REPORT of R.I.P.O.

Regional Register of Orthopedic Prosthetic Implantology

OVERALL DATA

HIP, KNEE AND SHOULDER ARTHROPLASTY

IN THE EMILIA-ROMAGNA REGION (ITALY)

1st January 2000 – 31st December 2011

SERVIZIO SANITARIO REGIONALE
EMILIA-ROMAGNA

Foreword

This is the twelfth report, elaborated by the Register of Orthopedic Prosthetic Implantology (RIPO). It presents the most significant results of the descriptive statistical analyses performed on hip, knee and shoulder arthroplasty surgeries carried out in the Emilia-Romagna region, in Italy, between **1st January 2000 and 31st December 2011**.
Starting from today this document accompanies the brief evaluations that authorized persons may make alone via the Register's website (https://ripo.cineca.it). The aim of this report is the presentation of the overall regional data:

- for the hip, total arthroplasty, hemiarthroplasty, resurfacing, revision and removal operations,
- for the knee, uni-, bi- and tricompartmental arthroplasty, revision and removal operations.
- for the shoulder (since July 2008), anatomical and inverse arthroplasty, resurfacing, revision and removal operations.

Altogether data of 112.000 hip, 60.000 knee and 1.700 shoulder prostheses have been reported from 72 Orthopedic Units in 61 Hospitals, either public or private.
Like in the past, data from the orthopedic wards were provided on paper forms. Registry staff transferred the data electronically to the databank run by CINECA (Interuniversity Consortium of North-East Italy), which was responsible for computer management and security aspects of the data. Statistical analysis was performed by Registry statistics staff.
The RIPO representatives of each surgical unit have cooperated actively in fulfilling the aims by providing clarification and integration of the data transferred, when necessary.

Objective of the Register

The Register has some fundamental objectives:

- to determine the demographic characteristics and the diagnostic categories of the patients who have undergone replacement surgery;
- to gather detailed information on the use of the different prostheses used in primary and revision surgery;
- to assess the effectiveness of the different types of prostheses;
- to supply orthopedic surgeons with a very useful tool to give the patient timely information;
- to collaborate in a post-marketing surveillance, allowing surgeons to easily identify patients implanted with a re-called implant;
- to compare the regional situation with other national and international situations with this aim; the present edition was designed to facilitate a comparison with the data presented by the Swedish and Australian registers, which were the models that inspired the RIPO analysis;
- to supply a confidential report to the Unit directors so that they can assess their performance in comparison with that reported in the register;
- to inform the Regional Orthopedic Commission about those implants that show an abnormal failure rate;
- to answer to questions coming from the Regional Orthopedic Commission.

Methodological notes

As for last year descriptive analyses are done on all cases, while survival analyses are performed only on patients living in the Emilia-Romagna region, in order to avoid the bias resulting from the 'loss' of non-resident patients.

Therefore, all survival analyses presented in this report are based on primary operations in patients resident in Emilia-Romagna and on revisions of same prostheses, wherever performed.
The number of implants for which survival is calculated is obviously lower than the amount present in the database, but the analysis is more accurate.
As for last year, the validity of the data reported in the present report is based on the **complete** adhesion to the register and degree of **reliability** of the information given.
The assessment of the **completeness** is made by comparison with the data from the Hospital Discharge database; in the last year the Register has 'captured' 98% of hip and knee operations.

As far as concerns the **reliability** of the data given, RIPO handles two types of data: incontrovertible data, either that RIPO checks by comparison with other data banks (labels of the components implanted, demographic data of the patients, dates of admission, any date of death), and not verifiable data such as disease that led to replacement or revision or the complications that arose during hospitalization. Reliability is checked by sampling the data, by asking for confirmation of some information. The percentage of responses obtained is increasing.

Explanatory guide for the survival analysis

The survival of the prosthesis is illustrated by tables and graphs.
The ***survival curves*** are calculated only on patients living in Region Emilia-Romagna; on the x-axis is the time expressed in years, on the y-axis the percentage of survival of the prosthesis. The curve starts, by definition, at 100% survival at the moment where the period of follow-up begins. The prosthesis is considered to be 'surviving' up to when it was necessary to intervene surgically to replace even a single component. The revision is, thus, the end-point. Each curve is flanked by a pair of curves symmetrical to it that are the 95% Confidence Interval, which delimits the interval of values where at 95% the possibility falls that a patient with prosthesis in place is found. The range of the interval is closely dependent on the number of operations considered in the analysis. If the number of operations is low, the uncertainty of the analysis is high, which is shown by a wide confidence interval.
Each graph is preceded by a table showing the number of prostheses considered and the number of failed prostheses.
The survival curves are preceded by the **multivariate analysis** performed according to the **Cox** method.
This analysis enables us to check what, if any, independent variables among them may influence the event, in our case the removal of at least one prosthetic component.
In the report both complete hip and knee prostheses and single components (acetabulum and stems) were compared, if there was a sufficient number of implants (at least 300 cases). The comparison tables show the number of implants and survival rate at 5 and 10 years.

Summary of the main results presented

HIP

During 2011 primary THA was performed in nearly 6500 patients to treat pathologies mainly primary arthrosis, arthrosis secondary to developmental dysplasia is progressively decreasing. Mean age at surgery is stable, with a slight increase for women (70.2yrs) and a slight decrease for men (66.8yrs). In 2011 91 different types of cup and 109 of stem were used. 40% of the stems have a modular neck. During 2011 100 different types of cotyls and 107 types of stems have been implanted; 26

and 24 of them are 'new' not implanted in previous years. Modular stems with exchangeable neck are implanted in 42% of cases.
Cemented prostheses were 62% in year 2000 and 94% in year 2010, whilst hybrid fixation was 22% and it is now 5%. Cemented prostheses are now only 1%, and they were 15% in year 2000.
Compared to year 2000, uncemented prostheses increased from 61% to 95%.
Most common articular coupling is ceramic on ceramic that in 2011 represents 60% of primary surgery (it was 18% in 2000); second most common is ceramic on poly (23%). Metal on poly, that was 45% in 2000, is now reduced to 13%. Nearly half of poly is cross-linked in met-poly and nearly three forth in cer-poly.

Resurfacing, that starting from 2006 were progressively decreasing, during 2011 showed a small increasing, representing 2.1% of primary surgery.

The survival of the hip prostheses is confirmed at very high levels. Nearly 93% of the 50.485 prostheses implanted in Emilia-Romagna region on resident patients are still in place 12 years after the operation.
Part (75%) of the 1736 revisions is major revisions, where at least one component interfacing with bone, has been revised. The remaining 25% are minor revisions (liner, head, and modular neck).
High incidence of prosthesis breakage was observed among causes of failure; this phenomenon is partially related to the extensive use of ceramic components and of exchangeable necks.
Survival of resurfacing, at 8 years, is slightly lower than THA (91.5%, statistically significant). This datum is affected by the recall of ASR. The most frequently implanted resurfacing, on the contrary, shows survival comparable to conventional THA.
As for previous years, multivariate analysis demonstrated that survival of prosthesis is significantly influenced by hip pathology. Patients with higher risk of revisions are those affected by rheumatic arthritis, fractures, sequelae of fractures and rare pathologies. Survival is lower for males and young patients.
At maximum 12 years of follow up failure seem not to be affected by fixation and articular coupling, but these two variables cannot be introduced in the Cox multivariate analysis, as they are not independent and they are linked to other variables, such as age at surgery. Survival curves for fixation and coupling are traced without adjusting.

We found no prosthesis (cup and stem) with sufficient number of cases, having a survival significantly lower than the mean of the region. In the analysis of single stems or cups, very few have survival slightly lower than the regional mean, barely statistically significant.
Hemiarthroplasty has an optimal survival of the implant (97% at 12 years) even if it is burdened by a high rate of patient's deaths due to age and general conditions of the patients.
Total revisions are not revised the second time in 87% of cases at 12 yrs.

KNEE
High percentage of primary knee prostheses is implanted in private structures (64% in 2011, vs 43% in 2000).
In 2010 10% of implanted prostheses are unicompartmental, 73% are bicompartmental with no patella resurfacing and the remaining 17% have patella resurfacing.
95% of implants are cemented. In one third of them cement is antibiotic loaded.
Procedure involving cruciate sacrifice is slightly increasing. (58% during last year).
Mobile inserts are used in 44.7% of implants, unchanged compared to previous year.
Types of implanted prostheses are less numerous and more stable during years compared to hip. Survival of bicompartmental is 94,9% at 10 yrs, survival of

tricompartmental is 95,7% and of unicompartmentale is significantly lower (88,0%). In these analyses patella resurfacing after primary TKA is not considered as a failure.

As requested by the Board, bicompartmental TKA has been calculated also considering patella resurfacing a failure.
The incidence of revisions due to infection in the prosthesis remains high, both in uni and bicompartmental implants.
At present it is irrelevant the use of antibiotic-loaded cement than conventional one.
Cox multivariate analysis shows that the survival of knee prostheses is negatively influenced by age of the patient (younger is the patient, lower is the expectancy of prosthesis survival) and by type of insert (mobile liner is worse than fixed liner).

Some models of have prosthetic survival slightly below the regional average, as already observed in previous report.

SHOULDER
Data refers to a short follow-up (30 months maximum). Interesting data are emerging particularly for types of prosthesis and epidemiology of surgery. Rapid increase of number of prostheses implanted in private hospitals has to be pointed out.
Reverse prosthesis is the most frequently implanted one.
Women are more affected than men, either for fracture and elective surgery.
Mean age at surgery for reverse prostheses is 73 for women and 71 for men. Patients are younger in anatomic prostheses (respectively 67 and 63)
Fixation of total is mainly cementless; fixation for hemi is equally distributed between cemented and cementless.
Survival at 3 yrs is 100% for anatomical, 96,9% for reverse and 94,7% for hemi.

Units supporting RIPO, Head of Orthopaedic Surgery Department or Health Manager in the case of Private Nursing homes and RIPO representatives inside the unit are listed in the Table below.
The data are updated to December 2012.

Province of Bologna

	Head of Orthopaedic Surgery Department or Health Manager	**RIPO Representative**
AZIENDA ULS BOLOGNA		
Ospedale Maggiore	Dott. Raffaele Pascarella	Dr. Diana Iantorno
Ospedale di Vergato	Dr. Giovanni Serra	Dr. Massimo Corlianò
Ospedale privato "Villa Regina"	Dir. San. Dr. Sandro Uva	Dr. Mirka Cocconcelli
Ospedale privato "Villa Erbosa"	Dir. San. Prof. Piero Fiorentini	Sig.ra Sladjana Karavdic Sig.ra Stefania Volpe
Ospedale privato "Villa Nigrisoli"	Dir. San. Dr. Sandro Uva	Dr. Mirka Cocconcelli
Ospedale privato "Villa Torri Hospital"	Dir. San. Dr. Gianluigi Gardini	Dr. Carlo Magelli
Ospedale privato "Villa Laura"	Dir. San. Dr. Domenico Cucinotta	Dr. Franca Frau
Ospedale privato "Prof. Nobili"	Dr. Margherita Gallina	Dr. Enzo Zanini
Ospedale privato "Villa Chiara"	Dir. San. Dott .Ezio Spasari	Dr. Ezio Spasari

Az. Osp-Univ S. Orsola-Malpighi	Dr. Massimo Laus	Dr. Luigi Brizio Dr. Valerio Bochicchio

Istituto Ortopedico Rizzoli	Clinica Ortopedica e Traumatologica II (Prof. Sandro Giannini) Clinica Ortopedica e Traumatologica III (Prof. Maurilio Marcacci) Chirurgia di Revisione della protesi d'anca e sviluppo nuovi impianti (Dr. Giovanni Pignatti) Chirurgia ortopedica conservativa e tecniche innovative (Dr. Dante Dallari) Clinica Ortopedica e Traumatologica IV a prevalente indirizzo Oncologico (Prof. Pietro Ruggieri f.f.) Ortopedia Bentivoglio (Dr. Mauro Girolami) Ortopedia-Traumatologia e Chirurgia protesica e dei reimpianti d'anca e di ginocchio (Dr. Aldo Toni) Chirurgia della spalla e del gomito (Dr. Roberto Rotini) Chirurgia ricostruttiva articolare dell'anca e del ginocchio (Dr. Ermanno A. Martucci)	
AZIENDA ULS IMOLA		
Ospedale Civile di Imola	Dr. Guglielmo Vicenzi	Dr. Marco Scardoni Dr. Michele Macchiagodena

Province of Ferrara

AZIENDA ULS FERRARA		
Ospedale di Cento	Dr. Giorgio Massini	Dr. Raffaele Rossi Dr. Giorgio Massini
Ospedale di Argenta	Dr. Michele Di Scioscio	Dr. Roberto Rossi Dr. Michele Di Scioscio
Ospedale del Delta	Dr. Giorgio Massini	Dr. Luigi Sorbilli

Az Osp-Univ Sant Anna Ferrara	Prof. Leo Massari	Prof. Leo Massari Dr. Gaetano Caruso

Province of Forlì-Cesena

AZIENDA USL FORLI'		
Ospedale di Forlì	Dr. Francesco Lijoi	Dr. Stefano Nardi
Ospedale privato "Villa Igea"	Dir. San Dr. Alberto Casadei	Dr. ssa Lorena Sangiorgi
Ospedale privato "Villa Serena"	Dir. San Dr. Alberto Casadei	Dr. Lorena Sangiorgi

AZIENDA USL CESENA		
Ospedale di Cesena	Dr. Mauro Monesi	Dr. Franco Calista Dr. Francesco Fanton
Ospedale privato casa di cura "Malatesta Novello"	Dir. San. Dr. Gianluca Bersani	Dr. Maria Gabriella Pignati

Ospedale privato casa di cura "San Lorenzino"	Dir. San. Dr. Raffaele Bisulli	Dr. Paolo Pardini

Province of Modena

AZIENDA USL MODENA		
Ospedale Baggiovara	Dr. Pier Bruno Squarzina	Dr. Giorgio Squarzina
Ospedale di Carpi	Dr. Eugenio Rossi Urtoler	Dr. Eugenio Rossi Urtoler Sig.ra Mariana Dardi
Ospedale di Mirandola	Dr. Franco Boselli	Sig. Gabriele Palumbo Sig.ra Adriana Cestari
Ospedale di Sassuolo	Dr. Luigi Adriano Pederzini	Dr. Mauro Grandini Dr. Gianluca Bonanno
Ospedale di Vignola	Dr. Gilberto Masetti	Dr. Mauro Tisi
Ospedale di Pavullo	Dr. Mario Longo	Dr. Mario Longo Dr. Angelo Rizza
Ospedale privato "Hesperia Hospital"	Dir. San. Dr. Stefano Reggiani	Dr. Michelina Guerra
Ospedale privato casa di cura "Prof. Fogliani"	Dr. Angelo Rosi	Dr. Angelo Rosi

Az. Osp-Univ Policlinico Modena	Prof. Fabio Catani	Prof. Fabio Catani Dr. Omofrio La Selva

Province of Parma

AZIENDA USL PARMA		
Ospedale Civile Fidenza	Prof. Enrico Vaienti	Sig.ra Sandra Teresa Regnani
Ospedale Borgo Val di Taro	Dr. Aldo Guardoli	Dr. Aldo Guardoli
Ospedale privato casa di cura "Città di Parma"	Dir. San. Dr. Tiziano Cocchi	Sig.ra Rosa Concari
Ospedale privato "Hospital Piccole Figlie"	Dir. San. Dr. Giorgio Bordin	Sig.ra Paola Casalini

Azienda Osp-Univ di Parma	Clinica ortopedica (Prof. Francesco Ceccarelli)	Dr. Paolo Perini Dr. Francesco Zaniboni Dr. Filippo Calderazzi
	Ortopedia (Prof. Pietro Marenghi)	Prof. Francesco Ceccarelli Prof. Pietro Marenghi

Province of Piacenza

AZIENDA USL PIACENZA		
Ospedale di Piacenza	Dr. Pietro Maniscalco	Dr. Pietro Maniscalco Dr. Giuseppe Ghidoni
Pres. Val Tidone, Castel San	Dr. Giuseppe Leddi	Dr. Claudio Gheduzzi

Giovanni		Sig.ra Raffaella Sorsi
Pres. Val D'Arda, Fiorenzuola D'Arda	Dr. Pietro Maniscalco	Dr. Stefano Cervi Sig.ra Maria Fava
Ospedale privato casa di cura Piacenza	Dr. Sergio Freschi	Sig.ra Brunetta Nazzari

Province of Ravenna

AZIENDA USL RAVENNA		
Ospedale di Ravenna	Dr. Alberto Belluati	Dr. Raffaele Pezzella
Ospedale di Lugo	Dr. Gabriele Zanotti	Dr. Gabriele Zanotti Dr. Alessandro Soldati
Ospedale di Faenza	Dr. Maurizio Fontana Dr. Andrea Martini	Dr. Paolo Frontali Dr.ssa Milena Sirri
Ospedale privato "Domus Nova"	Dir. San. Dr. Eugenio De Liberati	Dr. Eugenio De Liberati Dr. Massimo De Zerbi
Ospedale privato "San Francesco"	Dir. San. Dr. Giorgio Sansone di Campobianco	Mrs. Joanna Gorniak
Ospedale privato "Maria Cecilia Hospital"	Dir. San. Dr. Folco Galeati	Dr. Silvia Rapuano
Ospedale privato "San Pier Damiano"	Dir. San. Dr. Roberto Nonni	Dr. Maurizio Bergami Sig.ra Elena Ravagli

Province of Reggio-Emilia

AZIENDA USL REGGIO EMILIA		
Ospedale di Guastalla	Dr. Panno Bruno	Dr. Panno Bruno
Ospedale di Montecchio Emilia	Dr. Norberto Negri	Dr. Antonio Palmieri
Ospedale di Scandiano	Dr. Salsi Antonello	Dr. Orlando Montanari
Ospedale di Castelnovo Monti	Dr. Paolo Carretti	Dr. Giuseppe Sciaboni
Ospedale privato "Salus Hospital"	Dr. Luigi Lezzi	Dr. Rodolfo Rocchi Dr. Ivo Tartaglia
Ospedale privato "Villa Verde"	Dr. Sergio Roti	Dr. Uluhogian Sevag

Az Osp Arcisp Santa Maria Nuova	Dr. Ettore Sabetta	Dr.Valentina Montemaggiori

Province of Rimini

AZIENDA USL RIMINI		
Ospedale di Rimini	Dr. Giannicola Lucidi	Dr. Giannicola Lucidi

		Dr.ssa Marina Gigli
Ospedale di Riccione	Dr. Lorenzo Ponziani	Dr. Luigi D'Elia
Ospedale Cervesi Cattolica	Dr. Giuseppe Porcellini	Dr. Giuseppe Porcellini
Ospedale privato "Sol et Salus"	Dir. San. Dr. Pier Paolo Balli	Sig.ra Ileana Zucchini Dr. Marco Fravisini
Ospedale privato casa di cura "Prof. E. Montanari"	Prof. Marco Bosso	Dr. Lia Montanari
Ospedale privato "Villa Maria Rimini"	Dir. San. Dr.ssa Giuliana Vandi	Dr.ssa Giuliana Vandi Dr. Giuliana Valdi

Dir.San.= Healthcare Medical Director

The RIPO has been recognized by the Region of Emilia-Romagna formative event in the field, the referents thus acquire their CME credits.

Board

· **Dr. Stefano Liverani**, Direttore Sanitario IRCCS Istituto Ortopedico Rizzoli, Bologna (Presidente)

· **Dr. Stefano Boriani**, Direttore di Struttura Complessa - Chirurgia Vertebrale a indirizzo Oncologico e Degenerativo, IRCCS Istituto Ortopedico Rizzoli, Bologna
· **Dr. Stefano Busetti**, Direttore Sanitario Presidio Ospedaliero di Rimini – Santarcangelo – Novafeltria, AUSL Rimini
· **Prof. Fabio Catani**, Direttore U.O. Ortopedia e Traumatologia, Azienda Ospedaliero-Universitaria di Modena
· **Dr.ssa Rossana De Palma**, Dirigente responsabile dell'Area Governo clinico dell'Agenzia Sanitaria e Sociale Regionale dell'Emilia-Romagna
· **Dr. Salvatore Ferro**, Servizio Presidi Ospedalieri, Direzione generale Sanità e Politiche Sociali Regione Emilia-Romagna
· **Dr. Mauro Girolami**, Direttore Responsabile della Nuova Struttura Complessa di Traumatologia di II Livello collocata presso la sede distaccata dell'IRCCS Istituto Ortopedico Rizzoli, sita nell'Ospedale di Bentivoglio
· **Dr. Francesco Lijoi**, Direttore U.O. Ortopedia-Traumatologia, Azienda USL di Forlì
· **Dr. Pietro Maniscalco**, Direttore U.O. Traumatologia, Azienda USL di Piacenza
· **Dr. Mauro Marabini**, Direttore Sanitario Azienda USL di Ferrara
· **Prof. Pietro Marenghi**, Direttore Struttura complessa Ortopedia, Dipartimento Chirurgico, Azienda Ospedaliero-Universitaria di Parma
· **Dr. Giorgio Martelli**, Direttore Sanitario Azienda USL di Cesena
· **Prof. Leo Massari**, Direttore U.O. Ortopedia, Azienda Ospedaliero- Universitaria di Ferrara
· **Dr. Guido Pedrazzini**, Direttore Sanitario Azienda USL di Modena
· **Dr.ssa Maria Gabriella Pignati**, Direttore Unità funzionale di Ortopedia – Traumatologia, Malatesta Novello, Cesena
· **Dr. Gennaro Pipino**, Direttore Reparto di Ortopedia, Ospedali Privati Riuniti - Villa Regina, Bologna
· **Dr. Lorenzo Ponziani**, Direttore U.O. Ortopedia e Traumatologia, Ospedale Ceccarini di Riccione, Azienda USL di Rimini
· **Dr. Luigi Prosperi**, Direttore U.O. Ortopedia e Traumatologia, Ospedale Maggiore, Azienda USL di Bologna
· **Dr. Ettore Sabetta**, Direttore Dipartimento Neuro-Motorio e Direttore U.O. Ortopedia, Azienda Ospedaliera di Reggio Emilia
· **Dr. Aldo Toni**, Direttore di Struttura Complessa Ortopedia-Traumatologia e Chirurgia Protesica e dei reimpianti d'anca e di ginocchio e Direttore di Struttura Complessa Laboratorio di Tecnologia Medica, IRCCS Istituto Ortopedico Rizzoli, Bologna
· **Dr. Guglielmo Vicenzi**, Direttore Dipartimento Chirurgico e Direttore U.O. Ortopedia, Azienda USL di Imola
· **Dr. Gabriele Zanotti**, Direttore U. O. Ortopedia e Traumatologia, Ospedale di Lugo, Azienda USL di Ravenna

Collaborators

· **Simona Bartoli**, Agenzia Sanitaria e Sociale Regionale dell'Emilia-Romagna
· **Susanna Trombetti**, Agenzia Sanitaria e Sociale Regionale dell'Emilia-Romagna
· **Chiara Ventura**, Agenzia Sanitaria e Sociale Regionale dell'Emilia-Romagna

The report has been prepared by Dr. Susanna Stea (data manager), Dr. Barbara Bordini (responsable for statistics), Dr. Stefano Falcioni and Dr. Cristina Ancarani (statisticians), with collaboration of Viridiana Casara, Anne Marie Chiesa, Alessandro La Loggia and Luigi Lena (graphic designer).
MargheritaRomagnoli is gratefully acknowledged for linguistic revision.

Technological partner for computer management of the database is CINECA of Bologna.

Bologna, 1st december 2012

PART ONE: HIP PROSTHESES

January 2000 – December 2011

1. RIPO data collection

1.1 Percentage of R.I.P.O. data collection

Percentage of R.I.P.O. data collection calculated versus hospital discharge data (S.D.O. – Schede di Dimissione Ospedaliera), is **97.9**% in the year 2011. Data are referred to primary total hip replacements (8151;74;75;76;85;86), hemiarthroplasties (8152), revision (8153;70;71;72;73) and prosthesis removal (8005).

1.2 Ratio public/private treatment

Percentage of primary total arthroplasties, hemiarthroplasties and revision surgeries of the hip performed in public hospitals.

% of operations performed in public hospitals (AUSL, AOSP, IRCCS)			
Year of surgery	**Total hip arthroplasties**	**Hemiarthroplasties**	**Revisions**
2000	77,0	97,0	78,0
2001	81,0	97,3	77,0
2002	78,0	97,5	79,0
2003	75,1	98,4	76,1
2004	75,3	97,6	76,1
2005	72,9	98,3	77,7
2006	74,8	99,0	74,5
2007	70,8	98,6	73,6
2008	71,6	98,9	76,0
2009	70,9	99,3	76,3
2010	71,8	99,3	76,8
2011	69,9	99,3	78,8

From SDO database

2. Types of surgery

Number of hip surgeries carried out on patients with admission date between 1st January 2000 and 31st December 2011, according to **type of surgery**.

Type of surgery	Number of surgeries	Percentage
Primary THA	67.595	62,5
Hemiarthroplasty	26.796	24,8
Total and partial revision*	10.891	10,1
Resurfacing	1.418	1,3
Prosthesis removal	762	0,7
Hemiarthroplasty with buffer°	118	0,1
Other	533	0,5
Total	**108.113**	**100,0**

° acetabular buffer

* 3.206 total revision, 4.459 cup revisions, 1.967 stem revisions, 1.259 revisions of other components.

Number of hip operations carried out with ***resurfacing prostheses***.

Year of operation	N.
2000	3
2001	7
2002	34
2003	77
2004	113
2005	178
2006	217
2007	200
2008	163
2009	166
2010	122
2011	138

Percentage increase of the number of primary and revision operations compared to the previous year.

Year of operation	Primary THA		Revision (total + partial)	
	N.	Increase %	N.	Increase %
2000	4.369		743	
2001	4.581	4,9%	856	15,2%
2002	4.641	1,3%	871	1,8%
2003	5.045	8,7%	862	-1,0%
2004	5.359	6,2%	858	-0,5%
2005	5.566	3,9%	827	-3,6%
2006	5.832	4,8%	943	14,0%
2007	6.247	7,1%	1.019	8,1%
2008	6.327	1,3%	984	-3,4%
2009	6.684	5,6%	987	0,3%
2010	6.572	-1,7%	1.030	4,4%
2011	6.372	-3,0%	911	-11,6%

3. Descriptive statistics of patients

3.1 Age

Number of hip operations carried out on patients with admission date between 1st January 2000 and 31st December 2011, according to **type of operation** and **age group** of patients at the time of surgery.

