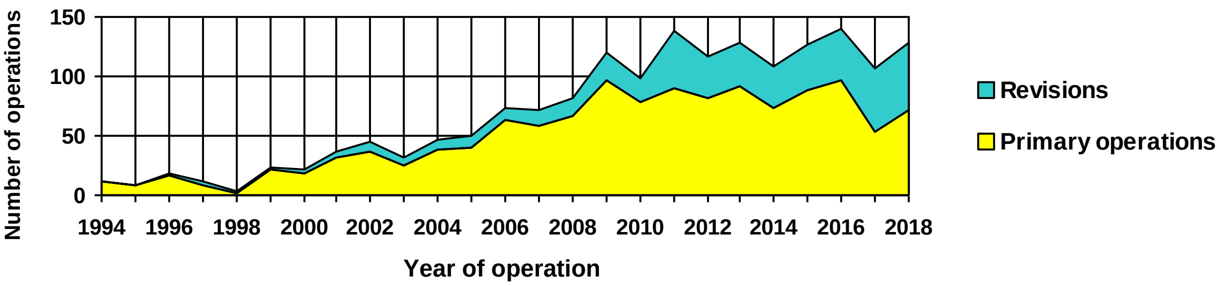
ANKLE PROSTHESES

Table 1: Annual number of operations

Year	Primary operations		Reoperations *		Revisions		Total
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**
2004	39	(83,0%)			8	(17,0%)	**47**
2003	25	(78,1%)			7	(21,9%)	**32**
1994-02	155	(86,1%)			25	(13,9%)	**180**
Total	**1270**	**(72,7%)**	**1**	**(0,1%)**	**477**	**(27,3%)**	**1748**

* 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. 53,6 % performed in women. Mean age: 60 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
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	
2004	8	10	17		1			3	1
2003	7	11	2	1				4	
1994-02	25	99	20	3	1			17	
Total	**350**	**336**	**400**	**13**	**160**	**1**	**6**	**80**	**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
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%)			61	(92,4%)	4	(6,1%)	**66**
2007					58	(100,0%)			**58**
2006					63	(100,0%)			**63**
2005	1	(2,5%)			39	(97,5%)			**40**
2004					39	(100,0%)			**39**
2003	1	(4,0%)			24	(96,0%)			**25**
1994-02	21	(13,5%)	10	(6,5%)	123	(79,4%)	1	(0,6%)	**155**
Total	**29**	**(2,3%)**	**10**	**(0,8%)**	**1 221**	**(96,2%)**	**9**	**(0,7%)**	**1 269**

Table 4: Primary operations - Talus

Year	Cement with antibiotics		Cement without antibiotics		Uncemented		Missing		Total
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%)			61	(92,4%)	4	(6,1%)	**66**
2007					58	(100,0%)			**58**
2006	1	(1,6%)			62	(98,4%)			**63**
2005	1	(2,5%)			39	(97,5%)			**40**
2004					39	(100,0%)			**39**
2003	1	(4,0%)	1	(4,0%)	23	(92,0%)			**25**
1994-02	22	(14,2%)	10	(6,5%)	123	(79,4%)			**155**
Total	**31**	**(2,4%)**	**11**	**(0,9%)**	**1 220**	**(96,1%)**	**7**	**(0,6%)**	**1 269**

Prostheses used in ankle prostheses

Table 5: Primary operations - Tibia

Prostheses	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
STAR	448	40	50	39	38		1				**616**
Salto Talaris					26	62	85	81	28	35	**317**
Mobility	32	26	16	12	15						**101**
CCI	16	13	17	12	11	9					**78**
TM Total Ankle						3	3	16	22	20	**64**
Norwegian TPR	32										**32**
Rebalance			7	8							**15**
INFINITY									2	11	**13**
Salto Mobile				11	1						**12**
Hintegra	11										**11**
Integra Cadence									2	4	**6**
AES	3										**3**
Total	**542**	**79**	**90**	**82**	**91**	**74**	**89**	**97**	**54**	**70**	**1268**

Table 6: Primary operations - Talus

Prostheses	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
STAR	448	40	50	39	38		1				**616**
Salto Talaris					22	61	84	80	27	35	**309**
Mobility	32	26	16	12	15						**101**
CCI	16	13	17	12	11	9					**78**
TM Total Ankle						3	3	16	22	20	**64**
Norwegian TPR	32										**32**
Rebalance			7	8							**15**
INFINITY									2	11	**13**
Salto Mobile				11	1						**12**
Hintegra	11										**11**
Salto XT					4	1	1	1	1		**8**
Integra Cadence									2	4	**6**
AES	3										**3**
Total	**542**	**79**	**90**	**82**	**91**	**74**	**89**	**97**	**54**	**70**	**1268**

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

Prosthesis	Material	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
STAR	Uhmwpe	445	40	50	39	32		1				**607**
TM Total Ankle	HXLPE						3	3	15	21	20	**62**
INFINITY	Uhmwpe									2	11	**13**
Integra Cadence	HXLPE									2	4	**6**
Total		**445**	**40**	**50**	**39**	**32**	**3**	**4**	**15**	**25**	**35**	**688**

Reasons for revisions in ankle prostheses

Table 8:

Year	Loose proximal comp.	Loose distal comp.	Dislocation	Instability	Malalignment	Deep infection	Fracture (near implant)	Pain	Defect polyethylene	Osteolysis	Poor mobility	Other	Missing
2018	11	12		3	10	13	3	29	18	2		1	
2017	14	10		2	8	4	2	25	9	8		5	
2016	13	12		2	2	3	2	15	5	2	2		
2015	6	6		1	7	4		16	10	6			
2014	14	11		1	4	1		14	9			2	
2013	6	3	1	5	9	3	1	14	17	3			
2012	7	4		2	1	3	1	14	9	1		2	
2011	9	6	1	8	7	5	1	17	10		1	1	
2010	2	1		3	3	1	2	12	3		3		
2009	7	3	1	5	7	3	1	9	4				
2008	3	4	1	2	5		1	4	2			3	
2007	2	2		2	1	1		7	3		1		
2006	3	2		2	2	1	1	4	1				
2005	1	3		1	2	1		4	1		1		
2004	5	4		1	1	2		1	1			1	
2003	3	3			2	1		2	1				
1994-02	15	10		3	5		1	10	1			2	
Total	**121**	**96**	**4**	**43**	**76**	**46**	**16**	**197**	**104**	**22**	**8**	**17**	**0**

More than one reason for revision is possible

FINGER JOINT PROSTHESES

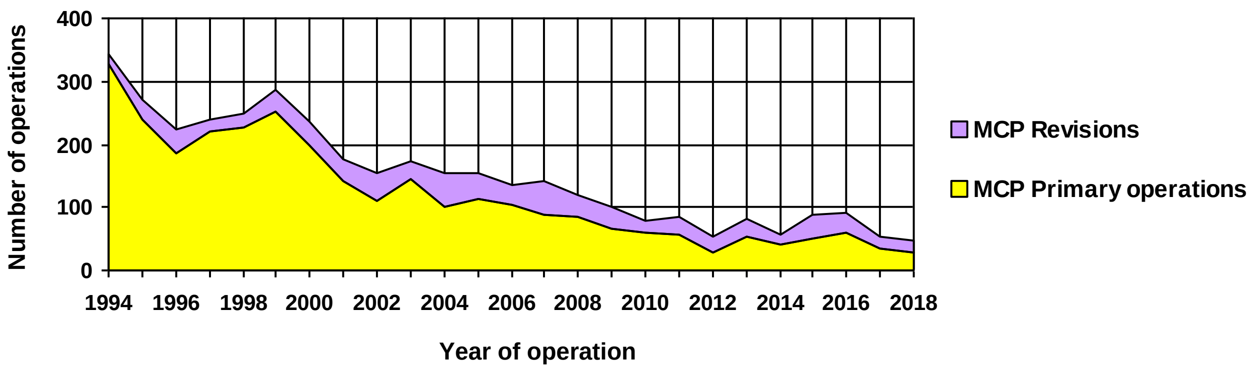
Table 1: Annual number of operations - MCP

Year	Primary operations		Revisions		Total
2018	28	(59,6%)	19	(40,4%)	**47**
2017	35	(67,3%)	17	(32,7%)	**52**
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**
2004	101	(66,0%)	52	(34,0%)	**153**
2003	145	(83,8%)	28	(16,2%)	**173**
1994-02	1902	(87,4%)	274	(12,6%)	**2176**
Total	**3018**	**(79,7%)**	**768**	**(20,3%)**	**3786**

Table 2: Annual number of operations - PIP

Year	Primary operations		Revisions		Total
2018	8	(88,9%)	1	(11,1%)	**9**
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**
2004	7	(87,5%)	1	(12,5%)	**8**
2003			1	(100,0%)	**1**
1994-02	31	(83,8%)	6	(16,2%)	**37**
Total	**105**	**(86,8%)**	**16**	**(13,2%)**	**121**

Figure 1: Annual number of operations



61,4 % of all operations were performed on the right side. 87,6 % performed in women. Mean age: 61,3 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
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
2004	5	95						1	1
2003	1	132		3				9	
2002	2	103						6	
2001	5	132						5	
2000	9	186					1	3	
1999	2	249		3				2	
1998	12	213		1		1		5	1
1997	3	215						5	
1996		181		1				5	
1995	1	228	3					9	
1994		323						5	
Total	**88**	**2831**	**16**	**11**	**1**	**1**	**4**	**95**	**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
2018	5	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						
2004	6	1						1	
2002	3	2	1					2	
2001		2							
2000	1	3							
1999	1	6						1	
1998		4							
1996	1	2	1			1			
1995		1				1			
1994		1							
Total	**46**	**37**	**13**	**0**	**2**	**2**	**3**	**6**	**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
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	**6**	**(0,2%)**	**2**	**(0,1%)**	**2 995**	**(99,3%)**	**12**	**(0,4%)**	**3 015**

Table 6: Primary operations - Distal

Year	Cement with antibiotics	Cement without antibiotics	Uncemented		Missing	Total
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			**39**	**(100,0%)**		**39**

Use of cement in PIP prostheses

Table 7: Primary operations - Proximal

Year	Cement with antibiotics	Cement without antibiotics	Uncemented		Missing		Total
2018			8	(100,0%)			**8**
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			**102**	**(97,1%)**	**3**	**(2,9%)**	**105**

Table 8: Primary operations - Distal

Year	Cement with antibiotics	Cement without antibiotics	Uncemented		Missing		Total
2018			8	(100,0%			**8**
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			**43**	**(97,7%)**	**1**	**(2,3%)**	**44**

Finger prostheses

Table 9: MCP prostheses in primary operations - Proximal

Prostheses	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Silastic HP 100	1814	53	49	27	25		5	1	5		**1979**
Avanta	554	1					1		4		**560**
Silastic HP 100 II	2	5	6		28	41	45	56	26	26	**235**
NeuFlex	198										**198**
Ascension MCP	26	1	2			1		2		2	**34**
MCS	6										**6**
SR Avanta								2			**2**
Moje	1										**1**
Total	**2601**	**60**	**57**	**27**	**53**	**42**	**51**	**61**	**35**	**28**	**3015**

Table 10: MCP prostheses in primary operations - Distal

Prostheses	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Ascension MCP	24	1	2			1		2		2	**32**
MCS	6										**6**
Moje	1										**1**
Total	**31**	**1**	**2**			**1**		**2**		**2**	**39**

Table 11: PIP prostheses in primary operations - Proximal

Prostheses	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Silastic HP 100	21				4	2					**27**
SR Avanta	10	4	1		1	1	5	1			**23**
Ascension MCP	18										**18**
TACTYS								2	6	6	**14**
NeuFlex	7										**7**
Ascension PIP PyroCarbon		2	2			1				2	**7**
MCS	4										**4**
Avanta	3				1						**4**
Moje	1										**1**
Total	**64**	**6**	**3**		**6**	**4**	**5**	**3**	**6**	**8**	**105**

Table 12: PIP prostheses in primary operations - Distal

Prostheses	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Ascension MCP	18										**18**
TACTYS								2	6	6	**14**
Ascension PIP PyroCarbon		2	2			1				2	**7**
MCS	4										**4**
Moje	1										**1**
Total	**23**	**2**	**2**			**1**		**2**	**6**	**8**	**44**

Finger prostheses - Reasons for revisions

Table 13: MCP prostheses - Reasons for revisions

Year	Loose proximal comp.	Loose distal comp.	Dislocation	Instability	Malalignment	Deep infection	Fracture (near implant)	Pain	Defect polyethylene	Fractured/defect component	Other	Missing
2018			4	7	1		6	5		8	4	
2017			1	3			9	4			10	
2016			5	5	8	1	2	10	9	5	9	
2015	6	2		6		1		15	9	8	10	
2014		1		4				2	4		5	
2013				4	13			13		10	1	
2012			1	2	4			10	4	13	1	
2011					6	2		13		12	8	
2010	1	1	2				2	3		10	3	
2009	1	2	3	2	2	4		6	3	22	5	
2008		1	2	4	15	4		13	5	10	5	
2007		3	11	8	2	1		16		39		4
2006			4	10	4	1		7	4	11		1
2005			5	6	6			12	5	24	4	2
2004	2	5		8	8			12		30	5	4
2003		1	1		9			8	1	17	2	
2002		3		12	7			15		27	4	
2001		3	3	4	7			11	3	9	10	
2000		2	1	2	1	4	8	4		20	5	1
1999		1	4	3	6		4	7		14	8	
1998		1	1	3	5		1	2		11	1	
1997		1	3	4	4	1		8		11	1	
1996				8				13		22	7	2
1995	4				4		7	12		13	5	
1994					1		1	1		2	4	6
Total	**14**	**27**	**51**	**105**	**113**	**19**	**40**	**222**	**47**	**348**	**117**	**20**

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

Table 14: PIP prostheses - Reasons for revisions

Year	Loose proximal comp.	Loose distal comp.	Dislocation	Instability	Malalignment	Deep infection	Fracture (near implant)	Pain	Defect polyethylene	Fractured/defect component	Other	Missing
2018									1			
2016	1											
2008	1	1	1	1	1			2				
2007								1			1	
2006					1							
2005										1		
2004	1	1										
2003	1	1										
1998				1						1		
1997										4		
1996	1											
Total	**5**	**3**	**1**	**2**	**2**	**0**	**0**	**3**	**1**	**6**	**1**	**0**

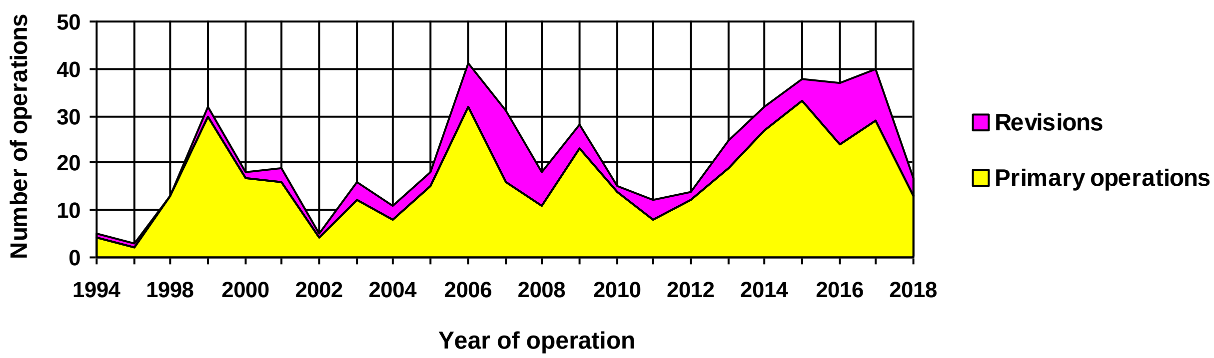
Revision reasons are not mutually exclusive. More than one reason for revision is possible

WRIST PROSTHESES

Table 1: Annual number of operations

Year	Primary operations		Revisions		Total
2018	13	(76,5%)	4	(23,5%)	**17**
2017	29	(72,5%)	11	(27,5%)	**40**
2016	24	(64,9%)	13	(35,1%)	**37**
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**
2004	8	(72,7%)	3	(27,3%)	**11**
2003	12	(75,0%)	4	(25,0%)	**16**
1994-02	86	(90,5%)	9	(9,5%)	**95**
Total	**382**	**(78,3%)**	**106**	**(21,7%)**	**488**

Figure 1: Annual number of operations



57,2 % of all operations were performed on the right side. 61,1 % performed in women. Mean age: 56,3 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
2018	4	2	2		3			3	
2017	2	3	11		12	1	1	4	
2016	4		10		9	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	
2004		8							
2003	1	5	3					3	
1994-02	2	77	2	1				4	
Total	**51**	**145**	**94**	**1**	**60**	**2**	**3**	**45**	**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
2018					4	(100,0%)			**4**
2017					27	(100,0%)			**27**
2016					24	(100,0%)			**24**
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**	**(1,9%)**	**1**	**(0,3%)**	**356**	**(96,5%)**	**5**	**(1,4%)**	**369**

Table 4: Primary operations - Distal

Year	Cement with antibiotics		Cement without antibiotics		Uncemented		Missing		Total
2018					13	(100,0%)			**13**
2017					29	(100,0%)			**29**
2016					24	(100,0%)			**24**
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**	**(2,4%)**			**359**	**(97,3%)**	**1**	**(0,3%)**	**369**

Wrist prostheses

Table 5: Primary operations - Proximal

Prostheses	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Motec Wrist	77	14	5	5	4	9	17	11	9	3	**154**
Biax	90										**90**
Remotion Wrist			3	3	10	13	13	8	6		**56**
Elos[1]	23										**23**
Scheker Radio-ulnar	2			1	3	3	1	3	8	1	**22**
Uhead (Druj)				3	2	2	1	2	4		**14**
Silastic ulnar head	7										**7**
Eclypse radio-ulnar	2										**2**
TMW	1										**1**
Total	**202**	**14**	**8**	**12**	**19**	**27**	**32**	**24**	**27**	**4**	**369**

Table 6: Primary operations - Distal

Prostheses	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Motec Wrist	77	14	5	5	4	9	17	11	9	3	**154**
Biax	89										**89**
Remotion Wrist			3	3	10	13	14	8	6		**57**
Elos[1]	23										**23**
Scheker Radio-ulnar				1	3	3	1	3	8	1	**20**
Uhead (Druj)				3	2	2	1	2	4		**14**
Herbert UHP										6	**6**
RCPI									2	3	**5**
TMW	1										**1**
Total	**190**	**14**	**8**	**12**	**19**	**27**	**33**	**24**	**29**	**13**	**369**

Table 7: Reasons for revisions

Year	Loose proximal comp.	Loose distal comp.	Dislocation	Instability	Malalignment	Deep infection	Fracture (near implant)	Pain	Defect polyethylene	Other	Missing	Total
2018	2	1					1	1				5
2017	3	5			1			3		1		13
2016		4	2	1	1	2		3	1	1		15
2015		2		1		1		1	1	1		7
2014		1				1		1		3		6
2013		1			1	1		3	1	1		8
2012					2			1				3
2011		2			1	1		2				6
2010										1		1
2005-09	3	19	1	3	2	10		8	1	4		51
2000-04	1	5	1	1	5	1		5				19
1994-99	1				1	1		3				6
Total	**10**	**40**	**4**	**6**	**14**	**18**	**1**	**31**	**4**	**12**	**0**	**139**

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

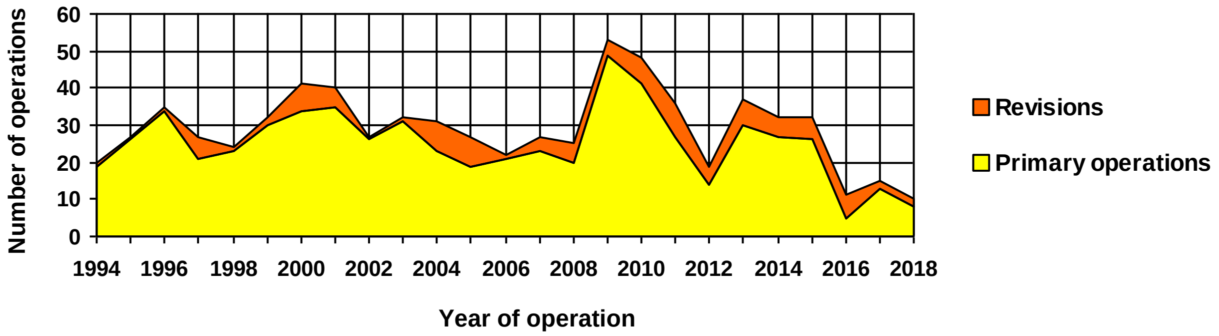
[1]Elos are 3 different development models of Motec Wrist. Motec Wrist was previously sold under the name Gibbon.

CARPOMETACARPAL PROSTHESES (CMC I)

Table 1: Annual number of operations

Year	Primary operations		Revisions		Total
2018	8	(80,0%)	2	(20,0%)	**10**
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	20	(80,0%)	5	(20,0%)	**25**
2007	23	(85,2%)	4	(14,8%)	**27**
2006	21	(95,5%)	1	(4,5%)	**22**
2005	19	(70,4%)	8	(29,6%)	**27**
2004	23	(74,2%)	8	(25,8%)	**31**
2003	31	(96,9%)	1	(3,1%)	**32**
1994-02	248	(90,8%)	25	(9,2%)	**273**
Total	**625**	**(85,6%)**	**105**	**(14,4%)**	**730**

Figure 1: Annual number of operations



47,5 % of all operations were performed on the right side. 81,6 % performed in women. Mean age: 62,7 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
2018	8								
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	17	3							
2007	17	6						1	
2006	15	4						2	
2005	16	2						1	
2004	21							2	
2003	23	5						3	
1994-02	167	72	2	4				9	
Total	**494**	**109**	**3**	**5**	**0**	**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
2018				8	(100,0%)			**8**
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**
2011				27	(100,0%)			**27**
2010				40	(97,6%)	1	(2,4%)	**41**
2009				44	(91,7%)	4	(8,3%)	**48**
2008				20	(100,0%)			**20**
2007				23	(100,0%)			**23**
2006				21	(100,0%)			**21**
2005				19	(100,0%)			**19**
2004				23	(100,0%)			**23**
2003	1	(3,2%)		30	(96,8%)			**31**
1994-02	2	(0,8%)		245	(98,8%)	1	(0,4%)	**248**
Total	**3**	**(0,5%)**		**614**	**(98,4%)**	**7**	**(1,1%)**	**624**

Carpometacarpal prostheses - Prosthesis brand

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

Prostheses	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Swanson Silastic Trapezium	314	11	9	6	8	8	4	2		1	**363**
Swanson Titanium Basal	71	1									**72**
Motec	21	17	15	2							**55**
Elektra	15	12	3	5	4	5	8	2			**54**
Motec II				1	18	14	14				**47**
ARPE								1	9	4	**14**
Avanta Trapezium	7										**7**
Custom made	5										**5**
IVORY									4		**4**
Moovis										3	**3**
Total	**433**	**41**	**27**	**14**	**30**	**27**	**26**	**5**	**13**	**8**	**624**

Reasons for revisions

Table 5:

Year	Loose proximal comp.	Loose distal comp.	Dislocation	Instability	Malalignment	Deep infection	Fracture (near implant)	Pain	Defect polyethylene	Other	Missing
2018	2					1					
2017			1			1		1			
2016	3		1	1				2			
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		3	2		1		3			
2005-09	1		10	4				13	1	3	
2000-04	1		8	3				16	1	2	1
1994-99	1		6					4		5	
Total	**32**	**0**	**39**	**11**	**0**	**4**	**1**	**49**	**2**	**11**	**1**

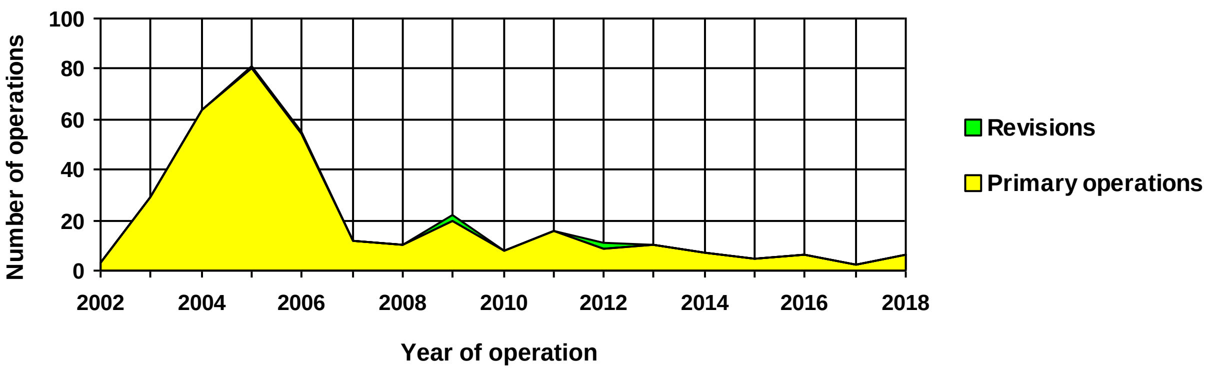
Revision reasons are not mutually exclusive. More than one reason for revision is possible

LUMBAR DISC PROSTHESES

Table 1: Annual number of operations

Year	Primary operations		Revisions		Total
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	**341**	**(98,3%)**	**6**	**(1,7%)**	**347**

Figure 1: Annual number of operations



59,9 % 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
2018	1				6			
2017					2			
2016	1				6			
2015					5			
2014			5		2			
2013				1	9			
2012					9			
2011			6		10			
2010				1	6		2	
2005-09	8	1	78	38	77		5	
2000-04	2		72	3		1	21	
Totalt	**12**	**1**	**161**	**43**	**132**	**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
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**
2011			16 (100,0%)		**16**
2010			8 (100,0%)		**8**
2005-09			176 (100,0%)		**176**
2000-04			96 (100,0%)		**96**
Total			**341 (100,0%)**		**341**

Table 4: Primary operations - Distal

Year	Cement with antibiotics	Cement without antibiotics	Uncemented	Missing	Total
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**
2011			16 (100,0%)		**16**
2010			8 (100,0%)		**8**
2005-09	3 (1,7%)		171 (97,2%)	2 (1,1%)	**176**
2000-04			96 (100,0%)		**96**
Total	**3 (0,9%)**		**336 (98,5%)**	**2 (0,6%)**	**341**

Lumbar disc prostheses - Prosthesis brand

Table 5: Primary operations - Proximal

Prostheses	2002-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Prodisc	214	4	16	9	10	7	5	6	2	1	**274**
Charité	58	4									**62**
BAGUERA L										3	**3**
Mobidisc L										2	**2**
Total	**272**	**8**	**16**	**9**	**10**	**7**	**5**	**5**	**2**	**6**	**341**

Table 6: Primary operations - Distal

Prostheses	2002-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Prodisc	214	4	16	9	10	7	5	6	2	1	**274**
Charité	58	4									**62**
BAGUERA L										3	**3**
Mobidisc L										2	**2**
Total	**272**	**8**	**16**	**9**	**10**	**7**	**5**	**5**	**2**	**6**	**341**

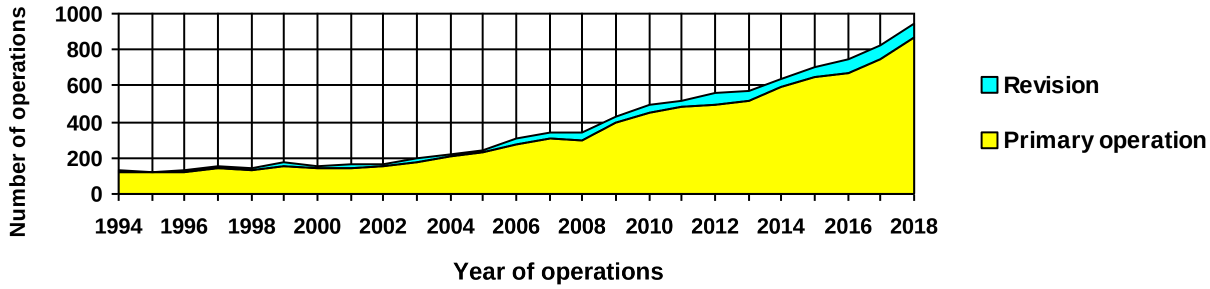
SHOULDER PROSTHESES

Table 1: Annual number of operations in shoulder prostheses

Year	Primary operations		Reoperations *		Revisions		Total
2018	871	(91,7%)			79	(8,3%)	**950**
2017	742	(89,6%)	1	(0,1%)	85	(10,3%)	**828**
2016	673	(90,3%)			72	(9,7%)	**745**
2015	644	(91,7%)			58	(8,3%)	**702**
2014	594	(92,5%)			48	(7,5%)	**642**
2013	517	(90,9%)	2	(0,4%)	50	(8,8%)	**569**
2012	500	(89,1%)	1	(0,2%)	60	(10,7%)	**561**
2011	481	(92,5%)			39	(7,5%)	**520**
2010	447	(91,2%)			43	(8,8%)	**490**
1994-09	3122	(91,3%)			299	(8,7%)	**3421**
Total	**8591**	**(91,1%)**	**4**	**(0,0%)**	**833**	**(8,8%)**	**9428**

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

Figure 1: Annual number of operations - All prostheses



53,6 % of all operations were performed on the right side   70,4 % performed in women.   Mean age: 70 years.

Figure 2: Prostheses - all operations

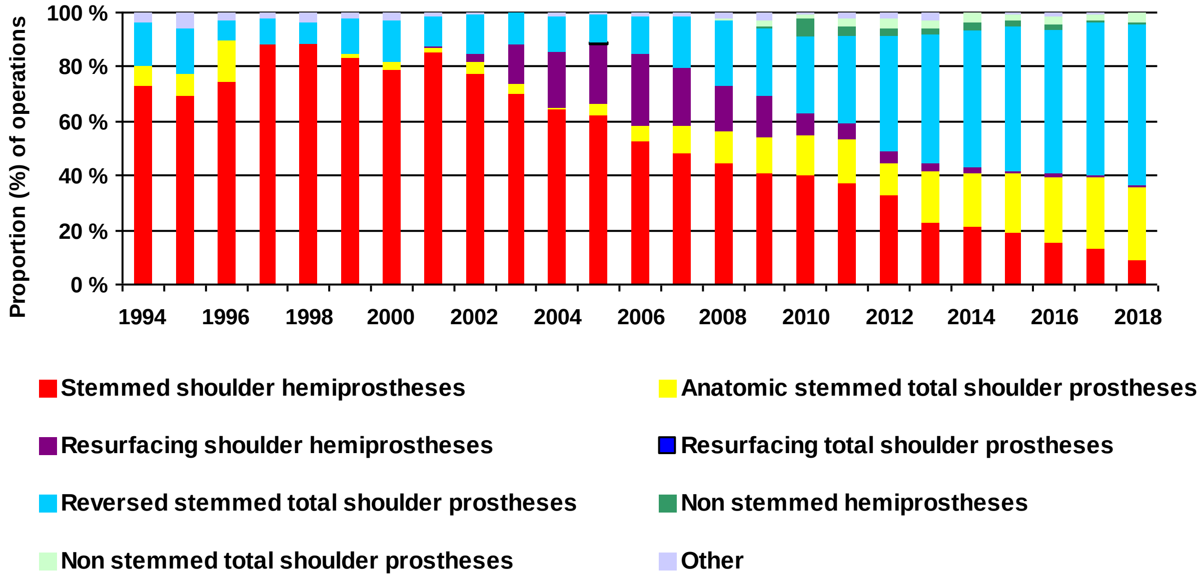


Figure 3: Age at the insertion of primary total prostheses

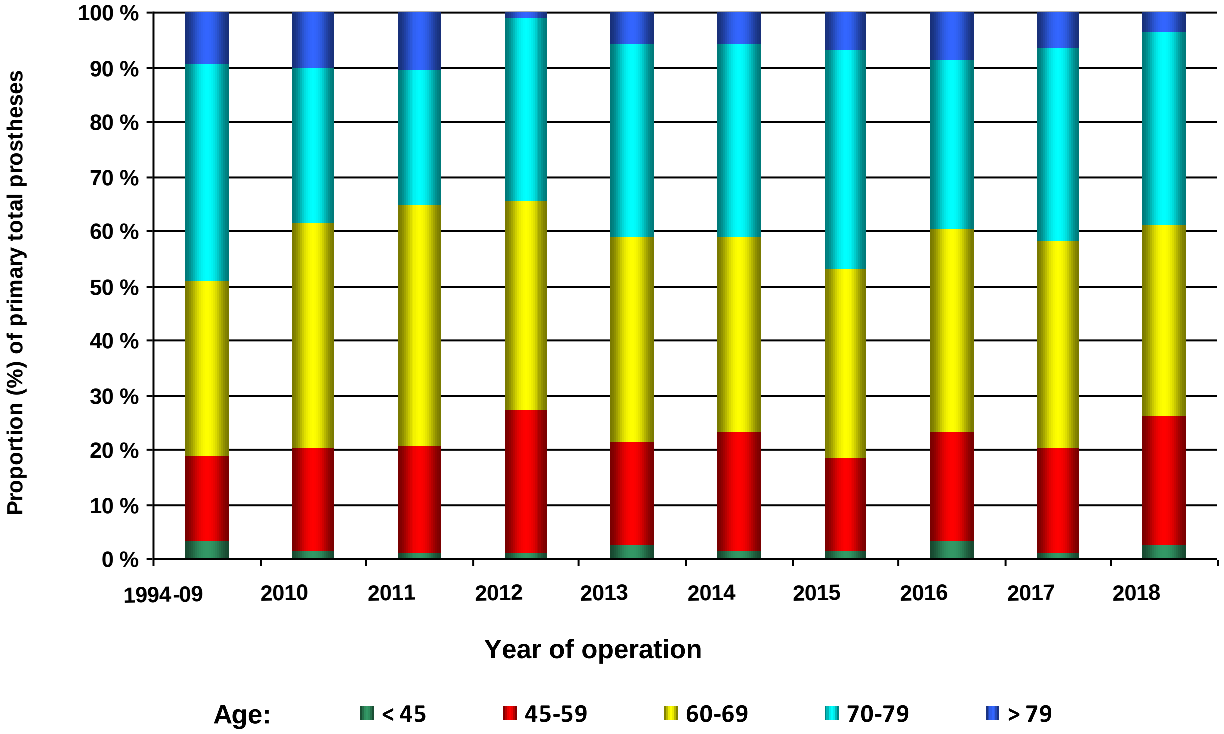


Figure 4: Age at the insertion of primary reversed total prostheses

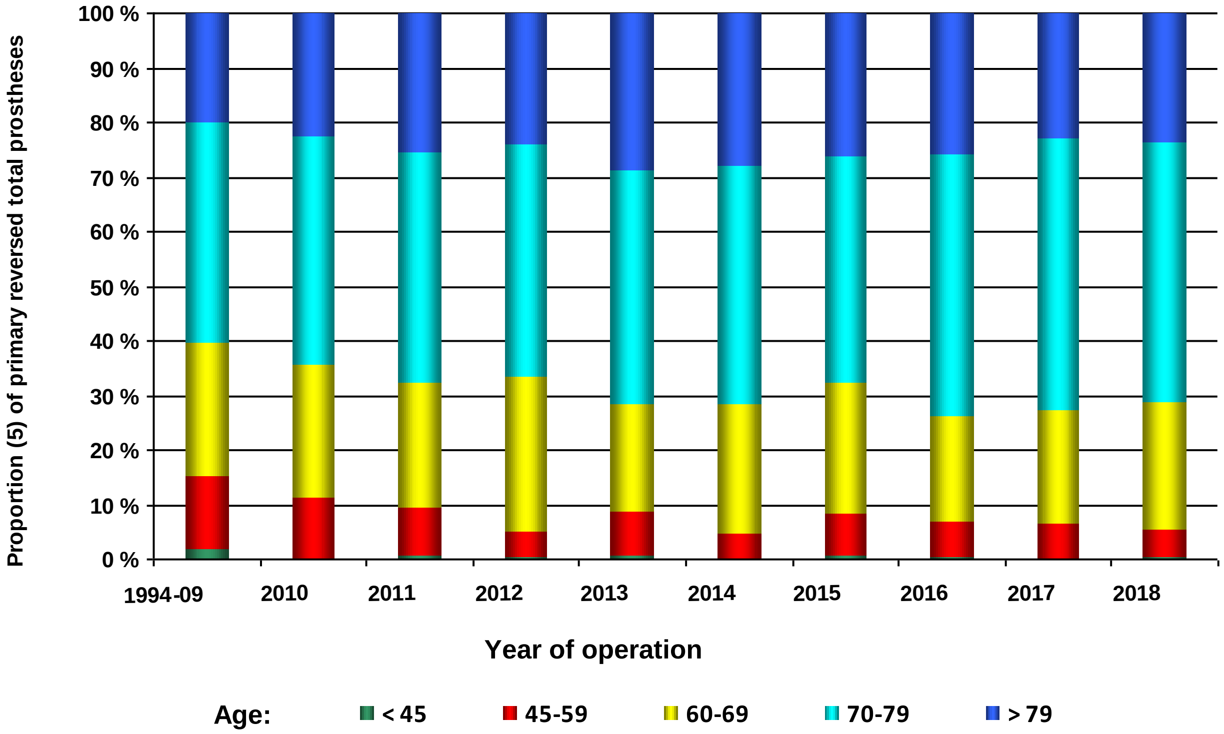


Figure 5: Age at the insertion of primary hemiprostheses

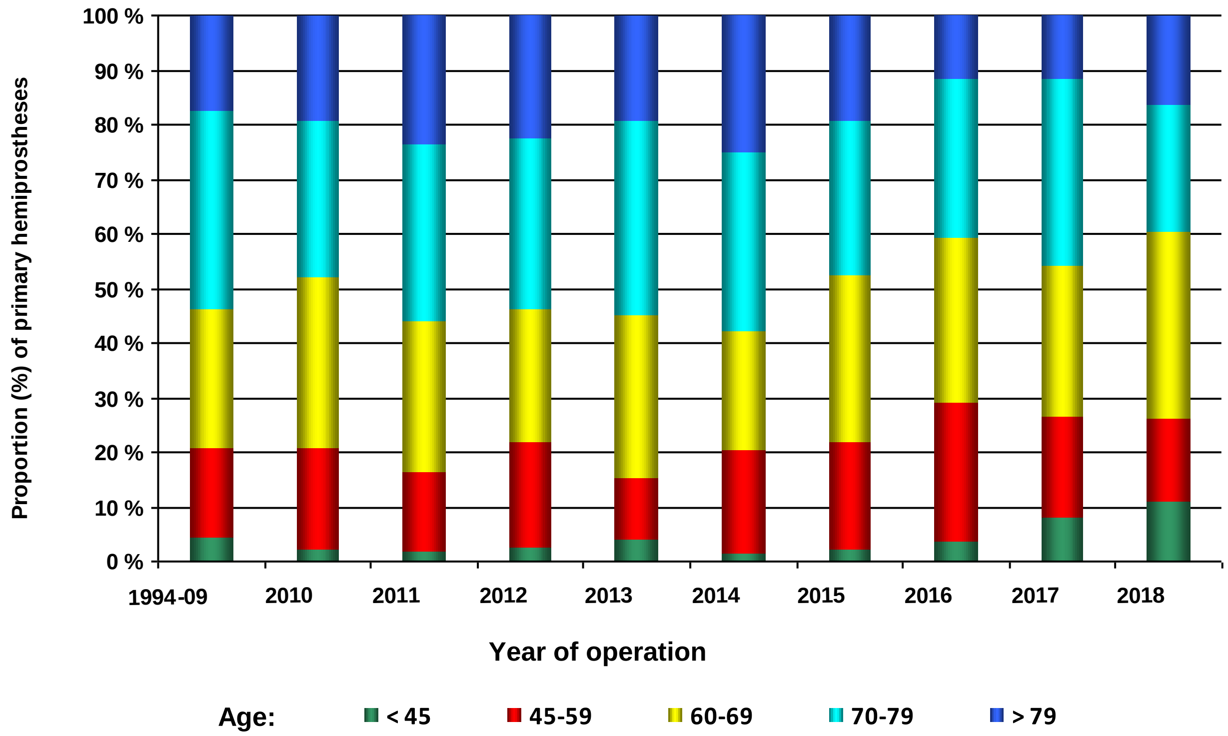


Table 2: Annual number of operations - Stemmed shoulder hemiprostheses

Year	Primary operations		Reoperations *		Revisions		Total
2018	67	(77,9%)			19	(22,1%)	**86**
2017	86	(77,5%)	1	(0,9%)	24	(21,6%)	**111**
2016	97	(82,9%)			20	(17,1%)	**117**
2015	116	(85,9%)			19	(14,1%)	**135**
2014	124	(93,2%)			9	(6,8%)	**133**
2013	109	(85,8%)			18	(14,2%)	**127**
2012	166	(91,7%)			15	(8,3%)	**181**
2011	179	(92,7%)			14	(7,3%)	**193**
2010	177	(92,7%)			14	(7,3%)	**191**
1994-09	2007	(92,8%)			155	(7,2%)	**2162**
Total	**3128**	**(91,0%)**	**1**	**(0,0%)**	**307**	**(8,9%)**	**3436**

* 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

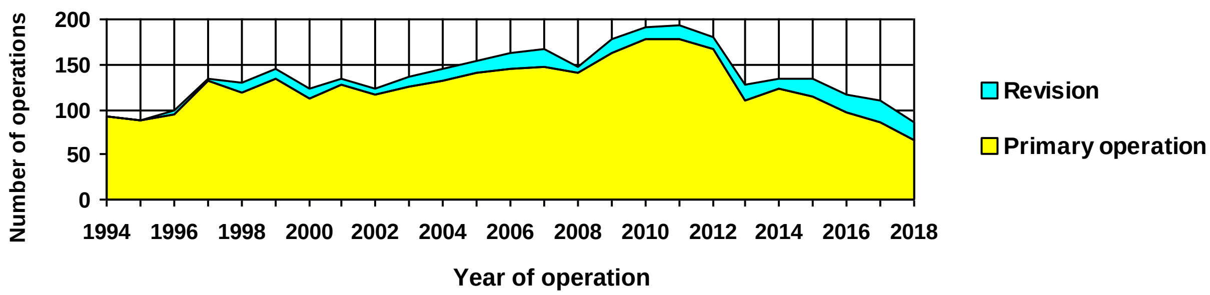


Table 3: Annual number of operations - Anatomic stemmed total shoulder prostheses

Year	Primary operations		Revisions		Total
2018	239	(93,4%)	17	(6,6%)	**256**
2017	199	(92,6%)	16	(7,4%)	**215**
2016	167	(91,8%)	15	(8,2%)	**182**
2015	140	(95,9%)	6	(4,1%)	**146**
2014	120	(91,6%)	11	(8,4%)	**131**
2013	99	(95,2%)	5	(4,8%)	**104**
2012	61	(93,8%)	4	(6,2%)	**65**
2011	79	(94,0%)	5	(6,0%)	**84**
2010	69	(90,8%)	7	(9,2%)	**76**
1994-09	205	(86,1%)	33	(13,9%)	**238**
Total	**1378**	**(92,1%)**	**119**	**(7,9%)**	**1497**

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

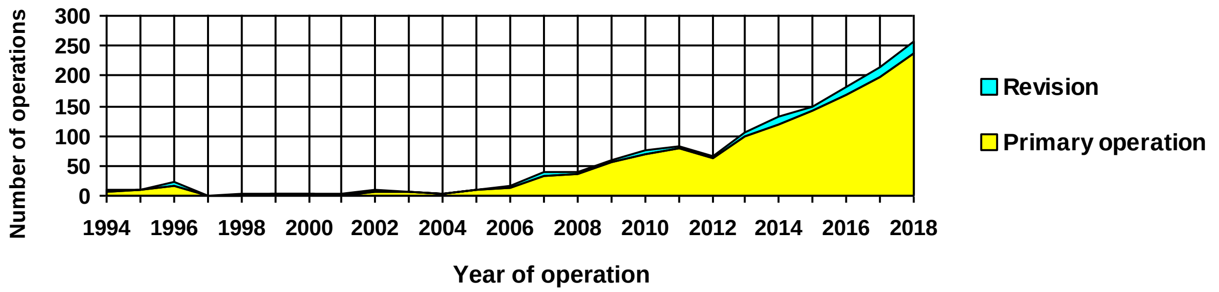


Table 4: Annual number of operations - Resurfacing shoulder hemiprostheses

Year	Primary operations		Revisions		Total
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**
2011	20	(71,4%)	8	(28,6%)	**28**
2010	25	(71,4%)	10	(28,6%)	**35**
1994-09	370	(92,7%)	29	(7,3%)	**399**
Total	**438**	**(79,3%)**	**114**	**(20,7%)**	**552**

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

Year	Primary operations		Revisions		Total
2011	1	(100,0%)			**1**
2010	1	(100,0%)			**1**
1994-09	2	(66,7%)	1	(33,3%)	**3**
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
2018	529	(92,2%)	2	(0,3%)	43	(7,5%)	**574**
2017	437	(94,0%)			28	(6,0%)	**465**
2016	378	(95,0%)	1	(0,3%)	19	(4,8%)	**398**
2015	353	(92,4%)			29	(7,6%)	**382**
2014	306	(94,2%)			19	(5,8%)	**325**
2013	254	(95,1%)			13	(4,9%)	**267**
2012	216	(90,4%)	1	(0,4%)	22	(9,2%)	**239**
2011	161	(95,8%)			7	(4,2%)	**168**
2010	132	(93,6%)			9	(6,4%)	**141**
1994-09	504	(89,8%)			57	(10,2%)	**561**
Total	**3270**	**(92,9%)**	**4**	**(0,1%)**	**246**	**(7,0%)**	**3520**

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

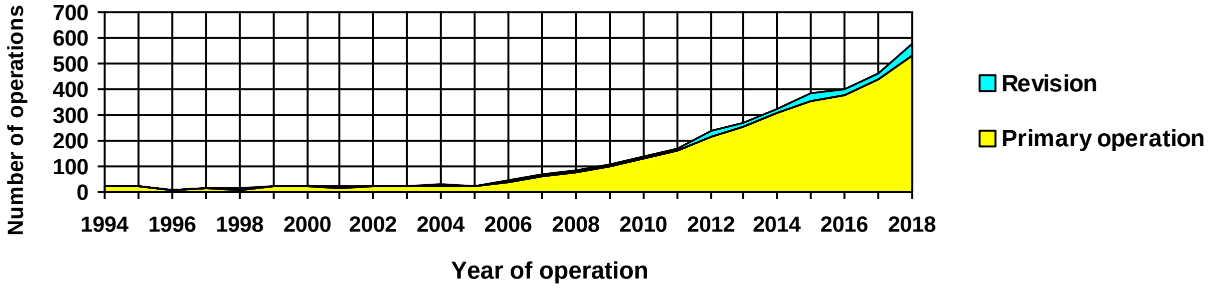


Table 7: Annual number of operations - Non stemmed hemiprostheses

Year	Primary operations		Revisions		Total
2018	6	(54,5%)	5	(45,5%)	**11**
2017	1	(20,0%)	4	(80,0%)	**5**
2016	13	(76,5%)	4	(23,5%)	**17**
2015	16	(72,7%)	6	(27,3%)	**22**
2014	23	(82,1%)	5	(17,9%)	**28**
2013	26	(100,0%)			**26**
2012	24	(82,8%)	5	(17,2%)	**29**
2011	21	(95,5%)	1	(4,5%)	**22**
2010	35	(100,0%)			**35**
1994-09	5	(100,0%)			**5**
Total	**170**	**(85,0%)**	**30**	**(15,0%)**	**200**

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

Year	Primary operations		Revisions		Total
2018	29	(93,5%)	2	(6,5%)	**31**
2017	18	(85,7%)	3	(14,3%)	**21**
2016	18	(85,7%)	3	(14,3%)	**21**
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**
2011	16	(100,0%)			**16**
2010	8	(100,0%)			**8**
1994-09	11	(100,0%)			**11**
Total	**174**	**(90,2%)**	**19**	**(9,8%)**	**193**

Reasons for primary operations

Table 9: 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
2018	9		8			48	1	4	5	
2017	19	4	10			52	1	1	8	
2016	18	1	9	1		64		2	3	
2015	15	2	15			85	1		5	
2014	21		15			89			4	
2013	21	1	7		1	78		2	3	
2012	22	3	13			126			4	
2011	34	4	27			116			2	
2010	35	9	22	1		109			2	
1994-09	373	447	422	15	7	729	8	6	85	10
Total	**567**	**471**	**548**	**17**	**8**	**1496**	**11**	**15**	**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

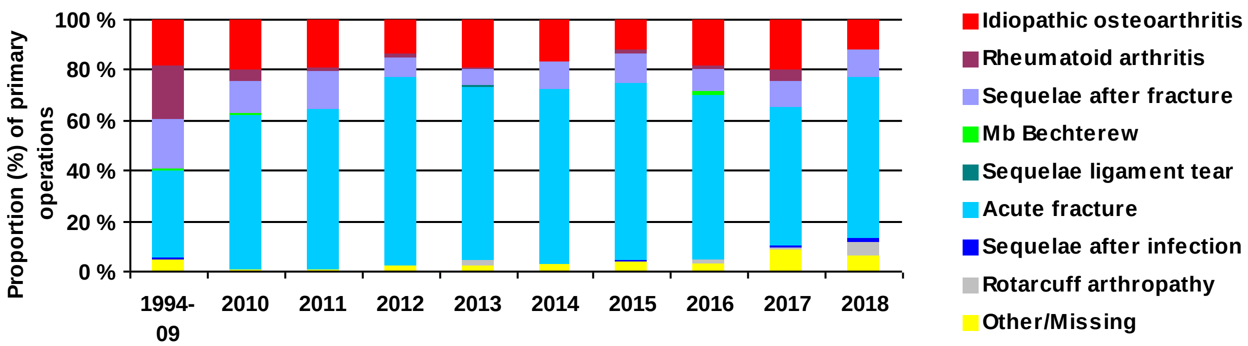


Table 10: Shoulder disease in primary operations - Anatomic stemmed total shoulder prostheses

Year	Idiopathic osteo-arthritis	Rheumatoid arthritis	Sequelae after fracture	Mb. Bechte-rew	Sequelae ligament tear	Acute fracture	Sequelae after infection	Rotarcuff arthropathy	Other	Missing
2018	206	14	11	1	4	1		2	13	
2017	167	3	18		4				13	
2016	138	7	20		1	2	1		2	
2015	124	4	7		1		1		6	
2014	96	5	14		3				3	
2013	84	3	10		1	1	1			
2012	54	1	4		1				2	
2011	68	3	10				1			
2010	58	2	3		2				3	1
1994-09	136	21	30	1	2	2	2		13	1
Total	**1131**	**63**	**127**	**2**	**19**	**6**	**6**	**2**	**55**	**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

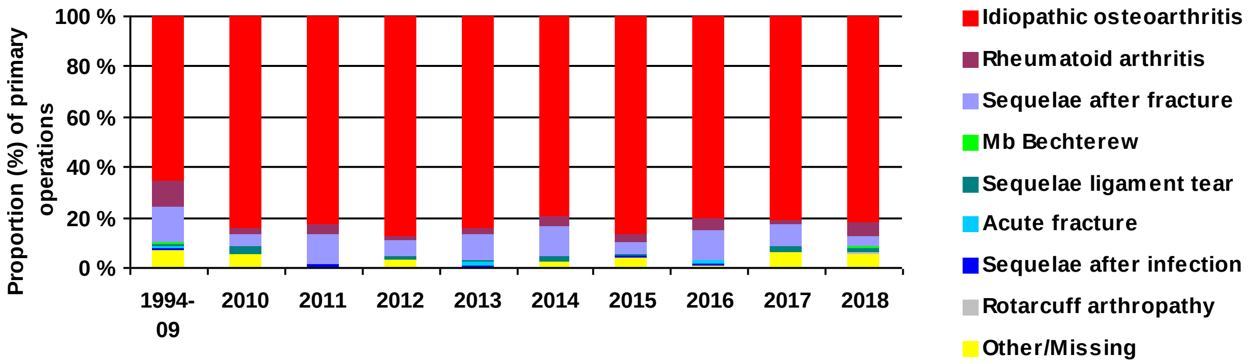


Table 11: Shoulder disease in primary operations - Resurfacing shoulder hemiprostheses

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	
2011	18	1						1	1	
2010	17	3	3						2	
1994-09	239	90	30	3	5	1	3	4	14	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

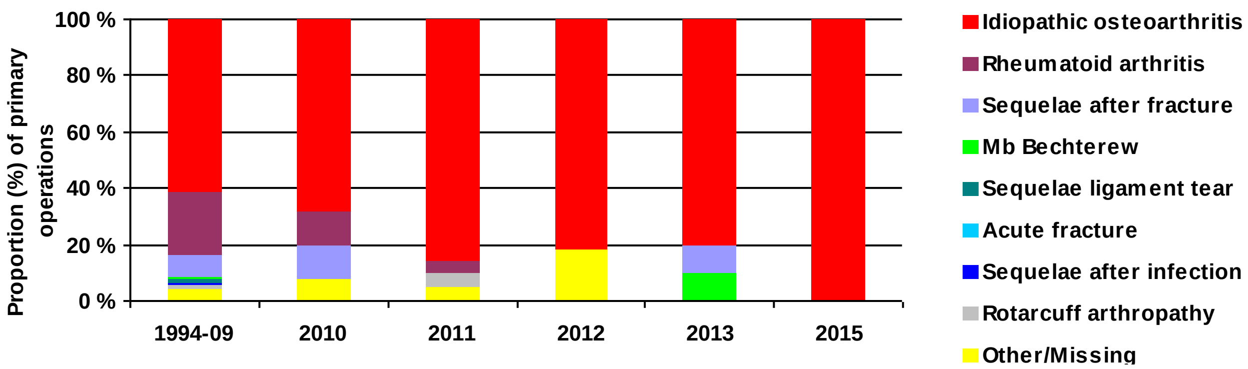


Table 12: Shoulder disease in primary operations - Resurfacing total shoulder prostheses

Year	Idiopathic osteo-arthritis	Rheumatoid arthritis	Sequelae after fracture	Mb. Bechte-rew	Sequelae ligament tear	Acute fracture	Sequelae after infection	Rotarcuff arthropathy	Other	Missing
2011	1									
2010	1									
1994-09	2								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

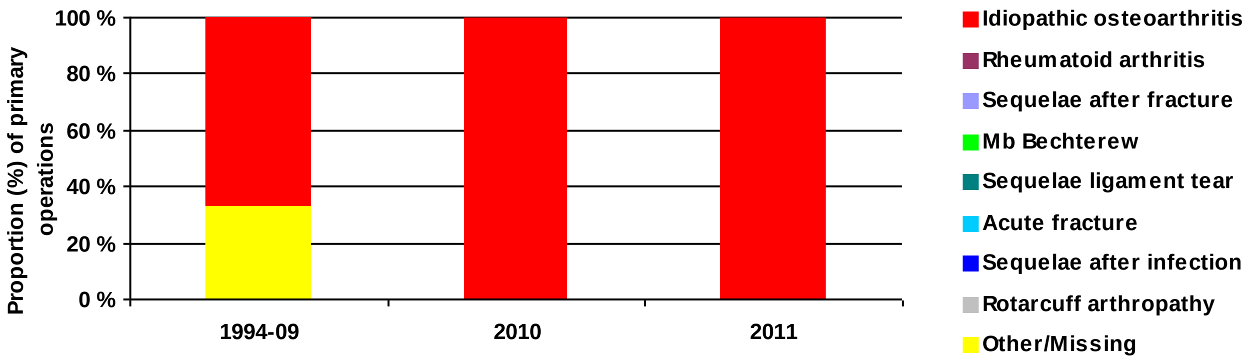


Table 13: Shoulder disease in primary operations - Reversed stemmed total shoulder prostheses

Year	Idiopathic osteo-arthritis	Rheumatoid arthritis	Sequelae after fracture	Mb. Bechte-rew	Sequelae ligament tear	Acute fracture	Sequelae after infection	Rotarcuff arthropathy	Other	Missing
2018	164	31	80		16	161	4	123	20	
2017	132	33	73		8	115	2	123	19	
2016	119	29	62	2	13	102	2	82	14	
2015	126	30	63	1	17	78	4	60	19	
2014	116	22	45	2	18	88	2	39	12	
2013	87	26	37		15	78	1	24	4	
2012	61	19	50		24	43	4	33	10	
2011	46	21	30	1	9	30	1	35	9	1
2010	42	27	26		5	12	4	21	8	1
1994-09	133	185	102	3	4	21	5	51	31	1
Total	**1026**	**423**	**568**	**9**	**129**	**728**	**29**	**591**	**146**	**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

