



## **REPORT of R.I.P.O.**

*Register of orthopedic prosthetic implantology*

*Laboratorio di Tecnologia Medica – I.O.R..*

### **OVERALL DATA**

### **HIP AND KNEE ARTHROPLASTY**

### **IN EMILIA-ROMAGNA Region**

**1st January 2000 – 31st December 2005**

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## Foreword

This report, elaborated by the Register of Orthopedic Prosthetic Implantology (RIPO), presents the most significant results of the descriptive statistical analyses performed on operations of hip and knee arthroplasty carried out in Emilia-Romagna, between 1<sup>st</sup> January 2000 and 31<sup>st</sup> December 2005. (<http://ripo.cineca.it>)

The data include for the hip, besides primary arthroplasty, revision surgery, prosthesis removal and hemiarthroplasty.

In section two knee prostheses (both uni and bicompartamental) revisions and prosthesis removal are reported.

Altogether the data of **65.857 operations at 57 hospitals** are reported.

As in the past, data from the orthopedic wards was provided on paper forms. Registry staff transferred the data via internet to the databank run by CINECA (Interuniversity Consortium of North-eastern 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 classes of the patients that have undergone replacement surgery;
- to gather detailed information on the use of the different prostheses used in the primary operations and in the revisions
- to assess the effectiveness of the different types of prosthesis
- to compare the regional situation with other national and international situations
- to supply a confidential report to the Unit directors so that they can assess their prosthesis work in comparison with that reported in the present register
- to supply orthopedic surgeons with a very useful tool to give the patient timely information

## Notes on methodology

Elaboration includes data concerning the period 1<sup>st</sup> January 2000 to 31<sup>st</sup> December 2005, which arrived before 30<sup>th</sup> October 2006. The collection of data about the knee started in July 2000.

The identification of the type of prosthesis implanted is reported in detail: the manufacturer's name is reported as it appears on the label, even if the trade mark varies slightly.

The commercial reference of the product and its batch are also recorded. To facilitate the interpretation of the present report the prosthetic models have been identified with the name of the Firm mostly responsible for marketing them and the name commonly used by the orthopedic surgeons.

The data collected so far has a six year maximum follow-up, it is therefore possible to perform evaluations of prosthesis survivorship.

Survival curves were calculated and plotted according the actuarial method of Kaplan and Meier. The prosthesis is considered to be "surviving" until surgical intervention is needed to replace even one component. Thus, revision surgery represents the end-point.

From a comparison of Hospital Discharge records it is seen that the Register "captures" over 90% of the operations performed in the Region; last year this percentage reached 94% for hip operations and 96% for those on the knee.

In theory the degree of reliability of the curves plotted is affected by the failure to report to R.I.P.O. around 4200 operations performed in Emilia-Romagna between 2000 and 2005.

Units supporting RIPO, Head of Orthopedic 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 2005, to be lined up with the contents of the present report.

### Provincia di Bologna

	<b>Head of Orthopedic Surgery Department or Health Manager</b>	<b>RIPO Representative</b>
<b>AZIENDA ULS DI BOLOGNA</b>		
Ospedale Maggiore	Dr. Stefano Boriani	Dr.ssa Stefania Paderni Dr.ssa Silvia Terzi
Ospedale di Bentivoglio	Dr. Luigi Prosperi	Dr. Paolo Borelli Dr. Cataldo Lippo
Ospedale di Vergato	Dr. Giovanni Serra	Dr. Massimo Corlianò
Casa di cura Villa Regina	Dir. San.Dr. Sandro Uva	Dr. Mirka Cocconcelli
Casa di cura Villa Erbosa	Dr. Marcello Acciaro	Dr. Enzo Zanini
Casa di cura Villa Nigrisoli	Dir. San.Dr. Sandro Uva	Dr. Mirka Cocconcelli
Casa di cura Villa Torri	Dir San:Dr. Gianluigi Gardini	Sig.ra Maria Bucca
Casa di cura Villa Laura	Dir San:Dr. Giancarlo Caroli	Dr. Francesco Noia Dr. Michele Perozzi
Casa di cura Prof. Nobili	Dir San:Dr. Margherita Gallina	Dr. Enzo Zanini
Casa di cura Villa Chiara	Dir San: Dr. Corrado Ballarini	Dr. Maria Braicovick

Az. Osp- Univ S. Orsola- Malpighi	Dr. Massimo Laus	Dr. Luigi Brizio Dr. Franco A. Zappoli
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Istituti Ortopedici Rizzoli	Dr. Mauro Girolami Prof. Sandro Giannini Prof. Armando Giunti Prof. Maurilio Marcacci Dr. Ermyear Martucci Prof. Mario Mercuri Dr. Aldo Toni	
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<b>AZIENDA ULS IMOLA</b>		
Ospedale Civile di Imola	Dr. Guglielmo Vicenzi	Dr. Luca Gaiani

### Provincia di Ferrara

<b>AZIENDA ULS FERRARA</b>		
Ospedale di Cento	Dr. Luigi Specchia	Dr. Raffaele Rossi Dr. Luigi Specchia
Ospedale di Argenta	Dr. Pier Giorgio Vasina	Dr. Roberto Rossi Dr. PierGiorgio Vasina
Ospedale del Delta	Dr. Riccardo Faccini	Dr. Giorgio Massini

Az Osp- Univ Sant Anna Ferrara	Prof. Leo Massari	Dr. Roberto Biscione Prof Leo Massari
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## Provincia di Forlì-Cesena

<b>AZIENDA USL FORLÌ</b>		
Ospedale di Forlì	Dr. Francesco Liyoi	Dr. Maurizio Barchetti Dr. Stefano Nardi
Casa di Cura Villa Igea	Dir San Dr. Giuliana Vandi	Sig.ra Debora Bertaccini
Casa di cura Villa Serena	Dir San Dr Giovanni Gardini	Dr. Lorena Sangiorgi

<b>AZIENDA USL CESENA</b>		
Ospedale di Cesena	Dr. Mauro Monesi	Dr. Franco Calista Dr Francesco Fanton Dr. Adolfo Mantero
Casa di cura Malatesta Novello	Dir San: Dr. Marino Segantini	Dr. Maria Gabriella Pignati Dr. Alessandro Romani
Casa di cura S. Lorenzino	Dir San: Dr. Raffaele Bisulli	Dr. Paolo Pardini

## Provincia di Modena

<b>AZIENDA USL MODENA</b>		
Ospedale S. Agostino-Estense	Dr. Antonio Vaccari	Dr. Pier Bruno Squarzina
Ospedale di Carpi	Dr. Saverio Montella	Dr. Silvano Franchini
Ospedale di Mirandola	Dr. Eugenio Rossi Urtoler	Sig. Gabriele Palumbo
Ospedale di Castelfranco Emilia	Dr. Mario Argazzi	
Ospedale di Sassuolo	Dr. Mario Longo	Dr. Mario Longo Dr. Alessandro Tambella
Ospedale di Vignola	Dr. Gilberto Masetti	Dr. Mauro Tisi
Ospedale di Pavullo	Dr. Alessandro Balli	Dr. Mauro Lineti
Casa di cura Hesperia Hospital	Dir San Dr Stefano Reggiani	Dr. Michelina Guerra
Casa di cura Prof. Fogliani	Dir San Dr. Angelo Rosi	Dr. Angelo Rosi

Az. Osp-Univ Policlinico Modena	Prof. Luigi Celli	Dr. Anselmo Campagna
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## Provincia di Parma

<b>AZIENDA USL PARMA</b>		
Ospedale Civile Fidenza	Dr. Ettore Sabetta	Sig.ra Claudia Zoppi
Ospedale Borgo Val di Taro	Dr. Aldo Guardoli	Dr. Aldo Guardoli
Casa di cura Città di Parma	Dir San: Dr. Felice De Cristofaro	Sig.ra Rosa Concari
Azienda Osp-Univ di Parma	Prof. Pietro Marengi Prof. Giovanni Soncini	Dr. Paolo Perini Dr. Francesco Zaniboni

## Provincia di Piacenza

<b>AZIENDA USL PIACENZA</b>		
Ospedale di Piacenza	Prof. Carlo Fioruzzi	Dr Michael Memminger
Pres. Val Tidone, Castel San Giovanni	Dr. Giuseppe Leddi	Dr. Claudio Gheduzzi
Pres. Val D'Arda, Fiorenzuola D'Arda	Prof. Carlo Fioruzzi	Dr. Paolo Bonatti Dr. Paolo Isola

## Provincia di Ravenna

<b>AZIENDA USL RAVENNA</b>		
Ospedale di Ravenna	Dr. Aristide Guerra	Dr. Alessandro Campagna
Ospedale di Lugo	Dr. Gabriele Zanotti	Dr. Andrea Martini
Ospedale di Faenza	Dr. Maurizio Fontana	Dr. Paolo Frontali Dr.ssa Milena Sirri
Casa di cura Domus Nova	Dir San: Dr. Gian Battista Roversi	Dr. Giuseppe Coppola
Casa di cura S. Francesco	Dir San: Dr. Nunzio D'Agnelli	Sig.ra Joanna Gorniak Sig. Irinel Longu
Casa di cura V. Maria Cecilia	Dir San Dr. Folco Galeati	Dr. Silvia Rapuano
Casa di cura S. Pier Damiano	Dir San: Dr. Daniela Russetti	Dr. Maurizio Bergami Sig.ra Elena Ravagli

## Provincia di Reggio-Emilia

<b>AZIENDA USL REGGIO EMILIA</b>		
Ospedale di Guastalla	Dr. Enrico Magnani	Dr. Enrico Magnani
Ospedale di Montecchio Emilia	Dr. Norberto Negri	Dr. Antonio Carbognani
Ospedale di Scandiano	Dr. Roberto Fiocchi	Dr. Roberto Fiocchi
Ospedale di Castelnovo Monti	Dr. Paolo Carretti	Dr. Giuseppe Sciaboni
Casa di cura Villa Salus	Dir San Dr. Sevag Uluhogian	Dr. Sevag Uluhogian
Casa di cura Villa Verde	Dr. Pietro Piccinini	Dr. Cesario Vezzosi
Az Osp Arcisp Santa Maria Nuova	Dr. Paolo Costa	Dr. Valentina Montemaggiori

## Provincia di Rimini

### **AZIENDA USL RIMINI**

Ospedale di Rimini	Dr. Giannicola Lucidi	Dr. Giannicola Lucidi
Ospedale di Riccione	Dr. Luigi D'Elia	Dr. Luigi D'Elia
Casa di cura Sol et Salus	Dir San: Dr. Pierpaolo Balli	Dr. Ettore La Bruna Sig.ra Sirte Sgarbi
Casa di cura Villa Maria	Dir San Dr. Rosaria Stefania D'Urso	Dr. Sandro Vasini



## Board

On November 9th 2006 the Regional Technical-Scientific Commission for the area of orthopedic healthcare set up by the Emilia Romagna Region Council met for the first time by resolution 1066 of July 31st 2006 and ruling 2620 of the Manager of the Regional Health agency.

The Commission, that will stay in office for three years to provide technical-scientific support for the development of the activities of clinical government on a departmental, commercial, and large area scale, is thus composed:

- Dr. Paolo Adravanti**, Responsabile Reparto di Ortopedia Casa di Cura Città di Parma, Parma
- Dr. Stefano Boriani**, Primario Unità Operativa Ortopedia Ospedale Maggiore Azienda USL di Bologna
- Dr. Giuseppe Caroli**, Direttore Sanitario IRCCS 'Istituti Ortopedici Rizzoli' di Bologna
- Prof. Luigi Celli**, Direttore Unità Operativa Ortopedia e Traumatologia, Azienda Ospedaliero-Universitaria di Modena
- Dr. Eugenio Di Ruscio**, Direttore Sanitario Azienda USL di Ravenna
- Dr. Carlo Fioruzzi**, Direttore del dipartimento di chirurgia specialistica – ortopedica dell'Ospedale di Piacenza e Direttore dell'Unità Operativa di ortopedia I di Piacenza e Fiorenzuola d'Arda, Azienda USL di Piacenza
- Dr. Francesco Lijoi**, Responsabile U.O. Ortopedia e Traumatologia Ospedale G.B.Morgagni-L.Pierantoni AUSL di Forlì
- Prof. Maurilio Marcacci**, Direttore IX Divisione di Chirurgia ortopedico-traumatologica, IRCCS 'Istituti Ortopedici Rizzoli' di Bologna
- Prof. Pietro Marengi**, Direttore Unità Operativa Ortopedia, Azienda Ospedaliero-Universitaria di Parma
- Prof. Leo Massari**, Direttore Unità Operativa Ortopedia, Azienda Ospedaliero-Universitaria di Ferrara
- Dr. Luigi Pederzini**, Primario Reparto Ortopedia artroscopica Ospedale di Sassuolo, Azienda USL di Modena
- Dr. Giuseppe Porcellini**, Direttore Unità Operativa di Chirurgia Ortopedica della Spalla Ospedale Cervesi di Cattolica, Azienda USL di Rimini
- Dr. Luigi Prospero**, Primario Unità Operativa di Ortopedia Ospedale di Bentivoglio, Azienda USL di Bologna
- Dr. Alessandro Romani**, Responsabile Unità Funzionale di ortopedia Casa di Cura Malatesta-Novello, Cesena
- Dr. Ettore Sabetta**, Direttore struttura complessa di Ortopedia, Azienda Ospedaliera di Reggio Emilia
- Dr. Luca Siriana**, Direttore Sanitario Azienda Ospedaliero-Universitaria di Parma
- Dr. Aldo Toni**, Direttore I Divisione di Chirurgia ortopedico-traumatologica, IRCCS 'Istituti Ortopedici Rizzoli' di Bologna
- Dr. Antonio Vaccari**, Direttore Dipartimento di Ortopedia Ospedale S. Agostino Estense di Baggiovara – Azienda USL di Modena
- Dr. Gabriele Zanotti**, Direttore Dipartimento Chirurgie Specialistiche Ospedale di Lugo, Azienda USL di Ravenna;

Bologna, 7th December 2006

*This report has been prepared by Dr. Susanna Stea, Dr. Barbara Bordini, Dr. Manuela De Clerico, with the collaboration of Viridiana Serena Casara, Anne Marie Chiesa, Dott.ssa Sara Cremonini, Alessandro La Loggia, Valentina Monaco, Milanka Rajak, Alessandra Varagnolo, graphic by Luigi Lena.*

*Translation by Keith Smith*

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

# **PART ONE: HIP PROSTHESIS**

January 2000 – December 2005

## 1. RIPO capture

### 1.1 Capture for RIPO per hospital in years 2000-2004

Percentage of R.I.P.O. capture calculated versus Schede di Dimissione Ospedaliera (S.D.O.), according to Agency. Data are referred to primary hip prosthesis (8151), hemiarthroplasty (8152), revision (8153) and prosthesis removal (8005)

CAPTURE TO RIPO					
PROVINCES	Year 2000 %	Year 2001 %	Year 2002 %	Year 2003 %	Year 2004 %
<b>BOLOGNA PROVINCE</b>					
AZIENDA Bologna Nord	103.3*	106.0*	102.6*	96.0	105.4*
AZIENDA Bologna Sud	78.7	90.0	93.7	86.4	78.2
AZIENDA Città di Bologna	77.7	93.4	98.6	95.6	95.6
AZIENDA Imola	57.6	93.9	87.2	87.1	75.4
Az. Osp. S. Orsola-Malpighi	97.3	95.6	82.5	86.7	89.4
Istituti Ortopedici Rizzoli	102.3*	99.4	101.9*	99.6	100.0
<b>FERRARA PROVINCE</b>					
AZIENDA Ferrara	102.2*	96.9	91.7	79.8	81.2
Az. Ospedaliera di Ferrara	98.0	89.2	91.7	83.6	74.3
<b>FORLÌ-CESENA PROVINCE</b>					
AZIENDA Forlì	91.6	92.5	82.0	91.9	88.1
AZIENDA Cesena	100.6*	103.9*	93.7	87.9	84.7
<b>MODENA PROVINCE</b>					
AZIENDA Modena	78.2	92.0	95.7	93.8	97.1
Az. Osp. Policlinico di Modena	89.6	95.9	89.5	39.7	74.7
<b>PARMA PROVINCE</b>					
AZIENDA Parma	73.6	100.5*	109.6*	102.4*	98.2
Az. Ospedaliera di Parma	75.7	79.3	86.2	91.5	93.8
<b>PIACENZA PROVINCE</b>					
AZIENDA Piacenza	70.0	95.8	105.3*	97.4	96.1
<b>RAVENNA PROVINCE</b>					
AZIENDA Ravenna	93.3	100.7*	98.0	97.1	96.1
<b>REGGIO EMILIA PROVINCE</b>					
AZIENDA Reggio Emilia	77.2	75.5	81.4	89.6	90.8
Arcispedale Santa M. Nuova	104.3*	86.0	103.8*	72.5	100.3*
<b>RIMINI PROVINCE</b>					
AZIENDA Rimini	101.0*	101.5*	100.0	91.7	98.4
<b>TOTAL</b>	<b>87.8</b>	<b>94.3</b>	<b>95.4</b>	<b>91.7</b>	<b>92.7</b>

\* Percentage higher than 100 is possibly due to a mistake in SDO code.