Type of operation	<40		40-49		50-59		60-69		70-79		≥80		Total
	N.	%	N.	%	N.	%	N.	%	N.	%	N.	%	
Primary THA	2.103	3,1	4.338	6,4	9.673	14,3	19.556	28,9	24.657	36,5	7.267	10,8	67.594
Hemiarthroplasty	18	0,1	55	0,2	163	0,6	883	3,3	6.317	23,6	19.359	72,2	26.795
Revision	216	2,0	440	4,0	1.125	10,3	2.775	25,5	4.399	40,4	1.936	17,8	10.891
Resurfacing	219	15,4	369	26,0	481	33,9	289	20,4	59	4,2	1	0,1	1.418
Prosthesis removal	27	3,5	40	5,2	80	10,5	195	25,6	297	39,0	123	16,1	762
Hemiarthroplasty with buffer	0	0,0	2	1,7	3	2,5	15	12,7	36	30,5	62	52,5	118
Other	23	4,3	34	6,4	67	12,6	132	24,8	181	34,0	96	18,0	533
Total*	**2.606**	**2,4**	**5.278**	**4,9**	**11.592**	**10,7**	**23.845**	**22,1**	**35.946**	**33,2**	**28.844**	**26,7**	**10.8111**

*2 missing data

Mean age at surgery

Type of operation	Mean age	Range
Primary THA	66,6	12-101
Hemiarthroplasty	83,0	20-109
Resurfacing	51,3	15-81
Revision	69,7	15-100

Mean age of patients, per type of operation, comparison 2000-2011

	Year 2000		Year 2011	
Type of operation	**Mean age**	**Range**	**Mean age**	**Range**
Primary THA	66,0	16-99	66,8	12-99
Hemiarthroplasty	82,4	35-104	83,9	35-105
Revision	68,6	22-97	70,1	15-94

	Year 2003		Year 2011	
Type of operation	**Mean age**	**Range**	**Mean age**	**Range**
Resurfacing	49,7	18-72	49,6	19-71

Mean age at surgery of patients affected by coxarthrosis

	THA			
	Year 2000		Year 2011	
Gender	**Mean age**	**Range**	**Mean age**	**Range**
Males	67,3	34-92	66,8	34-94
Females	68,9	31-93	70,2	28-93

3.2 Gender

Number of hip operations carried out on patients with admission date between 1st January 2000 and 31st December 2011, according to **type of operation** and **sex** of patient.

Type of operation	Males		Females		Total
	N.	%	N.	%	N.
Primary THA	26.487	39,2	41.108	60,8	67.595
Hemiarthroplasty	6.660	24,9	20.136	75,1	26.796
Revision	3.509	32,2	7.382	67,8	10.891
Resurfacing	972	68,5	446	31,5	1.418
Removal	297	39,0	465	61,0	762
Hemiarthroplasty with buffer	25	21,2	93	78,8	118
Other	224	42,0	309	58,0	533
Total	**38.174**	**35,3**	**69.939**	**64,7**	**108.113**

3.3 Side of surgery

Coxarthrosis more often affects right hip (58.7%). The percentage has been calculated on patients wearing only one implant due to primary coxarthrosis.

Percentage of operations carried out on the right or left side, considered by gender

Side	Males	Females
Right	53,1	60,5
Left	46,9	39,5

The difference is statistically significant (Chi – squared $p<0.001$).

3.4 Diseases treated with total hip arthroplasty

Number of primary total hip arthroplasty operations carried out on patients with admission date between 1st January 2000 and 31st December 2011, according to **diagnosis**

Diagnosis	Number	Percentage
Primary arthritis	45.266	67,1
Sequelae of LCA and DCA	7.328	10,9
Femoral neck fracture	5.959	8,9
Femoral head necrosis (idiopathic, due to dialysis, due to steroids)	3.949	5,9
Post traumatic arthritis	1.638	2,4
Post traumatic necrosis	914	1,4
Rheumatic arthritis	874	1,3
Femoral neck fracture sequelae	562	0,8
Epiphysiolysis sequelae	187	0,3
Perthes disease sequelae	155	0,2
Septic coxitis sequelae	130	0,2
Tumor	107	0,2
Paget disease	73	0,1
TBC coxitis sequelae	52	0,1
Other	133	0,2
Total**	**67.327**	**100.0**

** 268 missing data (0.4%)

Prostheses for bone tumor resection are not registered by R.I.P.O.

Percentage distribution of diseases leading to THA according to **year of operation**

Diagnosis in primary arthroplasty	Percentage			
	2000-2002	2003-2005	2006-2008	2009-2011
Primary arthrosis	65,0	68,0	67,3	68,4
Sequelae of LCA and DCA	13,3	11,2	10,4	8,6
Femoral neck fracture	9,1	8,4	9,0	9,4
Femoral head necrosis idiopathic	5,2	5,3	5,8	6,0
Post traumatic arthritis	2,5	2,2	2,5	2,4
Post traumatic necrosis	1,5	1,4	1,4	1,2
Rheumatic arthritis	1,5	1,3	1,1	1,0
Other	1,9	2,1	2,6	3,1

Number of **resurfacing** operations carried out on patients with admission date between 1st January 2000 and 31st December 2011, according to **diagnosis**.

Diagnosis in resurfacing	Number	Percentage
Primary arthrosis	1.015	71,6
Sequelae of LCA and DCA	156	11,0
Post traumatic arthritis	78	5,5
Femoral head necrosis (idiopathic, due to dialysis, due to steroids)	86	6,1
Rheumatic arthritis	26	1,8
Post traumatic necrosis	12	0,8
Femoral neck fracture sequelae	8	0,6
Epiphysiolysis sequelae	10	0,7
Perthes disease sequelae	8	0,6
Septic coxitis sequelae	3	0,2
Anchylosing spondylitis	2	0,1
Paget's disease sequelae	3	0,2
Poliomyelitis sequelae	1	0,1
TBC coxitis sequelae	1	0,1
Femoral neck fracture	1	0,1
Other	3	0,2
Total*	**1.413**	**100,0**

*5 missing data, (0.3%)

3.5 Causes for revision

Number of revision operations carried out on patients admitted between 1st January 2000 and 31st December 2011 according to ***diagnosis***
In italic revisions of hemiarthroplasty, underscored revisions of resurfacings.
In the Table all revisions performed in the Region, without taking care of site and date of primary implant are reported. No indication of follow-up time is in these data.

Diagnosis in revision	Number	Percentage
Cup aseptic loosening	3.262	30,4
Total aseptic loosening	2.303	21,4
Stem aseptic loosening	1.242	11,5
Prosthesis dislocation	884	8,2
Bone fracture	505	4,7
Two steps prosthesis removal	441	4,1
Prosthesis breakage*	436	4,1
Poly wear	321	3,0
Hemiarthroplasty dislocation	281	2,6
Cotiloiditis	253	2,4
Hemiarthroplasty stem loosening	235	2,2
Pain without loosening	144	1,3
Septic loosening	129	1,2
Other diagnosis (trauma, fracture…)	78	0,7
Primary instability	59	0,5
Bone fracture in hemiarthroplasty	58	0,5
Loosening of resurfacing	40	0,4
Bone fracture in resurfacing	34	0,3
Primary instability in hemiarthroplasty	7	0,1
Pain in resufacing	7	0,1
Metallosis in resufacing	5	0,0
Heterotopic bone	35	0,3
Total**	**10.759**	**100,0**

***** Failure of 56 cups, 59 stems, 81 heads, 99 liners, 119 modular necks

****** 132 missing data, (1.2%)

4. Types of prostheses

The following tables show the types of prostheses (cups, stems) commonly used in the Emilia-Romagna region, according to primary and revision surgery.

4.1 Cups used in primary surgery

Cemented cups	2000-2004		2005-2009		2010-2011	
	N.	%	N.	%	N.	%
MULLER Citieffe	10	0,3	40	2,6	41	20,1
ZCA Zimmer	375	12,2	235	15,5	29	14,2
CUPULE AVANTAGE Biomet	2	0,1	46	3,0	29	14,2
CONTEMPORARY Stryker Howmedica	458	14,9	311	20,6	22	10,8
MULLER Samo	351	11,4	85	5,6	13	6,4
MULLER Sulzer-Centerpulse-Zimmer	342	11,2	82	5,4	10	4,9
PE Adler-Ortho	-	-	157	10,4	9	4,4
MULLER Lima	116	3,8	120	7,9	7	3,4
CCB Mathys	47	1,5	4	0,3	3	1,5
MULLER Smith & Nephew	264	8,6	165	10,9	1	0,5
MULLER Wright Cremascoli	903	29,4	58	3,8	-	-
MULLER Groupe Lepine	39	1,3	18	1,2	-	-
LUNA Amplitude	-	-	88	5,8	-	-
Other (< 50 cases)	160	5,2	104	6,9	40	19,6
Totale	**3.067**	**100,0**	**1.513**	**100,0**	**204**	**100,0**

102 missing data

Cementless cup	2000-2004		2005-2009		2010-2011	
	N.	%	N.	%	N.	%
FIXA TI-POR Adler-Ortho	-	-	1946	6,7	3694	29,0
EP-FIT PLUS Smith & Nephew	24	0,1	2574	8,8	1143	9,0
FIXA Adler-Ortho	16	0,1	6435	22,1	800	6,3
R3 Smith & Nephew	-	-	49	0,2	648	5,1
PINNACLE SECTOR II DePuy	69	0,3	622	2,1	529	4,2
EXCEED ABT Biomet	-	-	366	1,3	487	3,8
CONTINUUM Zimmer	-	-	10	0,0	392	3,1
DELTA PF Lima	96	0,5	1042	3,6	329	2,6
ABGII Stryker Howmedica	1309	6,3	1082	3,7	307	2,4
EXPANSION Mathys	51	0,2	976	3,3	290	2,3
SPARKUP Samo	-	-	134	0,5	256	2,0
DELTA TT Lima	-	-	147	0,5	231	1,8
FITMORE Sulzer-Centerpulse-Zimmer	1368	6,6	1193	4,1	230	1,8
TRIDENT Stryker Howmedica	459	2,2	1345	4,6	229	1,8
ALLOFIT S Zimmer	-	-	16	0,1	228	1,8
RECAP RESURFACING Biomet	-	-	631	2,2	215	1,7
VERSAFITCUP CC Medacta	-	-	391	1,3	211	1,7
REFLECTION Smith & Nephew	866	4,1	817	2,8	183	1,4
SELEXYS TH+ Mathys	-	-	-	-	176	1,4
CUPULE RELOAD AVANTAGE Biomet	-	-	118	0,4	138	1,1
HILOCK LINE Symbios	245	1,2	294	1,0	102	0,8
BETA CUP Link	-	-	147	0,5	101	0,8
FIN II Biompianti	-	-	9	0,0	101	0,8
JUMP Permedica	30	0,1	54	0,2	101	0,8
POLARCUP Ortho-Id	-	-	136	0,5	101	0,8
CLS Sulzer-Centerpulse-Zimmer	2480	11,9	800	2,7	89	0,7
BS Citieffe	-	-	264	0,9	82	0,6

REGENEREX RINGLOC+ Biomet	-	-	53	0,2	78	0,6
Cupule April Symbios	-	-	77	0,3	76	0,6
TRABECULAR METAL Zimmer	17	0,1	437	1,5	61	0,5
BHR Smith & Nephew	-	-	75	0,3	53	0,4
BICON PLUS Smith & Nephew	318	1,5	898	3,1	52	0,4
SELEXYS TH Mathys	-	-	531	1,8	50	0,4
CUPULE AVANTAGE Biomet	87	0,4	278	1,0	37	0,3
MALLORY Biomet	74	0,4	141	0,5	31	0,2
TRILOGY Zimmer	809	3,9	273	0,9	25	0,2
M2A Biomet	72	0,3	114	0,4	21	0,2
DUOFIT PDT Samo	29	0,1	169	0,6	20	0,2
MRS RIVESTIMENTO Lima	-	-	160	0,5	20	0,2
COOPER Permedica	37	0,2	194	0,7	18	0,1
TRILOGY AB Zimmer	115	0,6	243	0,8	17	0,1
CFP Link	216	1,0	296	1,0	15	0,1
ALLOFIT Zimmer	1	0,0	119	0,4	14	0,1
EASY HIT Medica	155	0,7	140	0,5	13	0,1
PROCOTYL-L Wright Cremascoli	-	-	141	0,5	11	0,1
DUROM HIP RESURFACING Zimmer	1	0,0	309	1,1	9	0,1
DUOFIT PSF Samo	1056	5,1	310	1,1	8	0,1
MOBILIS I Othesio	-	-	107	0,4	7	0,1
MBA Groupe Lepine	102	0,5	111	0,4	6	0,0
ASR Depuy	5	0,0	95	0,3	3	0,0
ABG Stryker Howmedica	225	1,1	-	-	-	-
ALBI + Wright Cremascoli	159	0,8	-	-	-	-
AnCA FIT Wright Cremascoli	6022	28,8	686	2,4	-	-
ELLIPTICAL CUP HEDROCEL Stratec	154	0,7	-	-	-	-
ELLIPTICAL CUP Stratec	197	0,9	-	-	-	-
EXCEED PC Biomet	87	0,4	98	0,3	-	-
MARBURG Zimmer	164	0,8	2	0,0	-	-
METASUL STAR CUP Sulzer	145	0,7	-	-	-	-
OSTEOLOCK Stryker Howmedica	173	0,8	-	-	-	-
SECUR-FIT Stryker Osteonics	170	0,8	-	-	-	-
SPH BLIND Lima	81	0,4	121	0,4	-	-
SPH CONTACT Lima	227	1,1	10	0,0	-	-
STANDARD CUP Protek Sulzer Zimmer	1116	5,3	60	0,2	-	-
TRABECULAR METAL MONOBLOCK Zimmer	150	0,7	267	0,9	-	-
Other (< 100 cases)	1697	8,1	971	3,3	679	5,3
Total*	**20874**	**100,0**	**29084**	**100,0**	**12717**	**100,0**

In the table cups designed for resurfacing but implanted in traditional THA are reported.

*In 34 cases the type of cup was not communicated to RIPO

4.2 Cups used in total revision surgery

In 14 cases the type the fixation and/or the type of cup was not communicated to RIPO

Cemented cup	2000-2004		2005-2009		2010-2011	
	N.	%	N.	%	N.	%
MULLER Protek-Sulzer-Centerpulse-Zimmer	98	24,9	59	29,8	14	25,5
CONTEMPORARY Stryker Howmedica	85	21,6	31	15,7	9	16,4
MULLER Samo	40	10,2	21	10,6	7	12,7
ZCA Zimmer	22	5,6	10	5,1	6	10,9
CUPULE AVANTAGE CEMENTED Biomet	1	0,3	19	9,6	5	9,1
MULLER Lima	31	7,9	13	6,6	4	7,3
CCB Mathys	19	4,8	-	-	1	1,8
MULLER Smith & Nephew	8	2,0	6	3,0	-	-
MULLER Wright Cremascoli	53	13,5	5	2,5	-	-
Other (< 10 cases)	36	9,2	34	17,2	9	16,4
Total	**393**	**100,0**	**198**	**100,0**	**55**	**100,0**

Cementless cup	2000-2004		2005-2009		2010-2011	
	N.	%	N.	%	N.	%
FIXA Ti-Por Adler-Ortho	-	-	34	3,3	70	17,5
DELTA ONE TT Lima	-	-	5	0,5	39	9,7
TRABECULAR METAL Zimmer	2	0,2	98	9,6	38	9,5
REGENEREX RINGLOC+ Biomet	-	-	10	1,0	31	7,7
Hermes BS Rev Citieffe	-	-	21	2,1	22	5,5
DELTA TT Lima	-	-	12	1,2	21	5,2
CONTINUUM Zimmer	-	-	1	0,1	19	4,7
DELTA REVISION TT Lima	-	-	1	0,1	19	4,7
OMNIA Adler-Ortho	-	-	36	3,5	15	3,7
EP-FIT PLUS Smith & Nephew	-	-	22	2,1	14	3,5
TRILOGY Zimmer	79	7,0	49	4,8	9	2,2
DELTA PF Lima	0	0,0	35	3,4	6	1,5
BICON PLUS Smith & Nephew	5	0,4	17	1,7	3	0,7
FIXA Adler-Ortho	-	-	125	12,2	3	0,7
TRIDENT Stryker Howmedica	27	2,4	121	11,8	3	0,7
CLS Zimmer	34	3,0	7	0,7	2	0,5
FITMORE Zimmer	35	3,1	17	1,7	2	0,5
MC MINN Link	63	5,6	24	2,3	2	0,5
ABGII Stryker Howmedica	12	1,1	8	0,8	1	0,2
PINNACLE MULTIHOLE II DePuy	7	0,6	24	2,3	1	0,2
REFLECTION Smith & Nephew	9	0,8	20	2,0	1	0,2
AnCA FIT Wright Cremascoli	282	25,2	18	1,8	-	-
CONICAL SCREW CUP Protek	25	2,2	-	-	-	-
DUOFIT PSF Samo	30	2,7	19	1,9	-	-
LOR ALLOPRO Sulzer	42	3,7	1	0,1	-	-
OSTEOLOCK Stryker Howmedica	47	4,2	-	-	-	-
PROCOTYL-E Wright Cremascoli	32	2,9	4	0,4	-	-
PROCOTYL-Z-PIVOT Wright Cremascoli	4	0,4	18	1,8	-	-
SECUR-FIT Stryker Osteonics	25	2,2	-	-	-	-
STANDARD CUP Protek Sulzer	128	11,4	4	0,4	-	-
TRIDENT ARC2F Stryker Howmedica	-	-	36	3,5	-	-
Other (< 20 cases)	233	20,8	237	23,1	80	20,0
Total	**1121**	**100,0**	**1024**	**100,0**	**401**	**100,0**

4.3 Stems used in primary surgery

In 132 cases the type of stem used in primary operations was not communicated to RIPO

Cemented stem	2000-2004		2005-2009		2010-2011	
	N.	%	N.	%	N.	%
APTA Adler-Ortho	0	0,0	974	25,3	107	17,4
BASIS Smith & Nephew	336	4,7	448	11,6	91	14,8
C-STEM AMT DePuy	-	-	19	0,5	84	13,7
EXETER Stryker Howmedica	641	9,0	565	14,7	51	8,3
AB Citieffe	23	0,3	78	2,0	49	8,0
LC Samo	315	4,4	51	1,3	37	6,0
CCA Mathys	38	0,5	142	3,7	27	4,4
TAPERLOC CEM Biomet	1	0,0	44	1,1	20	3,3
SL Lima	39	0,5	33	0,9	17	2,8
VERSYS ADVOCATE Zimmer	33	0,5	189	4,9	16	2,6
AD Samo	313	4,4	66	1,7	9	1,5
LUBINUS SP2 Link	225	3,2	66	1,7	8	1,3
MERCURIUS Adler-Ortho	0	0,0	102	2,6	8	1,3
P507 Samo	455	6,4	196	5,1	6	1,0
ARCAD SO Symbios	-	-	64	1,7	2	0,3
MS 30 Zimmer	174	2,4	9	0,2	2	0,3
SL STREAKES Hitmedica	40	0,6	8	0,2	2	0,3
SPECTRON Smith & Nephew	551	7,7	170	4,4	2	0,3
DUOFIT CKA Samo	15	0,2	35	0,9	1	0,2
ABG Stryker Howmedica	229	3,2	-	-	-	-
ABGII Stryker Howmedica	55	0,8	1	0,0	-	-
AHS Wright Cremascoli	302	4,2	4	0,1	-	-
ANCA Wright Cremascoli	89	1,2	-	-	-	-
ANCA-FIT CLU Wright Cremascoli	303	4,2	11	0,3	-	-
C STEM DePuy	230	3,2	84	2,2	-	-
DEFINITION Stryker Howmedica	272	3,8	75	1,9	-	-
DUOFIT CFS Samo	59	0,8	13	0,3	-	-
FULLFIX Mathys	67	0,9	-	-	-	-
JVC Wright Cremascoli	669	9,4	58	1,5	-	-
MBA Groupe Lepine	46	0,6	41	1,1	-	-
MRL Wright Cremascoli	468	6,6	1	0,0	-	-
MULLER AUTOBLOCCANTE Sulzer	43	0,6	11	0,3	-	-
PERFECTA RA Wright	51	0,7	9	0,2	-	-
ULTIMA Johnson & Johnson	197	2,8	-	-	-	-
VERSYS CEMENTED LD Zimmer	123	1,7	10	0,3	-	-
VERSYS CEMENTED Zimmer	333	4,7	2	0,1	-	-
Other (< 50 cases)	398	5,6	276	7,2	76	12,4
TOTAL*	**7.133**	**100,0**	**3.855**	**100,0**	**615**	**100,0**

* In 28 cases the type of cemented stem was not communicated to RIPO

Uncemented stem	2000-2004		2005-2009		2010-2011	
	N.	%	N.	%	N.	%
APTA Adler-Ortho	10	0,1	4.077	15,2	2.000	16,2
RECTA Adler-Ortho	6	0,0	2731	10,3	1.119	9,1
HYDRA Adler-Ortho	-	-	317	1,2	735	6,0
TAPERLOC Biomet	158	0,9	1.239	4,6	664	5,4
SL PLUS Smith & Nephew	528	3,1	2.674	10,0	662	5,4
CONUS Zimmer	2.176	13,0	1.705	6,5	528	4,4
CBC Mathys	104	0,6	1.222	4,6	519	4,2
ABGII Stryker Howmedica	1.229	7,3	1.584	5,9	431	3,5
SL PLUS MIA STEM Smith & Nephew	-	-	5	0,0	427	3,5
CORAIL DePuy	218	1,3	446	1,7	364	3,0
PROXYPLUS Endoplant Gmbh	-	-	824	3,1	316	2,6
CLS Zimmer	2.556	15,2	1.109	4,1	302	2,4
ADR Smith & Nephew	-	-	200	0,7	262	2,1
PARVA Adler-Ortho	-	-	4	0,0	258	2,1
FITMORE Zimmer	-	-	95	0,4	227	1,8
NANOS Endoplant gmbh	-	-	169	0,6	204	1,7
ALATA ACUTA S Adler-Ortho	-	-	453	1,7	190	1,5
TAPERLOC MICROPLASTY Biomet	-	-	128	0,5	189	1,5
MODULUS HIP SYSTEM Lima	44	0,3	371	1,4	183	1,5
CFP Link	237	1,4	624	2,3	159	1,3
MULTIFIT Samo	-	-	142	0,5	138	1,1
MINIMAX Medacta	-	-	96	0,4	137	1,1
SAM-FIT Lima	-	-	36	0,1	125	1,0
SPS MODULAR Symbios	-	-	111	0,4	121	1,0
VERSYS FIBER METAL TAPER Zimmer	594	3,5	463	1,7	111	0,9
PLS Lima	-	-	32	0,1	96	0,8
PBF Permedica	71	0,4	166	0,6	94	0,8
S-TAPER Bioimpianti	-	-	10	0,0	92	0,7
SYNERGY Smith & Nephew	220	1,3	245	0,9	92	0,7
QUADRA-H Medacta	-	-	137	0,5	89	0,7
DUOFIT RTT Samo	23	0,1	92	0,3	78	0,6
SUMMIT DePuy	1	0,0	192	0,7	70	0,6
C2 Lima	298	1,8	540	2,0	64	0,5
Z1 Citieffe	-	-	230	0,9	64	0,5
ACCOLADE Stryker Osteonics	92	0,5	236	0,9	59	0,5
PROFEMUR Z Wright Cremascoli	574	3,4	68	0,3	51	0,4
CONELOCK SHORT Biomet	0	0,0	245	0,9	41	0,3
PORO-LOCK II HIT Medica	48	0,3	108	0,4	39	0,3
QUADRA-S Medacta	3	0,0	171	0,6	38	0,3
ALLOCLASSIC SL ALLOPRO Sulzer	169	1,0	129	0,5	32	0,3
ARCAD HA Symbios	5	0,0	203	0,8	32	0,3
HIPSTAR + Stryker Howmedica	-	-	192	0,7	29	0,2
SL REVISION Zimmer	67	0,4	71	0,3	29	0,2
HIPSTAR Stryker Howmedica	124	0,7	193	0,7	19	0,2
MAYO Zimmer	36	0,2	82	0,3	14	0,1
PPF Biomet	168	1,0	75	0,3	14	0,1
ANCA FIT Wright Cremascoli	3.819	22,8	678	2,5	6	0,0
MBA HAP Groupe Lepine	37	0,2	83	0,3	6	0,0
S. ROM Johnson e Johnson	79	0,5	86	0,3	6	0,0
DUOFIT RKT Samo	202	1,2	103	0,4	3	0,0
SPS Symbios	156	0,9	65	0,2	1	0,0
STEM Wright Cremascoli	208	1,2	1	0,0	-	-
ABG Stryker Howmedica	330	2,0	-	-	-	-
BHS Smith & Nephew	272	1,6	160	0,6	-	-
CITATION Stryker Howmedica	112	0,7	-	-	-	-
EASY Hitmedica	150	0,9	77	0,3	-	-

EHS Wright Cremascoli	252	1,5	60	0,2	-	-
FIT STEM Lima	69	0,4	227	0,8	-	-
G3 Citieffe	179	1,1	-	-	-	-
PROXILOCK FT Stratec	287	1,7	17	0,1	-	-
Other (< 100 cases)	866	5,2	921	3,4	778	6,3
TOTAL*	**16.777**	**100,0**	**26.719**	**100,0**	**12.307**	**100,0**

* In 29 cases the type of uncemented stem was not communicated to RIPO

4.4 Stems used in total revision surgery

In 54 cases the fixation and/or the type of stem was not communicated to RIPO

Cemented stem	**2000-2004**		**2005-2009**		**2010-2011**	
	N.	**%**	**N.**	**%**	**N.**	**%**
APTA Adler-Ortho	-	-	30	18,2	4	8,2
EXETER Stryker Howmedica	39	16,3	35	21,2	4	8,2
VERSYS REVISION CALCAR Zimmer	8	3,3	9	5,5	2	4,1
AD Samo	26	10,8	3	1,8	-	-
ANCA Wright Cremascoli	25	10,4	-	-	-	-
ANCA-FIT CLU Wright Cremascoli	10	4,2	-	-	-	-
JVC Wright Cremascoli	24	10,0	9	5,5	-	-
Other (< 10 cases)	108	45,0	79	47,9	39	79,6
Total	**240**	**100,0**	**165**	**100,0**	**49**	**100,0**

Uncemented stem	**2000-2004**		**2005-2009**		**2010-2011**	
	N.	**%**	**N.**	**%**	**N.**	**%**
SL REVISION Sulzer Centerpulse Zimmer	281	22,8	154	14,6	68	16,7
ALATA AEQUA REVISION Adler-Ortho	-	-	86	8,1	66	16,2
REVISION HIP Lima	6	0,5	41	3,9	65	15,9
CONELOCK REVISION Stratec	21	1,7	64	6,1	37	9,1
RESTORATION Stryker Howmedica	11	0,9	192	18,2	29	7,1
ALATA ACUTA S Adler-Ortho	-	-	25	2,4	22	5,4
MGS Samo	43	3,5	56	5,3	15	3,7
SLR PLUS Smith & Nephew	8	0,6	12	1,1	8	2,0
MODULUS HIP SYSTEM Lima	-	-	17	1,6	8	2,0
APTA Adler-Ortho	0	0,0	16	1,5	8	2,0
SL PLUS Smith & Nephew	9	0,7	20	1,9	7	1,7
CLS Zimmer	26	2,1	8	0,8	7	1,7
MP RECONSTRUCTION PROSTHESIS Link	33	2,7	17	1,6	5	1,2
ZMR REVISION TAPER CONE Zimmer	12	1,0	30	2,8	4	1,0
S. ROM Johnson&Johnson	91	7,4	52	4,9	3	0,7
CONUS Zimmer	54	4,4	28	2,6	3	0,7
PROFEMUR R VERS. 4 Wright Cremascoli	350	28,4	56	5,3	2	0,5
EMPERION Smith & Nephew	0	0,0	21	2,0	2	0,5
C2 Lima	32	2,6	30	2,8	2	0,5
VERSYS FIBER METAL TAPER Zimmer	9	0,7	10	0,9	1	0,2
ANCA FIT Wright Cremascoli	55	4,5	4	0,4	-	-
ZMR REVISION TAPER Zimmer	30	2,4	-	-	-	-
RESTORATION T3 Stryker Howmedica	74	6,0	-	-	-	-
CBK REVISION STEM Mathys	18	1,5	2	0,2	-	-
Other (< 20 cases)	70	5,7	116	11,0	46	11,3
Total	**1233**	**100,0**	**1057**	**100,0**	**408**	**100,0**

4.5 Number of different types of implant

Number of **different types** of cups and stems implanted in primary surgery, according to **year of operation**.