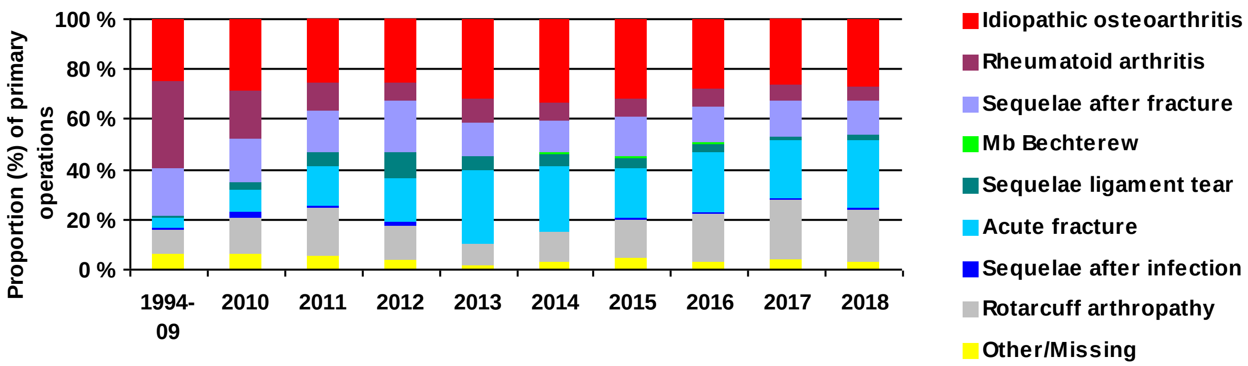


Table 14: Shoulder disease in primary operations - Non stemmed shoulder hemiprostheses

Year	Idiopathic osteo-arthritis	Rheumatoid arthritis	Sequelae after fracture	Mb. Bechte-rew	Sequelae ligament tear	Acute fracture	Sequelae after infection	Rotarcuff arthropathy	Other	Missing
2018	2				1				3	
2017							1			
2016	7		5		1				1	
2015	13		3			1		1		
2014	16		2		1				4	
2013	23	1	2						2	
2012	16	3	3	2				1		
2011	13	6	2						1	
2010	24	3	8			1			2	
1994-09	2		1		1				2	
Total	**116**	**13**	**26**	**2**	**4**	**2**	**1**	**2**	**15**	**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

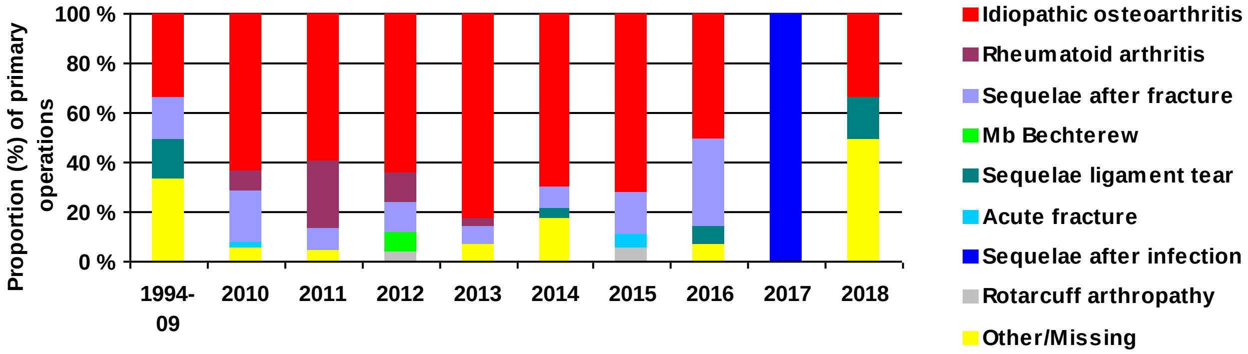
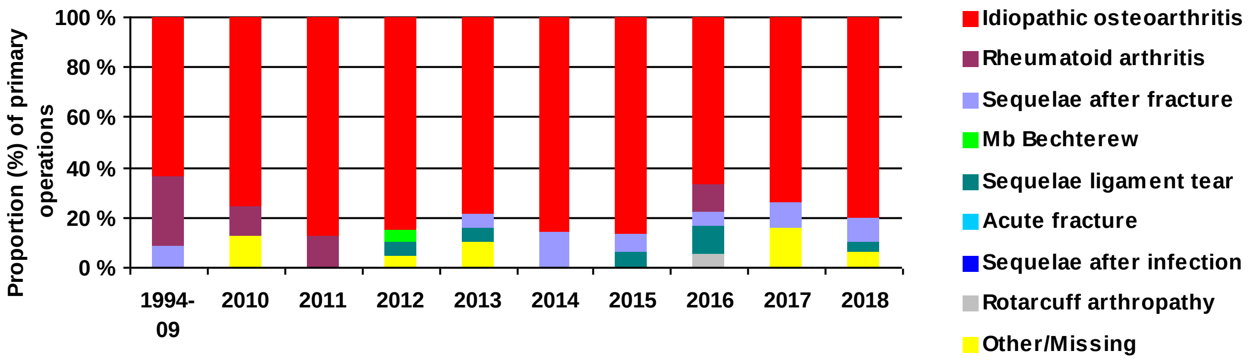


Table 15: Shoulder disease in primary operations - Non stemmed total shoulder prostheses

Year	Idiopathic osteo-arthritis	Rheumatoid arthritis	Sequelae after fracture	Mb. Bechte-rew	Sequelae ligament tear	Acute fracture	Sequelae after infection	Rotarcuff arthropathy	Other	Missing
2018	24		3		1				2	
2017	14		2						3	
2016	12	2	1		2			1		
2015	13		1		1					
2014	18		3							
2013	15		1		1				2	
2012	17			1	1				1	
2011	14	2								
2010	6	1							1	
1994-09	7	3	1							
Total	**140**	**8**	**12**	**1**	**6**	**0**	**0**	**1**	**9**	**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

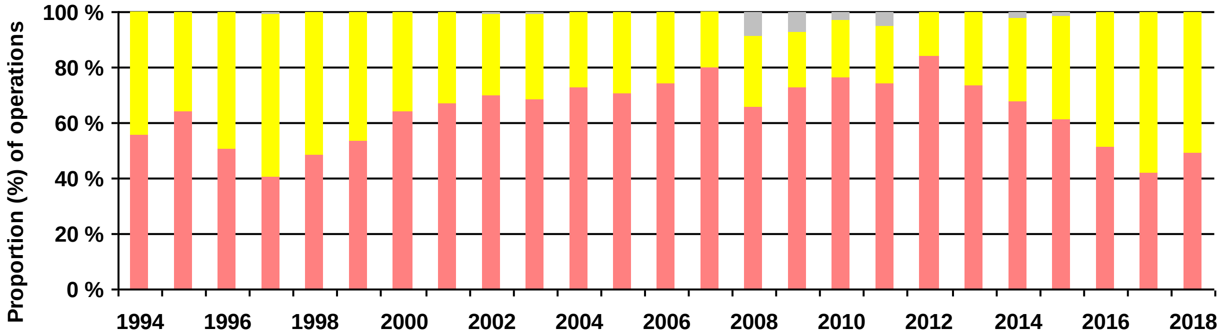


Figure 17: Anatomic stemmed total shoulder prostheses - Primary operations - Glenoid

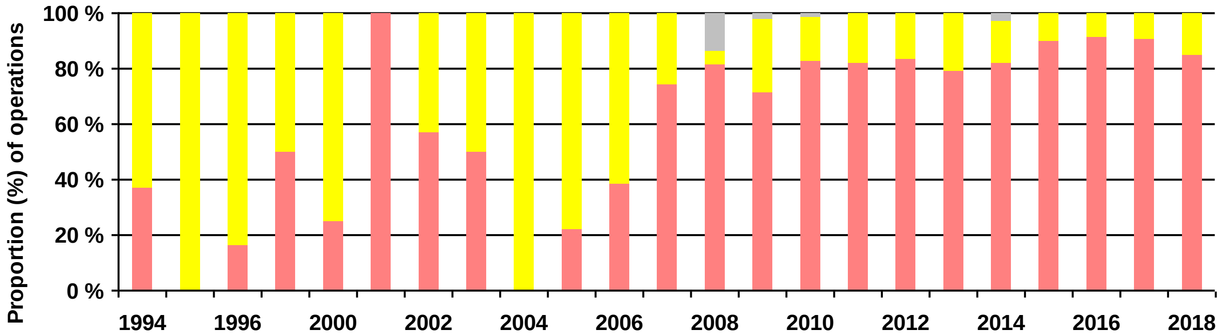


Figure 18: Anatomic stemmed total shoulder prostheses - Primary operations - Humerus

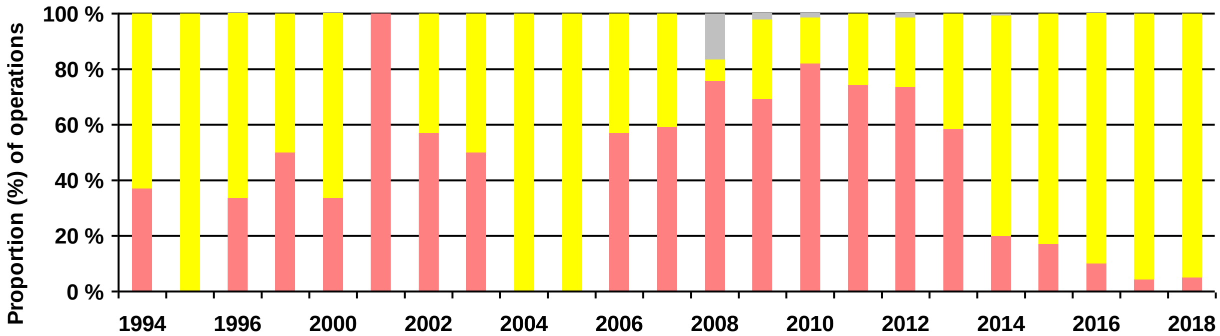


Figure 19: Resurfacing shoulder hemiprostheses - Primary operations - Humerus

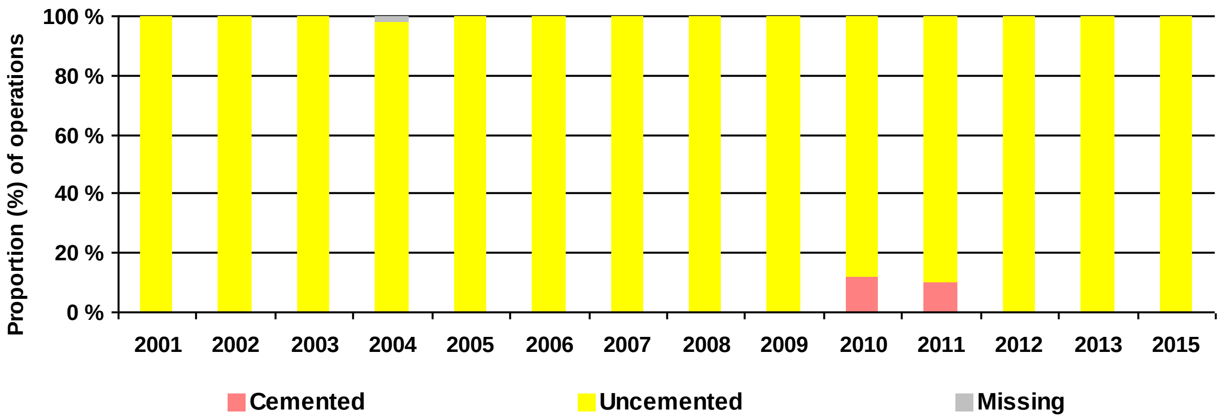


Figure 20: Resurfacing total shoulder prostheses - Primary operations - Glenoid

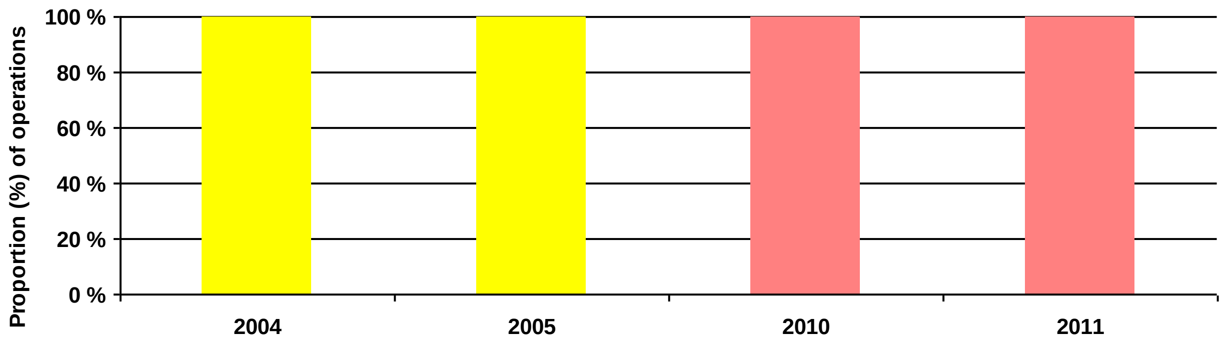


Figure 21: Resurfacing total shoulder prostheses - Primary operations - Humerus

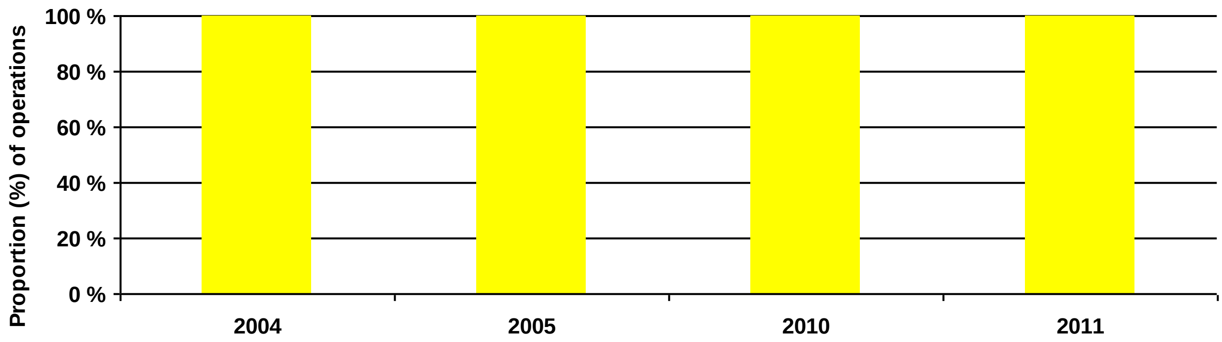


Figure 22: Reversed stemmed total shoulder prostheses - Primary operations - Glenoid

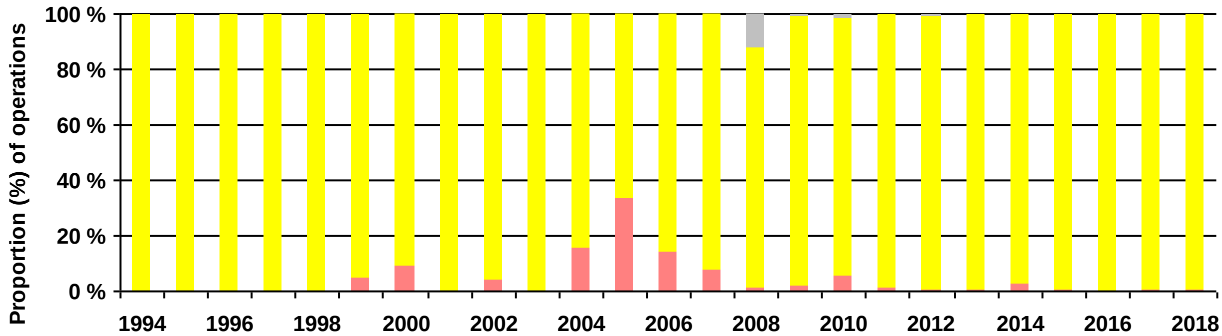


Figure 23: Reversed stemmed total shoulder prostheses - Primary operations - Humerus

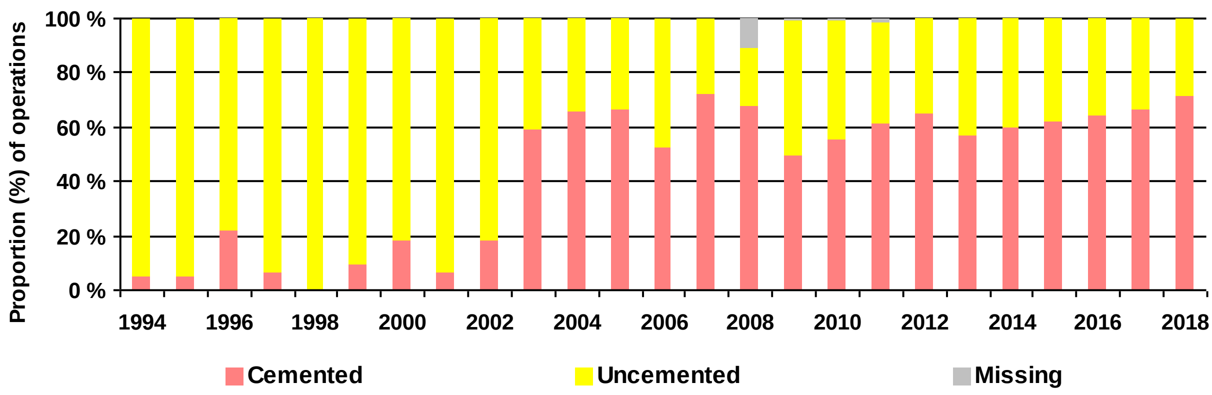


Figure 24: Non stemmed shoulder hemiprostheses - Primary operations - Humerus

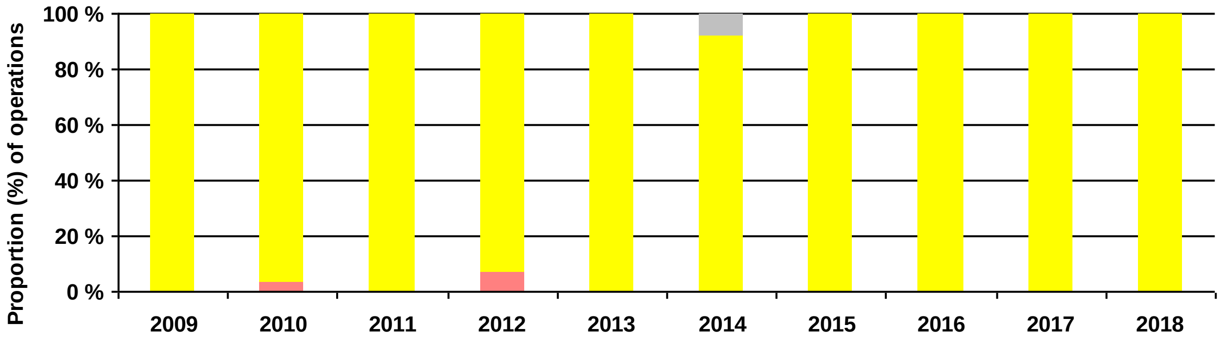


Figure 25: Non stemmed total shoulder prostheses - Primary operations - Glenoid

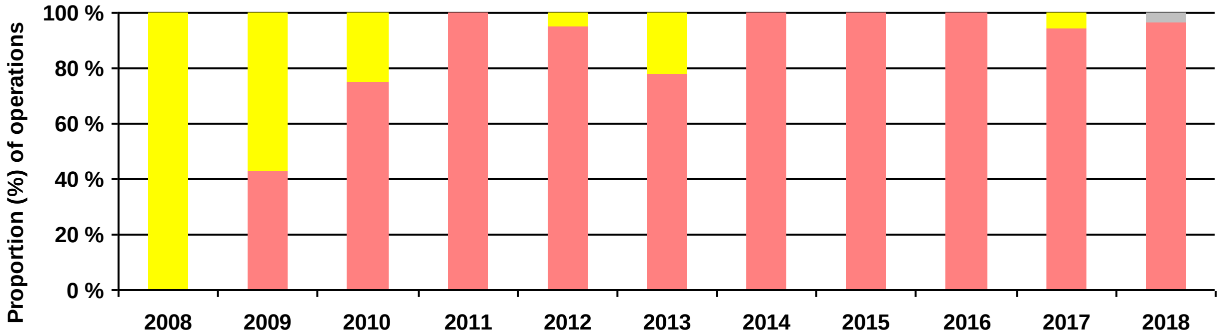
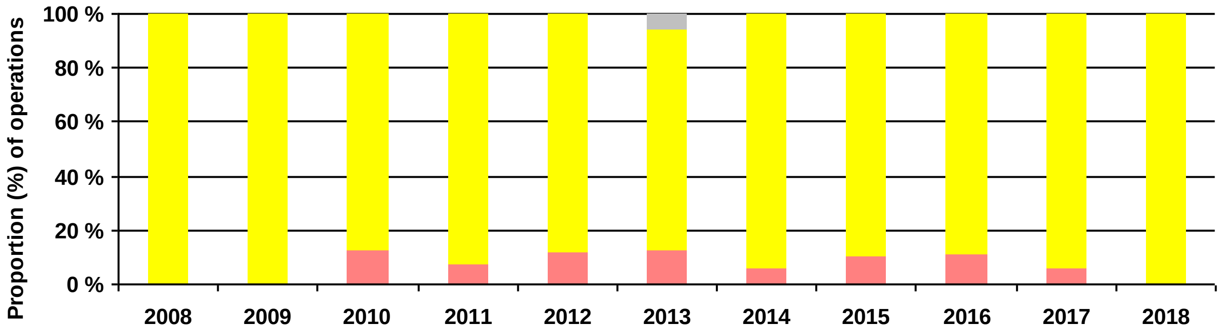


Figure 26: Non stemmed total shoulder prostheses - Primary operations - Humerus



Prosthesis brand

Stemmed hemiprostheses shoulder

Table 16: Primary operations- Caput humeri

Prostheses	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Bio - Modular	683	36	15	20	2	1	2			2	**761**
Global Advantage	440	54	66	44	36	40	34	16	1		**731**
Global Fx	95	29	47	50	17	16	13	11			**278**
Global	248										**248**
Nottingham	191	7	3	3							**204**
EPOCA	27	20	28	24	20	21	5				**145**
Global Unite				1		14	23	34	31	37	**140**
Delta I	63										**63**
Promos standard				8	14	12	11	6	2		**53**
Comprehensive				2	4	6	5	13	16	4	**50**
Aequalis	20	5	8	7	6						**46**
Aequalis-Fracture	12	7	7	2	3	3	1	1	3	2	**41**
Nottingham 1	14	15	2	4	2						**37**
SMR- anatomic						1	2	7	13	11	**34**
Modular	33										**33**
Aequalis Ascend Flex Anatomic					2	2	8	3	11	6	**32**
Bigliani/Flatow	23	1	3		2		1			1	**31**
JR-Vaios Anatomic					1	7	9	3	6	2	**28**
Other (n < 10)	8	1				1	1	3	3	2	**19**
Total	**1857**	**175**	**179**	**165**	**109**	**124**	**115**	**97**	**86**	**67**	**2974**

Table 17: Primary operations - Humerus

Prostheses	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Bio - Modular	702	34	15	20	2	1	2			2	**778**
Global Advantage	269	42	60	41	35	38	33	16	1		**535**
Global Fx	267	41	53	54	18	18	14	11			**476**
Global	261										**261**
Nottingham	189	10	4	7							**210**
EPOCA	27	21	28	24	20	21	5				**146**
Global Unite				1		14	23	34	31	37	**140**
Delta I	64										**64**
Scan Shoulder	56										**56**
Promos standard				8	14	12	11	6	2		**53**
Neer II	47										**47**
Aequalis-Fracture	15	7	7	2	4	3	1	1	3	2	**45**
Aequalis	17	5	8	7	5						**42**
SMR- anatomic						1	2	7	13	11	**34**
Modular	33										**33**
Aequalis Ascend Flex Anatomic					2	2	8	3	11	6	**32**
Nottingham 1	14	15	1		2						**32**
Bigliani/Flatow	23	1	3		2		1			1	**31**
JR-Vaios Anatomic					1	7	9	3	6	2	**28**
Comprehensive Fracture	1			2	4	6	5	3	3	2	**26**
Comprehensive								10	13	2	**25**
Monosperical	14										**14**
Other (n < 10)	8	1				1	1	3	3	2	**19**
Total	**2007**	**177**	**179**	**166**	**109**	**124**	**115**	**97**	**86**	**67**	**3127**

Anatomic stemmed total shoulder prostheses

Table 18: Primary operations - Glenoid

Prostheses	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Global unite anatomic						3	81	100	139	152	**475**
Aequalis	71	51	51	32	36	3					**244**
Aequalis Ascend Flex Anatomic					11	68	15	29	25	25	**173**
Global	36	14	18	14	30	9	1				**122**
Global Advantage	4				2	18	27	18	1		**70**
Bio - Modular	50										**50**
JR-Vaios Anatomic					4	8	8	11	8	8	**47**
SMR- anatomic						1		4	11	27	**43**
Comprehensive			2	3	2		1		10	23	**41**
Promos standard				1	3	6	6	4	3	3	**26**
Bigliani/Flatow	11		2	4	1	2		1	2	1	**24**
Anatomical shoulder				5	8	2	1				**16**
Nottingham	13										**13**
Elos	13										**13**
Other (n < 10)	5	4	6	1							**16**
Total	**203**	**69**	**79**	**60**	**97**	**120**	**140**	**167**	**199**	**239**	**1373**

Table 19: Primary operations - Caput humeri

Prostheses	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Global unite anatomic						3	81	100	130	135	**449**
Aequalis	71	51	51	33	36	6					**248**
Global Advantage	40	14	18	14	31	27	28	17	1		**190**
Aequalis Ascend Flex Anatomic					12	65	14	29	25	25	**170**
Bio - Modular	49										**49**
JR-Vaios Anatomic					4	8	8	11	8	8	**47**
SMR- anatomic						1		4	11	27	**43**
Comprehensive			2	3	2		1		10	23	**41**
Promos standard				1	4	6	6	4	3	3	**27**
Global Icon									9	16	**25**
Bigliani/Flatow	11		2	4	1	2		1	2	1	**24**
Anatomical shoulder				5	8	2	2				**17**
Nottingham	15										**15**
Other (n < 10)	6	4	6	1	1			1		1	**20**
Total	**192**	**69**	**79**	**61**	**99**	**120**	**140**	**167**	**199**	**239**	**1365**

Table 20: Primary operations - Humerus

Prostheses	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Global unite anatomic						3	81	100	130	135	**449**
Aequalis	71	51	51	33	36	6					**248**
Global Advantage	38	14	18	14	31	26	27	16	1		**185**
Aequalis Ascend Flex Anatomic					12	63	14	29	25	25	**168**
Bio - Modular	48										**48**
JR-Vaios Anatomic					3	8	8	11	8	8	**46**
SMR- anatomic						1		4	11	27	**43**
Comprehensive			2	3	2		1		10	23	**41**
Promos standard				1	4	6	6	4	3	3	**27**
Global Icon									9	16	**25**
Bigliani/Flatow	11		2	4	1	2		1	2	1	**24**
Anatomical shoulder				5	8	1	2				**16**
Nottingham	15										**15**
Other (n < 10)	8	1	5	1	2	3	1	2		1	**24**
Total	**191**	**66**	**78**	**61**	**99**	**119**	**140**	**167**	**199**	**239**	**1359**

Resurfacing shoulder hemiprostheses

Table 21: Primary operations - Humerus

Prostheses	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Copeland	284	12	4	4							**304**
Global C.A.P.	66	8	11	4	2		2				**93**
EPOCA Resurfacing	2	3	4	2	7		1				**19**
Aequalis Resurfacing	13		1	1							**15**
Other (n < 10)	5	2									**7**
Total	**370**	**25**	**20**	**11**	**9**	**0**	**3**	**0**	**0**	**0**	**438**

Resurfacing total shoulder prostheses

Table 22: Primary operations - Glenoid

Prostheses	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Copeland	2										**2**
Aequalis Resurfacing		1	1								**2**
Total	**2**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**

Table 23: Primary operations - Humerus

Prostheses	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Copeland	2										**2**
Aequalis Resurfacing		1	1								**2**
Total	**2**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**

Reversed stemmed total shoulder prostheses

Table 24: Primary operations - Glenoid

Prostheses	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Delta Xtend	128	91	114	147	142	179	222	245	304	391	**1963**
Delta III	313	1									**314**
Tess Reversed	45	31	28	32	30	38	39	28	22	3	**296**
Aequalis Ascend Flex Reversed					17	38	47	40	32	33	**207**
Aequalis Reversed II			1	18	37	11	13	5	8	17	**110**
Promos Reverse			9	10	17	21	14	17	11	9	**108**
SMR-reverse						2	3	11	31	51	**98**
Comprehensive Reverse			1	1	1	4	8	29	22	20	**86**
Aequalis-Reversed	14	9	7	2							**32**
JRI-Vaios Inverse					9	5	4	3	5	5	**31**
Trebecular Metal Reverse Shou	3		1	1	1	3	2		2		**13**
Anatomical shoulder Reversed				5		5					**10**
Other (n < 10)							1				**1**
Total	**503**	**132**	**161**	**216**	**254**	**306**	**353**	**378**	**437**	**529**	**3269**

Table 25: Primary operations - Caput humeri

Prostheses	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Delta Xtend	128	91	115	147	142	179	222	245	304	391	**1964**
Delta III	306	1									**307**
Tess Reversed	44	31	27	32	30	38	39	28	22	3	**294**
Aequalis Ascend Flex Reversed					17	41	44	34	32	30	**198**
Promos Reverse			9	10	17	21	14	17	11	9	**108**
SMR-reverse						2	4	11	31	51	**99**
Comprehensive Reverse			1	1	1	4	8	29	22	20	**86**
Aequalis Reversed Fracture				3	16	8	16	11	8	20	**82**
Aequalis-Reversed	11	9	8	10	13						**51**
JRI-Vaios Inverse					9	5	4	3	5	5	**31**
Aequalis Reversed II				6	8						**14**
Trebecular Metal Reverse Shou	3		1	1		3	2		2		**12**
Anatomical shoulder Reversed				5		5					**10**
Total	**492**	**132**	**161**	**215**	**253**	**306**	**353**	**378**	**437**	**529**	**3256**

Table 26: Primary operations - Humerus

Prostheses	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Delta Xtend	128	91	115	147	142	179	222	245	304	391	**1964**
Delta III	314	1									**315**
Tess Reversed	45	31	27	32	30	38	39	28	22	3	**295**
Aequalis Ascend Flex Reversed					17	41	44	34	32	30	**198**
Promos Reverse			9	10	17	21	14	17	11	9	**108**
SMR-reverse						2	4	11	31	51	**99**
Comprehensive Reverse			1	1	1	4	8	27	21	19	**82**
Aequalis Reversed Fracture				3	16	8	16	11	8	20	**82**
Aequalis-Reversed	14	9	8	12	19						**62**
JRI-Vaios Inverse					9	5	4	3	5	5	**31**
Trebecular Metal Reverse Shou	3		1	1	1	3	2		2		**13**
Anatomical shoulder Reversed				5		5					**10**
Other (n < 10)				5	2			2	1	1	**11**
Total	**504**	**132**	**161**	**216**	**254**	**306**	**353**	**378**	**437**	**529**	**3270**

Non stemmed shoulder hemiprostheses

Table 27: Primary operations - Caput humeri

Prostheses	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Tess-Anatomic	5	30	16	13	7	7	3	6			**87**
ECLIPSE TM		5	5	10	15	10	11	3			**59**
Simpliciti				1	3	4		1		1	**10**
Other (n < 10)					1	2	2	3	1	5	**14**
Total	**5**	**35**	**21**	**24**	**26**	**23**	**16**	**13**	**1**	**6**	**170**

Table 28: Primary operations - Humerus

Prostheses	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Tess-Anatomic	5	30	16	13	7	7	3	6			**87**
Simpliciti				1	3	4		1		1	**10**
Other (n < 10)					1	2	2	3	1	5	**14**
Total	**5**	**30**	**16**	**14**	**11**	**13**	**5**	**10**	**1**	**6**	**111**

Non stemmed total shoulder prostheses

Table 29: Primary operations - Glenoid

Prostheses	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Aequalis Ascend Flex Anatomic						13	7	12	13	24	**69**
Tess-Anatomic	10	8	14	7	3	3	3	4	2	3	**57**
Simpliciti				10	10						**20**
ECLIPSE TM			2	3	2	4	5		2	1	**19**
Other (n < 10)					3	1		2	1	1	**8**
Total	**10**	**8**	**16**	**20**	**18**	**21**	**15**	**18**	**18**	**29**	**173**

Table 30: Primary operations - Caput humeri

Prostheses	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Simpliciti				10	12	13	7	12	13	24	**91**
Tess-Anatomic	11	8	14	7	4	3	3	4	2	3	**59**
ECLIPSE TM			2	3	2	4	5		2	1	**19**
Other (n < 10)						1		2	1	1	**5**
Total	**11**	**8**	**16**	**20**	**18**	**21**	**15**	**18**	**18**	**29**	**174**

Table 31: Primary operations - Humerus

Prostheses	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Simpliciti				10	12	14	7	12	13	24	**92**
Tess-Anatomic	11	8	14	7	4	3	3	4	2	3	**59**
Other (n < 10)								2	1	1	**4**
Total	**11**	**8**	**14**	**17**	**16**	**17**	**10**	**18**	**16**	**28**	**155**

Reasons for revisions

Table 32: Stemmed shoulder hemiprostheses

Year	Loose proximal	Loose distal comp	Dislocation	Instability	Malalignment	Deep infection	Fracture (near implant)	Pain	Defect polyethylene	Other	Missing
2018	1	2	2	2		5		7		5	
2017	1		4	3		3	2	11		9	
2016	1	1	3	1		1	1	8		7	
2015	1	2	2	3	1	2		10		5	
2014			2	1		1		6		2	
2013		2	2	5		3	2	12	2	4	
2012	1	2	4	1			2	5		4	1
2011			3	2		3		6		4	
2010		3	3	1		2	1	9		5	
2009			1	3		3	1	10		4	
2008			1	2		1		5		2	1
2007	1	1	1	3		2		12		2	2
2006	1	3		4		2	2	10	1	4	
2005	1	2		1	1	3		5		3	
2004		1	5	3				5		5	
2003		1		1		2		6		3	
1994-02	2	3	7	4		4	2	29		11	2
Total	**10**	**23**	**40**	**40**	**2**	**37**	**13**	**156**	**3**	**79**	**6**

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

Table 33: Anatomic stemmed total shoulder prostheses

Year	Loose proximal	Loose distal comp	Dislocation	Instability	Malalignment	Deep infection	Fracture (near implant)	Pain	Defect polyethylene	Other	Missing
2018	2		2	4	1	1		2	1	9	
2017	4		2	6			1	4		5	
2016	4	1		2		7		3		1	
2015				1	1	1		4		1	
2014	2			4	2	3	1	4		4	
2013	1					3		2	1		
2012			1	2				2	2		
2011	1	1	3					1			
2010			1	2		4		1		1	
2009			1			1				1	
2008								1	3		
2007	1		1			1			3		
2006		1	1							1	
2004	1										
2003								1			
1994-02	5	1	5	1		2		6		3	
Total	**21**	**4**	**17**	**22**	**4**	**23**	**2**	**31**	**10**	**26**	**0**

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

Table 34: Resurfacing shoulder hemiprostheses

Year	Loose proximal	Loose distal comp	Dislocation	Instability	Malalignment	Deep infection	Fracture (near implant)	Pain	Defect polyethylene	Other	Missing
2018				1			2	6		3	
2017				1				8		1	
2016		3		1				7		3	
2015	1	2						1		1	
2014		1		1			1	10		2	
2013		1						7		1	
2012		1	1	2		2		6		3	
2011					1			6		5	
2010								9		1	
2009								9		2	
2008		2		1				11		2	
2007	1		1			1		2	1		
2006		1		1		1		2			
2005		1						1			
Total	**2**	**12**	**2**	**8**	**1**	**4**	**3**	**85**	**1**	**24**	**0**

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

Table 35: Resurfacing total shoulder prostheses

Year	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 36: Reversed stemmed total shoulder prostheses

Year	Loose proximal	Loose distal comp	Dislocation	Instability	Malalignment	Deep infection	Fracture (near implant)	Pain	Defect polyethylene	Other	Missing
2018	1	3	18	6		11	6	6	2	2	
2017	2	2	6	3	1	12	2	6	2	1	
2016	4	3	4	1		9	4	2	1		
2015	6	2	4	1	1	12	2	2	3	2	
2014	1	2	3	2		8	1	2		2	
2013	3	3	4	1		6		1		2	
2012	6	5	6	1		7		1	2	2	
2011	1		2	1			3				
2010	3	1	2	1		1	1			2	
2009	2	1				4				2	
2008	1		3		1					1	
2007	2	2	3	2		7		1			
2006	1	1	1	1		1			1	1	
2005	1	1						1			
2004	4	3	3	1						3	
2003	2		1					1			1
1994-02	5	1		1		8	1	1		2	
Total	**45**	**30**	**60**	**22**	**3**	**86**	**20**	**24**	**11**	**22**	**1**

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

Table 37: Non stemmed shoulder hemiprostheses

Year	Loose proximal	Loose distal comp	Dislocation	Instability	Malalignment	Deep infection	Fracture (near implant)	Pain	Defect polyethylene	Other	Missing
2018	2	1						2		3	
2017			1					3			
2016							1	3		2	
2015								3		3	
2014		1						4		1	
2012			1			2		1		2	
2011										1	
Total	**2**	**2**	**2**	**0**	**0**	**2**	**1**	**16**	**0**	**12**	**0**

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

Table 38: Non stemmed total shoulder prostheses

Year	Loose proximal	Loose distal comp	Dislocation	Instability	Malalignment	Deep infection	Fracture (near implant)	Pain	Defect polyethylene	Other	Missing
2018	2							1	1		
2017	1		1							1	
2016		1				1		1		1	
2015	2			1		3		1			
2014	1							1			
2012	4					3		1			
Total	**10**	**1**	**1**	**1**	**0**	**7**	**0**	**5**	**1**	**2**	**0**

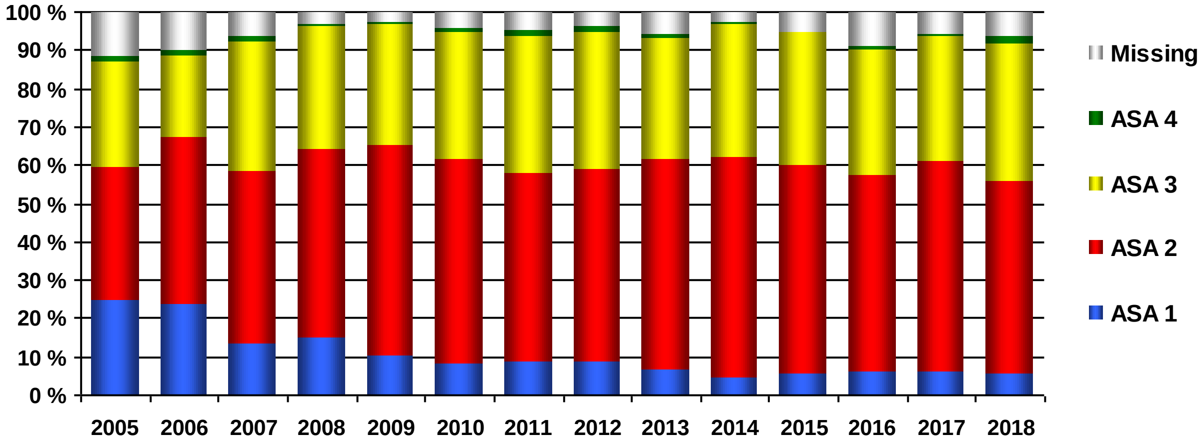
Revision reasons are not mutually exclusive. More than one reason for revision is possible. All revisions were included.

ASA classification all shoulder prostheses

Table 39: Primary operations

Year	ASA 1	ASA 2	ASA 3	ASA 4	ASA 5	Missing	Total
2018	49	440	309	20		53	**871**
2017	45	409	243	4		41	**742**
2016	41	347	220	7		58	**673**
2015	37	349	223	3		32	**644**
2014	28	342	206	4		14	**594**
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.

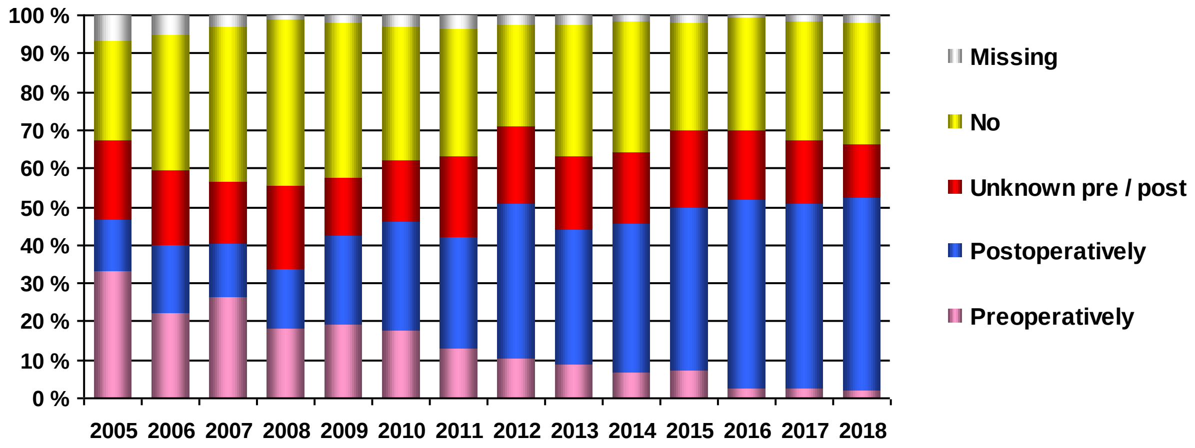
Registration of ASA classification started in 2005

Thrombosis prophylaxis

Table 40: Primary operations

Year	Preoperatively	Postoperatively	Unknown* pre / post	No	Missing	Total
2018	18	439	122	272	20	**871**
2017	18	360	123	229	12	**742**
2016	18	329	123	198	5	**673**
2015	46	276	129	180	13	**644**
2014	40	230	111	205	8	**594**
2013	46	183	99	176	13	**517**
2012	52	201	102	133	12	**500**
2011	62	141	100	160	18	**481**
2010	78	128	71	155	15	**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	54	98	15	**278**
2005	75	30	47	59	15	**226**

Figure 28: Primary operations



Registration of thrombosis prophylaxis started in 2005

Previous operation in relevant joint

Table 41: For primary total prostheses

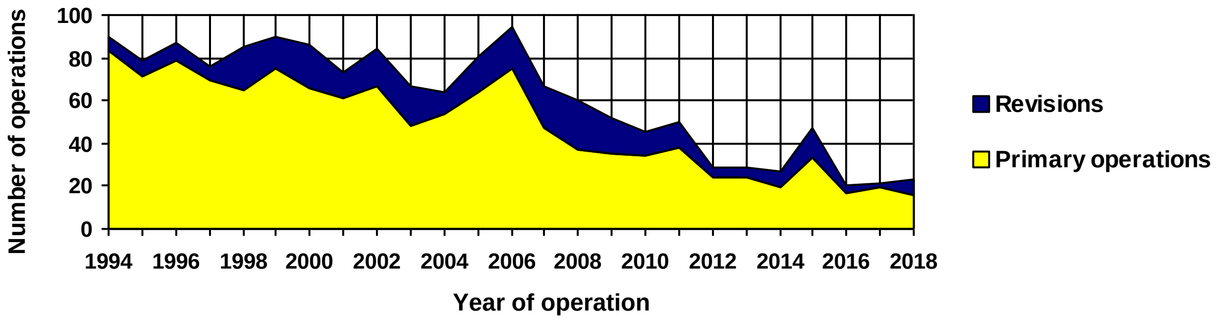
Type	1994-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Osteosynthesis of intraarticular joint fracture	209	27	23	35	25	30	37	46	54	46	532
Synovectomy	107	11	12	7	9	6	5	5	7	9	178
"Shaving"/Cleanup (Debridement)	6	1	4		2	1		1	5	3	23
Osteotomy	7	1			2	1	1	4	1	3	20
Ligament	1		1				1	2	6		11
Artrodesis	3							1	1		5
Other previous op.	146	31	33	49	45	59	54	68	84	143	712

TOE JOINT PROSTHESES

Table 1: Annual number of operations

Year	Primary operations		Revisions		Total
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**
2004	54	(84,4%)	10	(15,6%)	**64**
2003	48	(71,6%)	19	(28,4%)	**67**
1994-02	636	(84,8%)	114	(15,2%)	**750**
Total	**1220**	**(79,9%)**	**306**	**(20,1%)**	**1 526**

Figure 1: Annual number of operations



52,4 % of all operations were performed on the right side. 83,2 % 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
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	
2004	13	37						5	
2003	2	41	1	2				3	
1994-02	57	539	3	5	1			32	3
Total	**283**	**841**	**20**	**10**	**2**	**1**	**2**	**87**	**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
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%)**		**1 205**	**(98,9%)**	**8**	**(0,7%)**	**1 219**

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	2002-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Silastic HP 100	831	22	22	14	13	11	11	5	6	4	**939**
LPT	35	6	14	9	10	8	20	12		6	**120**
Toefit-plus	42	5	2	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**
Swanson Titanium	4	1									**5**
Total	**995**	**34**	**38**	**24**	**24**	**19**	**33**	**33**	**19**	**16**	**1219**

Table 6: Primary operations - Distal

Prostheses	2002-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Toefit-plus	42	5	2	1	1		1				**52**
Biomet Total Toe	25										**25**
Moje	18										**18**
Total	**85**	**5**	**2**	**1**	**1**	**0**	**1**	**1**	**0**	**0**	**95**

Reasons for revisions

Table 7:

Year	Loose proximal comp.	Loose distal comp.	Dislocation	Instability	Malalignment	Deep infection	Fracture (near implant)	Pain	Defect polyethylene	Other	Missing
2018					3	1		2	3	3	
2017	1							1		1	
2016								1	1		
2015				1	5			4	5	3	
2014		1		1	2			2	4		
2013					2			3	2		
2012					1			2		3	
2011					3	1		7	1	5	
2010		3			2	2		3	2	3	
2009			1		3	2		7	3	5	
2008				2	10	1		13	1	6	
2007	2	3	2	1	3	2	1	10		6	
2006		1		1	4	2		10	1	6	1
2005	1	1	1		7	2		6	1	5	2
2004					3			7		6	
2003	1	2	1	2	6	2		9		8	
2002	1	1		1	4	4		5		7	3
2001		3		2	5			8	1	4	
2000		2		1	6	2		6	1	6	1
1999		2			3	1		6		6	
1998		2	1	1	4	3		5		6	1
1997		1			3	1		6		1	
1996				1	4		1	4		3	
1995			1	2	2	2		5		1	
1994		1					1	3		2	1
Total	**6**	**23**	**7**	**16**	**85**	**28**	**3**	**135**	**26**	**96**	**9**

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

Completeness of reporting analysis for total elbow arthroplasty, 2015-2016

A completeness of reporting analysis has been conducted by combining the data in the Register with data from the Norwegian Patient Register (NPR). The report and analysis were prepared by the NPR in collaboration with the Norwegian Arthroplasty Register (NAR). There are separate statistics on primary operations and revisions. Some hospitals have few total elbow arthroplasties and the completeness of reporting rate must be seen in this light.

NCSP codes for combining data from NPR hospital stays and total elbow arthroplasties

Type	Code	Description
Primary operation	**NCB 20**	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
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

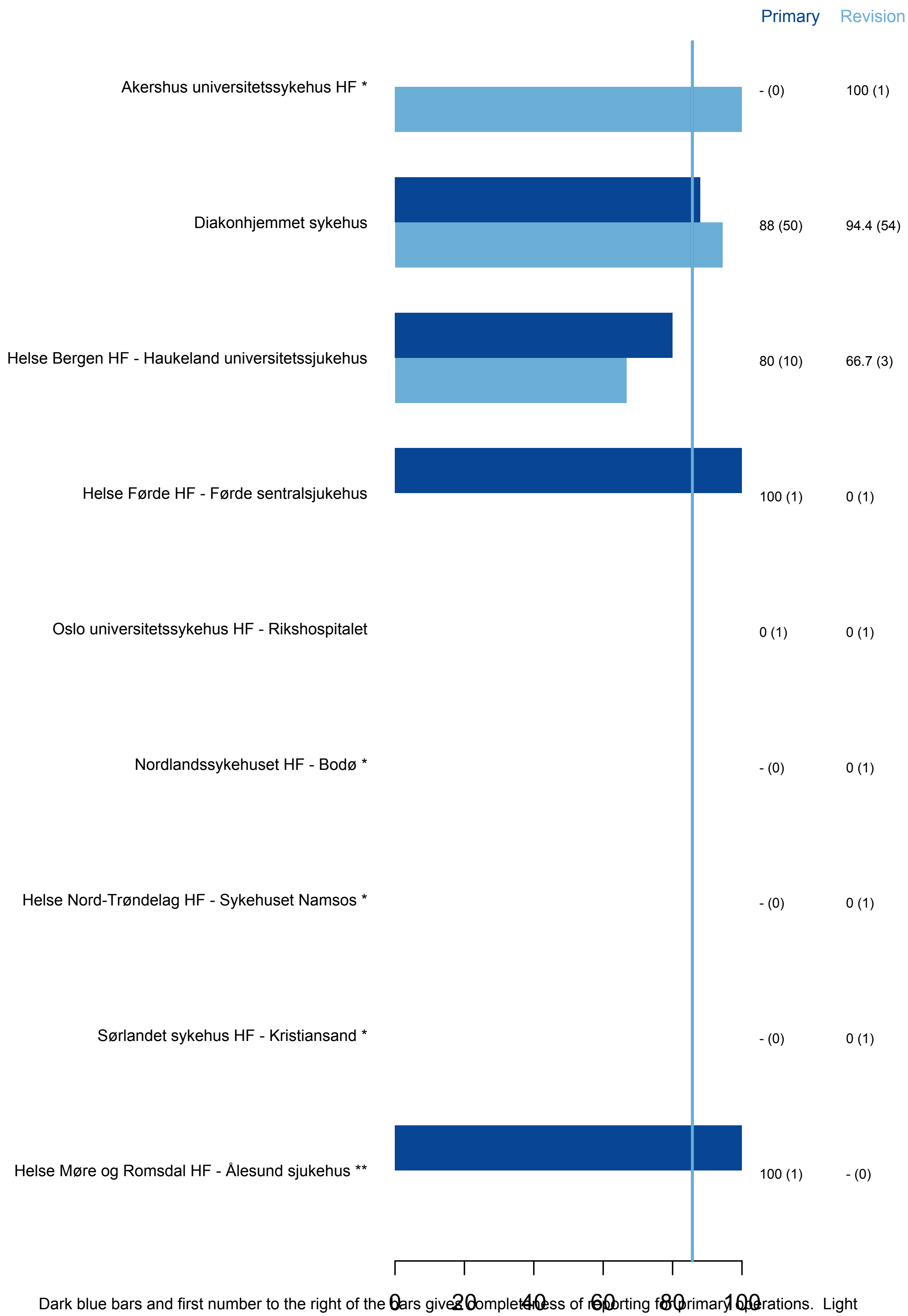
Primary operations. From 2015 to 2016, 63 primary total elbow arthroplasties were reported to one or both of the registers. 85.7% were reported to the NAR while 100% were reported to the NPR. Completeness of reporting varies much between the different hospitals. For hospitals with a low completeness 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 2015 to 2016, 63 revisions were reported to one or both of the registers. 85.7% of these were reported to the NAR, while 76.2% were reported to the NPR (revision level 1). Completeness of reporting varies much between the different hospitals. A low completeness of reporting rate may mean that the 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* and NCC 99.

Completeness of reporting for primary and revision operations, elbow total prosthesis, 2015-2016



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.

* Have no registered primary operations in NAR or NPR.

** Have no registered revisions in NAR or NPR.

Completeness of reporting analysis for ankle arthroplasty, 2015-2016

A completeness of reporting analysis has been conducted by combining the data in the Register with data from the Norwegian Patient Register (NPR). The report and analysis were prepared by the NPR in collaboration with the Norwegian Arthroplasty Register (NAR). There are separate statistics on primary operations and revisions. Some hospitals have few ankle arthroplasties and the completeness of reporting rate must be seen in this light.

NCSP codes for combining data from NPR hospital stays and ankle arthroplasties

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 cement
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

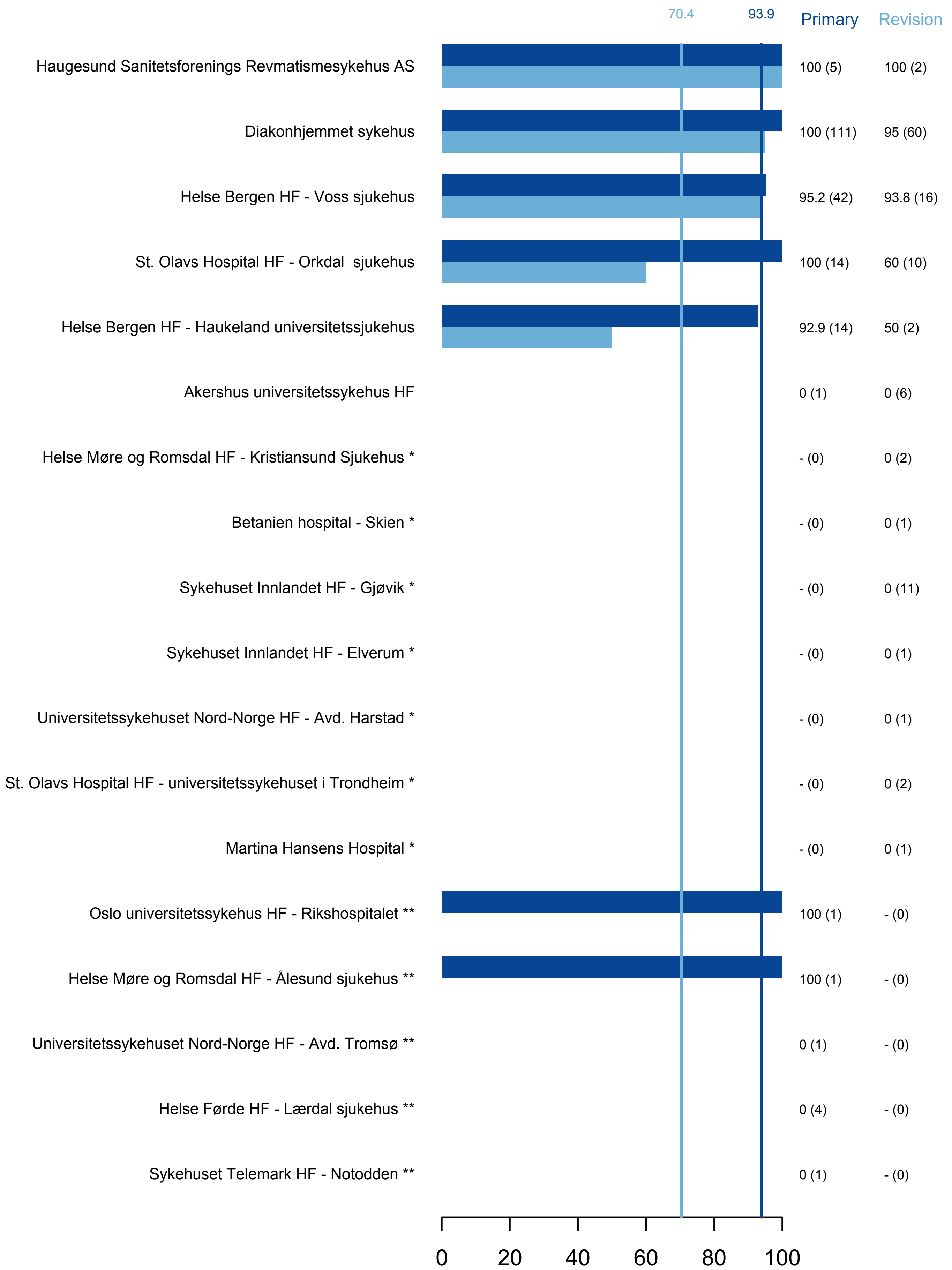
Primary operations. From 2015 to 2016, 198 primary ankle arthroplasties were reported to one or both of the registers. 93.9% were reported to the NAR, while 97.5% were reported to the NPR. Completeness of reporting varies much between the different hospitals. For hospitals with a low completeness of reporting rate for the NAR, either the form was not sent, or other interventions than ankle arthroplasties were incorrectly coded with NHB 0*/NHB 1*/NHB 20/NHB 30/NHB 40.

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

Revision operations. From 2015 to 2016, 115 revisions were reported to one or both of the registers. 70.4% of these were reported to the NAR, while 97.4% 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:
NHC 0* - NHC 1* - NHC 2* - NHC 3* - NHC 4* - NHC 99 - NHU 0* - NHU 1*

Completeness of reporting for primary and revision operations, ankle prosthesis, 2015-2016



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.

* Have no registered primary operations in NAR or NPR.

** Have no registered revisions in NAR or NPR.

Completeness of reporting analysis for finger arthroplasty, 2015-2016

A completeness of reporting analysis has been conducted by combining the data in the Register with data from the Norwegian Patient Register (NPR). The report and analysis were prepared by the NPR in collaboration with the Norwegian Arthroplasty Register (NAR). There are separate statistics on primary operations and revisions. Some hospitals have few finger arthroplasties and the completeness of reporting rate must be seen in this light.