## 1.2 Percentage of RIPO capture year 2005

Percentage of R.I.P.O. capture calculated versus Schede di Dimissione Ospedaliera (S.D.O.), according to Orthopaedic department.

<b>YEAR 2005</b>			
<b>BOLOGNA PROVINCE</b>	N° of operations communicated to RIPO	N° operations communicated via S.D.O.	% capture to R.I.P.O.
<b>AZIENDA BOLOGNA</b>			
<b>Bologna Città</b>			
Casa di cura "Villa Regina" (non accr.)	42	42	<b>98</b>
Casa di cura "Villa Erbosa"	121	121	
Casa di cura "Villa Nigrisoli"	107	108	
Casa di cura "Villa Torri"	174	178	
Casa di cura "Villa Laura"	117	120	
Ospedale Maggiore, Bellaria	139	143	
<b>Bologna Nord</b>			
Bentivoglio, Budrio, S. Giovanni in Persiceto	94	92	<b>102</b>
<b>Bologna Sud</b>			
Ospedale Civile di Vergato	64	71	<b>90</b>
Casa di cura "Prof. Nobili"	14	17	
Casa di cura "Villa Chiara"	16	16	
<b>Total</b>	<b>94</b>	<b>104</b>	
Azienda Ospedaliera S. Orsola-Malpighi	302	380	<b>79</b>
Istituti Ortopedici Rizzoli	1614	1610	<b>100</b>
<b>AZIENDA IMOLA</b>			
Osp. Civile di Imola – Castel San Pietro	<b>306</b>	<b>312</b>	<b>98</b>

<b>FERRARA PROVINCE</b>	N° of operations communicated to RIPO	N° operations communicated via S.D.O.	% capture to R.I.P.O.
Stab. Ospedaliero di Cento, Bondeno	183	187	<b>78</b>
Ospedale Civile Argenta	179	192	
Ospedale Civile Comacchio – Delta	57	147	
Copparo	-	11	
<b>Total</b>	<b>419</b>	<b>537</b>	
Azienda Ospedaliera di Ferrara	174	236	<b>74</b>

<b>YEAR 2005</b>			
<b>FORLÌ-CESENA PROVINCE</b>	N° of operations communicated to RIPO	N° operations communicated via S.D.O.	% capture to R.I.P.O.
<b>AZIENDA FORLÌ'</b>			
Ospedale "Morgagni-Pierantoni" Forlì, Forlimpopoli, Santa Sofia	113	157	<b>82</b>
Villa Igea Forlì	9	9	
Casa di cura "Villa Serena" Forlì	89	91	
<b>Total</b>	<b>211</b>	<b>257</b>	
<b>AZIENDA CESENA</b>			
Ospedale "M. Bufalini" Cesena, Bagno di Romagna, Cesenatico	186	231	<b>91</b>
Casa di cura "Malatesta Novello" Cesena	232	232	
Casa di cura "S. Lorenzino" Cesena	15	15	
<b>Total</b>	<b>433</b>	<b>478</b>	

<b>MODENA PROVINCE</b>	N° of operations communicated to RIPO	N° operations communicated via S.D.O.	% capture to R.I.P.O.
<b>AZIENDA MODENA</b>			
Ospedale S. Agostino-Estense	345	324	<b>98</b>
Ospedale Civile degli Infermi, Carpi	208	200	
Ospedale di Finale Emilia	-	15	
Ospedale S. Maria Bianca, Mirandola	121	114	
Ospedale Civile Castelfranco Emilia	12	26	
Ospedale Civile, Sassuolo	92	107	
Ospedale Civile, Vignola	111	119	
Ospedale, Pavullo	72	79	
Hesperia Hospital	19	16	
Casa di cura Prof. Fogliani	24	24	
<b>Total</b>	<b>1004</b>	<b>1024</b>	
Azienda Ospedaliera Policlinico di Modena	290	345	<b>84</b>

<b>PARMA PROVINCE</b>	N° of operations communicated to RIPO	N° operations communicated via S.D.O.	% capture to R.I.P.O.
<b>AZIENDA PARMA</b>			
Ospedale Civile, Fidenza, San Secondo Parmense	113	113	<b>99</b>
Ospedale Santa Maria, Borgo Val di Taro	79	81	
Casa di cura "Città di Parma"	89	90	
<b>Total</b>	<b>281</b>	<b>284</b>	
Azienda Ospedaliera di Parma	461	466	<b>99</b>

<b>YEAR 2005</b>			
<b>PIACENZA PROVINCE</b>	N° of operations communicated to RIPO	N° operations communicated via S.D.O.	% capture to R.I.P.O.
<b>AZIENDA PIACENZA</b>			
Ospedale Civile, Piacenza	178	177	<b>97</b>
Presidio Val Tidone, Castel San Giovanni	86	97	
Presidio Val D'Arda, Fiorenzuola D'Arda, Cortemaggiore	134	137	
<b>Total</b>	<b>398</b>	<b>411</b>	

<b>RAVENNA PROVINCE</b>	N° of operations communicated to RIPO	N° operations communicated via S.D.O.	% capture to R.I.P.O.
<b>AZIENDA RAVENNA</b>			
Ospedale S. Maria delle Croci, Ravenna	135	164	<b>96</b>
Presidio Ospedaliero, Lugo	277	278	
Ospedale per gli Infermi, Faenza	133	136	
Casa di cura "Domus Nova"	4	4	
Casa di cura "S. Francesco"	107	108	
Casa di cura "Villa Maria Cecilia"	37	37	
Casa di cura "S. Pier Damiano"	105	107	
<b>Total</b>	<b>798</b>	<b>834</b>	

<b>REGGIO EMILIA PROVINCE</b>	N° of operations communicated to RIPO	N° operations communicated via S.D.O.	% capture to R.I.P.O.
<b>AZIENDA REGGIO EMILIA</b>			
Ospedale, Guastalla	105	100	<b>95</b>
Ospedale S. Sebastiano, Correggio	0	14	
Ospedale di Montecchio Emilia	59	62	
Ospedale di Scandiano	75	69	
Ospedale S. Anna, Castelnovo Monti	68	69	
Casa di cura "Villa Salus"	109	108	
Casa di cura "Villa Verde"	23	40	
<b>Total</b>	<b>439</b>	<b>462</b>	
Arcispedale Santa Maria Nuova –RE	283	283	<b>100</b>

<b>RIMINI PROVINCE</b>	N° of operations communicated to RIPO	N° operations communicated via S.D.O.	% capture to R.I.P.O.
<b>AZIENDA RIMINI</b>			
Ospedale Infermi, Rimini, Sant Arcangelo	139	125	<b>94</b>
Ospedale G. Ceccarini, Riccione, Cattolica	167	167	
Casa di cura "Sol et Salus"	147	149	
Casa di Cura Prof. Montanari	-	41	
Casa di cura "Villa Maria"	7	7	
<b>Total</b>	<b>460</b>	<b>489</b>	

<b>TOTAL</b>	<b>8761</b>	<b>9316</b>	<b>94</b>
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### 1.3 Ratio public/private treatment

Percentage of primary arthroplasties, hemiarthroplasties and revisions of the hip performed in public hospitals.

<b>% of operations performed in public hospitals (AUSL, AOSP, IRCCS)</b>			
<b>Year of surgery</b>	<b>Primary arthroprosthesis</b>	<b>Hemiarthroplasty</b>	<b>Revision</b>
<b>2000</b>	77.0	97.0	78.0
<b>2001</b>	81.0	97.3	77.0
<b>2002</b>	78.0	97.5	79.0
<b>2003</b>	75.1	98.4	76.1
<b>2004</b>	75.3	97.6	76.1
<b>2005</b>	72.9	98.3	77.7

From database SDO

More than  $\frac{3}{4}$  of THA (total hip arthroplasties) and nearly all hemiarthroplasties are performed in public hospitals.

No significant differences can be evidenced during the years



## 2. Quality of data

The reliability of data provided by the Units is assessed at the time they are inserted into the databank. An index number between 2 (data missing or incongruent) and 8 (data complete and probable) is assigned to each admission form.

The quality of the data supplied to RIPO is much better than that of past years, although it would be desirable that all the units fill in the form as clearly and fully as possible. The use of self-adhesive labels describing the prostheses enables unequivocal identification of the implant and the registration of the production batch. In 2000 only 70% of the data supplied to RIPO was of satisfactory quality, in 2005 this percentage was much higher, 98%.

There are still, in isolated cases, some difficulties due to inaccurate reporting of data.

## 3. Type of operation

Number of hip operations carried out on patients with admission date between 1st January 2000 and 31st December 2005, according to **type**

Type of operation	Number of operation	Percentage
Primary THA	29.349	61.8
Total and partial revision*	4.948	10.4
Hemiarthroplasty	12.266	25.8
Resurfacing	406	0.9
Prosthesis removal	291	0.6
Other**	262	0.5
<b>Total</b>	<b>47.522</b>	<b>100.0</b>

\* 1.723 total revisions, 2.038 cup revision, 770 stem revision, 333 head revision. 72 revision of hemiarthroplasty

\*\* Including 122 luxation reductions, 52 debridements, 15 hematoma drains, 13 ossification removals and 8 biopsies

The percentage distribution of primary total arthroplasties, hemiarthroplasty and revision remained constant throughout the six years

Number of hip operations carried out with resurfacing prostheses.

Year of operation	Percentage of THA	
	N.	Percentage of THA
2000	-	-
2001	6	0.1%
2002	34	0.7%
2003	76	1.5%
2004	113	2.1%
2005	177	3.1%

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	4287	-	719	-
2001	4565	+6.5	852	+18.5
2002	4661	+2.1	866	+1.6
2003	5104	+9.5	856	-1.2
2004	5460	+7.0	848	-0.9
2005	5678	+4.0	807	-4.8

## 4. Descriptive statistics of patients

### 4.1 Age

Number of hip operations carried out on patients with admission date between 1st January 2000 and 31st December 2005, 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	900	3.1	1824	6.2	4181	14.3	9015	30.7	10684	36.4	2739	9.3	<b>29343</b>
Hemiarthroplasty	9	0.05	19	0.15	86	0.7	473	3.9	3305	27.0	8368	68.2	<b>12260</b>
Resurfacing	59	14.5	112	27.6	147	36.2	78	19.2	10	2.5	-	-	<b>406</b>
Revision	89	1.8	175	3.5	481	9.7	1375	27.8	2054	41.5	773	15.6	<b>4947</b>
Prosthesis removal	5	1.7	17	5.8	31	10.6	77	26.5	121	41.6	40	13.8	<b>291</b>
Other	15	5.7	15	5.7	35	13.4	63	24.1	87	33.2	47	17.9	<b>262</b>
<b>Total*</b>	<b>1077</b>	<b>2.3</b>	<b>2162</b>	<b>4.6</b>	<b>4961</b>	<b>10.4</b>	<b>11081</b>	<b>23.3</b>	<b>16261</b>	<b>34.2</b>	<b>11967</b>	<b>25.2</b>	<b>47509</b>

\* 13 data (0.1%) are missing

### 4.2 Sex

Number of hip operations carried out on patients with admission date between 1st January 2000 and 31st December 2005, according to **type of operation** and **sex** of patient.

Type of operation	Male		Female		Total
	N.	%	N.	%	N.
Primary THA	11082	37.8	18267	62.2	<b>29.349</b>
Hemiarthroplasty	2876	23.4	9390	76.6	<b>12.266</b>
Revision	1470	29.7	3478	70.3	<b>4.948</b>
Prosthesis removal	103	35.4	188	64.6	<b>291</b>
Resurfacing	242	59.6	164	40.4	<b>406</b>
Other	106	40.5	156	59.5	<b>262</b>
<b>Total*</b>	<b>15.879</b>	<b>33.4</b>	<b>31.643</b>	<b>66.6</b>	<b>47.522</b>

### 4.3 Side of surgery

Coxarthrosis more often affects right hip (59.1%). The percentage has been calculated on patients wearing only one implant.

### 4.4 Clinical condition

Number of arthroplasty operations carried out on patients with admission date between 1st January 2000 and 31st December 2005, according to **Charnley classification** of patients at the time of surgery

<b>Clinical condition</b>	<b>Number</b>	<b>Percentage</b>
One hip affected	30.122	64.9
Two hips affected	11.909	25.7
Other diseases restricting movement	4.360	9.4
<b>Total*</b>	<b>46.391</b>	<b>100.0</b>

\* 1131 data (2.4%) are missing

### 4.5 Bilateral arthroplasty

In the period of registry observation (6 years) 1472 patients underwent bilateral operations. About 7% of this group of patients chose to undergo the second operation at a different hospital from where the first one was performed.

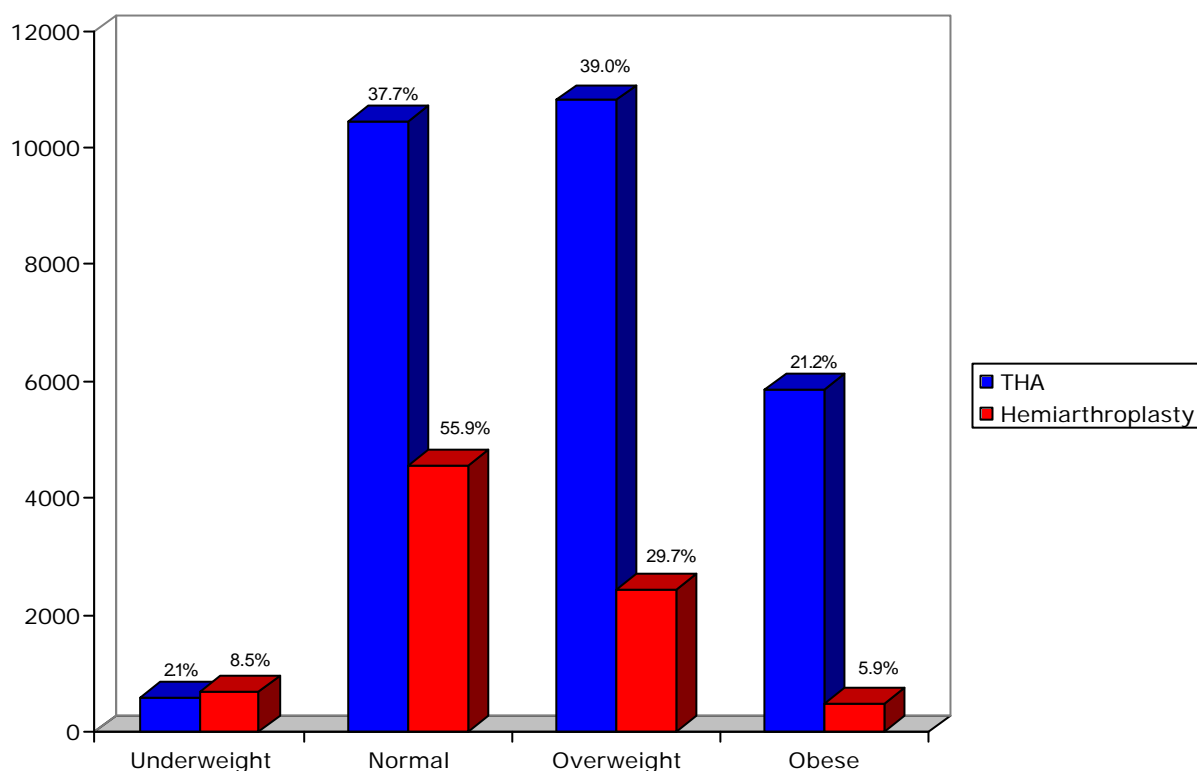
In bilateral operations, it was observed that the first hip to be treated was the right one in 55.4 % of cases

#### 4.6 Body Mass Index

Number of arthroplasty operations carried out on patients with admission date between 1st January 2000 and 31st December 2005, according to **body mass index** of patients at the time of surgery.