Year of operation	Primary THA	
	Stems	Cups
2000	93	87
2001	98	92
2002	94	90
2003	110	94
2004	99	84
2005	110	90
2006	98	87
2007	113	100
2008	114	105
2009	115	95
2010	109	91
2011	107	100

In 2011 were implanted 26 different types of cup and 24 stems not used in 2010.

Number of **different types** of cups and stems implanted in revision surgery, according to **year of operation**.

Year of operation	Total revision	
	Stms	Cups
2000	48	58
2001	55	64
2002	48	59
2003	60	62
2004	40	46
2005	44	45
2006	55	55
2007	50	60
2008	49	50
2009	42	54
2010	46	49
2011	49	49

4.6 Resurfacing surgery

In the following table percentage of primary conventional and resurfacing are presented

Year of surgery	Primary	
	Conventional	Resurfacing
2000	99,9	0,1
2001	99,8	0,2
2002	99,3	0,7
2003	98,5	1,5
2004	97,9	2,1
2005	96,9	3,1
2006	96,4	3,6
2007	96,9	3,1
2008	97,5	2,5
2009	97,6	2,4
2010	98,2	1,8
2011	97,9	2,1

Types of resurfacing implanted between **1st January 2000** and **31st December 2011**

Type	N.	%
BHR – Smith & Nephew	823	58,0
ADEPT – Finsbury	174	12,3
MITCH TRH – Finsbury	87	6,1
ASR – DePuy	74	5,2
BMHR* – Smith & Nephew	66	4,7
RECAP – Biomet	64	4,5
MRS* – Lima	44	3,1
CONSERVE PLUS – Wright	19	1,3
ROMAX – Medacta	33	2,3
ICON – International Orthopaedics	21	1,5
DURON Hip Resurfacing – Zimmer	8	0,6
CORMET – Corin	1	0,1
WAGNER METASUL - Protek	**3**	0,2
TRIBOFIT – Active Implants	1	0,1
Total	**1.418**	**100,0**

*considered similar to resurfacing

4.7 Modular neck

33.6% of stems implanted in primary surgery have modular neck.

Year of surgery	Primary surgery	
	Standard neck	Modular neck
2000	78,1	21,9
2001	74,6	25,4
2002	70,9	29,1
2003	70,9	29,1
2004	71,1	28,9
2005	64,5	35,5
2006	62,4	37,6
2007	65,4	34,6
2008	64,3	35,7
2009	64,0	36,0
2010	60,4	39,6
2011	58,1	41,9

Types of stems with proximal modularity

Types of stems with proximal modularity	2000-2004		2005-2009		2010-2011	
	N.	%	N.	%	N.	%
APTA Adler-Ortho	10	0,2	5.063	46,9	2.107	40,0
RECTA Adler-Ortho	6	0,1	2.773	25,7	1.120	21,2
HYDRA Adler-Ortho	-	-	324	3,0	754	14,3
PARVA Adler-Ortho	-	-	4	0,0	258	4,9
ALATA ACUTA S Adler-Ortho	-	-	454	4,2	190	3,6
MODULUS HIP SYSTEM Lima	44	0,7	371	3,4	183	3,5
MULTIFIT Samo	-	-	142	1,3	138	2,6
SAM-FIT Lima	-	-	36	0,3	125	2,4
SPS MODULAR Symbios	-	-	111	1,0	121	2,3
VITAE Adler-Ortho	-	-	-	-	54	1,0
PROFEMUR Z Wright Cremascoli	574	8,9	68	0,6	51	1,0
HARMONY Symbios	-	-	64	0,6	30	0,6
ABGII MODULAR Howmedica	-	-	48	0,4	11	0,2
MERCURIUS Adler-Ortho	-	-	102	0,9	8	0,2
S. ROM Johnson e Johnson	79	1,2	86	0,8	6	0,1
MBA HAP Groupe Lepine	37	0,6	83	0,8	6	0,1
ANCA FIT Wright Cremascoli	3.820	58,9	678	6,3	6	0,1
PROFEMUR L Wright Cremascoli	-	-	95	0,9	1	0,0
STEM Wright Cremascoli	208	3,2	1	0,0	-	-
STELO MODULARE NDS1 Citieffe	60	0,9	16	0,1	-	-
PROFEMUR C Wright Cremascoli	87	1,3	-	-	-	-
MBA Groupe Lepine	46	0,7	41	0,4	-	-
JVC Wright Cremascoli	669	10,3	58	0,5	-	-
G3 Citieffe	179	2,8	-	-	-	-
EHS Wright Cremascoli	252	3,9	60	0,6	-	-
ANCA-FIT Dual fit Wright Cremascoli	303	4,7	11	0,1	-	-
ALBI PTC Wright Cremascoli	31	0,5	4	0,0	-	-
Other (< 30 implants)	80	1,2	91	0,8	104	2,0
Total	**6.485**	**100,0**	**10784**	**100,0**	**5.273**	**100,0**

4.8 Articular couplings and head diameters

Number of primary total hip arthroplasty operations carried out on patients with admission date between 1st January 2000 and 31st December 2011, according to the **type of operation and articular coupling.**

Articular coupling	Primary		Total revision	
	N.	%	N.	%
Cer-cer	25.918	38,5	750	23,5
Met-poly	13.030	19,4	728	22,8
Cer-poly	10.613	15,8	717	22,5
Met-met	6.110	9,1	96	3,0
Met-X linked poly	5.237	7,8	462	14,5
Cer- X linked poly	4.314	6,4	298	9,3
Met-poly undefined	1.173	1,7	84	2,6
Cer- poly undefined *	525	0,8	53	1,7
Biolox delta-met	212	0,3	-	-
Cerid-poly	183	0,3	1	0,0
Total^	**67.315**	**100,0**	**3.189**	**100,0**

* ^missing label did not allow classification of poly (280 primary and 17 revisions)

Percentage of total hip arthroplasty interventions between 2001 and 2011, according to the **type of polyethylene** used**.**

Year of surgery	Primary surgery		
	Standard poly	Crosslinked poly	Not defined poly
2001	78,8	16,2	5,0
2002	82,6	14,7	2,8
2003	82,3	16,5	1,2
2004	79,1	20,3	0,5
2005	76,8	22,1	1,0
2006	76,2	23,6	0,3
2007	72,8	27,0	0,2
2008	65,5	34,3	0,1
2009	52,7	47,2	0,1
2010	42,0	57,9	-
2011	36,5	63,4	-

Percentage of total hip arthroplasty according **to articular coupling** during the years 2001 - 2011.

Year of surgery	Primary surgery					
	met-pol	met-xlk	cer-pol	cer-xlk	cer-cer	met-met
2001	29,4	10,4	29,4	1,7	21,3	7,9
2002	29,8	9,0	29,5	1,5	22,8	7,4
2003	29,6	10,0	27,0	1,3	23,9	8,2
2004	25,4	10,0	25,1	2,9	28,0	8,6
2005	24,6	9,5	19,6	3,2	33,8	9,3
2006	22,2	7,9	14,3	3,4	39,8	12,4
2007	21,8	7,4	11,5	4,9	42,6	11,8
2008	16,3	6,3	9,8	7,4	47,5	12,7
2009	12,1	7,2	8,7	11,4	49,8	10,9
2010	8,6	5,6	6,2	14,8	56,7	8,2
2011	7,1	6,3	6,2	16,8	59,5	4,2

Percentage of total revision surgeryarthroplasty according **to articular coupling** during the years 2001 - 2011.

Year of surgery	Total revision surgery					
	met-pol	met-xlk	cer-pol	cer-xlk	cer-cer	met-met
2001	35,1	12,8	36,0	3,4	10,7	2,1
2002	31,2	9,9	40,4	4,5	12,0	2,1
2003	29,0	11,7	40,0	5,0	13,3	1,0
2004	29,0	14,5	28,6	2,0	19,8	6,0
2005	25,3	16,9	20,9	6,2	23,6	7,1
2006	24,6	20,1	18,3	4,5	26,5	6,0
2007	19,0	22,7	13,2	8,4	33,7	2,9
2008	18,0	18,0	13,5	13,5	33,3	3,6
2009	14,0	17,6	10,9	18,1	35,3	4,1
2010	10,6	11,9	11,5	25,5	38,3	2,1
2011	12,3	14,1	5,9	30,9	36,4	0,5

Percentage of elective THA according **to articular coupling and class age**

Age class	Elective THA			
	met-pol	cer-pol	cer-cer	met-met
<40	5,4	12,3	65,5	16,8
40-49	8,0	14,0	60,7	17,3
50-59	11,8	17,0	54,7	16,5
60-69	22,7	22,8	44,4	10,1
70-79	36,0	28,4	30,4	5,1
Over 80	55,0	24,5	17,2	3,3

Number of hip arthroplasty operations on patients admitted between 1st January 2000 and 31st December 2011, according **to material** and **diameter of the head**

Head material	**Diameter of the head (mm)**											
	22		**26**		**28**		**32**		**36**		**>=38**	
	N.	**%**	**N.**	**%**	**N.**	**%**	**N.**	**%**	**N.**	**%**	**N.**	**%**
Alumina	-	-	-	-	17007	43,4	5027	44,4	3342	26,5	-	-
Cr-Co	225	82,7	18	75,0	16974	43,3	1442	12,7	1143	9,0	2515	62,6
Biolox Delta	-	-	-	-	1421	3,6	4613	40,8	7947	62,9	1437	35,8
Stainless steel	46	16,9	5	20,8	3131	8,0	160	1,4	14	0,1	-	-
Zirconia	1	0,4	1	4,2	288	0,7	2	0,0	2	0,0	-	-
Oxinium	-	-	-	-	200	0,5	63	0,6	182	1,4	-	-
Cerid	-	-	-	-	180	0,5	-	-	-	-	-	-
Titaniun nitruro	-	-	-	-	-	-	-	-	-	-	57	1,4
Revision ceramic	-	-	-	-	-	-	3	0,0	1	0,0	9	0,2
Bionium-Diamant	-	-	-	-	2	0,0	-	-	-	-	-	-
Total*	**272**	**100,0**	**24**	**100,0**	**39203**	**100,0**	**11310**	**100,0**	**12631**	**100,0**	**4018**	**100,0**

*137 missing data, (0.4%)

Year of surgery	**Diameter of the head (mm)** in THA					
	<=28 cer	**<=28 met**	**32 cer**	**32 met**	**>=36 cer**	**>=36 met**
2000	46,8	49,6	1,1	1,3	0,0	1,1
2001	51,1	46,5	0,7	0,4	0,0	1,4
2002	52,6	45,6	0,9	0,1	0,0	0,8
2003	51,2	46,3	0,9	0,1	0,3	1,2
2004	51,5	41,3	3,2	0,6	1,3	2,2
2005	34,4	38,0	16,6	1,6	5,5	3,9
2006	23,6	33,3	19,0	2,0	14,8	7,2
2007	16,6	28,1	20,7	3,8	21,7	9,1
2008	14,6	21,5	20,4	3,7	29,5	10,3
2009	11,5	17,4	21,5	3,1	36,5	9,9
2010	8,6	10,0	23,9	4,6	44,7	8,1
2011	6,6	7,9	27,6	4,7	48,0	5,3

Heads made of alumina, zirconia and biolox delta are marked with the initials "**cer**"; heads made of cobalt-based alloy and stainless steel are marked with the initials "**met**"

4.9 Prosthesis fixation

Number of hip arthroplasty operations on patients admitted between 1st January 2000 and 31st December 2011, according **to type of operation** and **fixation**.

Fixation	Primary THA	%	Total revision	%
Cementless	55.658	82,5	2.289	71,6
Hybrid (cemented stem and cementless cup)	6.989	10,4	260	8,1
Cemented	4.316	6,4	187	5,8
Reverse hybrid (cementless stem and cemented cup)	474	0,7	462	14,4
Total*	**67.437**	**100,0**	**3.198**	**100,0**

*158 primary THA and 8 total revision missing data

Fixation of the acetabular component of the resurfacing prosthesis was press fit in 100% of the cases and in 10.6% of the cases screws were used.

Percentage of total hip arthroplasties **according to fixation**, during the years 2000 – 2011.

Year	Primary surgery			
	Cemented	Cementless	Hybrid	Reverse hybrid
2000	15,1	61,9	22,0	1,0
2001	14,2	66,4	18,6	0,7
2002	12,1	71,2	15,8	0,8
2003	11,0	73,3	15,0	0,7
2004	8,6	78,3	12,4	0,7
2005	7,0	80,5	11,6	0,8
2006	6,1	83,1	10,2	0,6
2007	4,3	87,0	8,0	0,6
2008	2,5	90,4	6,5	0,6
2009	2,0	91,5	5,7	0,8
2010	1,2	94,1	4,1	0,6
2011	0,8	95,1	3,5	0,6

Percentage of elective total hip arthroplasties **according to fixation, by age of patient**

Age class	Elective primary THA 2000-2011			
	Cemented	Cementless	Hybrid	Reverse hybrid
<40	0,7	97,9	0,9	0,5
40-49	0,2	98,8	0,7	0,3
50-59	0,6	97,1	2,1	0,3
60-69	1,5	90,2	8,0	0,4
70-79	7,4	76,2	15,6	0,8
≥80	22,1	58,7	17,4	1,8

Percentage of total hip arthroplasties **according to fixation and class age** - year 2000

Age class	Elective primary surgery year 2000			
	Cemented	Cementless	Hybrid	Reverse hybrid
<40	0,9	93,1	5,2	0,9
40-49	0,4	96,1	3,1	0,4
50-59	1,5	88,7	9,5	0,3
60-69	5,8	70,4	23,3	0,6
70-79	21,5	46,5	30,5	1,4
≥80	54,1	27,3	16,9	1,7

Percentage of total hip arthroplasties **according to fixation and class age** - year 2011

Age class	Elective primary surgery year 2011			
	Cemented	Cementless	Hybrid	Reverse hybrid
<40	0,0	99,5	0,5	0,0
40-49	0,0	100,0	0,0	0,0
50-59	0,0	99,3	0,5	0,2
60-69	0,2	99,1	0,6	0,2
70-79	0,3	94,8	4,2	0,7
≥80	2,4	82,8	12,9	1,9

Percentage of total revision surgery **according to fixation**, during the years 2000 – 2011.

Year	Total revision			
	Cemented	Cementless	Hybrid	Reverse hybrid
2000	9,4	62,5	9,4	18,7
2001	7,9	64,3	8,2	19,6
2002	6,0	66,0	7,3	20,7
2003	7,2	69,3	6,9	16,7
2004	7,1	69,1	7,9	15,9
2005	7,1	68,3	8,4	16,3
2006	6,3	72,4	10,7	10,7
2007	4,0	73,6	9,8	12,7
2008	3,1	78,2	8,4	10,2
2009	1,8	82,4	6,8	9,0
2010	1,7	83,8	6,0	8,5
2011	5,9	78,7	7,2	8,1

Percentage of total revision surgery **according to fixation and age class**

Age class	Total revision			
	Cemented	Cementless	Hybrid	Reverse hybrid
<40	1,7	91,4	1,7	5,2
40-49	4,5	88,3	2,7	4,5
50-59	1,9	84,6	3,5	10,0
60-69	3,5	75,6	6,7	14,2
70-79	5,0	69,6	9,2	16,3
≥80	15,0	56,7	12,3	16,0

4.10 Bone cement

Type of cement used in primary surgery with at least one cemented component, in resurfacing and in hemiarthroplasty (information recorded in RIPO from 30st September 2001).

In **bold** cements with antibiotics

Cement	% in THA	% in Hemi	% in Resurf
Surgical Simplex P – Howmedica	34,5	34,1	8,1
Cemex System – Tecres	13,1	29,9	2,1
Palacos R – Biomet	6,5	1,7	1,9
Antibiotic Simplex – Howmedica	***5,3***	***2,9***	***71,3***
Smartset HV – DePuy	5,2	5,4	4,8
Amplicem 3 – Amplimedical	4,1	4,3	-
Cemex RX – Tecres	2,5	6,7	0,2
Cemex + Cemex System - Tecres	2,3	-	-
Exolent High – Elmdown	1,8	0,8	-
Cemex RX + Cemex System - Tecres	1,7	-	-
Amplicem 1 + Amplicem 3 – Amplimedical	1,6	0,01	-
CMW 3 – DePuy	1,6	1,2	-
Cemex System – Tecres + Surgical Simplex P – Howmedica	1,6	0,01	-
Amplicem 1 – Amplimedical + Smartset HV – DePuy	1,5	-	-
Cemex – Tecres	1,4	2,0	0,4
Cemfix 1 – Teknimed	1,3	0,2	-
Versabond – Smith & Nephew	1,2	0,03	2,9
Sulcem 3 – Centerpulse	1,2	1,3	0,1
Cemex Genta - Cemex Genta System – Tecres	***1,1***	0,01	-
Palacos R – Heraeus Medical	1,0	1,2	-
Cemfix 3 – Teknimed	0,9	0,1	-
Aminofix 1 – Groupe Lepine	***0,9***	0,03	-
Palacos R 40 – SP Europe	0,7	0,1	-
Cemex Genta – Tecres	***0,7***	***0,4***	***0,1***
Bone Cement R – Biomet	0,6	0,1	1,6
Cemex Genta System – Tecres	***0,6***	***1,9***	***2,2***
Smartset MV – DePuy	0,5	0,5	0,1
Amplicem 1 – Amplimedical	0,4	0,03	0,3
Vacu Mix Plus CMW 3 – DePuy	0,4	0,8	-
Amplicem 3G – Amplimedical	***0,3***	***-***	***-***
Refobacin Bone Cement R – Biomet	***0,2***	***0,01***	***-***
Cemex XL – Tecres	0,2	0,8	-
Palacos R+G – Heraeus Medical	***0,2***	***0,1***	***0,1***
Osteobond – Zimmer	0,2	0,02	1,8
Other without antibiotic	1,8	2,8	2,0
Other with antibiotic	***1,3***	***0,5***	***0,2***
Total	**100,0**	**100,0**	**100,0**

4.11 Surgical techniques (surgical approach, bone graft, reinforcement rings)

The most commonly used surgical approaches are lateral and postero-lateral.

65.5% of THA is implanted through lateral approach, 29.5% through postero-lateral.

54.1% of hemiarthroplasties is implanted through lateral approach, 43.4% through postero-lateral

85.1 % of resurfacing prostheses is implanted through postero-lateral approach and 13.4 % through lateral.

13,3% of cup revision with reinforcing rings

5 Types of hemiarthroplasty

5.1 Heads and stem

Monoblock	2000-2004		2005-2009		2010-2011	
	N.	%	N.	%	N.	%
THOMPSON - Corin	39	52,7	37	97,4	-	-
AUSTIN MOORE - Amplimedical	16	21,6	-	-	-	-
THOMPSON - Amplimedical	14	18,9	-	-	-	-
THOMPSON -Stryker Howmedica	4	5,4	-	-	-	-
THOMPSON - Bioimpianti	1	1,4	-	-	-	-
THOMPSON - Surgival	-	-	1	2,6	-	-
Total	**74**	**100,0**	**38**	**100,0**	**-**	**-**

Monoarticular head	2000-2004		2005-2009		2010-2011	
	N.	%	N.	%	N.	%
TESTA ELLITTICA - Samo	212	99.5	210	99.0	-	-
Other	1	0.5	2	1.0	-	-
Total	**213**	**100.0**	**212**	**100.0**	**-**	**-**

Biarticular head	2000-2004		2005-2009		2010-2011	
	N.	%	N.	%	N.	%
C1 - Citieffe	867	8,9	1.757	15,4	1.386	28,0
BI-POLAR - DePuy	2	0,0	209	1,8	742	15,0
SPHERI-LOCK - Hit Medica	2.042	21,0	2.213	19,4	709	14,3
JANUS - Bioimpianti	291	3,0	557	4,9	554	11,2
UHR Osteonics Stryker Howmedica	444	4,6	1632	14,3	541	10,9
CUPOLA NEMAUSUS - Transysteme	0	0,0	238	2,1	382	7,7
TESTA BIARTICOLARE LOCK - Lima	243	2,5	1100	9,6	368	7,4
CUPOLA BIPOLARE - Mathys	404	4,2	233	2,0	44	0,9
TESTA BIPOLARE - Samo	100	1,0	2	0,0	35	0,7
CUPOLA BIPOLARE - Zimmer	94	1,0	326	2,9	26	0,5
CUPOLA MOBILE - Zimmer	360	3,7	500	4,4	21	0,4
BI-POLAR - Biomet	143	1,5	231	2,0	16	0,3
CORON - Tantum	1	0,0	174	1,5	15	0,3
CUPOLA MOBILE - Medacta	0	0,0	185	1,6	6	0,1
BICENTRIC - Stryker Howmedica	233	2,4	3	0,0	0	0,0
CENTRAX - Stryker Howmedica	525	5,4	12	0,1	0	0,0
CUPOLA MOBILE - Centerpulse	63	0,6	201	1,8	0	0,0
CUPOLA MOBILE BIARTICOLARE - Permedica	461	4,7	259	2,3	0	0,0
CUPOLA MOBILE MODULARE - Cremascoli	886	9,1	286	2,5	0	0,0
CUPOLA SEM - D.M.O.	431	4,4	299	2,6	0	0,0
MODULAR BIPOLAR - Protek	342	3,5	5	0,0	0	0,0
RETENTIVE MOBILE CUP - Cedior	292	3,0	0	0,0	0	0,0
SPHERIC - Amplitude	0	0,0	351	3,1	0	0,0
TESTA BIARTICOLARE - Lima	608	6,3	4	0,0	0	0,0
TESTA BIPOLARE -Amplimedical	193	2,0	0	0,0	0	0,0
ULTIMA MONK - Johnson+Johnson	528	5,4	476	4,2	0	0,0
Other (less than 100 cases)	171	1,8	165	1,4	105	2,1
Total	9.724	100,0	11.418	100,0	4.950	100,0

***90** missing (0.3%)

CEMENTED STEM	2000-2004		2005-2009		2010-2011	
	N.	%	N.	%	N.	%
AB - Citieffe	665	7,4	1644	17,5	1.321	37,1
G2 - Citieffe	53	0,6	693	7,4	537	15,1
SL STREAKES - Hit Medica	276	3,1	888	9,5	329	9,2
APTA - Adler-Ortho	0	0,0	534	5,7	324	9,1
SL - Lima	438	4,9	287	3,1	235	6,6
SPERI-SYSTEM II - Hit Medica	888	9,8	1103	11,7	193	5,4
EXETER - Stryker Howmedica	203	2,3	347	3,7	181	5,1
S-TAPER - Bioimpianti	0	0,0	3	0,0	179	5,0
DUOFIT CKA - Samo	116	1,3	36	0,4	32	0,9
SL -Hit Medica	731	8,1	8	0,1	32	0,9
STANDARD STRAIGHT - Zimmer	524	5,8	232	2,5	22	0,6
LOGICA MIRROR - Lima	131	1,5	376	4,0	16	0,4
VERSYS LD/FX - Zimmer	234	2,6	300	3,2	9	0,3
CCA - Mathys	400	4,4	214	2,3	2	0,1
VERSYS HERITAGE - Zimmer	82	0,9	68	0,7	2	0,1
QUADRA-C - Medacta	0	0,0	173	1,8	1	0,0
AHS - Cremascoli	303	3,4	9	0,1	0	0,0
ALBI PTC - Cremascoli	134	1,5	15	0,2	0	0,0
DEFINITION - Stryker Howmedica	68	0,8	168	1,8	0	0,0
FIN - Bioimpianti	229	2,5	295	3,1	0	0,0
HIP FRACTURE - Stryker Howmedica	162	1,8	0	0,0	0	0,0
JVC - Cremascoli	272	3,0	209	2,2	0	0,0
LOGICA - Lima	141	1,6	106	1,1	0	0,0
MRL - Cremascoli	270	3,0	0	0,0	0	0,0
ORTHO-FIT - Allopro	387	4,3	442	4,7	0	0,0
RELIANCE - Stryker Howmedica	305	3,4	315	3,4	0	0,0
SEM II - DMO	361	4,0	276	2,9	0	0,0
SL - Amplimedical	158	1,8	0	0,0	0	0,0
SL - Permedica	426	4,7	252	2,7	0	0,0
ULTIMA LX - Johnson&Johnson	315	3,5	0	0,0	0	0,0
ULTIMA STRAIGHT- J&J	156	1,7	0	0,0	0	0,0
Other (less than 100 cases)	589	6,5	390	4,2	142	4,0
Total	9.017	100,0	9.390	100,0	3.557	100,0