NCSP codes for combining data from NPR hospital stays and finger arthroplasties

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

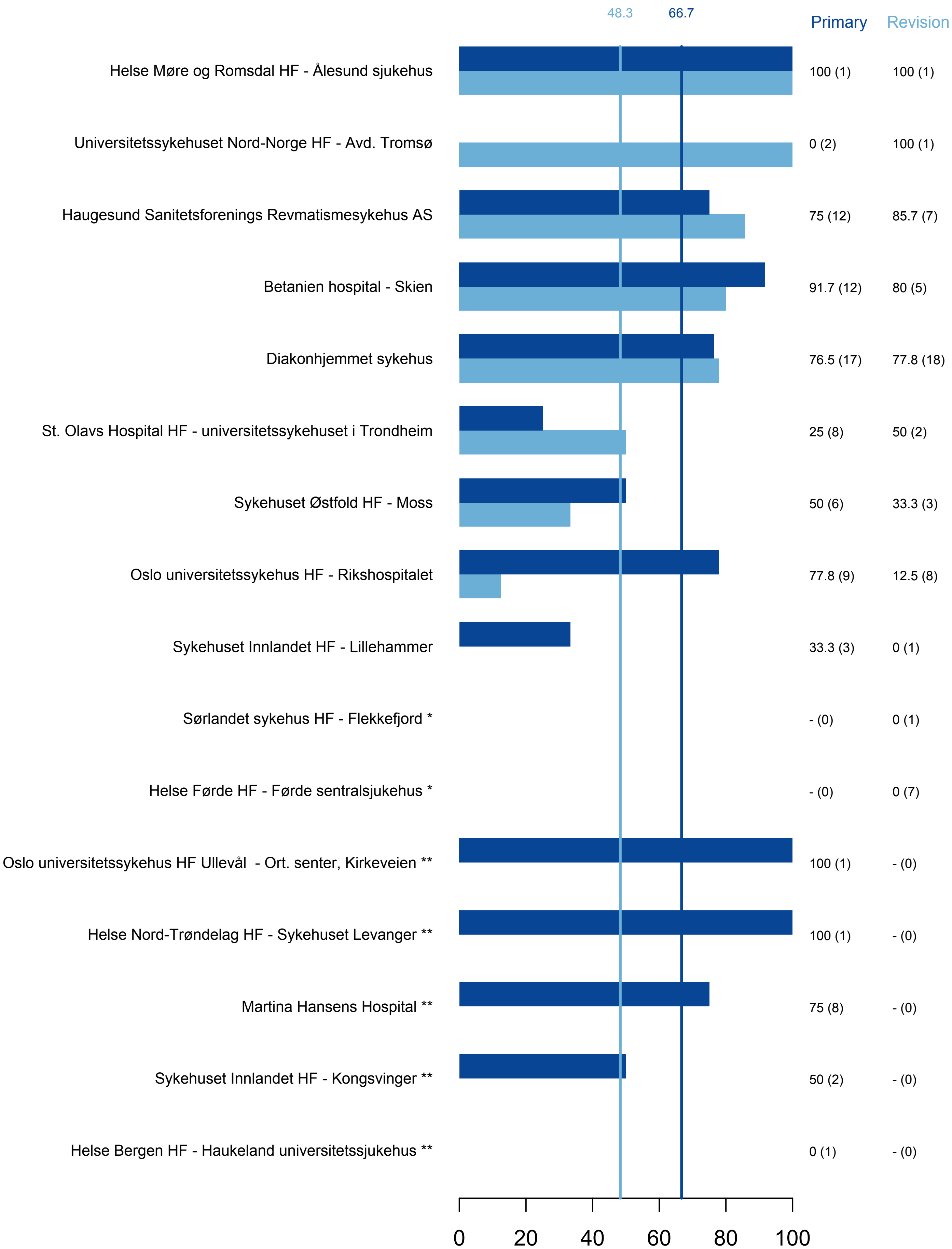
Primary operations. From 2015 to 2016, 84 primary finger arthroplasties were reported to one or both of the registers. 66.7% were reported to the NAR, while 95.2% were reported to the NPR. Completeness of reporting varies much between the different hospitals. For hospitals with a low completeness of reporting rate for the NAR, either the form was not sent, or other interventions than finger arthroplasties were incorrectly coded with NDB 8y.

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

Revision operations. From 2015 to 2016, 60 revisions were reported to one or both of the registers. 48.3% of these were reported to the NAR, while 100% were reported to the NPR (revision level 1). Completeness of reporting varies much between the different hospitals. A low completeness of reporting rate may mean that the revision 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:
NDC 8y - NDU 2y

Completeness of reporting for primary and revision operations, finger prosthesis, 2015-2016



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.

* Have no registered primary operations in NAR or NPR.

** Have no registered revisions in NAR or NPR.

Completeness of reporting analysis for wrist/carpus/distal radioulnar joint (DRUJ), 2015-2016

A completeness of reporting analysis has been conducted by combining the data in the Register with data from the Norwegian Patient Register (NPR). The report and analysis were prepared by the NPR in collaboration with the Norwegian Arthroplasty Register (NAR). There are separate statistics on primary operations and revisions. Some hospitals perform few of these arthroplasties and the completeness of reporting rate must be seen in this light.

NCSP codes for combining data from NPR hospital stays and wrist/carpus/DRUJ

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
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

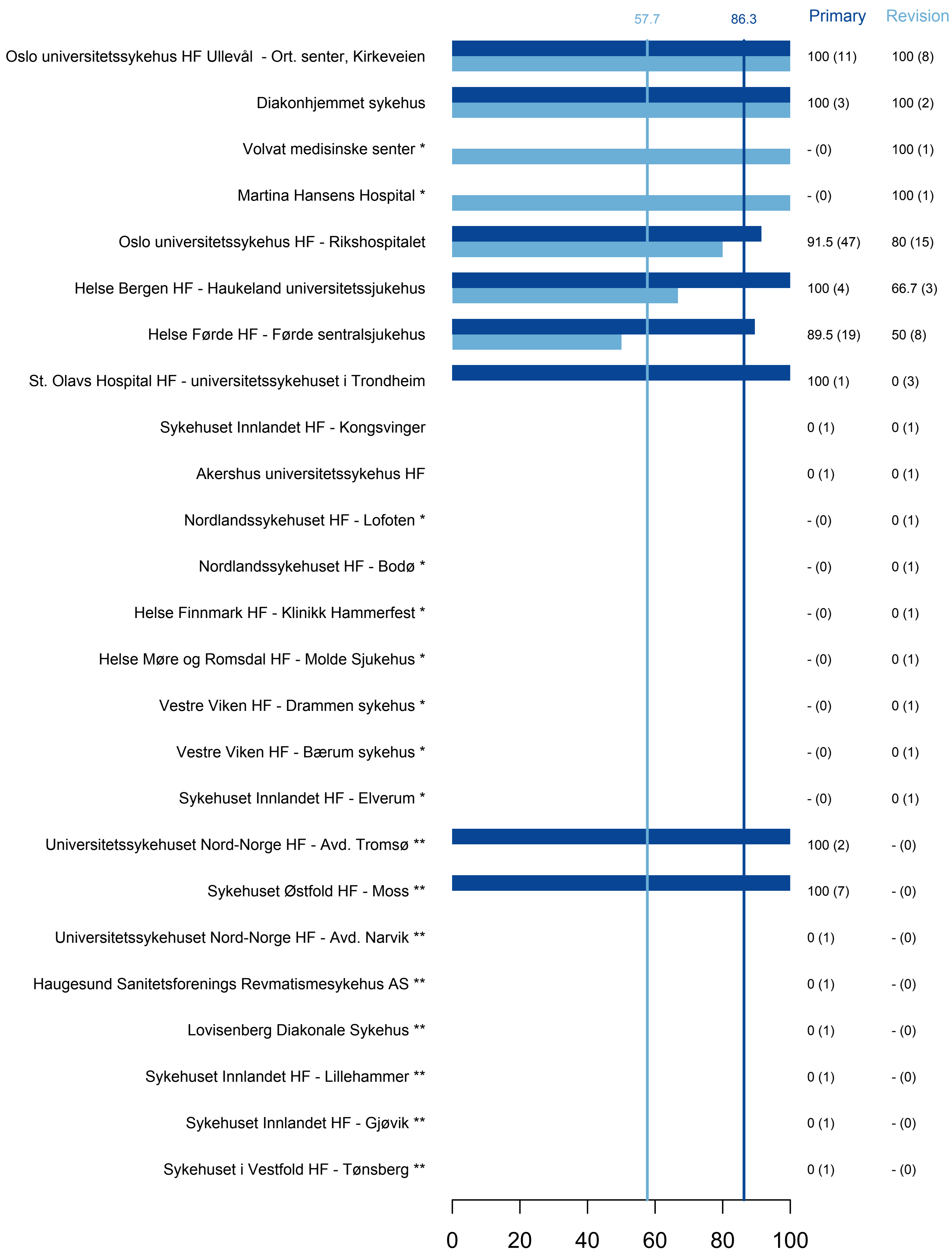
Primary operations. From 2015 to 2016, 102 primary wrist/carpus/DRUJ arthroplasties were reported to one or both of the registers. 86.3% were reported to the NAR while 77.5% were reported to the NPR. Completeness of reporting varies much between the different hospitals.

Procedure codes to be used for primary operations: NDB 0* - NDB 1* - NDB 2* - NDB 3* - NDB 4* - NDB 5*

Revision operations. From 2015 to 2016, 52 revisions were reported to one or both of the registers. 57.7% of these were reported to the NAR, while 67.3% 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: NDC 0* - NDC 1* - NDC 2* - NDC 3* - NDC 4* - NDB 5*

Completeness of reporting for primary and revision operations, hand prosthesis, 2015-2016



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.

* Have no registered primary operations in NAR or NPR.

** Have no registered revisions in NAR or NPR.

Completeness of reporting analysis for shoulder arthroplasty, 2015-2016

A completeness of reporting analysis has been conducted by combining the data in the Register with data from the Norwegian Patient Register (NPR). The report and analysis were prepared by the NPR in collaboration with the Norwegian Arthroplasty Register (NAR). There are separate statistics on primary operations and revisions. Some hospitals perform few shoulder arthroplasties and the completeness of reporting rate must be seen in this light.

NCSP codes for combining data from NPR hospital stays and shoulder arthroplasties

Type	Code	Description
Primary operation	**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
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 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

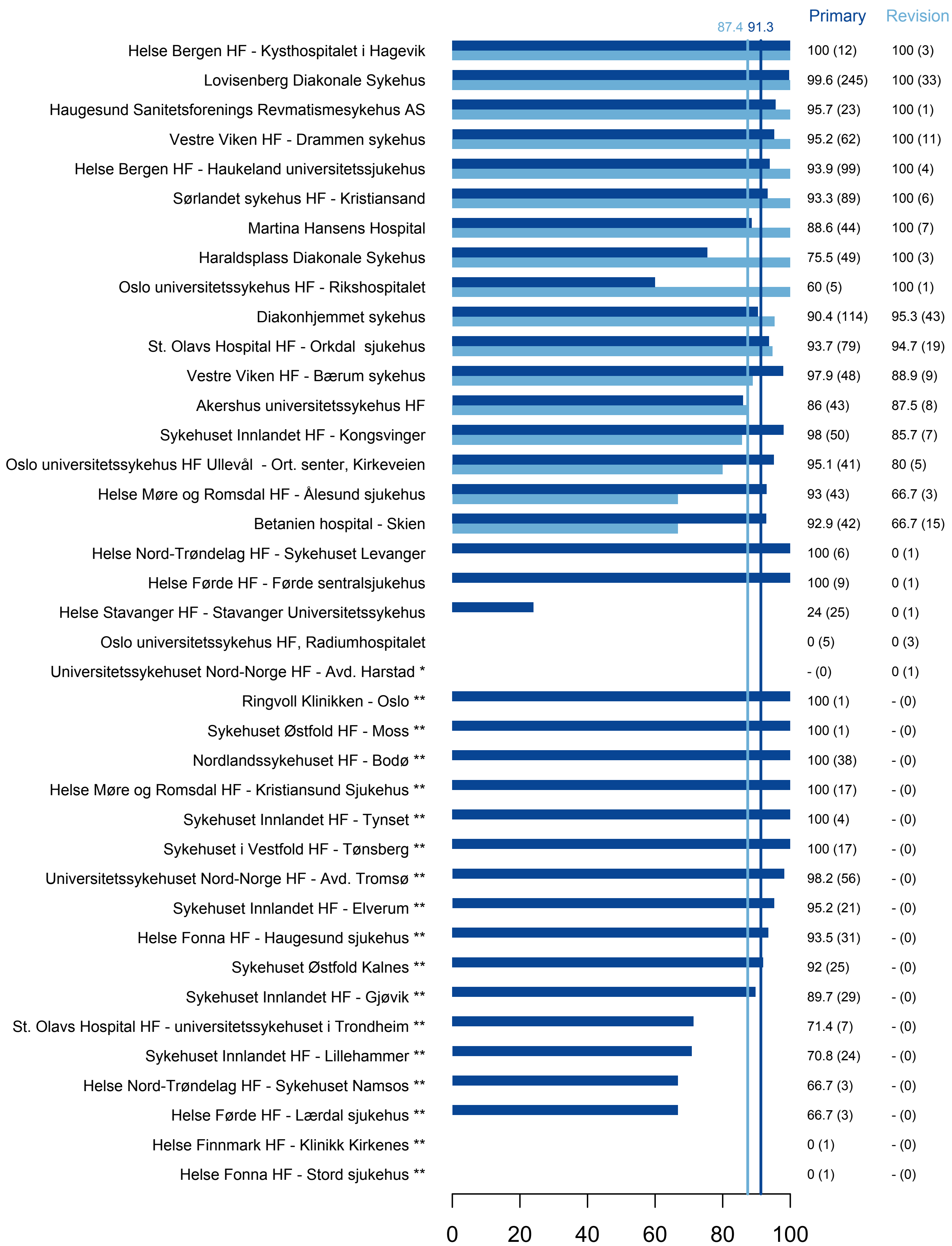
Primary operations. From 2015 to 2016, 1441 primary shoulder arthroplasties were reported to one or both of the registers. 91.3% were reported to the NAR, while 97.2% were reported to the NPR. Completeness of reporting varies much between the different hospitals. For hospitals with a low completeness of reporting rate for the NAR, either the form was not sent, or other interventions than shoulder arthroplasties were incorrectly coded with NBB 0*/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 2015 to 2016, 190 revisions were reported to one or both of the registers. 87.4% of these were reported to the NAR, while 85.8% 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: NBC 0* - NBC 1* - NBC 2* - NBC 3* - NBC 4* - NBC 99 - NBU 0* - NBU 1*

Completeness of reporting for primary and revision operations, shoulder prosthesis, 2015-2016



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.

* Have no registered primary operations in NAR or NPR.

** Have no registered revisions in NAR or NPR.

Completeness of reporting analysis for toe joint replacements, 2015-2016

A completeness of reporting analysis has been conducted by combining the data in the Register with data from the Norwegian Patient Register (NPR). The report and analysis were prepared by the NPR in collaboration with the Norwegian Arthroplasty Register (NAR). There are separate statistics on primary operations and revisions. Some hospitals perform few toe joint replacements and the completeness of reporting rate must be seen in this light.

NCSP codes for combining data from NPR hospital stays and toe joint replacements

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
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

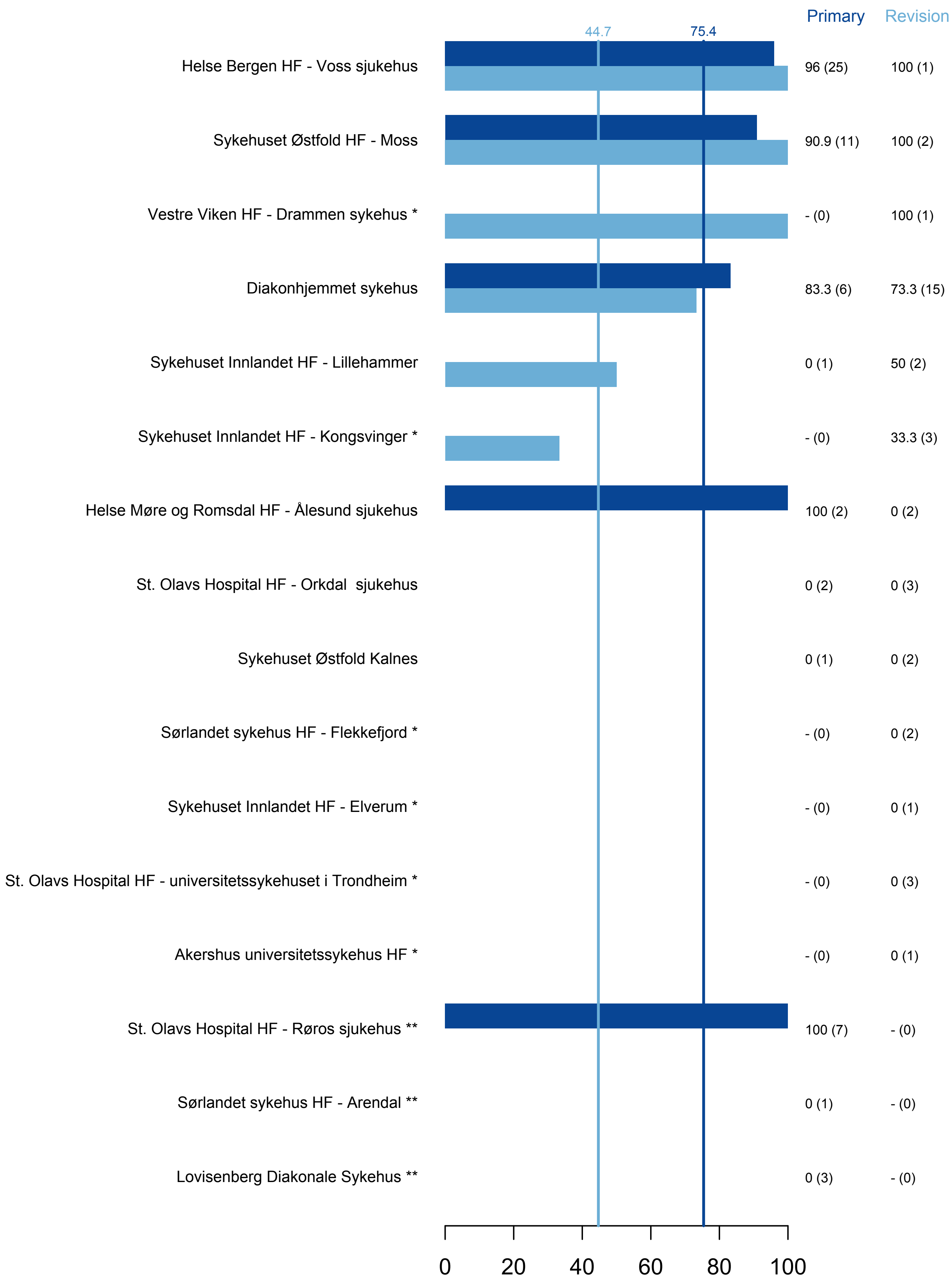
Primary operations. From 2015 to 2016, 65 primary toe joint replacements were reported to one or both of the registers. 75.4% were reported to the NAR, while 96.9% were reported to the NPR. Completeness of reporting varies much between the different hospitals. For hospitals with a low completeness of reporting rate for the NAR, either the form was not sent, or other interventions than toe joint replacements 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 2015 to 2016, 38 revisions were reported to one or both of the registers. 44.7% of these were reported to the NAR, while 97.4% 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:
NHC 6y - NHC 7y - NHC 8y - NHU 2y

Completeness of reporting for primary and revision operations, toe prosthesis, 2015-2016



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.

* Have no registered primary operations in NAR or NPR.

** Have no registered revisions in NAR or NPR.

CONTENTS

Norwegian Hip Fracture Register

HIP FRACTURE REGISTER: ANNUAL REPORT 2019

The Norwegian Hip Fracture Register now contains data from more than 113 000 primary operations and almost 12 500 revisions. In 2018, 8334 primary and 913 revision operations were reported to the Register. The figures are almost unchanged from the previous year, and reporting to the Register appears to be stable. When the annual report with the hospital results is sent out later this year, we would, however, ask all hospitals to compare their numbers of primary and revision operations with those recorded in the Hip Fracture Register.

The Centre for Clinical Documentation and Evaluation (SKDE) assesses all medical quality registers in Norway every year. The Norwegian Hip Fracture Register is assessed as a stage 3 register. The most important reason why the Register did not quite achieve stage 4 in last year's evaluation was that it reported low coverage for reoperations compared with data in the Norwegian Patient Register (NPR). For some time, we have been uncertain as to whether reoperations are adequately reported to the Hip Fracture Register. This is especially true for minor revisions such as removal of osteosynthesis material and closed repositioning following luxation of a hemiprosthesis. At the same time, we have been concerned that the real number of reoperations is difficult to calculate using NPR data. One reason for this is that there is probably a wide variety of practices in the use of the ICD-10 and NSCP codes for reoperations. In addition, NPR data are not side-specific, which makes it difficult to determine which hip has been reoperated. During 2019, we will conduct attrition analyses in order to calculate more accurately the coverage rates for the Hip Fracture Register. This work is already underway at Haukeland University Hospital. We hope that other hospitals will also conduct an attrition analysis for their patients and we ask interested hospitals to contact the Register. While we wait for the results of these analyses, please remember that all reoperations following a hip fracture must be reported to the Hip Fracture Register.

The Hip Fracture Register has published interactive results online since 2017. Updated online results are also a requirement for approval as a stage 4 register. 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 and the Hip Arthroplasty Register are currently implementing a quality improvement project. The aim is to reduce the use of uncemented femoral stems in elderly hip fracture patients. The Hip Fracture Register has previously recommended avoiding the use of uncemented femoral stems in hip fracture surgery in patients over 70 years. We are therefore pleased to note that the proportion of uncemented prostheses has been decreasing regularly in recent years. I 2018, only about 10% of hemiprostheses were uncemented. However, uncemented stems are still routinely used in a few hospitals. We hope that their use will continue to decline.

There is still great variation between hospitals in the time patients have to wait from fracture to surgery. The Norwegian Knowledge Centre for the Health Services, the new interdisciplinary guidelines for hip fracture treatment, and the Hip Fracture Register all recommend that hip fractures are operated on within 24 hours, or within 48 hours as a maximum. Particularly the larger hospitals fail to operate a large proportion of their hip fracture patients within these time limits. There are few reasons to postpone hip fracture surgery for more than 48 hours, and hospitals should make every effort to operate on hip fractures as soon as possible. When we eventually have an electronic reporting solution for hip fracture surgery, we will inquire about the reason when patients have to wait for longer than 48 hours.

The interdisciplinary guidelines for the treatment of hip fracture patients have been developed in collaboration between the Norwegian Orthopaedic Association, the Norwegian Geriatrics Society and the Norwegian Anaesthesiology Association. The new guidelines should be used in the design of standard pathways for hip fracture patients. The hospital-based results and interactive results of the Hip Fracture Register will indicate whether individual recommendations in the guidelines are being followed. Since 2018, the Hip Fracture Register has been represented on the board of FFN Norway, an interdisciplinary organisation whose efforts are directed at the prevention and treatment of low-energy fractures. We would like the Hip Fracture Register to be more involved in quality improvement work through monitoring to ensure that hip fracture patients receive the recommended treatment. We hope to expand the Register to include other variables such as hospital days, mobilisation in hospital, fall prevention, osteoporosis treatment, medical complications in connection with hospital stays, and post-discharge care. The new variables in the Hip Fracture Register will probably be recorded on a new electronic form completed by a doctor or nurse at discharge. An electronic reporting solution for the surgery form will hopefully be in place in 2019, which will enable easier and more complete recording.

Advisor Lise Kvamsdal will leave the Norwegian National Advisory Unit on Arthroplasty and Hip Fractures in September 2019. She has been a key person in the daily operation of the Hip Fracture Register ever since its inception in 2005. We extend our warmest thanks to her for her excellent work for the Hip Fracture Register through all these years and wish her the very best for her retirement.

PUBLICATIONS SINCE 1 JANUARY 2018

Bartels S et al. have studied treatment of displaced femoral neck fractures in younger patients (55-70 years). The results showed a high proportion of revisions following screw fixation. Patients receiving a hemiprosthesis or total hip prosthesis reported better quality of life and less pain and were more satisfied with the outcome of the surgery than patients operated on with screw fixation.

Authen A et al. have investigated whether the level of experience of the surgeon affects risk of revision following hip fractures. The results showed an increased risk of reoperation if the operating surgeon had fewer than three years of experience in treating fractures. The risk was higher in particular for displaced femoral neck fractures, regardless of treatment method. The conclusion was that at least one of the surgeons involved in operations for displaced femoral neck fracture should be experienced.

Sunniva Leer-Salvesen has compared perioperative and postoperative thrombosis prophylaxis in osteosynthesis for hip fractures. The timing of the initiation of thrombosis prophylaxis had no impact on mortality or risk of revision, but postoperative thrombosis prophylaxis reduced the risk of intraoperative bleeding complications.

Torbjørn Berge Kristensen has studied results for hemiprostheses with different stem designs. His study revealed a lower risk of revision for anatomical and straight femoral stems when compared to polished, taper-slip stems. The latter design had a higher risk of periprosthetic fracture.

Please also see the list of publications in this report and on our website: http://nrlweb.ihelse.net/

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.

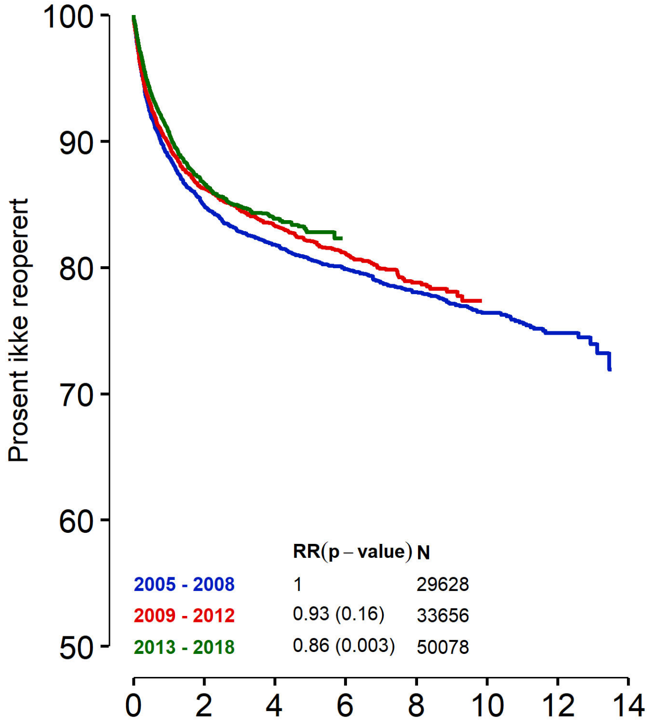
Thank you all for good reporting and we look forward to continued fruitful cooperation!

Bergen, June 2019

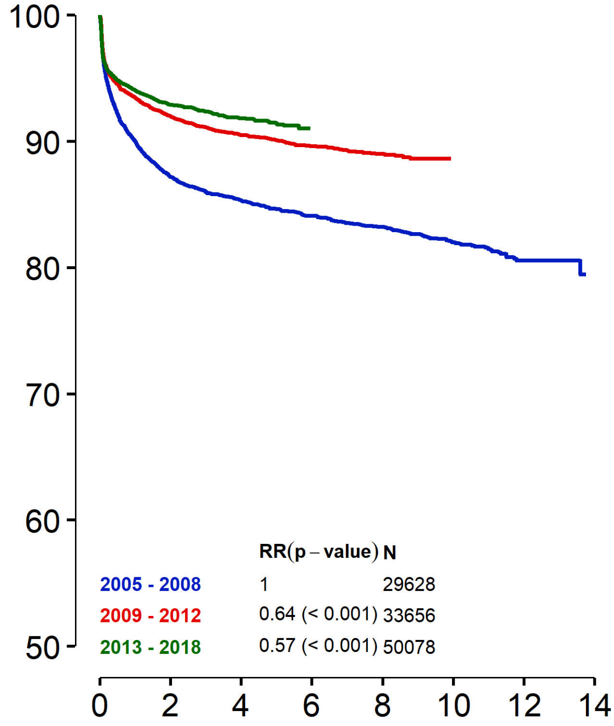
Jan-Erik Gjertsen Chief Physician/Associate Professor Head of Hip Fracture Register	Eva Dybvik Biostatistician	Gard Kroken Biostatistician
Lise Kvamsdal Advisor	Irina Kvinnesland IT Consultant	

Survival of hip fracture implants
2005-2018

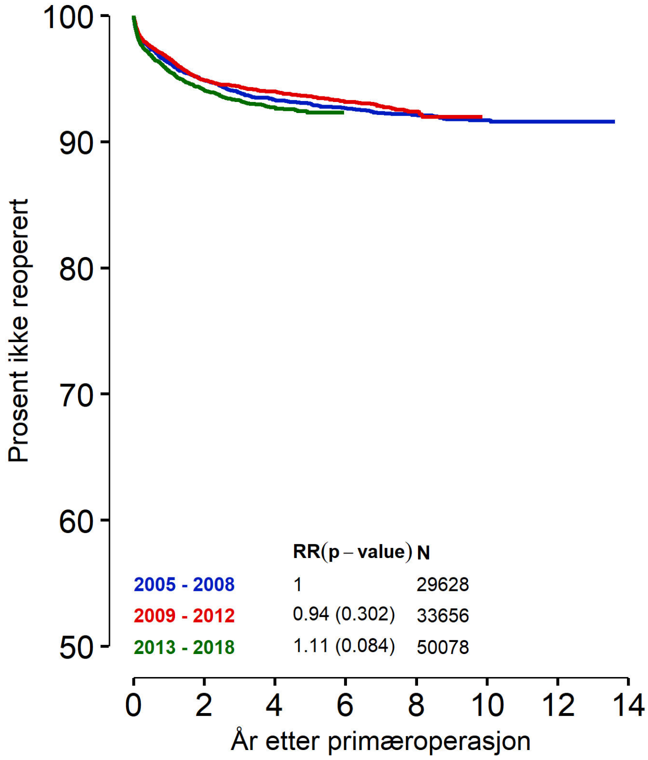
D.1) Femoral neck fractures, undisplaced



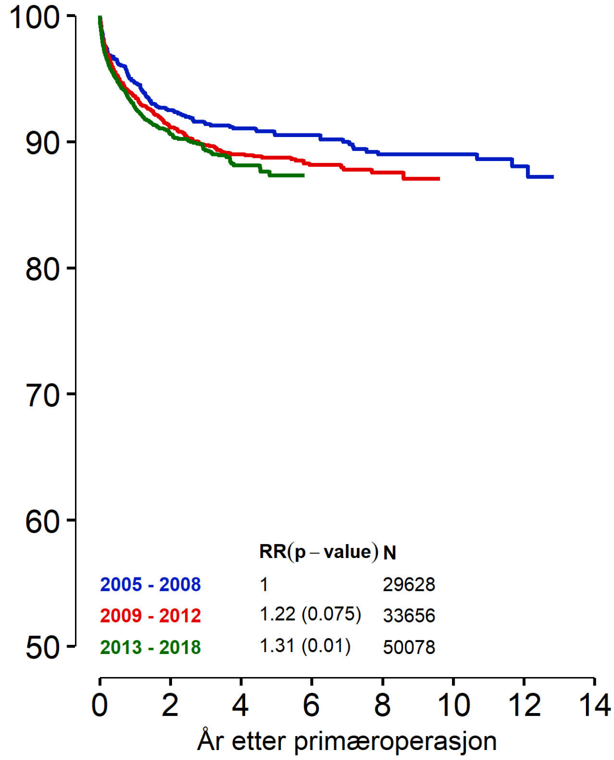
D.2) Intracapsular fractures, displaced



D.3) Trochanteric fractures



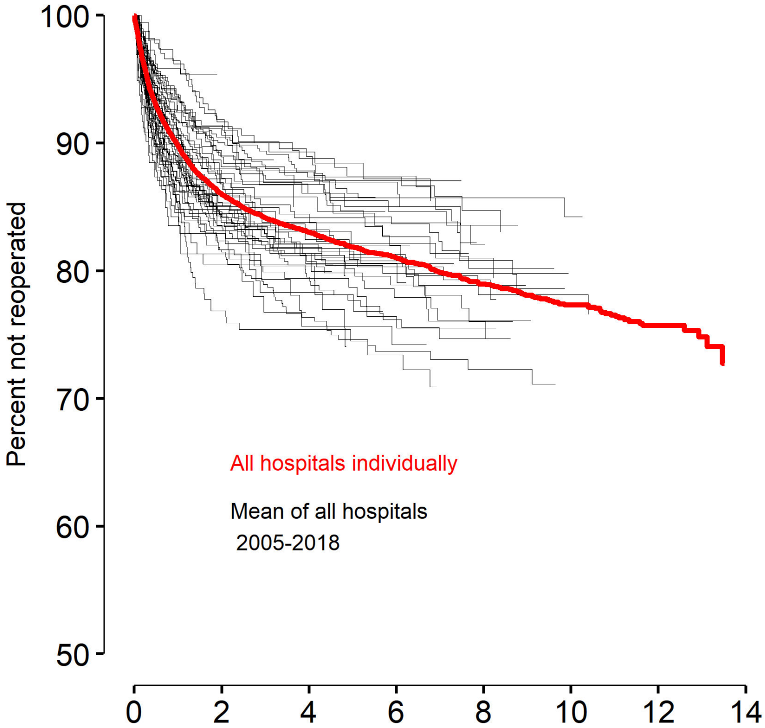
D.4) Sub-/intertrochanteric fractures



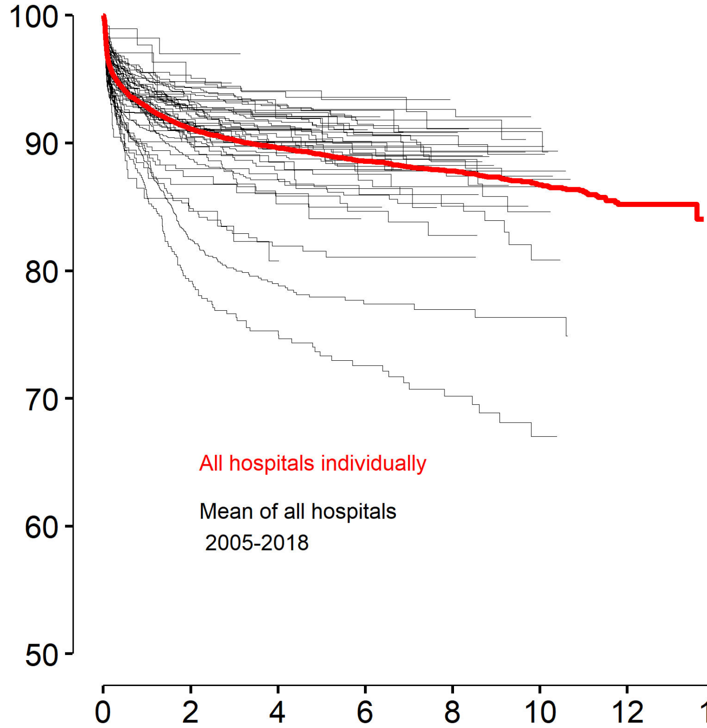
Kaplan-Meier survival curves. Risk ratio (RR) is adjusted for age and gender.
Survival estimate is given as long as more than 50 prostheses are at risk.

Hospital results after hip fractures
2005-2018

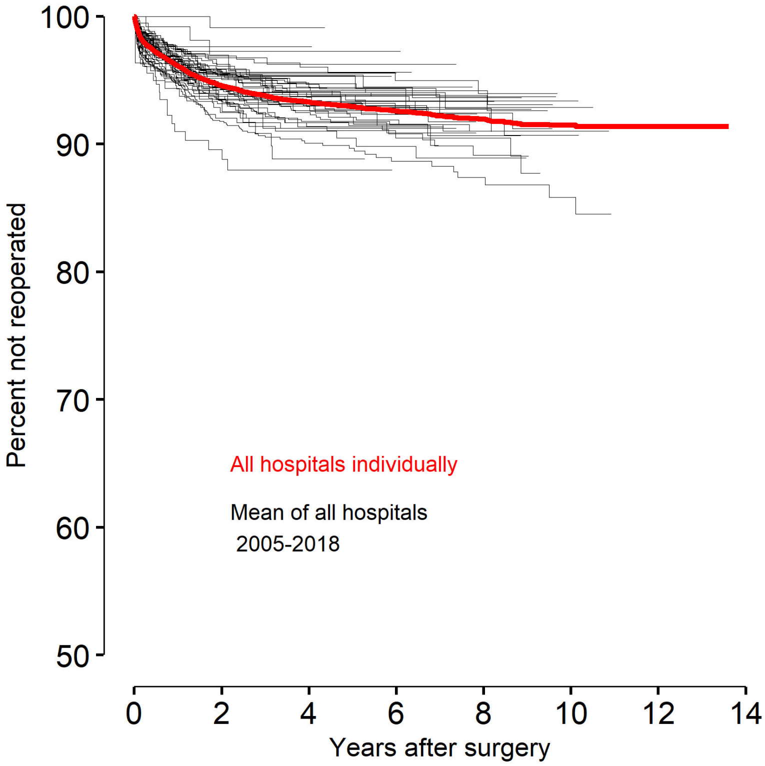
D.5) Femoral neck fractures, undisplaced



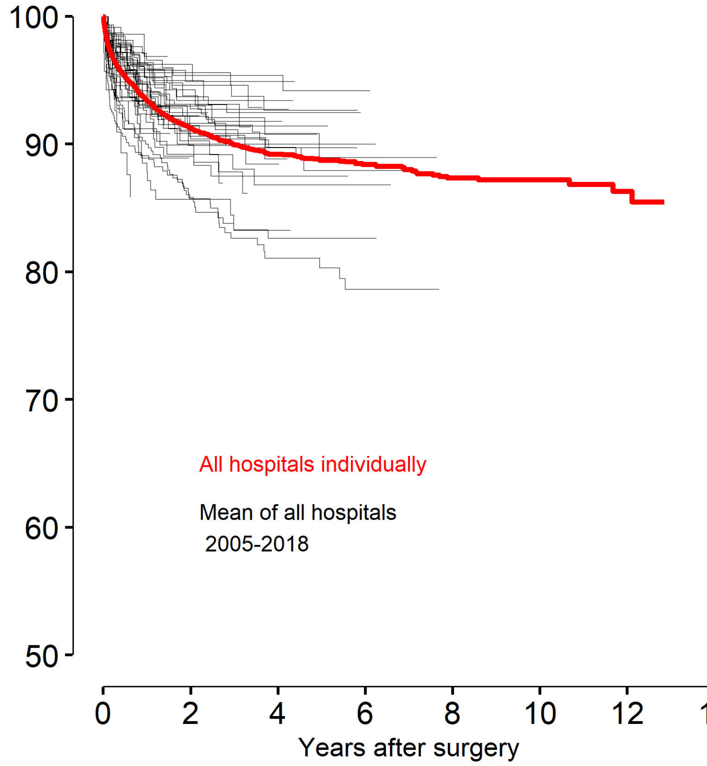
D.6) Femoral neck fractures, displaced



D.7) Trochanteric fractures

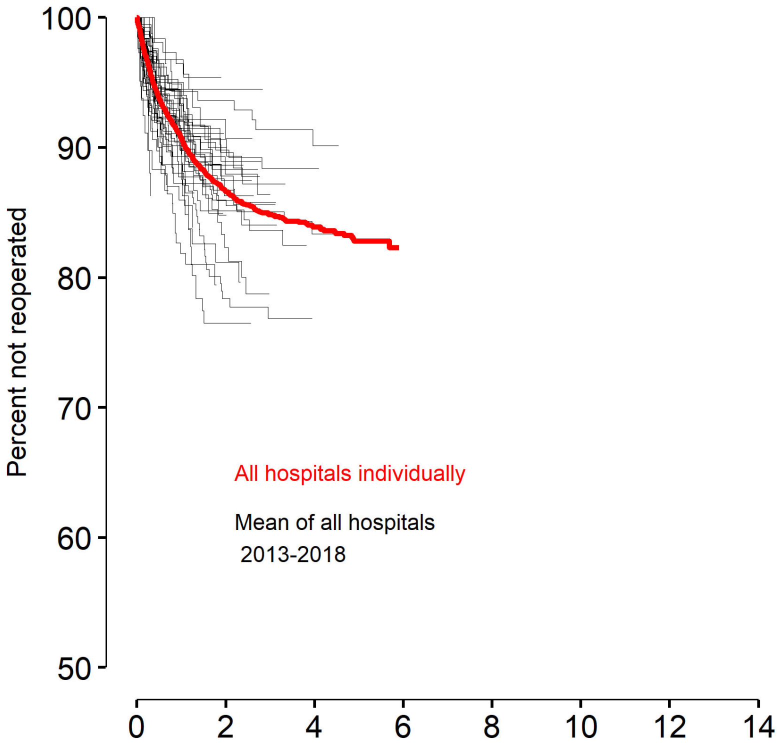


D.8) Sub-/intertrochanteric fractures

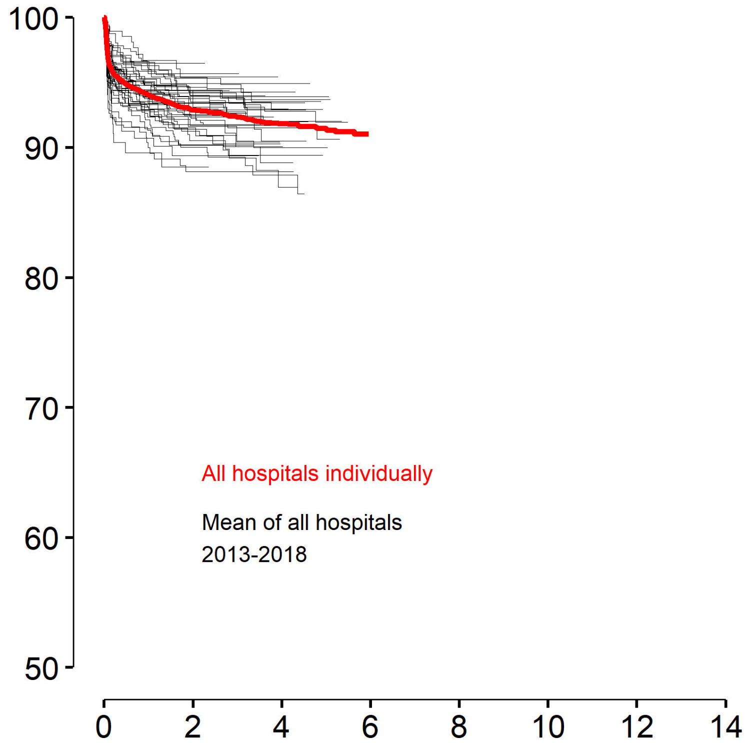


Hospital results after hip fractures 2013-2018

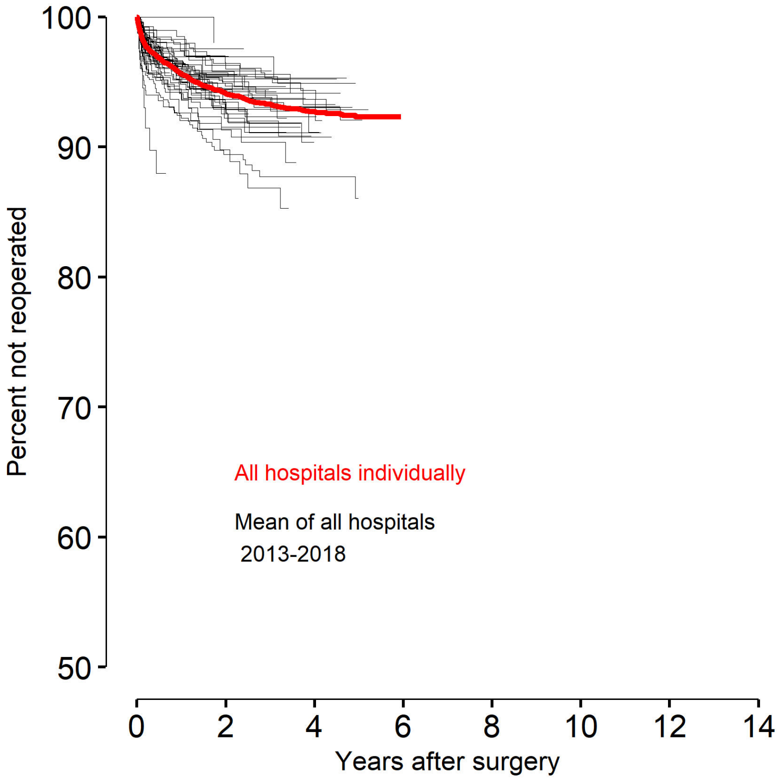
D.9) Femoral neck fractures, undisplaced



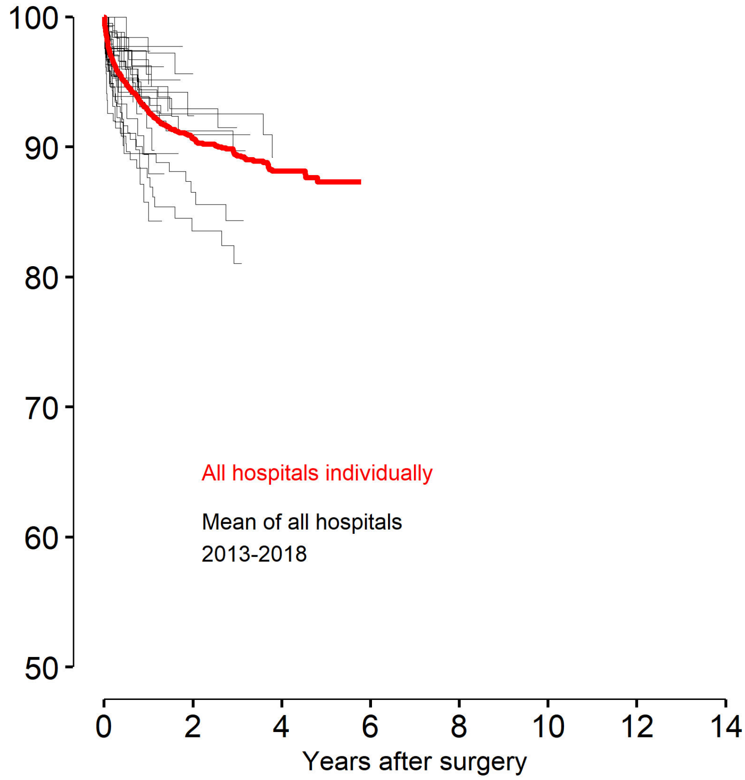
D.10) Femoral neck fractures, displaced



D.11) Trochanteric fractures



D.12) Sub-/intertrochanteric fractures



HIP FRACTURES

Numbers of operations

Table 1: Annual numbers of operations

Year	Primary operation		Reoperation		Total
2018	8334	(90,1%)	913	(9,9%)	**9247**
2017	8345	(90,3%)	898	(9,7%)	**9243**
2016	8497	(89,7%)	978	(10,3%)	**9475**
2015	8411	(90,0%)	931	(10,0%)	**9342**
2014	8182	(91,2%)	791	(8,8%)	**8973**
2013	8309	(90,3%)	898	(9,8%)	**9207**
2012	8435	(90,4%)	896	(9,6%)	**9331**
2011	8600	(90,3%)	924	(9,7%)	**9524**
2010	8363	(90,7%)	861	(9,3%)	**9224**
2009	8258	(89,5%)	970	(10,5%)	**9228**
2008	8362	(89,9%)	942	(10,1%)	**9304**
2007	7870	(89,4%)	933	(10,6%)	**8803**
2006	7517	(89,4%)	893	(10,6%)	**8410**
2005	5879	(89,9%)	664	(10,2%)	**6543**
Total	**113362**	**(90,1%) ***	**12492**	**(9,9%) ****	**125854**

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.
* 3518 (3%) were primary operations with total hip prostheses from the Norwegian Arthroplasty Register.
** 4391 (35%) were reoperations with total hip prostheses from the Norwegian Arthroplasty Register.

Figure 1: Annual numbers of operations

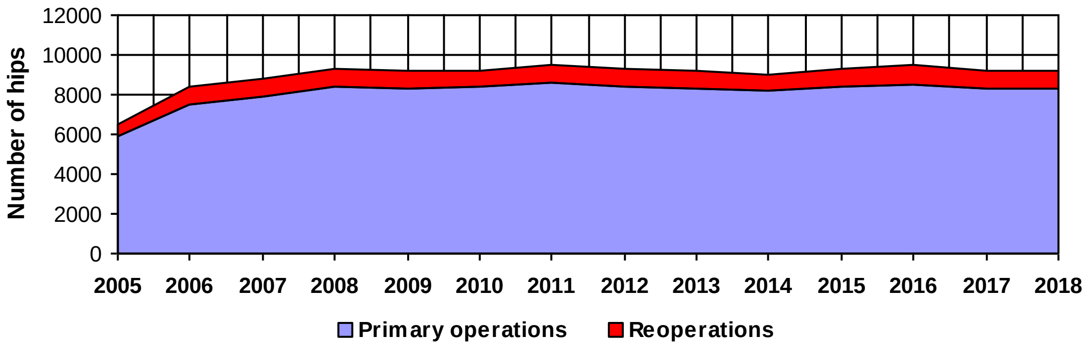
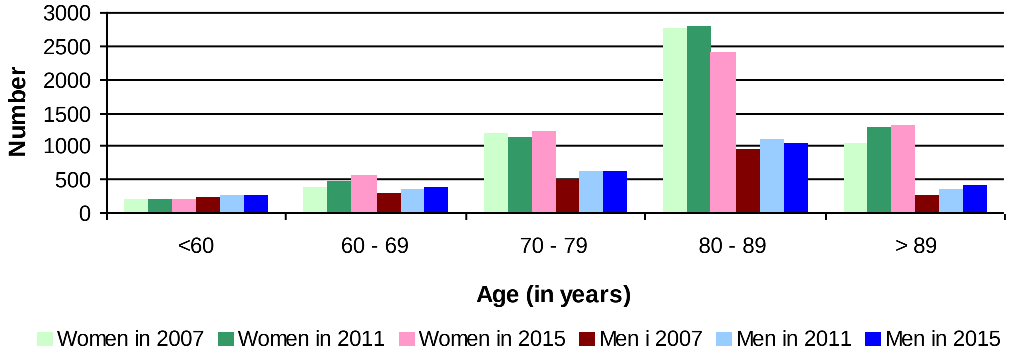


Figure 2: Age by primary operation (in 2007, 2011 and 2015)



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
2018	277 (3,6%)	951 (12,3%)	2686 (34,6%)	2397 (30,9%)	1275 (16,4%)	176 (2,3%)	**7762**
2017	298 (3,8%)	1112 (14,0%)	2769 (34,9%)	2378 (30,0%)	1208 (15,2%)	168 (2,1%)	**7933**
2016	299 (3,7%)	1107 (13,6%)	2897 (35,6%)	2425 (29,8%)	1235 (15,2%)	186 (2,3%)	**8149**
2015	309 (3,8%)	1086 (13,4%)	3054 (37,8%)	2330 (28,8%)	1105 (13,7%)	202 (2,5%)	**8086**
2014	326 (4,1%)	1157 (14,7%)	2996 (38,0%)	2189 (27,7%)	1045 (13,2%)	179 (2,3%)	**7892**
2013	314 (3,9%)	1129 (14,1%)	2932 (36,6%)	2260 (28,2%)	1198 (15,0%)	179 (2,2%)	**8012**
2012	316 (3,8%)	1167 (14,2%)	2936 (35,7%)	2309 (28,1%)	1326 (16,1%)	171 (2,1%)	**8225**
2011	313 (3,7%)	1206 (14,3%)	2844 (33,8%)	2419 (28,8%)	1421 (16,9%)	205 (2,4%)	**8408**
2010	355 (4,3%)	1218 (14,9%)	2882 (35,1%)	2216 (27,0%)	1340 (16,3%)	189 (2,3%)	**8200**
2009	354 (4,4%)	1290 (15,9%)	2857 (35,3%)	2128 (26,3%)	1306 (16,1%)	165 (2,0%)	**8100**
2008	385 (4,7%)	1321 (16,1%)	2834 (34,5%)	2201 (26,8%)	1292 (15,7%)	178 (2,2%)	**8211**
2007	452 (5,9%)	1434 (18,6%)	2610 (33,8%)	1872 (24,3%)	1188 (15,4%)	155 (2,0%)	**7711**
2006	465 (6,3%)	1488 (20,2%)	2647 (35,9%)	1683 (22,8%)	983 (13,3%)	115 (1,6%)	**7381**
2005	445 (7,7%)	1294 (22,4%)	1974 (34,2%)	1147 (19,9%)	809 (14,0%)	105 (1,8%)	**5774**
Total	**4908 (4,5%)**	**16960 (15,4%)**	**38918 (35,4%)**	**29954 (27,3%)**	**16731 (15,2%)**	**2373 (2,2%)**	**109844**

* Total hip prostheses are not counted

Figure 3: Time from fracture to operation - grouped in hours (n=109844)

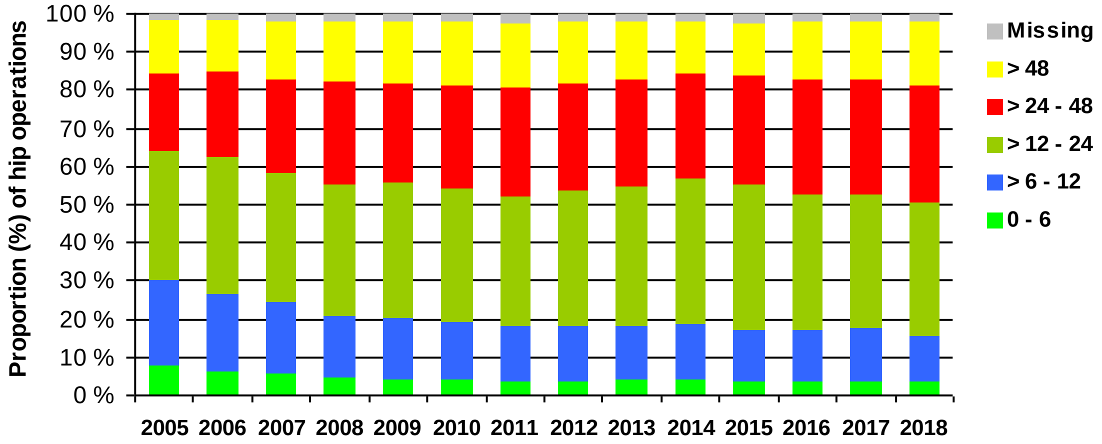
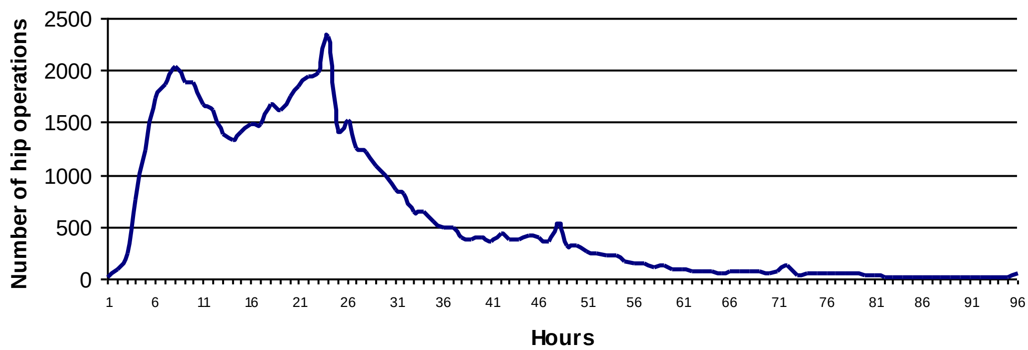


Figure 4: Time from fracture to operation - continuous (n=56039)



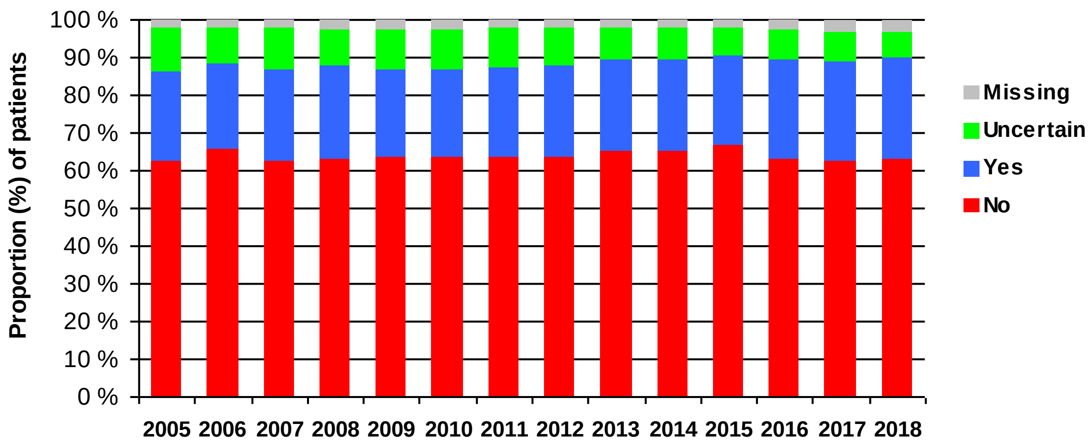
Mean time from fracture to operation was 24 hours (median 21 hours).