Body Mass Index	Primary THA and revision	Hemiarthroplasty	Total
Underweight (= 19)	595	694	1289
Normal (20-25)	10.456	4563	15019
Overweight (26-29)	10.818	2425	13243
Obese (= 30)	5.872	487	6359
<b>Total*</b>	<b>27.741</b>	<b>8.169</b>	<b>35.910</b>

\* 11612 data (20.2%) are missing



#### 4.7 Diseases treated with total hip arthroplasty and hemiarthroplasty

Number of primary total hip arthroplasty operations carried out on patients with admission date between 1st January 2000 and 31st December 2005, according to **diagnosis**.

Diagnosis in primary arthroplasty	Number	Percentage
Primary arthritis *	19.440	66.6
Sequelae of LCA and DCA	3.628	12.4
Femoral neck fracture	2.537	8.7
Femoral head necrosis (idiopathic, due to dialysis, due to steroids)	1.579	5.4
Post traumatic arthritis	712	2.4
Post traumatic necrosis	416	1.4
Rheumatic arthritis	392	1.3
Femoral neck fracture sequelae	154	0.5
Epiphysiolysis sequelae	70	0.2
Perthes disease sequelae	65	0.2
Septic coxitis sequelae	49	0.2
Tumor	51	0.2
Paget's disease sequelae	31	0.1
TBC coxitis sequelae	25	0.1
Other	83	0.3
<b>Total**</b>	<b>29.232</b>	<b>100.0</b>

\* in 670 cases (2.3% ) patients are younger than 50 years or older than 95

\*\* 117 data missing (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
Primary arthrosis	65.1	67.7
Sequelae of LCA and DCA	14.0	12.3
Femoral neck fracture	9.1	8.3
Femoral head necrosis idiopathic	5.1	5.3
Post traumatic arthritis	2.5	2.4
Post traumatic necrosis	1.5	1.3
Rheumatic arthritis	1.5	1.2
Other	1.2	1.5

Number of resurfacing operations carried out on patients with admission date between 1st January 2000 and 31st December 2005, according to **diagnosis**.

<b>Diagnosis in resurfacing</b>	<b>Number</b>	<b>Percentage</b>
Primary arthrosis	269	66.7
Sequelae of LCA and DCA	64	15.9
Femoral head necrosis idiopathic	23	5.7
Post traumatic arthritis	20	5.0
Rheumatic arthritis	10	2.5
Perthes disease sequelae	4	1.0
Femoral neck fracture sequelae	4	1.0
Post traumatic necrosis	3	0.7
Epiphysiolysis sequelae	3	0.7
Septic coxitis sequelae	2	0.5
Paget's disease sequelae	1	0.3
<b>Total*</b>	<b>403</b>	<b>100.0</b>

\* 3 data are missing

#### 4.8 Causes for revision

Number of revision operations carried out on patients admitted between 1<sup>st</sup> January 2000 and 31 December 2005 according to **diagnosis**.

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.

<b>Diagnosis in revision</b>	<b>Number</b>	<b>Percentage</b>
Cup aseptic loosening	1596	32.7
Total aseptic loosening	1341	27.4
Stem aseptic loosening	525	10.7
Prosthesis luxation	339	6.9
Prosthesis removal	145	3.0
Bone fracture*	142	2.9
<i>Hemiarthroplasty stem loosening</i>	138	2.8
<i>Hemiarthroplasty luxation</i>	107	2.2
Prosthesis breakage*	100	2.1
Poly wear	101	2.1
Septic loosening	72	1.5
<i>Cotiloiditis</i>	75	1.5
Pain without loosening	59	1.2
<i>Pain without loosening in hemiarthroplasty</i>	25	0.5
<i>Bone fracture in hemiarthroplasty</i>	20	0.4
Other (ossification, trauma..)	102	2.1
<b>Total**</b>	<b>4.887</b>	<b>100.0</b>

\* 14 cup, 20 stem, 14 head, 26 liner

\*\* 61 data are missing, equal to 1.2% of the series of revision operations

*In italics the cause of hemiarthroplasty revision*

## 5. Types of prosthesis

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

### 5.1 Cups used in primary arthroplasty

Type of cup	2000-2002		2003-2005	
	N.	%	N.	%
AnCA FIT Cremascoli-Wright	3255	24.1	3158	19.9
CLS Sulzer-Centerpulse-Zimmer	1473	10.9	1248	7.9
FIXA Adler	0	0.0	1162	7.3
FITMORE Sulzer-Centerpulse-Zimmer	770	5.7	931	5.9
TRIDENT Stryker-Howmedica	21	0.2	750	4.7
ABGII Stryker-Howmedica	824	6.1	663	4.2
REFLECTION Smith and Nephew	401	3.0	624	3.9
STANDARD CUP PROTEK Sulzer	703	5.2	541	3.4
DUOFIT PSF Samo	684	5.1	535	3.4
TRILOGY Zimmer	476	3.5	422	2.7
MULLER Cremascoli-Wright	550	4.1	393	2.5
BICON PLUS Endoplus	138	1.0	384	2.4
HILOCK LINE Symbios	52	0.4	281	1.8
DELTA PF Lima	0	0.0	277	1.7
CONTEMPORARY Howmedica	268	2.0	262	1.6
EP-FIT PLUS Endoplus	1	0.0	260	1.6
TRABECULAR METAL MONOBLOCK Zimmer	3	0.0	238	1.5
CFP Link	71	0.5	219	1.4
ZCA Zimmer	224	1.7	207	1.3
MULLER Smith and Nephew	156	1.2	159	1.0
CUPULE AVANTAGE Biomet	18	0.1	138	0.9
PINNACLE SECTOR II DePuy	5	0.0	135	0.9
SPH BLIND Lima	7	0.1	135	0.9
M2A Biomet	0	0.0	133	0.8
MULLER Samo	256	1.9	131	0.8
EXCEED PC Biomet	5	0.0	130	0.8
TRILOGY AB Zimmer	24	0.2	127	0.8
ALLOFIT S ALLOPRO	12	0.1	121	0.8
EXPANSION MATHYS	7	0.1	117	0.7
Muller Protek-Sulzer	261	1.9	116	0.7
SPH CONTACT Lima	124	0.9	109	0.7
EASY Hit Medica	103	0.8	85	0.5
ALBI + CREMASCOLI	106	0.8	44	0.3
ELLIPTICAL CUP HEDROCEL Stratec	110	0.8	40	0.3
OSTEOLOCK Stryker-Howmedica	163	1.2	7	0.0
SECUR-FIT Osteonics	166	1.2	3	0.0
ELLIPTICAL CUP Stratec	197	1.5	3	0.0
ABG Howmedica	238	1.8	2	0.0
METASUL STAR CUP Sulzer-Centerpulse-Zimmer	144	1.1	0	0.0
Others (97 types)	1457	10.8	1586	10.0
<b>Total</b>	<b>13.473</b>	<b>100.0</b>	<b>15.876</b>	<b>100.0</b>

83 data (0.3%) are missing.

## 5.2 Cups used in revision surgery

TYPE OF CUP	2000-2002		2003-2005	
	N.	%	N.	%
AnCA FIT Cremascoli-Wright	178	18.7	112	14.5
TRIDENT Stryker-Howmedica	2	0.2	51	6.6
MC MINN-Link	29	3.0	48	6.2
TRILOGY Zimmer	50	5.3	40	5.2
STANDARD CUP PROTEK Sulzer-Centerpulse-Zimmer	97	10.2	33	4.3
Muller Protek- Sulzer-Centerpulse-Zimmer	68	7.1	31	4.0
DUOFIT PSF Samo	5	0.5	30	3.9
CONTEMPORARY Stryker-Howmedica	62	6.5	30	3.9
FIXA Adler	0	0.0	24	3.1
MULLER Cremascoli-Wright	32	3.4	24	3.1
PINNACLE MULTIHOLE II DePuy	0	0.0	20	2.6
FITMORE Sulzer-Centerpulse-Zimmer	24	2.5	16	2.1
TRABECULAR METAL Zimmer	0	0.0	15	1.9
MULLER Lima	15	1.6	15	1.9
CLS Sulzer-Centerpulse-Zimmer	24	2.5	15	1.9
OSTEOLOCK Stryker-Howmedica	32	3.4	15	1.9
PE Centerpulse	0	0.0	14	1.8
ALLOFIT S ALLOPRO	2	0.2	14	1.8
CUSTOM MADE PROCOTYL Z PIVOT Cremascoli-Wright	0	0.0	12	1.6
MULLER Samo	29	3.0	12	1.6
PROCOTYL-E Cremascoli-Wright	23	2.4	11	1.4
SPH CONTACT Lima	3	0.3	10	1.3
CONICAL SCREW CUP Protek	15	1.6	10	1.3
ZCA Zimmer	15	1.6	9	1.2
CCB Mathys	13	1.4	6	0.8
LOR ALLOPRO Sulzer-Centerpulse-Zimmer	38	4.0	6	0.8
ARTHOPOR II Depuy J and J	12	1.3	5	0.6
HAC CERAFIT CUP Ceraver Osteal	12	1.3	2	0.3
CERAFIT Ceraver Osteal	13	1.4	0	0.0
SECUR-FIT Osteonics	25	2.6	0	0.0
Others (70 types)	133	14.0	142	18.4
<b>Total</b>	<b>951</b>	<b>100.0</b>	<b>772</b>	<b>100.0</b>



### 5.3 Stems used in primary surgery

TYPE OF STEM	2000-2002		2003-2005	
	N.	%	N.	%
AnCA FIT - Cremascoli-Wright	2173	16.1	1935	12.2
CLS - Sulzer-Centerpulse-Zimmer	1489	11.0	1462	9.2
CONUS - Sulzer-Centerpulse-Zimmer	1220	9.1	1330	8.4
ABGII - Stryker-Howmedica	563	4.2	1041	6.6
APTA - Adler	0	0.0	885	5.6
SL PLUS - Endoplus	207	1.5	728	4.6
PROFEMUR Z Cremascoli-Wright	12	0.1	608	3.8
JVC Cremascoli-Wright	280	2.1	436	2.7
VERSYS FIBER METAL TAPER Zimmer	284	2.1	426	2.7
EXETER Stryker-Howmedica	352	2.6	402	2.5
RECTA Adler	0	0.0	324	2.0
TAPERLOC Biomet	18	0.1	299	1.9
BASIS Smith and Nephew	135	1.0	297	1.9
BHS Smith and Nephew	65	0.5	268	1.7
CFP LINK	87	0.6	251	1.6
P507 Samo	288	2.1	246	1.5
C2 Lima	128	1.0	239	1.5
SPECTRON Smith and Nephew	378	2.8	223	1.4
HIPSTAR Stryker-Howmedica	11	0.1	198	1.2
C STEM DePuy	66	0.5	196	1.2
SPS SYMBIOS	25	0.2	165	1.0
CORAIL DePuy	113	0.8	157	1.0
FIT STEM Lima	0	0.0	145	0.9
ALLOCLASSIC SL ALLOPRO SULZER	49	0.4	139	0.9
CBC Mathys	40	0.3	127	0.8
PPF Biomet	3	0.0	123	0.8
ACCOLADE Osteonics Stryker-Howmedica	34	0.2	116	0.7
MRL Cremascoli-Wright	355	2.6	115	0.7
LC Samo	227	1.7	110	0.7
LUBINUS SP2 Link	143	1.1	107	0.7
MODULUS HIP SYSTEM Lima	2	0.0	106	0.7
AD Samo	235	1.7	106	0.7
DEFINITION Stryker-Howmedica	198	1.5	100	0.6
EHS Cremascoli-Wright	180	1.3	96	0.6
VERSYS CEMENTED Zimmer	237	1.8	95	0.6
DUOFIT RKT Samo	155	1.1	92	0.6
PROXILOCK FT Stratec	210	1.6	91	0.6
AHS Cremascoli-Wright	206	1.5	89	0.6
AnCA Dualfit Cremascoli	225	1.7	87	0.5
SYNERGY Smith and Nephew	184	1.4	62	0.4
STEM Cremascoli-Wright	170	1.3	38	0.2
MS 30 Protek Sulzer	134	1.0	30	0.2
VERSYS CEMENTED LD Zimmer	102	0.8	24	0.2
ABG Stryker-Howmedica	561	4.2	11	0.1
G3 Citieffe	175	1.3	2	0.0
ULTIMA Johnson e Johnson	199	1.5	0	0.0
Others ( 116 types)	1555	11.5	1749	11.0
<b>Total</b>	<b>13.473</b>	<b>100.0</b>	<b>15.876</b>	<b>100.0</b>

#### 5.4 Stems used in revision surgery

TYPE OF STEM	2000-2002		2003-2005	
	N.	%	N.	%
PROFEMUR R VERS. 4 - Cremascoli	200	21.0	163	21.1
SL REVISION - Sulzer-Centerpulse-Zimmer	201	21.1	124	16.1
S. ROM - Johnson e Johnson	44	4.6	66	8.5
MGS - Samo	14	1.5	37	4.8
RESTORATION - Stryker-Howmedica	0	0.0	36	4.7
CONUS - Sulzer-Centerpulse-Zimmer	33	3.5	32	4.2
RESTORATION T3 - Stryker-Howmedica	46	4.8	28	3.6
EXETER - Stryker-Howmedica	22	2.3	21	2.7
C2 - Lima	11	1.2	20	2.6
APTA - Adler	0	0.0	15	1.9
CLS - Sulzer-Centerpulse-Zimmer	18	1.9	15	1.9
ANCA FIT - Cremascoli Wright	40	4.2	14	1.8
CONELock REVISION - Biomet	12	1.3	13	1.7
JVC - Cremascoli Wright	14	1.5	13	1.7
ZMR REVISION TAPER CONE - Zimmer	0	0.0	11	1.4
MP RECONSTRUCTION PROSTHESIS - Link	25	2.6	10	1.3
AD - Samo	17	1.8	9	1.2
ZMR REVISION TAPER - Zimmer	30	3.2	6	0.8
CBK REVISION STEM - Mathys	14	1.5	4	0.5
ANCA - Cremascoli	24	2.5	1	0.1
PROFEMUR, unknown model - Cremascoli	39	4.1	0	0.0
unknown	6	0.6	5	0.7
Others (80 types)	141	14.8	129	16.7
<b>Total</b>	<b>951</b>	<b>100.0</b>	<b>772</b>	<b>100.0</b>

## 5.5 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

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

Year of operation	Total revision	
	Stems	Cups
2000	48	58
2001	55	64
2002	48	59
2003	60	62
2004	40	46
2005	44	45

The marked dispersion of models is evident. The low number of the homogeneous population according to type of component implanted will make the statistic evaluation of the effectiveness of the device difficult. After an apparent decrease in 2004, in 2005 a new increase is observed.

Types have not been considered different when only change of trade-marked occurred (ex. Sulzer-Centerpulse, or Johnson & Johnson-Depuy)

**Percentage trend of the 4 most commonly implanted stems in Emilia-Romagna**

<b>STEMS in primary surgery</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>
APTA – Adler	-	-	-	-	-	15.9
CONUS Sulzer, Centerpulse, Zimmer	8.4	9.1	9.5	9.5	8.3	6.9
SL PLUS – Endoplus	1.0	1.8	1.8	2.3	3.6	7.7
RECTA – Adler	-	-	-	-	-	5.8
ANCA FIT – Cremascoli Wright	15.0	15.8	17.2	15.4	15.9	5.5
CLS Sulzer, Centerpulse, Zimmer	12.5	10.1	10.6	10.5	9.7	7.3
ABGII –Stryker Howmedica	0.9	4.8	5.8	6.1	7.0	6.2

**Percentage trend of the 4 most commonly implanted cups in Emilia-Romagna**

<b>CUPS in primary surgery</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>
FIXA – Adler	-	-	-	-	-	20.8
AnCA FIT – Cremascoli Wright	22.1	24.4	25.7	25.1	27.2	7.5
TRIDENT – Stryker Howmedica	-	-	0.5	3.0	5.4	5.7
CLS Sulzer, Centerpulse, Zimmer	11.6	9.9	11.2	10.2	8.7	4.6
ABGII – Stryker Howmedica	2.0	7.5	6.9	4.5	4.3	3.7
FITMORE – Sulzer, Centerpulse, Zimmer	5.6	6.2	5.3	6.0	5.3	6.1

## 5.6 Resurfacing prosthesis

The resurfacing prosthesis represents an innovative solution for some categories of patients

The following Table shows the percentages of traditional joint arthroplasty and resurfacing prostheses.