107 cases are missing

UNCEMENTED STEM	2000-2004		2005-2009		2010-2011	
	N.	%	N.	%	N.	%
S-TAPER - Bioimpianti	0	0,0	217	10,5	359	26,5
ACCOLADE – Osteonics Stryker Howmedica	281	40,3	831	40,4	345	25,5
LOGICA CS - Lima	0	0,0	52	2,5	99	7,3
SL - Lima	3	0,4	206	10,0	76	5,6
APTA - Adler-Ortho	0	0,0	47	2,3	69	5,1
RECTA - Adler-Ortho	0	0,0	48	2,3	56	4,1
G2 – De Puy	0	0,0	1	0,0	45	3,3
TWINSYS - Mathys	0	0,0	9	0,4	43	3,2
HYDRA - Adler-Ortho	0	0,0	4	0,2	31	2,3
SPS MODULAR - Symbios	0	0,0	0	0,0	31	2,3
Z1 - Citieffe	0	0,0	2	0,1	30	2,2
PORO-LOCK II - Hit Medica	0	0,0	52	2,5	22	1,6
SUMMIT – De Puy	0	0,0	4	0,2	20	1,5
ENDON - Tantum	1	0,1	172	8,4	15	1,1
Taperloc - Biomet	1	0,1	5	0,2	15	1,1
CONUS - Centerpulse	5	0,7	12	0,6	8	0,6
C2 – Lima	3	0,4	11	0,5	7	0,5
PROFEMUR Z - Cremascoli	2	0,3	13	0,6	7	0,5
VERSYS FIBER METAL TAPER - Zimmer	3	0,4	35	1,7	7	0,5
SL REVISION - Sulzer	7	1,0	17	0,8	2	0,1
EURO HIP SYSTEM - Cremascoli	17	2,4	23	1,1	0	0,0
H-AC STEM FURLONG JRI	67	9,6	7	0,3	0	0,0
HIP FRACTURE - Stryker Howmedica	132	18,9	0	0,0	0	0,0
PPF - Biomet	112	16,0	154	7,5	0	0,0
Other (less than 20 cases)	64	9,2	137	6,7	67	4,9
Total	698	100,0	2.059	100,0	1.354	100,0

5.2 Other characteristics of hemiarthroplasties

Number of surgeries according to **head type**

Head type	N.	%
Bipolar head to be assembled in the operating theatre	25.080	93,9
Preassembled bipolar head	1.102	4,1
Monoarticular head	425	1,6
Monoblock prosthesis	112	0,4
Total	**26.718**	**100,0**

***71 missing data, (0.3%)

6. Blood transfusion

Percentages of operations performed on patients admitted between 1st January 2003 and 31st December 2011 **according to type of operation and transfusion**

Type of surgery	None	Autologous (recovery)	Autologous (predeposit)	Homologous	Autologous and homologous
Emergency primary	23,3	11,0	-	58,2	7,5
Elective primary	13,2	21,4	38,1	16,4	10,9
Revision	9,6	13,9	17,5	43,1	15,9

In the following tables the analysis is repeated according **to type of surgery** and **type of hospital**

Emergency primary THA and hemiarthroplasty				
Type of hospital	**None**	**Autologous (recovery)**	**Homologous**	**Autologous and homologous**
AOSP	29,8	3,4	66,3	0,5
Private	7,6	35,4	26,5	30,5
AUSL	36,3	5,1	55,0	3,6
IOR	2,6	0,7	96,7	0,0

Elective THA				
Type of hospital	**None**	**Autologous**	**Homologous**	**Autologous and homologous**
AOSP	19,6	58,7	18,3	3,4
Private	6,0	71,5	5,5	17,0
AUSL	21,3	49,2	18,4	11,1
IOR	4,3	61,3	28,2	6,2

7. Complications occurred during hospitalization

The rate of complications appears to be very widely spread out over the various Units. Probably reporting complications is not accurate partially because of interpretative doubts. Therefore, definitive conclusions are not drawn until the ways of checking these data are redefined.

The rate of complications in **primary surgery** carried out on patients hospitalised between January 1st 2000 and December 31st 2011.

Complications observed during hospitalization								
Intra-operative			**Post-operative local**			**Post-operative general**		
	N.	**%**		**N.**	**%**		**N.**	**%**
Calcar fracture	265	*0,4*	Hematoma	748	*1.1*	Anemia	3.744	*5,5*
Diaphyseal fracture	214	*0,3*	Prosthesis disloc	287	*0.4*	Hyperpyrexia	518	*0,8*
Greater troch fracture	142	*0,2*	SPE paralysis	135	*0.2*	Genito-urinary	292	*0.4*
			Deep vein thromb	84	*0.1*	Gastro-intestinal	282	*0,4*
Anaesthesiolog complications	110	*0,2*	Bleeding	80	*0.1*	Cardiovascular	145	*0.2*
			Bed sores	74	*0.1*	Embolism	124	*0.2*
Cotyle fracture	103	*0.2*	Crural paralysis	70	*0.1*	Collapse	103	*0.2*
Hemorragia	31	*0.05*	Infection	70	*0.1*	Respiratory	102	*0.2*
			Secretion	47	*0.1*	Infarction	92	*0.1*
Instability	19	*0.03*				Disorientation	80	*0.1*
						Dyspnoea	54	*0.1*
Other	66	*0.1*	Other	246	*0.4*	Others	398	*0.6*
Total	**950**	***1.4***	**Total**	**1.841**	***2.7***	**Total**	**5.945**	***8.8***

The rate of complications in **revision surgery** carried out on patients hospitalised between January 1st 2000 and December 31st 2011

Complications observed during hospitalization								
Intra-operative			**Post-operative local**			**Post-operative general**		
	N.	**%**		**N.**	**%**		**N.**	**%**
Diaphyseal fracture	160	*1.5*	Hematoma	156	*1.4*	Anemia	771	*7.1*
Calcar fracture	54	*0.5*	Prosthesis disloc	100	*0.9*	Hyperpyrexia	66	*0.6*
			SPE paralysis	60	*0.6*	Cardiovascular	43	*0.4*
Anaesthesiologic complications	42	*0.4*	Bleeding	45	*0.4*	Gastro-intestinal	43	*0.4*
			Infection	35	*0.3*	Genito-urinary	39	*0.4*
Greater troch fracture	36	*0.3*	Bed sores	21	*0.2*	Collapse	37	*0.3*
			Deep vein thromb	19	*0.2*	Infarction	24	*0.2*
Cotyle fracture	19	*0.2*	Crural paralysis	8	*0.1*	Embolism	21	*0.2*
Hemorragia	15	*0.1*				Respiratory	21	*0.2*
Other	18	*0.2*	Other	50	*0.5*	Other	112	*1.0*
Total	**344**	***3.2***	**Total**	**494**	***4.5***	**Total**	**1.175**	***10.8***

The rate of complications in **hemiarthroplasty** carried out on patients hospitalised between January 1st 2000 and December 31st 2011.

Complications observed during hospitalization								
Intra-operative			**Post-operative local**			**Post-operative general**		
	N.	**%**		**N.**	**%**		**N.**	**%**
Anaesthesiol. complications	105	*0.4*	Hematoma	224	*0.8*	Anemia	2.487	*9.3*
			Prosthesis disloc	124	*0.5*	Hyperpyrexia	236	*0.9*
Calcar fracture	98	*0.4*	Bed sores	107	*0.4*	Genito-urinary	250	*0.9*
			Deep vein thromb	68	*0.3*	Collaspse	212	*0.8*
Greater toch fracture	62	*0.2*	SPE paralysis	67	*0.3*	Respiratory	195	*0.7*
						Gastro-intestinal	165	*0.6*
Diaphyseal fracture	48	*0.2*	Infection	40	*0.1*	Cardiovascular	140	*0.5*
Anemia	20	*0.1*	Bleeding	12	*0.04*	Embolism	136	*0.5*
Hemorragia	16	*0.1*				Infarction	93	*0.3*
Acetabula fracture	4	*0.01*	Crural paralysis	3	*0.01*	Disorient.	53	*0.2*
						Dyspnea	42	*0.2*
Other	27	*0.1*	Other	40	*0.1*	Other	248	*0.9*
Total	**380**	***1.4***	**Total**	**685**	***2.6***	**Total**	**4257**	***15.9***

7.1 Deaths during hospitalization

Number of deaths in prosthetic surgery on patients hospitalized between January 1st 2000 and December 31st 2011.

The deaths recorded are those that occurred during hospitalization.

Years 2000-2011			
Type of surgery	**Deaths**	**n. of operations**	**Percentage**
Primary THA	171	67.713	0,3
Hemiarthroplasty	1.206	26.796	4,5
Revision	72	10.891	0,7
Resurfacing prostheses	0	1.418	-
Prosthesis removal	18	762	2,4

Deaths in first 90 days after surgery, exceeding the previous one, are reported in the following table.

Death in first 90 days after surgery – Hemiarthroplasty on resident patients			
Year of surgery	**Deaths**	**n. of operations**	**Percentage**
2000	172	1.683	10,2
2001	202	2.062	9,8
2002	154	1.866	8,3
2003	153	1.970	7,8
2004	181	2.146	8,4
2005	179	2.221	8,1
2006	168	2.297	7,3
2007	162	2.067	7,8
2008	172	2.360	7,3
2009	168	2.401	7,0
2010	171	2.411	7,1
2011	219	2.386	9,2
Total	**2.101**	**25.870**	**8,1**

8. Duration of pre-operative hospitalization

Days of pre-operative hospitalization (mean, minimal, maximal) according to type of operations and year of operation.

Year 2000			
Type of operation	**N.**	**Mean pre-op.**	**Range**
Primary THA	4.369	2,4	0-49
Hemiarthropl	1.754	3,5	0-44
Revision	743	3,9	0-52
Prosthesis removal	40	5,0	1-20
Year 2011			
Type of operation	**N.**	**Mean pre-op.**	**Range**
Primary THA	6.373	1,5	0-35
Hemiarthropl	2.472	3,4	0-46
Revision	911	3,8	0-100
Resurfacing	138	1,3	0-5
Prosthesis removal	86	7,0	0-67

9. Analysis of survival of primary surgery

9.1 Cox multivariate analysis

The Cox multivariate analysis identifies any variables that are independent from each other that can influence the event, in our case the removal of at least one prosthesis component. Analysis was performed on three independent variables, sex, age at surgery and pathology.
Other variables that might influence the outcome of surgery, such as the method of fixing the prosthesis, or joint coupling, were not introduced into the analysis because they were not independent (for example, prosthesis fixation depends on the patient's age).
All primary hip arthroplasties performed in the region between 2000 and 2011 were analyzed.
As in past year, this analysis was limited to patients resident in Emilia Romagna region. In such a way the bias due to lost to follow up of non-resident patients is avoided.

COX PROPORTIONAL RISK MODEL

Variables

Dependent: Follow-up
Independent: Age, gender, diagnosis

Number of valid observations: 50.485
Non revised: 48.749
Revised: 1.736

Chi-square: 102.1 *p*= 0.0001

VARIABLE	SIGNIFICANCE (P)
Gender	**S** (0.001)
Age	**S** (0.001)
Diagnosis	**S** (0.001)

The chi-square test, used to test globally the model applied, was significant, which suggested that, on the whole, the variables inserted in the model influenced the outcome of prosthetic surgery. The effect of each variable was compared to the others when equal.
Variables inserted in the model significantly influenced the outcome. At this point we tested how it acts, either by reducing or increasing the risk.
Diagnosis
The rate of relative risk was expressed with respect to the risk rate presented by the patients affected by coxarthrosis. A relative risk rate below 1 indicated a reduced risk of prosthesis revision, a relative risk rate over 1 indicated an increased risk of prosthesis revision.

To analyze the influence of the disease, the patients were divided into 6 groups:
- arthritis
- rheumatic arthritis (rheumatoid arthritis, psoriasis, rhizomelic spondylitis)
- femoral fractures and their consequences (necrosis and post-traumatic arthrosis)
- idiopathic necrosis of the femoral head
- sequelae of congenital and infantile diseases (LCA, DCA, Perthes, epiphysiolysis)
- "others" that include sequelae of septic coxitis, coxitis from TBC, ankylosis, and metastasis

In the case shown in the following table a significantly increased risk is observed in the case of arthroplasty following "femoral fracture and their sequelae" or following "rheumatic arthritis" or to treat rare pathologies, such as septic coxitis.
Patients who had undergone arthroplasty because of femoral fracture or sequelae of fracture had a 1.6-fold greater risk in comparison to subjects of matching sex and age treated for coxarthrosis.
Patients of the grup 'Other pathologies' had a 2.7-fold greater risk of failure. In this heterogeneous group septic coxitis represent the higher risk pathology.
Conversely, in patients treated by arthroplasty due to cephalic necrosis, or to correct sequelae of congenital and infantile diseases the risk of loosening was not significantly higher than in patients treated for coxarthrosis

Preop diagnosis	**Relative risk rate**	**Confidence interval 95%**		**Significance (p)**
Others (sequelae of coxitis, Paget's disease, metastasis, etc..)	2,7	1,7	4,3	S (0,001)
Sequelae congenital diseases	-	-	-	NS (0,376)
Idiopathic necrosis of femoral head	1,3	1,1	1,5	S (0,026)
Fracture and Sequelae (both femoral and acetabular)	1,6	1,4	1,8	S (0,001)
Rheumatic arthritis	1,3	1,1	1,7	S (0,014)

Concerning gender and age, males have a higher risk of 1.2 compared to women, and with increasing age of the patient decreases the risk of revision surgery.

9.2 Rate of failure

Prosthesis failure is defined as the revision of even one prosthetic component. As already mentioned in the introduction of this report the recovery of data of operations not reported to RIPO is in progress. The uncertainty due to the failure to report about 10% of operations performed in the Region, over 12 yrs, may lead to an underestimation of the revision rate that is not quantifiable at the moment.
The following table shows in the first column the number of primary joint arthroplasty operations performed in the period from 1st January 2000 to 31st December 2011 on resident in Emilia-Romagna region, the second and third columns show the number of revision operations performed on the same patients.
Some revision operations were performed in the same hospital as the primary operation while others were performed at other hospitals in the Emilia-Romagna region.

Maximum follow-up is 12 years.

Type of operation	Number of operations	N. of revisions performed in the same hospital	N. of revisions performed in a different hospital
Primary THA	50.485	1.217	519
Hemiarthroplasty	25.870	345	110
Total revision	1.969	123	56
Total	**78.324**	**1.685**	**685**

* hemiartroplasties with acetabular buffer are not considered. 13 failures were observed in 109 implants

The following table shows the number of resurfacing prostheses performed in Emilia-Romagna. Resurfacing prosthesis has been used significantly only since 2002.

Maximum follow-up is 8 years.

Type of operation	Number of operations	N. of revisions performed in the same hospital	N. of revisions performed in a different hospital
Resurfacing	577	35	3

As for other registies, revision surgery has been divided in two classes: major if one of both bone-fixed components has been revised, and minor if liner, and/or head, and/or modular neck have been exchanged.

The following table shows the **rate of revision** according to type of surgery:

Type of operation	Major revisions	Minor revisions	Revision rate
Primary THA	1328	408	1.736/50.485
Hemiarthroplasty	443	12	455/25.870
Resurfacing	38	-	38/577
Total revision	142	37	179/1969

9.3 Survival curves according to Kaplan Meier

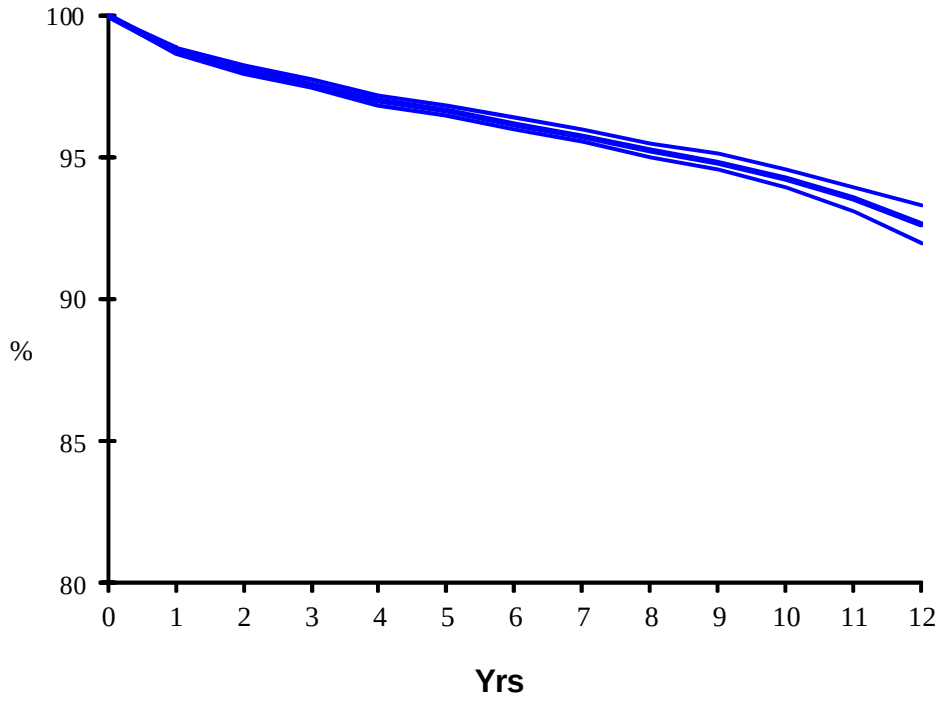
The survival curve calculated by the Kaplan Meier method enables an estimation of the probability that each individual has of maintaining its initial condition (prosthesis in place) over time.
The following paragraphs show the survival curves calculated separately for primary prosthesis, endoprosthesis, and total joint revision.
The influence of fixation and articular coupling was assessed only for primary prosthesis.
Furthermore, survival of single components, stem and cup, was also assessed.

9.4 Analysis of survival in primary total hip arthroplasty

50.485 primary arthroprostheses are under observation. Of these, 1.736 revisions were carried out.

Number of arthroprostheses	n. revisions	% survival at 12 yrs	Confidence interval 95%
50.485	1.736	92,6	92,0-93,3

Survival curve



The following table shows the rate of revision in total joint arthroplasty according to **cause of revision: the % distribution of the causes of failure is shown**.

Cause of revision	Rate	%	% Distribution failure causes
RECURRENT PROSTHESIS DISLOCATION	**370**/50.485	0,73	**21,3**
within 60 days	*189/50.485*		
over 60 days	*181/50.485*		
Aseptic loosening of the stem	**313**/50.485	0,62	**18,0**
within 60 days	*14/50.485*		
over 60 days	*299/50.485*		
Aseptic loosening of the cup	**273**/50.485	0,74	**21,5**
within 60 days	*21/50.485*		
over 60 days	*252/50.485*		
Periprosthetic bone fracture	**194**/50.485	0,38	**11,2**
within 60 days	*57/50.485*		
over 60 days	*137/50.485*		
Breakage of prosthesis	**184**/50.485	0,36	**10,6**
Global aseptic loosening	**111**/50.485	0,22	**6,4**
within 60 days	*11/50.485*		
over 60 days	*100/50.485*		
Septic loosening	**110**/50.485	0,22	**6,3**
within 60 days	*2/50.485*		
over 60 days	*108/50.485*		
Primary instability	**37**/50.485	0,07	**2,1**
Pain without loosening	**41**/50.485	0,08	**2,4**
Poly wear	**19**/50.485	0,04	**1,1**
Heterotopic bone	**16**/50.485	0,03	**0,9**
Others	**23**/50.485	0,05	**1,3**
Unknown	**45**/50.485	0,09	**2,6**
Total	**1.736/50.485**	**3,4**	**100,0**

Percentage of causes of revision according to follow-up

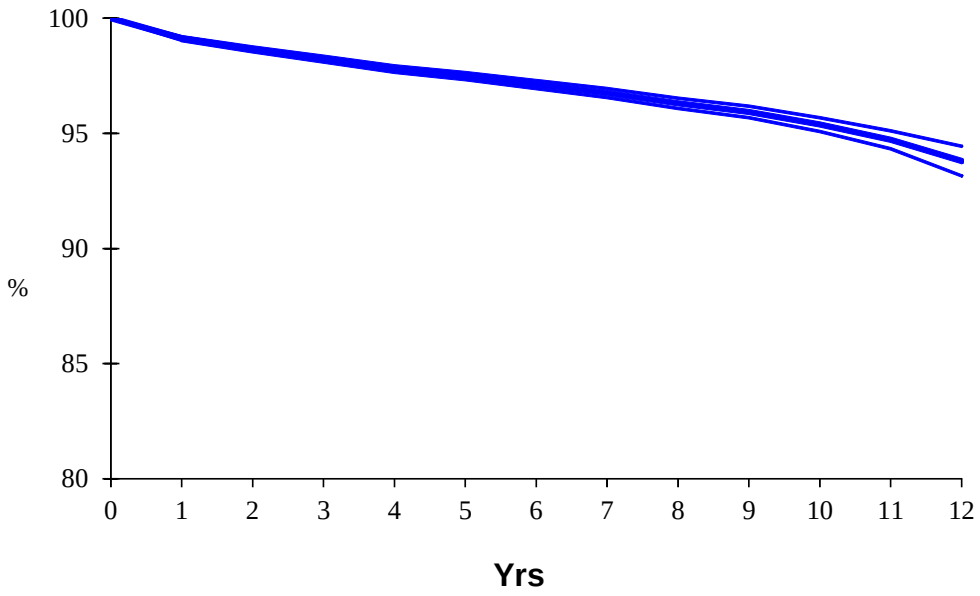
Cause of revision	0-2 Years	3-4 Years	>=5 Years
Recurrent prosthesis dislocation	30,0	10,3	10,1
Stem loosening	16,2	22,1	19,1
Periprosthetic bone fracture	11,5	9,7	11,5
Cuo loosening	11,0	18,2	24,4
Septic loosening	7,6	6,4	3,7
Breakage of prosthesis	7,3	17,6	12,7
Global loosening	3,8	7,6	11,1
IPrimary instability	3,6	0,6	0,0
Pain w/o loosening	2,8	3,3	0,7
Heterotopic bone	1,4	0,3	0,2
Poly wear	0,5	0,9	2,5
Other	1,2	0,9	1,8
Missing	3,0	2,1	2,1

9.5 Analysis of survival in primary total hip arthroplasty – major revisions

50.485 primary arthroprostheses are under observation. Of these, 1.328 revisions were carried out to remove cup and/or stem

Number of arthroprostheses	n. revisions	% survival at 12 yrs	Confidence interval 95%
50.485	**1.328**	93,8	93,2-94,4

Survival curve



9.6 Analysis of survival according to model of prosthesis

Survival analysis has benne calculated either for association of cup and stems and for single component (9.9 and 9.10)
In the following table the prosthesis is considered 'failed' when even a single component has been revised.
Neither articular coupling nor case mix are considered. These two parameters may be differently distributed among groups.