Cognitive impairment

Table 3: Cognitive impairment - primary operations*

	No		Yes		Uncertain		Missing		Total
2018	4916	(63,3%)	2050	(26,4%)	556	(7,2%)	240	(3,1%)	**7762**
2017	4978	(62,8%)	2083	(26,3%)	637	(8,0%)	235	(3,0%)	**7933**
2016	5156	(63,3%)	2139	(26,2%)	635	(7,8%)	219	(2,7%)	**8149**
2015	5386	(66,6%)	1919	(23,7%)	601	(7,4%)	180	(2,2%)	**8086**
2014	5136	(65,1%)	1933	(24,5%)	642	(8,1%)	181	(2,3%)	**7892**
2013	5235	(65,3%)	1938	(24,2%)	675	(8,4%)	164	(2,0%)	**8012**
2012	5221	(63,5%)	2007	(24,4%)	821	(10,0%)	176	(2,1%)	**8225**
2011	5348	(63,6%)	1990	(23,7%)	901	(10,7%)	169	(2,0%)	**8408**
2010	5220	(63,7%)	1917	(23,4%)	834	(10,2%)	229	(2,8%)	**8200**
2009	5157	(63,7%)	1890	(23,3%)	832	(10,3%)	221	(2,7%)	**8100**
2008	5186	(63,2%)	2026	(24,7%)	794	(9,7%)	205	(2,5%)	**8211**
2007	4834	(62,7%)	1873	(24,3%)	836	(10,8%)	168	(2,2%)	**7711**
2006	4845	(65,6%)	1675	(22,7%)	720	(9,8%)	141	(1,9%)	**7381**
2005	3610	(62,5%)	1384	(24,0%)	649	(11,2%)	131	(2,3%)	**5774**
Total	**70228**	**(63,9%)**	**26824**	**(24,4%)**	**10133**	**(9,2%)**	**2659**	**(2,4%)**	**109844**

Figure 5: Cognitive impairment - primary operations*



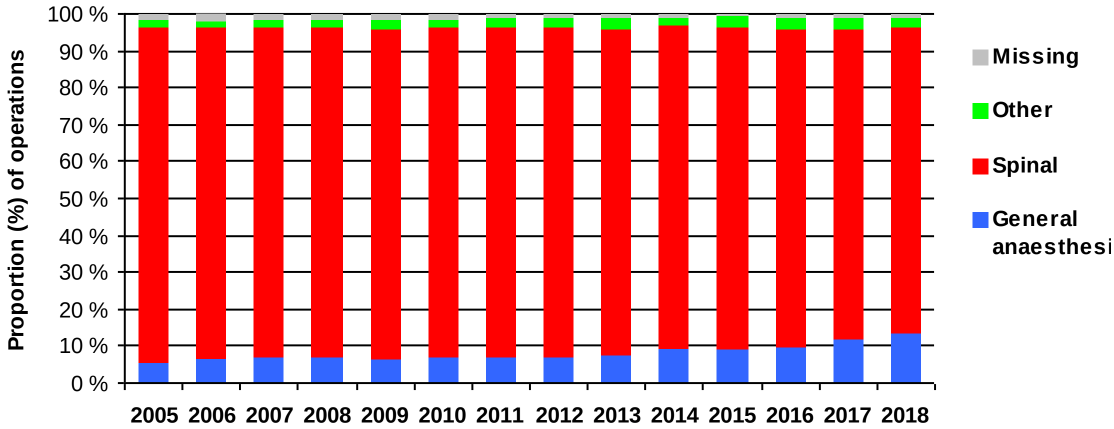
* Total hip prostheses are not counted

Type of anaesthesia

Table 4: Type of anaesthesia - primary operations*

	General anaesthesia		Spinal		Other		Missing		Total
2018	1054	(13,6%)	6411	(82,6%)	229	(3,0%)	68	(0,9%)	**7762**
2017	927	(11,7%)	6668	(84,1%)	258	(3,3%)	80	(1,0%)	**7933**
2016	810	(9,9%)	6974	(85,6%)	282	(3,5%)	82	(1,0%)	**8148**
2015	758	(9,4%)	7040	(87,1%)	226	(2,8%)	62	(0,8%)	**8086**
2014	732	(9,3%)	6890	(87,3%)	203	(2,6%)	67	(0,8%)	**7892**
2013	588	(7,3%)	7094	(88,5%)	256	(3,2%)	74	(0,9%)	**8012**
2012	560	(6,8%)	7364	(89,5%)	219	(2,7%)	82	(1,0%)	**8225**
2011	586	(7,0%)	7506	(89,3%)	219	(2,6%)	97	(1,2%)	**8408**
2010	565	(6,9%)	7321	(89,3%)	194	(2,4%)	120	(1,5%)	**8200**
2009	520	(6,4%)	7246	(89,5%)	188	(2,3%)	146	(1,8%)	**8100**
2008	591	(7,2%)	7297	(88,9%)	182	(2,2%)	141	(1,7%)	**8211**
2007	550	(7,1%)	6852	(88,9%)	187	(2,4%)	122	(1,6%)	**7711**
2006	472	(6,4%)	6632	(89,9%)	137	(1,9%)	140	(1,9%)	**7381**
2005	323	(5,6%)	5222	(90,4%)	123	(2,1%)	106	(1,8%)	**5774**
Total	**9036**	**(8,2%)**	**96517**	**(87,9%)**	**2903**	**(2,6%)**	**1387**	**(1,3%)**	**109843**

Figure 6: Type of anaesthesia in primary operations*



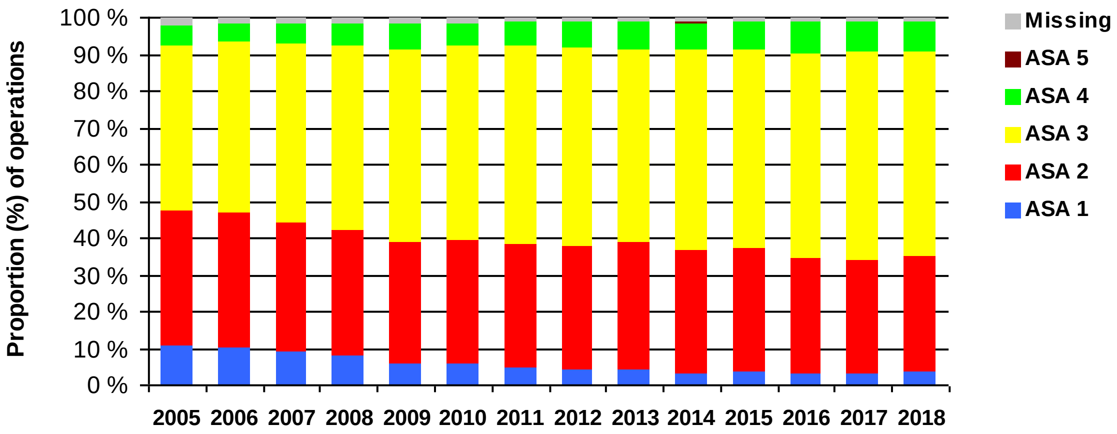
* Total hip prostheses are not counted

ASA classification (ASA = American Society of Anesthesiologists)

Table 5: ASA classification - primary operations

	ASA 1		ASA 2		ASA 3		ASA 4		ASA 5		Missing		Total
2018	318	(3,8%)	2627	(31,5%)	4642	(55,7%)	641	(7,7%)	12	(0,1%)	94	(1,1%)	**8334**
2017	282	(3,4%)	2549	(30,5%)	4728	(56,7%)	679	(8,1%)	15	(0,2%)	92	(1,1%)	**8345**
2016	263	(3,1%)	2693	(31,7%)	4729	(55,7%)	708	(8,3%)	10	(0,1%)	93	(1,1%)	**8496**
2015	303	(3,6%)	2851	(33,9%)	4525	(53,8%)	624	(7,4%)	12	(0,1%)	96	(1,1%)	**8411**
2014	256	(3,1%)	2732	(33,4%)	4471	(54,6%)	608	(7,4%)	14	(0,2%)	101	(1,2%)	**8182**
2013	378	(4,5%)	2839	(34,2%)	4382	(52,7%)	609	(7,3%)	17	(0,2%)	84	(1,0%)	**8309**
2012	356	(4,2%)	2833	(33,6%)	4547	(53,9%)	594	(7,0%)	8	(0,1%)	97	(1,1%)	**8435**
2011	437	(5,1%)	2877	(33,5%)	4612	(53,6%)	558	(6,5%)	6	(0,1%)	110	(1,3%)	**8600**
2010	493	(5,9%)	2806	(33,6%)	4410	(52,7%)	498	(6,0%)	16	(0,2%)	140	(1,7%)	**8363**
2009	509	(6,2%)	2720	(32,9%)	4309	(52,2%)	564	(6,8%)	10	(0,1%)	146	(1,8%)	**8258**
2008	677	(8,1%)	2858	(34,2%)	4172	(49,9%)	527	(6,3%)	9	(0,1%)	119	(1,4%)	**8362**
2007	716	(9,1%)	2767	(35,2%)	3820	(48,5%)	451	(5,7%)	7	(0,1%)	109	(1,4%)	**7870**
2006	772	(10,3%)	2746	(36,5%)	3496	(46,5%)	372	(4,9%)	13	(0,2%)	118	(1,6%)	**7517**
2005	639	(10,9%)	2166	(36,8%)	2620	(44,6%)	316	(5,4%)	13	(0,2%)	125	(2,1%)	**5879**
Total	**6399**	(5,6%)	**38064**	(33,6%)	**59463**	(52,5%)	**7749**	(6,8%)	**162**	(0,1%)	**1524**	(1,3%)	**113362**

Figure 7: ASA classification - 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.

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	Annet	Missing	Total
2018	961	3413	197	1101	1276	225	492	567	5	92	5	**8334**
	11,5%	41,0%	2,4%	13,2%	15,3%	2,7%	5,9%	6,8%	0,1%	1,1%	0,1%	
2017	1037	3433	217	1153	1315	206	474	405	7	98	0	**8345**
	12,4%	41,1%	2,6%	13,8%	15,8%	2,5%	5,7%	4,9%	0,1%	1,2%	0,0%	
2016	1086	3543	234	1243	1321	162	465	344	4	93	2	**8497**
	12,8%	41,7%	2,8%	14,6%	15,5%	1,9%	5,5%	4,0%	0,0%	1,1%	0,0%	
2015	1154	3350	243	1336	1255	228	442	323	2	77	1	**8411**
	13,7%	39,8%	2,9%	15,9%	14,9%	2,7%	5,3%	3,8%	0,0%	0,9%	0,0%	
2014	1050	3331	287	1333	1243	161	422	288	2	64	1	**8182**
	12,8%	40,7%	3,5%	16,3%	15,2%	2,0%	5,2%	3,5%	0,0%	0,8%	0,0%	
2013	1171	3296	259	1302	1277	167	448	293	4	91	1	**8309**
	14,1%	39,7%	3,1%	15,7%	15,4%	2,0%	5,4%	3,5%	0,0%	1,1%	0,0%	
2012	1226	3471	262	1277	1271	173	467	207	3	75	3	**8435**
	14,5%	41,1%	3,1%	15,1%	15,1%	2,1%	5,5%	2,5%	0,0%	0,9%	0,0%	
2011	1317	3443	276	1346	1393	162	398	188	4	73	0	**8600**
	15,3%	40,0%	3,2%	15,7%	16,2%	1,9%	4,6%	2,2%	0,0%	0,8%	0,0%	
2010	1249	3287	321	1313	1364	167	431	161	2	66	2	**8363**
	14,9%	39,3%	3,8%	15,7%	16,3%	2,0%	5,2%	1,9%	0,0%	0,8%	0,0%	
2009	1234	3368	328	1306	1211	149	425	151	7	71	8	**8258**
	14,9%	40,8%	4,0%	15,8%	14,7%	1,8%	5,1%	1,8%	0,1%	0,9%	0,1%	
2008	1316	3222	351	1475	1240	83	439	149	2	82	3	**8362**
	15,7%	38,5%	4,2%	17,6%	14,8%	1,0%	5,2%	1,8%	0,0%	1,0%	0,0%	
2007	1416	2993	391	1353	1052	0	438	158	1	66	2	**7870**
	18,0%	38,0%	5,0%	17,2%	13,4%	0,0%	5,6%	2,0%	0,0%	0,8%	0,0%	
2006	1408	2820	343	1311	1010	0	414	131	5	71	4	**7517**
	18,7%	37,5%	4,6%	17,4%	13,4%	0,0%	5,5%	1,7%	0,1%	0,9%	0,1%	
2005	1073	2291	276	1011	757	0	318	102	3	35	13	**5879**
	18,3%	39,0%	4,7%	17,2%	12,9%	0,0%	5,4%	1,7%	0,1%	0,6%	0,2%	
Total	**16698**	**45261**	**3985**	**17860**	**16985**	**1883**	**6073**	**3467**	**51**	**1054**	**45**	**113362**
	14,7%	**39,9%**	**3,5%**	**15,8%**	**15,0%**	**1,7%**	**5,4%**	**3,1%**	**0,0%**	**0,9%**	**0,0%**	

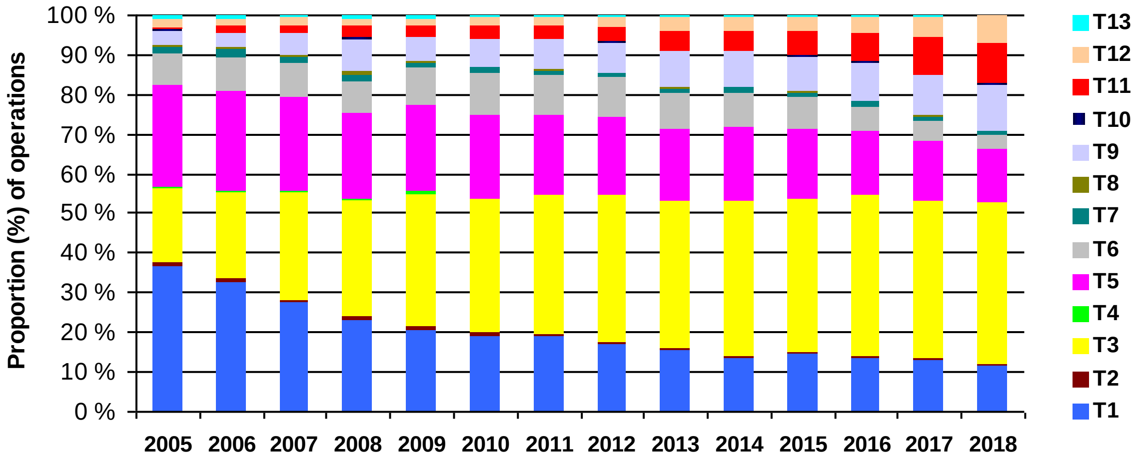
Type 1: Intracapsular fracture, undisplaced
Type 2: Intracapsular fracture, displaced
Type 3: Basocervical fracture
Type 4: Trochanteric fracture (2 fragments) (AO / OTA A1)
Type 5: Trochanteric fracture (multifragment) (AO / OTA A2)
Type 9: Intertrochanteric fracture (AO / OTA A3) (The registration 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
2018	960	62	3388	1	1112	310	78	12	951	16	853	572	19	0	**8334**
	11,5%	0,7%	40,7%	0,0%	13,3%	3,7%	0,9%	0,1%	11,4%	0,2%	10,2%	6,9%	0,2%	0,0%	
2017	1079	46	3333	1	1261	401	104	19	828	24	802	412	35	0	**8345**
	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	1160	39	3444	2	1384	520	97	21	817	11	615	348	39	0	**8497**
	13,7%	0,5%	40,5%	0,0%	16,3%	6,1%	1,1%	0,2%	9,6%	0,1%	7,2%	4,1%	0,5%	0,0%	
2015	1241	36	3233	2	1499	664	96	14	758	8	510	325	25	0	**8411**
	14,8%	0,4%	38,4%	0,0%	17,8%	7,9%	1,1%	0,2%	9,0%	0,1%	6,1%	3,9%	0,3%	0,0%	
2014	1127	31	3188	1	1551	689	102	17	734	8	418	290	26	0	**8182**
	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	1289	32	3100	3	1495	749	109	20	747	4	431	297	33	0	**8309**
	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	1455	27	3138	5	1632	848	97	19	635	8	332	210	28	0	**8435**
	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	1650	50	3003	19	1697	870	112	12	658	14	281	192	42	0	**8600**
	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	1616	83	2781	29	1733	899	127	17	571	4	280	163	60	0	**8363**
	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	1688	81	2755	82	1765	788	101	50	489	8	228	158	65	0	**8258**
	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	1943	64	2439	70	1784	690	128	64	686	10	266	151	65	0	**8362**
	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	2181	50	2115	48	1868	644	127	36	430	6	157	159	48	1	**7870**
	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%	
2006	2466	60	1643	34	1891	628	142	43	272	4	127	136	69	1	**7517**
	32,8%	0,8%	21,9%	0,5%	25,2%	8,4%	1,9%	0,6%	3,6%	0,1%	1,7%	1,8%	0,9%	0,0%	
2005	2154	52	1112	24	1492	469	110	28	211	3	55	105	61	2	**5879**
	36,6%	0,9%	18,9%	0,4%	25,4%	8,0%	1,9%	0,5%	3,6%	0,1%	0,9%	1,8%	1,0%	0,0%	
Total	**22009**	**713**	**38672**	**321**	**22164**	**9169**	**1530**	**372**	**8787**	**128**	**5355**	**3518**	**615**	**4**	**113362**
	19,4%	**0,6%**	**34,1%**	**0,3%**	**19,6%**	**8,1%**	**1,3%**	**0,3%**	**7,8%**	**0,1%**	**4,7%**	**3,1%**	**0,5%**	**0,0%**	

T1: Two screws or pins
T2: Three screws or pins
T3: Bipolar hemiprosthesis
T4: Unipolar hemiprosthesis
T5: Hip compression screw and plate
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



T1: Two screws or pins
T2: Three screws or pins
T3: Bipolar hemiprosthesis
T4: Unipolar hemiprosthesis
T5: Hip compression screw and plate
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

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	14898	253	1034	4	359	2	97	7	27	0	4	0	12	0	**16795**
	88,7%	1,5%	6,2%	0,0%	2,1%	0,0%	0,6%	0,0%	0,2%	0,0%	0,0%	0,0%	0,1%	0,0%	
Intracapsular fracture, displaced	6937	455	36793	302	371	7	172	4	41	0	13	0	165	1	**45433**
	15,3%	1,0%	81,0%	0,7%	0,8%	0,0%	0,4%	0,0%	0,1%	0,0%	0,0%	0,0%	0,4%	0,0%	
Basocervical fracture	136	2	381	12	2184	82	706	29	393	1	26	0	32	0	**4691**
	2,9%	0,0%	8,1%	0,3%	46,6%	1,7%	15,1%	0,6%	8,4%	0,0%	0,6%	0,0%	0,7%	0,0%	
Trochanteric fracture (2 fragments)	11	0	50	0	12400	974	329	249	3487	11	301	0	44	2	**18189**
	0,1%	0,0%	0,3%	0,0%	68,2%	5,4%	1,8%	1,4%	19,2%	0,1%	1,7%	0,0%	0,2%	0,0%	
Trochanteric fracture (multifragment)	3	1	123	0	5593	5629	149	71	3905	38	1271	0	201	0	**17134**
	0,0%	0,0%	0,7%	0,0%	32,6%	32,9%	0,9%	0,4%	22,8%	0,2%	7,4%	0,0%	1,2%	0,0%	
Intertrochanteric fracture **	0	0	13	0	168	774	6	5	338	11	539	0	29	0	**1889**
	0,0%	0,0%	0,7%	0,0%	8,9%	41,0%	0,3%	0,3%	17,9%	0,6%	28,5%	0,0%	1,5%	0,0%	
Subtrochanteric fracture	5	1	41	0	929	1492	19	6	507	61	2943	0	69	0	**6092**
	0,1%	0,0%	0,7%	0,0%	15,2%	24,5%	0,3%	0,1%	8,3%	1,0%	48,3%	0,0%	1,1%	0,0%	
Intracapsular fracture, unspecified *	0	0	0	0	0	0	0	0	0	0	0	3467	0	0	**3467**
	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	100,0%	0,0%	0,0%	
Trochanteric fracture unspecified *	0	0	0	0	0	0	0	0	0	0	0	51	0	0	**51**
	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	100,0%	0,0%	0,0%	
Other	14	1	214	2	153	206	49	1	87	6	258	0	63	0	**1103**
	1,3%	0,1%	19,4%	0,2%	13,9%	18,7%	4,4%	0,1%	7,9%	0,5%	23,4%	0,0%	5,7%	0,0%	
Missing	5	0	23	1	7	3	3	0	2	0	0	0	0	1	**48**
	10,4%	0,0%	47,9%	2,1%	14,6%	6,3%	6,3%	0,0%	4,2%	0,0%	0,0%	0,0%	0,0%	2,1%	
Total	**22009**	**713**	**38672**	**321**	**22164**	**9169**	**1530**	**372**	**8787**	**128**	**5355**	**3518**	**615**	**4**	**114892**
	19,2%	**0,6%**	**33,7%**	**0,3%**	**19,3%**	**8,0%**	**1,3%**	**0,3%**	**7,6%**	**0,1%**	**4,7%**	**3,1%**	**0,5%**	**0,0%**	

T1: Two screws or pins
T2: Three screws or pins
T3: Bipolar hemiprosthesis
T4: Unipolar hemiprosthesis
T5: Hip compression screw and plate
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

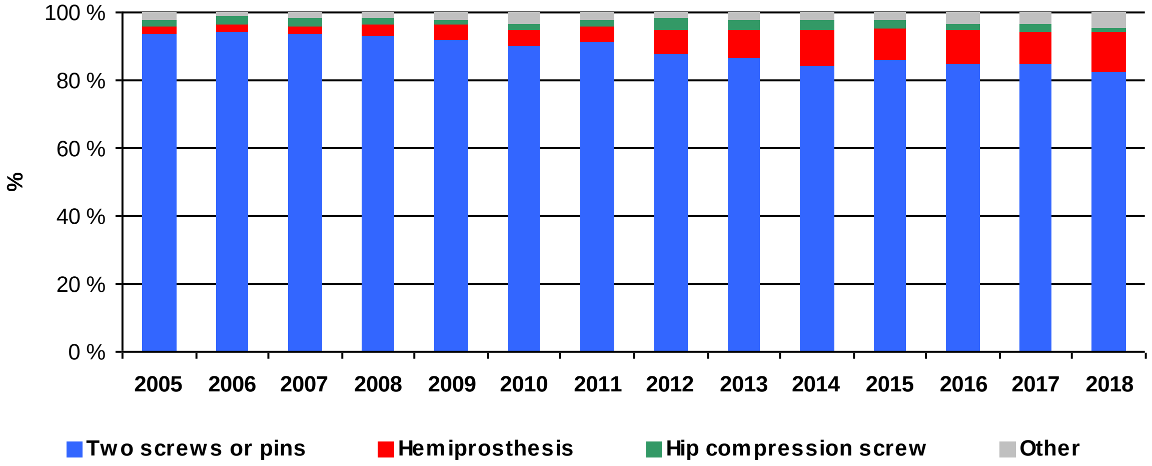
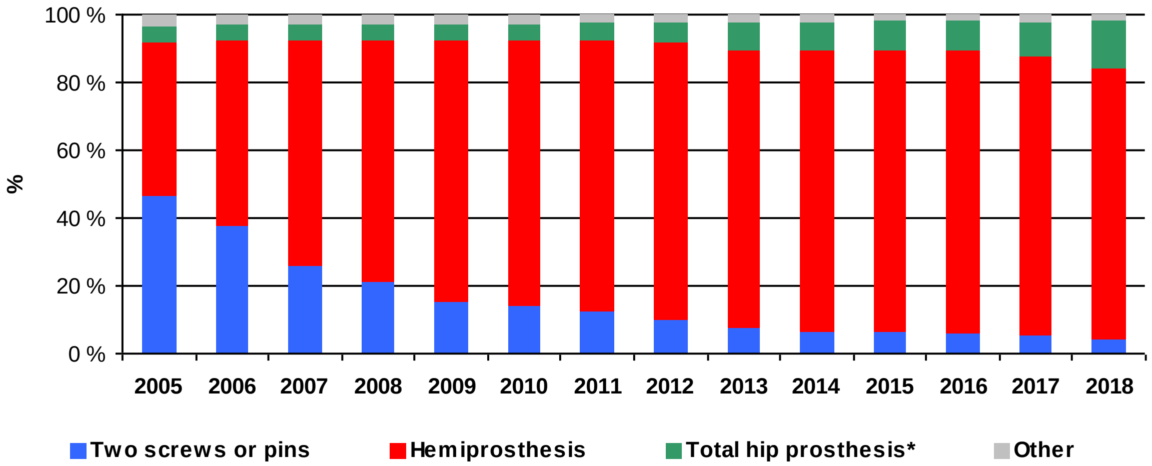


Figure 9b: Time trend for treatment of displaced femoral neck fractures



* 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

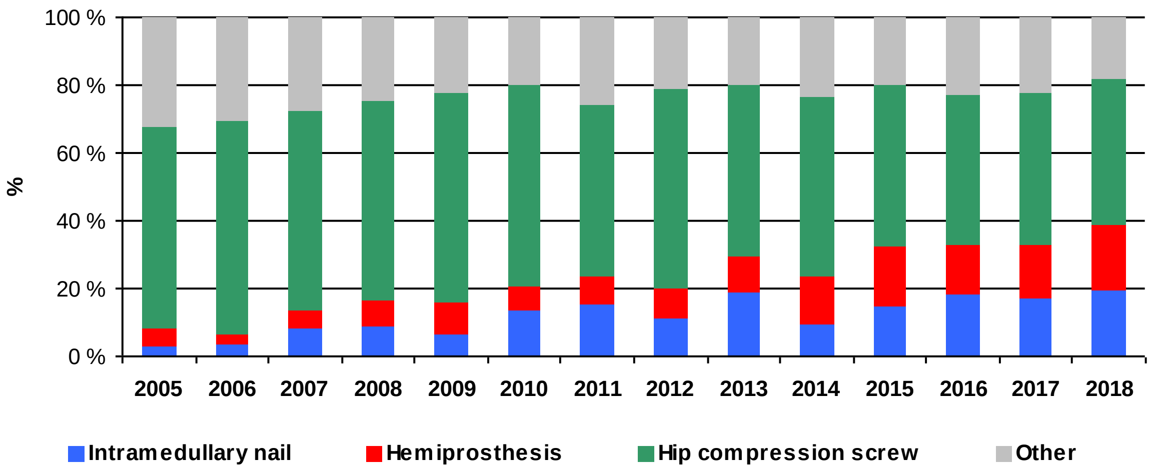


Figure 9d: Time trend for treatment of trochanteric fractures (AO OTA type A1)

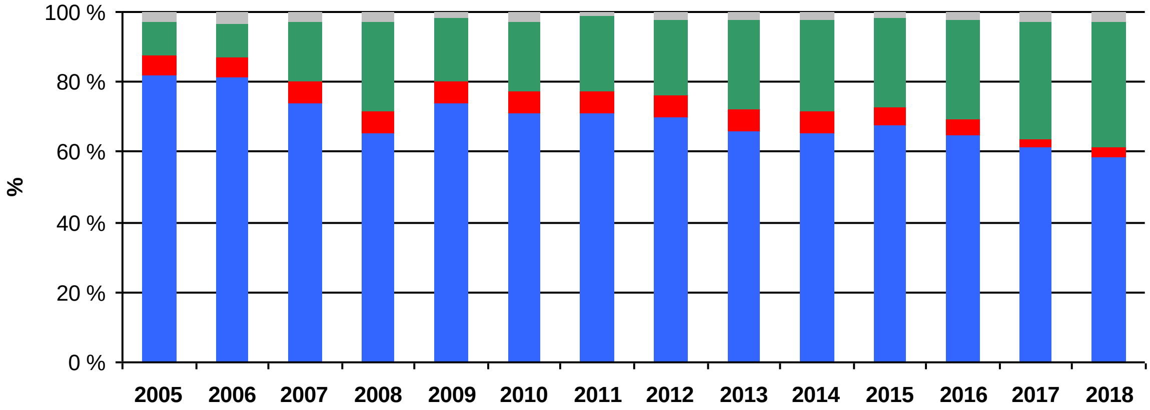


Figure 9e: Time trend for treatment of trochanteric fractures (AO OTA type A2)

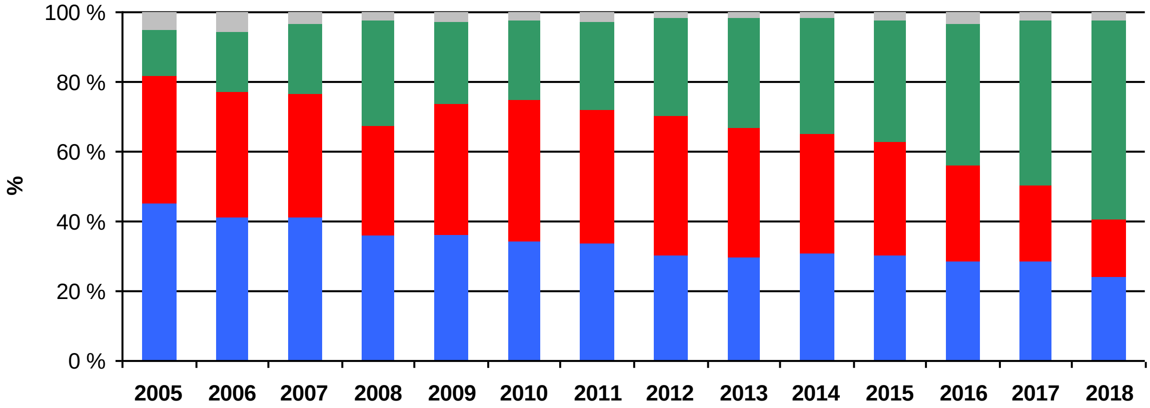
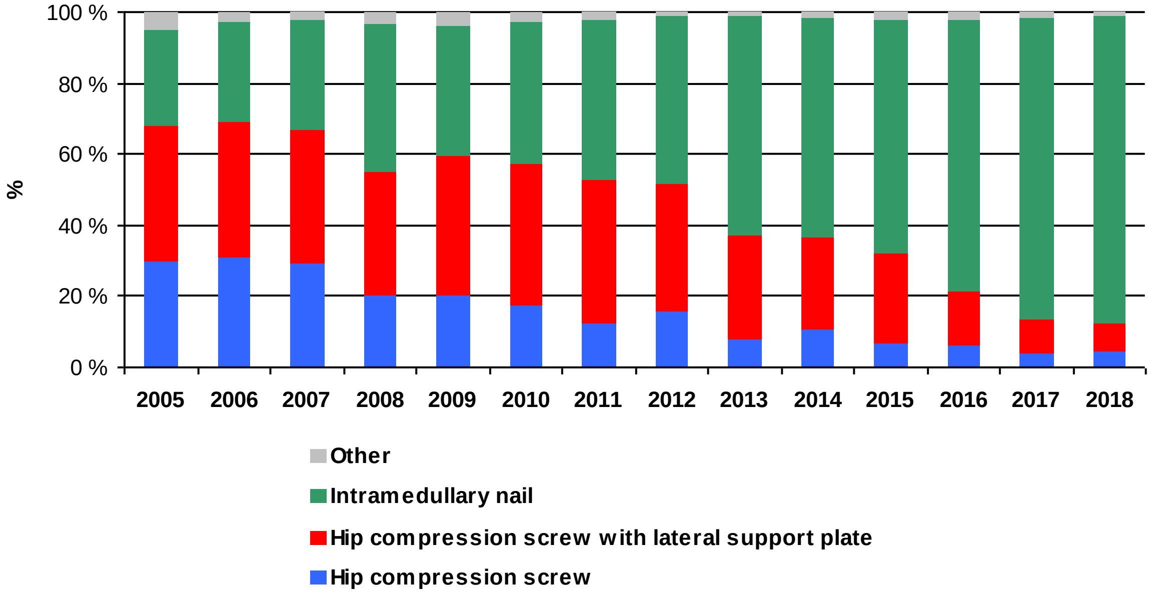


Figure 9f: Time trend for treatment of inter-* and subtrochanteric fractures



* Intertrochanteric fracture (AO OTA type A3)

Reoperations

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

	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	Total
2018	96	46	17	56	3	8	217	10	35	23	76	9	41	410	**1047**
	9,2%	4,4%	1,6%	5,3%	0,3%	0,8%	20,7%	1,0%	3,3%	2,2%	7,3%	0,9%	3,9%	39,2%	
2017	106	47	17	60	10	8	197	14	37	16	82	5	51	378	**1028**
	10,3%	4,6%	1,7%	5,8%	1,0%	0,8%	19,2%	1,4%	3,6%	1,6%	8,0%	0,5%	5,0%	36,8%	
2016	141	49	17	78	10	9	199	17	32	36	74	13	43	437	**1155**
	12,2%	4,2%	1,5%	6,8%	0,9%	0,8%	17,2%	1,5%	2,8%	3,1%	6,4%	1,1%	3,7%	37,8%	
2015	161	71	35	65	8	10	180	18	35	33	83	11	47	383	**1140**
	14,1%	6,2%	3,1%	5,7%	0,7%	0,9%	15,8%	1,6%	3,1%	2,9%	7,3%	1,0%	4,1%	33,6%	
2014	111	58	31	51	7	4	156	14	20	20	66	17	23	368	**946**
	11,7%	6,1%	3,3%	5,4%	0,7%	0,4%	16,5%	1,5%	2,1%	2,1%	7,0%	1,8%	2,4%	38,9%	
2013	141	57	33	74	5	10	164	15	28	22	76	7	47	389	**1068**
	13,2%	5,3%	3,1%	6,9%	0,5%	0,9%	15,4%	1,4%	2,6%	2,1%	7,1%	0,7%	4,4%	36,4%	
2012	153	65	37	75	18	9	187	15	34	22	63	4	43	350	**1075**
	14,2%	6,0%	3,4%	7,0%	1,7%	0,8%	17,4%	1,4%	3,2%	2,0%	5,9%	0,4%	4,0%	32,6%	
2011	157	75	59	83	12	5	152	12	41	23	67	8	33	352	**1079**
	14,6%	7,0%	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	176	79	48	79	11	11	132	14	44	26	58	10	37	293	**1018**
	17,3%	7,8%	4,7%	7,8%	1,1%	1,1%	13,0%	1,4%	4,3%	2,6%	5,7%	1,0%	3,6%	28,8%	
2009	216	96	59	95	8	18	155	7	38	36	49	9	57	300	**1143**
	18,9%	8,4%	5,2%	8,3%	0,7%	1,6%	13,6%	0,6%	3,3%	3,1%	4,3%	0,8%	5,0%	26,2%	
2008	245	104	63	102	10	10	110	20	39	42	57	10	33	269	**1114**
	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	**1145**
	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%	
2006	318	125	64	101	7	8	79	20	21	30	33	7	21	205	**1039**
	30,6%	12,0%	6,2%	9,7%	0,7%	0,8%	7,6%	1,9%	2,0%	2,9%	3,2%	0,7%	2,0%	19,7%	
2005	281	107	71	85	9	12	50	16	25	27	33	2	23	79	**820**
	34,3%	13,0%	8,7%	10,4%	1,1%	1,5%	6,1%	2,0%	3,0%	3,3%	4,0%	0,2%	2,8%	9,6%	
Total	**2589**	**1111**	**636**	**1115**	**128**	**132**	**2064**	**205**	**461**	**395**	**865**	**121**	**530**	**4465**	**14817**
	17,5%	**7,5%**	**4,3%**	**7,5%**	**0,9%**	**0,9%**	**13,9%**	**1,4%**	**3,1%**	**2,7%**	**5,8%**	**0,8%**	**3,6%**	**30,1%**	

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	610	246	199	284	29	6	133	15	24	56	187	5	109	**1903**
	32,1%	12,9%	10,5%	14,9%	1,5%	0,3%	7,0%	0,8%	1,3%	2,9%	9,8%	0,3%	5,7%	
Intracapsular fracture, displaced	654	255	161	275	23	72	1158	119	373	54	251	79	109	**3583**
	18,3%	7,1%	4,5%	7,7%	0,6%	2,0%	32,3%	3,3%	10,4%	1,5%	7,0%	2,2%	3,0%	
Basocervical fracture	124	60	30	59	8	1	44	4	11	30	17	2	22	**412**
	30,1%	14,6%	7,3%	14,3%	1,9%	0,2%	10,7%	1,0%	2,7%	7,3%	4,1%	0,5%	5,3%	
Trochanteric fracture (2 fragments)	155	53	20	66	14	10	92	16	5	55	60	0	58	**604**
	25,7%	8,8%	3,3%	10,9%	2,3%	1,7%	15,2%	2,6%	0,8%	9,1%	9,9%	0,0%	9,6%	
Trochanteric fracture (multifragment)	328	138	29	111	19	17	257	28	9	98	83	3	77	**1197**
	27,4%	11,5%	2,4%	9,3%	1,6%	1,4%	21,5%	2,3%	0,8%	8,2%	6,9%	0,3%	6,4%	
Intertrochanteric fracture*	63	25	6	21	4	2	41	5	2	14	8	0	13	**204**
	30,9%	12,3%	2,9%	10,3%	2,0%	1,0%	20,1%	2,5%	1,0%	6,9%	3,9%	0,0%	6,4%	
Subtrochanteric fracture	160	91	6	60	5	6	115	9	5	20	35	3	54	**569**
	28,1%	16,0%	1,1%	10,5%	0,9%	1,1%	20,2%	1,6%	0,9%	3,5%	6,2%	0,5%	9,5%	
Other	27	11	2	4	2	3	28	2	4	8	9	2	12	**114**
	23,7%	9,6%	1,8%	3,5%	1,8%	2,6%	24,6%	1,8%	3,5%	7,0%	7,9%	1,8%	10,5%	
Missing	2	0	0	0	0	0	1	0	1	0	1	0	0	**5**
	40,0%	0,0%	0,0%	0,0%	0,0%	0,0%	20,0%	0,0%	20,0%	0,0%	20,0%	0,0%	0,0%	
Total	**2123**	**879**	**453**	**880**	**104**	**117**	**1869**	**198**	**434**	**335**	**651**	**94**	**454**	8591
	24,7%	**10,2%**	**5,3%**	**10,2%**	**1,2%**	**1,4%**	**21,8%**	**2,3%**	**5,1%**	**3,9%**	**7,6%**	**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
2018	57	27	112	0	107	164	16	7	186	416	**1092**
	5,2%	2,5%	10,3%	0,0%	9,8%	15,0%	1,5%	0,6%	17,0%	38,1%	
2017	70	32	137	0	115	152	18	6	143	369	**1042**
	6,7%	3,1%	13,1%	0,0%	11,0%	14,6%	1,7%	0,6%	13,7%	35,4%	
2016	82	36	151	0	100	150	14	7	160	422	**1122**
	7,3%	3,2%	13,5%	0,0%	8,9%	13,4%	1,2%	0,6%	14,3%	37,6%	
2015	68	36	182	0	114	131	19	4	148	371	**1073**
	6,3%	3,4%	17,0%	0,0%	10,6%	12,2%	1,8%	0,4%	13,8%	34,6%	
2014	47	26	157	0	81	112	7	4	99	353	**886**
	5,3%	2,9%	17,7%	0,0%	9,1%	12,6%	0,8%	0,5%	11,2%	39,8%	
2013	70	32	159	0	117	116	14	6	118	376	**1008**
	6,9%	3,2%	15,8%	0,0%	11,6%	11,5%	1,4%	0,6%	11,7%	37,3%	
2012	73	42	188	0	91	137	14	9	109	342	**1005**
	7,3%	4,2%	18,7%	0,0%	9,1%	13,6%	1,4%	0,9%	10,8%	34,0%	
2011	72	34	214	0	97	105	19	13	113	358	**1025**
	7,0%	3,3%	20,9%	0,0%	9,5%	10,2%	1,9%	1,3%	11,0%	34,9%	
2010	86	40	220	2	89	105	15	11	103	290	**961**
	8,9%	4,2%	22,9%	0,2%	9,3%	10,9%	1,6%	1,1%	10,7%	30,2%	
2009	120	40	254	0	97	129	10	11	94	302	**1057**
	11,4%	3,8%	24,0%	0,0%	9,2%	12,2%	0,9%	1,0%	8,9%	28,6%	
2008	112	40	317	1	84	83	10	15	91	266	**1019**
	11,0%	3,9%	31,1%	0,1%	8,2%	8,1%	1,0%	1,5%	8,9%	26,1%	
2007	118	31	371	1	78	67	5	11	64	239	**985**
	12,0%	3,1%	37,7%	0,1%	7,9%	6,8%	0,5%	1,1%	6,5%	24,3%	
2006	97	37	371	6	82	63	8	5	56	206	**931**
	10,4%	4,0%	39,8%	0,6%	8,8%	6,8%	0,9%	0,5%	6,0%	22,1%	
2005	82	25	322	35	46	39	9	7	42	81	**688**
	11,9%	3,6%	46,8%	5,1%	6,7%	5,7%	1,3%	1,0%	6,1%	11,8%	
Total	**1154**	**478**	**3155**	**45**	**1298**	**1553**	**178**	**116**	**1526**	**4391**	**13894**
	8,3%	**3,4%**	**22,7%**	**0,3%**	**9,3%**	**11,2%**	**1,3%**	**0,8%**	**11,0%**	**31,6%**	

R1: Removal of implant (when only procedure)
R2: Girdlestone (= Removal of implant/hemiprosthesis and caput)
R3: Bipolar hemiprosthesis
R4: Unipolar haemiprosthesis
R5: Re-osteosynthesis
R6: 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
2018	19 8,8%	1 0,5%	30 13,9%	0 0,0%	25 11,6%	3 1,4%	7 3,2%	131 60,6%	**216**
2017	24 11,2%	4 1,9%	36 16,8%	0 0,0%	21 9,8%	2 0,9%	2 0,9%	125 58,4%	**214**
2016	33 11,8%	3 1,1%	53 18,9%	0 0,0%	27 9,6%	3 1,1%	4 1,4%	157 56,1%	**280**
2015	25 9,9%	3 1,2%	66 26,1%	0 0,0%	22 8,7%	3 1,2%	6 2,4%	128 50,6%	**253**
2014	16 6,3%	0 0,0%	70 27,8%	0 0,0%	25 9,9%	3 1,2%	3 1,2%	135 53,6%	**252**
2013	34 11,9%	2 0,7%	72 25,3%	0 0,0%	35 12,3%	1 0,4%	2 0,7%	139 48,8%	**285**
2012	31 10,2%	10 3,3%	98 32,1%	0 0,0%	27 8,9%	4 1,3%	3 1,0%	132 43,3%	**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%	113 34,8%	1 0,3%	26 8,0%	2 0,6%	4 1,2%	125 38,5%	**325**
2009	65 18,0%	8 2,2%	125 34,5%	0 0,0%	15 4,1%	7 1,9%	5 1,4%	137 37,8%	**362**
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**
2006	34 8,8%	5 1,3%	193 49,9%	5 1,3%	21 5,4%	2 0,5%	2 0,5%	125 32,3%	**387**
2005	4 1,9%	6 2,9%	124 59,6%	12 5,8%	6 2,9%	4 1,9%	4 1,9%	48 23,1%	**208**
Total	**484** **11,4%**	**82** **1,9%**	**1452** **34,2%**	**19** **0,4%**	**309** **7,3%**	**40** **0,9%**	**57** **1,3%**	**1797** **42,4%**	**4240**

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)

	R1	R2	R3	R4	R6	R7	R8	R9	R10	Total
2018	0	9	27	0	103	10	4	113	45	**311**
	0,0%	2,9%	8,7%	0,0%	33,1%	3,2%	1,3%	36,3%	14,5%	
2017	0	9	28	0	78	8	4	84	48	**259**
	0,0%	3,5%	10,8%	0,0%	30,1%	3,1%	1,5%	32,4%	18,5%	
2016	0	12	20	0	80	9	6	97	42	**266**
	0,0%	4,5%	7,5%	0,0%	30,1%	3,4%	2,3%	36,5%	15,8%	
2015	0	5	18	0	66	16	1	74	47	**227**
	0,0%	2,2%	7,9%	0,0%	29,1%	7,0%	0,4%	32,6%	20,7%	
2014	0	9	19	0	48	5	4	61	37	**183**
	0,0%	4,9%	10,4%	0,0%	26,2%	2,7%	2,2%	33,3%	20,2%	
2013	0	11	15	0	68	9	4	78	37	**222**
	0,0%	5,0%	6,8%	0,0%	30,6%	4,1%	1,8%	35,1%	16,7%	
2012	0	11	23	0	55	10	8	56	31	**194**
	0,0%	5,7%	11,9%	0,0%	28,4%	5,2%	4,1%	28,9%	16,0%	
2011	0	10	14	0	60	16	8	70	32	**210**
	0,0%	4,8%	6,7%	0,0%	28,6%	7,6%	3,8%	33,3%	15,2%	
2010	0	8	17	0	58	10	9	68	17	**187**
	0,0%	4,3%	9,1%	0,0%	31,0%	5,3%	4,8%	36,4%	9,1%	
2009	0	9	10	0	44	7	9	49	20	**148**
	0,0%	6,1%	6,8%	0,0%	29,7%	4,7%	6,1%	33,1%	13,5%	
2008	0	10	7	0	46	5	12	45	20	**145**
	0,0%	6,9%	4,8%	0,0%	31,7%	3,4%	8,3%	31,0%	13,8%	
2007	0	5	9	0	27	3	10	35	11	**100**
	0,0%	5,0%	9,0%	0,0%	27,0%	3,0%	10,0%	35,0%	11,0%	
2006	0	6	2	0	28	4	3	29	10	**82**
	0,0%	7,3%	2,4%	0,0%	34,1%	4,9%	3,7%	35,4%	12,2%	
2005	0	1	1	0	12	3	3	13	2	**35**
	0,0%	2,9%	2,9%	0,0%	34,3%	8,6%	8,6%	37,1%	5,7%	
Total	**0**	**115**	**210**	**0**	**773**	**115**	**85**	**872**	**399**	**2569**
	0,0%	**4,5%**	**8,2%**	**0,0%**	**30,1%**	**4,5%**	**3,3%**	**33,9%**	**15,5%**	

R1: Removal of implant (when only procedure)
R2: Girdlestone (= Removal of implant/hemiprosthesis and caput)
R3: Bipolar hemiprosthesis
R4: Unipolar 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

	2005-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Cable Ready plate + cerclage	2			1		2			1	1	**7**
Cement spacer	1	1	2	1	3	3	4	4	3	1	**23**
Cerclage	4		2	1	3	2	3	2	2		**19**
Dall Miles plate + cerclage	1	3	3	1		4	4	3	2	2	**23**
DCP plate + possibly cerclage								3	4	4	**11**
Drainage of haematoma	19	3	2	1				1	1		**27**
Exchange of caput/bipolar head	131	56	58	42	67	43	55	76	67	95	**690**
Exchange of caput/bipolar head + osteosynthesis with plate/cerclage		2			1	1	1			1	**6**
Suture of muscle/fascie	2	3		1			1	2	1	1	**11**
Unspecified plate + cerclage	3		1	3	2	2	5	1	2	2	**21**
Other (n<5)	8		2	5	2	4	1	5	1	6	**34**
Total	**171**	**68**	**70**	**56**	**78**	**61**	**74**	**97**	**84**	**113**	**872**

Implants

Table 15: Cemented hemiprostheses - primary operations

Femur	Caput	Bipolar head	2005 -09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Charnley		Hastings bipolar head	2056	290	143	120	98	61					**2768**
Charnley Modular	Elite	Hastings bipolar head	615	208	142	160	152	1					**1278**
Charnley Modular	Elite	Landos bipolar cup (DePuy)	24										**24**
Charnley Modular	Elite	Self-centering bipolar (DePuy)	31	31	23	36	55	241	258	71	45		**791**
Corail	Articul/Eze CoCr	Self-centering bipolar (DePuy)	1	1	9	40	51	75	118	93	80	83	**551**
Corail	Articul/Eze CoCr	Vario-Cup (Link)		1	6	8	8	35	47	64	7		**176**
Corail	Cobalt chrome (DePuy)	Self-centering bipolar (DePuy)	15	31	22	9							**77**
CPS-PLUS	Metal Ball Head	Bipolar Ball Head	2	19	2								**23**
CPT	Protasul/Metasul	Multipolar									783	350	**1133**
CPT	Protasul/Metasul	Self-centering bipolar (DePuy)									67	92	**159**
CPT	Protasul/Metasul	UHR									22	3	**25**
CPT	Versys	Multipolar									17	13	**30**
CPT	Zimmer hoder	Multipolar									31	14	**45**
C-Stem	Articul/Eze CoCr	Self-centering bipolar (DePuy)							5	88	69	163	**325**
C-Stem	Articul/Eze Ultamet (M-Spec)	Self-centering bipolar (DePuy)							12	99	97		**208**
Elite	Elite	Hastings bipolar head	17	1	4		1						**23**
ETS			252	23	16	3	2	2	2	1			**301**
Exeter/V40	Exeter/V40	Multipolar									40	115	**155**
Exeter/V40	Exeter/V40	Self-centering bipolar (DePuy)	1	7	42	31	94	250	228	217	46	2	**918**
Exeter/V40	Exeter/V40	UHR	2521	852	1139	1241	1262	1318	1456	1568	890	1345	**13592**
Exeter/V40	Exeter/V40	Unknown bipolar head	7	4	8	3	2	2	1	6	2		**35**
MS-30	Protasul/Metasul	Multipolar	8								106	260	**374**
MS-30	Protasul/Metasul	UHR	21		1								**22**
MS-30	Versys	Self-centering bipolar (DePuy)							11	46	38	11	**106**
MS-30	Versys	UHR										21	**21**
SP II (Link)	Articul/Eze CoCr	Self-centering bipolar (DePuy)				1		18	9	3	3		**34**
SP II (Link)	CoCrMo (Link)	Self-centering bipolar (DePuy)					7	49	70	99	20		**245**
SP II (Link)	CoCrMo (Link)	UHR					62	204	218	258	260	260	**1262**
SP II (Link)	CoCrMo (Link)	Vario-Cup (Link)	639	279	251	233	263	71	90	112	177	268	**2383**
Spectron	Cobalt Chrom (S&N)	Biarticular cup (Permedica)	29	2	2								**33**
Spectron	Cobalt Chrom (S&N)	HIP Bipolar Cup	8	12	19	9	16	21	19	15	15	13	**147**
Spectron	Cobalt Chrom (S&N)	Landos bipolar cup (DePuy)	112										**112**
Spectron	Cobalt Chrom (S&N)	Self-centering bipolar (DePuy)	21	9									**30**
Spectron	Cobalt Chrom (S&N)	Tandem	756	70	104	95	65						**1090**
Spectron	Cobalt Chrom (S&N)	Universal bipolar	17										**17**
Spectron	Cobalt Chrom (S&N)	Vario-Cup (Link)	68	13									**81**
Spectron	Cobalt chrome (DePuy)	Landos bipolar cup (DePuy)	16										**16**
Titan	Articul/Eze CoCr	Landos bipolar cup (DePuy)	15										**15**
Titan	Articul/Eze CoCr	Self-centering bipolar (DePuy)		12	2	1							**15**
Titan	Cobalt chrome (DePuy)	Landos bipolar cup (DePuy)	671	1									**672**
Titan	Cobalt chrome (DePuy)	Self-centering bipolar (DePuy)	190	36	1								**227**
Titan	Unknown caput	Landos bipolar cup (DePuy)	15										**15**
Other	(n < 15)		163	28	26	16	26	21	17	27	67	54	**445**
Unknown			27	2	1			1	2	1	1	1	**36**
Total			**8318**	**1932**	**1963**	**2006**	**2164**	**2370**	**2563**	**2768**	**2883**	**3068**	**30035**

Table 16: Uncemented hemiprostheses - primary operations

Femur	Caput	Bipolar head	2005 -09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Accolade II	Exeter/V40	Vario-Cup (Link)					2	8	11	4	2		**27**
Corail	Alumina Biolox (DePuy)	Self-centering bipolar (DePuy)	2	6	3								**11**
Corail	Alumina Biolox (DePuy)	Vario-Cup (Link)	1	9									**10**
Corail	Articul/Eze Biolox Forte (DePuy)	Self-centering bipolar (DePuy)	3	1	3	7							**14**
Corail	Articul/Eze CoCr	Bipolar Ball Head			17	39	8						**64**
Corail	Articul/Eze CoCr	Landos bipolar cup (DePuy)	112	5	1								**118**
Corail	Articul/Eze CoCr	Multipolar									20	13	**33**
Corail	Articul/Eze CoCr	Self-centering bipolar (DePuy)	110	202	348	620	532	471	429	486	300	169	**3667**
Corail	Articul/Eze CoCr	UHR		17	49	44	40	82	75	69	33	40	**449**
Corail	Articul/Eze CoCr	Vario-Cup (Link)		21	37	32	47	17	4	1		5	**164**
Corail	Articul/Eze Ultamet (M-Spec)	Self-centering bipolar (DePuy)			21	143	146	80	9	6	1		**406**
Corail	Cobalt Chrom (S&N)	Self-centering bipolar (DePuy)	14	23									**37**
Corail	Cobalt Chrom (S&N)	Vario-Cup (Link)		13									**13**
Corail	Cobalt chrome (DePuy)	Landos bipolar cup (DePuy)	772	7									**779**
Corail	Cobalt chrome (DePuy)	Self-centering bipolar (DePuy)	385	383	344	31	1						**1144**
Corail	Cobalt chrome (DePuy)	Tandem	5	4	2								**11**
Corail	Cobalt chrome (DePuy)	UHR	12	3	5								**20**
Corail	Metal Ball Head	Bipolar Ball Head	1	5	19								**25**
Corail	Modular Cathcart (Fracture head hip ball)		3	8	3								**14**
Corail	Unknown caput	Landos bipolar cup (DePuy)	10										**10**
Corail	Unknown caput	Unknown bipolar head	8	4	1	1	1				1		**16**
Filler	Biotechni fem. head	Biarticular cup (Permedica)	24										**24**
Filler	Cobalt Chrom (S&N)	Biarticular cup (Permedica)	18			1							**19**
Filler	Hipball Premium	Biarticular cup (Permedica)	190	7									**197**
Filler	Hipball Premium	HIP Bipolar Cup	33	95	129	126	99	37	44	36	35	61	**695**
Filler	Hipball Premium	UHR					10	22	6	3			**41**
Furlong	Furlong	UHR							21	57	31		**109**
HACTIV	HACTIV head	Moonstone	22										**22**
HACTIV	HACTIV head	Tandem	15		1	2	1						**19**
HACTIV	HACTIV head	UHR						41	22		1		**64**
Polarstem	Cobalt Chrom (S&N)	Tandem		18	64	74	39	16	2				**213**
Polarstem	Cobalt Chrom (S&N)	UHR						25	34	9	12	15	**95**
SL-PLUS	HACTIV head	Bipolar Ball Head	16										**16**
SL-PLUS	Metal Ball Head	Bipolar Ball Head	148	7									**155**
Other	(n < 10)		95	41	13	18	13	20	16	15	19	19	**269**
Unknown			5					1					**6**
Total			**2004**	**879**	**1060**	**1138**	**939**	**820**	**673**	**686**	**455**	**322**	**8976**

Table 17: Cemented hemiprostheses - reoperations

Femur	Caput	Bipolar head	2005-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Charnley		Hastings bipolar head	414	40	22	8	3	3					**490**
Charnley Modular	Elite	Hastings bipolar head	49	12	11	2	8						**82**
Charnley Modular	Elite	Landos bipolar cup (DePuy)	7										**7**
Charnley Modular	Elite	Self-centering bipolar (DePuy)	2	1	3	7	1	12	8	1	1		**36**
Corail	Articul/Eze CoCr	Self-centering bipolar (DePuy)			4	8	1	5	7	9	1	3	**38**
Corail	Articul/Eze CoCr	Vario-Cup (Link)			1			3	1	1			**6**
Corail	Cobalt chrome (DePuy)	Self-centering bipolar (DePuy)	2	5	4								**11**
CPS-PLUS	Metal Ball Head	Bipolar Ball Head	4	4									**8**
CPS-PLUS Rev. stem	Metal Ball Head	Bipolar Ball Head	7										**7**
CPT	Protasul/Metasul	Multipolar									16	6	**22**
CPT	Protasul/Metasul	Self-centering bipolar (DePuy)									2	4	**6**
C-Stem	Articul/Eze CoCr	Self-centering bipolar (DePuy)								5	4	2	**11**
C-Stem	Articul/Eze Ultamet (M-Spec)	Self-centering bipolar (DePuy)								5	3		**8**
Elite	Elite	Hastings bipolar head	2	1		2							**5**
ETS			22				1						**23**
Exeter/V40	Exeter/V40	Multipolar									2	7	**9**
Exeter/V40	Exeter/V40	Self-centering bipolar (DePuy)		1	3	8	7	14	11	6	1		**51**
Exeter/V40	Exeter/V40	UHR	399	42	55	64	52	47	73	46	31	36	**845**
Exeter/V40	Exeter/V40	Unknown bipolar head	2	1			1	2					**6**
Fjord	Cobalt chrome (DePuy)	Landos bipolar cup (DePuy)	7										**7**
MS-30	Protasul/Metasul	Multipolar	3								3	2	**8**
MS-30	Protasul/Metasul	UHR	5										**5**
Restoration Modular (femur)	Exeter/V40	Self-centering bipolar (DePuy)	3	4	3	1	1		1			3	**16**
Restoration Modular (femur)	Exeter/V40	UHR					5	2	2	3	5	4	**21**
SP II (Link)	CoCrMo (Link)	Self-centering bipolar (DePuy)							3	7	2		**12**
SP II (Link)	CoCrMo (Link)	UHR					2	12	15	12	12	7	**60**
SP II (Link)	CoCrMo (Link)	Vario-Cup (Link)	60	18	24	19	12	7	4	6	11	1	**162**
Spectron	Cobalt Chrom (S&N)	HIP Bipolar Cup		1	3				1		1		**6**
Spectron	Cobalt Chrom (S&N)	Landos bipolar cup (DePuy)	11										**11**
Spectron	Cobalt Chrom (S&N)	Tandem	102	3	5	11	6	1					**128**
Spectron	Cobalt Chrom (S&N)	Universal bipolar	9										**9**
Titan	Cobalt chrome (DePuy)	Landos bipolar cup (DePuy)	135										**135**
Titan	Cobalt chrome (DePuy)	Self-centering bipolar (DePuy)	15	3	1								**19**
Other	(n < 5)		56	6	2	3	2	6	6	11	6	10	**108**
Unknown			4		1				1		2		**8**
Total			**1320**	**142**	**142**	**133**	**102**	**114**	**133**	**112**	**103**	**85**	**2386**