Year of operation	Primary surgery	
	Traditional	Resurfacing
2000	100.0%	-
2001	99.9%	0.1%
2002	99.3%	0.7%
2003	98.5%	1.5%
2004	97.9%	2.1%
2005	96.9%	3.1%

Types of resurfacing from **01/01/2001** to **31/12/2005**

Types of prostheses	N.	%
BHR - Midland Medical Technologies	334	82.3
ASR – Depuy	23	5.7
MRS – Lima	20	4.9
CONSERVE PLUS – Wright	16	3.9
ADEPT – Finsbury	7	1.7
ICON – International Orthopaedics	3	0.7
DURON Hip Resurfacing – Zimmer	3	0.8
<b>Total</b>	<b>406</b>	<b>100.0</b>

## 5.7 Modular neck

Nearly 28% of stems implanted in primary surgery have modular neck.

ANCA-fit stem by Cremascoli, the more common stem in the region, short necks are used in 65% of operations.

Straight neck is implanted in 39.1% of operations, anti-retro versus in 35.1% and varus-valgus in 23.1%.

APTA stem, the second model, the most commonly used in the region, 59.5% is implanted with a neutral neck and the remaining 40.5% with the neck in varying degrees of correction.

## 5.8 Articular coupling and head diameter

Number of primary total hip arthroplasty operations carried out on patients with admission date between 1<sup>st</sup> January 2000 and 31st December 2005, according to **type of operation and articular coupling**.

Articular coupling	Total hip arthroplasty		Total revision	
	N.	%	N.	%
Metal-polyethylene	11315	38.7	756	44.2
Ceramic-polyethylene	8160	28.0	641	37.4
Ceramic-ceramic	7227	24.7	264	15.4
Metal-metal	2324	8.0	51	3.0
Cerid- polyethylene	182	0.6	-	-
<b>Total*</b>	<b>29.208</b>	<b>100.0</b>	<b>1.712</b>	<b>100.0</b>

\* 141 missing data for primary and 11 for revision

Percentage of total hip arthroplasty according **to articular coupling** during the years

Year of operation	Primary surgery			
	met-pol	cer-pol	cer-cer	met-met
2000	45.6	28.9	18.5	7.0
2001	41.2	30.6	20.6	7.6
2002	39.5	30.8	22.4	7.3
2003	39.8	28.4	23.7	8.1
2004	35.6	28.0	27.9	8.5
2005	34.1	23.0	33.7	9.2

Percentage of total revision according **to articular coupling** during the years.

Year of operation	Total revision			
	met-pol	cer-pol	cer-cer	met-met
2000	47.4	34.5	17.1	1.0
2001	48.9	38.9	10.1	2.1
2002	41.3	45.0	11.7	2.0
2003	40.7	45.0	13.3	1.0
2004	43.5	30.5	20.3	5.7
2005	41.6	26.7	23.5	8.2

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

Age class	Elective THA			
	met-pol	cer-pol	cer-cer	met-met
<40	7.8	15.7	53.4	23.1
40-49	11.7	16.6	49.9	21.8
50-59	18.4	20.4	42.9	18.3
60-69	34.6	28.2	28.7	8.5
70-79	48.7	33.6	15.7	2.0
> 80	66.7	26.6	6.2	0.5

Number of hip arthroplasty operations on patients admitted between 1st January 2000 and 31<sup>st</sup> December 2005, according to **material** and **diameter of the head**.

Material	Diameter of the head											
	22		26		28		32		36		≥38	
	N.	%	N.	%	N.	%	N.	%	N.	%	N.	%
Alumina	-	-	-	-	13387	50.2	1234	86.4	382	76.7	-	-
Cr-Co	84	75.0	16	84.2	10603	39.8	154	10.8	116	23.3	421	100.0
Inox	28	25.0	3	15.8	2143	8.0	41	2.8	-	-	-	-
Zirconia	-	-	-	-	351	1.3	-	-	-	-	-	-
Cerid	-	-	-	-	180	0.7	-	-	-	-	-	-
<b>Total*</b>	<b>112</b>	<b>100.0</b>	<b>19</b>	<b>100.0</b>	<b>26664</b>	<b>100.0</b>	<b>1429</b>	<b>100.0</b>	<b>498</b>	<b>100.0</b>	<b>421</b>	<b>100.0</b>

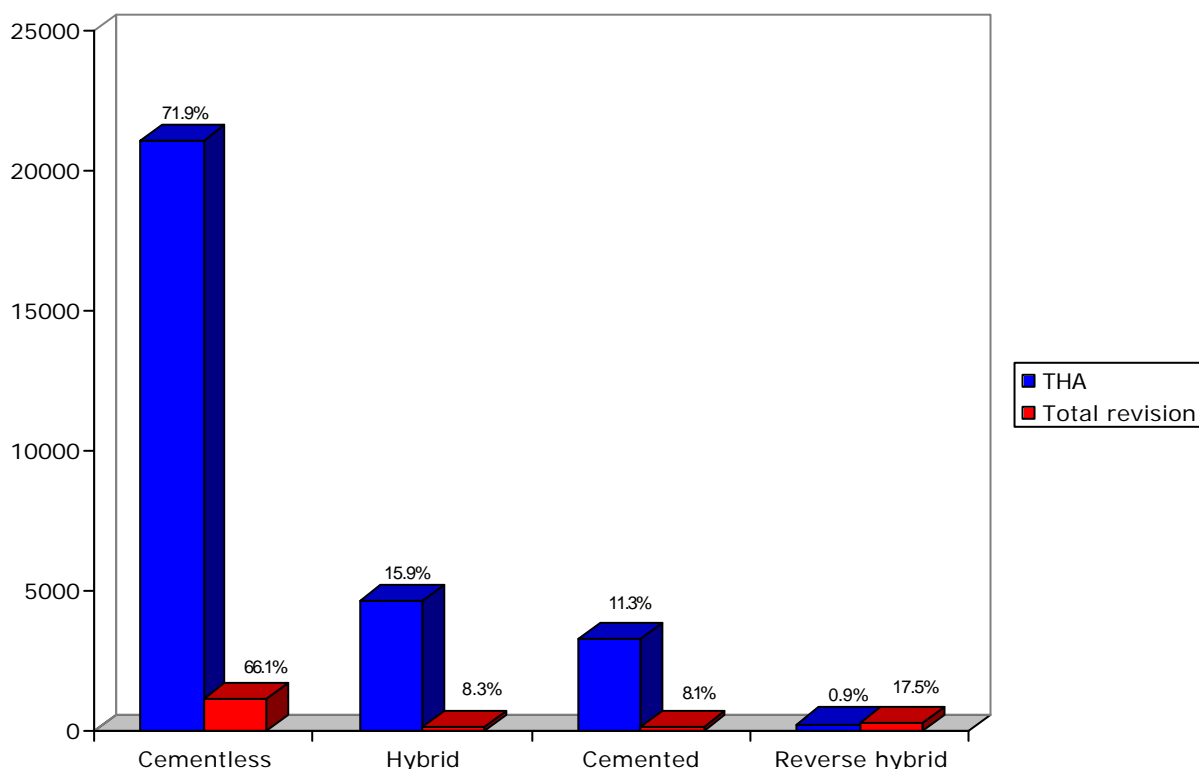
\*206 (0.7%) missing data

### 5.9 Prosthesis fixation

Number of hip arthroplasty operations on patients admitted between 1st January 2000 and 31<sup>st</sup> December 2005, according to **type of operation** and **fixation method**.

Fixation method	Primary THA	Total revision
Uncemented	21.057	1.135
Hybrid (stem cemented and cementless cup)	4.657	143
Cemented prostheses	3.309	140
Cementless stem and cemented cup	246	300
<b>Total*</b>	<b>29.269</b>	<b>1.718</b>

\* data not supplied in 80 primary operations and 5 revision operations



Fixation of the acetabular component of the resurfacing prosthesis was press fit in 100% of the cases and in 24.6% of the cases screws were used.

Percentage of total hip arthroplasties **according to fixation**, during the years

Year of operation	Primary surgery			
	Cemented	Cementless	Hybrid	Reverse hybrid
2000	15.8	60.5	22.9	0.8
2001	14.4	65.8	19.1	0.7
2002	12.2	70.9	16.1	0.8
2003	11.1	73.1	15.1	0.7
2004	8.8	77.8	12.4	1.0
2005	7.1	80.2	11.9	0.8

Percentage of total revision surgery **according to fixation**, during the years

Year of operation	Total revision			
	Cemented	Cementless	Hybrid	Reverse hybrid
2000	10.9	63.1	9.6	16.4
2001	9.4	63.0	8.2	19.4
2002	6.7	65.2	7.4	20.7
2003	7.3	68.5	7.3	16.9
2004	6.9	69.6	8.9	14.6
2005	6.4	69.1	8.6	15.9

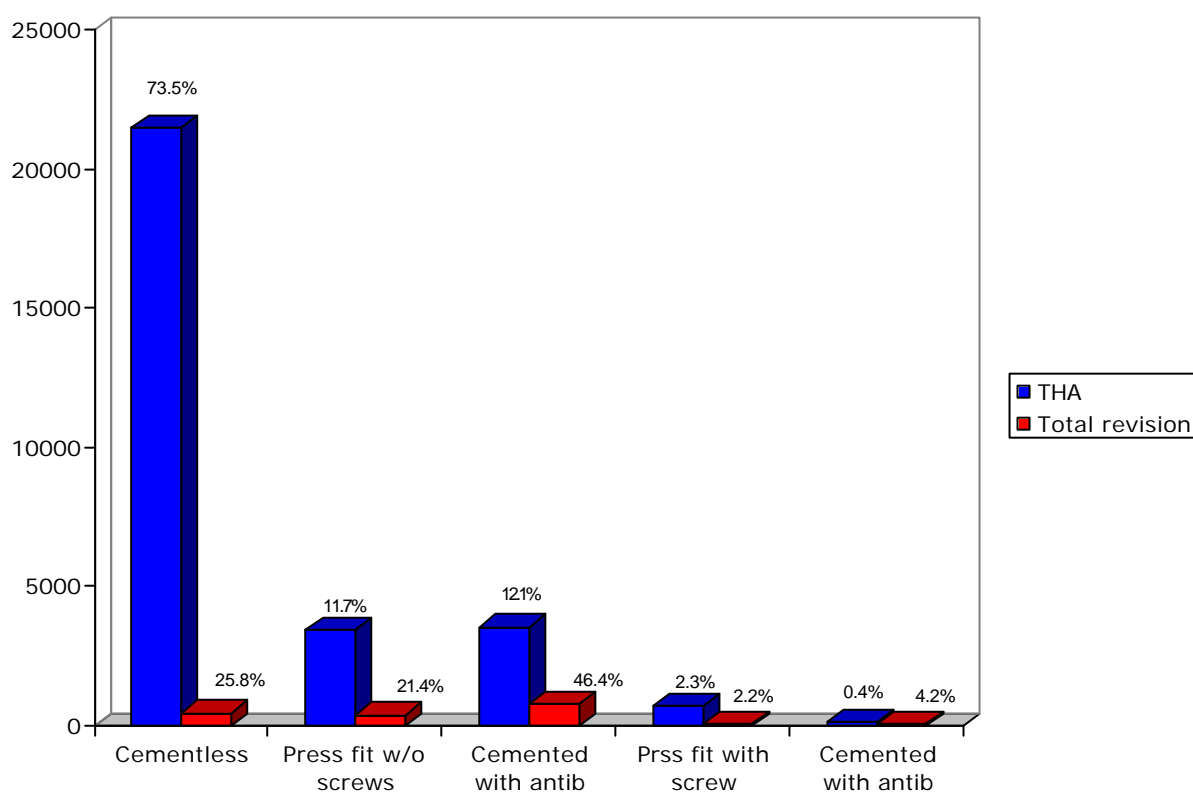


## 5.10 Cup fixation

Number of hip operations carried out on patients admitted between 1<sup>st</sup> January 2000 and 31<sup>st</sup> December 2005, according to **type of operation and cup fixation**

Cup fixation	THA	Total revision
Press-fit, uncemented	21508	443
Cemented without antibiotic	3545	797
Press fit with screw, uncemented	3437	367
Threaded	686	38
Cemented with antibiotic	119	73
<b>Total*</b>	<b>29.295</b>	<b>1.718</b>

\*54 missing data for THA and 5 for revision

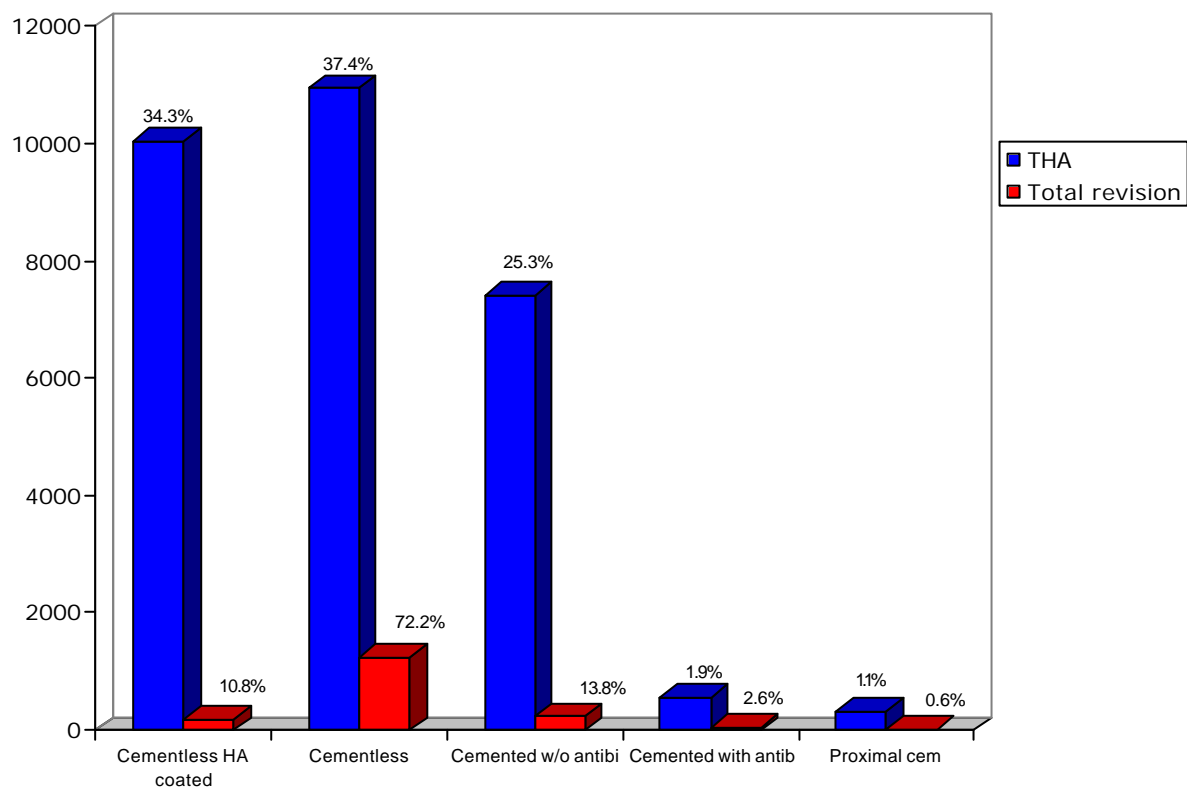


## 5.11 Stem fixation

Number of hip operations carried out on patients admitted between 1<sup>st</sup> January 2000 and 31<sup>st</sup> December 2005, according to **type of operation and stem fixation**

Stem fixation	THA	Total revision
Uncemented, HA coated	10050	186
Uncemented, no ceramic coating	10947	1241
Cemented without antibiotic	7421	238
Cemented with antibiotic	551	44
Proximally cemented	312	10
<b>Total*</b>	<b>29.281</b>	<b>1.719</b>

\*68 missing data for THA and 4 for revision.



## 5.12 Bone cement

**Type of cement** used in primary surgery with at least one cemented component and in hemiarthroplasty (information recorded in RIPO from 30/09/2001)

Type of cement	Hemiarthroplasty	THA
Surgical Simplex P - Howmedica	27.6%	33.5%
Cemex - Tecres	40.2%	22.0%
Palacos R - Biomet	3.7%	11.3%
AmpliCEM 3 - Amplimedical	4.0%	10.3%
Cemex rx - Tecres	9.9%	4.2%
Antibiotic Simplex - Howmedica	3.0%	3.7%
CMW 3 - DePuy	3.5%	3.6%
Sulcem 3 - Centerpulse	2.9%	1.7%
Cemfix 3 - Teknimed	0.0%	1.5%
Cemex iso - Tecres	0.3%	0.8%
AmpliCEM 1 - Amplimedical	0.1%	0.7%
Cemex Genta - Tecres	0.2%	0.6%
CMW 1 - DePuy	1.0%	0.4%
Endurance - DePuy	1.1%	0.4%
Cemex XL - Tecres	1.2%	0.3%
Cemfix 1 - Teknimed	0.1%	0.3%
Sulcem 1 - Centerpulse	0.4%	0.3%
Other	0.8%	4.5%
<b>Total</b>	<b>100.0%</b>	<b>100.0%</b>

**Bone cement preparation** for stem fixation is done under vacuum in 44.1% of cases

The stem is cemented in 80.8% of cases under pressure with applicator, in 17.4% manually, and in the remaining 1.8% by aspiration system.