Cemented cups and stems are in bold

Cup (stem) Manufacturer	From years	N.	N. REVISION	% survival 5 yrs	c.i. at 95%	% survival 10 yrs	c.i. at 95%
AnCA Fit (AnCA Fit) Wright Cremascoli	2000	2.873	151	96,0	95,3-96,7	93,9	92,9-94,9
FIXA (RECTA) Adler-Ortho	2004	2.547	82	95,5	94,4-96,5	-	-
Fixa TI-por (Apta) Adler-Ortho	2007	2.009	17	98,1	96,6-99,5	-	-
ABGII (ABGII) Stryker Howmedica	2000	1.926	34	98,2	97,5-98,9	97,1	95,9-98,2
FIXA (APTA) Adler-Ortho	2004	1.702	62	96,6	95,7-97,5	-	-
EP-FIT PLUS (SL PLUS) ENDOPLUS	2003	1.665	30	97,5	96,6-98,4	-	-
CLS (CLS) SulzerCenterpulse Zimmer	2000	1.516	60	97,9	97,2-98,6	94,0	92,3-95,7
FITMORE (CONUS) SulzerCenterpulse Zimmer	2000	998	27	97,1	95,9-98,2	96,5	95,2-97,9
EXPANSION (CBC) Mathys	2000	957	32	95,5	93,8-97,1	-	-
BICON PLUS (SL PLUS) Smith & Nephew	2000	902	39	96,2	94,9-97,5	93,6	90,9-96,3
FITMORE (CLS) SulzerCenterpulse Zimmer	2000	783	25	97,3	96,1-98,5	96,1	94,5-97,7
EP-FIT PLUS (PROXYPLUS) Smith & Nephew	2004	778	7	98,9	98,0-99,7	-	-
Fixa TI-por (Hydra) Adler-Ortho	2007	717	7	96,9	94,2-99,7	-	-
REFLECTION (**BASIS**) Smith & Nephew	2001	601	20	97,2	95,7-98,6	94,4	91,7-97,0
CLS (CONUS) SulzerCenterpulse Zimmer	2000	591	31	97,3	96,0-98,7	94,3	92,1-96,5
FIXA (**APTA**) Adler-Ortho	2004	571	16	97,0	95,5-98,4	-	-
Fixa TI-por (RECTA) Adler-Ortho	2007	562	15	96,6	94,9-98,3	-	-
TRILOGY (VERSYS FIBER) Zimmer	2000	496	16	97,1	95,6-98,6	96,5	94,7-98,2
DUOFIT PSF (**P507**) Samo	2000	492	12	98,3	97,1-99,5	96,9	95,0-98,8
CONTEMPORARY (**EXETER**) Stryker Howmedica	2000	470	14	97,2	95,6-98,8	96,3	94,3-98,3
RECAP RESURFACING (TAPERLOC) Biomet	2005	468	12	96,7	94,7-98,6	-	-

Exceed ABT (TAPERLOC) Biomet	2006	465	5	98,5	97,1-99,8	-	-
SELEXYS TH (CBC) MATHYS	2006	434	20	90,8	85,9-95,8	-	-
PINNACLE SECTOR II (CORAIL) DePuy	2002	433	8	97,3	95,2-99,4	97,3	95,2-99,4
TRIDENT (ABGII) Stryker Howmedica	2002	429	19	94,7	92,1-97,2	93,6	90,7-96,5
AnCA Fit (PROFEMUR Z) Wright Cremascoli	2002	420	28	94,5	92,3-96,7	93,0	90,5-95,5
CFP (CFP) Link	2001	396	8	97,9	96,4-99,3	97,9	96,4-99,3
REFLECTION (**SYNERGY**) Smith & Nephew	2000	334	11	96,9	94,5-99,2	93,4	89,4-97,5
MULLER (**JVC**) Wright Cremascoli	2000	326	10	98,7	97,5-100	96,6	94,2-99,1
STANDARD CUP (CLS) SulzerCenterpulse Zimmer	2000	322	7	98,7	97,5-100	97,7	96,0-99,4
CLS Zimmer (SL PLUS) Smith & Nephew	2001	311	5	98,0	96,2-99,7	98,0	96,2-99,7
MULLER (**MRL**) Wright Cremascoli	2000	305	13	96,8	94,8-98,9	95,0	92,4-97,7
MULLER (**SPECTRON**) Smith and Nephew	2000	304	13	96,0	93,8-98,3	93,8	90,0-97,6
Others *(models < 300 cases)*	2000	22.378	880	96,3	96,0-96,6	93,6	93,2-94,1
All models	**2000**	**50.485**	**1.736**	**96,6**	**96,5-96,8**	**94,2**	**93,9-94,6**

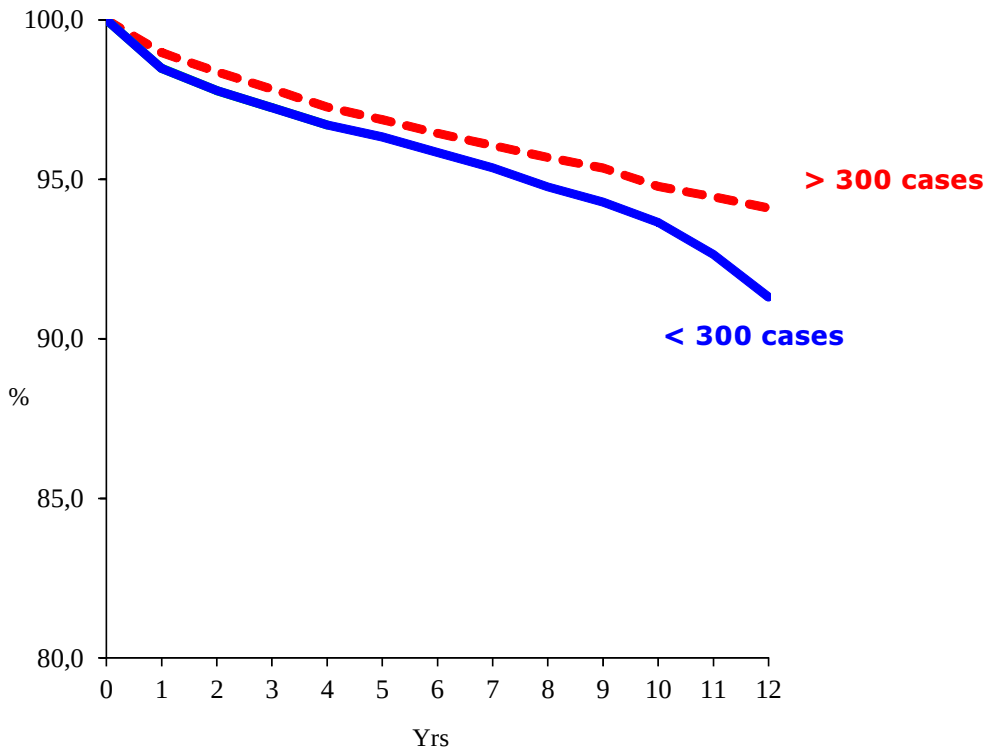
The marked dispersion of prosthesis types and the wide variability of the combinations between acetabulum and stems enable the comparison of only some types of prosthesis.
To provide, anyway, an indication of the survival of the prosthesis types less represented in data banks, they were grouped together to make a class of prostheses of which less than 300 were implanted over 12 years.
They were compared with the prosthesis types of which more than 300 were implanted (those of the previous table), also grouped into a single class.

Survival is not adjusted for articular coupling.

Analysis of the survivorship of the prosthesis according to commercial type (cup + stem)

	Number of implants	n. revisions	% survival at 12 yrs	Confidence interval 95%
Models > 300 cases	28.107	856	94,1	93,4-94,8
Models < 300 cases	22.378	880	91,3	90,3-92,3

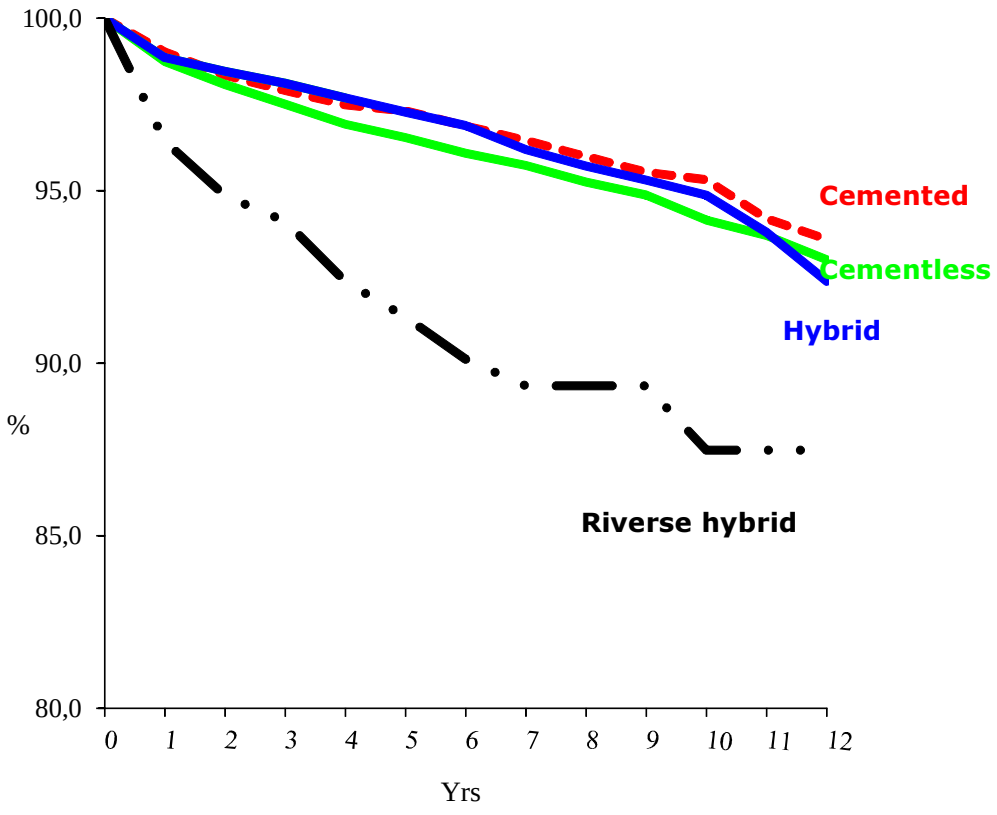
Survival curve



Curves are significantly different (p=0.001, Wilcoxon test)

9.7 Analysis of survival in primary total hip arthroplasty according to fixation

Fixation	N.	Removals	% survival at 12 yrs	Confidence interval 95%
Cementless	40.387	1.331	93,0	92,3-93,7
Hybrid (cemented stem, cementless cup)	5.659	211	92,4	90,7-94,1
Cemented	3.894	137	93,6	91,9-95,3
Reverse hybrid (cementless stem, cemented cup)	389	30	87,5	82,2-92,8



Difference is statistically significant (p=0.001, Wilcoxon test).

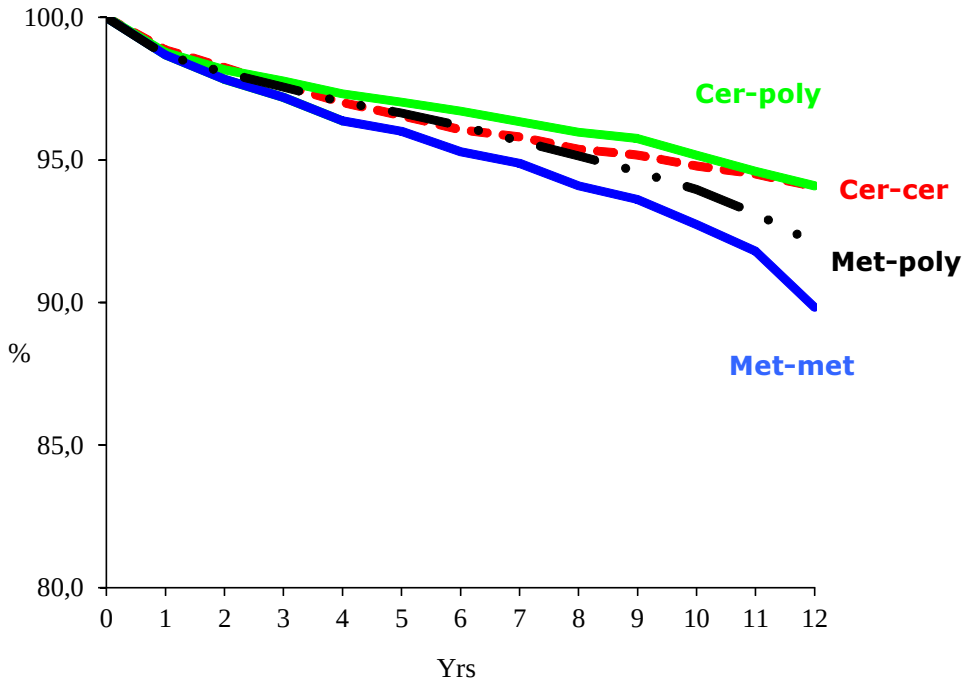
	Cemented		
Cause of revision	**Rate**	**%**	**% distribut. of failure causes**
Aseptic loosening of the cup	**40**/3.894	1,0	29,2
Recurrent prosthesis dislocation	**26**/3.894	0,7	19,0
Global aseptic loosening	**23**/3.894	0,6	16,8
Aseptic loosening of the stem	**17**/3.894	0,4	12,4
Septic loosening	**13**/3.894	0,3	9,5
Periprosthetic bone fracture	**10**/3.894	0,3	7,3
Primary instability	**4**/3.894	0,1	2,9
Breakage of prosthesis	**1**/3.894	0,03	0,7
Missing	**3**/3.894	0,08	2,2
Total	**137/3.894**	**3,5**	**100,0**
	Cementless		
Cause of revision	**Rate**	**%**	**% distribut. of failure causes**
Recurrent prosthesis dislocation	**273**/40.387	0,68	20,5
Aseptic loosening of the stem	**216**/40.387	0,53	16,2
Aseptic loosening of the cup	**193**/40.387	0,5	14,5
Periprosthetic bone fracture	**163**/40.387	0,4	12,2
Breakage of prosthesis	**180**/40.387	0,45	13,5
Global aseptic loosening	**71**/40.387	0,18	5,3
Septic loosening	**78**/40.387	0,19	5,9
Pain without loosening	**40**/40.387	0,10	3,0
Primary instability	**31**/40.387	0,08	2,3
Heterotopic bone	**13**/40.387	0,03	1,0
Poly wear	**13**/40.387	0,03	1,0
Other	**20**/40.387	0,05	1,5
Missing	**40**/40.387	0,10	3,0
Total	**1.331/40.387**	**3,3**	**100,0**
	Hybrid		
Cause of revision	**Rate**	**%**	**% distribut. of failure causes**
Aseptic loosening of the stem	**69**/5.659	1,22	32,7
Recurrent prosthesis dislocation	**61**/5.659	1,08	28,9
Aseptic loosening of the cup	**21**/5.659	0,37	10,0
Septic loosening	**17**/5.659	0,30	8,1
Global aseptic loosening	**12**/5.659	0,21	5,7
Periprosthetic bone fracture	**14**/5.659	0,25	6,6
Breakage of prosthesis	**3**/5.659	0,05	1,4
Primary instability	**2**/5.659	0,04	0,9
Poly wear	**4**/5.659	0,07	1,9
Pain without loosening	**1**/5.659	0,02	0,5
Heterotopic bone	**2**/5.659	0,04	0,9
Missing	**2**/5.659	0,04	0,9
Other	**3**/5.659	0,05	1,4
Total	**211/5.659**	**3,7**	**100,0**
	Reverse hybrid		
Cause of revision	**Rate**	**%**	**% distribut. of failure causes**
Aseptic loosening of the cup	**12**/389	3,1	40,0
Aseptic loosening of the stem	**6**/389	1,5	20,0
Recurrent prosthesis dislocation	**5**/389	1,3	16,7
Periprosthetic bone fracture	**4**/389	1,0	13,3
Global aseptic loosening	**2**/389	0,5	6,7
Septic loosening	**1**/389	0,3	3,3
Total	**30/**389	**7,9**	**100,0**

9.8 Analysis of survival in primary total hip arthroplasty according to coupling

In questa analisi sono stati considerati separatamente i quattro tipi di accoppiamento.

Articular coupling	N.	Removals	% survival at 12 yrs	Confidence interval 95%
Metal-poly	15.901	635	92,1	91,0-93,1
Ceramic-ceramic	17.751	487	94,1	92,9-95,2
Ceramic-poly	11.791	377	94,1	93,1-95,1
Metal-metal	4.525	193	89,1	86,7-93,0

Survival curve



Difference is statistically significant (p=0.001, Wilcoxon test).
Cer-poly vs met-met and met-poly is statistically significant (p=0.002 and p=0.02, Wilcoxon test)

Met-poly			
Cause of revision	**Rate**	**%**	**% distribution of failure causes**
Recurrent prosthesis dislocation	**152**/15.901	1,0	23,9
Aseptic loosening of the cup	**129**/15.901	0,8	20,3
Aseptic loosening of the stem	**131**/15.901	0,8	20,6
Periprosthetic bone fracture	**71**/15.901	0,4	11,2
Global aseptic loosening	**54**/15.901	0,3	8,5
Septic loosening	**34**/15.901	0,2	5,4
Pain without loosening	**17**/15.901	0,1	2,7
Primary instability	**11**/15.901	0,1	1,7
Poly wear	**13**/15.901	0,1	2,0
Breakage of prosthesis	**6**/15.901	0,04	0,9
Missing	**10**/15.901	0,06	1,6
Other	**7**/15.901	0,04	1,1
Total	**635/15.901**	**4,0**	**100,0**
Cer-cer			
Cause of revision	**Rate**	**%**	**% distribution of failure causes**
Recurrent prosthesis dislocation	**99**/17.751	0,6	20,3
Periprosthetic bone fracture	**65**/17.751	0,4	13,3
Aseptic loosening of the stem	**57**/17.751	0,3	11,7
Breakage of stem	**70**/17.751	0,4	14,4
Breakage of liner	**39**/17.751	0,2	8,0
Breakage of head	**35**/17.751	0,2	7,2
Aseptic loosening of the cup	**25**/17.751	0,1	5,1
Septic loosening	**28**/17.751	0,2	5,7
Primary instability	**12**/17.751	0,1	2,5
Pain without loosening	**15**/17.751	0,1	3,1
Global aseptic loosening	**11**/17.751	0,1	2,3
Others	**9**/17.751	0,05	1,8
Unknown	**13**/17.751	0,1	2,7
Total	**487/17.751**	**2,7**	**100,0**
Cer-poly			
Cause of revision	**Rate**	**%**	**% distribution of failure causes**
Recurrent prosthesis dislocation	**89**/11.791	0,8	23,6
Aseptic loosening of the stem	**86**/11.791	0,7	22,8
Aseptic loosening of the cup	**53**/11.791	0,4	14,1
Periprosthetic bone fracture	**34**/11.791	0,3	9,0
Septic loosening	**27**/11.791	0,2	7,2
Global aseptic loosening	**24**/11.791	0,2	6,4
Breakage of stem	**12**/11.791	0,1	3,2
Primary instability	**9**/11.791	0,1	2,4
Pain without loosening	**7**/11.791	0,1	1,9
Poly wear	**5**/11.791	0,04	1,3
Heterotopic bone	**5**/11.791	0,04	1,3
Breakage of head	**4**/11.791	0,03	1,1
Breakage of cup	**4**/11.791	0,03	1,1
Other	**2**/11.791	0,02	0,5
Missing	**16**/11.791	0,1	4,2
Total	**377/11.791**	**3,2**	**100,0**

Met-met			
Cause of revision	**Rate**	**%**	**% distribution of failure causes**
Aseptic loosening of the cup	**57**/4.525	1,3	29,5
Aseptic loosening of the stem	**29**/4.525	0,6	15,0
Recurrent prosthesis dislocation	**21**/4.525	0,5	10,9
Septic loosening	**19**/4.525	0,4	9,8
Global aseptic loosening	**18**/4.525	0,4	9,3
Periprosthetic bone fracture	**15**/4.525	0,3	7,8
Breakage of cup	**7**/4.525	0,2	3,6
Breakage of stem	**7**/4.525	0,2	3,6
Primary instability	**5**/4.525	0,1	2,6
Pain without loosening	**2**/4.525	0,04	1,0
Heterotopic bone	**2**/4.525	0,04	1,0
Other	**5**/4.525	0,1	2,6
Missing	**6**/4.525	0,1	3,1
Total	**193/4.525**	**4,3**	**100,0**

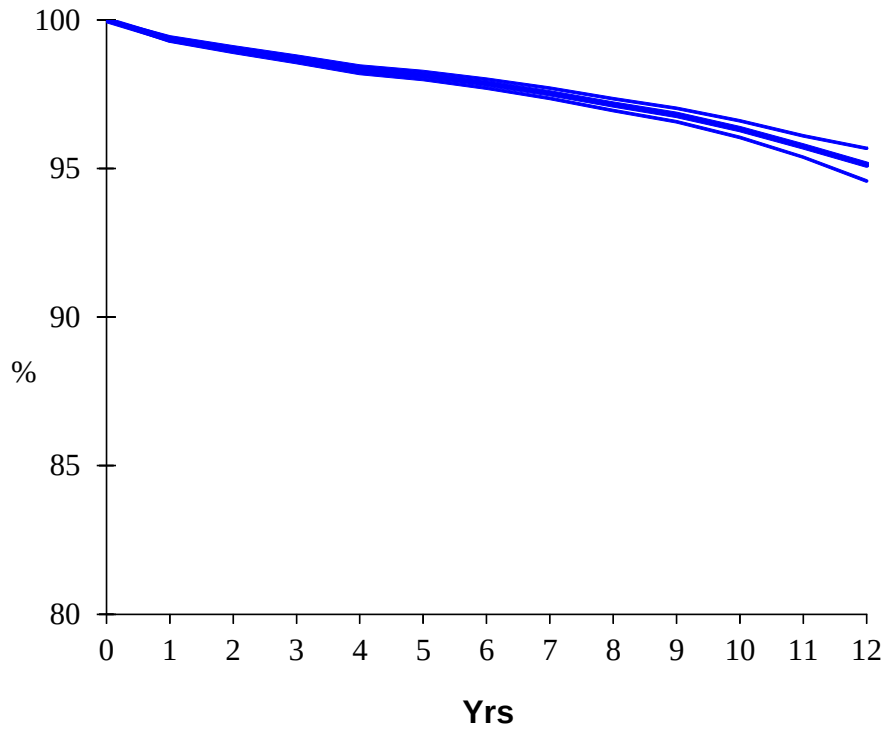
9.9 Survival analysis of acetabular component

Analysis was performed on primary cups. Cup 'survives' until it is completely revised or is revised the liner.

Number of arthroprostheses	n. revisions	% survival at 12 yrs	Confidence interval 95%
50.485	**1.024**	95,1	94,6-95,7

*252 of them liner only

Survival curve



9.10 Analysis of the survivorship of the acetabular cup according to commercial type

Cemented cups in bold

Cup	From year	N.	n. revisions	% survival 5 yrs	c.i at 95%	% survival 10 yrs	c.i at 95%
ABGII Stryker Howmedica	2000	2240	29	98,8	98,3-99,3	98,0	97,2-98,8
AnCA FIT Wright Cremascoli	2000	4939	119	98,4	98,1-98,8	97,1	96,6-97,7
BICON PLUS Smith & Nephew	2000	1162	41	97,2	96,2-98,2	93,2	90,2-96,2
CFP Link	2000	443	9	98,1	96,8-99,4	97,5	95,7-99,3
CLS Sulzer, Centerpulse,Zimmer	2000	3012	93	98,5	98,1-99,0	95,5	94,5-96,5
CONTEMPORARY Stryker Howmedica	2000	697	20	97,5	96,2-98,7	95,9	93,6-98,2
DELTA PF – Lima	2003	1050	15	98,0	97,0-99,0	-	-
DELTA TT – Lima	2007	335	2	99,3	98,3-100,0	-	-
DUOFIT PSF Samo	2000	986	31	97,6	96,6-98,6	96,3	94,9-97,7
EP-FIT Plus – Smith & Nephew	2003	2914	18	99,2	98,7-99,6	-	-
EXCEED ABT Biomet	2006	735	3	99,4	98,8-100	-	-
EXPANSION Mathys	2003	1168	29	97,1	95,9-98,2	91,7	85,2-98,1
FITMORE Sulzer	2000	2074	37	98,3	97,7-98,9	97,6	96,8-98,4
FIXA Adler-Ortho	2004	5394	61	98,7	98,3-99,0	-	-
FIXATi por – Adler-Ortho	2007	3819	22	98,8	98,0-99,7	-	-
HILOCK LINE Symbios	2000	523	27	94,8	92,6-96,9	92,2	89,1-95,3
MULLER Wright Cremascoli	2000	884	20	98,9	98,2-99,6	97,3	96,0-98,7
MULLER Smith & Nephew	2000	400	13	97,3	95,7-99,0	95,4	92,5-98,2
MULLER Samo	2000	360	16	95,4	93,1-97,8	94,3	91,6-97,1
PE (Muller Protek) Sulzer	2000	399	16	97,6	96,0-99,1	95,3	92,9-97,7
Pinnacle Sector II – DePuy	2002	813	9	98,1	96,7-99,5	98,1	96,7-99,5
RECAP RESURFACING - Biomet	2005	646	12	97,4	95,9-98,9	-	-
REFLECTION Smith & Nephew	2000	1401	27	98,8	98,2-99,4	96,3	94,7-97,9
SELEXYS TH - Mathys	2006	526	16	93,7	90,1-97,3	-	-
STANDARD CUP PROTEK Sulzer	2000	867	27	98,2	97,3-99,1	96,7	95,4-98,0
TRIDENT Stryker Howmedica	2002	1184	17	98,3	97,5-99,1	98,3	97,5-99,1
TRILOGY Zimmer	2000	846	16	98,7	97,9-99,4	97,6	96,4-98,8
VERSAFITCUP CC Medacta	2005	453	15	95,6	93,3-97,8	-	-
ZCA Zimmer	2000	612	9	98,9	98,0-99,8	98,1	96,7-99,5
R3 SMITH AND NEPHEW	2009	504	4	-	-	-	-
Others *(with < 300 cases each)*	2000	9.099	251	97,6	97,2-97,9	95,1	94,3-95,8
ALL MODELS	2000	50.485	1.024	98,1	98,0-98,3	96,3	96,1-96,6

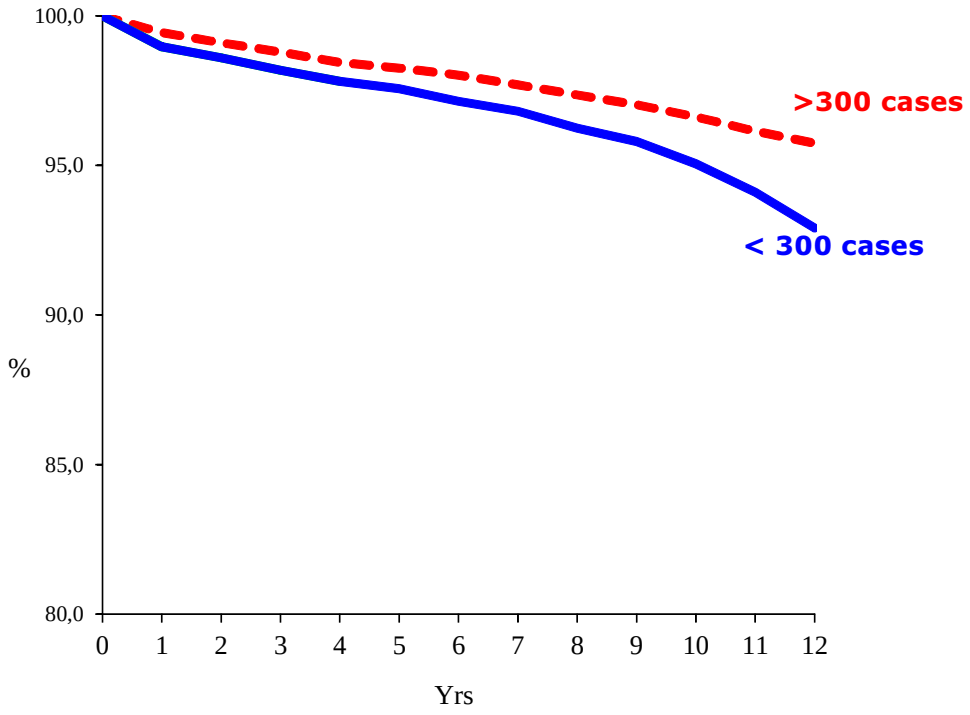
Cup is failed when even only liner has been exchanged

The marked dispersion of prosthesis types enables a comparison of only some types of acetabulum.
To provide, anyway, an indication of the survival of the prosthesis types less represented in data banks, they were grouped together to make a class of prostheses of which less than 300 were implanted over 12 years.
They were compared with the prosthesis types of which more than 300 were implanted (those of the previous table), also grouped into a single class.

Analysis of the survival according to commercial type (Cup)

		n. revisions	% survival at 12 yrs	Confidence interval 95%
Models >300 cases	41.386	773	95,7	95,2-96,3
Models <300 cases	9.099	251	92,9	91,4-94,4

Survival curve



Curves are significantly different (p=0.001, Wilcoxon test).