Table 18: Uncemented hemiprostheses - reoperations

Femur	Caput	Bipolar head	2005 -09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Arcos	Modular Head (Biomet)	Multipolar									5	3	**8**
Arcos	Modular Head (Biomet)	Self-centering bipolar (DePuy)						2	5	5			**12**
Corail	Articul/Eze CoCr	Landos bipolar cup (DePuy)	23										**23**
Corail	Articul/Eze CoCr	Self-centering bipolar (DePuy)	6	19	10	15	19	12	14	13	6	7	**121**
Corail	Articul/Eze CoCr	UHR		3	4			2	2	4	1	1	**17**
Corail	Articul/Eze Ultamet (M-Spec)	Self-centering bipolar (DePuy)			4	13	10	2	2				**31**
Corail	Cobalt chrome (DePuy)	Landos bipolar cup (DePuy)	90	2									**92**
Corail	Cobalt chrome (DePuy)	Self-centering bipolar (DePuy)	32	25	17	1							**75**
Corail	Cobalt chrome (DePuy)	UHR	3	1	1	1							**6**
Filler	Biotechni fem. head	Biarticular cup (Permedica)	21										**21**
Filler	Cobalt chrome (DePuy)	Biarticular cup (Permedica)	6										**6**
Filler	Cobalt chrome (DePuy)	Landos bipolar cup (DePuy)	5										**5**
Filler	Hipball Premium	Biarticular cup (Permedica)	57										**57**
Filler	Hipball Premium	HIP Bipolar Cup	4	8	21	7	13	12	8	7	9	5	**94**
HACTIV	HACTIV head	Moonstone	7										**7**
KAR	Articul/Eze CoCr	Self-centering bipolar (DePuy)				3	3	1					**7**
KAR	Articul/Eze Ultamet (M-Spec)	Self-centering bipolar (DePuy)				4	3						**7**
KAR	Cobalt chrome (DePuy)	Landos bipolar cup (DePuy)	19		1								**20**
KAR	Cobalt chrome (DePuy)	Self-centering bipolar (DePuy)	6	5	2	1							**14**
Polarstem	Cobalt Chrom (S&N)	UHR						2	1	1	2	1	**7**
REEF	Cobalt chrome (DePuy)	Self-centering bipolar (DePuy)	4	2									**6**
Restoration-HA	C-Taper Head	Landos bipolar cup (DePuy)	7										**7**
SL-PLUS	Metal Ball Head	Bipolar Ball Head	11	1									**12**
TTHR	Articul/Eze CoCr	UHR						4	1	1			**6**
TTHR	CoCrMo (Link)	UHR						1	4	2			**7**
TTHR	TETE Inox	Self-centering bipolar (DePuy)		4	2								**6**
Other	(n < 5)		55	9	11	10	9	5	13	6	10	9	**137**
Unknown			3								1		**4**
Total			**359**	**79**	**73**	**55**	**57**	**43**	**50**	**39**	**34**	**26**	**815**

Table 19: Screws - primary operations

Product	2005-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Asnis III	439	126	177	156	105	121	120	118	114	117	**1593**
Cann. Screw S&N			2							17	**19**
Hansson pin system (LIH)	1459	212	112	69	60	41	60	49	79	59	**2200**
Olmed	6391	790	675	660	563	448	483	433	272	194	**10909**
Richards CHP	2466	572	734	597	593	547	614	595	657	633	**8008**
Other (n<10)						1		3	2	4	**10**
Total	**10755**	**1700**	**1700**	**1482**	**1321**	**1158**	**1277**	**1198**	**1124**	**1024**	**22739**

Table 20: Hip compression screws - primary operations

Product	2005-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
DHS	3995	108	58	28	8	13	25	25	29	11	**4300**
LCP DHS	739	476	485	458	468	662	1357	1161	1092	917	**7815**
Omega	102	2	3	2	2						**111**
Richards CHS	7180	2046	2021	1992	1764	1564	773	711	533	484	**19068**
Swemac CHS System							8	5	6	10	**29**
Other (n<10)	3				1	1		2	2		**9**
Total	**12019**	**2632**	**2567**	**2480**	**2243**	**2240**	**2163**	**1904**	**1662**	**1422**	**31332**

Table 21: Intramedullary nails - primary operations

Product	2005-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
ACE	49										**49**
AFFIXUS									5	14	**19**
Gamma 3	1530	656	672	657	766	710	467	428	369	502	**6757**
IMHS	26	1									**27**
IMHS CP	10										**10**
LFN	19	12	8	8	8	7	4	3	5	2	**76**
PFN	26										**26**
PFNA	152	30	40	91	136	117	174	200	186	227	**1353**
T2	6	1	3	1		2	1				**14**
T2 recon	2	19	38	29	61	33	24	28	34	31	**299**
T-Gamma	504	3									**507**
Trigen Intertan	705	133	190	186	198	285	561	743	990	981	**4972**
Trigen TAN/FAN	139	17	14	22	34	22	62	65	88	76	**539**
Other (n<10)	7			1		2	1			2	**13**
Total	**3175**	**872**	**965**	**995**	**1203**	**1178**	**1294**	**1467**	**1677**	**1835**	**14661**

Fixation of hemiprostheses

Table 22: Primary operations

	Uncemented		Cement with antibiotics		Cement without antibiotics		Missing		Total
2018	329	(9,7%)	3053	(90,0%)	1	(0,0%)	8	(0,2%)	**3391**
2017	455	(13,6%)	2882	(86,3%)	0	(0,0%)	1	(0,0%)	**3338**
2016	687	(19,9%)	2766	(80,1%)	0	(0,0%)	1	(0,0%)	**3454**
2015	667	(20,6%)	2562	(79,2%)	1	(0,0%)	6	(0,2%)	**3236**
2014	811	(25,4%)	2360	(74,0%)	3	(0,1%)	16	(0,5%)	**3190**
2013	921	(29,7%)	2154	(69,4%)	0	(0,0%)	28	(0,9%)	**3103**
2012	1064	(33,8%)	1959	(62,3%)	11	(0,3%)	110	(3,5%)	**3144**
2011	987	(32,6%)	1925	(63,7%)	6	(0,2%)	105	(3,5%)	**3023**
2010	837	(29,8%)	1896	(67,4%)	7	(0,2%)	71	(2,5%)	**2811**
2009	568	(20,0%)	2174	(76,6%)	8	(0,3%)	87	(3,1%)	**2837**
2008	399	(15,9%)	2010	(80,1%)	8	(0,3%)	92	(3,7%)	**2509**
2007	387	(17,9%)	1726	(79,8%)	1	(0,0%)	49	(2,3%)	**2163**
2006	323	(19,3%)	1331	(79,4%)	3	(0,2%)	20	(1,2%)	**1677**
2005	233	(20,5%)	882	(77,6%)	4	(0,4%)	17	(1,5%)	**1136**
Total	**8668**	**(22,2%)**	**29680**	**(76,1%)**	**53**	**(0,1%)**	**611**	**(1,6%)**	**39012**

Figure 10: Time trend for fixation of primary hemiprostheses

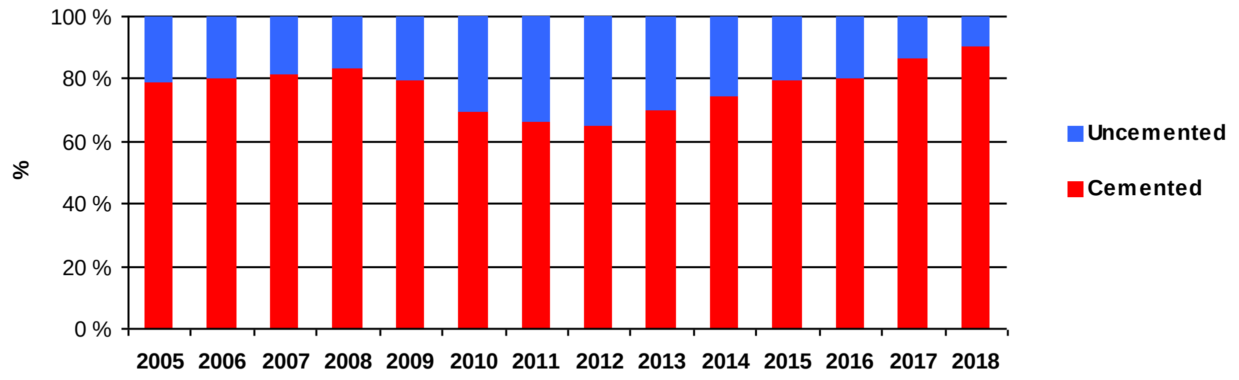


Table 23: Type of cement - primary operations

Product	Manufacturer	2005-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Cemex w/gentamicin	Alere	49	1			11	10	71	111			**253**
Cemex System Genta FAST	Alere	181	102	83	74	84	86	29				**639**
Cemex system genta ID green	Alere								16	125	105	**246**
Copal G+ V	Heraeus						1	1	2	8	4	**16**
Optipac Refobacin Bonecement R	Biomet	265	518	718	790	725	911	1248	1040	947	766	**7928**
Optipac Refobacin Revision	Biomet			2	1	58	67					**128**
Palacos w/gentamicin	Heraeus/Sc	353										**353**
Palacos R + G	Heraeus	4767	992	714	690	869	880	958	1006	763	869	**12508**
Palacos R+G pro	Heraeus		1					1	93	374	1073	**1542**
Refobacin Bone Cement R	Biomet	1974	246	357	368	394	380	220	366	524	77	**4906**
Refobacin Revision	Biomet							1	1	3		**5**
Refobacin-Palacos	Biomet	314										**314**
Simplex w/Tobramycin	Stryker	2										**2**
Simplex unknown	Stryker	62	13									**75**
SmartMix Cemvac + SmartSet GHV Genta	Ortomedic	66						3	39	31	19	**158**
Missing information		90	23	51	36	13	25	30	92	107	140	**607**
Total		**8123**	**1896**	**1925**	**1959**	**2154**	**2360**	**2562**	**2766**	**2882**	**3053**	**29680**

Table 24: Hydroxyapatite (HA) - uncemented prostheses

	With HA		Without HA		Missing		Total
2018	322	(97,9%)	3	(0,9%)	4	(1,2%)	**329**
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	1062	(99,8%)	2	(0,2%)	0	(0,0%)	**1064**
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**
2006	284	(87,9%)	39	(12,1%)	0	(0,0%)	**323**
2005	192	(82,4%)	41	(17,6%)	0	(0,0%)	**233**
Total	**8428**	**(97,2%)**	**230**	**(2,7%)**	**10**	**(0,1%)**	**8668**

Pathological fractures

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

	No		Yes		Missing		Total
2018	6719	(86,6%)	107	(1,4%)	936	(12,1%)	**7762**
2017	6847	(86,3%)	118	(1,5%)	968	(12,2%)	**7933**
2016	7062	(86,7%)	117	(1,4%)	970	(11,9%)	**8149**
2015	7077	(87,5%)	117	(1,4%)	892	(11,0%)	**8086**
2014	6920	(87,7%)	80	(1,0%)	892	(11,3%)	**7892**
2013	6987	(87,2%)	133	(1,7%)	892	(11,1%)	**8012**
2012	7191	(87,4%)	106	(1,3%)	928	(11,3%)	**8225**
2011	7485	(89,0%)	135	(1,6%)	788	(9,4%)	**8408**
2010	7611	(92,8%)	93	(1,1%)	496	(6,0%)	**8200**
2009	7307	(90,2%)	107	(1,3%)	686	(8,5%)	**8100**
2008	7388	(90,0%)	102	(1,2%)	721	(8,8%)	**8211**
2007	6958	(90,2%)	93	(1,2%)	660	(8,6%)	**7711**
2006	6653	(90,1%)	91	(1,2%)	637	(8,6%)	**7381**
2005	5135	(88,9%)	65	(1,1%)	574	(9,9%)	**5774**
Total	**97340**	**(88,6%)**	**1464**	**(1,3%)**	**11040**	**(10,1%)**	**109844**

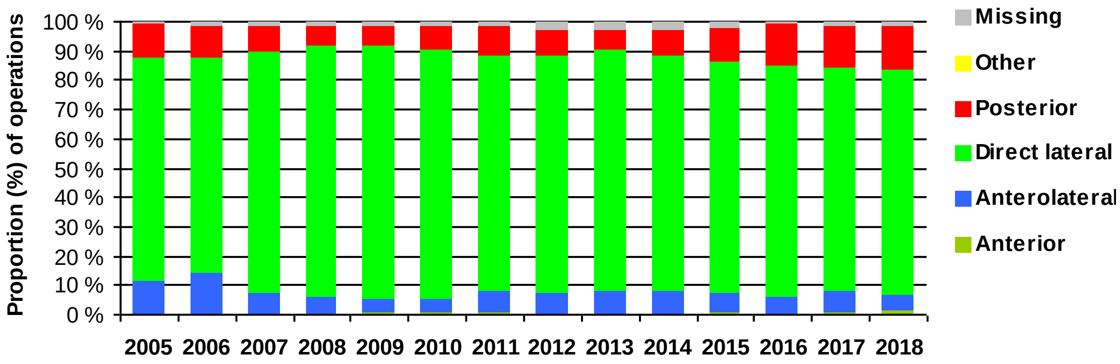
* Patients operated with total hip prostheses were excluded

Surgical approach used in hemiarthroplasty

Table 26: Surgical approach used in hemiarthroplasty

	Anterior		Anterolateral		Direct lateral		Posterior		Other		Missing		Total
2018	44	(1,3%)	195	(5,8%)	2607	(76,9%)	499	(14,7%)	0	(0,0%)	46	(1,4%)	**3391**
2017	24	(0,7%)	247	(7,4%)	2538	(76,0%)	493	(14,8%)	0	(0,0%)	36	(1,1%)	**3338**
2016	11	(0,3%)	210	(6,1%)	2712	(78,5%)	487	(14,1%)	0	(0,0%)	34	(1,0%)	**3454**
2015	14	(0,4%)	232	(7,2%)	2544	(78,6%)	388	(12,0%)	1	(0,0%)	57	(1,8%)	**3236**
2014	3	(0,1%)	252	(7,9%)	2560	(80,3%)	291	(9,1%)	1	(0,0%)	83	(2,6%)	**3190**
2013	8	(0,3%)	255	(8,2%)	2538	(81,8%)	224	(7,2%)	0	(0,0%)	78	(2,5%)	**3103**
2012	6	(0,2%)	238	(7,6%)	2535	(80,6%)	278	(8,8%)	1	(0,0%)	86	(2,7%)	**3144**
2011	11	(0,4%)	228	(7,5%)	2443	(80,8%)	290	(9,6%)	0	(0,0%)	51	(1,7%)	**3023**
2010	14	(0,5%)	142	(5,1%)	2391	(85,1%)	230	(8,2%)	0	(0,0%)	34	(1,2%)	**2811**
2009	14	(0,5%)	147	(5,2%)	2441	(86,0%)	200	(7,0%)	0	(0,0%)	35	(1,2%)	**2837**
2008	1	(0,0%)	155	(6,2%)	2143	(85,4%)	176	(7,0%)	0	(0,0%)	34	(1,4%)	**2509**
2007	0	(0,0%)	162	(7,5%)	1777	(82,2%)	201	(9,3%)	0	(0,0%)	23	(1,1%)	**2163**
2006	1	(0,1%)	244	(14,5%)	1224	(73,0%)	189	(11,3%)	0	(0,0%)	19	(1,1%)	**1677**
2005	0	(0,0%)	131	(11,5%)	864	(76,1%)	136	(12,0%)	0	(0,0%)	5	(0,4%)	**1136**
Total	**151**	**(0,4%)**	**2838**	**(7,3%)**	**31317**	**(80,3%)**	**4082**	**(10,5%)**	**3**	**(0,0%)**	**621**	**(1,6%)**	**39012**

Figure 11: Surgical approach used in hemiarthroplasty



Definition of operative approach:

- **Anterior** (between sartorius and tensor)
- **Anterolateral** (between gluteus medius and tensor)
- **Direct lateral** (transgluteal)
- **Posterior** (behind the gluteus medius)

Intraoperative complications

Table 27: Intraoperative complications - primary operations

	Yes		No		Missing		Total
2018	263	(3,2%)	7834	(94,0%)	237	(2,8%)	**8334**
2017	266	(3,2%)	7859	(94,2%)	220	(2,6%)	**8345**
2016	333	(3,9%)	7907	(93,1%)	257	(3,0%)	**8497**
2015	305	(3,6%)	7812	(92,9%)	294	(3,5%)	**8411**
2014	308	(3,8%)	7586	(92,7%)	288	(3,5%)	**8182**
2013	306	(3,7%)	7745	(93,2%)	258	(3,1%)	**8309**
2012	340	(4,0%)	7770	(92,1%)	325	(3,9%)	**8435**
2011	353	(4,1%)	7959	(92,6%)	288	(3,4%)	**8600**
2010	322	(3,9%)	7762	(92,8%)	279	(3,3%)	**8363**
2009	302	(3,7%)	7684	(93,1%)	272	(3,3%)	**8258**
2008	365	(4,4%)	7726	(92,4%)	271	(3,2%)	**8362**
2007	273	(3,5%)	7359	(93,5%)	238	(3,0%)	**7870**
2006	244	(3,3%)	7020	(93,4%)	253	(3,4%)	**7517**
2005	188	(3,2%)	5557	(94,5%)	134	(2,3%)	**5879**
Total	**4168**	**(3,7%)**	**105580**	**(93,1%)**	**3614**	**(3,2%)**	**113362**

Antibiotic prophylaxis

Table 28: Screw - primary fixation

	Yes		No		Missing		Total
2018	986	(96,5%)	30	(2,9%)	6	(0,6%)	**1022**
2017	1062	(94,4%)	54	(4,8%)	9	(0,8%)	**1125**
2016	1129	(94,2%)	63	(5,3%)	7	(0,6%)	**1199**
2015	1166	(91,3%)	102	(8,0%)	9	(0,7%)	**1277**
2014	988	(85,3%)	162	(14,0%)	8	(0,7%)	**1158**
2013	1008	(76,3%)	307	(23,2%)	6	(0,5%)	**1321**
2012	1016	(68,6%)	455	(30,7%)	11	(0,7%)	**1482**
2011	1000	(58,8%)	682	(40,1%)	18	(1,1%)	**1700**
2010	952	(56,0%)	721	(42,4%)	26	(1,5%)	**1699**
2009	885	(50,0%)	859	(48,6%)	25	(1,4%)	**1769**
2008	930	(46,3%)	1050	(52,3%)	27	(1,3%)	**2007**
2007	905	(40,6%)	1300	(58,3%)	26	(1,2%)	**2231**
2006	812	(32,1%)	1663	(65,8%)	51	(2,0%)	**2526**
2005	533	(24,2%)	1626	(73,7%)	47	(2,1%)	**2206**
Total	**13372**	**(58,9%)**	**9074**	**(39,9%)**	**276**	**(1,2%)**	**22722**

Table 29: Hemiprosthesis - primary operations

	Yes		No		Missing		Total
2018	3371	(99,5%)	4	(0,1%)	14	(0,4%)	**3389**
2017	3318	(99,5%)	2	(0,1%)	14	(0,4%)	**3334**
2016	3429	(99,5%)	3	(0,1%)	14	(0,4%)	**3446**
2015	3228	(99,8%)	2	(0,1%)	5	(0,2%)	**3235**
2014	3183	(99,8%)	0	(0,0%)	6	(0,2%)	**3189**
2013	3090	(99,6%)	4	(0,1%)	9	(0,3%)	**3103**
2012	3135	(99,7%)	6	(0,2%)	2	(0,1%)	**3143**
2011	3009	(99,6%)	4	(0,1%)	9	(0,3%)	**3022**
2010	2803	(99,8%)	4	(0,1%)	3	(0,1%)	**2810**
2009	2826	(99,6%)	8	(0,3%)	3	(0,1%)	**2837**
2008	2487	(99,1%)	13	(0,5%)	9	(0,4%)	**2509**
2007	2150	(99,4%)	7	(0,3%)	6	(0,3%)	**2163**
2006	1665	(99,3%)	9	(0,5%)	3	(0,2%)	**1677**
2005	1129	(99,4%)	2	(0,2%)	5	(0,4%)	**1136**
Total	**38823**	**(99,6%)**	**68**	**(0,2%)**	**102**	**(0,3%)**	**38993**

Table 30: Hip compression screw and plate (including angle plate) - primary operations

	Yes		No		Missing		Total
2018	1410	(99,2%)	2	(0,1%)	10	(0,7%)	**1422**
2017	1656	(99,6%)	2	(0,1%)	4	(0,2%)	**1662**
2016	1895	(99,5%)	1	(0,1%)	8	(0,4%)	**1904**
2015	2155	(99,6%)	3	(0,1%)	5	(0,2%)	**2163**
2014	2227	(99,4%)	7	(0,3%)	6	(0,3%)	**2240**
2013	2238	(99,7%)	4	(0,2%)	2	(0,1%)	**2244**
2012	2462	(99,2%)	14	(0,6%)	5	(0,2%)	**2481**
2011	2527	(98,4%)	28	(1,1%)	12	(0,5%)	**2567**
2010	2583	(98,1%)	37	(1,4%)	12	(0,5%)	**2632**
2009	2490	(97,5%)	53	(2,1%)	10	(0,4%)	**2553**
2008	2377	(96,0%)	83	(3,4%)	16	(0,6%)	**2476**
2007	2361	(94,0%)	138	(5,5%)	13	(0,5%)	**2512**
2006	2343	(93,0%)	161	(6,4%)	16	(0,6%)	**2520**
2005	1823	(92,9%)	121	(6,2%)	18	(0,9%)	**1962**
Total	**30547**	**(97,5%)**	**654**	**(2,1%)**	**137**	**(0,4%)**	**31338**

Table 31: Intramedullary nail - primary operations

	Yes		No		Missing		Total
2018	1820	(99,3%)	1	(0,1%)	11	(0,6%)	**1832**
2017	1667	(99,6%)	2	(0,1%)	4	(0,2%)	**1673**
2016	1457	(99,5%)	1	(0,1%)	6	(0,4%)	**1464**
2015	1280	(99,2%)	6	(0,5%)	4	(0,3%)	**1290**
2014	1160	(98,6%)	5	(0,4%)	12	(1,0%)	**1177**
2013	1182	(98,3%)	15	(1,2%)	5	(0,4%)	**1202**
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%)	**1026**
2007	573	(91,1%)	54	(8,6%)	2	(0,3%)	**629**
2006	397	(89,0%)	48	(10,8%)	1	(0,2%)	**446**
2005	236	(79,5%)	56	(18,9%)	5	(1,7%)	**297**
Total	**13993**	**(95,6%)**	**568**	**(3,9%)**	**81**	**(0,6%)**	**14642**

Table 32: In reoperation

	Yes		No		Missing		Total
2018	785	(86,0%)	113	(12,4%)	15	(1,6%)	**913**
2017	768	(85,5%)	121	(13,5%)	9	(1,0%)	**898**
2016	856	(87,5%)	110	(11,2%)	12	(1,2%)	**978**
2015	855	(91,8%)	63	(6,8%)	13	(1,4%)	**931**
2014	744	(94,1%)	45	(5,7%)	2	(0,3%)	**791**
2013	822	(91,5%)	66	(7,3%)	10	(1,1%)	**898**
2012	814	(90,8%)	76	(8,5%)	6	(0,7%)	**896**
2011	815	(88,2%)	95	(10,3%)	14	(1,5%)	**924**
2010	739	(85,8%)	111	(12,9%)	11	(1,3%)	**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**
2006	754	(84,4%)	122	(13,7%)	17	(1,9%)	**893**
2005	548	(82,5%)	108	(16,3%)	8	(1,2%)	**664**
Total	**10895**	**(87,2%)**	**1437**	**(11,5%)**	**160**	**(1,3%)**	**12492**

Table 33: Type of antibiotics - primary operations

Antibiotics (generic name)	2005-09	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Dikloksacillin (Diclocil, Dicillin)	1 582	132	176	201	141	18	18	14	3	12	2 297
	5,2%	1,8%	2,2%	2,5%	1,7%	0,2%	0,2%	0,2%	0,0%	0,1%	2,2%
Cefazolin (Cephazolin)	1		1	1		1		2	747	2 039	2 792
	0,0%		0,0%	0,0%		0,0%		0,0%	9,0%	24,6%	2,7%
Cefuroksim (Zinacef, Cefuroxim, Lifurox)	1 582	300	321	385	193	87	31	26	21	6	2 952
	5,2%	4,0%	4,1%	4,8%	2,4%	1,1%	0,4%	0,3%	0,3%	0,1%	2,9%
Kloksacillin (Ekvacillin)	374	358	497	422	511	532	510	80	14	8	3 306
	1,2%	4,7%	6,3%	5,3%	6,3%	6,6%	6,1%	0,9%	0,2%	0,1%	3,2%
Klindamycin (Dalacin, Clindamycin)	673	207	269	288	325	338	366	397	394	376	3 633
	2,2%	2,7%	3,4%	3,6%	4,0%	4,2%	4,4%	4,7%	4,7%	4,5%	3,5%
Cefalotin (Keflin)	25 534	6 430	6 418	6 543	6 745	6 947	7 306	7 835	7 027	5 780	86 565
	84,2%	85,3%	81,8%	81,7%	83,3%	85,8%	87,1%	92,0%	84,6%	69,6%	83,7%
Other *	448	87	144	148	139	133	121	130	75	67	1 492
	1,5%	1,2%	1,8%	1,8%	1,7%	1,6%	1,4%	1,5%	0,9%	0,8%	1,4%
Missing information	129	26	22	19	41	38	34	28	30	12	379
	0,4%	0,3%	0,3%	0,2%	0,5%	0,5%	0,4%	0,3%	0,4%	0,1%	0,4%
Total	**30 323**	**7 540**	**7 848**	**8 007**	**8 095**	**8 094**	**8 386**	**8 512**	**8 311**	**8 300**	**103 416**

* 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
2018	8123	(97,5%)	190	(2,0%)	21	(0,5%)	**8334**
2017	8142	(97,6%)	182	(1,9%)	21	(0,5%)	**8345**
2016	8279	(97,4%)	186	(1,9%)	31	(0,6%)	**8497**
2015	8210	(97,6%)	168	(1,8%)	33	(0,6%)	**8411**
2014	7966	(97,4%)	191	(1,9%)	25	(0,7%)	**8182**
2013	8162	(98,2%)	139	(1,3%)	8	(0,4%)	**8309**
2012	8308	(98,5%)	125	(1,1%)	2	(0,4%)	**8435**
2011	8488	(98,7%)	92	(1,0%)	20	(0,3%)	**8600**
2010	8238	(98,5%)	94	(1,1%)	31	(0,4%)	**8363**
2009	8150	(98,7%)	78	(0,9%)	30	(0,4%)	**8258**
2008	8218	(98,3%)	112	(1,3%)	32	(0,4%)	**8362**
2007	7707	(97,9%)	135	(1,7%)	28	(0,4%)	**7870**
2006	7274	(96,8%)	197	(2,6%)	46	(0,6%)	**7517**
2005	5736	(97,6%)	117	(2,0%)	26	(0,4%)	**5879**
Total	**111001**	**(97,9%)**	**2006**	**(1,8%)**	**354**	**(0,3%)**	**113362**

Table 35: Number of drugs in antithrombotic prophylaxis

	One drug		Two drugs		Total
2018	7940	(97,7%)	183	(2,3%)	**8123**
2017	7958	(97,7%)	184	(2,3%)	**8142**
2016	8096	(97,8%)	183	(2,2%)	**8279**
2015	7963	(97,0%)	247	(3,0%)	**8210**
2014	7749	(97,3%)	217	(2,7%)	**7966**
2013	7902	(96,8%)	260	(3,2%)	**8162**
2012	8134	(97,9%)	174	(2,1%)	**8308**
2011	8402	(99,0%)	86	(1,0%)	**8488**
2010	8204	(99,6%)	34	(0,4%)	**8238**
2009	8132	(99,8%)	18	(0,2%)	**8150**
2008	8202	(99,8%)	16	(0,2%)	**8218**
2007	7692	(99,8%)	15	(0,2%)	**7707**
2006	7259	(99,8%)	15	(0,2%)	**7274**
2005	5715	(99,6%)	21	(0,4%)	**5736**
Total	**109348**	**(98,5%)**	**1653**	**(1,5%)**	**111001**

Table 36: Antithrombotic prophylaxis if one drug - primary operation (n=109349)

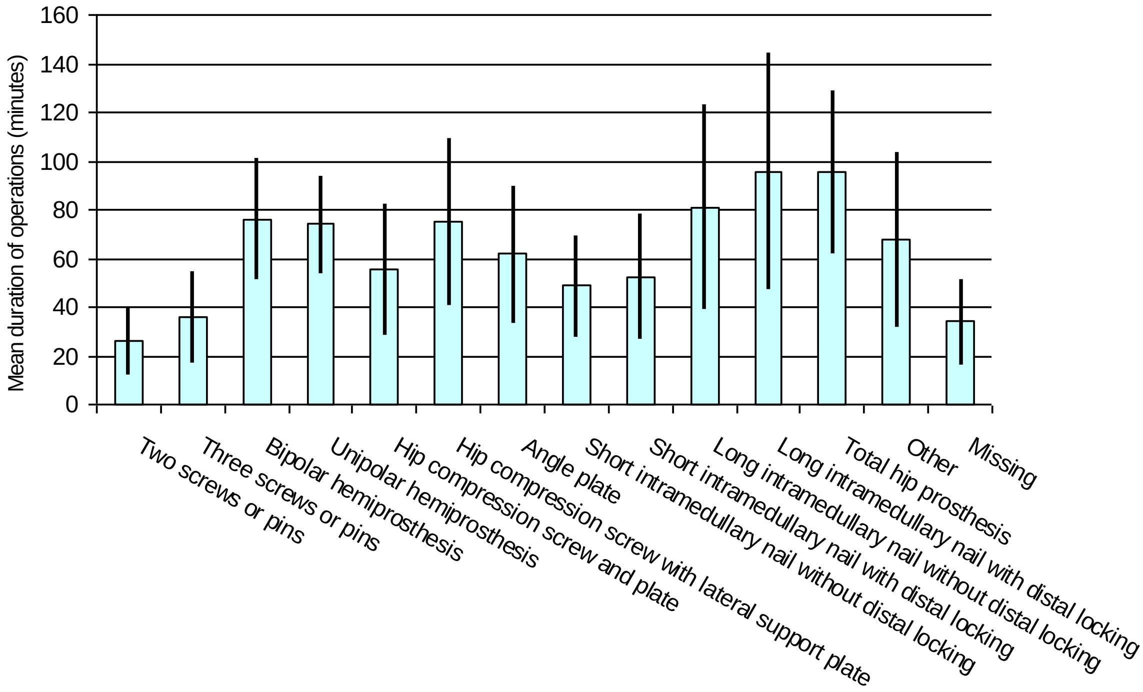
	2005-09	2010	2011	2012	2013	2014	2015	2016	2017	2018
Dalteparin (Fragmin)	54,48%	61,32%	62,97%	62,93%	53,35%	51,05%	59,81%	64,76%	70,53%	71,70%
Enoksaparin (Klexane)	45,23%	38,37%	36,62%	36,33%	45,68%	48,02%	39,12%	34,26%	28,20%	27,36%
Other	0,02%	0,03%	0,02%	0,02%	0,05%	0,05%	0,06%	0,07%	0,06%	0,07%
Missing information	0,19%	0,12%	0,31%	0,70%	0,68%	0,55%	0,62%	0,59%	0,73%	0,39%

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

	Preoperatively		Postoperatively		Missing		Total
2018	2388	(29,4%)	4882	(60,1%)	853	(10,5%)	**8123**
2017	2343	(28,8%)	4843	(59,5%)	956	(11,7%)	**8142**
2016	2595	(31,4%)	4760	(57,5%)	925	(11,2%)	**8280**
2015	2633	(32,1%)	4698	(57,2%)	879	(10,7%)	**8210**
2014	2618	(32,9%)	4477	(56,2%)	871	(11,0%)	**7966**
2013	2818	(34,6%)	4352	(53,3%)	992	(12,1%)	**8162**
2012	3108	(37,4%)	4132	(49,8%)	1068	(12,9%)	**8308**
2011	3322	(39,2%)	4060	(47,8%)	1106	(9,8%)	**8488**
2010	3309	(40,2%)	3585	(43,5%)	1344	(10,5%)	**8238**
2009	3760	(46,2%)	3046	(37,4%)	1344	(12,1%)	**8150**
2008	3509	(42,7%)	2973	(36,2%)	1736	(16,3%)	**8218**
2007	2925	(38,0%)	2968	(38,5%)	1814	(17,6%)	**7707**
2006	2931	(40,4%)	2058	(28,3%)	2285	(19,6%)	**7274**
2005	2188	(38,7%)	44	(0,8%)	3504	(26,7%)	**5736**
Total	**40447**	**(36,4%)**	**50878**	**(45,8%)**	**19677**	**(17,7%)**	**111002**

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	20976	26	14
Three screws or pins	662	36	19
Bipolar hemiprosthesis	37270	76	25
Unipolar hemiprosthesis	301	74	20
Hip compression screw and plate	21175	56	27
Hip compression screw with lateral support plate	8801	75	34
Angle plate	5	62	28
Short intramedullary nail without distal locking	342	49	21
Short intramedullary nail with distal locking	8366	52	26
Long intramedullary nail without distal locking	120	81	42
Long intramedullary nail with distal locking	5118	96	49
Total hip prosthesis	3424	96	33
Other	2044	68	36
Missing	4	34	18

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 (%)	
2018	7339	4154	(56,6%)	5997	3421	(57,0%)	4346	2373	(54,6%)	**17682**	**9948**	(56,3%)
2017	7012	4062	(57,9%)	5954	3420	(57,4%)	4091	2253	(55,1%)	**17057**	**9735**	(57,1%)
2016	7015	3963	(56,5%)	6077	3519	(57,9%)	4206	2325	(55,3%)	**17298**	**9807**	(56,7%)
2015	6919	3980	(57,5%)	5844	3346	(57,3%)	4384	2393	(54,6%)	**17147**	**9719**	(56,7%)
2014	6818	3825	(56,1%)	6003	3272	(54,5%)	4332	2350	(54,2%)	**17153**	**9447**	(55,1%)
2013	6903	3955	(57,3%)	6095	3516	(57,7%)	4443	2439	(54,9%)	**17441**	**9910**	(56,8%)
2012	7575	4202	(55,5%)	6784	3816	(56,3%)	1789	1050	(58,7%)	**16148**	**9068**	(56,2%)
2011	6459	3555	(55,0%)	5553	3118	(56,1%)	1411	816	(57,8%)	**13423**	**7489**	(55,8%)
2010	4985	2826	(56,7%)	2264	1308	(57,8%)	3752	2134	(56,9%)	**11001**	**6268**	(57,0%)
2009	2554	1484	(58,1%)	2359	1362	(57,7%)	4095	2207	(53,9%)	**9008**	**5053**	(56,1%)
2008	2273	1305	(57,4%)	1902	1084	(57,0%)	3180	1817	(57,1%)	**7355**	**4206**	(57,2%)
2007	3503	1967	(56,2%)	5068	2836	(56,0%)				**8571**	**4803**	(56,0%)
2006	6160	3607	(58,6%)	4848	2787	(57,5%)				**11008**	**6394**	(58,1%)
2005	2817	1640	(58,2%)							**2817**	**1640**	(58,2%)
Total	78332	44525	(56,8%)	64748	36805	(56,8%)	40029	22157	(55,4%)	**183109**	**103487**	(56,5%)

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

Figure D.13: EQ-5D-3L index score before fracture

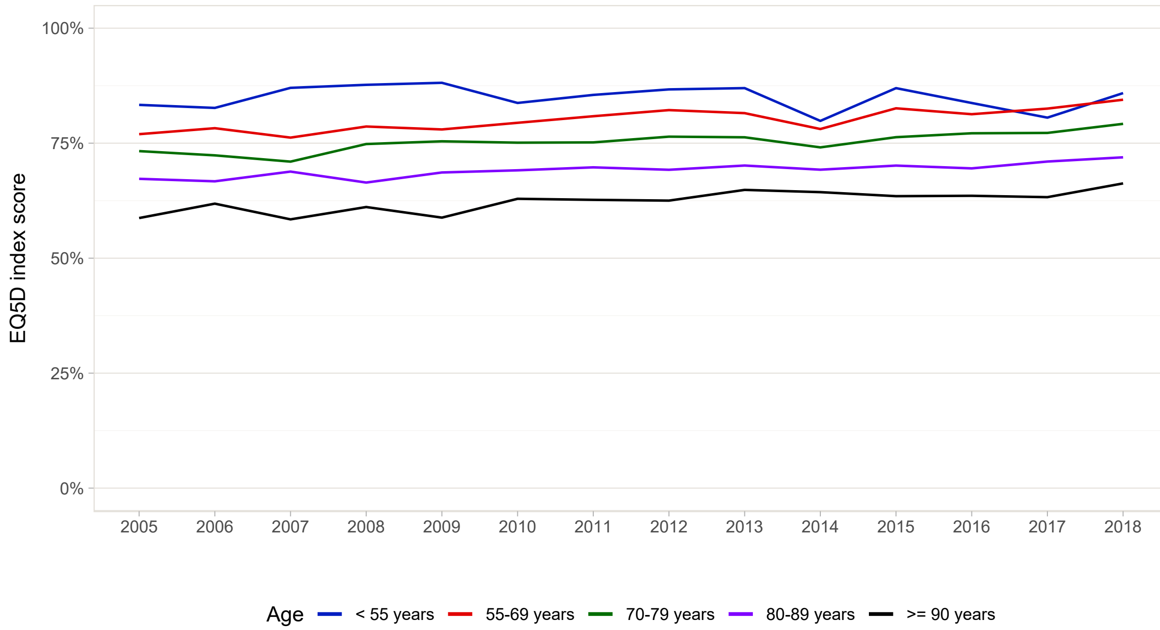


Figure D.13 shows change over time of mean pre-fracture EQ-5D-3L index score for different age groups. 1 represents the best possible quality of life and 0 represents quality of life equivalent to death.

Figure D.14: EQ-5D-3L index score 12 months postoperatively

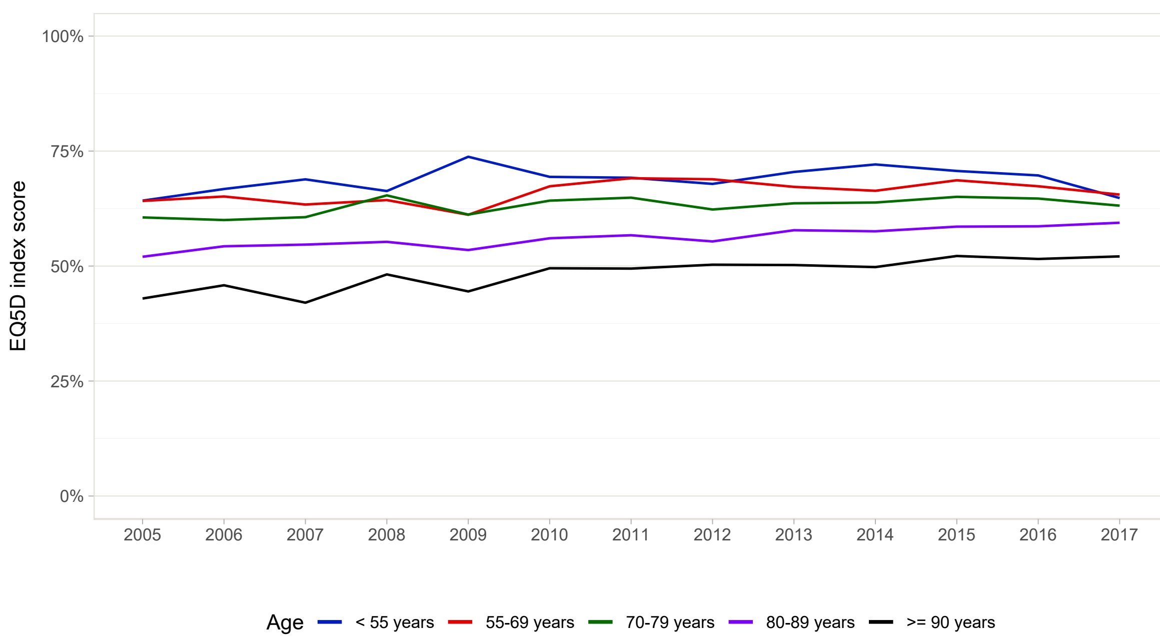


Figure D.14 shows change over time of mean EQ-5D-3L index score for different age groups 12 months postoperatively. 1 represents the best possible quality of life and 0 represents quality of life equivalent to death.

Figure D.15: EQ-5D-3L walking ability before fracture

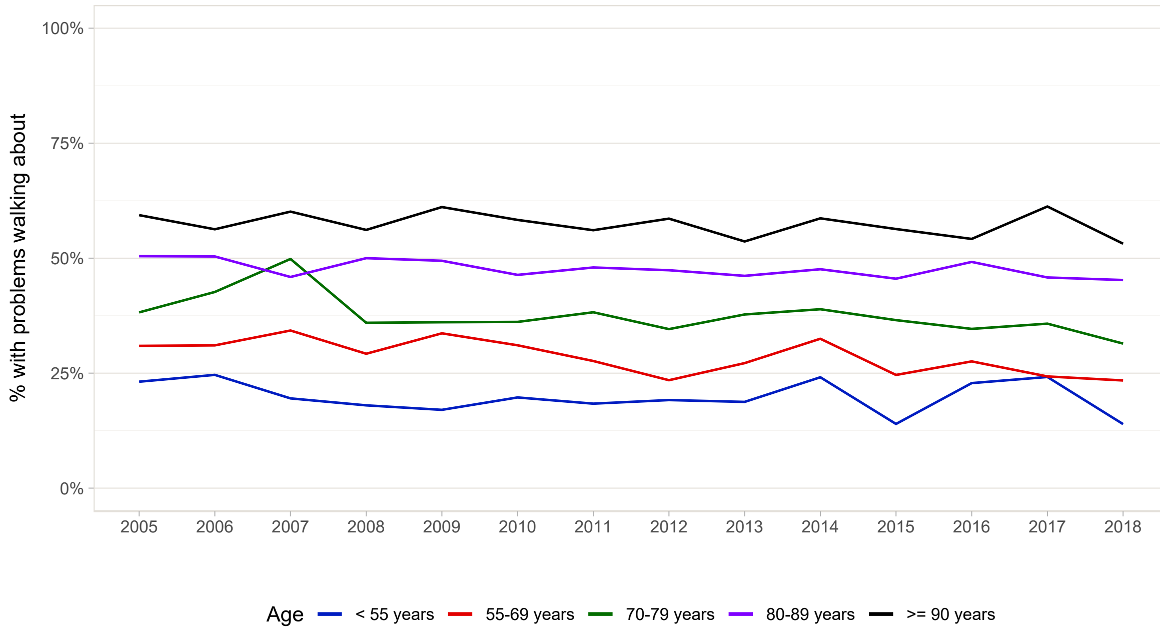


Figure D.15 shows change over time of walking ability before fracture for different age groups evaluated using the first question in EQ-5D-3L. The figure shows the proportion of patients reporting “I have problems in walking around” or “I am confined to bed”.

Figure D.16: EQ-5D-3L walking ability 12 months postoperatively

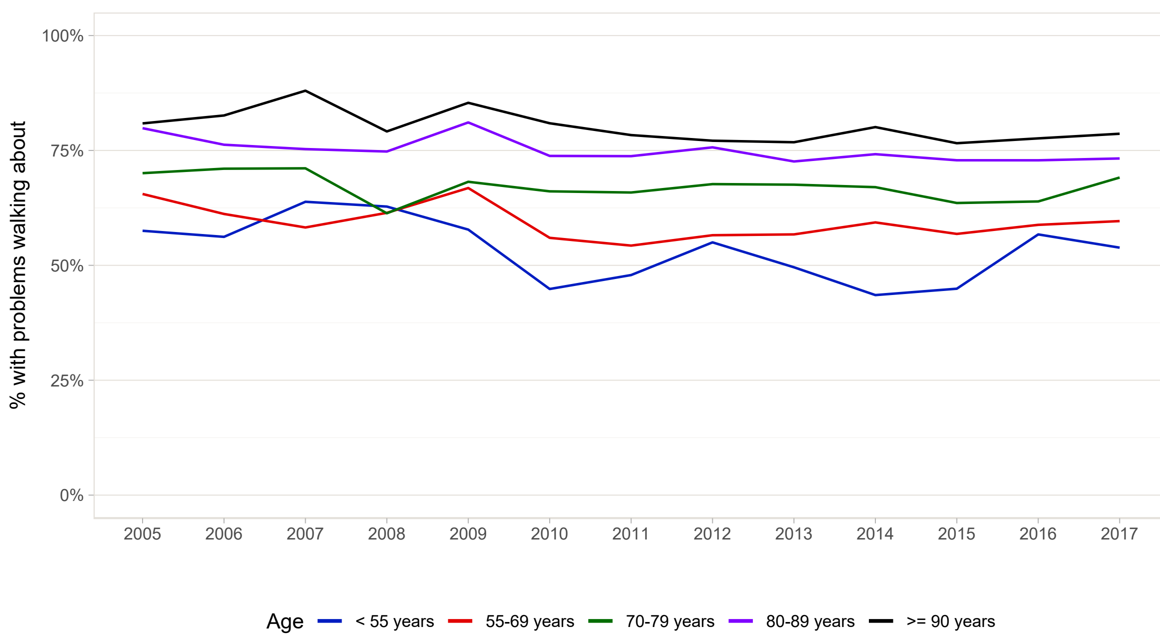


Figure D.16 shows change over time of walking ability 12 months postoperatively for different age groups evaluated using the first question in EQ-5D-3L. The figure shows the proportion of patients reporting “I have problems in walking around” or “I am confined to bed”.

Figure D.17: EQ-5D-3L Ability to perform self-care before fracture

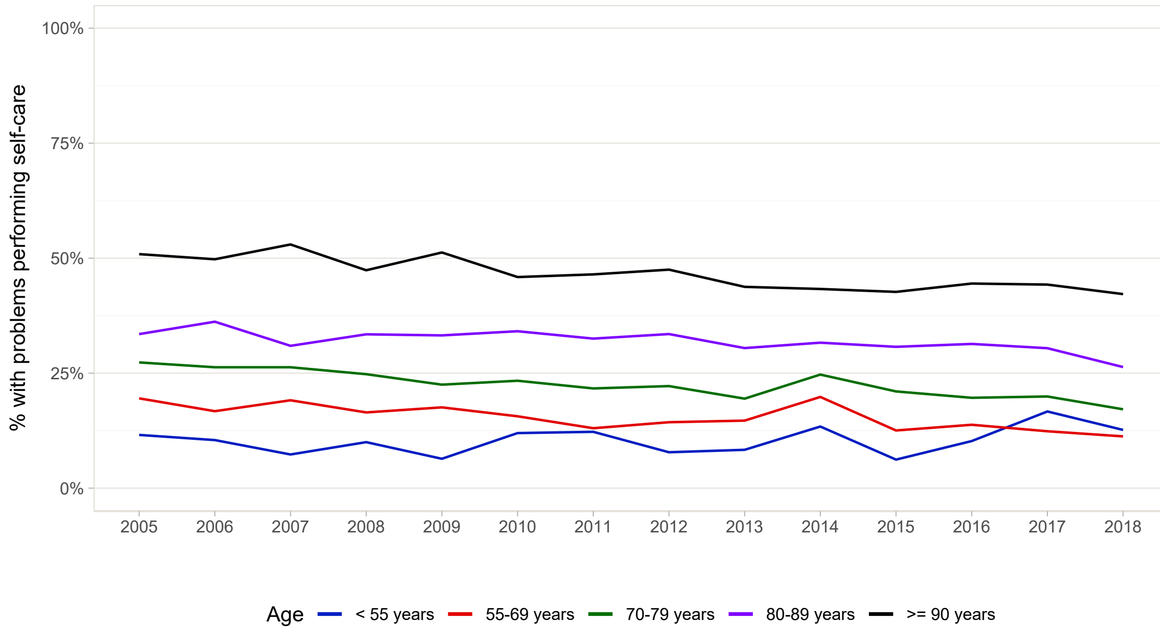


Figure D.17 shows change over time of ability to perform self-care before fracture for different age groups evaluated using the second question in EQ-5D-3L. The figure shows the proportion of patients reporting "I have problems with self-care" or "I am unable to wash or dress myself".

Figure D.18: EQ-5D-3L Ability to perform self-care 12 months postoperatively

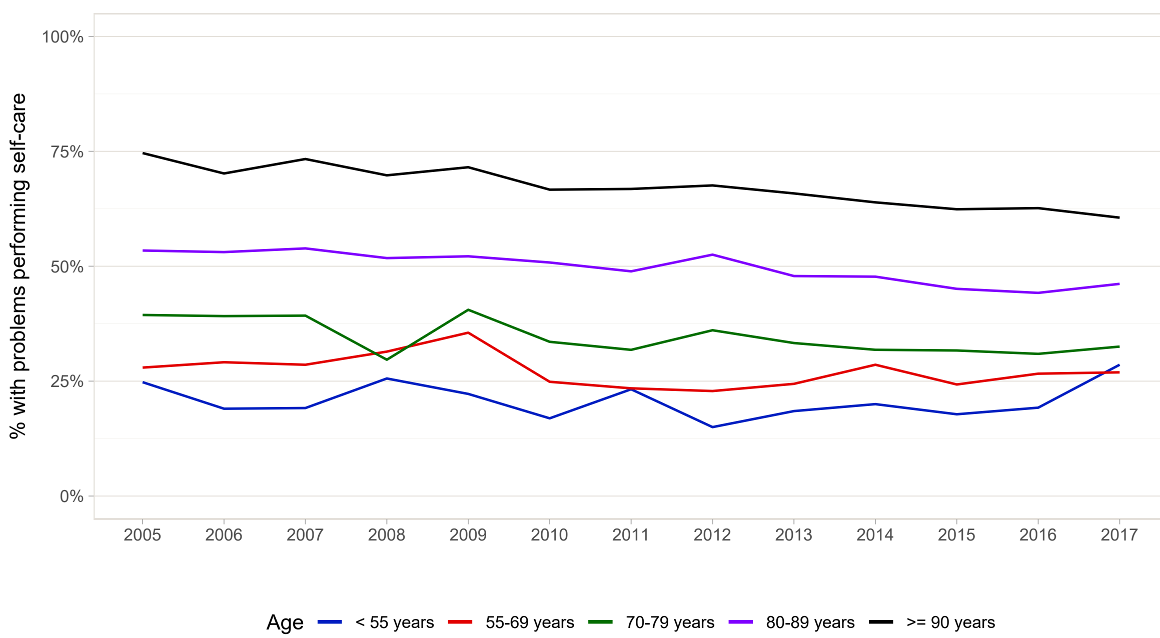


Figure D.18 shows change over time of ability to perform self-care 12 months postoperatively for different types of fractures evaluated using the second question in EQ-5D-3L. The figure shows the proportion of patients reporting "I have problems with self-care" or "I am unable to wash or dress myself".

Figure D.19: EQ-5D-3L Ability to perform usual activities before fracture

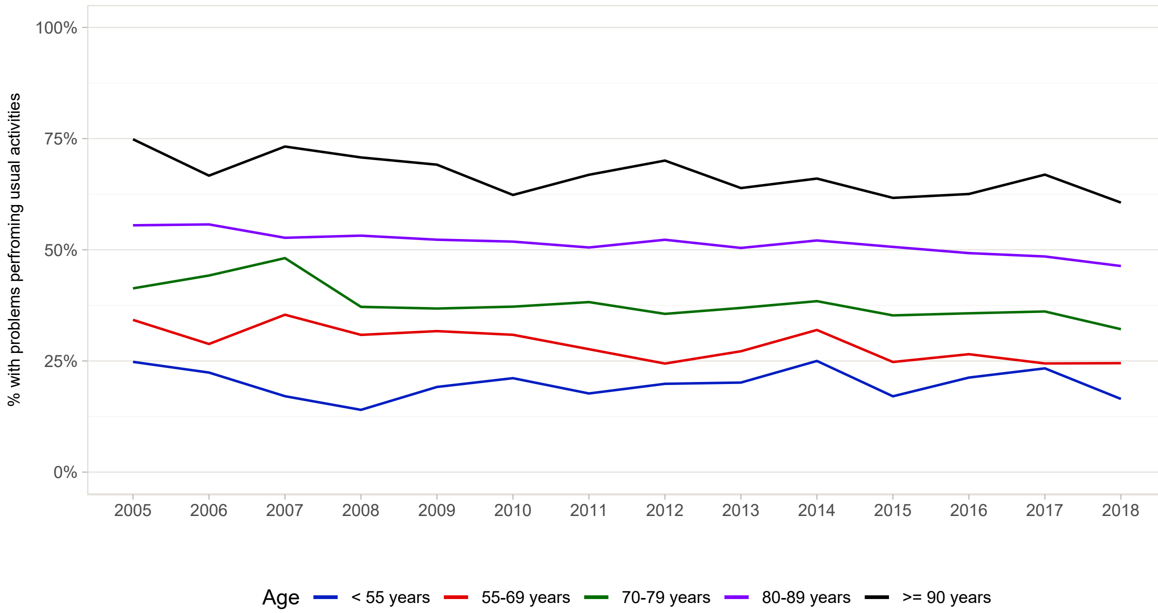


Figure D.19 shows change over time of ability to perform usual activities (e.g. work, study, housework, family or leisure activities) before fracture for different age groups evaluated using the third question in EQ-5D- 3L. The figure shows the proportion of patients reporting "I have problems with performing my usual activities" or "I am unable to perform my usual activities".

Figure D.20: EQ-5D-3L Ability to perform usual activities 12 months postoperatively

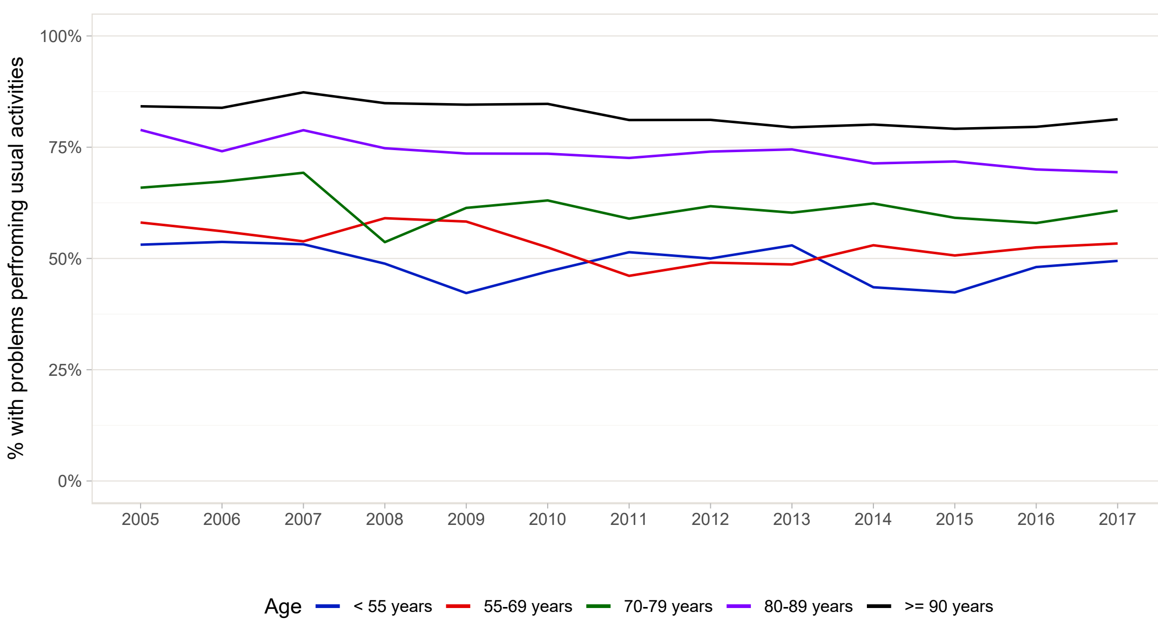


Figure D.20 shows change over time of ability to perform usual activities (e.g. work, study, housework, family or leisure activities) 12 months postoperatively for different age groups evaluated using the third question in EQ-5D-3L. The figure shows the proportion of patients reporting "I have problems with performing my usual activities" or "I am unable to perform my usual activities".