## 5.13 Surgical techniques (*surgical approach, bone graft, reinforcement rings*)

The most commonly used surgical approaches are lateral and postero-lateral. 66.6% of THA is implanted through lateral approach, 28.1% through postero-lateral. Minimally invasive approach is used in 0.9% of operations.

89.7% of resurfacing prostheses is implanted through postero-lateral approach.

55.9% of hemiarthroplasties is implanted through lateral approach, 40.4% through postero-lateral

Number of hip arthroplasty operations on patients admitted between 1st January 2000 and 31st December 2005, according to **type of operation and bone graft**.

Graft	THA		Total revision		Stem revision		Cup revision		Total
	N.	%	N.	%	N.	%	N.	%	
Not used	27919	95.1%	972	56.4%	704	91.4%	1111	54.5%	30706
Acetabular	1066	3.6%	643	37.3%	16	2.1%	875	42.9%	2600
Femoral	283	1.0%	26	1.5%	40	5.2%	10	0.5%	359
Both	81	0.3%	82	4.8%	10	1.3%	42	2.1%	215
<b>Total</b>	<b>29349</b>	<b>100.0</b>	<b>1723</b>	<b>100.0</b>	<b>770</b>	<b>100.0</b>	<b>2038</b>	<b>100.0</b>	<b>33.880</b>

In 2.0% of the resurfacing prostheses acetabular grafts were used.

In 15.7% of revision surgery of cups, **reinforcement rings** were uses.

More commonly used are MULLER – Sulzer (67.6% ) and Burch-Schneider – Sulzer (23.6% of cases).

## 6. Types of hemiarthroplasty

### 6.1 Stem and head

TYPES OF HEMIARTHROPLASTY (head + stem)	N.	%
SPERI-LOCK + SPERI-SYSTEM II – Hit Medica	1060	8.6
C1 + AB – Citieffe	863	7.0
SPERI-LOCK + SL –Hit Medica	741	6.0
CUPOLA MOBILE BIARTICOLARE + SL – Permedica	521	4.2
CUPOLA BIPOLARE + CCA – Mathys	478	3.9
RETENTIVE MOBILE CUP – Cedior + ORTHO-FIT – Allopro	433	3.5
CUPOLA SEM + STELO SEM II – D.M.O.	432	3.5
TESTA BIARTICOLARE + SL – Lima	426	3.5
MODULAR BIPOLAR + STANDARD STRAIGHT – Protek	391	3.2
CUPOLA MOBILE + JVC – Cremascoli	383	3.1
UHR + ACCOLADE – Osteonics	367	3.0
SPERI-LOCK + SL STREAKES – Hit Medica	348	2.8
TESTA ELLITTICA + LC – Samo	330	2.7
ULTIMA + ULTIMA LX – Johnson & Johnson	327	2.7
CUPOLA MOBILE + AHS – Cremascoli	307	2.5
JANUS + FIN – Bioimpianti	303	2.5
CENTRAX + HIP FRACTURE – Howmedica	289	2.4
CUPOLA MOBILE + STANDARD STRAIGHT – Centerpulse	217	1.8
BI-POLAR + PPF - Biomet Merck	206	1.7
BICENTRIC + RELIANCE Howmedica	201	1.6
TESTA BIARTICOLARE LOCK + LOGICA – Lima	173	1.4
TESTA BIPOLARE + SL – Amplimedical	157	1.3
UHR + RELIANCE – Howmedica	152	1.2
C1 – Citieffe + VERSYS – Zimmer	137	1.1
ULTIMA MONK + G2 – DePuy	132	1.1
CENTRAX + EXETER – Howmedica	130	1.1
ULTIMA + ULTIMA STRAIGHT – Johnson & Johnson	129	1.1
CUPOLA MOBILE + MRL – Cremascoli	129	1.1
TESTA BIARTICOLARE LOCK + LOGICA MIRROR – Lima	125	1.0
SPERI-LOCK – Hit Medica + MRL – Cremascoli	107	0.9
CUPOLA MOBILE – Cremascoli + VERSYS – Zimmer	107	0.9
CUPOLA BIPOLARE + VERSYS – Zimmer	99	0.8
UHR – Osteonics + EXETER – Howmedica	96	0.8
TESTA BIARTICOLARE + DUOFIT CKA – Samo	90	0.7
TESTA BIARTICOLARE + LOGICA – Lima	78	0.6
CUPOLA SEM + STELO SEM – D.M.O.	77	0.6
TESTA BIPOLARE + FURLONG H-AC – JRI	72	0.6
BICONTACT + BICONTACT – Aesculap	68	0.6
C1 – Citieffe + DEON – Bioimpianti	63	0.5
TESTA BIARTICOLARE – Lima + SL Hit – Medical	58	0.5
RETENTIVE MOBILE CUP – Cedior + METABLOC – Protek	55	0.5
UHR – Osteonics + DEFINITION – Howmedica	54	0.4
CENTRAX + DEFINITION – Howmedica	50	0.4
JANUS – Bioimpianti + SPERI-SYSTEM II – Hit Medica	47	0.4
Unknown	112	0.9
Other (220 types less than 50 each)	1146	9.3
<b>TOTAL</b>	<b>12266</b>	<b>100.0</b>

## 6.2 Other characteristics of hemiarthroplasties

Number of surgeries according to **head type**

<b>Head type</b>	<b>N.</b>	<b>%</b>
Preassembled bipolar head	11123	91.0
Bipolar head to be assembled in the operating	682	5.6
Monopolar head	420	3.4
<b>Total*</b>	<b>12.225</b>	<b>100.0</b>

\*41 missing cases, equal to 0.3%

The most commonly used heads are biarticular, pre-assembled and ready for implantation. Two components to be assembled during surgery are very rarely used.

In 91.8% of cases the stem of the hemiarthroplasties was cemented and the stem had a modular neck in only 4.8% of cases.

In 1.7% of cases the hemiarthroplasties had a ceramic head, all the other heads were metal.

8.4% of the metal heads had collars.

## 7. Antibiotic prophylaxis

### 7.1 Antibiotic prophylaxis in primary surgery

List of active principles used in preoperative antibiotic prophylaxis in cases of **primary arthroplasty**.

The number indicates the cases where the active principle was used alone or in combination:

Active principle	Number	Percentage
AMOXICILLIN	254	0.9
AMOXICILLIN + GENTAMICIN	323	1.1
AMPICILLIN	287	1.0
AMPICILLIN + SULBACTAM	307	1.0
AMPICILLIN + GENTAMICIN	67	0.2
CEFAMANDOL	174	0.6
CEFAMANDOL + GENTAMICIN	145	0.5
CEFAMANDOL + TOBRAMICIN	146	0.5
CEFAZOLIN	8080	27.5
CEFAZOLIN + GENTAMICIN	734	2.5
CEFAZOLIN + NETILMICINA	403	1.4
CEFAZOLIN + TOBRAMICIN	5076	17.3
CEFEPIME	340	1.2
CEFOTAXIME	797	2.7
CEFODIZIMA	212	0.7
CEFTAZIDIMA	195	0.7
CEFTIZOXIMA	734	2.5
CEFTRIAXONE	1542	5.3
CEFTRIAXONE + TOBRAMICIN	171	0.6
CEFUROXIMA	2778	9.5
CEFUROXIMA + TOBRAMICIN	95	0.3
CEFUROXIMA + NETILMICINA	29	0.1
CIPROFLOXACINA	366	1.2
GENTAMICIN	480	1.6
PEFLOXACINA	140	0.5
TEICOPLANINA	1374	4.7
TEICOPLANINA + NETILMICINA	275	0.9
TOBRAMICIN	30	0.1
VACOMICIN	683	2.3
VACOMICIN + GENTAMICIN	919	3.1
VACOMICIN + TOBRAMICIN	109	0.4
Other	1469	5.0
Unknown*	615	2.1
<b>Total</b>	<b>29.349</b>	<b>100.0</b>

\* In 615 cases, although antibiotic prophylaxis was carried out, the active principle used was not reported to the registry.

## 7.2 Antibiotic prophylaxis in revision surgery

List of active principles used in preoperative antibiotic prophylaxis in cases of **revision surgery**.

The number indicates the cases where the active principle was used alone or in combination:

Active principle	Number	Percentage
AMOXICILLINA	43	0.9
AMOXICILLINA + GENTAMICIN	50	1.0
AMPICILLINA	24	0.5
AMPICILLINA + SULBACTAM	30	0.6
CEFAMANDOL	28	0.6
CEFAMANDOL + GENTAMICIN	25	0.5
CEFAMANDOL + TOBRAMICIN	32	0.6
CEFAZOLIN	1126	22.8
CEFAZOLIN + GENTAMICIN	76	1.5
CEFAZOLIN + NETILMICINA	32	0.6
CEFAZOLIN + TOBRAMICIN	972	19.6
CEFEPIME	29	0.6
CEFOTAXIME	73	1.5
CEFODIZIMA	36	0.7
CEFTAZIDIMA	12	0.2
CEFTIZOXIMA	167	3.4
CEFTRIAZONE	192	3.9
CEFTRIAZONE + TOBRAMICIN	36	0.7
CEFUROXIMA	431	8.7
CEFUROXIMA + TOBRAMICIN	21	0.4
CIPROFLOXACINA	20	0.4
GENTAMICIN	61	1.2
GENTAMICIN + TEICOPLANINA	66	1.3
PEFLOXACINA	6	0.1
PIPERACILLINA	16	0.3
TEICOPLANINA	258	5.2
TEICOPLANINA + LEVOFLOXACINA	86	1.7
TEICOPLANINA + AMICACINA	51	1.0
TEICOPLANINA + NETILMICINA	51	1.0
VACOMICIN	149	3.0
VACOMICIN + GENTAMICIN	216	4.4
VACOMICIN + TOBRAMICIN	49	1.0
Other	204	4.1
Unknown*	280	5.7
<b>Total</b>	<b>4.948</b>	<b>100.0</b>

Prophylaxis is performed by multiple administrations in 81.2% primary arthroplasties, 81.3 % of hemiarthroplasty, and 84.0% of revision operations.

In the remaining percentages a single administration is used at the moment of induction.



## 8. Blood transfusion

Percentages of operations performed on patients admitted between 1st January 2003 and 31st December 2005 **according to type of operation and transfusion**

Type of surgery	None	Autologus (recovery)	Autologus (predeposit)	Homologous	Autologous and Homologous
Emergency primary	22.3	10.5	-	59.7	7.5
Elective primary	13.0	15.1	45.9	15.4	10.6
Revision	8.2	10.4	23.4	41.8	16.2

In the following tabs, the analysis has been performed according to type of operation and healthcare structure

Emergency primary				
Type of hospital	None	Autologus (recovery)	Homologous	Autologous and homologous
AOSP	29.7	3.0	67.1	0.2
Private	9.4	28.3	35.4	26.8
AUSL	37.6	5.2	53.1	4.1
IOR	6.7	1.6	91.7	0.0

Elective THA				
Type of hospital	None	Autologus (recovery)	Homologous	Autologous and homologous
AOSP	11.3	73.5	12.1	3.1
Private	7.9	68.5	8.6	15.0
AUSL	19.8	53.9	15.3	11.0
IOR	7.9	53.0	30.7	8.4

## 9. Complications occurred during hospitalization

The rate of complications in **primary surgery** carried out on patients hospitalized between January 1st 2000 and December 31st 2005.

Complications observed during hospitalization								
Intra-operative			Post-operative local			Post-operative general		
	N.	%		N.	%		N.	%
Calcar fracture	113	0.4	Hematoma	285	1.0	Anemia	776	2.6
Diaphyseal fracture	97	0.3	Prosthesis disloc	156	0.5	Hyperpyrexia	199	0.7
			SPE paralysis	64	0.2	Genito-urinary	128	0.4
Anesthesiologic complications	43	0.1	Deep vein thromb	49	0.2	Gastro-intestinal	92	0.3
			Infection	25	0.1	Cardiovascular	56	0.2
Cotyle fracture	35	0.1	Crural paralysis	33	0.1	Embolism	55	0.2
			Bed sores	34	0.1	Collaps	41	0.1
Others	68	0.2	Bleeding	41	0.1	Respiratory	37	0.1
			Others	78	0.3	Others	104	0.4
<b>Total</b>	<b>356</b>	<b>1.2</b>	<b>Total</b>	<b>765</b>	<b>2.6</b>	<b>Total</b>	<b>1488</b>	<b>5.1</b>

The rate of complications in **revision surgery** carried out on patients hospitalized between January 1st 2000 and December 31st 2005

Complications observed during hospitalization								
Intra-operative			Post-operative local			Post-operative general		
	N.	%		N.	%		N.	%
Calcar fracture	30	0.6	Hematoma	58	1.2	Anemia	148	3.0
Diaphyseal fracture	75	1.5	Prosthesis disloc	54	1.1	Cardiovascular	16	0.3
			SPE paralysis	26	0.5	Hyperpyrexia	33	0.7
Anesthesiologic complications	16	0.3	Infection	14	0.3	Collaps	17	0.3
			Bleeding	21	0.4	Genito-urinary	17	0.3
Cotyle fracture	8	0.2	Bed sores	9	0.2	Gastro-intestinal	14	0.3
			Deep venous thromb	7	0.1	Embolism	14	0.3
Others	22	0.4	Crural paralysis	4	0.1	Respiratory	5	0.1
			Others	9	0.2	Others	31	0.6
<b>Total</b>	<b>151</b>	<b>3.1</b>	<b>Total</b>	<b>202</b>	<b>4.1</b>	<b>Total</b>	<b>295</b>	<b>6.0</b>

The rate of complications in **hemiarthroplasty** carried out on patients hospitalized between January 1st 2000 and December 31st 2005.

Complications observed during hospitalization								
Intra-operative			Post-operative local			Post-operative general		
	N.	%		N.	%		N.	%
Calcar fracture	27	0.2	Hematoma	64	0.5	Anemia	461	3.8
			Prosthesis disloc	61	0.5	Genito-urinary	130	1.1
Anesthesiologic complications	53	0.4	Bed sores	53	0.4	Hyperpyrexia	101	0.8
			Deep venous thromb	34	0.3	Cardiovascular	56	0.5
Diaphyseal fracture	21	0.2	SPE paralysis	28	0.2	Respiratory	62	0.5
			Infection	13	0.1	Gastro-intestinal	60	0.5
Cotyle fracture	-	-	Bleeding	8	0.1	Collaps	54	0.4
			Crural paralysis	1	0.08	Embolism	67	0.5
						Confusion	23	0.2
Others	27	0.2	Others	5	0.04	Cerebral ischemia	5	0.04
						Others	17	0.1
<b>Total</b>	<b>128</b>	<b>1.0</b>	<b>Total</b>	<b>267</b>	<b>2.2</b>	<b>Total</b>	<b>1036</b>	<b>8.4</b>

The complications recorded refer only to those that occurred during hospitalization..

## 9.1 Deaths during hospitalization

Number of deaths in prosthetic surgery on patients hospitalized between January 1st 2000 and December 31st 2005  
(the deaths recorded are those that occurred during hospitalization).

Year 2000-2005			
Typy of operations	Deaths	n. of operations	Percentage
Primary THA	74	29.755	0.3
Hemiarthroplasty	430	12.266	3.5
Revision	28	4.948	0.6
Prosthesis removal	5	291	1.7
Resurfacing prostheses	-	406	-

## 10. 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	Range
Primary	4.282	2.4	0-49
Hemiarthropl	1.755	3.5	0-44
Revision	719	3.9	0-52
Other	46	9.0	0-36
Prosthesis removal	37	5.3	0-20
Year 2005			
Type of operation	N.	Mean	Range
Primary	5501	1.8	0-32
Hemiarthropl	2203	3.6	0-42
Revision	807	3.3	0-90
Resurfacing	177	1.9	0-10
Prosthesis removal	65	4.6	0-28
Other	37	6.9	0-63

Days of pre-operative hospitalization are diminishing in all types of operation but hemiarthroplasty.