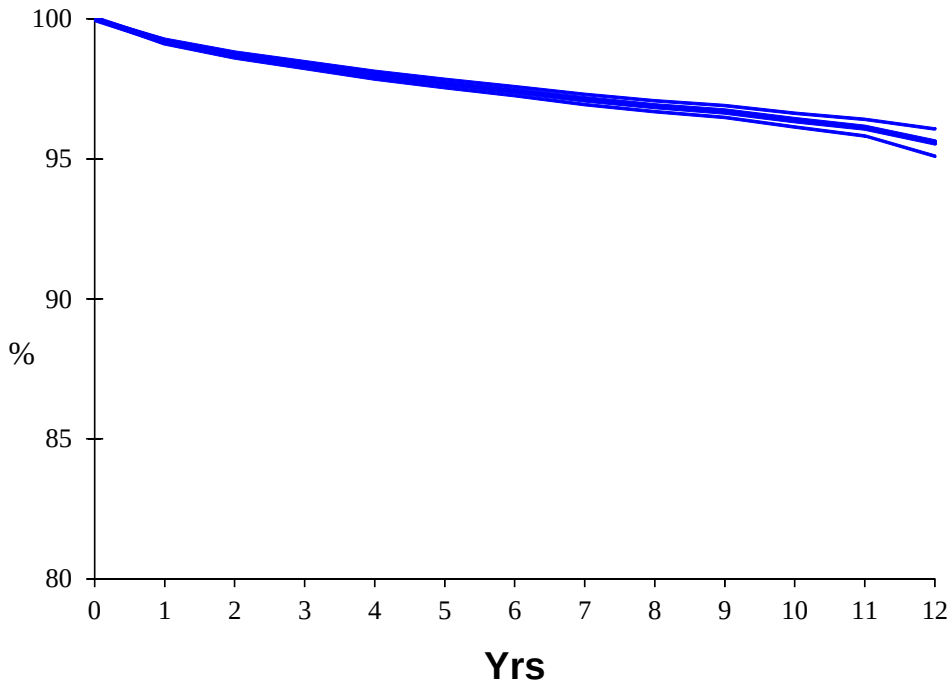
9.11 Survival analysis of stem

Analysis was performed considering only the femoral component. The stem is considered "surviving" up to when it is fully revised or only its proximal component is replaced. The possible revision of a modular neck was considered as the failure of the stem

Number of arthroprostheses	n. revisions	% survival at 12 yrs	Confidence interval 95%
50.485	**1.136***	95,6	95,1-96,1

*245 revision of modular neck/proximal component only

Survival curve



9.12 Analysis of the survivorship of the femoral component according to commercial type

Cemented stem in bold.
Revision of modular neck is considered stem revision.

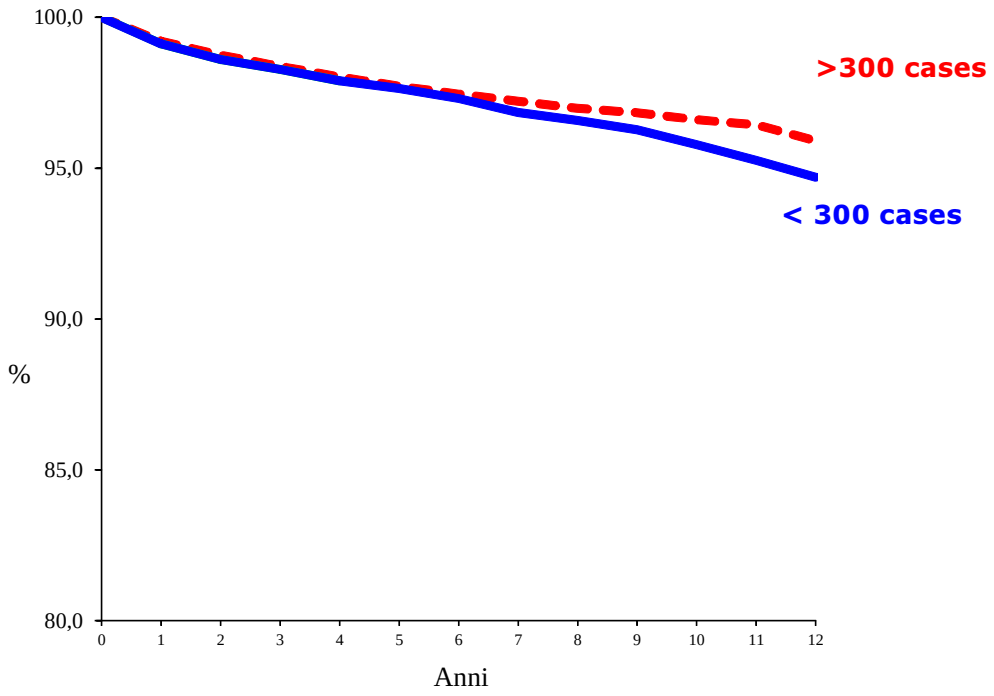
Stem	From year	N.	n. revision	% SURVIVAL 5 YRS	c.i at 95%	% SURVIVAL 10 yrs	c.i. at 95%
APTA Adler-Ortho	2004	3.761	78	97,1	96,4-97,9	-	-
SL PLUS Smith & Nephew	2000	3.392	59	98,0	97,4-98,5	96,9	95,7-98,1
CLS Sulzer Centerpulse Zimmer	2000	3.227	73	98,4	97,9-98,8	97,0	96,2-97,8
RECTA Adler-Ortho	2004	3.170	92	95,6	94,6-96,6	-	-
AnCA FIT Wright Cremascoli	2000	3.146	137	96,3	95,6-97,0	95,0	94,2-95,9
CONUS Sulzer Centerpulse Zimmer	2000	2.913	43	98,5	98,0-99,0	98,2	97,7-98,8
ABGII Stryker Howmedic	2000	2.640	44	98,1	97,5-98,7	97,5	96,6-98,3
TAPERLOC Biomet	2002	1.699	26	97,9	97,0-98,7	97,9	97,0-98,7
CBC Mathys	2000	1.679	36	96,8	95,6-98,0	96,8	95,6-98,0
EXETER Stryker Howmedic	2000	1.125	13	99,1	98,5-99,7	98,4	97,4-99,3
Hydra Adler-Ortho	2007	924	13	97,1	95,3-98,9	-	-
APTA Cem Adler-Ortho	2004	902	24	97,0	95,8-98,2	-	-
CFP Link	2000	856	6	99,3	98,7-99,9	99,3	98,7-99,8
VERSYS FIBER METAL TAPER Zimmer	2000	849	14	98,3	97,3-99,2	98,2	97,3-99,2
PROXIPLUS ENDOPLANT	2005	828	7	98,9	98,1-99,8	-	-
BASIS Smith & Nephew	2001	705	13	98,7	97,8-99,7	96,6	94,6-98,5
CORAIL De Puy	2000	695	9	98,3	97,2-99,5	98,3	97,2-99,5
JVC Wright Cremascoli	2000	694	21	98,1	97,0-99,1	96,8	95,4-98,2
SPECTRON Smith & Nephew	2000	674	23	98,5	97,5-99,5	94,8	92,6-97,1
P507 Samo	2000	586	9	99,3	98,5-100	97,7	96,0-99,4
Modulus Hip System Lima	2001	526	9	97,8	96,3-99,3	-	-
PROFEMUR Z Wright Cremascoli	2002	509	20	96,5	94,8-98,1	95,7	93,8-97,6
MRL Wright Cremascoli	2000	452	14	98,1	96,7-99,4	96,8	95,0-98,6
ABG riv -Stryker Howme.	2000	448	8	99,3	98,5-100	98,5	97,3-99,7
Alata acuta S Adler-Ortho	2005	377	15	94,6	91,6-97,6		
SYNERGY Smith & Nephew	2000	371	3	99,7	99,2-100	98,3	96,3-100
SL PLUS MIA Smith & Nephew	2009	350	2	-	-		
VERSYS CEMENTED Zimmer	2000	319	6	99,0	97,9-100	98,6	97,2-100
AD Samo	2000	310	13	95,7	93,2-98,2	94,5	91,5-97,5
Others *(with less than 300 cases each)*	2000	12.351	306	97,6	97,3-97,9	95,8	95,2-96,3
ALL MODELS	2000	50.485	1136	97,7	97,5-97,8	96,4	96,1-96,6

The marked dispersion of prosthesis types enables a comparison of only some types of stem.
To provide, anyway, an indication of the survival of the prosthesis types less represented in data banks, they were grouped together to make a class of prostheses of which less than 300 were implanted over 12 years.
They were compared with the prosthesis types of which more than 300 were implanted (those of the previous table), also grouped into a single class.

Analysis of the survival according to commercial type (stem)

	n.	n. revisions	% survival at 12 yrs	Confidence interval 95%
Models >300 cases	38.134	830	95,9	95,3-96,5
Models <300 cases	12.351	306	94,7	93,7-95,7

Survival curve



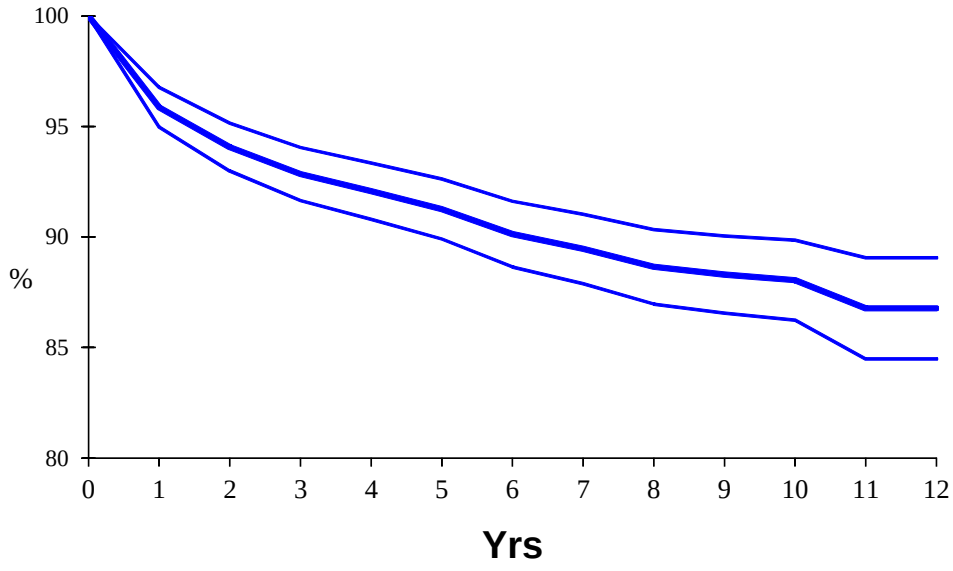
Curves are not significantly different (p=0.207, Wilcoxon test)

9.13 Survival analysis of total revision

In the present analysis the survival of the total revision operations was calculated. These operations were considered as "surviving" up to the moment when it was not necessary to perform a second revision of any component (even just a bearing or modular neck).

Number of total first revision	Second revision	% survival at 12 yrs	Confidence interval 95%
1.969	179	86,8	84,5-89,1

Survival curve



The following table shows the cause of second revision in total revisions according to **cause of revision**;

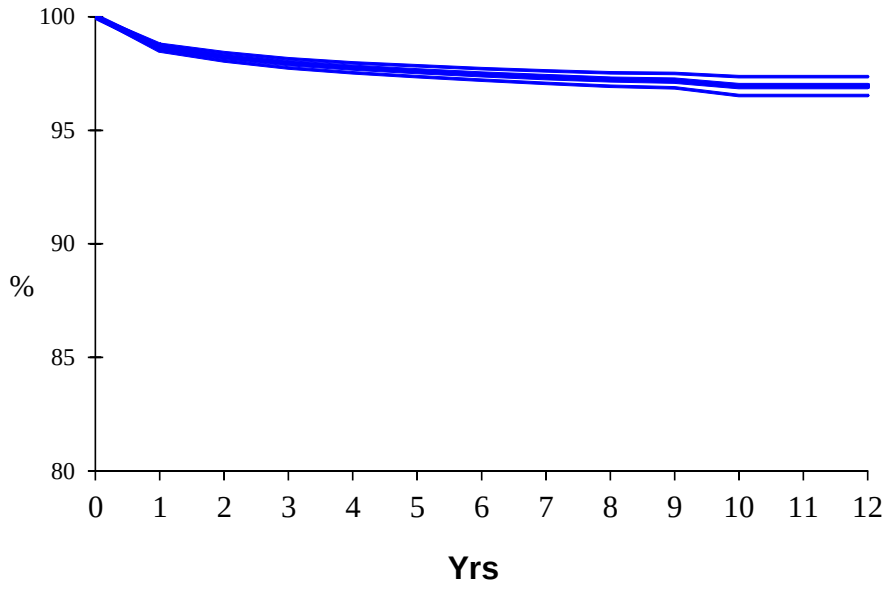
Cause of revision	Rate	%	% distribution of failure causes
Recurrent dislocation	**43**/1.969	2,2	24,0
Aseptic loosening of the cup	**33**/1.969	1,7	18,4
Aseptic loosening of the stem	**31**/1.969	1,6	17,3
Septic loosening	**26**/1.969	1,3	14,5
Total aseptic loosening	**17**/1.969	0,9	9,5
Periprosthetic bone fracture	**12**/1.969	0,6	6,7
Primary instability	**4**/1.969	0,2	2,2
Prosthesis breakage	**3**/1.969	0,2	1,7
Pain without loosening	**2**/1.969	0,1	1,1
Unknown	**8**/1.969	0,4	4,5
Total	**179/1.969**	**9,1**	**100,0**

9.14 Survival analysis of hemiarthroplasty

Survival of hemiarthroplasty was calculated considering revision of the head as a failure. Also revision of an hemiarthroplasty to total hip prosthesis is considered a failure.

N. of hemiarthroplasty	Removal	% survival at 12 yrs	Confidence interval 95%
25.870	**455**	96,9	96,5-97,4

Survival curve



The following table shows the rate of revision in hemiarthroplasty according to **cause of revision; percentage distribution of causes for revision is also reported.**

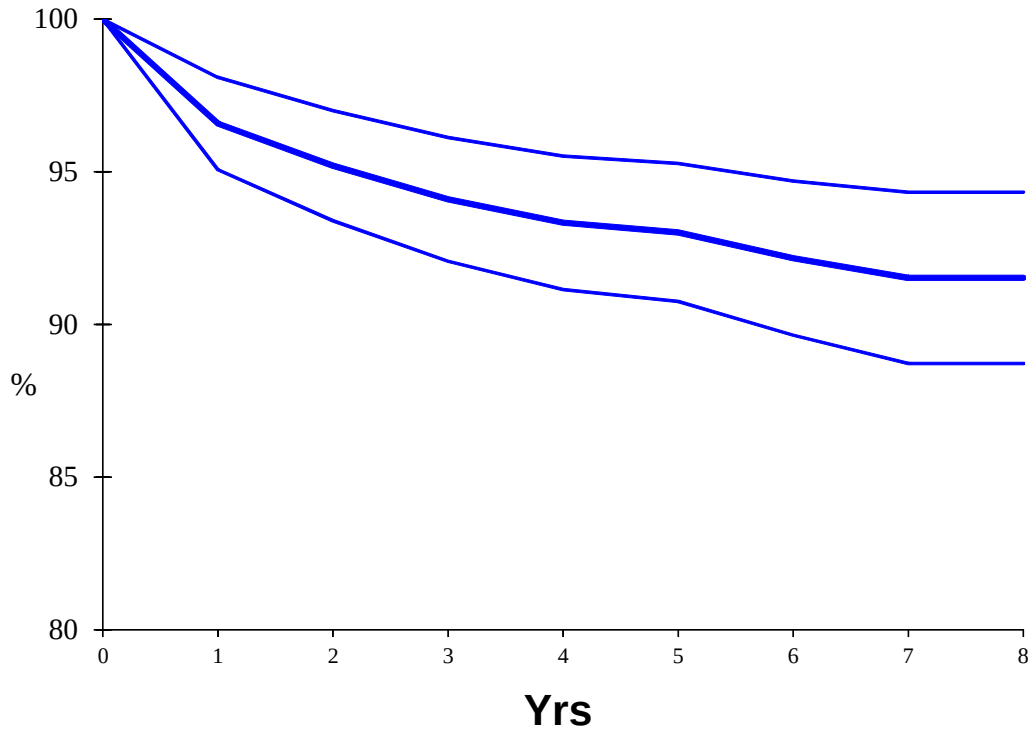
Cause of revision	Rate	%	% distribution of failure causes
Dislocation	**209**/25.870	0,81	45,9
Stem aseptic loosening	**80**/25.870	0,31	17,6
Cotyloiditis	**77**/25.870	0,30	16,9
Septic loosening	**35**/25.870	0,14	7,7
Periprosthetic bone fracture	**32**/25.870	0,12	7,0
Unknown	**9**/25.870	0,03	2,0
Primary instability	**8/**25.870	0,03	1,8
Other	**5**/25.870	0,02	1,1
Total	**455/25.870**	**1,8**	**100,0**

9.15 Survival analysis of resurfacing

Maximum follow-up is only 8 years. This should be borne in mind when comparing the curves so far described, where the maximum follow-up is 12 years.

N. of resurfacing	Removal	% survival at 12 yrs	Confidence interval 95%
577	38	91,5	(88,7-94,3)

Survival curve



Type of prosthesis	First implant	N.	Rev.	% survival at 12 yrs	Confidence interval 95%
BHR – Smith & Nephew	2001	297	10	96,7	94,5-98,8
ADEPT – Finsbury	2005	72	2	97,1	93,1-100,0
ASR – DePuy	2004	63	11	81,1	70,2-92,1
MRS – Lima	2005	42	8	80,9	92,8-69,0
BMHR – Smith & Nephew	2007	41	1	97,2	91,9-100,0
Other (< 40 cases)	2003	62	6	91,6	84,5-98,7
Totale	**2001**	**577**	**38**	**93,0**	**90,8-95,3**

The following table shows the rate of revision in resurfacing according to **cause of revision**

Cause of revision	Rate	%	Distribution of causes
Periprosthetic bone fracture	**15**/577	2,6	39,5
Aseptic loosening	**13**/577	2,2	34,2
Pain without loosening	**4**/577	0,6	10,5
Metal sensitization	**3**/577	0,5	7,9
Prosthesis breakage	**2**/577	0,3	5,3
Septic loosening	**1**/577	0,1	2,6
Total	**38/577**	**6,6**	**100,0**

PART TWO: KNEE PROSTHESIS

July 2000 – December 2011

10. RIPO capture

10.1 Percentage of capture

Percentage of R.I.P.O. capture calculated versus Schede di Dimissione Ospedaliera (S.D.O.), according to Agency was **98.1**% for year 2011. Data are referred to primary knee prosthesis (8154), revision (8155;80;81;82;83;84) and prosthesis removal (8006).

10.2 Ratio public/private treatment

Percentage of primary arthroprostheses and hemiarthroplasties of the knee performed in public hospitals

% of operations performed in public hospitals (AUSL, AOSP, IRCCS)		
Year of operation	**Primary**	**Revision**
2000	57,0	75,0
2001	59,0	71,0
2002	53,0	70,0
2003	49,0	68,0
2004	47,1	58,3
2005	45,3	60,2
2006	42,9	54,3
2007	42,3	49,9
2008	40,6	55,0
2009	37,7	49,8
2010	37,3	50,9
2011	35,9	45,5

From database SDO

Percentage of primary total knee arthroprostheses and revision performed in public and private hospitals, in year 2011

Type of operation	**Public**	**Private**
	%	**%**
Primary bicompartmental	62,3	71,3
Primary tricompartmental	17,1	10,9
Primary unicompartmental	10,8	10,9
Revision	6,8	5,5
Prosthesis removal	2,1	0,7
Implant of patella	0,9	0,7
Total	**100.0**	**100.0**

11. Type of operation

Bicompartmental implant has only femoral and tibial component, whilst tricompartmental one has patella too.
Implant of patella occurs when a bicompartmental knee prosthesis is transformed into tricompartmental with a second surgery. This is not considered a failure of primary bi-compartimental

Number of knee operations carried out on patients with admission date between 1st July 2000 and 31st December 2011, according to **type**

Type of operation	Number	Percentage
Primary bicompartmental	39.275	66,8
Primary unicompartmental	7.794	13,3
Primary tricompartmental	6.257	10,6
Revision^	3.489	5,9
Prosthesis removal	756	1,3
Implant of patella	437	0,7
Other prostheses*	257	0,4
Other operations°	501	0,9
Total	**58.766**	**100,0**

** 49 Hemicap – Arthrosurface, 29 Hemicap patello_femoral – Arthrosurface, 40 Avon-Patello-Femoral Joint Stryker, 63 other patella-femoral, 53 Unicompartimental Plus + rotula*

° 184 spacer exchange, 67 stiff knee loosenings, 56 debridments, 5 dislocation reductions

^ among them 312 liner, 5 femoral component, 77 femoral component and liner, 195 tibial component and liner, 2876 total, 24 patella

Percentage of different prostheses in the years

Years of operation	% unicompartim	% bicompartim	% tricompartim
2001	10,2	81,3	8,5
2002	12,7	80,1	7,2
2003	12,8	78,5	8,7
2004	13,0	75,7	11,3
2005	12,4	75,6	12,0
2006	10,8	70,0	19,2
2007	11,5	69,3	19,2
2008	11,6	72,1	16,4
2009	12,9	72,3	14,7
2010	12,5	71,5	16,0
2011	9,8	73,4	16,8

12. Descriptive statistics of patients with knee prosthesis

12.1 Age

Number of knee operations carried out on patients with admission date between 1st July 2000 and 31st December 2011, according to **type of operation** and **age group** of patients at the time of surgery.

Type of operation	<40		40-49		50-59		60-69		70-79		≥80		Total
	N.	%	N.	%	N.	%	N.	%	N.	%	N.	%	
Bi-tricomp	160	0,3	558	1,2	3.244	6,9	14.249	30,3	23.610	50,2	5.246	11,1	47.067
Unicomp	12	0,2	174	2,8	1.145	18,3	2.645	42,3	1.917	30,6	362	5,8	6.255
Revision	18	0,5	86	2,5	324	9,3	1.052	30,2	1.587	45,5	422	12,1	3.489
Prosthesis. removal	8	1,1	23	3,0	89	11,8	249	32,9	314	41,5	73	9,7	756
Patella only	4	0,9	13	3,0	33	7,6	129	29,5	214	49,0	44	10,1	437
Total*	**202**	**0,3**	**854**	**1,5**	**4.835**	**8,3**	**18.324**	**31,6**	**27.642**	**47,7**	**6.147**	**10,6**	**58.004**

* 4 missing cases (0.007%)

Mean age at surgery, according to type of operation - years 2000-2011

Type of operation	Mean age	Range
Primary bi/tricompartmental	70,7	13–96
Primary unicompartmental	66,3	32-91
Revision	69,9	18-92
Total	**70,2**	**13–96**

Mean age at surgery, according to type of operation - years **2001-2011**

Type of operation	Year 2001		Year 2011	
	Mean age	Range	Mean age	Range
Primary bi/tricompartmental	71,2	23-92	70,2	27-96
Primary unicompartmental*	68,9	45-87	64,8	39-87
Revision ^	71,7	26-87	69,4	18-89

*statistically different (t-test, p<0.001)
^ statistically different (t-test, p<0.05)

Mean age at surgery, according to type of operation - years 2000-2011 - according to **private or public hospital**

Type of operation	Public		Private	
	Mean age	Range	Mean age	Range
Primary bi/tricompartmental*	71,1	13-92	70,5	20-96
Primary unicompartmental^	67,3	32-89	65,5	33-91

* mean age for bicompartmental in public and private hospital is significantly different (t-test, p<0.001)
^ mean age for unicompartmental in public and private hospital is significantly different (t-test, p<0.001)

12.2 Gender

Number of knee operations carried out on patients with admission date between 1st July 2000 and 31st December 2011, according to **type of operation** and **gender** of patients at the time of surgery.

Type of operation	Males		Females		Totale
	N.	%	N.	%	N.
Bi/tricompartmental	12.834	27,3	34.235	72,7	47.069
Unicompartmental	1.990	31,8	4.267	68,2	6.257
Revision	881	25,3	2.608	74,7	3.489
Prosthesis removal	277	36,6	479	63,4	756
Patella only	105	24,0	332	76,0	437
Other	282	37,2	476	62,8	758
Total	**16.369**	**27,9**	**42.397**	**72,1**	**58.766**

12.3 Side of surgery

There is a prevalence of operations performed on the right side (55.0%) in comparison with the left side (45.0%). The percentage was calculated on patients with only one knee prosthesis affected by primary arthritis.

Percentage

Side	Males	Females
Right	51,2	56,5
Left	48,8	43,5

Difference is statistically significant (Chi – squared p<0.001).

12.4 Bilateral arthroplasty

In the period of registry observation (11 years) 7.660 patients underwent bilateral operations.
6.654 (86,9%) chose to undergo the second operation at the same hospital from where the first one was performed.
342 (4,5%) chose to undergo the second operation at a different hospital from where the first one was performed to follow the surgeon.

664 (8,7%) chose to undergo the second operation at a different hospital from where the first one was performed.
In bilateral operations, it was observed that the first knee to be treated was the right one in 54.0% of cases.

12.5 Diseases treated with unicompartmental knee prosthesis

Number of primary unicompartmental knee prosthesis operations carried out on patients with admission date between 1st July 2000 and 31st December 2011, according to **diagnosis**.

Diagnosis in unicomp. knee prosthesis	Number	Percentage
Primary arthritis	5.379	86,1
Necrosis of the condyle	334	5,3
Deformity	303	4,9
Post-traumatic arthritis	77	1,2
Post-traumatic necrosis	56	0,9
Idiopathic necrosis	31	0,5
Sequelae of fracture	28	0,4
Rheumatic arthritis	15	0,2
Sequelae of osteotomy	10	0,2
Others	11	0,2
Total *	**6.244**	**100,0**

* 13 missing cases (0.2%)

12.6 Diseases treated with bi-tricompartmental knee prosthesis

Number of primary bi-tricompartmental knee prosthesis operations carried out on patients with admission date between 1st July 2000 and 31st December 2011, according to **diagnosis**.