Figure D.21: EQ-5D-3L Pain / discomfort before fracture

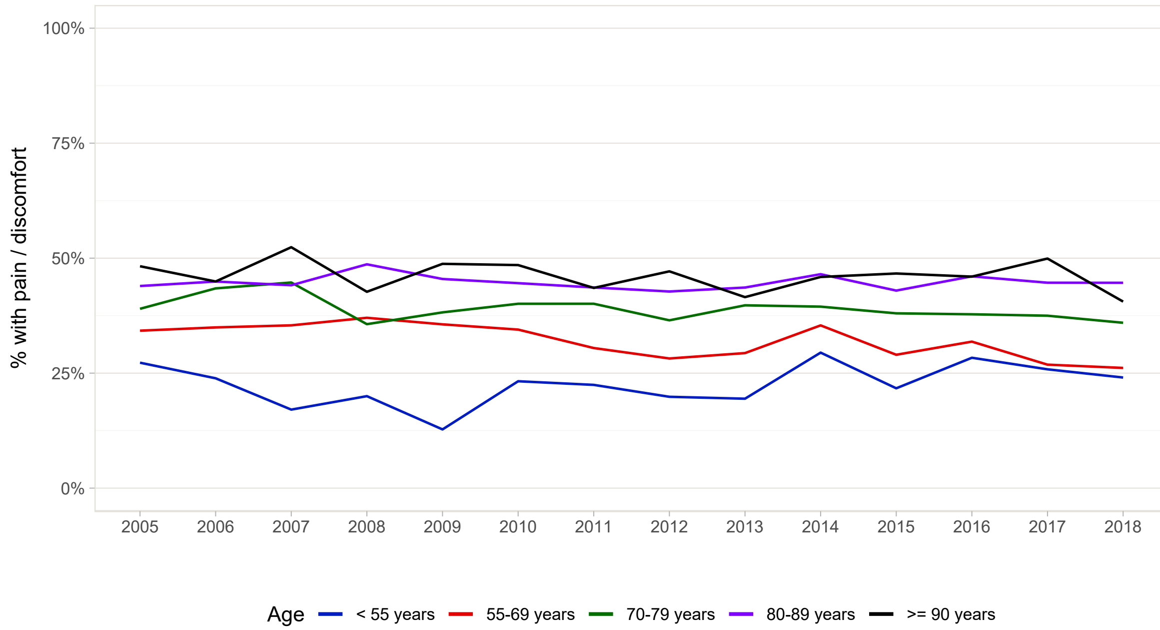


Figure D.21 shows change over time of pain/discomfort before fracture for different age groups evaluated using the forth question in EQ-5D-3L. The figure shows the proportion of patients reporting "I have moderate pain or discomfort" or "I have extreme pain or discomfort".

Figure D.22: EQ-5D-3L Pain / discomfort 12 months postoperatively

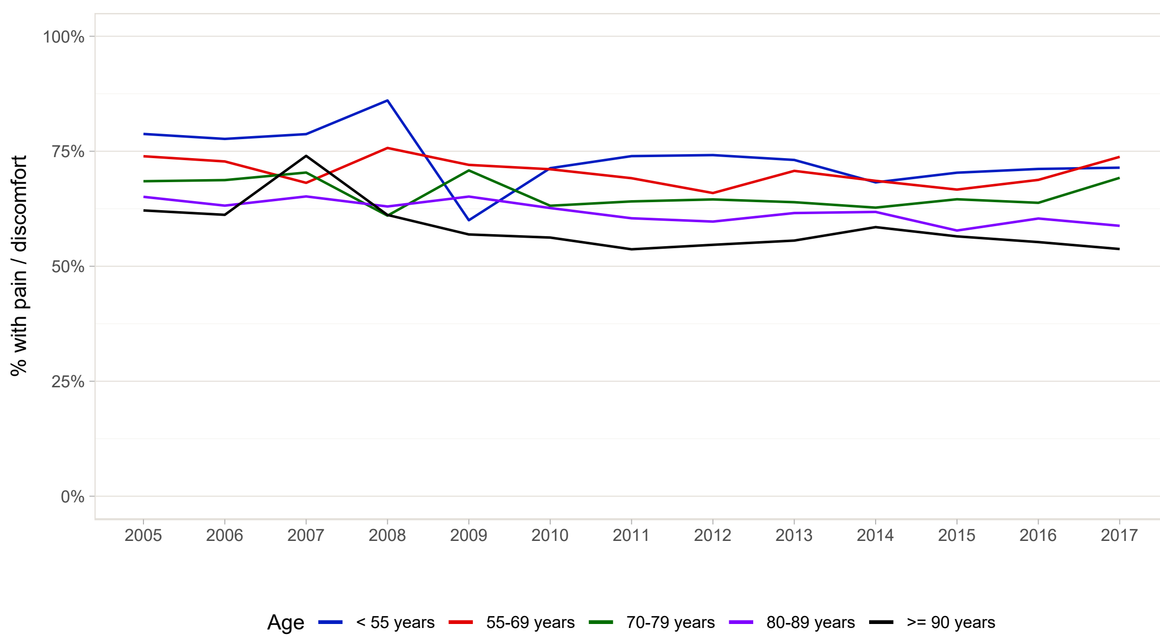


Figure D.22 shows change over time of pain/discomfort 12 months postoperatively for different age groups evaluated using the forth question in EQ-5D-3L. The figure shows the proportion of patients reporting "I have moderate pain or discomfort" or "I have extreme pain or discomfort".

Sykehusvise 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.24 to D.28 present updated results for the different hospitals for operations performed in the period 2016-2018.

Figure D.23: Number of primary operations in 2018 at each hospital

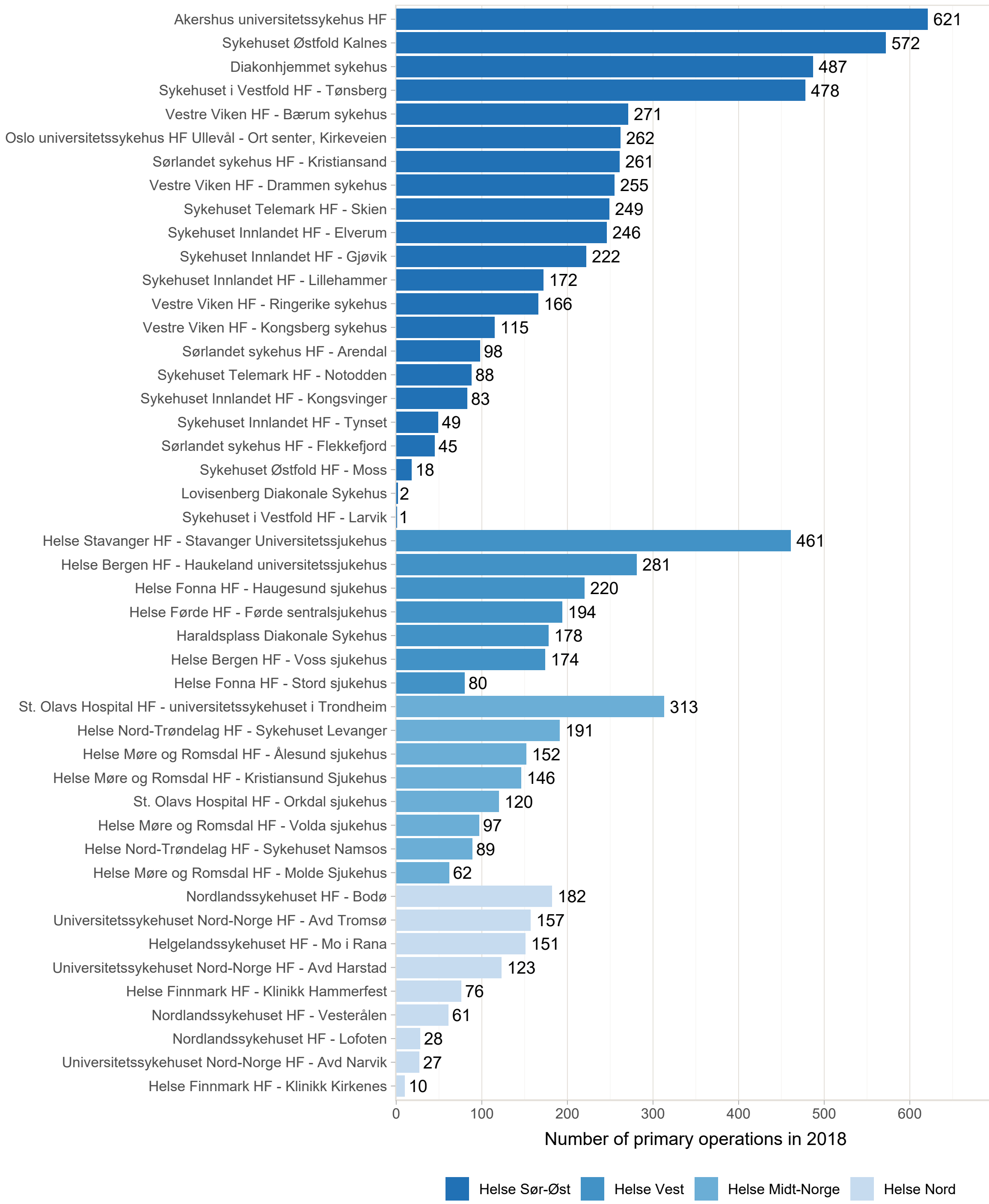


Figure D.24: Treatment of displaced femoral neck fracutres in patients over 70 years of age

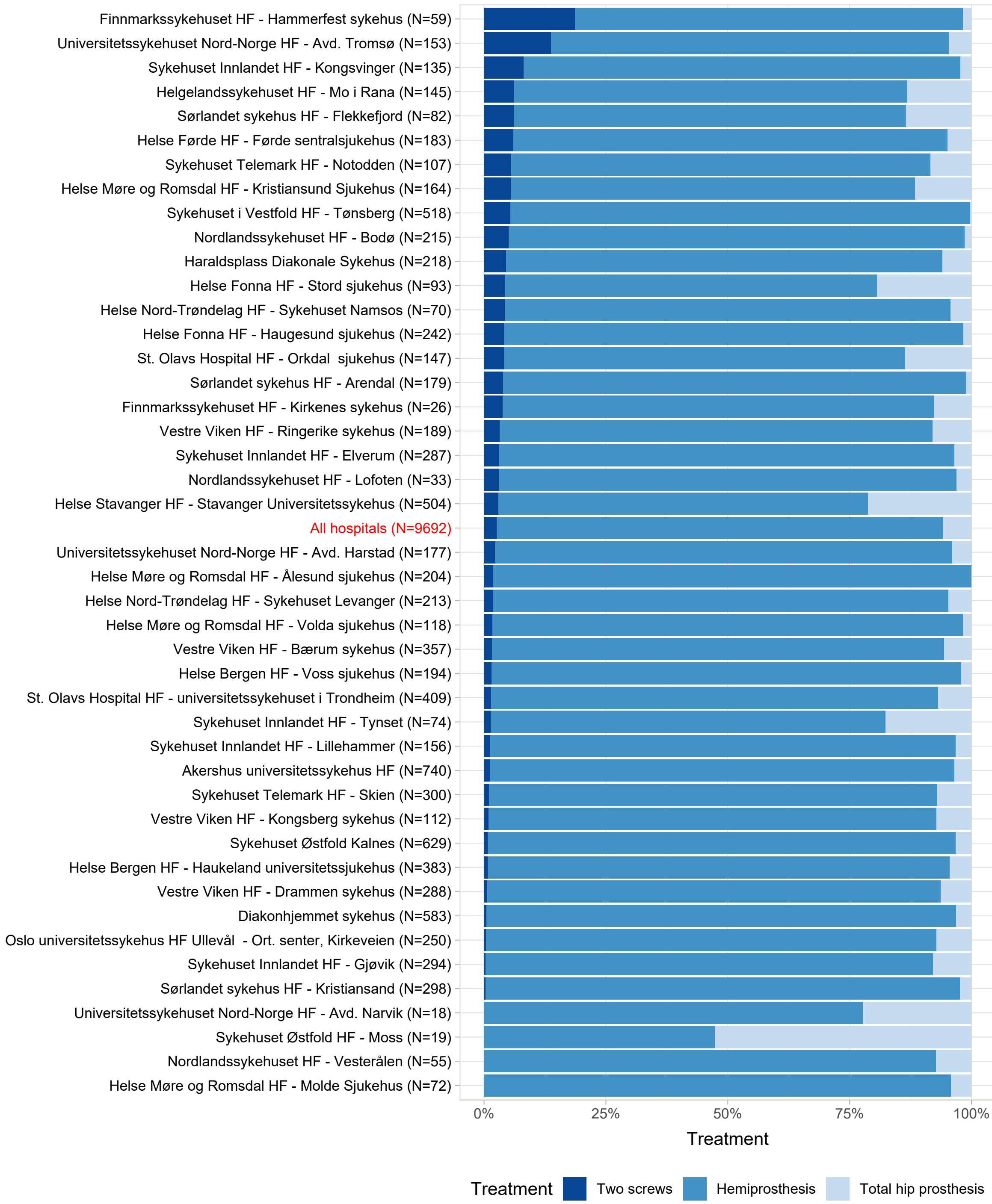


Figure D.24 shows the proportion of patients treated with screw osteosynthesis/hemiprosthesis/total hip prosthesis at each hospital in the period 2015-2017. Hospitals with n<10 have been excluded.

Figure D.25: Fixation of hemiprosthesis in patients over 70 years of age

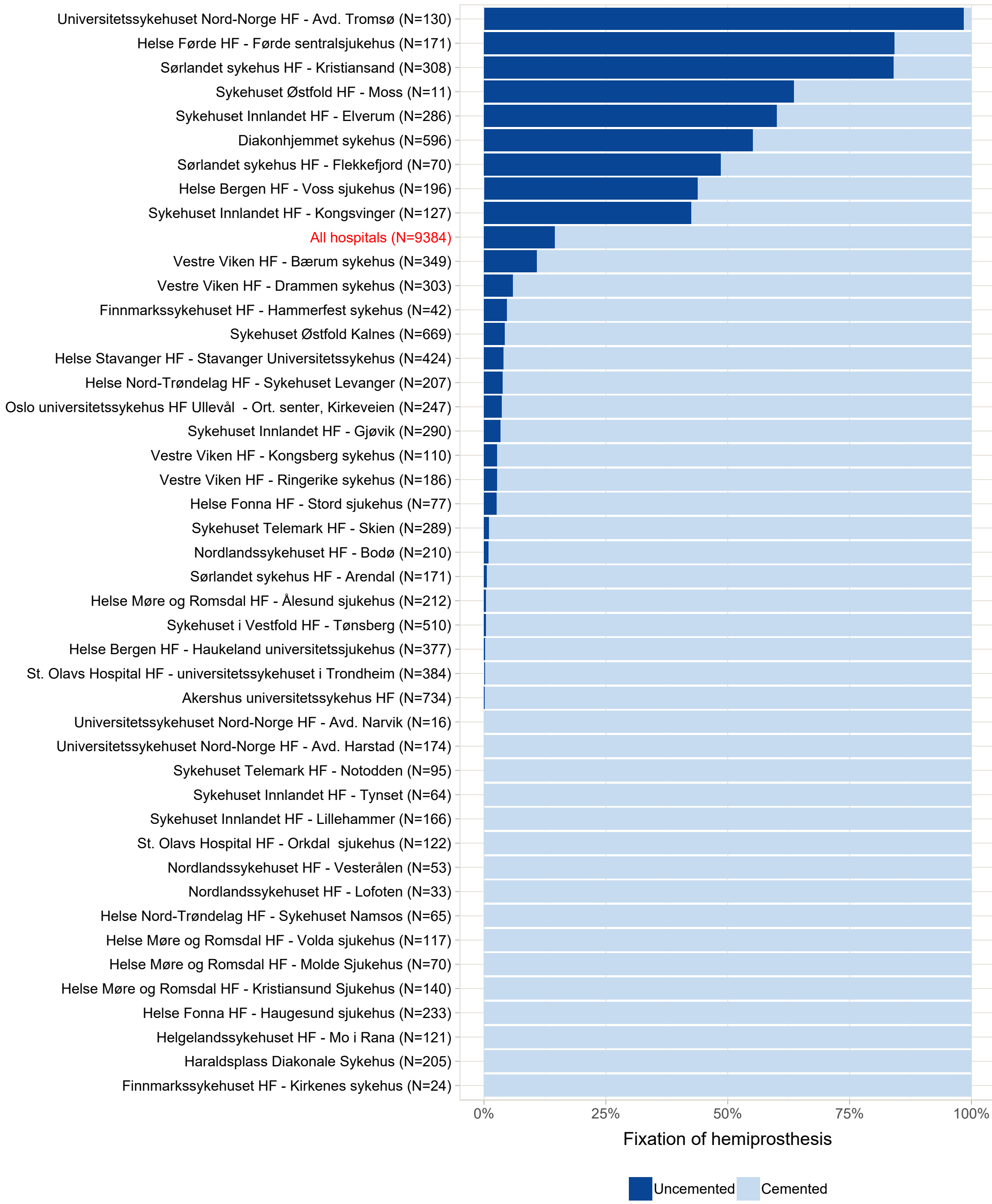


Figure D.25 shows the proportion of patients treated with uncemented/cemented hemiprosthesis at each hospital in the period 2015-2017. Hospitals with n<10 have been excluded.

Figure D.26: Waiting time from fracture to surgery

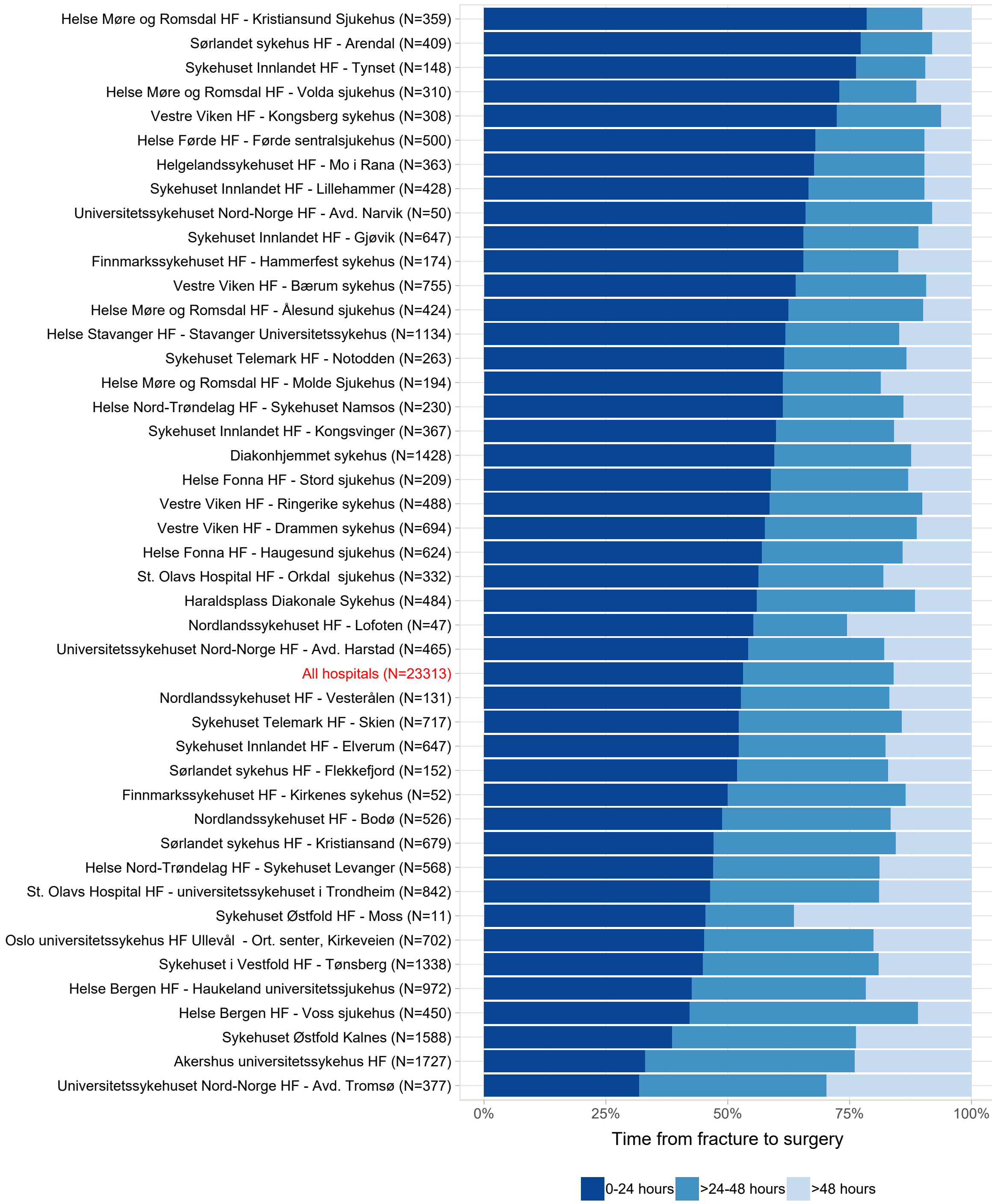


Figure D.26 shows waiting time, sorted by proportion of fractures treated within 24 hours after the fracture at the different hospitals in the period 2016-2018. Hospitals with n<10 have been excluded.

Figure D.27: Reoperations in the period2016-2018. All types of hip fractures.

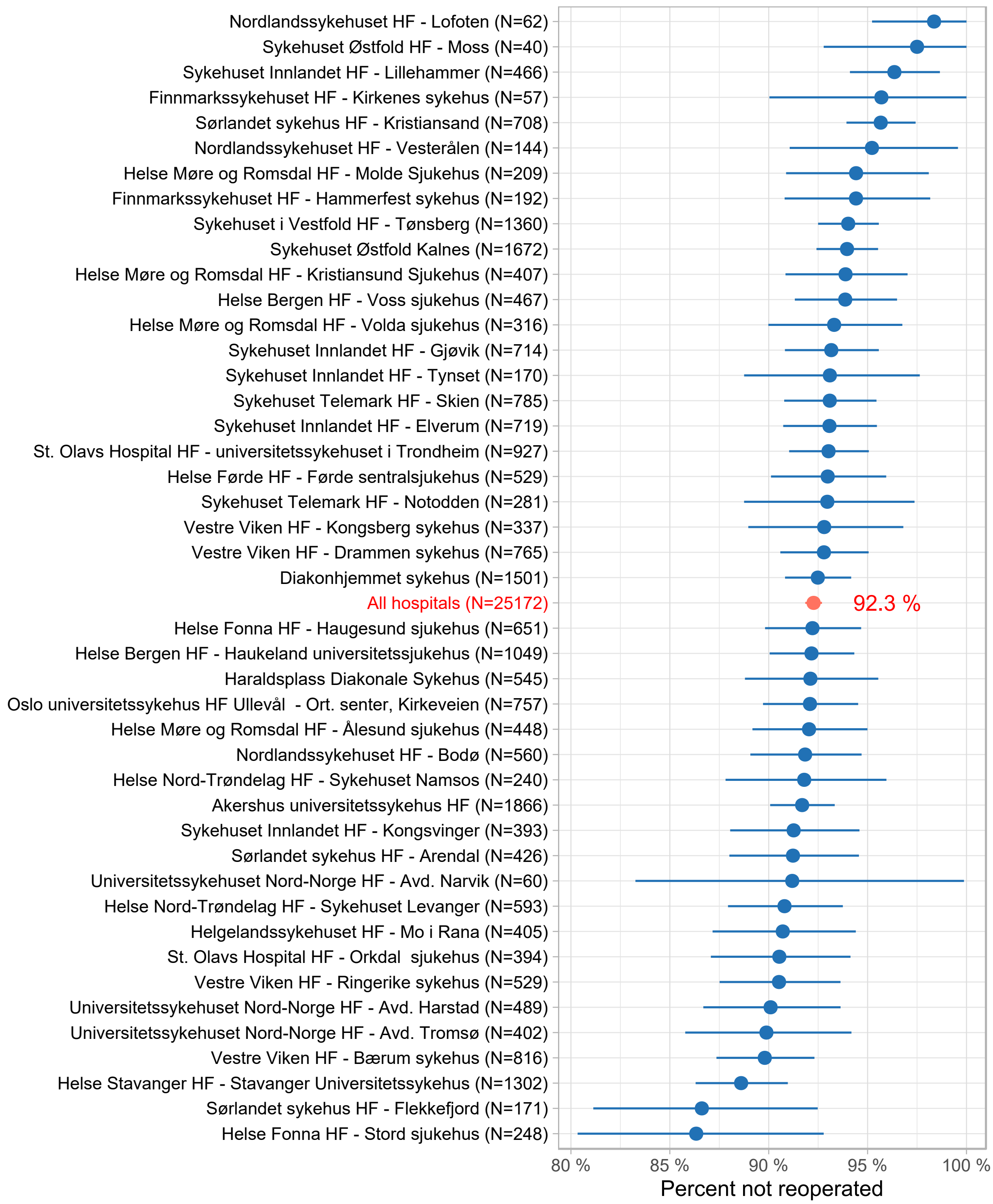


Figure D.27 shows proportion of patients not reoperated at each hospital. Hospitals with n<10 have been excluded.

Figure D.28: Reoperations in the period 2016-2018. Displaced femoral neck fractures in patients over 70 years of age, regardless of type of primary operation.

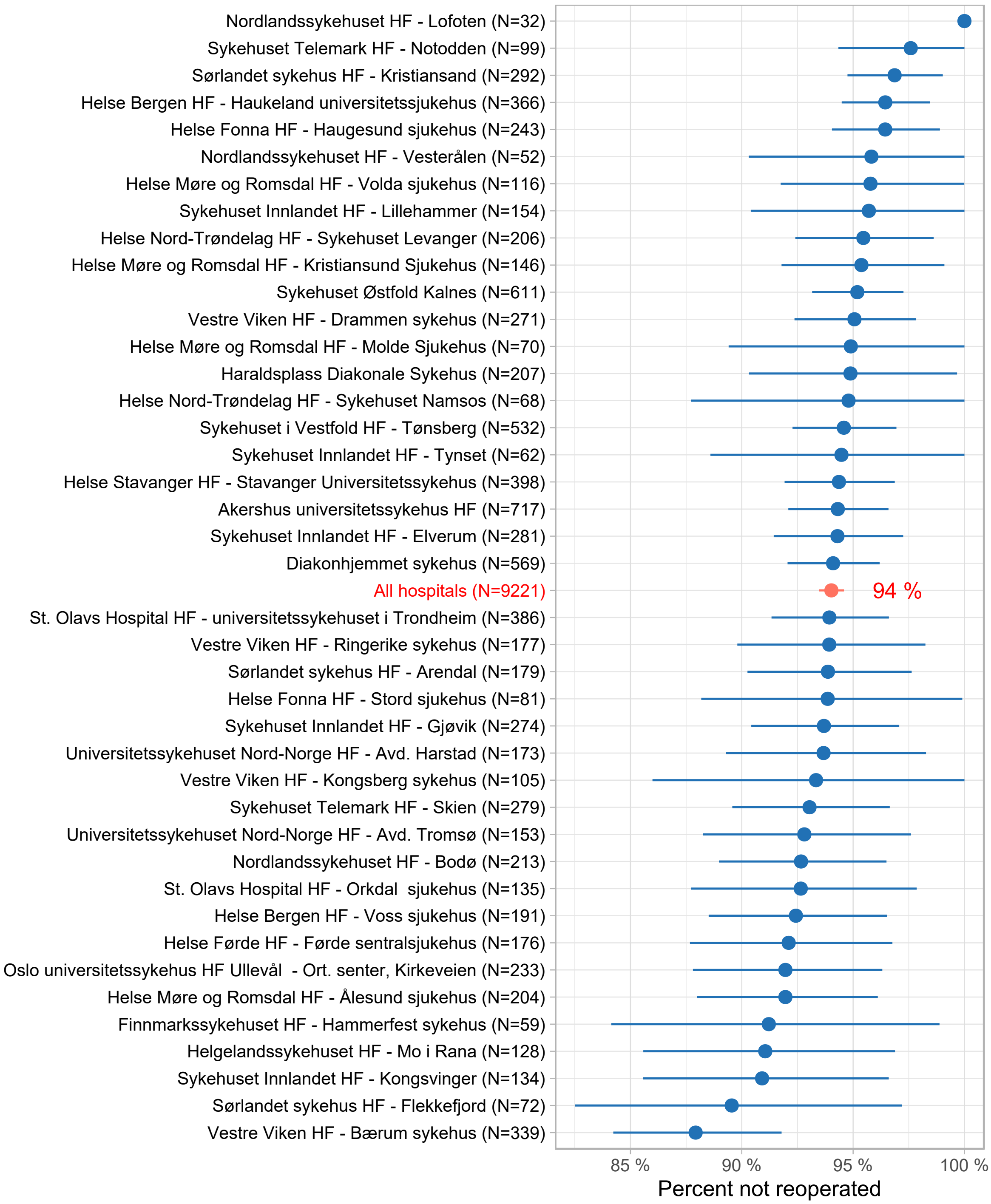


Figure D.28 shows proportion of patients not reoperated at each hospital. Hospitals with n<10 have been excluded.

Completeness analysis for the Norwegian Hip Fracture Register, 2015-2016

A completeness analysis has been conducted for the Norwegian Hip Fracture Register (NHFR) for primary operations (osteosynthesis, partial and total arthroplasty) and revisions (following primary osteosynthesis, partial and total arthroplasty for hip fractures) performed in the period 2015-16. 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:

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

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

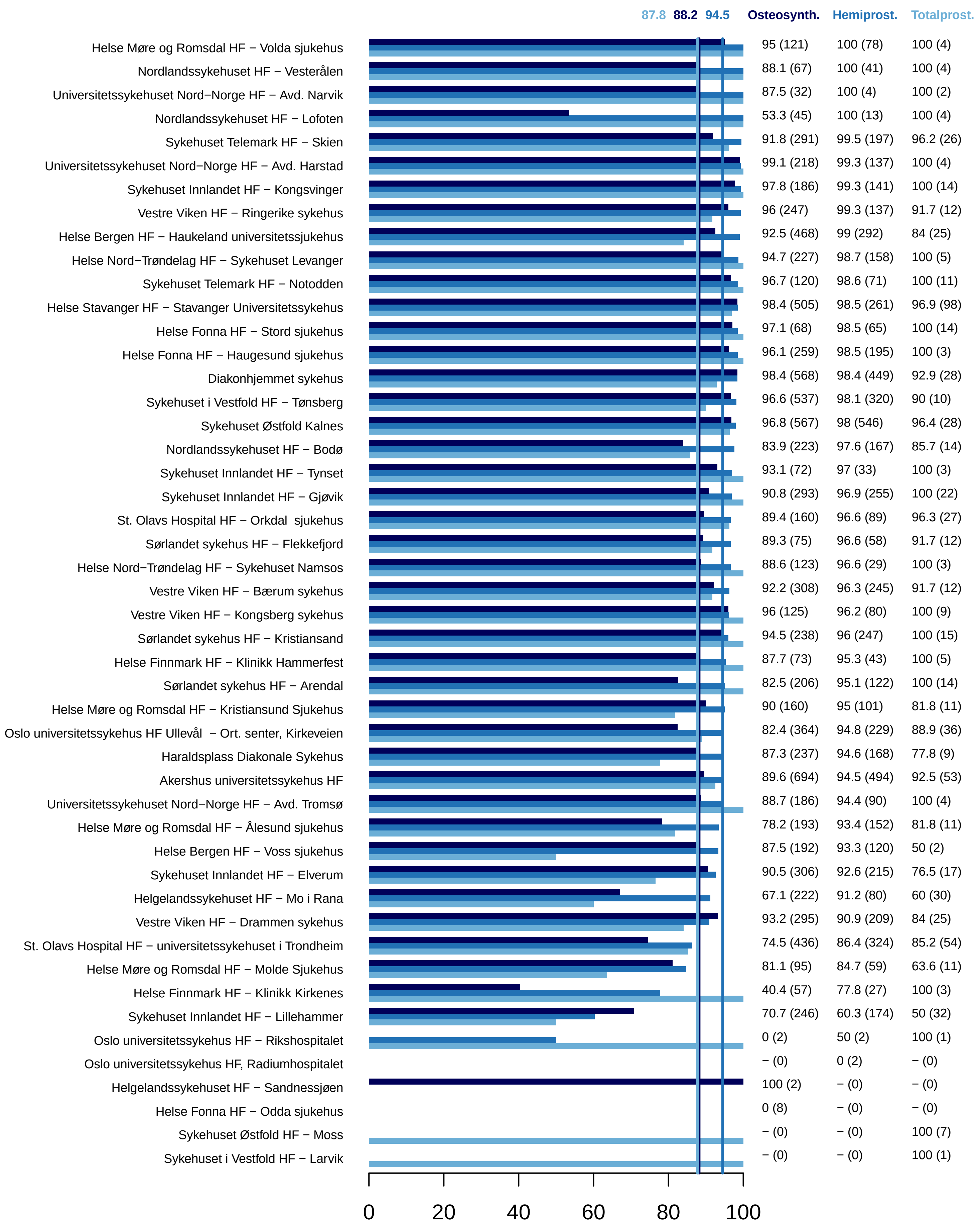
For details of the NSCP and ICD-10 codes used when extracting data from the NPR for comparison of primary and revision surgery in the NHFR and for the complete results, please consult the Completeness Analysis Report, which will be published atwww.helsedirektoratet.no.

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 88 %. 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.

Revisions. The information in the NHFR did not agree with NPR data as well as for primary surgery. Completeness for reoperations after osteosynthesis was 65 %, after hemiarthroplasty 66 %, and after total arthroplasty 90 %. 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 revisions reported to the NPR is often imprecise or incorrect. Low completeness may mean that the revision 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 revisions 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**.

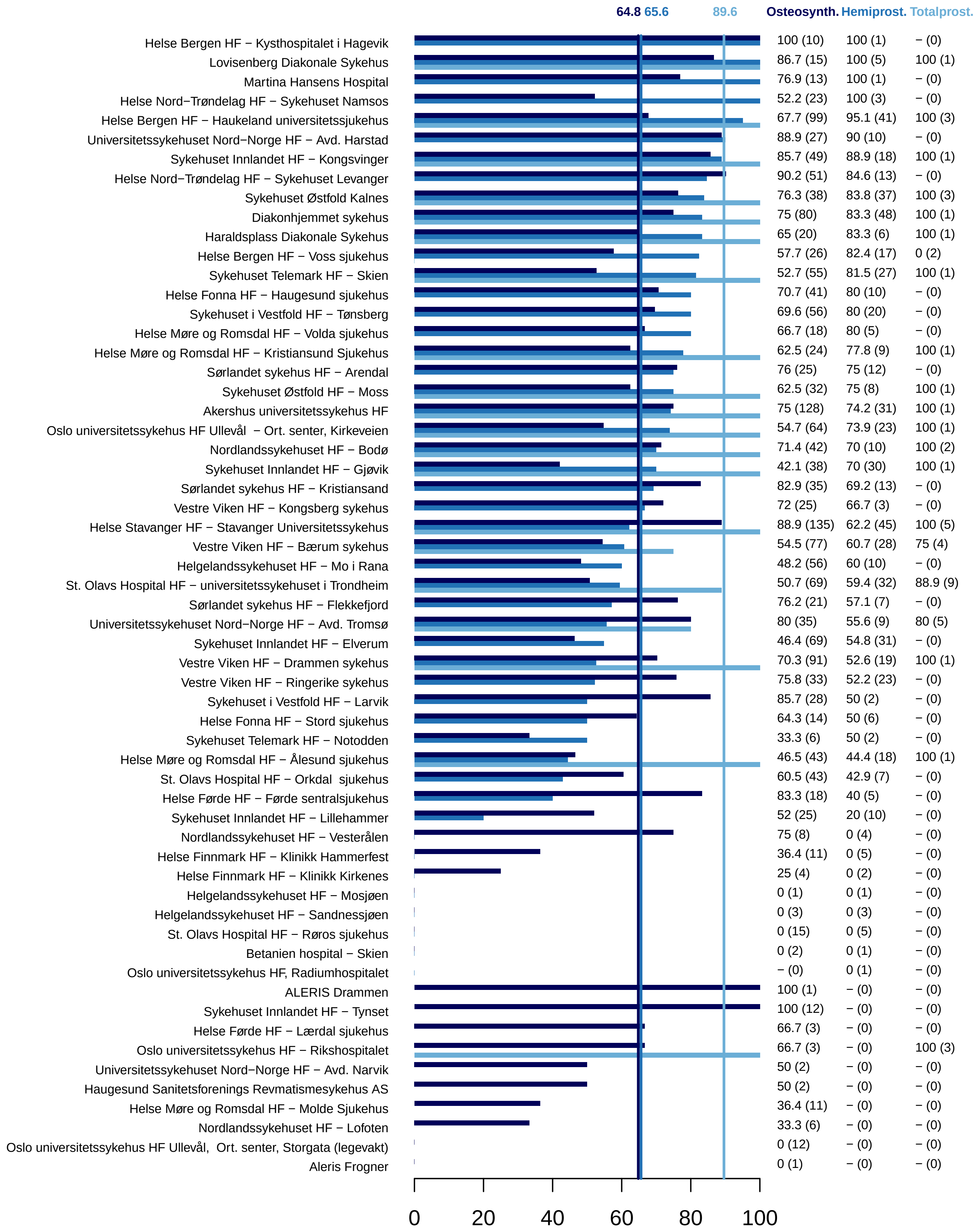
The following pages show the hospital-based completeness analysis for primary operations and reoperations. We urge hospitals with low completeness to review their coding practices and routines in reporting to the registers.

Completeness of reporting, primary hip fractures 2015−2016



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, revision of hip fractures 2015−2016



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

CRUCIATE LIGAMENT REGISTER: ANNUAL REPORT 2019

The management and administration of the Cruciate Ligament Register are proud to present the 2018 report from the Register.
We are very pleased to note the enthusiasm for ACL surgery and all the research in this field. 2019 will be an important year for the Register, when we will attempt to get as many hospitals as possible to use electronic recording of information on surgeons and patients. We are working hard to make this process as painless as possible.
This report contains many of the same tables and figures as before. The electronic form implies improved recording, and the report will therefore be revised and will have a different layout next year. Data from the Cruciate Ligament Register are also available in a report presented by SKDE (the Centre for Clinical Documentation and Evaluation) each autumn, which aims to simplify the information a little and make it easier to read for interested patients.

Work on the electronic ACL form is making good progress. We are attempting to contact all the hospitals and many have started using the form. High-volume hospitals have been the most positive.

Please remember that it is obligatory to submit the ACL form to the Cruciate Ligament Register. It is important to have good procedures at every hospital; the high-volume hospitals have traditionally been best at reporting. In 2018, 1856 primary ACL reconstructions and 206 revisions were recorded. These figures are similar to those of last year (1893/215). We have previously commented on volume and we see that last year there were 15 hospitals with 1-5 ACL reconstructions per year. The Cruciate Ligament Register will maintain its focus on this area in the coming year.

Surgeons' graft choices are relatively unchanged; patellar tendon graft is most frequently used, at 69%. This has increased somewhat from last year. Apart from this, hamstring and quadriceps tendon grafts are most common. The Danish register has reported increased risk of revision for quadriceps tendon grafts and we plan to follow this closely in Norway.
In primary ACL reconstructions with meniscus repair, it has become more common in recent years to suture the damaged meniscus (Figure 7). In 2011, just over 20% were sutured, but this has gradually increased to about 45% in 2018. We do not know whether this is because surgeons have changed their assessment of individual injuries. In the new electronic form, more details of root damage and ramp lesions will be easier to identify.

The proportion of day surgeries fell from 76.2% in 2017 to 73.8% in 2018. Our aim is to maintain as high a percentage as possible.

Research is important and in 2018 good research was again produced.

Randsborg PH et al. (2018) studied compensation after treatment: a review of claims for compensation for cruciate ligament injuries in Norway from 2005 to 2015.

Ingelsrud LH et al. (2018) showed that patients who underwent ACL surgery had better PROM scores.

Orchard JW et al. (2018) showed that there are a large number of ACL surgery patients in Australia and that it would be of great benefit to have a national cruciate ligament register in the country.

Prentice HA et al. (2018) described patient demographics and surgical techniques for ACL reconstruction based on the national registers of six countries.

Svantesson E et al. (2018) A systematic review of Scandinavian registers on factors associated with cruciate ligament injuries.

Hamrin SE et al. (2018) studied factors of significance for PROMs following ACL reconstruction in a systematic review of Scandinavian registers.

Ulstein S et al. (2018) The effects of concomitant cartilage damage on PROMs following ACLR. A cohort study from Norway and Sweden with 8470 patients and five-year follow-up.

Aga C et al. (2018), in a prospective RCT study with two-year follow-up, found no difference in the KOOS score for quality of life between double-bundle and single-bundle ACLR patients.

Ulstein S et al. (2018) A comparison of microfracture, debridement and no treatment of concomitant cartilage damage in ACLR. A prospective cohort study from Norway and Sweden with 368 patients and five-year follow-up.

Owesen C et al. (2018) studied the effect of activity at time of injury and concomitant ligament damage on PROMs for posterior cruciate ligament reconstructions.

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.

A special thank you to everyone who submits the forms.

Bergen, June 2019

Lars Engebretsen
Chairman of the Steering Committee

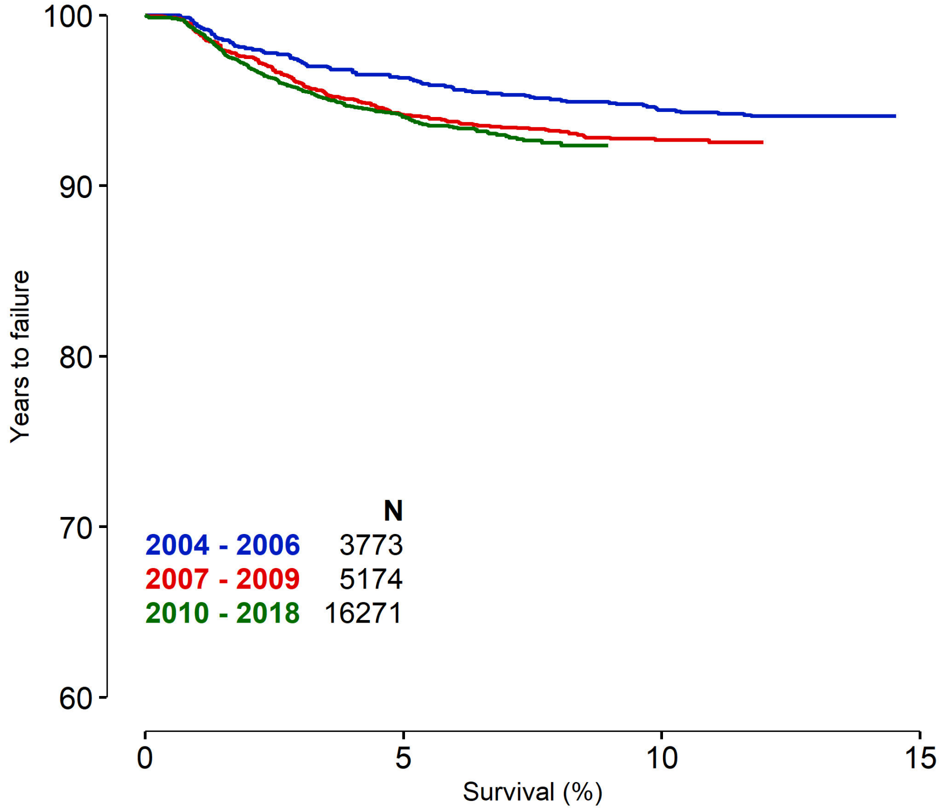
Håvard Visnes
Specialist Physician

Irina Kvinnesland
IT Consultant

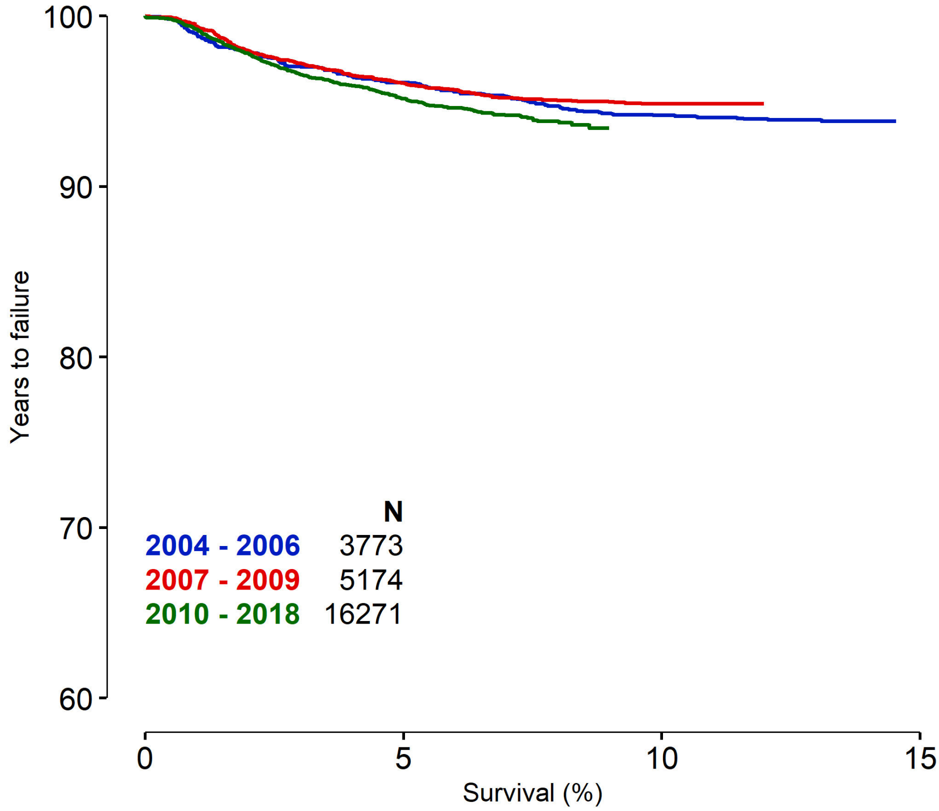
Stein Håkon Låstad Lygre
Biostatistician

Survival of crucicate ligaments operations 2004-2018

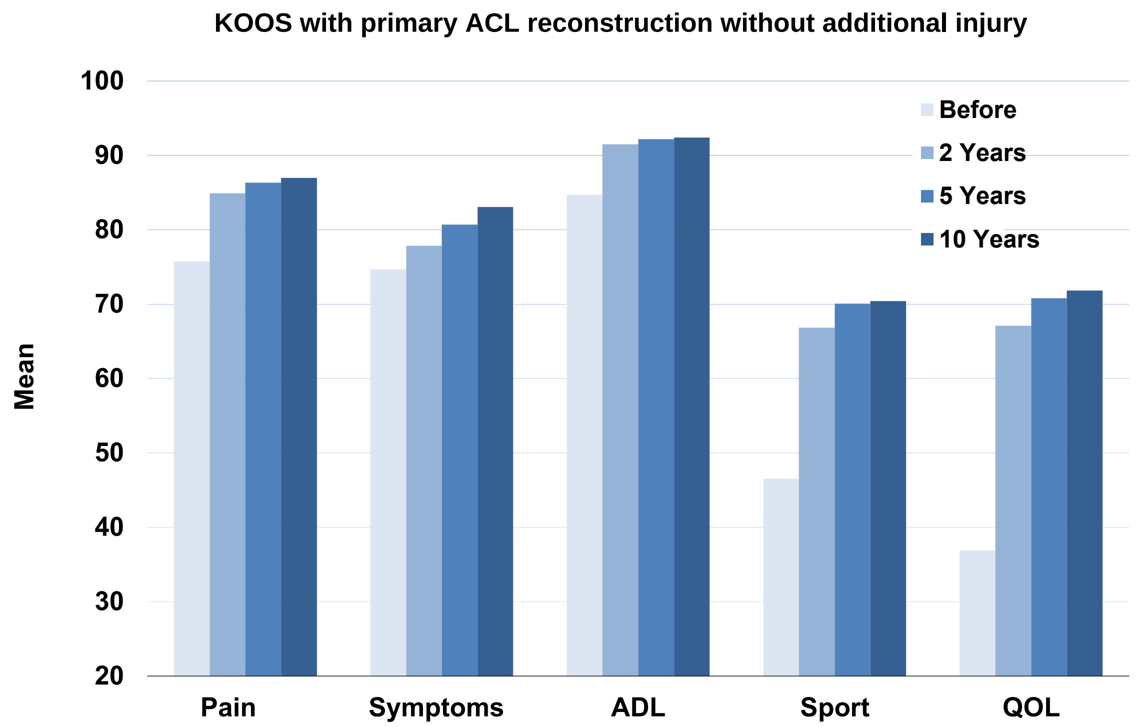
E.1) ACL reconstruction without additional injuries

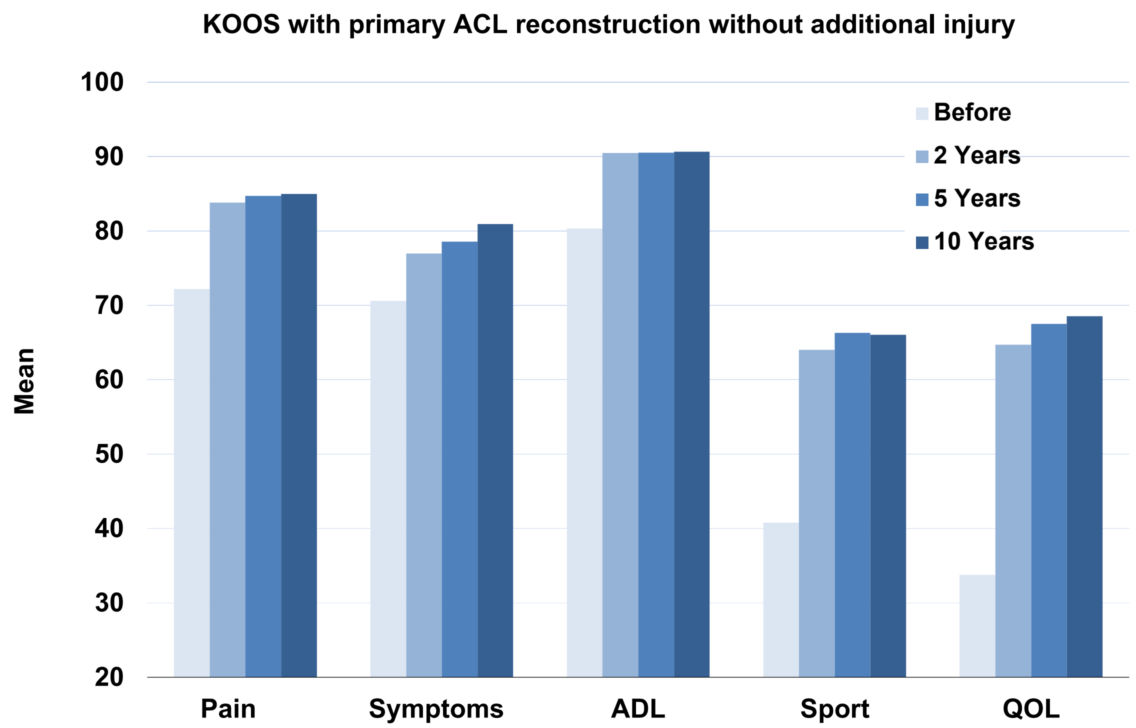


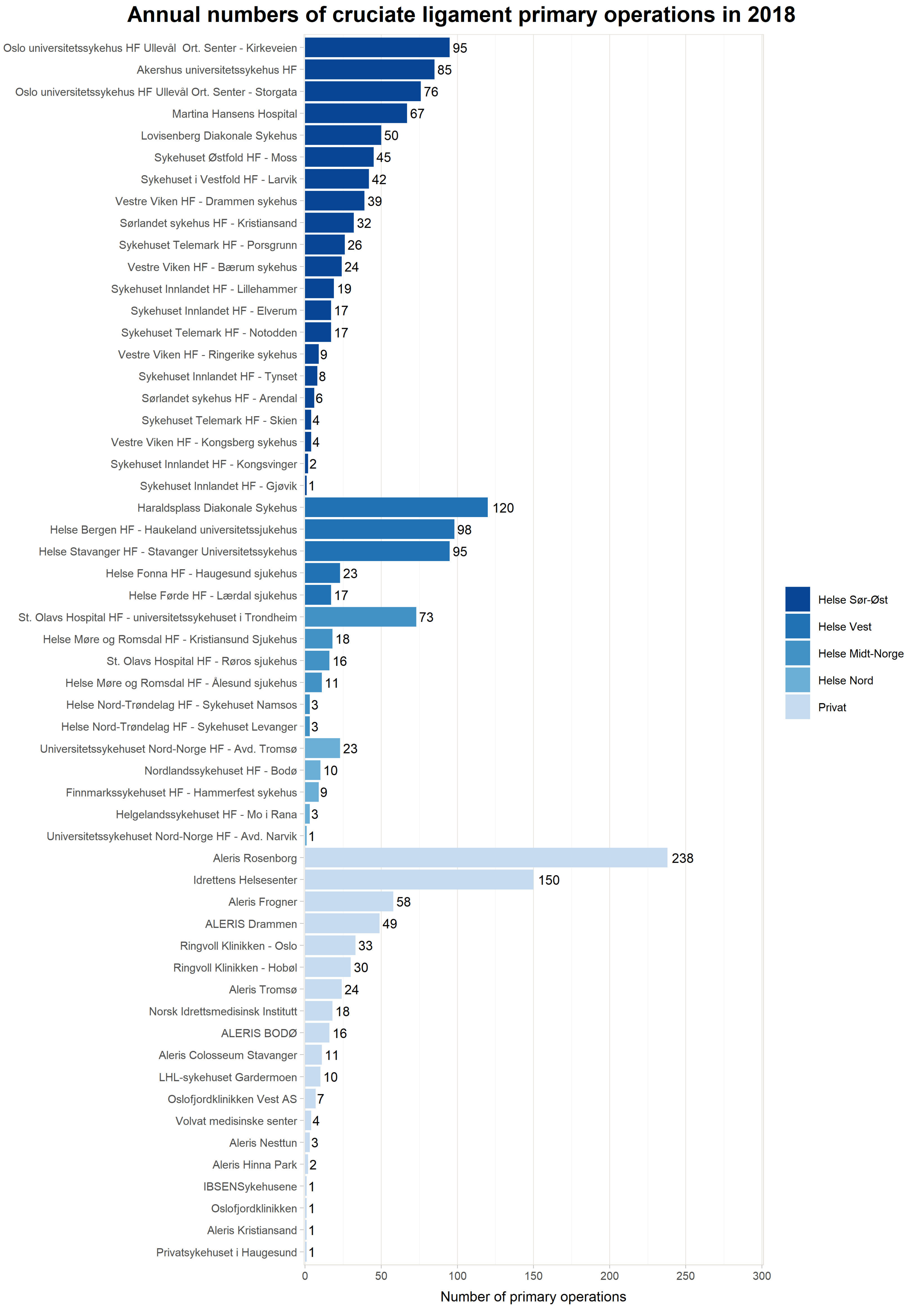
E.2) ACL reconstruction with additional injuries



Survival estimate is given as long as >20 reconstructions remains at risk


KOOS with primary ACL reconstruction without additional injury
Mean
100
90
80
70
60
50
40
30
20
Before
2 Years
5 Years
10 Years
Pain
Symptoms
ADL
Sport
QOL


KOOS with primary ACL reconstruction without additional injury
Mean
100
90
80
70
60
50
40
30
20
Before
2 Years
5 Years
10 Years
Pain
Symptoms
ADL
Sport
QOL



Annual numbers of cruciate ligament primary operations in 2018
Oslo universitetssykehus HF Ullevål Ort. Senter - Kirkeveien 95
Akershus universitetssykehus HF 85
Oslo universitetssykehus HF Ullevål Ort. Senter - Storgata 76
Martina Hansens Hospital 67
Lovisenberg Diakonale Sykehus 50
Sykehuset Østfold HF - Moss 45
Sykehuset i Vestfold HF - Larvik 42
Vestre Viken HF - Drammen sykehus 39
Sørlandet sykehus HF - Kristiansand 32
Sykehuset Telemark HF - Porsgrunn 26
Vestre Viken HF - Bærum sykehus 24
Sykehuset Innlandet HF - Lillehammer 19
Sykehuset Innlandet HF - Elverum 17
Sykehuset Telemark HF - Notodden 17
Vestre Viken HF - Ringerike sykehus 9
Sykehuset Innlandet HF - Tynset 8
Sørlandet sykehus HF - Arendal 6
Sykehuset Telemark HF - Skien 4
Vestre Viken HF - Kongsberg sykehus 4
Sykehuset Innlandet HF - Kongsvinger 2
Sykehuset Innlandet HF - Gjøvik 1
Haraldsplass Diakonale Sykehus 120
Helse Bergen HF - Haukeland universitetssjukehus 98
Helse Stavanger HF - Stavanger Universitetssykehus 95
Helse Fonna HF - Haugesund sjukehus 23
Helse Førde HF - Lærdal sjukehus 17
St. Olavs Hospital HF - universitetssykehuset i Trondheim 73
Helse Møre og Romsdal HF - Kristiansund Sjukehus 18
St. Olavs Hospital HF - Røros sjukehus 16
Helse Møre og Romsdal HF - Ålesund sjukehus 11
Helse Nord-Trøndelag HF - Sykehuset Namsos 3
Helse Nord-Trøndelag HF - Sykehuset Levanger 3
Universitetssykehuset Nord-Norge HF - Avd. Tromsø 23
Nordlandssykehuset HF - Bodø 10
Finnmarkssykehuset HF - Hammerfest sykehus 9
Helgelandssykehuset HF - Mo i Rana 3
Universitetssykehuset Nord-Norge HF - Avd. Narvik 1
Aleris Rosenborg 238
Idrettens Helsesenter 150
Aleris Frogner 58
ALERIS Drammen 49
Ringvoll Klinikken - Oslo 33
Ringvoll Klinikken - Hobøl 30
Aleris Tromsø 24
Norsk Idrettsmedisinsk Institutt 18
ALERIS BODØ 16
Aleris Colosseum Stavanger 11
LHL-sykehuset Gardermoen 10
Oslofjordklinikken Vest AS 7
Volvat medisinske senter 4
Aleris Nesttun 3
Aleris Hinna Park 2
IBSENSykehusene 1
Oslofjordklinikken 1
Aleris Kristiansand 1
Privatsykehuset i Haugesund 1
0
50
100
150
200
250
300
Number of primary operations
Helse Sør-Øst
Helse Vest
Helse Midt-Norge
Helse Nord
Privat

Cruciate Ligament

All categories of operations

Table 1: Annual numbers of operations

	Primary reconstruction		Revision reconstruction		Only other procedures		Total
2018	1856	(81,7%)	206	(9,1%)	210	(9,2%)	**2272**
2017	1893	(82,4%)	215	(9,4%)	189	(8,2%)	**2297**
2016	1857	(81,7%)	203	(8,9%)	212	(9,3%)	**2272**
2015	1773	(82,2%)	224	(10,4%)	161	(7,5%)	**2158**
2014	1737	(81,3%)	251	(11,8%)	148	(6,9%)	**2136**
2004-13	16112	(86,8%)	1399	(7,5%)	1043	(5,6%)	**18554**
Total	**25228**	**(85,0%)**	**2498**	**(8,4%)**	**1963**	**(6,6%)**	**29689**

Registration complete from 2005. 49,3% of the operations were performed on the right side. 44,3% of the operations were performed on females. 7,4% of the patients had a previous ACL/PCL-injury in the opposite knee. (10,8% was missing). Mean age was 28,5 years, 27,1 years for women and 29,6 years for men. Standard deviation of age was 10,6 years, 11,2 years for women and 10,0 years for men.
Median value for duration of primary ACL reconstruction was 70 minutes.