## 11. Analysis of survival of primary surgery

### 11.1 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 2005 were analyzed.

COX PROPORTIONAL RISK MODEL	
<b>Variables</b>	
<i>Dependant:</i> Follow-up	
<i>Independent:</i> Age, gender, diagnosis, number of operation performed per year	
<b>Number of valid observations 29.349</b>	
Non revised: 28.844	
Revised: 505	
Chi-square: 35.0 $p= 0.0001$	
VARIABLE	SIGNIFICANCE ( P)
<b>Gender</b>	<b>NS (0.54)</b>
<b>Age</b>	<b>NS (0.71)</b>
<b>Diagnosis</b>	<b>S (0.001)</b>
<b>Less than 50 operations/year</b>	<b>NS (0.69)</b>

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.

The only variable in the model that influences significantly the outcome of surgery is preoperative diagnosis, as already verified last year.

At this point we tested how it acts, either by reducing or increasing the risk.

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 loosening.

To analyze the influence of the disease, the patients were divided into 6 groups:

- coxarthrosis,
- 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 metastases.

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."

The patients affected by rheumatic arthritis had, in fact, a 1.8-fold greater risk in comparison with subjects of matching sex and age treated for hip arthritis. This risk rate is at the limit of statistical significance.

Patients who had undergone arthroplasty because of femoral fracture or sequelae of fracture had a 1.8-fold greater risk in comparison to subjects of matching sex and age treated for hip arthritis.

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

<b>Variable diagnosis</b>	<b>Relative risk rate</b>	<b>Confidence interval 95%</b>		<b>Significance (p)</b>
Others (sequelae of coxitis, Paget's disease, metastasis, etc.. )	-	-	-	NS (0.12)
Sequelae congenital diseases	-	-	-	NS (0.89)
Idiopathic necrosis of femoral head	-	-	-	NS (0.19)
Femoral neck fracture and sequelae	1.8	1.4	2.2	S (0.0001)
Rheumatic arthritis	1.8	0.99	3.3	S (0.05)

## 11.2 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, 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 January 2000 to December 2005 in the first column, 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 6 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	29.349	405	100
Hemiarthroplasty	12.266	124	31
Total revision	1.723	78	19
<b>Total</b>	<b>43.744</b>	<b>607</b>	<b>150</b>

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 4 years

Type of operation	Number of operations	N. of revisions performed in the same hospital	N. of revisions performed in a different hospital
Resurfacing prostheses	406	3	1

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

Type of operation	Revision rate	Percentage
Primary THA	<b>505/29.349</b>	1.7
Hemiarthroplasty	<b>155/12.266</b>	1.3
Resurfacing	<b>4/406</b>	1.0
Total revision	<b>97/1.723</b>	5.6

## 11.3 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 their 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.

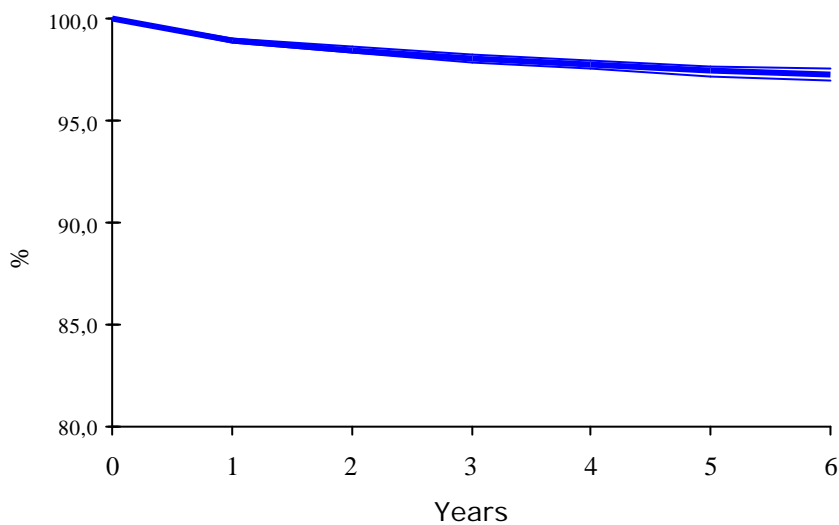
### 11.4 Analysis of survival in primary total hip arthroplasty

29,349 primary arthroplasties are under observation. Of these, 505 revisions were carried out for the reasons given at the bottom of the table.

Number of arthroplasties	Removals	% revision
29.349	505	1.7

° 31 prosthesis removal, 131 revision of the cup, 122 revision of head and insert, 55 revision of the head, 46 total revision, 123 revision of the stem and 82 revision of cup and head.

#### Survival curve



#### Results in detail

(i.c. = confidence interval)

Years	% in site	c.i. at 95%	
0	100.0	100.0	100.0
1	99.0	98.8	99.1
2	98.5	98.3	98.6
3	98.1	97.9	98.3
4	97.8	97.6	98.0
5	97.5	97.2	97.7
6	97.3	97.0	97.6

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	Percentage	% distribution of cause of failure
<b>Recurrent prosthesis luxation</b>	<b>154/29.349</b>	0.5	<b>30.5</b>
<i>within 60 days</i>	<i>94/29349</i>		
<i>over 60 days</i>	<i>60/29349</i>		
<b>Aseptic loosening of the stem</b>	<b>87/29.349</b>	0.3	<b>17.2</b>
<i>within 60 days</i>	<i>4/29349</i>		
<i>over 60 days</i>	<i>83/29349</i>		
<b>Aseptic loosening of the cup</b>	<b>75/29.349</b>	0.25	<b>14.9</b>
<i>within 60 days</i>	<i>16/29349</i>		
<i>over 60 days</i>	<i>59/29349</i>		
<b>Global aseptic loosening</b>	<b>31/29.349</b>	0.1	<b>6.1</b>
<i>within 60 days</i>	<i>2/29349</i>		
<i>over 60 days</i>	<i>29/29349</i>		
<b>Periprosthetic bone fracture</b>	<b>47/29.349</b>	0.16	<b>9.3</b>
<b>Septic loosening</b>	<b>34/29.349</b>	0.1	<b>6.7</b>
<b>Breakage of prosthesis</b>	<b>27/29.349</b>	0.1	<b>5.3</b>
<b>Pain without loosening</b>	<b>12/29.349</b>	0.04	<b>2.4</b>
<b>Other</b>	<b>9/29.349</b>	0.03	<b>1.8</b>
<b>Primary instability</b>	<b>14/29.349</b>	0.05	<b>2.8</b>
Unknown	<b>15/29.349</b>	0.05	<b>3.0</b>
<b>Total</b>	<b>505/29.349</b>	<b>1.7</b>	<b>100.0</b>

### 11.5 Analysis of the survivorship of the prosthesis according to commercial type

The regional % of arthroplasties for rheumatic arthritis or fracture and its sequelae is 14.4% of the regional series, while the rate of patients affected by primary arthritis is 66.6%. The regional % of patients between 60 and 75 with hip replacements is 54.6%.

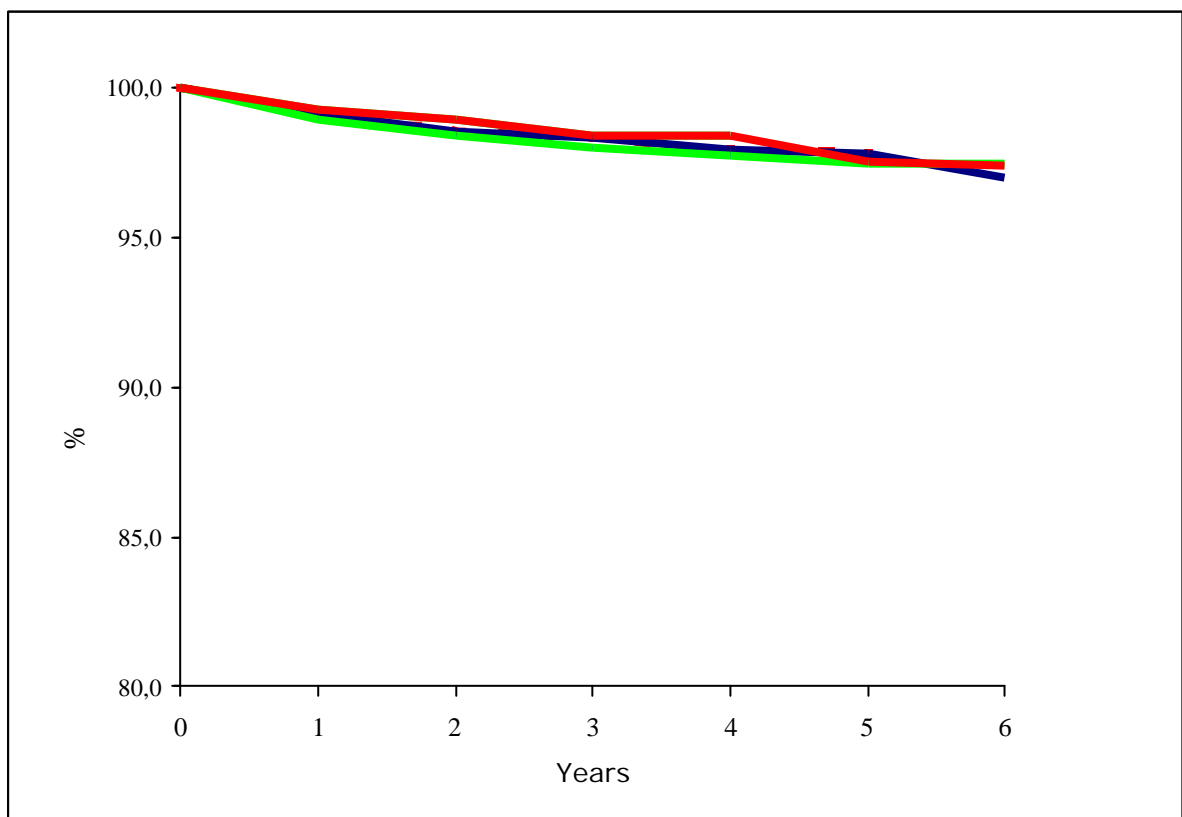
Cup (stem) Manufacturer	From year	N.	% fracture and reumatic arthritis	% arthrosis	% 60-75	% survival 3 yrs	i.c 95%	% survival 5 yrs	i.c al 95%
ABGII (ABGII) Stryker Howmedica	2000	1082	7.0	77.4	62.8	99.2	0.7	98.6	1.4
AnCa Fit (AnCa Fit) Cremascoli Wright	2000	3984	12.8	60.8	51.9	97.7	0.5	97.4	0.6
AnCa Fit (Anca Dual Fit) Cremascoli Wright	2000	302	24.8	62.3	63.9	99.1	1.2	98.2	2.2
AnCa Fit (PROFEMUR Z) Cremascoli Wright	2002	542	8.9	72.3	61.1	-	-	-	-
BICON PLUS (SL PLUS) Endoplus	2000	412	10.2	74.8	66.3	98.1	2.1		
CLS (CLS) Sulzer Centerpulse Zimmer	2000	1481	13.8	76.9	62.1	98.2	0.8	97.7	1.1
CLS (CONUS) Sulzer Centerpulse Zimmer	2000	549	13.3	53.0	57.4	97.9	1.4	97.9	1.4
CONTEMPORARY (EXETER) Stryker Howmedica	2000	334	13.8	72.2	23.4	97.5	2.3	97.5	2.3
DUOFIT PSF (LC) Samo	2000	321	25.9	59.5	71.3	99.0	1.1	99.0	1.1
DUOFIT PSF (P507) Samo	2000	498	33.1	58.4	66.7	99.0	1.0	97.5	2.2
FITMORE (CLS) Sulzer Centerpulse Zimmer	2000	632	9.3	76.9	56.7	98.8	1.0	98.8	1.0
FITMORE (CONUS) Sulzer Centerpulse Zimmer	2000	712	13.3	53.7	48.5	97.7	1.4	97.7	1.4
FIXA (APTA) Adler	2004	817	12.4	68.4	50.8	-	-	-	-
FIXA (RECTA) Adler	2004	321	6.5	78.5	65.4	-	-	-	-
MULLER (JVC) Cremascoli Wright	2000	332	13.3	76.2	24.1	98.8	1.4	-	-
MULLER (MRL) Cremascoli Wright	2000	313	21.4	69.3	40.6	97.7	1.7	97.7	1.7
MULLER (AD) Samo	2000	324	38.9	52.8	36.1	96.0	2.5	96.0	2.5
REFLECTION (BASIS) Smith and Nephew	2001	332	3.6	86.7	75.3	98.9	1.3	-	-
REFLECTION (BHS) Smith and Nephew	2001	305	4.6	81.6	63.0	99.3	1.0	-	-
STANDARD CUP (CLS) Sulzer Centerpulse Zimmer	2000	383	12.5	76.5	56.4	98.5	1.6	98.5	1.6
STANDARD CUP (CONUS) Sulzer Centerpulse Zimmer	2000	486	4.7	23.3	34.6	97.7	1.7	97.7	1.7
TRIDENT (ABGII) Stryker Howmedica	2002	315	9.5	81.9	62.5	-	-	-	-
TRILOGY (VERSYS FIBER) Zimmer	2000	537	4.3	81.8	62.8	97.6	1.4	97.6	1.4
Other models (< 300 cases)	2000	1403 5	14.8	65.3	54.0	97.6	0.3	97.0	0.4

### 11.6 Analysis of survival in primary total hip arthroplasty according to fixation

In this analysis cemented, cementless and hybrid prostheses were considered.

Fixation	N.	Removals	% revision
Cemented	3305	59	1.8
Cementless	21.038	359	1.7
Hybrid (cemented stem, cementless cup)	4.657	74	1.6
Reverse hybrid (cementless stem, cemented cup).	245	12	4.9

#### Survival curve



**Results in detail**

<b>Cemented</b>			
<b>Years</b>	<b>% in site</b>	<b>c.i. at 95%</b>	
<b>0</b>	100.0	100.0	100.0
<b>1</b>	99.1	98.8	99.4
<b>2</b>	98.5	98.1	99.0
<b>3</b>	98.3	97.8	98.8
<b>4</b>	97.9	97.3	98.5
<b>5</b>	97.8	97.2	98.4
<b>6</b>	97.0	95.9	98.1

<b>Cementless</b>			
<b>Years</b>	<b>% in site</b>	<b>c.i. at 95%</b>	
<b>0</b>	100.0	100.0	100.0
<b>1</b>	98.9	98.8	99.1
<b>2</b>	98.4	98.2	98.6
<b>3</b>	98.0	97.8	98.2
<b>4</b>	97.7	97.4	97.9
<b>5</b>	97.4	97.2	97.7
<b>6</b>	97.4	97.2	97.7

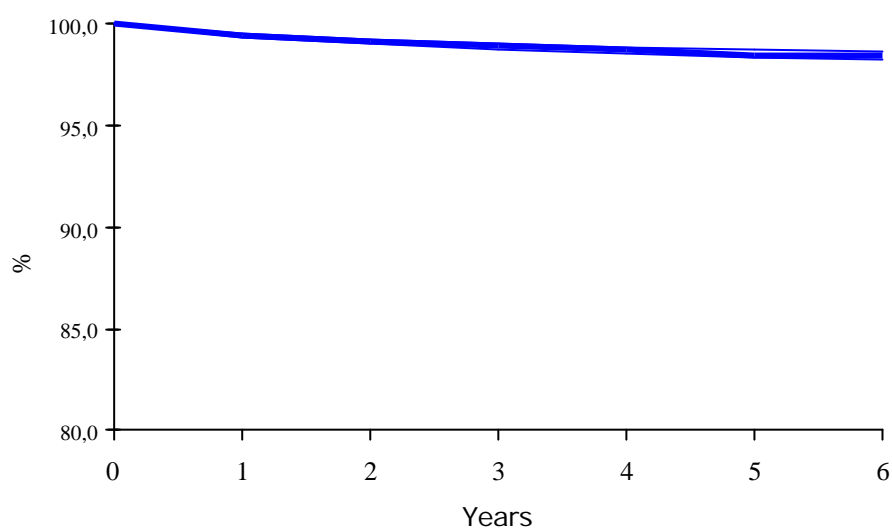
<b>Hybrid</b>			
<b>Years</b>	<b>% in site</b>	<b>c.i. at 95%</b>	
<b>0</b>	100.0	100.0	100.0
<b>1</b>	99.26	99.0	99.5
<b>2</b>	98.91	98.6	99.2
<b>3</b>	98.41	98.0	98.8
<b>4</b>	98.37	98.0	98.8
<b>5</b>	97.55	96.9	98.2
<b>6</b>	97.36	96.6	98.1

### 11.7 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 arthroplasties	Removals of the cup	% revision
29.349	284	1.0

#### Survival curve



#### Results in detail

Years	% in site	c.i. at 95%	
0	100.0	100.0	100.0
1	99.4	99.4	99.5
2	99.2	99.1	99.3
3	98.9	98.8	99.1
4	98.7	98.6	98.9
5	98.5	98.3	98.7
6	98.5	98.3	98.7

### 11.8 Analysis of the survivorship of the acetabular cup according to commercial type

The regional % of arthroplasties for rheumatic arthritis or fracture and its sequelae is 14.4% of the regional series, while the rate of patients affected by primary arthritis is 66.6%. The regional % of patients between 60 and 75 with hip replacements is 54.6%. Survival of the cup at 3 years is 98.9% (I.C. 95% 98.8-99.1), at 5 years 98.5 (I.C. 95% 98.3-98.7).