Diagnosis in bi/tricompartmental knee prosth.	Number	Percentage
Primary arthritis	40.621	86,6
Deformity	3.210	6,8
Post-traumatic arthritis	817	1,7
Rheumatic arthritis	765	1,6
Sequelae of fracture	602	1,3
Sequelae of osteotomy	279	0,6
Necrosis of the condyle	267	0,6
Post-traumatic necrosis	71	0,2
Sequelae of septic arthritis	52	0,1
Sequelae of poliomyelitis	37	0,1
Idiopathic necrosis	35	0,1
Tumor	12	0,03
Other	151	0,3
Total*	**46.919**	**100,0**

* 150 missing data, equal to 0.3% of primary arthroprostheses

12.7 Causes of revision and removal

Number of revision operations carried out on patients admitted between 1st July 2000 and 31st December 2011, according to **diagnosis**.
In the Table all revisions performed in the Region, without taking care of site and date of primary implant are reported.

Diagnosis in revision	Number	Percentage
Total aseptic loosening	1.459	42,3
Prosthesis removal	621	18,0
Pain without loosening	287	8,3
Aseptic loosening of tibial component	274	7,9
Insert wear	183	5,3
Septic loosening	123	3,6
Aseptic loosening of femoral component	110	3,2
Prosthesis dislocation	72	2,1
Instability	68	2,0
Stiffness	46	1,3
Bone fracture	46	1,3
Breakage of prosthesis	29	0,8
Other	134	3,9
Total*	**3.452**	**100,0**

***** 37 missing data, (1.1%)

Number of prosthesis removal carried out on patients admitted between 1st July 2000 and 31st December 2011, according to **diagnosis**.
In the Table all removals performed in the Region, without taking care of site and date of primary implant are reported.

Diagnosis in removal	Number	Percentage
Septic loosening	679	91,3
Total aseptic loosening	40	5,4
Aseptic loosening of tibial	5	0,7
Bone fracture	4	0,5
Dislocation	4	0,5
Pain	3	0,4
Other	9	1,2
Total*	**744**	**100,0**

* 12 missing data,(1.6%)

13. Types of knee prosthesis

13.1 Unicompartmental prosthesis

Prostheses used in patients admitted between 1st July 2000 and 31st December 2011, primary *unicompartmental* surgery.

All poly tibial components in bold

TYPE OF PROSTHESIS	2000-2004		2005-2009		2010-2011	
	N.	%	N.	N.	%	N.
GENESIS UNI - Smith & Nephew	131	8,6	492	15,0	247	17,2
ZIMMER UNI - Zimmer	-	-	300	9,1	232	16,1
GENESIS UNI - ALL POLY - Smith & Nephew	16	1,0	84	2,6	144	10,0
UNI SIGMA HP - De Puy Johnson & Johnson	-	-	11	0,3	144	10,0
OXFORD UNICOMPARTMENTAL PHASE 3 - Biomet Merck	433	28,3	691	21,0	125	8,7
JOURNEY UNI - ALL POLY - Smith & Nephew	-	-	-	-	122	8,5
GKS - ONE - Permedica	-	-	107	3,3	62	4,3
UC-PLUS SOLUTION - ALL POLY - Endoplus	3	0,2	79	2,4	55	3,8
BALANSYS - UNI - Mathys	-	-	62	1,9	51	3,5
EFDIOS - Citieffe	254	16,6	171	5,2	47	3,3
OPTETRAK - UNI - ALL POLY - Exactech	-	-	126	3,8	45	3,1
MITUS - ENDO-MODEL UNI - ALL POLY - Link	76	5,0	245	7,5	37	2,6
UNI SIGMA HP - ALL POLY - De Puy Johnson & Johnson	-	-	-	-	28	1,9
PRESERVATION UNI - ALL POLY - Depuy	125	8,2	228	6,9	21	1,5
ALLEGRETTO UNI - Protek-Sulzer	204	13,3	49	1,5	19	1,3
TRIATHLON - PKR - HOWMEDICA Osteonics	-	-	3	0,1	17	1,2
GKS - ONE - CUSTOM MADE - Permedica	-	-	5	0,2	15	1,0
PRESERVATION UNI - Depuy	-	-	14	0,4	13	0,9
UC-PLUS SOLUTION - Endoplus	45	2,9	194	5,9	3	0,2
MAIOR - Finceramica	-	-	154	4,7	-	-
HLS - UNI EVOLUTION - ALL POLY - Tornier	53	3,5	100	3,0	-	-
MILLER GALANTE UNI - Zimmer	103	6,7	75	2,3	1	0,1
EIUS UNI - ALL POLY - STRYKER Howmedica	5	0,3	54	1,6	-	-
OPTETRAK - ARTHROFOCUS - Exactech	-	-	10	0,3	-	-
PFC - UNI - De Puy Johnson & Johnson	41	2,7	-	-	-	-
UNICIA - VECTEUR ORTHOPEDIC - Stratec	27	1,8	-	-	-	-
Others (models with less than 10 cases)	15	1,0	14	0,4	8	0,6
Unknown	1	0,1	17	0,5	4	0,3
TOTAL	**1.532**	**100,0**	**3.285**	**100,0**	**1.440**	**100,0**

13.2 Bi-tricompartmental knee prosthesis

Prostheses used in patients admitted between 1st July 2000 and 31st December 2011, primary bi/tricompartmental surgery.

TYPE OF PROSTHESIS	2000-2004		2005-2009		2010-2011	
	N.	%	N.	N.	%	N.
NEXGEN – Zimmer	3.021	27,1	5.926	24,3	1.956	17,0
P.F.C – DePuy	903	8,1	1.894	7,8	1.444	12,5
VANGUARD – Biomet Merck France	-	-	1.579	6,5	1.311	11,4
GENESIS - Smith & Nephew	212	1,9	1.781	7,3	1.225	10,6
TC-PLUS - SOLUTION - Smith & Nephew	13	0,1	1.066	4,4	858	7,5
GENUS – Adler-Ortho	-	-	328	1,3	609	5,3
GEMINI - Link	151	1,4	991	4,1	455	4,0
TRIATHLON – Stryker Howmedica Osteonics	-	-	401	1,6	449	3,9
SCORPIO – Stryker Howmedica	526	4,7	1.534	6,3	447	3,9
FIRST - Symbios Orthopedie SA	-	-	345	1,4	423	3,7
BALANSYS - Mathys	-	-	173	0,7	303	2,6
PROFIX – Smith & Nephew	1.854	16,6	2.823	11,6	276	2,4
G.K.S. – Permedica	106	1,0	252	1,0	263	2,3
GSP - TREKKING - Samo	-	-	249	1,0	259	2,3
OPTETRACK – Exactech	289	2,6	657	2,7	141	1,2
ROTAGLIDE – Corin Medical	295	2,6	362	1,5	115	1,0
LCS – DePuy	417	3,7	354	1,5	113	1,0
ADVANCE - Wright	292	2,6	383	1,6	111	1,0
SCORE – Amplitude	38	0,3	542	2,2	-	-
AGC - Biomet Merck France	58	0,5	527	2,2	3	0,0
MULTIGEN - Lima	20	0,2	393	1,6	17	0,1
GENIUS TRICCC - Dedienne Sante	295	2,6	246	1,0	71	0,6
COLUMBUS - B.Braun	-	-	192	0,8	83	0,7
JOURNEY – Smith & Nephew	-	-	170	0,7	64	0,6
HLS – Tornier	137	1,2	164	0,7	46	0,4
E.MOTION - B.Braun	-	-	130	0,5	49	0,4
ENDO-MODEL - Link	149	1,3	123	0,5	48	0,4
INTERAX - Stryker Howmedica	639	5,7	95	0,4	-	-
T.A.C.K. – Link	616	5,5	16	0,1	-	-
913 – Wright Cremascoli	315	2,8	42	0,2	-	-
PERFORMANCE – Kirschner Biomet Merck	239	2,1	40	0,2	-	-
DURACON – Stryker Howmedica	178	1,6	89	0,4	-	-
RO.C.C. – Biomet Merck France	102	0,9	61	0,2	-	-
CONTINUUM KNEE SYSTEM – Stratec Medical	101	0,9	65	0,3	-	-
Others (models with less than 100 cases)	181	1,6	363	1,5	361	3,1
Unknown	9	0,1	46	0,2	11	0,1
TOTAL	**11.156**	**100,0**	**24.402**	**100,0**	**11.511**	**100,0**

Prosthesis system are reported in the Table, even if they are analytically registered (E.g.: NEXGEN - CR – Zimmer; NEXGEN - LCCK – Zimmer; NEXGEN – LPS – Zimmer; NEXGEN - RHK – Zimmer).

13.3 Revision prosthesis

Prostheses used in patients admitted between 1st July 2000 and 31st December 2011, in total revision surgery.

TYPE OF PROSTHESIS	2000-2004		2005-2009		2010-2011	
	N.	%	N.	N.	%	N.
NEXGEN - Zimmer	163	27,2	453	30,2	166	21,4
RT-PLUS - Smith & Nephew	5	0,8	117	7,8	95	12,2
ENDO-MODEL - Link	112	18,7	103	6,9	66	8,5
LEGION - CONSTRAINED - Smith & Nephew	-	-	49	3,3	64	8,2
PFC - DePuy	59	9,8	115	7,7	57	7,3
GENESIS - Smith & Nephew	2	0,3	66	4,4	44	5,7
SIGMA RP - TC3 - DePuy	-	-	61	4,1	44	5,7
VANGUARD - Biomet	-	-	39	2,6	34	4,4
GKS - Permedica	13	2,2	44	2,9	28	3,6
DURATION MRH - Osteonics	12	2,0	73	4,9	21	2,7
SCORPIO - Osteonics	2	0,3	61	4,1	19	2,4
TC-PLUS -SOLUTION - Smith & Nephew	1	0,2	18	1,2	16	2,1
S-ROM NRH - Johnson & Johnson	10	1,7	19	1,3	15	1,9
OPTETRAK - Exactech	13	2,2	53	3,5	14	1,8
TRIATHLON - Howmedica Osteonics	-	-	8	0,5	13	1,7
E.MOTION - B.Braun	-	-	11	0,7	10	1,3
AGC - Biomet Merck France	52	8,7	70	4,7	5	0,6
PROFIX - Smith & Nephew	57	9,5	55	3,7	9	1,2
GEMINI - Link	1	0,2	13	0,9	5	0,6
INTERAX - Stryker Howmedica	27	4,5	8	0,5	-	-
DURACON II - Stryker Howmedica	13	2,2	5	0,3	-	-
Others (models with less than 10 cases)	54	9,0	51	3,4	50	6,4
Unknown	4	0,7	8	0,5	1	0,1
TOTAL	**600**	**100,0**	**1.500**	**100,0**	**776**	**100,0**

13.4 Prosthesis fixation

Number of knee prosthesis arthroplasty performed on patients admitted to hospital between 1st July 2000 and 31st December 2011, **according to prosthesis fixation**

Fixation	Primary unicomp.		Primary bi/tricomp.		Total revision		Total	
	N.	%	N.	%	N.	%	N.	%
Cemented	5.610	89,8	42.364	90,1	2.801	97,5	50.775	90,4
Uncemented	475	7,6	2.564	5,5	39	1,4	3.078	5,5
Fem. cementless + tib. cemented	156	2,5	1.570	3,3	20	0,7	1.746	3,1
Fem. cem. + tib. cementless	6	0,1	537	1,1	12	0,4	555	1,0
Total*	**6.247**		**47.035**		**2.872**		**56.154**	

* 48 data are missing (0.1%)

Fixation according to year of operation

Years of operation	% Cemented	% Cementless	% cemented tibia	% cemented femur
2001	82,6	8,0	8,8	0,7
2002	79,9	9,0	10,7	0,4
2003	83,5	7,6	8,5	0,4
2004	88,0	7,4	4,0	0,6
2005	89,9	6,2	3,3	0,6
2006	90,8	5,3	3,6	0,4
2007	91,1	4,5	3,0	1,3
2008	91,2	4,2	2,2	2,4
2009	91,5	4,5	1,5	2,5
2010	93,5	4,5	0,9	1,1
2011	94,9	4,1	0,4	0,6

13.5 Type of insert

Stabilization of liner in bi-tricompartmental knee prostheses.

Years of operation	% Unstabilized	% Posterior stabilized	% Hinged
2001	47,8	50,2	2,0
2002	51,4	46,1	2,5
2003	45,5	52,3	2,2
2004	41,3	57,0	1,7
2005	36,0	62,5	1,5
2006	33,6	64,8	1,7
2007	34,1	63,9	2,0
2008	38,4	59,9	1,7
2009	40,8	57,4	1,8
2010	36,8	60,7	2,5
2011	39,6	58,3	2,1

Mobility of insert of bi-tricompartmental knee prosthesis according to year of implant

Years of operation	% fixed bearing	% mobile bearing
2001	74,2	25,8
2002	72,2	27,8
2003	69,7	30,3
2004	67,9	32,1
2005	66,0	34,0
2006	58,4	41,6
2007	62,2	37,8
2008	60,7	39,3
2009	59,2	40,8
2010	54,7	45,3
2011	55,3	44,7

13.6 Articular coupling

Non met-poly coupling according to year of ooperation

	% cupling oxinium® - poly	
Years of operation	Primary unicomp.	Primary bi-tricomp.
2001	-	0,4
2002	-	0,3
2003	0,2	0,5
2004	2,8	1,2
2005	4,0	1,3
2006	6,2	1,8
2007	9,6	3,1
2008	13,1	2,6
2009	16,3	2,3
2010	24,4	3,2
2011	38,1	4,5

13.7 Bone Cement

Types of cement used (since 1-1-2002)

In **bold** bone cement loaded with antibiotic.

Cement	%
Surgical Simplex P – Howmedica	25,9
Antibiotic Simplex – Howmedica	***18,0***
Palacos R - Heraeus Medical	8,9
Palacos R+G - Heraeus Medical	***7,3***
Versabond AB - Smith & Nephew	***4,1***
Osteobond – Zimmer	3,5
Versabond - Smith & Nephew	3,2
Aminofix 1 – Groupe Lepine	***2,7***
Cemex System – Tecres	2,6
Palacos R - Biomet	2,4
Cemex – Tecres	1,8
Refobacin Revision - Biomet	***1,6***
Cemex Genta System - Tecres	***1,5***
Refobacin Bone Cement R - Biomet	***1,3***
Hi-Fatigue - Zimmer	1,3
Palamed G - Heraeus Medical	***1,2***
Amplicem 1 – Amplimedical	1,0
Other bone cement without antibiotic	11,5
Other bone cement loaded with antibiotic	***0,3***
Total	**100,0**

Bone cement loaded with antibiotic is used in 37.9% of cases.

14. Complications occurred during hospitalization

The rate of complications in **primary unicompartmental surgery** carried out on patients hospitalized between July 1st 2000 and December 31st 2011

Complications occurred during hospitalization								
Intra-operative			**Local post-operative**			**General post-op**		
	N.	**%**		**N.**	**%**		**N.**	**%**
Tibial fract.	6	*0,1*	Hematoma	31	*0,5*	Hyperpyrexia	15	*0,2*
						Anemia	12	*0,2*
Fem. Fract.	5	*0,1*	DVT	4	*0,1*	Gastro-intestinal	10	*0,2*
						Cardiac	8	*0,1*
			Infection	4	*0,1*	Embolism	6	*0,1*
Anesthesiol.	1	*0,02*				Genito-urinary	6	*0,1*
			SPE paralysis	1	*0,02*	Dyspnoea	4	*0,1*
						Disorientation	3	*0,05*
Other	5	*0,1*	Other	5	*0,1*	Collapse	2	*0,03*
						Other	15	*0,2*
Total	**17**	***0,3***	**Total**	**45**	***0,7***	**Total**	**81**	***1,3***

The rate of complications in primary **Bi-tricompartmental surgery** carried out on patients hospitalized between July 1st 2000 and December 31st 2011

Complications occurred during hospitalization								
Intra-operative			**Local post-operative**			**General post-op**		
	N.	**%**		**N.**	**%**		**N.**	**%**
Fem. fract.	36	*0,1*	Hematoma	491	*1,0*	Anemia	1.091	*2,3*
			DVT	97	*0,2*	Hyperpyrexia	295	*0,6*
Ligament lesion	27	*0,1*	SPE paralysis	37	*0,1*	Genito-urinary	136	*0,3*
			Wound dehiscence	39	*0,1*	Cardiac	134	*0,3*
Anesthes.	22	*0,05*	Edema	33	*0,1*	Gastro-intestinal	136	*0,3*
Hemorragia	22	*0,05*	Bed sores	23	*0,05*	Embolism	69	*0,1*
			Bleeding	19	*0,04*	Respiratorie minori	65	*0,1*
Tibial fracture	23	*0,05*	Infection	16	*0,03*	Disorientation	51	*0,1*
Rupture patellar tendon	21	*0,04*	Instability of ligaments	12	*0,03*			
						Collaps	42	*0,1*
			Prosthesis disloc	6	*0,01*	Infarction	37	*0,1*
Tibial tuberosity fracture	6	*0,01*				Dyspnoea	36	*0,1*
Other	24	*0,1*	Other	78	*0,2*	Other	181	*0,4*
Total	**181**	***0,4***	**Total**	**851**	***1,8***	**Total**	**2.273**	***4,8***

The rate of complications in **revision surgery** carried out on patients hospitalized between July 1st 2000 and December 31st 2011

Complications occurred during hospitalization								
Intra-operative			**Local post-operative**			**General post-op**		
	N.	**%**		**N.**	**%**		**N.**	**%**
Rupture patellar tendon	13	*0,4*	Hematoma	57	*1,6*	Anemia	141	*4,0*
			Wound dehiscence	12	*0,3*	Hyperpyrexia	27	*0,8*
Tibial fracture	13	*0,4*	Infection	9	*0,3*	Cardiac	15	*0,4*
						Gastro-intestinal	12	*0,3*
Anesthes.	8	*0,2*	Prosthesis disloc	7	*0,2*	Respiratory	10	*0,3*
						Disorientation	6	*0,2*
Femur fracture	9	*0,3*	SPE paralysis	5	*0,1*	Allergic reaction	6	*0,2*
						Genito-urinary	9	*0,3*
Tibial fracture	6	*0,2*	Bleeding	5	*0,1*	Reaction to transfusion	5	*0,1*
Ligament lesion	1	*0,03*	Edema	5	*0,1*	Embolism	4	*0,1*
			DVT	2	*0,1*	Collaps	2	*0,1*
						Infarction	1	*0,03*
Other	12	*0,3*	Other	8	*0,2*	Other	13	*0,4*
Total	**62**	***1,8***	**Total**	**110**	***3,2***	**Total**	**251**	***7,2***

14.1 Deaths occurred during hospitalization

Rate of deaths in knee prosthetic surgery carried out on patients hospitalized between July 1st 2000 and December 31st 2011.

Registered deaths occurred during hospitalization.

Year 2000-2011			
Type of surgery	**Deaths**	**Number of surgery**	**Percentage**
Primary bi/tricomp	43	47.069	0,09
Primary uni	1	6.257	0,02
Revision	7	3.489	0,20
Removal	1	756	0,13

15. Analysis of survival of primary surgery

15.1 Cox multivariate analysis

Bi-tri compartmental

The Cox multivariate analysis identifies any variables that are independent from each other that can influence the event, in our case the removal of at least one prosthesis component. Analysis was performed on following independent variables: gender, age at surgery, pathology and type of insert (fix vs mobile).

All primary bi-tri compartmental knee arthroplasties performed in the region between July 2000 and December 2011 only on patients living in the region, were analyzed.

COX PROPORTIONAL RISK MODEL

Variabiles
Dependent: Follow-up
Independent: Age, gender, diagnosis, type of insert

Number of valid observations 30.859
Non revised: 30.050
Revised: 809

Chi-square: 170,52 *p*= 0.0001

VARIABLE	SIGNIFICANCE (P)
Gender (Males vs females)	**NS** (0.704)
Age (less than 70 yrs vs more than 70 yrs)	**S** (0.001)
Diagnosis (arthrosis vs other)	**NS** (0. 664)
Type of insert (Fix vs mobile)	**S** (0.001)

The chi-square test, used to test globally the model applied, was significant, which suggested that, on the whole, the variables inserted in the model influenced the outcome of prosthetic surgery. The effect of each variable was compared to the others when equal.
All variables but gender and diagnosis, significantly influence the outcome of surgery. At this point we tested how it acts, either by reducing or increasing the risk.
A relative risk rate below 1 indicated a reduced risk of prosthesis loosening. Conversely, a relative risk rate above 1 indicated an increased risk of prosthesis loosening.

Age	Relative risk rate	Confidence interval 95%		Significance (p)
Less than 70 yrs	2.4	2.1	2.7	0.001

Liner	Relative risk rate	Confidence interval 95%		Significance (p)
Mobile	1.3	1.1	1.5	0.001

Uni compartmentale

All primary uni compartmental knee arthroplasties performed in the region between July 2000 and December 2011 only on patients living in the region and affected by arthrosis, were analyzed.
Variables in the model are: gender, age at surgery and type of tibial component (all poly vs metal back).

Age	Relative risk rate	Confidence interval 95%		Significance (p)
Less than 70 yrs	1.5	1.1	1.9	0.008

Other variables do not influence the risk (Gender p=0.22; Type of tibial component p=0.51)

15.2 Rate of failure

As already written in hip section, the recovery of data of operations not reported to RIPO is in progress. The uncertainty due to the failure to report about 10% of operations performed in the Region, may lead to an underestimation of the revision rate that is not quantifiable at the moment.
The following table shows the number of primary joint arthroplasty operations performed in the period from July 2000 to December 2011 in the second column, the third and fourth columns show the number of revision operations performed on the same patients. Some revision operations were performed in the same hospital as the primary operation while others were performed at other hospitals in the Emilia-Romagna Region.

Type of operation	Number of operations	N. of revisions performed in the same hospital	N. of revisions performed in a different hospital	N. Total revisions	% revisions
Primary bicompartmental	25.907	406	290	696	25.907
Primary tricompartmental	4.952	93	20	113	4.952
Primary unicomp.	3.929	159	91	250	3.929
Total revision	1.574	83	50	133	1.574

In **38%** of the primary total prostheses that are replaced, the patient undergoes revision surgery in a different hospital from the one where the primary operation was performed.

15.3 Survival curves according to Kaplan Meier

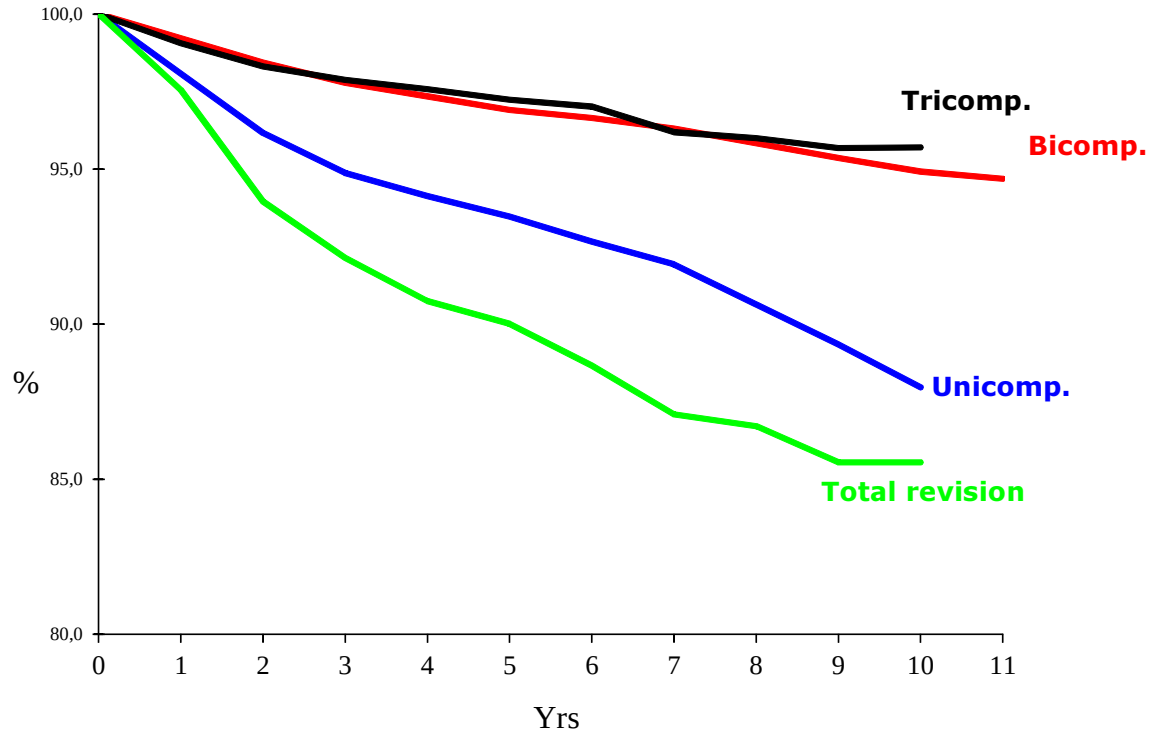
The survival curve calculated by the Kaplan Meier method enables an estimation of the probability that each individual has of maintaining its initial condition (prosthesis in place) over time.
The following paragraphs show the survival curves calculated separately for primary uni, bi/tri compartmental and total joint revision.

15.4 Analysis of survival in primary uni and bi/tri compartmental knee prosthesis

Analysis has been separately performed for uni, bi, tri compartmental prosthesis and total revisions. The revision of a single component (even insert) is considered as a failure.
Prosthetization of patella, in a second surgery, is not considered as a failure.
Major revision is performed when femoral and/or tibial component are revised; minor revision when liner and/or patella are revised.

Type of surgery	N. implants	N. major revisions	N. minor revisions	% revisions	Survival at 10 Yrs (CI)
Primary bicompartmental	25.907	612	84	696/25.907	94,9 (94,4-95,4)
Primary tricompartmental	4.952	95	18	113/4.952	95,7 (94,6-96,8)
Primary unicompartmental	3.929	240	10	250/3.929	88,0 (85,9-90,0)
Total revision	1.574	112	21	133/1.574	85.5 (82,6-88,4)

Survival curves



Survivorship of unicompartmental prostheses is significantly different at 10 years follow-up from bi and tri compartimental ones. (Wilcoxon, p=0.001).