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

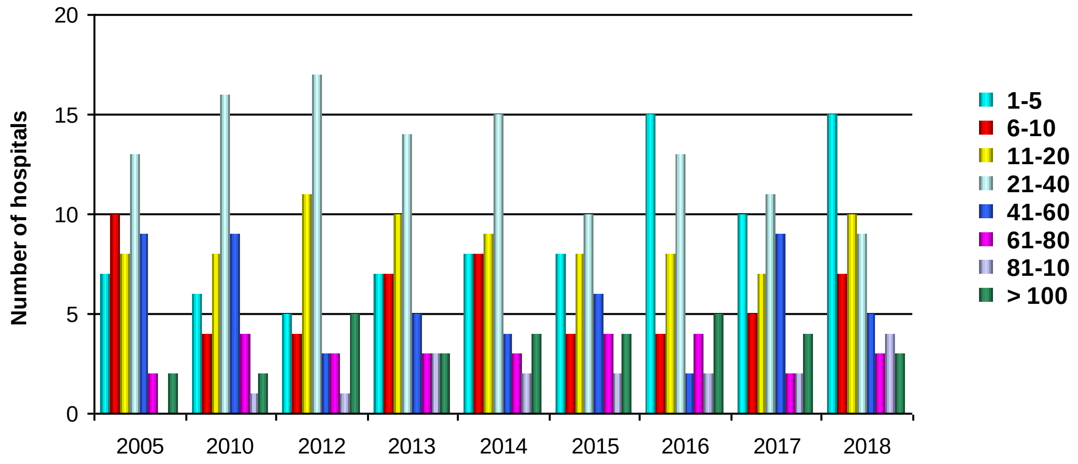


Figure 2: Distribution of hospitals by surgery volumes, revision reconstructions ACL

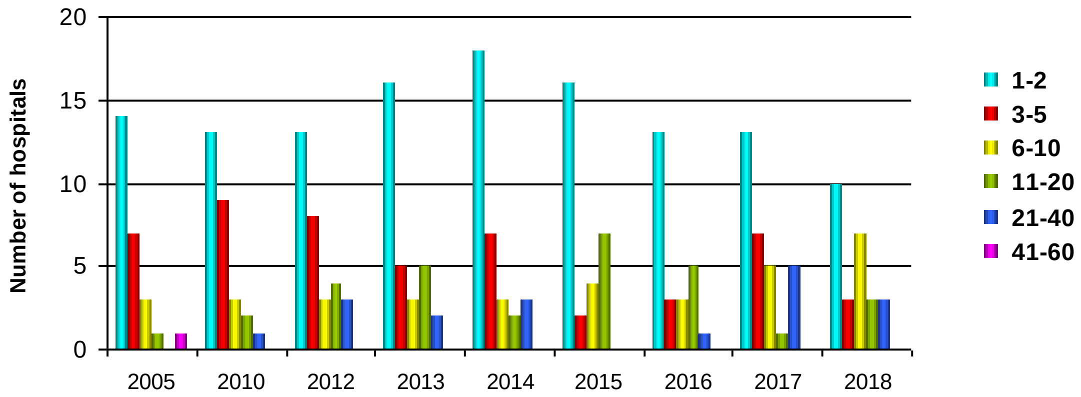
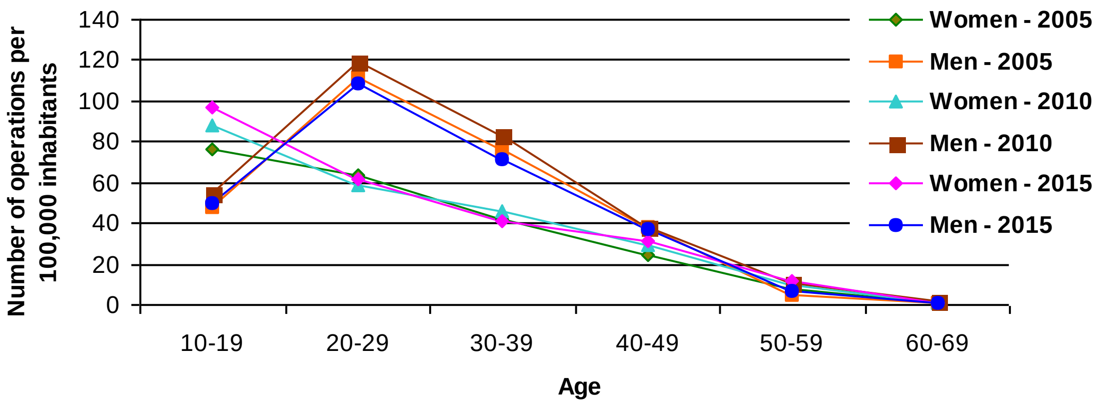


Figure 3: Incidence of primary reconstruction of cruciate ligament for 2005, 2010 and 2015



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
2018	1061	23	42	69	8	5	47	27	5	98	0	0
2017	1087	24	32	54	12	5	57	26	3	25	6	0
2016	1043	51	47	67	11	9	57	19	2	27	2	0
2015	1016	65	43	63	7	4	51	31	5	31	5	0
2014	944	80	86	60	8	12	47	43	1	28	1	0
2004-13	7762	784	284	585	67	52	388	208	16	479	22	0
Total	**12913**	**1027**	**534**	**898**	**113**	**87**	**647**	**354**	**32**	**688**	**36**	**0**

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)
10293	x					
425	x	x				
251		x				
204						x
196	x					x
92				x		
87	x		x			
84			x			
73	x			x		
29	x	x		x		
22	x			x		x
22					x	
21				x		x
16		x		x		
13		x				x
11	x	x				x
10	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)
627	x				
124			x		
86			x	x	
78				x	
53	x		x		
49		x			
34	x			x	
31	x		x	x	
28	x	x			
27					x
19	x				x
15			x		x
12	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
674	x							
202				x				
128							x	
75	x			x				
72			x					
63		x						
47	x		x					
46						x		
40				x	x			
28			x	x				
26	x	x						
24							x	x
23				x			x	
19			x		x			
19	x		x	x				
18				x			x	x
17		x		x				
16					x			
13				x		x		
13			x	x	x			
13	x						x	
11								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.

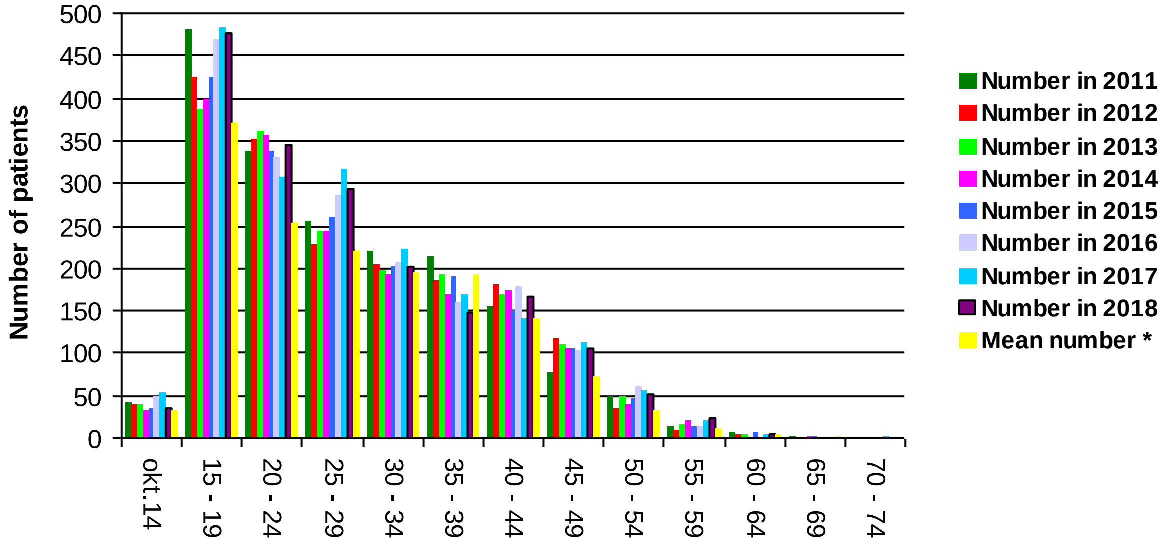
Intraoperative complications

Table 6: Intraoperative complications for all categories of surgeries

	Yes		No		Missing		Total
2018	43	(1,9%)	2172	(95,6%)	56	(2,5%)	**2272**
2017	64	(2,8%)	2182	(95,0%)	50	(2,2%)	**2297**
2016	51	(2,2%)	2155	(94,9%)	65	(2,9%)	**2272**
2015	63	(2,9%)	2035	(94,3%)	60	(2,8%)	**2158**
2014	59	(2,8%)	1995	(93,4%)	82	(3,8%)	**2136**
2004-13	571	(3,1%)	17589	(94,8%)	394	(2,1%)	**18554**
Total	**851**	**(2,9%)**	**28128**	**(94,7%)**	**707**	**(2,4%)**	**29689**

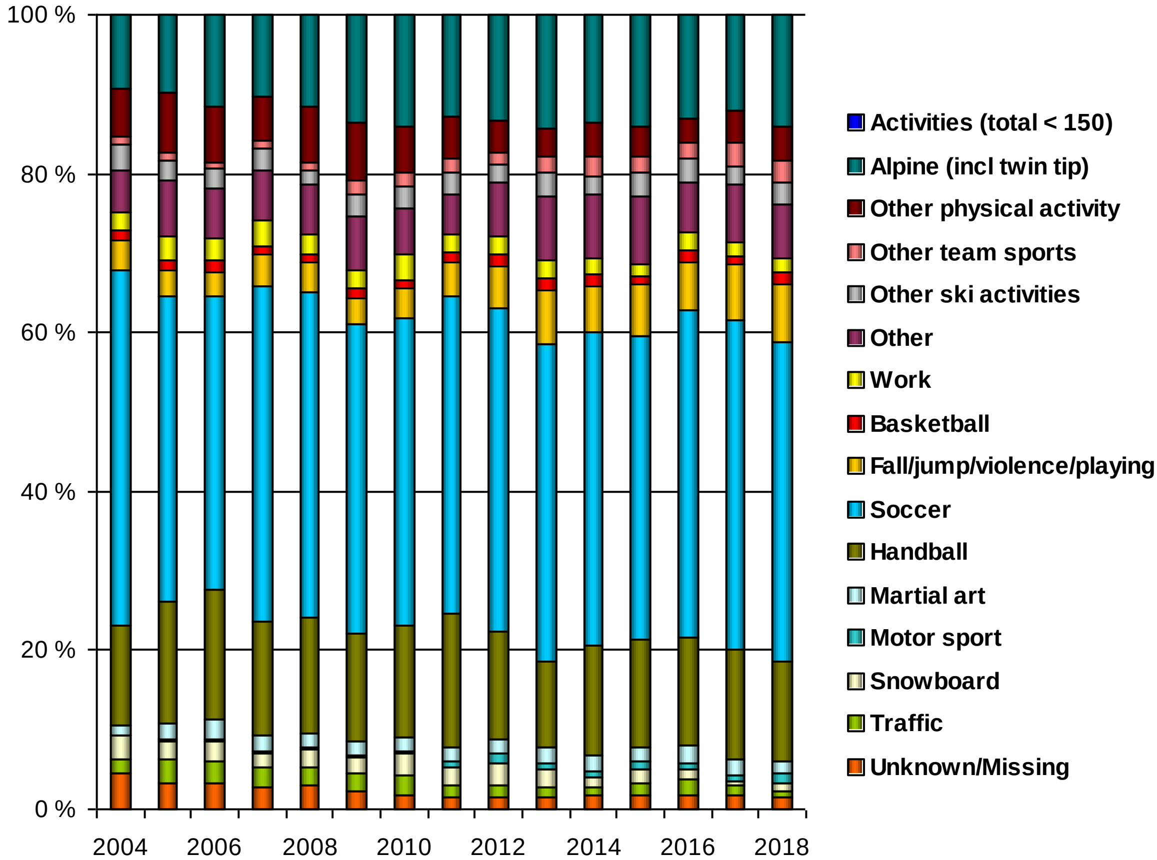
Primary reconstruction of cruciate ligament

Figure 4: Age by primary operation



* Mean number of primary operations for 2004 - 2010

Figure 5: Activity that lead to injury



Actual injury

Table 7: Actual injury*

	ACL	PCL	MCL	LCL	PLC	Cartilage	Meniscus
2018	1830	57	228	55	23	496	1169
2017	1877	33	180	39	17	445	1122
2016	1831	47	189	52	19	415	1059
2015	1746	56	167	39	23	354	995
2014	1712	58	171	35	20	367	931
2004-13	15954	409	1118	265	181	3891	7931
Total	**24950**	**660**	**2053**	**485**	**283**	**5968**	**13207**

* 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
8857	x						
8480	x					x	
3462	x					x	x
1623	x						x
627	x		x				
547	x		x			x	
335	x		x			x	x
191	x		x				x
100	x			x			
87	x	x	x				
56	x			x	x		
48	x	x	x				x
29	x	x					
26	x			x			x
25	x				x		
22	x			x		x	
20	x	x		x	x		

x indicates registered injury and each row tell the number of incidences of different combination of injuries. The first row gives the number of records where ACL 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
115		x					
87	x	x	x				
48	x	x	x				x
36		x					x
35	x	x	x			x	
29	x	x					
27		x	x				
26	x	x	x			x	x
23	x	x				x	
20	x	x		x	x		
17	x	x				x	x
14	x	x			x		
11		x	x				x
11	x	x		x	x		x
11		x				x	
11	x	x		x	x	x	x
10		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 10 or more.

Choice of graft for injuries registered in primary reconstructions

Table 10: BPTB

	ACL	PCL	MCL	LCL	PLC
2018	1289	3	1	0	0
2017	1136	0	0	0	0
2016	1126	0	0	0	0
2015	974	1	0	0	0
2014	736	1	0	0	0
2004-13	4634	25	1	0	0
Total	**9895**	**30**	**2**	**0**	**0**

Table 11: HAMSTRING

	ACL	PCL	MCL	LCL	PLC
2018	416	6	32	6	2
2017	595	5	11	9	2
2016	591	23	23	15	5
2015	727	29	17	6	3
2014	951	20	19	7	4
2004-13	11207	254	132	22	19
Total	**14487**	**337**	**234**	**65**	**35**

Table 12: ALLOGRAFT

	ACL	PCL	MCL	LCL	PLC
2018	8	28	2	7	10
2017	3	15	5	1	5
2016	4	20	7	4	6
2015	5	21	6	6	12
2014	4	20	3	8	10
2004-13	35	42	9	49	55
Total	**59**	**146**	**32**	**75**	**98**

Table 13: Suture

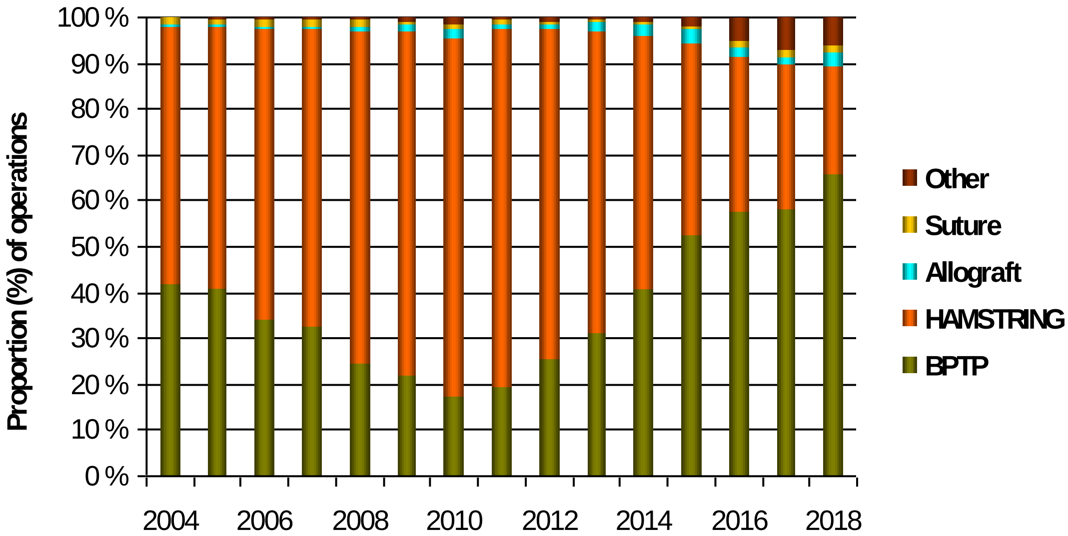
	ACL	PCL	MCL	LCL	PLC
2018	4	6	10	4	6
2017	19	4	9	3	1
2016	10	1	6	4	4
2015	0	1	7	3	2
2014	1	1	4	2	1
2004-13	3	7	81	57	46
Total	**37**	**20**	**117**	**73**	**60**

Table 14: Other

	ACL	PCL	MCL	LCL	PLC
2018	111	8	4	1	0
2017	124	1	10	1	1
2016	99	0	4	0	1
2015	37	1	1	0	0
2014	17	5	0	0	0
2004-13	58	30	7	8	5
Total	**446**	**45**	**26**	**10**	**7**

There are 21 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	Total	2004-13	2014	2015	2016	2017	2018
Endobutton CL Ultra	**7203**	4842	729	521	437	401	273
SoftSilk	**3451**	1525	281	368	428	420	429
Endobutton CL BTB	**1290**	134	141	261	309	229	216
Sheated Cannulated Int	**650**	33	35	70	126	174	212
ACL TightRope	**406**	67	79	50	49	75	86

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

Product	Total	2004-13	2014	2015	2016	2017	2018
RCI Screw	**4512**	3375	277	224	229	229	178
SoftSilk	**4041**	1585	343	502	576	512	523
Biosure HA Interferenc	**2189**	1352	234	207	178	140	78
Propel Cannulated	**985**	494	54	84	119	103	131
Biosure PK	**863**	400	117	62	101	104	79

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

Product	Total	2004-13	2014	2015	2016	2017	2018
Endobutton CL Ultra	**218**	135	29	24	16	7	7
SoftSilk	**96**	29	7	17	18	4	21
RCI Screw	**58**	19		14	15	4	6
Peek Interference Scre	**22**	10	5	4	1		2
Sheated Cannulated Int	**9**	1	1	2	2	3	

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

Product	Total	2004-13	2014	2015	2016	2017	2018
RCI Screw	**267**	196	9	20	17	2	23
AO Skrue	**79**	61	5	3	8	1	1
Biosure HA Interferenc	**33**	9	5	8	2	6	3
BioRCI-HA	**28**	13	6	4	3	2	
BIORCI Screw	**13**		1	8	2	1	1

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

Femur	Tibia	Total	2004-13	2014	2015	2016	2017	2018
SoftSilk	SoftSilk	**2971**	1378	248	296	359	336	354
Endobutton CL Ultra	RCI Screw	**2367**	1495	241	175	170	160	126
Endobutton CL Ultra	Biosure HA Interference screw	**1995**	1257	214	160	162	132	70
Endobutton CL BTB	SoftSilk	**834**	109	83	193	188	134	127
Sheated Cannulated Interference Screw	Sheated Cannulated Interference Screw	**420**	23	34	59	96	84	124

Meniscal lesion

Table 20: Actual treatment of meniscal lesion

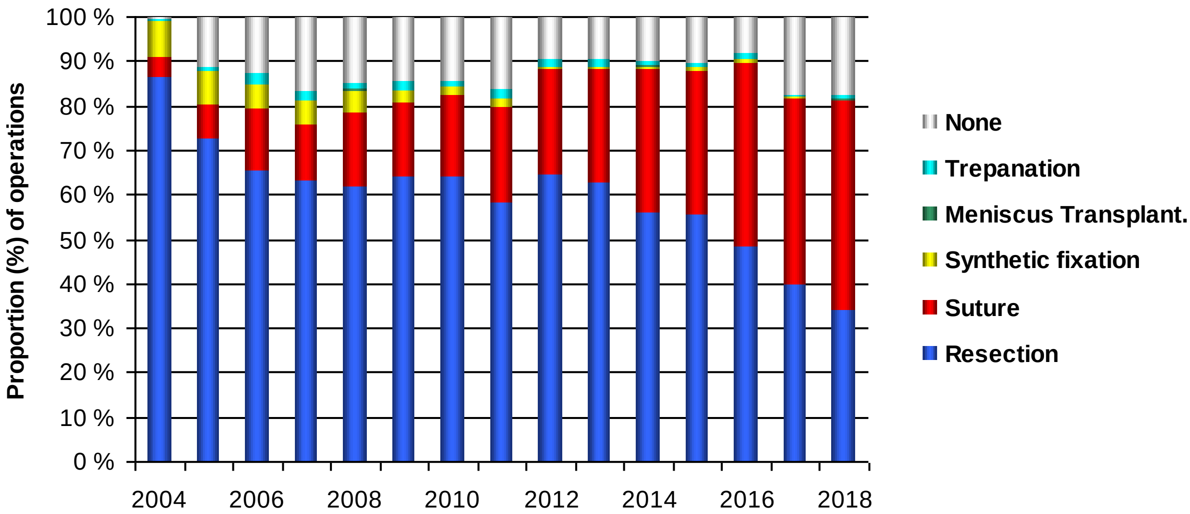
		Resection				Synthetic	Meniscus			
		OLD	Total	Partial	Suture	fixation	Transplant.	Trepanation	None	Total
2018	Lateral	0	1	269	302			9	144	**725**
2018	Medial	0	8	244	422		1	10	121	**806**
2017	Lateral	0	2	312	255	1		4	130	**704**
2017	Medial	0	5	289	381	3	1	3	135	**817**
2016	Lateral	0	2	314	206	8	2	10	59	**601**
2016	Medial	0	9	318	335	6		8	45	**721**
2015	Lateral	0	3	342	144	3		7	68	**567**
2015	Medial	0	3	349	262	9		3	60	**686**
2014	Lateral	0	2	292	130	4	1	7	68	**504**
2014	Medial	0	7	324	232	4	1	4	42	**614**
2004-13	Lateral	2040	5	766	544	68	2	89	614	**4128**
2004-13	Medial	2371	18	862	1101	243	3	77	587	**5262**
Total		**4411**	**65**	**4681**	**4314**	**349**	**11**	**231**	**2073**	**16135**

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	Total	2004-06	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Contour Meniscus arrow	**143**	71	38	25	8	1								
FAST-FIX	**16**					1	6	3		1		4	1	
Meniscal Dart	**19**	11	6	2										
Meniscal Dart Stick	**24**	11	1	6	5		1							
Meniscus arrow	**31**	25			2	1	2		1					
Unknown	**61**	8	3	3	2		11	4	4	7	10	9		
Total	**294**	**126**	**48**	**36**	**17**	**3**	**20**	**7**	**5**	**8**	**10**	**13**	**1**	

Table 22: Suture

Product	Total	2004-06	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
BioComposite SwiveLock C w Fiber Tape	**11**												9	2
FAST-FIX	**3072**	73	61	99	118	127	192	208	203	280	319	406	458	528
Meniscal Dart Stick	**2**					1								1
Meniscus arrow	**7**					3	4							
Other	**67**											6	23	38
Rapidloc	**74**	38	24	8	2				2					
Unknown	**349**	2	1	1	3	3	48	40	43	49	54	65	23	17
Total	**3582**	**113**	**86**	**108**	**123**	**134**	**244**	**248**	**248**	**329**	**373**	**477**	**513**	**586**

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
2018	42,9%	38,9%	13,9%	2,8%	1,5%
2017	43,8%	36,2%	15,9%	2,5%	1,6%
2016	37,5%	44,2%	14,4%	3,1%	0,7%
2015	31,4%	43,5%	19,1%	5,8%	0,3%
2014	29,9%	45,5%	17,9%	5,0%	1,8%
2004-13	36,0%	42,2%	16,0%	4,4%	1,3%

Table 24: Treatment codes for all localizations

	Debridement	Micro fracture	No treatment	Other	Missing
2018	6,5%	1,3%	84,4%	0,5%	7,3%
2017	6,9%	1,1%	81,5%	0,5%	10,1%
2016	9,3%	2,0%	76,8%		11,9%
2015	12,3%	3,6%	80,1%		3,9%
2014	13,3%	3,8%	77,7%	0,9%	4,2%
2004-13	11,9%	3,2%	61,1%	1,2%	22,6%

Cartilage injuries registered in primary reconstructions

Figure 8: All Cartilage injuries (total)

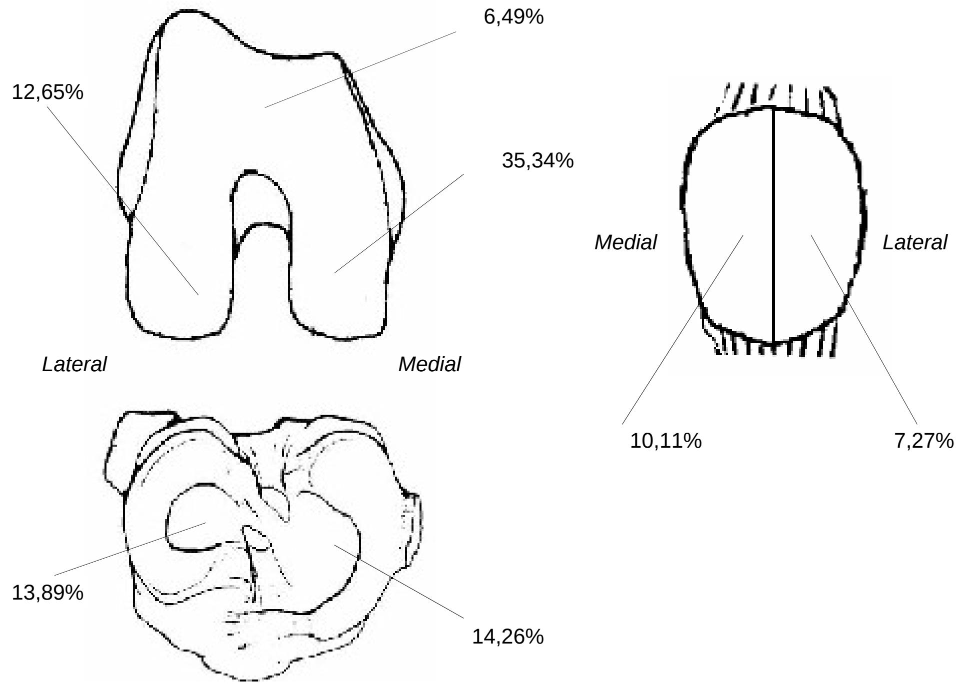
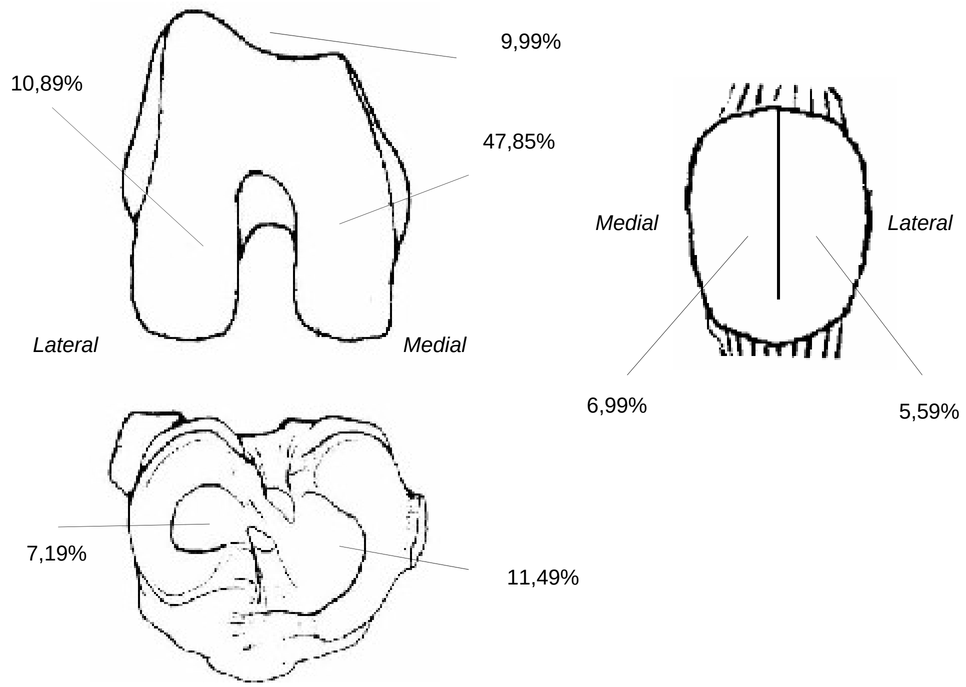


Figure 9: All Cartilage injuries with area greater than 2 cm² and ICRS equal 3 or 4 (total)



Outpatient surgery

Table 25: Outpatient surgery

	Yes		No		Missing		Total
2018	1370	(73,8%)	479	(25,8%)	6	(0,3%)	**1856**
2017	1431	(75,6%)	458	(24,2%)	4	(0,2%)	**1893**
2016	1326	(71,4%)	521	(28,1%)	10	(0,5%)	**1857**
2015	1244	(70,2%)	516	(29,1%)	13	(0,7%)	**1773**
2014	1166	(67,1%)	555	(32,0%)	16	(0,9%)	**1737**
2004-13	8151	(50,6%)	7886	(48,9%)	75	(0,5%)	**16112**
Total	**14688**	**(58,2%)**	**10415**	**(41,3%)**	**124**	**(0,5%)**	**25228**

Intraoperative complications

Table 26: Intraoperative complications

	Yes		No		Missing		Total
2018	40	(2,2%)	1775	(95,6%)	40	(2,2%)	**1856**
2017	50	(2,6%)	1806	(95,4%)	36	(1,9%)	**1893**
2016	43	(2,3%)	1762	(94,9%)	52	(2,8%)	**1857**
2015	55	(3,1%)	1673	(94,4%)	45	(2,5%)	**1773**
2014	55	(3,2%)	1621	(93,3%)	61	(3,5%)	**1737**
2004-13	515	(3,2%)	15280	(94,8%)	317	(2,0%)	**16112**
Total	**758**	**(3,0%)**	**23917**	**(94,8%)**	**551**	**(2,2%)**	**25228**

Systemic antibiotic prophylaxis

Table 27: Systemic antibiotic prophylaxis

	Yes		No		Missing		Total
2018	1844	(99,4%)	8	(0,4%)	3	(0,2%)	**1856**
2017	1888	(99,7%)	2	(0,1%)	3	(0,2%)	**1893**
2016	1855	(99,9%)	0	(0,0%)	2	(0,1%)	**1857**
2015	1768	(99,7%)	1	(0,1%)	4	(0,2%)	**1773**
2014	1734	(99,8%)	1	(0,1%)	2	(0,1%)	**1737**
2004-13	15968	(99,1%)	100	(0,6%)	44	(0,3%)	**16112**
Total	**25057**	**(99,3%)**	**112**	**(0,4%)**	**58**	**(0,2%)**	**25228**

Table 28: Drug

	2004-13	2014	2015	2016	2017	2018
Benzylpenicillin (Penicillin G)	0,01%	0,06%			0,05%	
Cefaleksin (Keflex, Cefalexin)	0,02%					
Cefalotin (Keflin)	90,60%	92,45%	94,85%	97,04%	92,64%	68,33%
Cefazolin (Cephazolin)					4,08%	28,42%
Cefotaksim (Claforan)		0,17%				
Cefuroksim (Zinacef, Cefuroxim, Lifurox)	1,71%	0,23%		0,05%		
Ciprofloksasin (Ciproxin)	0,01%	0,06%				
Dikloksacillin (Diclocil, Dicillin)	3,39%	0,75%	0,06%	0,16%	0,16%	
Doksysyklin (Vibramycin, Dumoxin, Doxylin)	0,01%					
Erytromycin (Ery-max, Abboticin)	0,01%	0,06%				
Gentamicin (Garamycin, Gensumycin)	0,01%			0,16%	0,16%	
Klindamycin (Dalacin, Clindamycin)	2,53%	2,08%	1,30%	1,99%	2,49%	2,28%
Kloksacillin (Ekvacillin)	1,52%	3,23%	3,11%	0,32%	0,21%	
Linkomycin (Lincocin)	0,01%					
Oxacillin (Unspecified)	0,02%	0,17%				
Piperacillin\Tazobactam (Tazocin)						0,05%
Tobramycin (Nebcina, Nebcin, Tobi)	0,01%					
Missing	0,15%	0,75%	0,68%	0,27%	0,21%	0,92%

Thrombosis prophylaxis

Table 29: Thrombosis prophylaxis

	Yes		No		Missing		Total
2018	1416	(76,3%)	437	(23,6%)	3	(0,2%)	**1856**
2017	1484	(78,4%)	406	(21,4%)	3	(0,2%)	**1893**
2016	1522	(82,0%)	327	(17,6%)	8	(0,4%)	**1857**
2015	1530	(86,3%)	239	(13,5%)	4	(0,2%)	**1773**
2014	1427	(82,2%)	301	(17,3%)	9	(0,5%)	**1737**
2005-13	12397	(81,0%)	2708	(17,7%)	238	(1,6%)	**15343**
Total	**19776**	**(80,9%)**	**4418**	**(18,1%)**	**265**	**(1,1%)**	**24459**

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

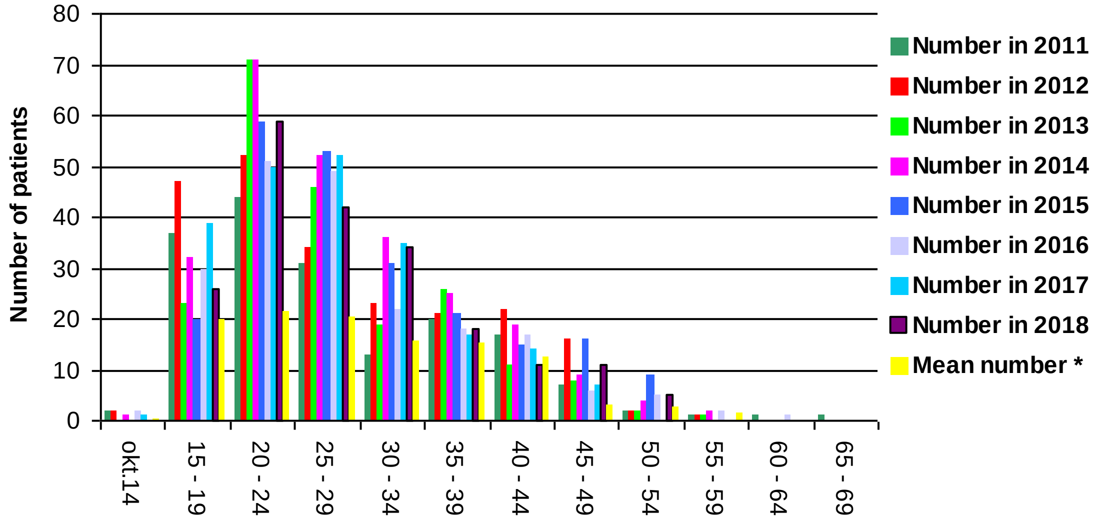
	One drug		Two drugs		Total
2018	1395	(98,5%)	21	(1,5%)	**1416**
2017	1476	(99,5%)	8	(0,5%)	**1484**
2016	1504	(98,8%)	18	(1,2%)	**1522**
2015	1521	(99,4%)	9	(0,6%)	**1530**
2014	1415	(99,2%)	12	(0,8%)	**1427**
2005-13	12318	(99,4%)	79	(0,6%)	**12397**
Total	**19629**	**(99,3%)**	**147**	**(0,7%)**	**19776**

Table 31: Drug

	2004-13	2014	2015	2016	2017	2018
Acetylsalicylsyre (Albyl-E, Globoid, Acetyratio, Magnyl E)		0,07%		0,07%		
Apixiban (Eliquis)						0,14%
Dabigatranetixalat (Re-Novate, Pradaxa)	0,02%					0,07%
Dalteparin (Fragmin)	61,57%	56,20%	58,69%	60,78%	59,50%	58,05%
Dekstran (Macrodex, Dextran)	0,06%	0,35%	0,20%	0,07%	0,07%	
Enoksaparin (Klexane)	34,26%	41,98%	39,87%	37,25%	39,22%	39,76%
Heparin (Heparin)	0,01%					
Rivaroksaban (Xarelto)	0,06%		0,07%	0,07%	0,07%	0,07%
Ticagrelor (Brilique)						0,07%
Warfarin (Marevan)	0,01%	0,14%		0,20%	0,07%	
Ximelagatran (Exanta, Malagatran)	0,24%					
Unknown	0,01%					
No drugs	2,94%					
Missing	0,19%	0,42%	0,59%	0,39%	0,54%	0,35%
Two drugs	0,64%	0,84%	0,59%	1,18%	0,54%	1,48%

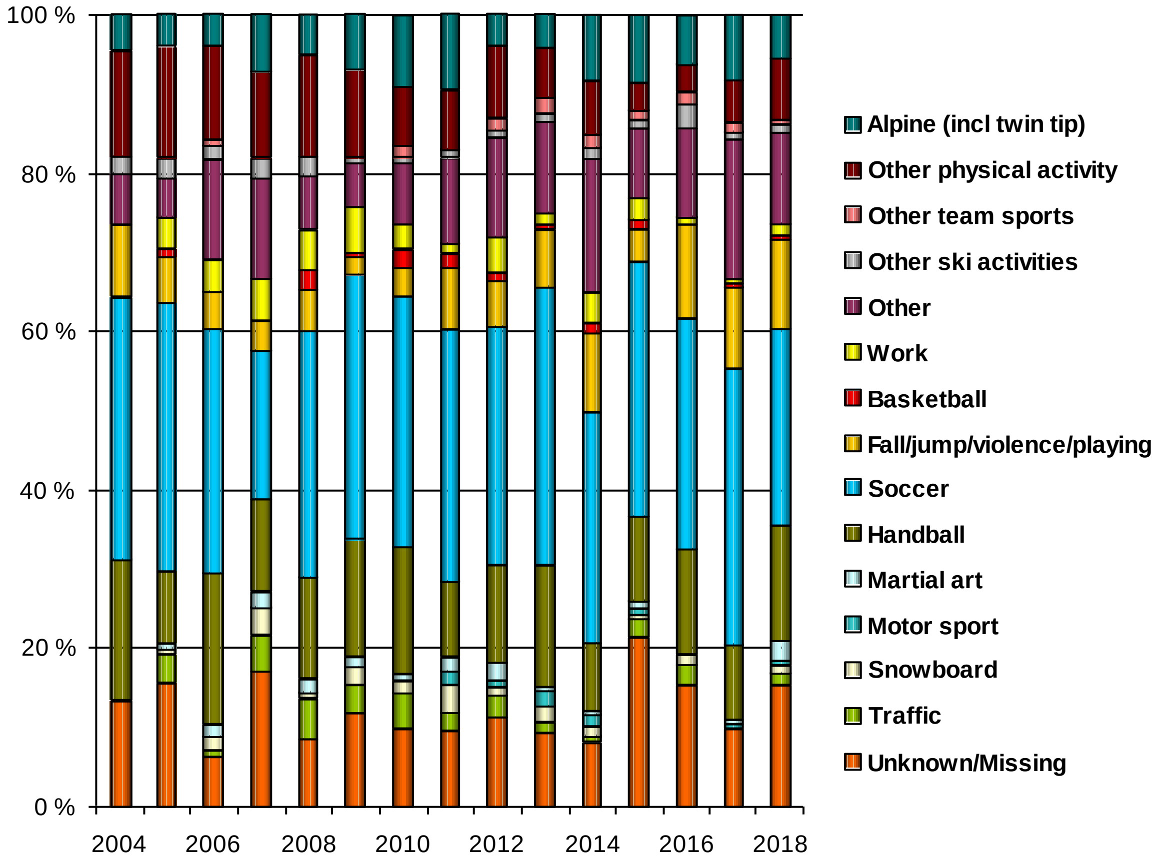
Revision reconstruction

Figure 10: Age by primary operation



* Mean number of primary operations for 2004 - 2010

Figure 11: Activity that lead to injury



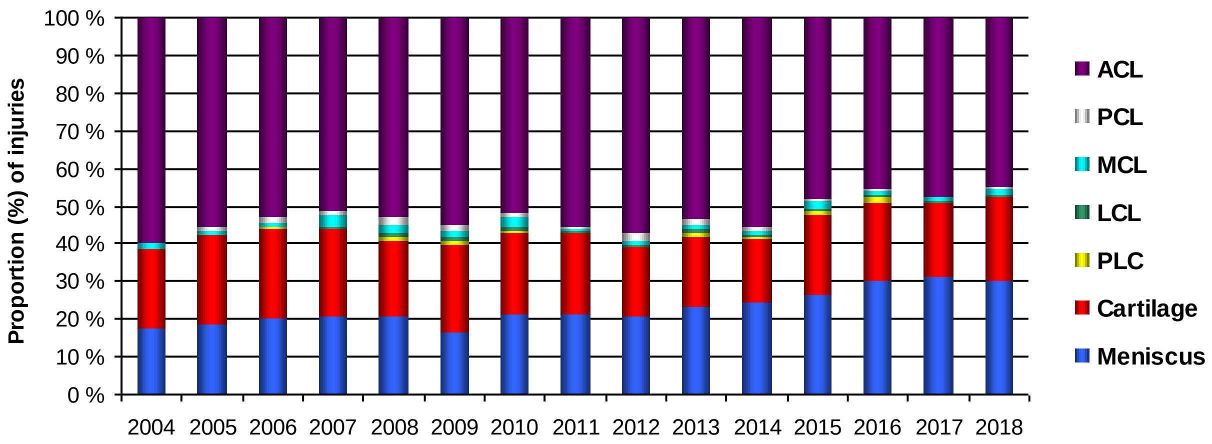
Actual injury

Table 32: Actual injury*

	ACL	PCL	MCL	LCL	PLC	Cartilage	Meniscus
2018	197	2	8	1	1	91	131
2017	205	1	5	1	1	79	135
2016	155	2	3	3	4	71	103
2015	165	2	7	2	3	73	91
2014	195	3	4	2	1	59	86
2004-13	1304	32	37	14	14	512	490
Total	**2221**	**42**	**64**	**23**	**24**	**885**	**1036**

* 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
895	x						
485	x					x	
431	x					x	x
322	x						x
18	x		x				
8	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
11		x					
7		x					x
4	x	x	x				x
3	x	x					x

x indicates registered injury and each row tell the number of incidences of different combination of injuries. The first row gives the number of records where PCL where the only injury. The total number will be identical to the total number of registered PCL injuries. The table shows only combinations that have a number of more than 2.

Reason for revision reconstruction

Table 35: Reason for revision reconstruction

	Cause 1	Cause 2	Cause 3	Cause 4	Cause 5	Cause 6	Other	Total
2018	3	9	3	90	90	4		195
2017	3	7	1	106	97	8		214
2016	4	9	5	110	78	4	1	207
2015	6	12	3	116	81	1	1	219
2014	3	4	1	109	120	6		237
2004-13	18	53	11	456	420	14	33	991
Total	**37**	**94**	**24**	**987**	**886**	**37**	**35**	**2100**

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
2018	91	0	0	0	0
2017	106	0	0	0	0
2016	87	0	0	0	0
2015	92	0	0	0	0
2014	120	0	0	0	0
2004-13	544	2	0	0	0
Total	**1040**	**2**	**0**	**0**	**0**

Table 37: HAMSTRING

	ACL	PCL	MCL	LCL	PLC
2018	39	0	2	0	0
2017	39	1	1	0	1
2016	38	1	0	1	1
2015	50	0	0	1	1
2014	50	1	1	0	0
2004-13	600	5	15	2	0
Total	**816**	**8**	**19**	**4**	**0**

Table 38: ALLOGRAFT

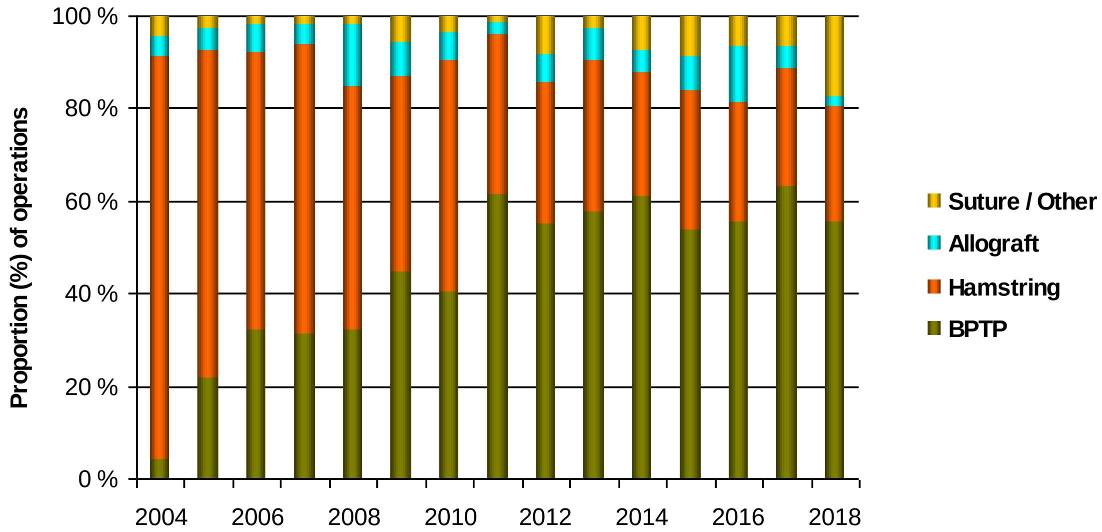
	ACL	PCL	MCL	LCL	PLC
2018	4	0	0	0	0
2017	6	0	2	0	0
2016	12	1	1	2	3
2015	7	2	3	0	0
2014	7	1	0	1	1
2004-13	39	19	6	7	10
Total	**75**	**23**	**12**	**10**	**14**

Table 39: Suture / Other

	ACL	PCL	MCL	LCL	PLC
2018	26	1	1	0	0
2017	11	0	0	0	0
2016	10	0	0	0	0
2015	15	0	0	0	0
2014	13	0	0	1	0
2004-13	37	4	3	0	1
Total	**112**	**5**	**4**	**1**	**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	Total	2004-13	2014	2015	2016	2017	2018
SoftSilk	**519**	273	61	44	48	50	43
Endobutton CL Ultra	**444**	236	50	49	36	37	36
Endobutton CL BTB	**105**	20	30	17	15	10	13
Sheated Cannulated Int	**95**	14	10	13	16	22	20
Peek Interference Scre	**33**	8	4	8	1	7	5

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

Product	Total	2004-13	2014	2015	2016	2017	2018
Endobutton CL Ultra	**12**	10	2				
RCI Screw	**12**	11			1		
SoftSilk	**7**	3		1	2	1	
EndoButton CL	**2**	2					
Propel Cannulated	**2**	2					

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

Product	Total	2004-13	2014	2015	2016	2017	2018
SoftSilk	**483**	243	59	39	48	51	43
RCI Screw	**359**	275	22	11	15	16	20
Biosure HA Interferenc	**232**	99	29	40	24	17	23
Propel Cannulated	**103**	58	18	7	9	6	5
Sheated Cannulated Int	**62**	12	11	11	11	8	9

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

Product	Total	2004-13	2014	2015	2016	2017	2018
RCI Screw	**25**	20	1	1	2	1	
AO Skrue	**7**	5			2		
Propel Cannulated	**3**	3					
Intrafix hylse	**1**		1				
Intrafix Screw	**1**		1				

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

Femur	Tibia	Total	2004-13	2014	2015	2016	2017	2018
SoftSilk	SoftSilk	**425**	224	52	33	43	43	30
Endobutton CL Ultra	Biosure HA Interference screw	**170**	62	23	31	21	14	19
Endobutton CL Ultra	RCI Screw	**142**	92	12	8	7	9	14
Sheated Cannulated Interference Screw	Sheated Cannulated Interference Screw	**59**	12	10	11	11	8	7
Endobutton CL BTB	Propel Cannulated	**36**	2	16	6	7	4	1

Meniscal lesion

Table 45: Actual treatment of meniscal lesion

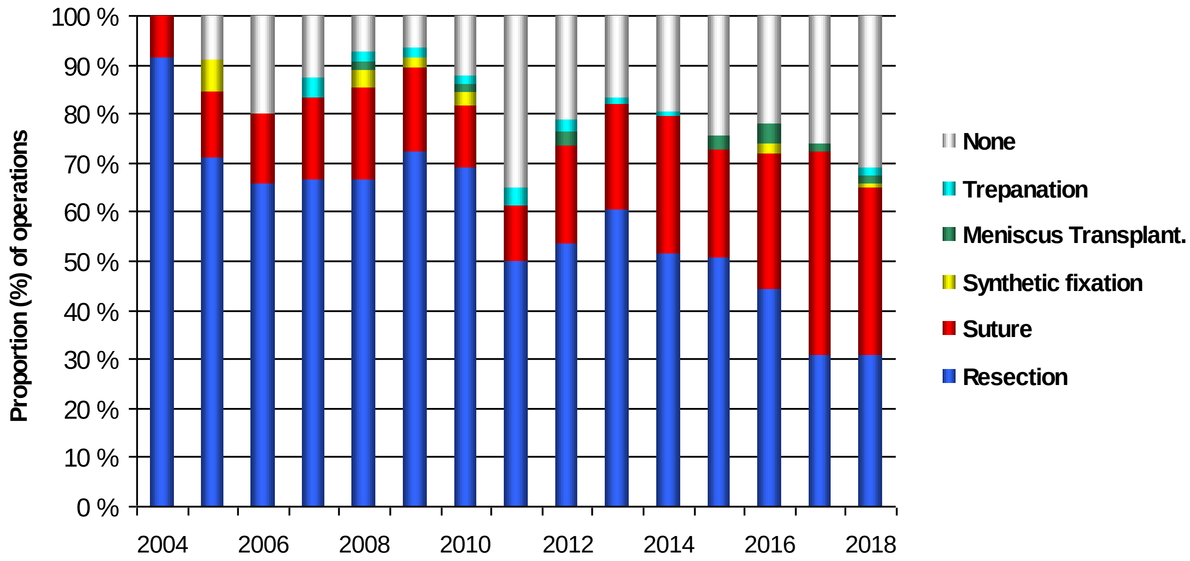
		Resection				Synthetic	Meniscus			
		OLD	Total	Partial	Suture	fixation	Transplant.	Trepanation	None	Total
2018	Lateral			22	30			2	18	**72**
2018	Medial		1	29	28	1	3	1	34	**97**
2017	Lateral		1	22	29				18	**70**
2017	Medial			29	41		3		26	**99**
2016	Lateral			20	22	1	1		11	**55**
2016	Medial		2	36	14	2	4		18	**76**
2015	Lateral			19	8				16	**43**
2015	Medial			39	17		3		12	**71**
2014	Lateral			24	12				4	**40**
2014	Medial			29	17			1	16	**63**
2004-13	Lateral	85	1	50	25	4	2	7	47	**221**
2004-13	Medial	149	4	78	70	4	2	4	50	**361**
Total		**234**	**9**	**397**	**313**	**12**	**18**	**15**	**270**	**1268**

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	Total	2004 -06	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Contour Meniscus arrow	**3**	2		1										
FAST-FIX	**1**													1
Meniscus arrow	**1**	1												
Unknown	**4**				1							3		
Total	**9**	**3**		**1**	**1**							**3**		**1**

Table 47: Suture

Product	Total	2004 -06	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
BioComposite SwiveLock C w Fiber Tape	**1**												1	
FAST-FIX	**185**	7	6	6	5	4	5	14	16	19	16	15	41	31
Meniscus arrow	**1**					1								
Other	**12**											1	8	3
Rapidloc	**4**	3	1											
Unknown	**42**				1		4	1	5	6	9	13	1	2
Total	**245**	**10**	**7**	**6**	**6**	**5**	**9**	**15**	**21**	**25**	**25**	**29**	**51**	**36**

Cartilage lesion all localizations

Table 48: ICRS Grade

Definitjon av ICRS Grade:

1. Nearly normal: Superficial lesions, soft indentation and/or superficial fissures and cracks.
2. Abnormal: Lesions extending down to <50% of cartilage depth.
3. Severely abnormal: Cartilage defects extending down >50% of cartilage depth as well as down to calcified layer.
4. Severely abnormal: Osteochondral injuries, lesions extending just through the subchondral boneplate or deeper defects down into trabecular bone.