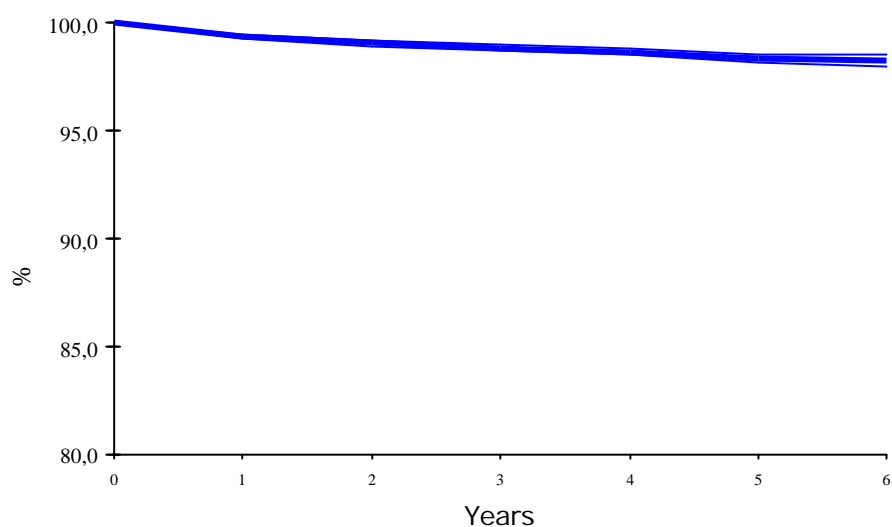
Cup	From year	n	% fracture and reumatic arthritis	% arthrosis	% 60-75	% survival 3 yrs	i.c 95%	% survival 5 yrs	i.c al 95%
ZCA Zimmer	2000	431	25.3	63.1	38.1	99.5	0.7	99.5	0.7
ABGII Stryker Howmedica	2000	1487	7.3	77.1	62.6	99.5	0.4	99.1	0.7
FITMORE Sulzer	2000	1701	14.1	64.7	53.3	99.1	0.5	99.0	0.6
AnCA FIT Cremascoli Wright	2000	6413	12.9	63.3	56.0	99.1	0.3	98.9	0.3
TRILOGY Zimmer	2000	898	6.6	77.7	60.9	98.7	0.8	98.7	0.8
BICON PLUS Endoplus	2000	522	10.9	67.4	61.1	98.7	1.4	98.7	1.4
MULLER Cremascoli Wright	2000	943	16.9	73.8	35.3	98.9	0.7	98.6	0.9
MULLER Smith and Nephew	2000	315	27.6	61.9	33.0	98.6	1.4	98.6	1.4
CLS Sulzer, Centerpulse, Zimmer	2000	2721	15.8	69.8	60.9	99.0	0.4	98.5	0.6
STANDARD CUP PROTEK Sulzer	2000	1216	13.8	51.2	50.3	99.1	0.6	98.4	0.9
DUOFIT PSF Samo	2000	1219	28.3	56.0	60.3	98.6	0.7	98.4	0.9
CONTEMPORARY Stryker Howmedica	2000	530	14.2	72.6	26.6	98.8	1.1	97.6	2.0
REFLECTION Smith and Nephew	2000	1025	5.8	77.3	68.6	99.7	0.4	97.4	2.3
MULLER Samo	2000	387	40.6	48.8	37.7	98.0	1.5	96.6	2.2
PE (Muller Protek) Sulzer	2000	360	44.2	38.6	37.5	98.5	1.3	96.3	4.4
HILOCK LINE Symbios	2000	333	12.0	78.4	62.5	96.2	3.2		
TRIDENT Stryker Howmedica	2002	771	11.4	75.6	61.0	99.4	0.6		
CFP Link	2000	300	4.5	79.7	63.8	100.0	0.0		
Other (with less than 300 cases each)	2000	6626	13.5	22.1		98.6	0.4	98.0	0.4

## 11.9 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 arthroplasties	Removals of the stem	% revision
29.349	310	1.06

### Survival curve



### Results in detail

Years	% in site	c.i. at 95%	
0	100.0	100.0	100.0
1	99.4	99.3	99.5
2	99.1	99.0	99.2
3	98.8	98.7	99.0
4	98.7	98.5	98.8
5	98.4	98.2	98.6
6	98.3	98.0	98.5

### 11.10 Analysis of the survivorship of the femoral component according to commercial type

The regional % of arthroplasties for rheumatic arthritis or fracture and its sequelae is 14.4% of the regional series, while the rate of patients affected by primary arthritis is 66.6%. The regional % of patients between 60 and 75 with hip replacements is 54.6%. Survival of the STEM at 3 years is 98.7 (I.C. 95% 98.5-98.8), at 5 years 98.3 (I.C. 95% 98.0-98.5).

Stem	From year	n	% fracture and reumatic arthritis	% arthrosis	% 60-75	% survival 3 yrs	i.c 95%	% survival 5 yrs	i.c al 95%
ANCA FIT Cremascoli Wright	2000	4108	12.8	60.5	51.9	97.7	0.5	97.5	0.6
CLS Sulzer Centerpulse Zimmer	2000	2951	12.1	76.0	58.7	98.9	0.4	98.7	0.6
CONUS Sulzer Centerpulse Zimmer	2000	2550	10.2	40.5	44.7	98.9	0.5	98.9	0.5
ABGII Howmedica	2000	1604	9.5	76.9	63.5	99.4	0.4	98.9	1.1
SL PLUS Endoplus	2000	935	11.8	71.2	62.8	99.5	0.5	99.5	0.5
APTA Adler	2004	885	12.3	69.3	48.5				
EXETER StrykerHowmedica	2000	754	9.7	79.2	45.9	99.7	0.4	96.9	4.4
JVC Cremascoli	2000	716	10.5	77.7	44.7	98.7	1.0	94.8	7.5
VERSYS FIBER METAL TAPER Zimmer	2000	710	5.4	80.0	62.1	98.7	0.9	98.7	0.9
PROFEMUR Z Cremascoli	2002	620	8.7	71.8	59.2	-	-		
SPECTRON Smith and Nephew	2000	601	33.4	56.1	54.6	99.2	0.8	97.6	2.5
ABG Str -Howmedica	2000	572	8.4	20.9	61.7	99.6	0.5	99.6	0.5
P507 Samo	2000	534	33.7	56.7	65.9	99.8	0.5	98.4	2.0
MRL Cremascoli	2000	470	22.8	68.9	51.1	99.1	0.9	98.2	1.5
BASIS Smith and Nephew	2001	432	3.5	86.6	61.8	100.0	-		
C2 Lima	2000	367	9.5	64.6	51.2	99.7	0.6		
AD Samo	2000	341	39.6	51.9	36.7	97.1	2.1	97.1	2.1
CFP Link		338	5.0	79.9	57.7	100.0	-		
LC Samo	2000	337	28.2	57.9	68.3	99.7	0.6	99.7	0.6
BHS Smith and Nephew	2001	333	4.8	79.9	60.1	-	-		
VERSYS CEMENTED Zimmer	2000	332	19.6	69.6	50.9	99.6	0.7	99.6	0.7
RECTA Adler	2004	324	6.5	78.4	64.8	-	-		
TAPERLOC Biomet	2002	317	6.9	74.8	59.6	-	-		
AnCA DualFit Cremascoli Wright	2000	312	24.7	62.2	64.7	99.1	1.2	98.2	2.1
PROXILOCK FT Stratec	2000	301	10.3	69.4	46.2	96.7	2.1	96.7	2.1
DEFINITION Howmedica	2000	300	12.4	74.5	47.7	99.5	0.9	98.8	1.7
AHS Cremascoli	2000	300	6.4	86.4	55.3	98.7	1.5	98.7	1.5
Other (with less than 300 cases each)	-	7005	16.9	63.6	58.4	98.3	0.4	98.1	0.4

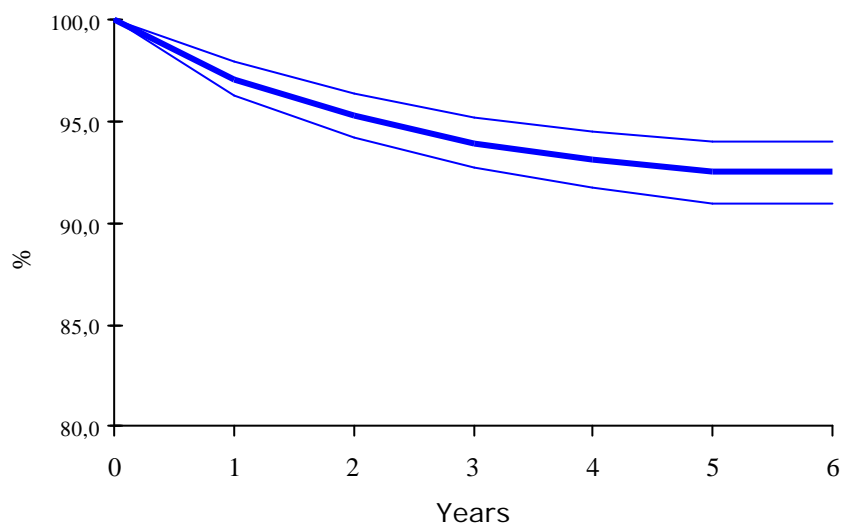


### 11.11 Survival analysis of total revision

First total revision implants are considered 'surviving' until it is necessary to revise even one single component (also the liner or the modular neck only).

Number of first revision	Second revision	% of revision
1.723	97	5.6

#### Survival curve



#### Results in detail

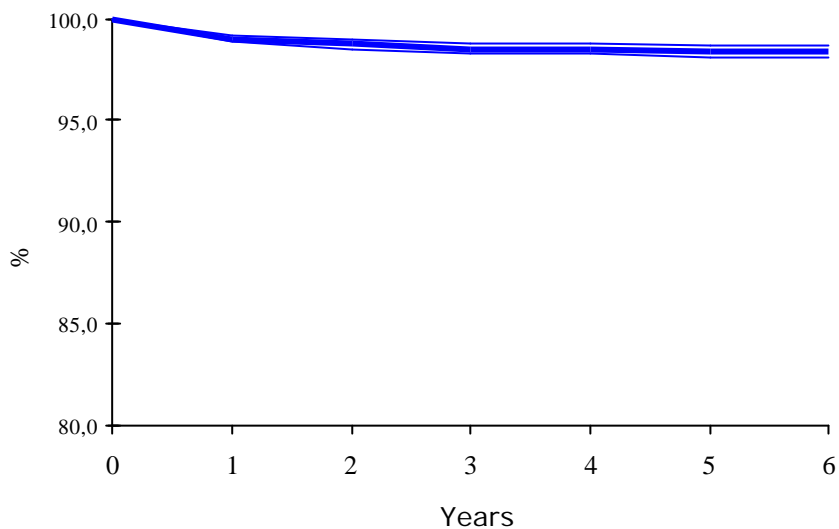
Years	% in site	c.i. at 95%	
0	100.0	100.0	100.0
1	97.1	96.3	97.9
2	95.3	94.2	96.4
3	94.0	92.7	95.2
4	93.1	91.7	94.5
5	92.5	91.0	94.0
6	92.5	91.0	94.0

### 11.12 Survival analysis of hemiarthroplasty

Revision of the head was considered as a failure. Therefore transformation of hemiarthroplasty into total arthroplasty was considered as a failure

Number of hemiarthroplasty	Removals	% of revision
12.266	155	1.3

#### Survival curve



#### Results in detail

Years	% in site	c.i. at 95%	
0	100.0	100.0	100.0
1	99.0	98.8	99.2
2	98.7	98.5	98.9
3	98.5	98.3	98.8
4	98.5	98.2	98.7
5	98.4	98.1	98.7
6	98.4	98.1	98.7

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

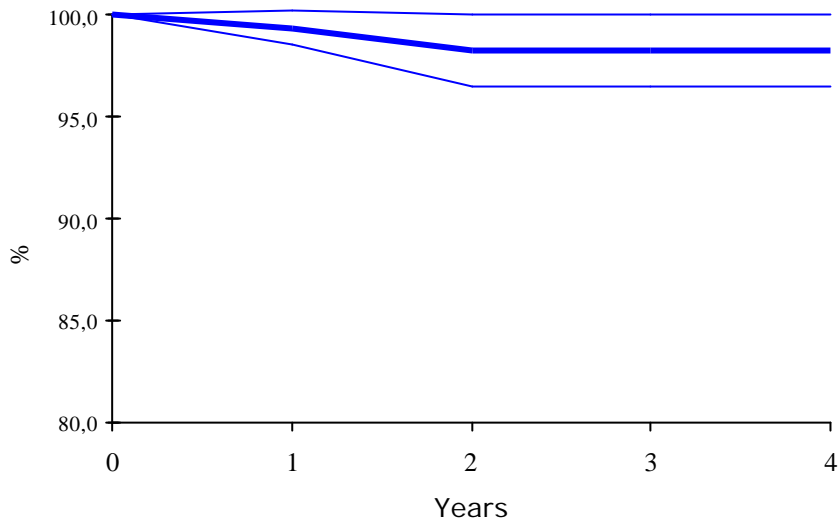
Cause of revision	Rate	%	% distribution of failure causes
Prosthesis luxation	78/12.266	0.6	50.4
Aseptic loosening of the stem	25/12.266	0.2	16.1
Acetabular erosion	18/12.266	0.14	11.6
Pain without loosening	7/12.266	0.06	4.5
Bone fracture	8/12.266	0.06	5.2
Septic loosening	11/12.266	0.09	7.1
Unknown	3/12.266	0.02	1.9
Other	5/12.266	0.04	3.2
<b>Total*</b>	<b>155/12.266</b>	<b>1.3</b>	<b>100.0</b>

### 11.13 Survival analysis of resurfacing

Maximum follow-up is 4 years. This should be borne in mind when comparing the curves so far described, where the maximum follow-up is 6 years.

Resurfacing	Removals	% o revisions
406	4	0.98

#### Survival curve



#### Results in detail

Years	% in site	c.i. at 95%	
0	100.0	100.0	100.0
1	99.4	98.5	100.0
2	98.3	96.5	100.0
3	98.3	96.5	100.0
4	98.3	96.5	100.0

## **PART TWO: KNEE PROSTHESIS**

July 2000 – December 2005

## 12. RIPO capture

### 12.1 Capture for RIPO per hospital in years 2000-2004

Percentage of R.I.P.O. capture calculated versus Schede di Dimissione Ospedaliera (S.D.O.), according to Agency. Data are referred to primary knee prosthesis (8154), revision (8155) and prosthesis removal (8006)

CAPTURE TO RIPO					
PROVINCES	Year 2000 %	Year 2001 %	Year 2002 %	Year 2003 %	Year 2004 %
<b>BOLOGNA Province</b>					
AZIENDA Bologna Nord	-	-	50.0	106.2	85.7
AZIENDA Bologna Sud	200.0*	87.0	98.4	90.4	81.6
AZIENDA Città di Bologna	77.9	91.7	96.6	98.2	95.6
AZIENDA Imola	61.9	85.4	92.3	82.0	78.1
Az. Osp. S. Orsola-Malpighi	43.8	89.5	83.3	89.3	96.4
Istituti Ortopedici Rizzoli	86.3	100.0	100.0	98.7	100.0
<b>FERRARA Province</b>					
AZIENDA Ferrara	80.2	67.0	56.3	53.6	48.9
Az. Ospedaliera di Ferrara	70.0	89.5	83.3	38.1	33.3
<b>FORLÌ-CESENA Province</b>					
AZIENDA Forlì	109.1*	91.7	97.7	104.8*	95.9
AZIENDA Cesena	85.1	97.6	98.4	97.4	95.7
<b>MODENA Province</b>					
AZIENDA Modena	67.1	87.0	91.4	93.1	88.2
Az. Osp. Policlinico di Modena	84.6	100.0	82.0	92.9	56.7
<b>PARMA Province</b>					
AZIENDA Parma	44.7	97.0	93.5	93.5	96.2
Az. Ospedaliera di Parma	60.0	75.0	87.9	86.0	92.7
<b>PIACENZA Province</b>					
AZIENDA Piacenza	28.6	83.3	101.6*	97.3	84.7
<b>RAVENNA Province</b>					
AZIENDA Ravenna	70.7	98.8	96.8	92.1	91.6
<b>REGGIO EMILIA Province</b>					
AZIENDA Reggio Emilia	23.1	33.1	52.1	79.1	74.3
Arcispedale Santa M. Nuova	150.0*	93.8	93.8	69.6	80.7
<b>RIMINI Province</b>					
AZIENDA Rimini	100.0	101.5*	96.2	95.6	98.0
<b>TOTAL</b>	<b>71.0</b>	<b>88.3</b>	<b>90.4</b>	<b>86.4</b>	<b>89.4</b>

## 12.2 Percentage of RIPO capture year 2005

Percentage of R.I.P.O. capture calculated versus Schede di Dimissione Ospedaliera (S.D.O.), according to Orthopaedic department. Data are referred to knee prosthesis (8154), revision (8155) and removal (8006).