The following table shows the rate of revision in knee arthroplasty according to cause of revision: the % distribution of the causes of failure is shown

Primary uni-compartmental

Cause of revision	Rate	Percentage	% distribution of cause of failure
Total aseptic loosening	105/3.929	2,7	42,0
Pain without loosening	38/3.929	1,0	15,2
Septic loosening	28/3.929	0,7	11,2
Tibial aseptic loosening	28/3.929	0,7	11,2
Femoral aseptic loosening	15/3.929	0,4	6,0
Liner wear	11/3.929	0,3	4,4
Prosthesis brakage	5/3.929	0,1	2,0
Dislocation	4/3.929	0,1	1,6
Bone fracture	4/3.929	0,1	1,6
Instability	2/3.929	0,05	0,8
Missing	5/3.929	0,1	2,0
Other	5/3.929	0,1	2,0
Total	**250/3.929**	**6,3**	**100,0**

Primary bi-tricompartmental

Cause of revision	Rate	Percentage	% distribution of cause of failure
Total aseptic loosening	255/30.859	0,83	31,5
Septic loosening	220/30.859	0,71	27,2
Tibial aseptic loosening	81/30.859	0,26	10,0
Pain without loosening	77/30.859	0,25	9,5
Dislocation	38/30.859	0,12	4,7
Liner wear	32/30.859	0,10	4,0
Femoral aseptic loosening	26/30.859	0,08	3,2
Instability	23/30.859	0,07	2,8
Stiffness	18/30.859	0,06	2,2
Bone fracture	15/30.859	0,05	1,9
Prosthesis breakage	6/30.859	0,02	0,7
Missing	8/30.859	0,03	1,0
Other	10/30.859	0,03	1,2
Total	**809/30.859**	**2,6**	**100,0**

Total revision

Cause of revision	Rate	Percentage	% distribution of cause of failure
Septic loosening	43/1.574	2,7	32,3
Total aseptic loosening	31/1.574	2,0	23,3
Tibial aseptic loosening	14/1.574	0,9	10,5
Instability	8/1.574	0,5	6,0
Femoral aseptic loosening	5/1.574	0,3	3,8
Pain without loosening	6/1.574	0,4	4,5
Dislocation	7/1.574	0,4	5,3
Prosthesis breakage	3/1.574	0,2	2,3
Liner wear	4/1.574	0,3	3,0
Missing	5/1.574	0,3	3,8
Other	5/1.574	0,3	3,8
Periprosthetic fracture	2/1.574	0,1	1,5
Total	**133/1.574**	**8,4**	**100,0**

15.5 Mobility of the bearing

The multivariate analysis presented in paragraph 16.1 shows that the bearing loosening increases the risk of failure.

To expand the subject further data are given.

The following table shows the revision rate in primary bi-tricompartmental arthroplasties according to the **mobility of bearing**

Type of poly liner	n. of operation	Removals	Rate
Fixed	18.891	467	467/18.891
Mobile	11.943	341	341/11.943

Primary surgery-fixed insert

Cause of revision	Rate	Percentage	% distribution of cause of failure
Septic loosening	**138**/18.891	0,73	29,6
Total aseptic loosening	**132**/18.891	0,70	28,3
Tibial aseptic loosening	**50**/18.891	0,26	10,7
Pain without loosening	**44**/18.891	0,23	9,4
Liner wear	**19**/18.891	0,10	4,1
Dislocation	**14**/18.891	0,07	3,0
Instability	**17/**18.891	0,09	3,6
Femoral aseptic loosening	**12**/18.891	0,06	2,6
Bone fracture	**13**/18.891	0,07	2,8
Stiffness	**10**/18.891	0,05	2,1
Other	**9**/18.891	0,05	1,9
Prosthesis breakage	**4**/18.891	0,02	0,9
Unknown	**5**/18.891	0,03	1,1
Total	**467**/18.891	**2,5**	**100,00**

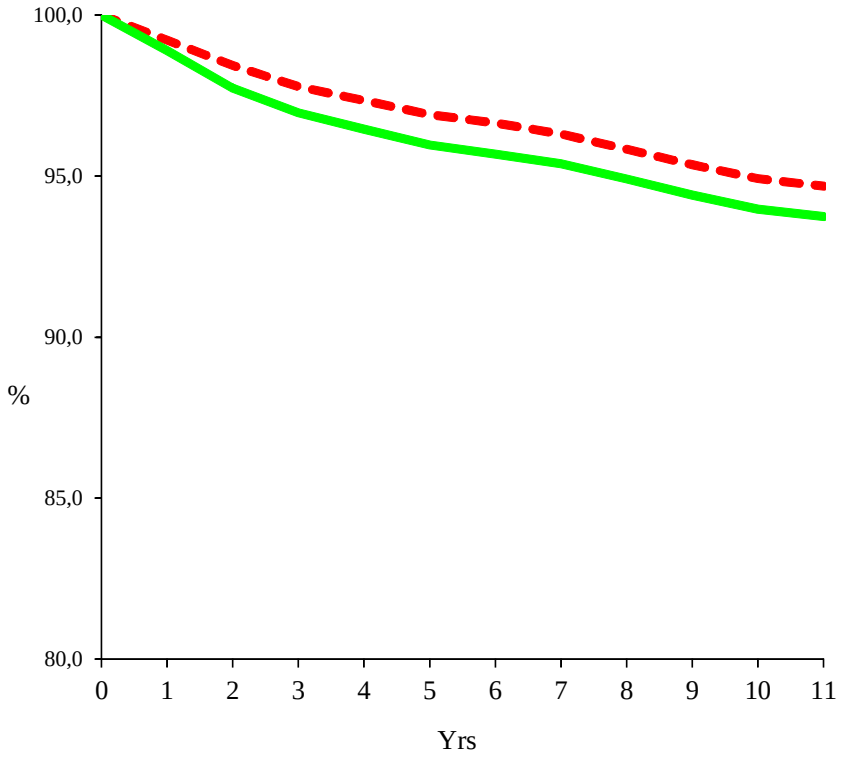
Primary surgery – mobile insert

Cause of revision	Rate	Percentage	% distribution of cause of failure
Total aseptic loosening	**122**/11.943	1,02	35,8
Septic loosening	**82**/11.943	0,69	24,0
Tibial aseptic loosening	**31**/11.943	0,26	9,1
Pain without loosening	**33**/11.943	0,28	9,7
Dislocation	**24**/11.943	0,20	7,0
Liner wear	**13**/11.943	0,11	3,8
Femoral aseptic loosening	**14**/11.943	0,12	4,1
Stiffness	**8**/11.943	0,07	2,3
Instability	**6**/11.943	0,05	1,8
Bone fracture	**2**/11.943	0,02	0,6
Prosthesis breakage	**2**/11.943	0,02	0,6
Trauma	**1**/11.943	0,01	0,3
Unknown	**3**/11.943	0,03	0,9
Total	**341/**11.943	**2,9**	**100,0**

15.6 Re-operation due to replacement of only the patella component

In rare cases bicompartmental prosthesis were transformed into tricompartmental prosthesis, with the addition of the patella component, during a second operation.
That was done in 223 cases (out 25.907 bicompartmental prostheses recorded in the RIPO).
The mean time lapse between primary bicompartmental arthroplasty and implanting the patella was 1.7 years (CI at 95% 1.5-1.8).
These 223 re-operations were not states considered as failures of the bicompartmental prosthesis as in dotted line. For comparison, when resurfacing is considered a failure, the survival is treaced as solid line
Survival at 11 yrs is 93.7% and 94.7% respectively

11% of the 223 cases that underwent the addition of patella resurfacing, have been successively revised



15.7 Analysis of the survival of unicompartmental prosthesis according to the most widely used commercial type in Emilia-Romagna

In bold all poly

Type	Starting Year	n.	n. failures	% survival at 5	c.i. at 95%	% survival at 9	c.i. at 95%
OXFORD UNICOMPARTIMENTAL PHASE 3 - Biomet Merck	2000	802	75	91,8	89,8-93,9	86,6	83,2-90,1
GENESIS UNI - Smith & Nephew	2000	565	31	93,2	90,6-95,8	91,8	88,7-95,0
EFDIOS - Citieffe	2000	314	30	93,6	90,6-96,6	85,9	80,7-91,1
ZIMMER UNI - Zimmer	2005	267	4	98,0	96,1-100	-	-
MITUS - ENDO-MODEL UNI – ALL POLY - Link	2003	232	18	91,9	88,1-95,6	90,6	86,1-95,0
ALLEGRETTO UNI - Protek-Sulzer	2000	212	17	93,3	89,8-96,8	90,6	86,2-95,0
PRESERVATION UNI – ALL POLY - DePuy	2002	185	15	92,2	88,0-96,3	90,1	85,1-95,0
UC-PLUS SOLUTION - Smith & Nephew	2000	176	3	98,9	97,3-100,0	-	-
HLS - UNI EVOLUTION - ALL POLY - Tornier	2001	143	9	94,9	91,0-98,9	88,9	80,9-96,8
OPTETRAK UNI – ALL POLY -Exactech	2005	128	3	98,7	96,0-100	-	-
MILLER GALANTE UNI - Zimmer	2001	118	4	96,6	93,3-99,9	96,6	93,3-99,9
UC-PLUS SOLUTION – ALL POLY - Smith & Nephew	2004	134	6	-	-	-	-
GKS - ONE – Permedica	2006	128	1	97,1	93,9-100	-	-
Other (models with less than 100 cases)	2000	525	34	90,1	86,5-93,7	86,2	79,8-92,5
Total	**2000**	**3.929**	**250**	**93,5**	**92,6-94,4**	**89,3**	**87,7-90,9**

15.8 Analysis of the survival of bicompartmental prosthesis according to the most widely used commercial type in Emilia-Romagna

Type	Starting Year	N.	n. failures	% survival at 5	c.i. at 95%	% survival at 9	c.i. at 95%
NEXGEN – Zimmer	2001	7.533	146	97,9	97,6-98,3	96,7	96,1-97,4
PROFIX– Smith&Neph	2000	2.831	95	96,9	96,3-97,6	95,1	94,0-96,3
P.F.C – DePuy	2000	2.482	53	97,6	96,9-98,3	96,6	95,5-97,6
GENESIS II– Smith&Neph	2000	2.461	36	97,5	96,6-98,4	97,5	96,6-98,4
VANGUARD - Biomet Merck France	2005	1.733	29	96,8	95,3-98,3	-	-
SCORPIO – Stryker Howmedica	2002	1.475	41	96,4	95,2-97,5	95,7	94,2-97,2
TC-PLUS - SOLUTION - Smith & Nephew	2002	1.368	23	96,3	94,5-98,1	-	-
GEMINI MKII–Link	2002	1.280	22	97,8	96,8-98,7	97,2	95,8-98,7
LCS – DePuy	2000	754	22	97,3	96,1-98,6	96,8	95,5-98,2
TRIATHLON – Stryker Howmedica Osteonics	2005	684	10	97,2	95,5-99,0	-	-
OPTETRACK – Exactech	2000	678	25	95,7	93,9-97,5	93,1	89,6-96,6
ROTAGLIDE–Corin	2000	624	34	94,6	92,6-96,5	92,4	89,7-95,1
GENUS – Adler-Ortho	2008	590	10	-	-	-	-
INTERAX – Stryker Howmedica	2000	569	47	94,8	93,0-96,6	90,9	88,2-93,7
GENIUS TRICCC – Dedienne Santé	2000	552	32	94,8	92,8-96,9	91,9	88,8-94,9
T.A.C.K. – Link	2000	529	39	94,1	92,1-96,2	92,3	90,0-94,7
ADVANCE – Wright	2000	492	19	95,9	94,0-97,8	95,5	93,4-97,5
FIRST - Symbios Orthopedie Sa	2006	490	13	94,5	90,6-98,5	-	-
SCORE– Amplitude	2004	437	7	98,2	96,8-99,6	-	-
MULTIGEN -Lima	2001	292	15	94,7	92,0-97,4	-	-
HLS - NOETOS - Tornier	2002	290	6	98,0	96,2-99,7	-	-
AGC – Kirschner Biomet Merck	2000	278	8	97,4	95,5-99,3	96,9	94,7-99,0
ENDO-MODEL Link	2000	241	9	95,8	92,6-98,9	94,0	90,1-97,9
BALANSYS-Mathys	2005	199	2	97,8	94,7-100	-	-
DURACON II – Stryker	2000	199	9	96,5	93,9-99	94,4	90,6-98,2

Howmedica							
GSP - TREKKING - Samo	2005	194	4	97,2	94,6-99,9	-	-
GKS– Permedica	2001	162	4	97,4	94,4-100	95,7	91,3-100
913 – Wright Crem	2000	156	5	98,7	96,9-100	96,2	92,9-99,5
RO.C.C. – Biomet Merck France	2003	149	15	91,2	86,6-95,8	-	-
COLUMBUS-B.Braun	2007	133	1	99,0	96,9-100	-	-
JOURNEY-Smith&Neph	2006	130	4	96,1	92,3-99,9	-	-
INNEX - Protek	2002	107	1	94,6	84,3-100	-	-
Other (< than 100 cases)	2000	712	22	96,1	94,4-97,9	94,8	92,5-97,1
UNKNOWN	2000	55	1	97,8	93,6-100	-	-
Total	**2000**	**30.859**	**809**	**97,0**	**96,7-97,2**	**95,4**	**95,0-95,8**

PART THREE: SHOULDER PROSTHESIS

July 2008 – December 2011

16. RIPO capture

16.1 Capture for RIPO

Percentage of R.I.P.O. capture calculated versus Discharge Records (S.D.O.) was **95.6**% in 2011. Data are referred to primary total prosthesis (8180), hemiarthroplasty (8181), revision (8197) and prosthesis removal (8001).

16.2 Ratio public/private treatment

Percentage of implants performed in public hospitals.

% of operations performed in public hospitals (AUSL, AOSP, IRCCS)			
Year of surgery	**Primary arthroprosthesis**	**Revision / removal**	**Hemiarthroplasty**
2008	73,9	100,0	93,0
2009	65,7	93,3	83,6
2010	59,6	81,3	84,6
2011	49,1	66,7	87,1

From database SDO

17. Type of operation

Number of shoulder operations carried out on patients with admission date between 1st July 2008 and 31st December 2011, according to **type**

Type of operation	Number of operation	Percentage
Inverse prosthesis	829	48,0
Hemiarthroplasty	432	25,0
Resurfacing	172	10,0
Anatomical prosthesis	150	8,7
Revisions	113	6,5
Prosthesis removal	20	1,2
Other	10	0,6
Total	**1.726**	**100,0**

18. Descriptive statistics of patients

18.1 Gender

Number of shoulder operations carried out on patients with admission date between 1st July 2008 and 31st December 2011, according to **type of operation** and **gender** of patients.

Type of operation	Males		Females		Total
	N.	%	N.	%	N.
Inverse prosthesis	172	20,7	657	79,3	**829**
Hemiarthroplasty	126	29,2	306	70,8	**432**
Resurfacing	79	45,9	93	54,1	**172**
Anatomical prosthesis	57	38,0	93	62,0	**150**
Revisions	32	28,3	81	71,7	**113**
Prosthesis removal	8	40,0	12	60,0	**20**
Total	**474**	**27,6**	**1.242**	**72,4**	**1716**

18.2 Age

Number of shoulder operations carried out on patients with admission date between 1st July 2008 and 31st December 2011, according to **mean age** and **gender** of patients.

	Males		Females	
Type of operation	Mean age	Range	Mean age	Range
Inverse prosthesis	71.2	34-86	73.6	50-93
Hemiarthroplasty	62.4	28-91	73.8	43-110
Resurfacing	53.3	18-96	61.5	21-82
Anatomical prosthesis	63.1	48-77	66.8	35-101
Revisions	63.0	35-84	70.5	44-84

18.3 Pathologies

Number of shoulder operations carried out on patients with admission date between 1st July 2008 and 31st December 2011, according to **type of operation** and **diagnosis** of patients.

Diagnosis	Total reverse arthroplasty	
	N.	%
Eccentric osteoarthritis	447	53,9
Concentric osteoarthritis	131	15,8
Fracture	112	13,5
Sequelae of fracture	22	2,7
Necrosis	20	2,4
Arthropaty of the cuff	21	2,5
Dislocation	11	1,3
Osteoarthritis	20	2,4
Rheumatic	10	1,2
Post-traumatic osteoarthritis	4	0,5
Pain	3	0,4
Osteomielitis	3	0,4
Missing	*17*	2,1
Other	*8*	1,0
Total	**829**	**100,0**

Diagnosis	Anatomic arthroplasty	
	N.	%
Concentric osteoarthritis	117	78,0
Eccentric osteoarthritis	9	6,0
Fracture	4	2,7
Rheumatic	7	4,7
Osteonecrosis	6	4,0
Osteoarthritis	2	1,3
Sequelae of fracture	3	2,0
Other	2	1,3
Total	**150**	**100,0**

Diagnosis	Hemiarthroplasty	
	N.	%
Fracture	268	62,0
Concentric osteoarthritis	57	13,2
Eccentric osteoarthritis	34	7,9
Osteonecrosis	31	7,2
Sequelae of fracture	18	4,2
Dislocation	6	1,4
Post traumatic necrosis	3	0,7
Osteomielitis	5	1,2
Reumatic arthritis	4	0,9
Missing	2	0,5
Other	4	0,9
Total	***432***	***100,0***

Diagnosis	Resurfacing	
	N.	%
Concentric osteoarthritis	87	50,5
Osteonecrosis	35	20,3
Eccentric osteoarthritis	24	14,0
Osteoarthritis	8	4,7
Sequelae of fracture	*6*	*3,5*
Reumatic arthritis	3	1,7
Steroid-induced Osteonecrosis	*2*	*1,2*
Fracture	2	1,2
Post traumatic arthrosis	1	0,6
Other	*4*	*2,3*
Total	**172**	**100,0**

Number of shoulder **revisions** carried out on patients with admission date between 1st July 2008 and 31st December 2011, according to **diagnosis** and **type of revision**.

Diagnosis	N.	%
Humeral loosening	19	16,8
Glenoid erosion	16	14,2
Two steps revision	17	15,0
Glenoid loosening	13	11,5
Anterior instability	9	8,0
Superior instability	7	6,2
Dislocation	6	5,3
Cuff lesion	6	5,3
Pain	6	5,3
Periprosthetic fracture	3	2,7
Septic loosening	*3*	2,7
Total aseptic loosening	*2*	1,8
Other	*3*	2,7
Missing	*3*	2,7
Total	**113**	**100,0**

Type of revision	N.	%
From hemi to reverse	22	
From reverse to reverse	19	
From anatomic to reverse	14	
Reimpianto su protesi precedentemente espiantata	18	
From resurfacing to reverse	8	
From resurfacing to resurfacing	4	
From hemi to hemi	5	
From reverse to anatomic CTA	6	
From hemi to anatomic	1	
From resurfacingto anatomic	2	
Other	11	
Da anatomica a anatomica	3	
Totale	**113**	**100,0**

19. Surgical technique, anesthesia and antithromboembolic prophylaxis

Number of shoulder operations carried out on patients with admission date between 1st July 2008 and 31st December 2011, according to **surgical approach**

Type of operation	Deltoideo-pectoral	Trans-deltoideo	Superior lateral
Anatomical	149	-	-
Inverse	727	53	35
Hemy	416	9	3
Resurfacing	162	4	2
Removal	20	-	-
Revision	105	5	-
Total*	**1.579**	**71**	**40**

26 missing data, (1.5%)

Number of shoulder operations carried out on patients with admission date between 1st July 2008 and 31st December 2011, according to **anesthesia**

Anesthesia	N.	%
Mixed	708	45,3
General	788	50,4
Loco-regional	66	4,3
Total	**1.562**	**100,0**

156 missing data, (9.0%)

Antithromboembolic prophylaxysis
Eparin is used in 76.0% of primary surgery, no prophylaxis in 11.7% and datum is missing in 11.4%.

20. Type of prosthesis

20.1 Prosthesis fixation

Number of shoulder operations carried out on patients with admission date between 1st July 2008 and 31st December 2011, according to **type of prosthesis** and **stem fixation**

Stem fixation	Anatomic	%	Inverse	%	Hemy	%
Cemented	20	13,3	219	26,4	212	49,2
Cementless	130	86,7	609	73,6	219	50,8
Total	**150**	**100,0**	**828**	**100,0**	**431**	**100,0**

*2 missing data, (0.1%)

20.2 Type of prosthesis

Number of **primary** shoulder operations carried out on patients with admission date between 1st July 2008 and 31st December 2011, according to the **type of prosthesis**

Model of prosthesis	Inverse		Anatomic + hemy	
	N	%		N
Delta Xtend - DePuy	350	42,2	31	5,3
SMR Alettato– Lima	187	22,6	166	28,5
Anatomical Shoulder - Zimmer	38	4,6	38	6,5
SMR Cementato – Lima	31	3,7	54	9,3
Promos - Plus orthopedics AG	15	1,8	6	1,0
Delta CTA - DePuy	18	2,2	0	0,0
Equinoxe Primary - Exactech	7	0,8	2	0,3
T.E.S.S - Biomet	10	1,2	2	0,3
SMR Revision – Lima	3	0,4	7	1,2
Bigliani/Flatow - Zimmer	0	0,0	122	21,0
LTO - Lima	0	0,0	35	6,0
Anatomical Shoulder Fracture - Zimmer	1	0,1	24	4,1
Global FX - DePuy	0	0,0	29	5,0
Global Advantage - DePuy	0	0,0	20	3,4
Aequalis - Tornier	131	15,8	15	2,6
Modular NEER 3 – Smith & Nephew	0	0,0	8	1,4
COMPREHENSIVE	5	0,6	5	0,9
Affinis – Mathys	18	2,2	7	1,2
Other(< 5 cases)	9	1,1	10	1,7
Missing	6	0,7	1	0,2
Total	**829**	**100,0**	**582**	**100,0**

Number of shoulder **resurfacing** carried out on patients with admission date between 1st July 2008 and 31st December 2011, according to the **type of prosthesis.**

Type of prosthesis	Resurfacing	
	N	%
T.E.S.S - Biomet	61	35,5
SMR RESURFACING - Lima	25	14,5
ECLIPSE - Arthrex	22	12,8
COPELAND SHOULDER - Biomet	19	11,0
EPOCA RH - Synthes	21	12,2
GLOBAL CAP – DePuy	11	6,4
DUROM SHOULDER - Zimmer	4	2,3
AEQUALIS RESURFACING - Tornier	4	2,3
VERSO - Biomet	1	0,6
PyroTITAN - Ascension Orthopedics	2	1,2
HEMICAP - Arthrosurface	1	0,6
CAPICA - Implantcast	1	0,6
Total	**172**	**100,0**

21. Duration of pre- and post-operative hospitalization

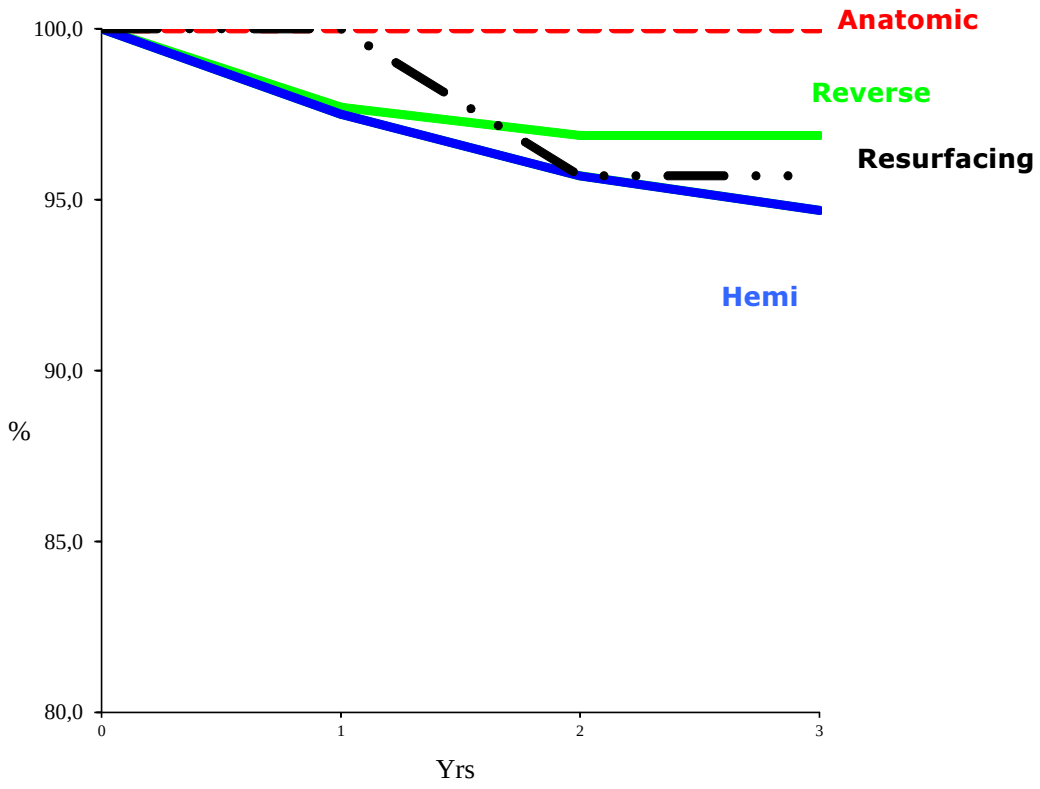
Year 2011			
Type of operation	**N.**	**Mean pre-op. (range)**	**Mean post-op. (range)**
Inverse primary total arthropl.	353	1,4 (0-34)	5,7 (0-59)
Hemiarthropl.	142	2,8 (0-20)	7,1 (0-39)
Resurfacing	48	0,7 (0-2)	5,3 (2-22)
Anatomical primary total arthropl.	41	1,0 (0-31)	4,0 (0-18)
Revisions	39	2,1 (0-46)	5,3 (1-22)

Year 2011			
Type of operation	**N.**	**Mean pre-op. (range)**	**Mean post-op. (range)**
Elective	453	0,8 (0-31)	5,3 (0-30)
Emergency	131	4,6 (0-34)	7,9 (2-59)

22. Survival analysis

Analysis was performed on all patients, and not only on the resident in Regione Emilia Romagna, as for all the other survival analyses of present report

Type of operation	Number of impants	Number of revision	Survial at 3 yrs (C.I. 95%)
Anatomic	150	-	100.0
Reverse	829	18	96,9 (95,4-98,4)
Hemi	432	14	94,7 (91,6-97,7)
Resurfacing	172	4	95,7 (91,6-99,8)



Difference is not statisically significant (p=0.168, Wilcoxon Test).