	Code 1	Code 2	Code 3	Code 4	Missing
2018	41,9%	39,3%	11,8%	2,9%	4,0%
2017	44,1%	35,4%	12,8%	4,1%	3,6%
2016	33,3%	40,4%	18,2%	7,6%	0,5%
2015	29,7%	42,3%	22,9%	4,0%	1,1%
2014	10,6%	60,2%	23,9%	3,5%	1,8%
2004-13	20,8%	51,0%	22,3%	4,6%	1,3%

Table 49: Treatment codes for all localizations

	Debridement	Micro fracture	No treatment	Other	Missing
2018	5,2%	1,9%	83,3%		9,7%
2017	7,7%	1,0%	75,9%	1,0%	14,4%
2016	8,6%	2,0%	85,9%		3,5%
2015	16,0%	0,6%	76,0%	1,7%	5,7%
2014	3,5%	4,4%	83,3%	1,8%	7,0%
2004-13	8,4%	2,3%	68,8%	1,1%	19,3%

Cartilage injuries registered in revision reconstructions

Figure 15: All Cartilage injuries (total)

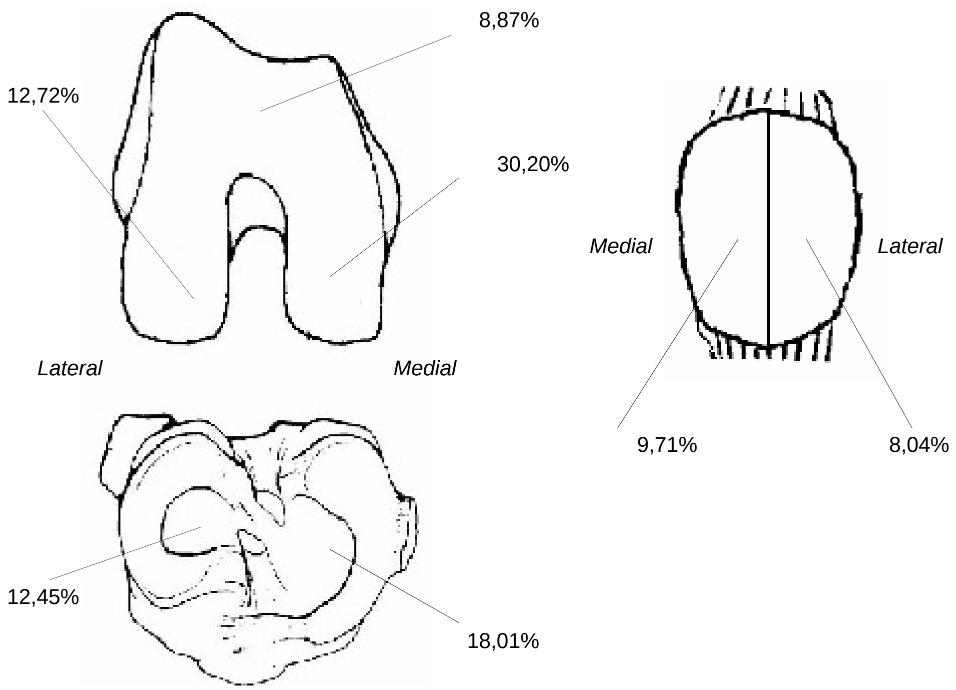


Figure 16: All Cartilage injuries with area greater than 2 cm² (total)

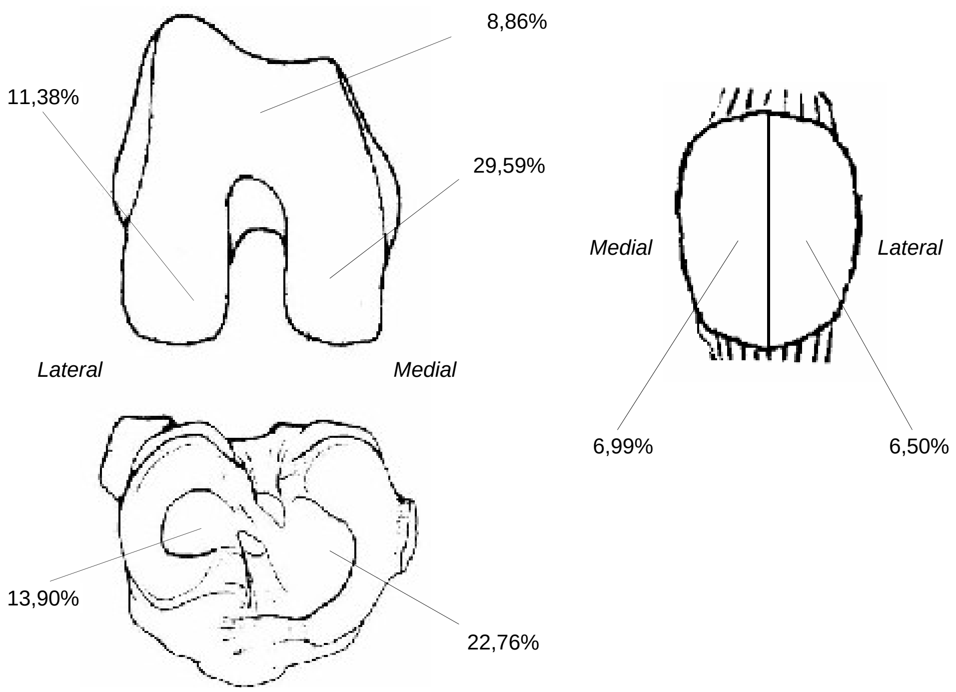
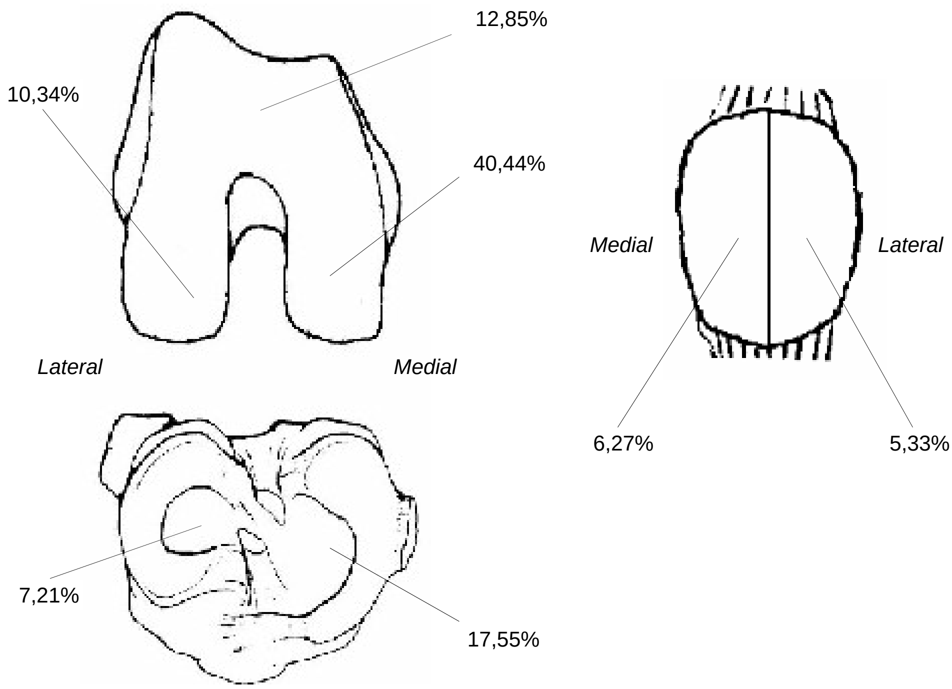


Figure 17: All Cartilage injuries with area greater than 2 cm² and ICRS equal 3 or 4 (total)



Outpatient surgery

Table 50: Outpatient surgery

	Yes		No		Missing		Total
2018	110	(53,4%)	94	(45,6%)	2	(1,0%)	**206**
2017	94	(43,7%)	118	(54,9%)	3	(1,4%)	**215**
2016	93	(45,8%)	109	(53,7%)	1	(0,5%)	**203**
2015	117	(52,2%)	101	(45,1%)	6	(2,7%)	**224**
2014	125	(49,8%)	124	(49,4%)	2	(0,8%)	**251**
2004-13	571	(40,8%)	818	(58,5%)	10	(0,7%)	**1399**
Total	**1110**	**(44,4%)**	**1364**	**(54,6%)**	**24**	**(1,0%)**	**2498**

Intraoperative complications

Table 51 : Intraoperative complications

	Yes		No		Missing		Total
2018	3	(1,5%)	194	(94,2%)	9	(4,4%)	**206**
2017	13	(6,0%)	195	(90,7%)	7	(3,3%)	**215**
2016	7	(3,4%)	192	(94,6%)	4	(2,0%)	**203**
2015	8	(3,6%)	206	(92,0%)	10	(4,5%)	**224**
2014	3	(1,2%)	235	(93,6%)	13	(5,2%)	**251**
2004-13	52	(3,7%)	1307	(93,4%)	40	(2,9%)	**1399**
Total	**86**	**(3,4%)**	**2329**	**(93,2%)**	**83**	**(3,3%)**	**2498**

Systemic antibiotic prophylaxis

Table 52: Systemic antibiotic prophylaxis

	Yes		No		Missing		Total
2018	203	(98,5%)	3	(1,5%)			**206**
2017	211	(98,1%)	3	(1,4%)	1	(0,5%)	**215**
2016	194	(95,6%)	6	(3,0%)	3	(1,5%)	**203**
2015	220	(98,2%)	3	(1,3%)	1	(0,4%)	**224**
2014	249	(99,2%)	2	(0,8%)			**251**
2004-13	1378	(98,5%)	16	(1,1%)	5	(0,4%)	**1399**
Total	**2455**	**(98,3%)**	**33**	**(1,3%)**	**10**	**(0,4%)**	**2498**

Table 53: Drug

	2004-13	2014	2015	2016	2017	2018
Benzylpenicillin (Penicillin G)	0,07%					
Cefalotin (Keflin)	92,16%	90,76%	92,73%	98,45%	93,36%	67,00%
Cefazolin (Cephazolin)					3,32%	30,54%
Ceftriakson (Rocefalin)		0,40%				
Cefuroksim (Zinacef, Cefuroxim, Lifurox)	0,65%					
Ciprofloksasin (Ciproxin)		0,40%				
Dikloksacillin (Diclocil, Dicillin)	2,03%	0,40%				
Gentamicin (Garamycin, Gensumycin)	0,07%					
Imipenem (Tienam)						0,49%
Klindamycin (Dalacin, Clindamycin)	2,69%	3,21%	3,18%	1,55%	2,37%	1,97%
Kloksacillin (Ekvacillin)	1,81%	4,02%	2,27%		0,47%	
Oxacillin (Unspecified)		0,40%				
Vankomycin (Vancomycin, Vancocin)	0,07%					
Missing	0,44%	0,40%	1,82%		0,47%	

Thrombosis prophylaxis

Table 54: Thrombosis prophylaxis

	Yes		No		Missing		Total
2018	146	(70,9%)	59	(28,6%)	1	(0,5%)	**206**
2017	163	(75,8%)	50	(23,3%)	2	(0,9%)	**215**
2016	141	(69,5%)	58	(28,6%)	4	(2,0%)	**203**
2015	176	(78,6%)	47	(21,0%)	1	(0,4%)	**224**
2014	201	(80,1%)	49	(19,5%)	1	(0,4%)	**251**
2005-13	1097	(81,1%)	239	(17,7%)	18	(1,3%)	**1354**
Total	**1924**	**(78,4%)**	**502**	**(20,5%)**	**27**	**(1,1%)**	**2453**

There are 2 old forms that are filled out so that thrombosis prophylaxis can not be registered. These are added to missing.
There are 9 forms with two drugs and 1915 forms with one drug.

Table 55: Drug

	2004-13	2014	2015	2016	2017	2018
Apixiban (Eliquis)		0,50%				
Dalteparin (Fragmin)	66,73%	58,21%	56,25%	60,28%	68,71%	64,38%
Dekstran (Macrodex, Dextran)	0,18%					
Enoksaparin (Klexane)	31,08%	39,30%	42,61%	38,30%	29,45%	34,25%
Rivaroksaban (Xarelto)		0,50%				
Warfarin (Marevan)			0,57%			
Ximelagatran (Exanta, Malagatran)	0,27%					
No drugs	1,28%					
Missing	0,09%	1,00%		0,71%	1,23%	0,68%
Two drugs	0,18%	0,50%	0,57%	0,71%	0,61%	0,68%

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 (%)	
2018	1865	999	(53,6%)	1722	881	(51,2%)	1646	816	(49,6%)	**5233**	**2696**	(51,5%)
2017	1766	1002	(56,7%)	1746	944	(54,1%)	1603	886	(55,3%)	**5115**	**2832**	(55,4%)
2016	1721	1033	(60,0%)	1818	1009	(55,5%)	1426	811	(56,9%)	**4965**	**2853**	(57,5%)
2015	1749	1058	(60,5%)	1717	965	(56,2%)	1515	935	(61,7%)	**4981**	**2958**	(59,4%)
2014	1750	1036	(59,2%)	1823	1053	(57,8%)	899	554	(61,6%)	**4472**	**2643**	(59,1%)
2013	1851	1163	(62,8%)	1688	989	(58,6%)				**3539**	**2152**	(60,8%)
2012	1917	1217	(63,5%)	1800	960	(53,3%)				**3717**	**2177**	(58,6%)
2011	1669	1095	(65,6%)	1303	717	(55,0%)				**2972**	**1812**	(61,0%)
2010	1864	1232	(66,1%)	1694	1126	(66,5%)				**3558**	**2358**	(66,3%)
2009	1632	1131	(69,3%)	762	527	(69,2%)				**2394**	**1658**	(69,3%)
2008	1452	914	(62,9%)							**1452**	**914**	(62,9%)
2007	1351	723	(53,5%)							**1351**	**723**	(53,5%)
2006	896	549	(61,3%)							**896**	**549**	(61,3%)
Total	21483	13152	(61,2%)	16073	9171	(57,1%)	7089	4002	(56,5%)	**44645**	**26325**	(59,0%)

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

Completeness analysis for the Cruciate Ligament Register

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
NGE 91	Other operation on capsule or ligament of knee; anterior cruciate, open
NGE 92	Other operation on capsule or ligament of knee; posterior cruciate, open
NGE 95	Other operation on capsule or ligament of knee; anterior cruciate, arthroscopic
NGE 96	Other operation on capsule or ligament of knee; 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

The completeness for the Cruciate Ligament Register was calculated as follows:

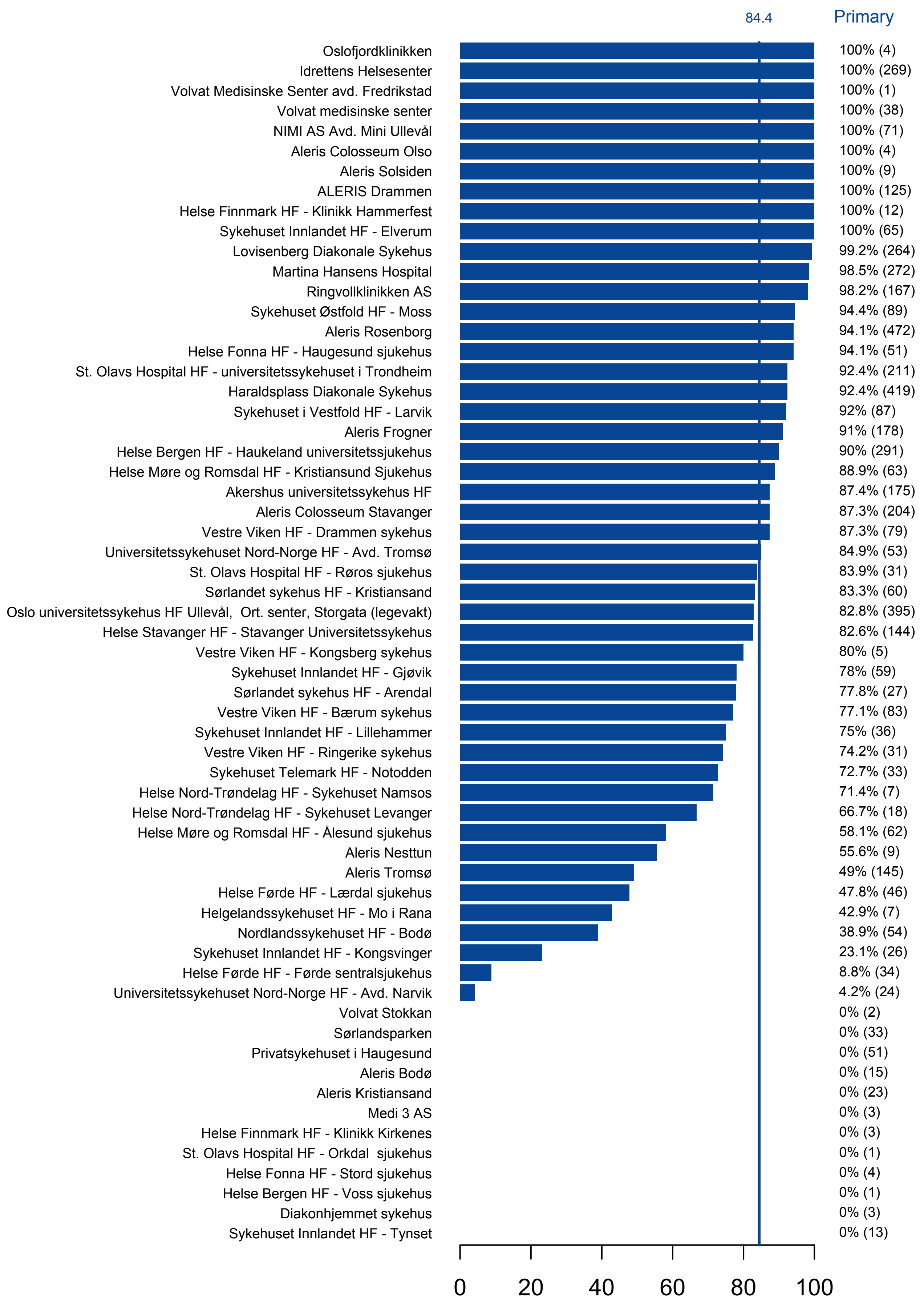
$$\frac{(Only\ Cruc.\ Lig.\ Reg. + Inclusion\ in\ both\ registers)}{(Only\ NPR + Only\ Cruc.\ Lig.\ Reg. + Inclusion\ in\ both\ registers)}$$

Completeness for the NPR was calculated in a similar way:

$$\frac{(Only\ NPR + Inclusion\ in\ both\ registers)}{(Only\ Cruc.\ Lig.\ Reg. + Only\ NPR + Inclusion\ in\ both\ registers)}$$

In 2015 and 2016, 5239 cruciate ligament operations were reported to one or both of the registers. 84.4% of these were reported to the Cruciate Ligament Register, while 77.0% 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, 2015-2016



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

PAEDIATRIC HIP REGISTER: ANNUAL REPORT 2019

Last year, the Paediatric Hip Register shifted to electronic reporting of data. There is now one form for children and a second, new form for scopic and open procedures in young adult hips. We are convinced that this will make reporting easier and increase the Register's coverage rate.

We have also been chosen as one of twelve national quality registers in an incentive scheme to increase coverage. This means that all patients diagnosed with developmental dysplasia of the hip, Calvé-Legg-Perthes' disease and slipped capital femoral epiphysis must be given a special national code in the electronic record when reported to the Paediatric Hip Register. A refund will be given for all coded patients at the end of the year.

There has been a great effort to produce a good reporting form for scopic and open surgery for young adult hips, and this has now been finalised. However, the results of these interventions will not be available until next year's annual report.

The Board and the General Manager have been working towards recognition as a quality register and have drawn up some quality indicators that we believe are relevant objectives for the treatment of children's hip disorders in Norway:

- Time from symptom debut to diagnosis of epiphysiolysis of the hip. The goal is to diagnose patients with epiphysiolysis of the hip as soon as possible, at most within six weeks of symptom debut.
- Time from symptom debut to diagnosis for children with Perthes' disease of the hip. We wish to find out the average time these patients have symptoms, and use this information in primary health care in order to reduce the time with symptoms before x-rays and diagnosis are performed.
- 90% of children over six years classified as Catterall 3 or 4 when diagnosed with Perthes' disease should receive varus osteotomy.
- 90% of children under six diagnosed with Perthes' disease should be treated conservatively. There will always be some borderline cases when conservative and operative treatment are being considered. A 5½-year-old with a very poor femoral head will probably benefit from surgery, while some children over six years with good congruence can probably be treated conservatively.
- Proportion of late-detected hip dysplasia (over 3 months) diagnosed annually
- Proportion of children with hip dysplasia who had ultrasound screening as newborns
- Proportion of patients treated for epiphysiolysis who develop avascular necrosis of the femoral head
- Proportion of patients operated for epiphysiolysis using a method that enables further growth
- Proportion of patients with epiphysiolysis requiring surgery after the primary operation

To enable us to report on all these quality indicators, we have been in dialogue with the Norwegian Paediatric Orthopaedic Association to define national guidelines for the treatment of paediatric hip disorders. These have now been agreed upon and will be presented at this year’s annual general meeting.
Some additional points have also been added to the electronic reporting form to include the quality indicators selected.

We hope you have all started electronic recording, and we also look forward to receiving patient-reported data. We plan to use PROMIS (www.healthmeasures.net) and are waiting for this to be translated. We hope that PROMIS will be in place before the end of the year.

Bergen, June 2019

Trude Gundersen — Ola Wiig

Trude Gundersen
General Manager

Ola Wiig
Head of the Steering Committee

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

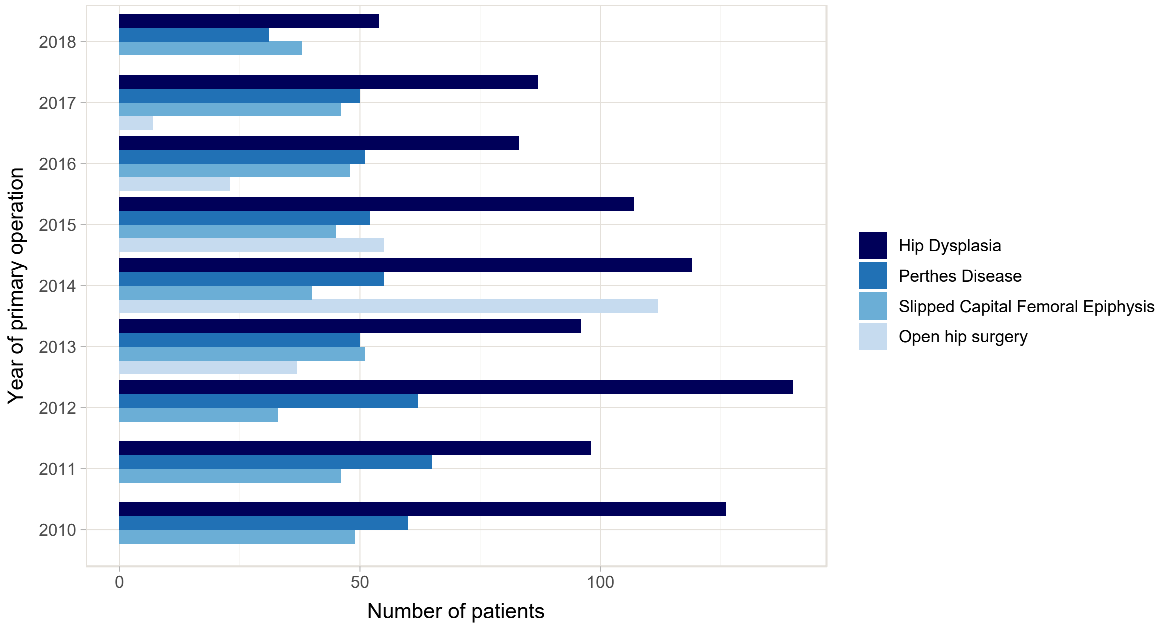
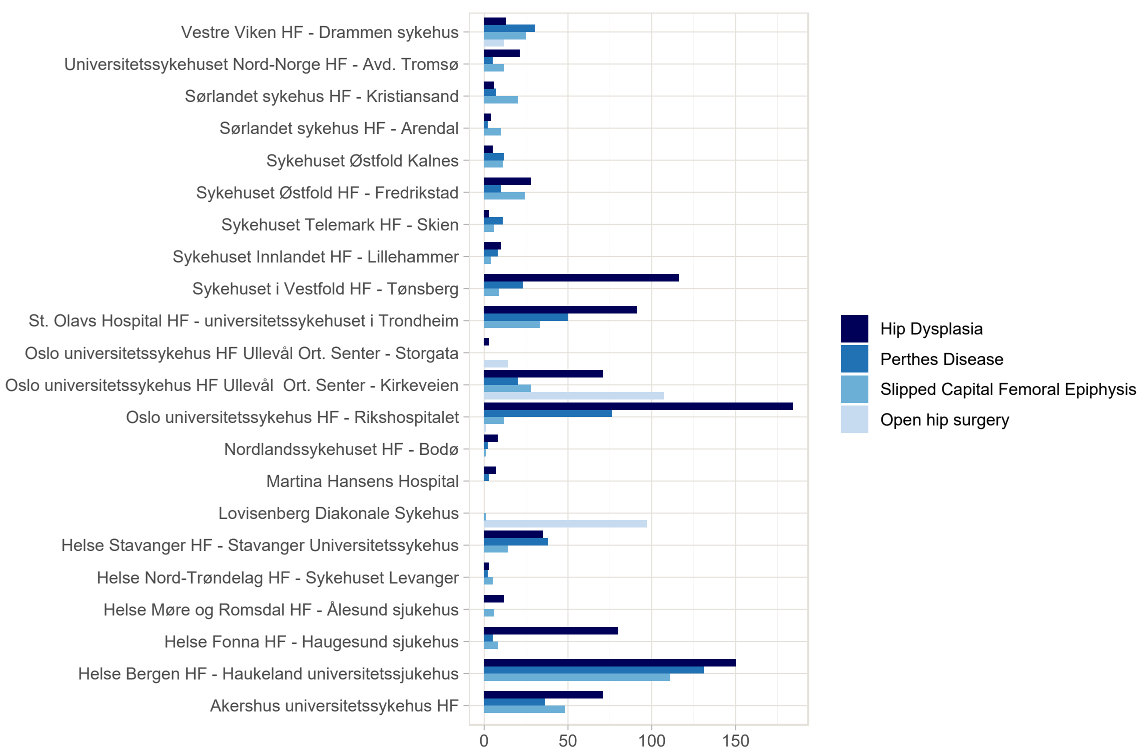


Figure F.2: Number of operations by diagnosis at each operating hospital*



*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
2018	17	6	0	**23**
2017	37	11	0	**48**
2016	34	17	0	**51**
2015	39	16	0	**55**
2014	62	26	1	**89**
2013	56	19	0	**75**
2012	79	30	0	**109**
2011	68	19	0	**87**
2010	95	19	0	**114**
Unknown	16	5	8	**29**
Total	**503**	**168**	**9**	**680**

Table 2: HD - Earlier treatment

Year treated	None	Abd. orthosis	Other	Missing	Total
2018	23	20	8	3	**54**
2017	36	33	15	3	**87**
2016	31	37	9	6	**83**
2015	39	25	15	28	**107**
2014	38	40	14	27	**119**
2013	30	16	9	41	**96**
2012	6	6	0	128	**140**
2011	1	1	0	96	**98**
2010	2	3	0	121	**126**
Total	**206**	**181**	**70**	**453**	**910**

More than one form for patient per side is possible.

Table 3: HD - Hip status

Year treated	Normally located	Subluxated	Dislocated	Missing	Total
2018	39	12	2	1	**54**
2017	51	16	19	1	**87**
2016	43	11	21	8	**83**
2015	55	26	17	9	**107**
2014	67	15	35	2	**119**
2013	50	19	18	9	**96**
2012	70	21	35	14	**140**
2011	56	14	23	5	**98**
2010	64	24	29	9	**126**
Total	**495**	**158**	**199**	**58**	**910**

More than one form for patient per side is possible

Table 4: HD - Acetabular index

Year diagnosed	< 30°	< 40°	>= 40°	Missing	Total
2018	2	10	5	6	**23**
2017	7	18	14	9	**48**
2016	7	13	22	9	**51**
2015	3	19	25	8	**55**
2014	13	33	29	14	**89**
2013	10	28	22	15	**75**
2012	16	39	41	13	**109**
2011	16	35	28	8	**87**
2010	33	39	27	15	**114**
Unknown	2	7	3	17	**29**
Total	**109**	**241**	**216**	**114**	**680**

Mean number used for both hips for bilateral HD,

Table 5: HD - Femoral osteotomy

Treatment year	Varus osteotomy	Rotational osteotomy	Shortening	Total
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	**29**	**22**	**9**	**60**

Table 6: HD - Pelvic osteotomy

Treatment year	Salter	Dega	Other	Total
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	**31**	**39**	**9**	**79**

Slipped Capital Femoral Epiphysis (SCFE)

Table 7: SCFE - New cases per year

Year diagnosed	Unilateral	Bilateral	Total
2018	17	3	**20**
2017	20	7	**27**
2016	21	8	**29**
2015	23	7	**30**
2014	24	3	**27**
2013	17	18	**35**
2012	18	5	**23**
2011	29	10	**39**
2010	22	6	**28**
Unknown	12	11	**23**
Total	**203**	**78**	**281**

Table 8: SCFE - Classification

Year diagnosed	Acute	Chronic	Acute on chronic	Stable (Able to bear weight)	Unstable (Unable to ambulate)
2018	3	13	3	12	7
2017	2	16	5	19	7
2016	7	16	4	19	10
2015	5	21	2	24	4
2014	1	18	6	13	11
2013	4	20	5	25	5
2012	4	8	5	8	6
2011	7	16	7	23	4
2010	4	15	3	18	7
Unknown	1	7	0	8	0
Total	**38**	**150**	**40**	**169**	**61**

Table 9: SCFE - Degree of slip

Year diagnosed	< 30°	30 - 50°	> 50°	Total
2018	13	3	5	**21**
2017	11	6	6	**23**
2016	12	9	7	**28**
2015	15	9	4	**28**
2014	8	7	9	**24**
2013	17	11	4	**32**
2012	6	4	5	**15**
2011	11	10	6	**27**
2010	16	4	7	**27**
Unknown	5	0	2	**7**
Total	**114**	**63**	**55**	**232**

Table 10: SCFE - Primary operation

Year treated	Screw osteosynthesis	Femoral osteotomy	Pin osteosynthesis	Total
2018	28	0	2	**30**
2017	30	1	2	**33**
2016	29	0	5	**34**
2015	22	1	10	**33**
2014	30	1	4	**35**
2013	36	0	12	**48**
2012	14	0	9	**23**
2011	26	1	15	**42**
2010	25	1	13	**39**
Total	**240**	**5**	**72**	**317**

Perthes disease

Table 11: Perthes - Number of new cases per year

Year diagnosed	Unilateral	Bilateral	Total
2018	12	3	**15**
2017	28	4	**32**
2016	25	2	**27**
2015	28	6	**34**
2014	37	1	**38**
2013	45	2	**47**
2012	43	5	**48**
2011	30	4	**34**
2010	62	12	**74**
Unknown	41	5	**46**
Total	**351**	**44**	**395**

Table 12: Perthes - Catterall classification

Year diagnosed	I/II	III/IV	Missing	Total
2018	6	11	0	**17**
2017	10	18	4	**32**
2016	6	17	4	**27**
2015	10	21	4	**35**
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	34	**52**
Total	**101**	**228**	**75**	**404**

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

Table 13: Perthes - Treatment

Year treated	None/ physiotherapy	Abduction orthosis	Femoral osteotomy	Pelvic osteotomy	Total
2018	22	0	6	1	**29**
2017	35	0	8	2	**45**
2016	22	0	21	1	**44**
2015	30	0	12	2	**44**
2014	37	2	11	0	**50**
2013	35	0	14	0	**49**
2012	38	0	4	4	**46**
2011	34	0	15	1	**50**
2010	46	0	10	0	**56**
Total	**299**	**2**	**101**	**11**	**413**

Table 14: Perthes - Plates and screws

Year treated	Prebent plate	Angel plate	Special plate
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	**7**	**15**	**83**

PUBLICATIONS

Doctoral thesis (44 stk)

Norwegian Arthroplasty Register (27 in total)

Havelin LI. Hip arthroplasty in Norway 1987–1994. The Norwegian Arthroplasty Register [dissertation]. Bergen, Norway: University of Bergen, 1995.

Espehaug B. Quality of total hip replacements in Norway 1987–1996. The Norwegian Arthroplasty Register [dissertation]. Bergen, Norway: University of Bergen, 1998.

Furnes O. Hip and knee replacement in Norway 1987–2000. The Norwegian Arthroplasty Register [dissertation]. Bergen, Norway: University of Bergen, 2002.

Lie SA. Survival studies of total hip replacements and postoperative mortality [dissertation]. Bergen, Norway: University of Bergen, 2002.

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.

Hallan G. Wear, fixation, and revision of total hip prostheses [dissertation]. Bergen, Norway: University of Bergen, 2007.

Monstad K. Essays on the Economics of health and fertility [dissertation]. Bergen, Norway: The Norwegian school of economics and business administration, 2007.

Arthursson AJ. Surgical approach and muscle strength in total hip arthroplasty [dissertation]. Bergen, Norway: University of Bergen, 2008.

Lygre SH. Pain, function and risk of revision after primary knee arthroplasty [dissertation]. 2010 University of Bergen; Bergen, Norway.

Lehmann TG. Slipped capital femoral epiphysis. Diagnostics, treatment and long-term outcome [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.

Engesæter IØ. Hip dysplasia in young adults [dissertation]. 2013 University of Bergen; Bergen, Norway.

Gøthesen Ø. Computer navigation in total knee replacement surgery. Effect on outcome [dissertation]. 2013 University of Bergen; Bergen, Norway.

Lindalen E. Reverse hybrid total hip replacement: Wear, fixation and bone remodeling [dissertation]. 2013 University of Oslo; Oslo, Norway.

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

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

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

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

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

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

Leta TH. Revision knee arthroplasty in Norway 1994–2011 [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.

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.

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.

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

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

Norwegian Hip Fracture Register (4 in total)

Gjertsen JE. Surgical treatment of hip fractures in Norway [dissertation]. Bergen, Norway: University of Bergen, 2009.

Matre K. Treatment of trochanteric and subtrochanteric hip fractures. Sliding hip screw or intramedullary nail? [dissertation]. 2013 University of Bergen; Bergen, Norway.

Bakken M. Barriers for improving medication in older adults [dissertation]. 2015 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.

Norwegian Cruciate Ligament Register (8 in total)

Granan LP. Development of a national knee ligament registry [dissertation]. 2009 University of Oslo; Oslo, Norway.

Heir S. Focal Cartilage defects in the knee [dissertation]. 2011 University of Oslo; Oslo, 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.

Gifstad T. Results after ACL reconstruction – Clinical and registry-based studies [dissertation]. 2014 University of Trondheim; Trondheim, Norway.

Røtterud JH. Focal cartilage lesions in anterior cruciate ligament-injured knees. Incidence, risk, prognosis and treatment [dissertation]. 2015 University of Oslo; Oslo, Norway.

Owesen C. Symptoms, diagnosis and outcomes in PCL injuries [dissertation]. 2017 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.

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.

Norwegian National Advisory Unit on Arthroplasty and Hip Fractures (5 in total)

Figved PW. Hemiarthroplasty and femoral neck fractures [dissertation]. 2010 University of Oslo; Oslo, 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.

Young S. Orthopaedic trauma surgery in low-income countries. Follow-up, infections and HIV [dissertation]. 2014 University of Bergen; Bergen, Norway.

Kadar TK. Wear and migration in cemented total hip arthroplasty [dissertation]. 2014 University of Bergen; Bergen, Norway.

Blomquist J. Surgical treatment of shoulder instability in Norway [dissertation]. 2016 University of Bergen; Bergen, Norway.

Articles (328 in total)

Norwegian Arthroplasty Register (182 in total)

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.

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.

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. 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 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, 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.

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.

Engesæter LB, Furnes A, Havelin LI, Lie SA, Vollset SE. [The hip registry. Good economy for society.] Tidsskr Nor Lægefor 1996;116:3025-7.

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.

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.

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.

Reigstad A. [Joint prostheses-development, quality and public regulation]. Tidsskr Nor Lægefor 1996 Oct 20;116(25):2990-1.

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.

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.

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, 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.

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.

Havelin LI. The Norwegian Joint Registry. Bull Hosp Jt Dis. 1999;58:139-48.

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.

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.

Lie SA. [Mortality after total hip replacements]. Nordisk Geriatrik 2000;4:72.

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.

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.

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.

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.

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.

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. [Patients in the Norwegian Arthroplasty Register]. Revmatikeren 2003;5:18-9.

Flugsrud GB, Nordsletten L, Espehaug B, Havelin LI, Meyer HE. Weight change and the risk of total hip replacements. Epidemiology 2003;14:578-84.

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.

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.

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.

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.

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, Gjessing HK, Vollset SE. Dependency issues in survival analyses of 55782 primary hip replacements from 47355 patients.
Stat Med 2004;23:3227-40.

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.

Furnes O. Hofteproteser og sementer. Tidsskr Nor Lægeforen 2004;124:2455.

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.

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.

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.

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.

Lie SA. Early mortality after elective hip surgery [guest editorial]. Acta Orthop 2006;77:345-6.

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.

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

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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 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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

Espehaug B, Furnes O, Engesæter LB, Havelin LI. Hip arthroplasty in Norway 1989–2008. Tidsskr Nor Legeforen 2011 131:1543-6.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

Monstad K, Engesæter LB, Espehaug B. Waiting time and socioeconomic status – an individual-level analysis. Health Econ 2013:1-16.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

Tsukanaka M, Halvorsen V, Nordsletten L, Engesæter I.Ø, Engesæter L.B, Fenstad A.M, Röhrl S.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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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 .

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

Furnes O. International registry collaboration and statistical approaches. Acta Orthop. 2018 Aug;89(4):367.

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.

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.

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.

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 Feb 11;1-8 [Epub ahead of print].

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.

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;[Epub ahead of print].

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;1-13 [Epub ahead of print].

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;[Epub ahead of print].

Mäkelä, K., Furnes, O., Hallan, G., Fenstad, A., Rolfson, O., Kärrholm, J., Rogmark, C., Pedersen, A., Robertsson, O., W-Dahl, A., Eskelinen, A., Schrøder, H., Äärimaa, V., Rasmussen, J., Salomonsson, B., Hole, R. and Overgaard, S. (2019). The benefits of collaboration: the Nordic Arthroplasty Register Association. EFORT Open Reviews, 4(6), pp.391-400.

Varnum, C., Pedersen, A., Rolfson, O., Rogmark, C., Furnes, O., Hallan, G., Mäkelä, K., de Steiger, R., Porter, M. and Overgaard, S. (2019). Impact of hip arthroplasty registers on orthopaedic practice and perspectives for the future. EFORT Open Reviews, 4(6), pp.368-376.

Pijls, B., Meessen, J., Tucker, K., Stea, S., Steenbergen, L., Marie Fenstad, A., Mäkelä, K., Cristian Stoica, I., Goncharov, M., Overgaard, S., de la Torre, J., Lübbeke, A., Rolfson, O. and Nelissen, R. (2019). MoM total hip replacements in Europe: a NORE report. EFORT Open Reviews, 4(6), pp.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.

Norwegian Hip Fracture Register (35 in total)

Gjertsen JE, Fevang J, Vinje T, Engesæter LB, Steindal K, Furnes O. Nasjonalt hoftebruddregister. Norsk Epidemiologi 2006;16:89-94.

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, 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, 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, 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, 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, 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.

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.

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. 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.

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.

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.

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.

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, 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.

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.

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, 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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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 Orthop 2018 June 4:1-7 [Epub ahead of print].

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.

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.

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.

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;[Epub ahead of print]

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.

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 2019 June 06 [Epub ahead of print].

Norwegian Cruciate Ligament Register (65 in total)

Granan LP, Engebretsen L, Bahr R. Kirurgi ved fremre korsbåndskader i Norge. Tidsskr Nor Legeforen 2004;124:928-30.

Granan LP, Engebretsen L, Bahr R. Kirurgi ved fremre korsbåndskader i Norge - sett fra et idrettsmedisinsk perspektiv. Norsk Idrettsmedisin 2004;4:3-4.

Solumshengslet K, Granan LP, Furnes O, Steindal K, Engebretsen L. Registreringsgrad i Nasjonalt Korsbåndregister. Norsk Idrettsmedisin 2007;2:7,9-11.

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.

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.

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.

Engebretsen L, Forssblad M. Why knee ligament registries are important. Kne Surg Sports Traumatol Arthrosc 2009 Feb;17(2):115-6.

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.

Granan LP, Forssblad M, Lind M, Engebretsen L. The Scandinavian ACL registries 2004–2007: baseline epidemiology. Acta Orthop 2009 Oct;80(5):563-7.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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, 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.

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.

Ekeland, AE, Engebretsen L, Heir S. Sekundær ACL rekonstruksjon hos fotballspillere, håndballspillere og alpine skiløpere. Norsk idrettsmedisin 2013 (3):21.

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.

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.

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.

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.

Engebretsen L. ACL surgery is not for all patients, nor for all surgeons. Knee Surg Sports Traumatol Arthrosc. 2014 Jan;22(1):1-2.

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.

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.

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.

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.

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.

Engebretsen L, Forssblad M, Lind M. Why registries analysing cruciate ligament surgery are important. Br J Sports Med. 2015 May;49(10):636-8.

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.

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.

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.

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, 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.

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.

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.

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.

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.

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.

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 Jun 19;475(10):2503-2512.

Engen CN, Årøen A, Engebretsen L. Development of a pilot cartilage surgery register. BMC Musculoskelet Disord. 2017 Jun 30;18(1):282.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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. 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.

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.

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;[Epub ahead of print].

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; [Epub ahead of print].

Clinical trials related to the Norwegian National Advisory Unit on Arthroplasty and Hip Fractures (46 in total)

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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, 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.

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.

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.

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.

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.

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.

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.

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.

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.

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, 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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

Furnes O. Fibrose i kneleddet. BestPractice 2017 Mai:24–25.

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.

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.

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.

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;1-9:[Epub ahead of print].

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.

MacInnes SJ, Hatzikotoulas K, Fenstad AM, Shah K, Southam L, Tachmazidou I, Hallan G, Dale H, Panoutsopoulou K, Furnes O, Zeggini E, Wilkinson M. The 2018 Otto Aufranc Award: How does genome-wide variation affect osteolysis risk after THA? Clin Orthop Relat Res. 2018 4 April; 0:1-13:[Epub ahead of print].

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 [Epub ahead of print].

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.

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.

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.

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.

Oral presentations/Abstracts/Posters 2018-2019 (58 in total)

Norwegian Arthroplasty Register (34 in total)

Furnes O. Implant selection and new technology: NARA (Nordic Arthroplasty Register Association). Symposium: What can registries do for me? The annual AAOS meeting. 2018 March 6-10;New Orleans, USA.

Tsikandylakis G, Kärrholm JN, Hailer NP, Hallan G, Furnes O, Eskelinen A, Mäkelä K, Pedersen AB, Overgaard S, Mohaddes M. The risk of revision in total hip arthroplasty performed with 28 mm, 32 mm, or 36 mm heads. Data from 248,827 patients in an arthroplasty register association. The annual AAOS meeting. 2018 March 6-10;New Orleans, USA.

Wilkinson M, Macinnes SJ, Hatzikotoulas K, Fenstad AM, Shan K, Southam L, Tachmazidou I, Hallan G, Dale H, Panoutsopoulou K, Furnes O, Zeggini E. The genetics of osteolysis after total hip arthroplasty. The 2018 Otto Aufranc Award. The annual AAOS meeting. 2018 March 6-10;New Orleans, USA.

Furnes O. Fagregistre kontra NPR-melding. DRG vårkonferansen. 2018 Mars 12-13;Scandic Ørnen, Bergen.

Furnes O. Nasjonale medisinske kvalitetsregistre i ortopedi: noen «highlights» og potensiale for samarbeidsprosjekter på tvers av fag og institutter. Instituttledermøte. 2018 April 10;Haukeland Universitetssykehus, Bergen.

Leta TH, Lygre SHL, Høvding P, Hallan G, Gjertsen JE, Dale H, Furnes O. Outcome of revision surgery for infected total knee arthroplasty: Do surgical strategis matter? 19th EFORT Congress. 2018 May 30- June 1; Barcelona, Spain.

Furnes O, Leta TH, Lygre SHL, Høvding P, Hallan G, Gjertsen JE, Dale H. Outcome of revision surgery for infected total knee arthroplasty: Do surgical strategis matter? 7th ISAR Congress. 2018 June 9-11; Reykjavik, Iceland.

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. 7th ISAR Congress. 2018 June 9-11; Reykjavik, Iceland.

Tsikandylakis G, Kärrholm J, Eskelinen A, Mäkelä K, Hallan G, Furnes O, Pedersen AB, Overgaard S, Mohaddes M. Does head size affect the risk of revision after total hip arthroplasty due to proximal femoral fracture? An analysis of 24,047 procedures in the Nordic arthroplasty registry association. 7th ISAR Congress. 2018 June 9–11; Reykjavik, Iceland.

Furnes O, Lygre SHL. Plenary new implants and technology: XLPE for TKR, differences in registry outcomes. 7th ISAR Congress. 2018 June 9–11; Reykjavik, Iceland.

Wilkinson M, MacInnes SJ, Hatzikotoulas K, Fenstad AM, Shah K, Southam L, Tachmazidou I, Hallan G, Dale H, Panoutsopoulou K, Furnes O, Zeggini E. The genetics of osteolysis after total hip arthroplasty: Results of two genome-wide association studies. 7th ISAR Congress. 2018 June 9–11; Reykjavik, Iceland.

Gøthesen Ø, Lorimer M, Cuthbert A, Graves S, Lygre SHL, Furnes O. Risks and reasons of revision for mobile vs fixed bearing medial unicompartmental knee replacements. A combined study from the Australian and Norwegian joint replacement registries 2003–2016. 7th ISAR Congress. 2018 9–11; Reykjavik, Iceland.

Nystad TW, Husum Y, Furnes O, Fevang BT. Predictors for orthopaedic surgery in patients with psoriatic arthritis. Results from a retrospective cohort study of 590 patients diagnosed 1954–2011, and followed up until 2017. Eular, Annual European Congress of Rheumatology; 2018 13.–16. June; Amsterdam.

Furnes O. Current professional knowledge in THA: Norwegian sources and modifications to international guidelines. Høstmøtet i Norsk Ortopedisk Forening; 2018 24.–26. oktober; Oslo.

Hallan G. Protesedokumentasjon hofteproteser. Høstmøtet i Norsk Ortopedisk Forening; 2018 24.–26. oktober; Oslo.

Dybvik E. Interaktive resultater hofte og kneproteser. Høstmøtet i Norsk Ortopedisk Forening; 2018 24.–26. oktober; Oslo.

Hallan G. Sementerte stammer ved hofteprotese hos kvinner >75 år. Høstmøtet i Norsk Ortopedisk Forening; 2018 24.–26. oktober; Oslo.

Fenstad AM. Kvalitetsforbedringsprosjekt- sementerte stammer. Høstmøtet i Norsk Ortopedisk Forening; 2018 24.–26. oktober; Oslo.

Lygre SHL, Furnes O. Gjev precoating av tibiaplatået til Nexgen-protesen lågare risiko for løsning? Høstmøtet i Norsk Ortopedisk Forening; 2018 24.–26. oktober; Oslo.

Furnes O, Lygre SHL. Bruk av kryssbundet plast ved kneproteser i Norge. Høstmøtet i Norsk Ortopedisk Forening; 2018 24.–26. oktober; Oslo.

Brüggermann H, Hallan G, Fenstad AM, Dalen I, Bache-Mathiesen LK, Fosse L. Occurrence and risk factors for intraoperative proximal femoral fractures during primary total hip arthroplasty. Høstmøtet i Norsk Ortopedisk Forening; 2018 24.–26. oktober; Oslo.

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 .

Furnes O. Medical devices vigilance and post marketing surveillance. The Norwegian hip registry. 6TH Nordic Pharmacovigilance Conference; 2019 9. April; Oslo, Norway.

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.

Fenstad AM, Dybvik E. Hvordan bruke interaktiv resultattjeneste i forbedringsarbeid? Helse Vest kvalitets- og registerkonferanse 2019, 9.–10. mai, Flesland, Bergen.

Wilkinson JM, Trela-Larsen L, Bartz-Johannessen C,Sayers A, Aram P, McCloskey E, Kadikamanathan V, Blom A, Lie SA, Furnes O. Estimating patient-specific mortality after joint replacement: Algorithm development and validation using national audit datasets. OARSI. 2019 May 2–5; Toronto, Canada.

Trela-Larvsen 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.

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.

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.

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.

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.

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.

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.

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.

Norwegian Hip Fracture Register (16 in total)

Dybvik E. Norwegian Arthroplasty Register and Norwegian Hip Fracture Register - Interactive results. The annual AAOS meeting. 2018 March 6–10;New Orleans, USA.

Gjertsen JE. Hoftebruddbehandling i Norge. Høstmøtet i Norsk Ortopedisk Forening; 2018 24.–26. oktober; Oslo.

Gjertsen JE, Dybvik E, Furnes O, Kristensen T, Leer-Salvesen S, Engesæter LB. Lang ventetid fra brudd til operasjon øker mortalitet etter hoftebrudd for pasienter med alvorlig komorbiditet. Høstmøtet i Norsk Ortopedisk Forening; 2018 24.–26. oktober; Oslo.

Kristensen T, Dybvik E, Kristoffersen M, Furnes O, Engesæter LB, Gjertsen JE. PROM-data, reoperasjon og mortalitet ved sementerte og usementerte hemiproteser i Nasjonalt hoftebruddregister 2005–2016. Høstmøtet i Norsk Ortopedisk Forening; 2018 24.–26. oktober; Oslo.

Kristoffersen M, Dybvik E, Steihaug OM, Kristensen T, Engesæter LB, Ranhoff AH, Gjertsen JE. Behandling av hoftebruddpasienter med demens, basert på data fra Nasjonalt hoftebruddregister. Høstmøtet i Norsk Ortopedisk Forening; 2018 24.–26. oktober; Oslo.

Lian T, Dybvik E, Nordsletten L, Gjertsen JE, Westberg M, Dale H, Figved W. Etterlevelse av nasjonale retningslinjer for antibiotikaprofylakse hos hoftebruddpasienter. Høstmøtet i Norsk Ortopedisk Forening; 2018 24.–26. oktober; Oslo.

Boutera A, Dybvik E, Gjertsen JE. Er det en «weekendeffekt» ved hoftebruddkirurgi i Norske sykehus? Høstmøtet i Norsk Ortopedisk Forening; 2018 24.–26. oktober; Oslo.

Kristensen T, Dybvik E, Furnes O, Engesæter LB, Gjertsen JE. Flere reoperasjoner og periprostetiske frakturer etter hemiprotese med Exeter og CPT stamme ved dislokerte lårhalsbrudd. Høstmøtet i Norsk Ortopedisk Forening; 2018 24.–26. oktober; Oslo.

Bartels S, Gjertsen JE, Frihagen F, Rogmark C, Utvåg SE. Høy morbiditet hos pasienter mellom 55 og 70 år med dislosert lårhalsbrudd (FNF). En case-control studie. Høstmøtet i Norsk Ortopedisk Forening; 2018 24.–26. oktober; Oslo.

Pollmann C, Røtterud JH, Gjertsen JE, Dahl F, Lenvik O, Årøen A. Uforandret mortalitet etter innføring av «fast track» for hoftebruddpasienter – en observasjonsstudie av 2230 pasienter. Høstmøtet i Norsk Ortopedisk Forening; 2018 24.–26. oktober; Oslo.

Gjertsen JE. Sementerte stammer ved protese for hoftebrudd. Høstmøtet i Norsk Ortopedisk Forening; 2018 24.–26. oktober; Oslo.

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.

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.

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.

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.

Gjertsen JE. The Norwegian National Hip Fracture Registry. 20th EFORT Congress; 2019 5.–9. juni; Lisboa, Portugal.

Norwegian Cruciate Ligament Register (4 in total)

Ekeland A, Engebretsen L, Fenstad AM, Heir S. Samme risiko for ACL graftsvikt i alpint, fotball og håndball, men 5 ganger høyere risiko for alder <18 enn >35 år. Høstmøtet i Norsk Ortopedisk Forening; 2018 24.–26. oktober; Oslo

Midttun E, Andersen MT, Engebretsen L, Visnes H, Fenstad AM, Gjertsen JE, Persson A. God validitet i Nasjonalt korsbåndregister. Høstmøtet i Norsk Ortopedisk Forening; 2018 24.–26. oktober; Oslo.

Andersen MT, Midtthun E, Lygre SHL, Engebretsen L, Martin RK, Fevang JM, Persson A. Sammenligning av pasient-rapportert knefunksjon 5 år etter rekonstruksjon av fremre korsbånd med PS-graft eller HS-graft. Høstmøtet i Norsk Ortopedisk Forening; 2018 24.–26. oktober; Oslo.

Røtterud JH, Lygre SHL, Forssblad M, Årøen A, Engebretsen L, Ulstein S. Meniskskade og rekonstruksjon av fremre korsbånd - 5 års pasientrapportert resultat fra 8408 pasienter. Høstmøtet i Norsk Ortopedisk Forening; 2018 24.–26. oktober; Oslo.

Clinical trials related to the Norwegian National Advisory Unit on Arthroplasty (2 in total)

Ludvigsen T, Matre K, Gudmundsdottir R, Krukhaug Y, Dybvik E, Fevang JM. Kirurgisk behandling av handleddsbrudd-ekstern fiksasjon eller volar plate? Ein randomisert multisenterstudie. Høstmøtet i Norsk Ortopedisk Forening; 2018 24.–26. 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.

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.

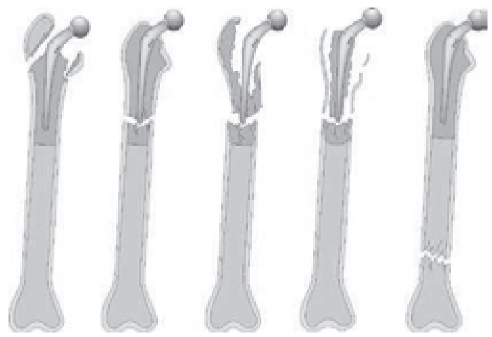
Type IIIA: Betydelig komponentvandring, osteolyse og bentap. Bentap fra kl.10 til 2.

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.

Hip disability and Osteoarthritis Outcome Score (HOOS), Norwegian version LK 2.0

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
☐2 Ankel
☐3 Tær (angi ledd) ....
☐4 Skulder
☐5 Albue
☐6 Håndledd
☐7 Fingre (angi ledd) ....
☐8 Annet ....
☐9 Rygg (angi nivå).......................

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)
☐1 Idiopatisk artrose
☐2 Rheumatoid artritt
☐3 Fraktursequele..............
☐4 Mb. Bechterew
☐5 Sequele ligamentskade
☐6 Sequele meniskskade
☐7 Akutt fraktur
☐8 Infeksjonssequele
☐9 Spondylose
☐10 Sequele prolaps kirurgi
☐11 Degenerativ skivesykdom
☐12 Rotarcuff artropati
☐13 Annet ....

B. Reoper. pga (ev. flere kryss)
☐1 Løs prox.protesedel
☐2 Løs distal protesedel
☐3 Løs patellaprotese
☐4 Luksasjon av patella
☐5 Luksasjon (ikke patella)
☐6 Instabilitet
☐7 Aksefeil
☐8 Dyp infeksjon
☐9 Fraktur av bein (nær protesen)
☐10 Smerter
☐11 Slitt eller defekt plastforing
Hvilken...........................
☐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.

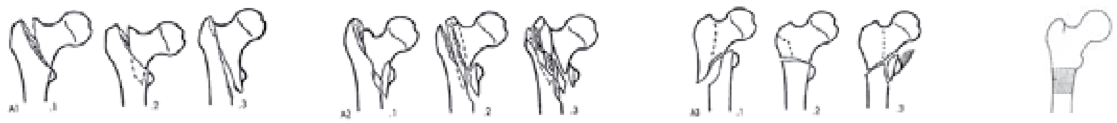
Kommentarer til enkelte punkt:
OPERASJONS- OG BRUDDTIDSPUNKT
Operasjonstidspunkt (dato og klokkeslett) må føres opp på alle primæroperasjoner. Det er også sterkt ønskelig at dato og klokkeslett for *bruddtidspunkt* føres opp. Dette bl.a. for å se om tid til operasjon har effekt på prognose. (Hvis en 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 FØR 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

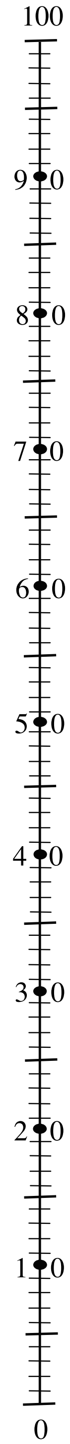
13. Din helsetilstand i dag.

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

IıııııııııIıııııııııIıııııııııIıııııııııIıııııııııIıııııııııIıııııııııIıııııııııIıııııııııIıııııııııI

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

IıııııııııIıııııııııIıııııııııIıııııııııIıııııııııIıııııııııIıııııııııIıııııııııIıııııııııIıııııııııI

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

☐ Karskade	Hvilken: ....
☐ 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 (cm^2) ≤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
☐ 0Nei ☐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 hoftedisloksjon 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

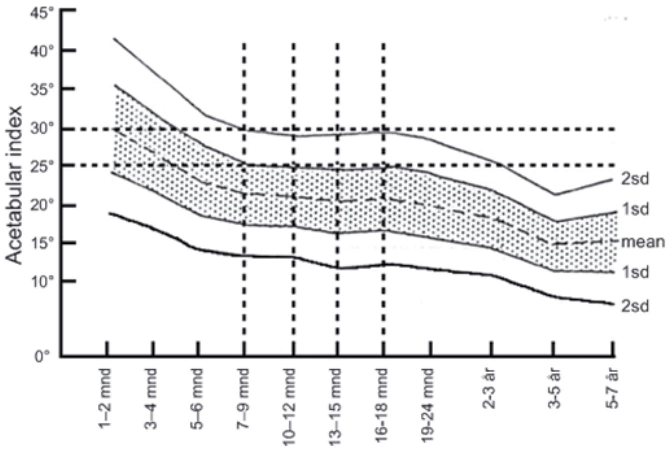
RETTLEDNING

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

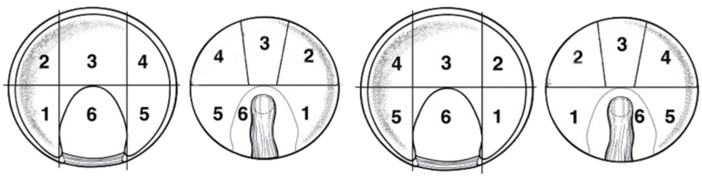
- **Registreres første gang ved diagnose/primærbehandling**
- **Registreres ved senere behandling som krever anestesi** Osteosyntese, femurosteotomier, reoperasjoner.

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