<b>YEAR 2005</b>			
<b>BOLOGNA PROVINCE</b>	N° of operations communicated to RIPO	N° operations communicated via S.D.O.	% capture to R.I.P.O.
<b>AZIENDA BOLOGNA</b>			
<b>Bologna Città</b>			
Casa di cura "Villa Regina" (non accr.)	54	56	<b>99.2</b>
Casa di cura "Villa Erbosa"	178	181	
Casa di cura "Villa Nigrisoli"	137	138	
Casa di cura "Villa Torri"	148	146	
Casa di cura "Villa Laura"	313	312	
Ospedale Maggiore, Bellaria	8	12	
<b>Bologna Nord</b>			
Bentivoglio, Budrio, S. Giovanni in Persiceto	31	31	<b>100</b>
<b>Bologna Sud</b>			
Ospedale Civile di Vergato	18	24	<b>88</b>
Casa di cura "Prof. Nobili"	25	27	
Casa di cura "Villa Chiara"	18	18	
<b>Total</b>	<b>930</b>	<b>945</b>	
Azienda Ospedaliera S. Orsola-Malpighi	27	29	<b>93</b>
Istituti Ortopedici Rizzoli	720	721	<b>100</b>
<b>AZIENDA IMOLA</b>			
Osp. Civile di Imola – Castel San Pietro	65	65	<b>100</b>

<b>FERRARA PROVINCE</b>	N° of operations communicated to RIPO	N° operations communicated via S.D.O.	% capture to R.I.P.O.
Stab. Ospedaliero di Cento, Bondeno, Copparo	66	68	<b>94</b>
Ospedale Civile Argenta	99	104	
Ospedale Civile Comacchio – Delta	162	177	
<b>Total</b>	<b>327</b>	<b>349</b>	
Azienda Ospedaliera di Ferrara	8	19	<b>42</b>

<b>YEAR 2005</b>			
<b>FORLÌ-CESENA PROVINCE</b>	N° of operations communicated to RIPO	N° operations communicated via S.D.O.	% capture to R.I.P.O.
<b>AZIENDA FORLÌ'</b>			
Ospedale "Morgagni-Pierantoni" Forlì, Forlimpopoli, Santa Sofia	60	66	<b>97</b>
Villa Igea Forlì	25	24	
Casa di cura "Villa Serena" Forlì	28	27	
<b>Total</b>	<b>113</b>	<b>117</b>	
<b>AZIENDA CESENA</b>			
Ospedale "M. Bufalini" Cesena, Bagno di Romagna, Cesenatico	25	24	<b>99</b>
Casa di cura "Malatesta Novello" Cesena	305	306	
Casa di cura "S. Lorenzino" Cesena	29	31	
<b>Total</b>	<b>359</b>	<b>361</b>	

<b>MODENA PROVINCE</b>	N° of operations communicated to RIPO	N° operations communicated via S.D.O.	% capture to R.I.P.O.
<b>AZIENDA MODENA</b>			
Ospedale S. Agostino-Estense	71	69	<b>98</b>
Ospedale Civile degli Infermi, Carpi	54	55	
Ospedale di Finale Emilia	0	3	
Ospedale S. Maria Bianca, Mirandola	24	21	
Ospedale Civile Castelfranco Emilia	8	11	
Ospedale Civile, Sassuolo	60	62	
Ospedale Civile, Vignola	26	31	
Ospedale, Pavullo	16	16	
Hesperia Hospital	24	24	
Casa di cura Prof. Fogliani	129	129	
Casa di cura Villa Fiorita	0	0	
<b>Total</b>	<b>412</b>	<b>421</b>	
Azienda Ospedaliera Policlinico di Modena	92	108	

<b>PARMA PROVINCE</b>	N° of operations communicated to RIPO	N° operations communicated via S.D.O.	% capture to R.I.P.O.
<b>AZIENDA PARMA</b>			
Ospedale Civile, Fidenza, San Secondo Parmense	49	54	<b>98</b>
Ospedale Santa Maria, Borgo Val di Taro	102	105	
Casa di cura "Città di Parma"	194	194	
<b>Total</b>	<b>345</b>	<b>353</b>	
Azienda Ospedaliera di Parma	85	85	<b>100</b>

<b>YEAR 2005</b>			
<b>PIACENZA PROVINCE</b>	N° of operations communicated to RIPO	N° operations communicated via S.D.O.	% capture to R.I.P.O.
<b>AZIENDA PIACENZA</b>			
Ospedale Civile, Piacenza	33	34	<b>99</b>
Presidio Val Tidone, Castel San Giovanni	94	92	
Presidio Val D'Arda, Fiorenzuola D'Arda, Cortemaggiore	43	46	
<b>Total</b>	<b>170</b>	<b>172</b>	
<b>RAVENNA PROVINCE</b>	N° of operations communicated to RIPO	N° operations communicated via S.D.O.	% capture to R.I.P.O.
<b>AZIENDA RAVENNA</b>			
Ospedale S. Maria delle Croci, Ravenna	13	19	<b>97</b>
Presidio Ospedaliero, Lugo	75	73	
Ospedale per gli Infermi, Faenza	31	31	
Casa di cura "Domus Nova"	60	72	
Casa di cura "S. Francesco"	195	196	
Casa di cura "Villa Maria Cecilia"	29	28	
Casa di cura "S. Pier Damiano"	106	107	
<b>Total</b>	<b>509</b>	<b>526</b>	
<b>REGGIO EMILIA PROVINCE</b>	N° of operations communicated to RIPO	N° operations communicated via S.D.O.	% capture to R.I.P.O.
<b>AZIENDA REGGIO EMILIA</b>			
Ospedale, Guastalla	29	29	<b>87</b>
Ospedale S. Sebastiano, Correggio	0	1	
Ospedale di Montecchio Emilia	9	10	
Ospedale di Scandiano	13	12	
Ospedale S. Anna, Castelnovo Monti	4	4	
Casa di cura "Villa Salus"	222	228	
Casa di cura "Villa Verde"	61	103	
<b>Total</b>	<b>338</b>	<b>387</b>	
Arcispedale Santa Maria Nuova -RE	21	21	<b>100</b>
<b>RIMINI PROVINCE</b>	N° of operations communicated to RIPO	N° operations communicated via S.D.O.	% capture to R.I.P.O.
<b>AZIENDA RIMINI</b>			
Ospedale Infermi, Rimini, Sant Arcangelo	15	15	<b>90</b>
Ospedale G. Ceccarini, Riccione, Cattolica	25	25	
Casa di cura "Sol et Salus"	215	209	
Casa di cura "Villa Maria"	24	24	
Casa di cura prof. Montanari	0	38	
<b>Total</b>	<b>279</b>	<b>311</b>	
<b>TOTAL</b>	<b>4800</b>	<b>4990</b>	<b>96</b>



### 12.3 Ratio public/private treatment

Percentage of primary arthroplasties, hemiarthroplasties and revisions of the knee performed in public hospitals.

% of operations performed in public hospitals (AUSL, AOSP, IRCCS)		
Year intervento	Primario	Reimpianto
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

From database SDO

### 13. Type of operation

Number of knee operations carried out on patients with admission date between 1st July 2000 and 31st December 2005, according to **type**

Type of operation	Number	Percentage
Primary bicompartamental	13240	72.2
Primary unicompartmental	2075	11.3
Primary tricompartmental	1640	8.9
Revision	1011	5.5
Prosthesis removal	204	1.1
Implant of patella	65	0.4
Other (debridement...)	107	0.6
<b>Total**</b>	<b>18342</b>	<b>100.0</b>

\*\* In 39 cases (0.2%) data was not communicated to RIPO. These cases have been excluded from the following analyses.

\* including 18 *Hemicap – ArthroSurface*, 7 *Avon-Patello-Femoral Joint Stryker*, 18 spacer replacements, 15 stiff knee loosening, 13 surgical cleaning and 3 dislocation reductions.

^ 119 liner replacements, 28 femoral component only replacements, 59 tibial component only replacements, 805 total replacements

Bicompartamental implant has only femoral and tibial component, whilst tricompartmental one has patella too.

Implant of patella occurs when a bicompartamental knee prosthesis is transformed into a tricompartmental with a second surgery.

## 14. Descriptive statistics of patients with knee prosthesis

### 14.1. Age

Number of knee operations carried out on patients with admission date between 1st July 2000 and 31st December 2005, 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	50	0.3	104	0.7	794	5.3	4434	29.8	7891	53.1	1606	10.8	14879
Unicomp	-	-	33	1.6	300	14.5	853	41.1	774	37.3	114	5.5	2074
Revision	6	0.6	15	1.5	65	6.4	306	30.3	511	50.5	108	10.7	1011
Prosthesis. removal	5	2.4	2	1.0	29	14.2	65	31.9	87	42.7	16	7.9	204
Patella only	-	-	1	1.5	3	4.6	24	36.9	35	53.9	2	3.1	65
Other	1	1.0	4	4.0	15	15.0	36	36.0	39	39.0	5	5.0	100
<b>Total*</b>	<b>62</b>	<b>0.3</b>	<b>159</b>	<b>0.9</b>	<b>1206</b>	<b>6.6</b>	<b>5718</b>	<b>31.2</b>	<b>9337</b>	<b>50.9</b>	<b>1851</b>	<b>10.1</b>	<b>18333</b>

\* 9 data (0.01%) are missing

Mean age at surgery, according to type of operation.

Type of operation	Mean age	Range
Primary bi/tricompartmental	71.7	11 – 94
Primary unicompartmental	68.2	41 – 89
Revision	71.2	13 – 90
<b>Total</b>	<b>71.2</b>	<b>11 – 94</b>

## 14.2 Gender

Number of knee operations carried out on patients with admission date between 1st July 2000 and 31st December 2005, according to **type of operation** and **gender** of patients at the time of surgery.

Type of operation	Males		Females		Total
	N.	%	N.	%	N.
Bi/tricompartmental	3619	24.3	11261	75.7	14880
Unicompartmental	535	25.8	1540	74.2	2075
Revision	227	22.5	784	77.5	1011
Eprosthesis removal	68	33.3	136	66.7	204
Patella only	14	21.5	51	78.5	65
Other	41	38.3	66	61.7	107
<b>Total</b>	<b>4504</b>	<b>24.6</b>	<b>13838</b>	<b>75.4</b>	<b>18342</b>

## 14.3 Side of surgery

There is a prevalence of operations performed on the right side (55.6%) in comparison with the left side (44.4%). The percentage was calculated on patients with only one knee prosthesis affected by primary arthritis.

In the hip the prevalence of the right side is in 59.1% of the cases.

## 14.4 Clinical condition

Number of arthroplasty operations carried out on patients with admission date between 1st July 2000 and 31st December 2005, according to **clinical condition** of patients at the time of surgery

Clinical condition	Number	Percentage
One knee affected	9268	51.8
Both knees affected	4684	26.2
Contralateral knee with prosthesis	2851	15.9
Other diseases that restrict motor ability	763	4.3
Carrier of joint prostheses other than that of the knee	319	1.8
<b>Total*</b>	<b>17885</b>	<b>100.0</b>

\* 457 cases (2.5%) missing

#### 14.5 Bilateral arthroplasty

In the period of registry observation (6 years) 2846 patients underwent bilateral operations. About 7.1% of this group of patients 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 hip to be treated was the right one in 54.9% of cases; beside this 2.9% of bilateral patients underwent also to hip prosthesis

#### 14.6 Body mass index

Number of arthroplasty operations carried out on patients with admission date between 1st July 2000 and 31st December 2005, according to **Body mass index** of patients at the time of surgery

Body mass index	Number	Percentage
Underweight (= 19)	78	0.5
Normal (20-25)	2.962	19.5
Overweight (26-29)	6.101	40.1
Obese (= 30)	6.070	39.9
<b>Total*</b>	<b>15.211</b>	<b>100.0</b>

\* 3.131 data (17.0%) are missing

#### 14.7 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 2005, according to **diagnosis**.

Diagnosis in unicomp. knee prosth.	Number	Percentage
Primary arthritis	1.823	87.9
Necrosis of the condyle	130	6.3
Deformity	51	2.5
Post-traumatic arthritis	27	1.3
Post-traumatic necrosis	23	1.1
Sequelae of fracture	9	0.4
Sequelae of osteotomy	4	0.2
Rheumatic arthritis	4	0.2
Tumor	2	0.1
<b>Total*</b>	<b>2.073</b>	<b>100.0</b>

\* 2 data are missing

#### 14.8 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 2005, according to **diagnosis**.

Diagnosis in bi/tricompartmental knee prosth.	Number	Percentage
Primary arthritis	13.246	89.2
Deformity	531	3.6
Rheumatic arthritis	301	2.0
Post-traumatic arthritis	265	1.8
Sequelae of fracture	199	1.3
Sequelae of osteotomy	115	0.8
Necrosis of the condyle	85	0.6
Sequelae of septic arthritis	25	0.2
Post-traumatic necrosis	26	0.2
Tumor	9	0.1
Sequelae of poliomyelitis	10	0.1
Other	32	0.2
<b>Total*</b>	<b>14.844</b>	<b>100.0</b>

\* 36 (0.2%) missing data

#### 14.9 Causes for revision or removal

Number of revision operations carried out on patients admitted between 1<sup>st</sup> July 2000 and 31 December 2005, according to **diagnosis**.

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
Total aseptic loosening	422	42.2
Prosthesis removal	144	14.1
Insert wear	96	9.6
Septic loosening	70	7.0
Aseptic loosening of tibial component	70	7.0
Pain without loosening	70	7.0
Aseptic loosening of femoral component	42	4.2
Prosthesis luxation	22	2.2
Bone fracture	11	1.1
Prosthesis fracture	9	0.9
Stiffness	10	1.0
Other	34	3.4
<b>Total*</b>	<b>1.000</b>	<b>100.0</b>

\*11 (1.1%) data missing

Number of prosthesis removal carried out on patients admitted between 1<sup>st</sup> July 2000 and 31 December 2005, according to **diagnosis**.

In the Table all removals 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 removal	Number	Percentage
Septic loosening	197	97.5
Total aseptic loosening	5	2.5
<b>Total*</b>	<b>202</b>	<b>100.0</b>

\* 2 (1.1%) data missing

## 15. Types of knee prosthesis

### 15.1 Unicompartmental prosthesis

Prostheses used in patients admitted between 1<sup>st</sup> July 2000 and 31 December 2005, primary surgery

TYPE OF PROSTHESIS	N.	%
OXFORD UNICOMPARTMENTAL PHASE 3 - Biomet Merck	561	27.1
EFDIOS - Citieffe	259	12.5
ALLEGRETTO UNI - Protek-Sulzer	210	10.2
PRESERVATION UNI – ALL POLY - Depuy	206	10.0
GENESIS UNI - Smith & Nephew	178	8.6
MILLER GALANTE UNI - Zimmer	143	6.9
UC-PLUS SOLUTION - Endoplus	129	6.2
MITUS - ENDO-MODEL UNI - ALLPOLY - Link	121	5.9
HLS - UNI EVOLUTION - ALL POLY - Tornier	71	3.4
PFC - UNI - De Puy	43	2.1
UNICIA - VECTEUR ORTHOPEDIC - Stratec	27	1.3
UNISPACER KNEE SYSTEM - Centerpulse	19	0.9
ZIMMER UNI - Zimmer	19	0.9
GENESIS UNI - ALL POLY - Smith & Nephew	17	0.8
OPTETRAK - UNI - ALL POLY -Exactech	14	0.7
EIUS UNI - ALL POLY - Stryker Howmedica	11	0.5
BALANSYS - UNI - Mathys	9	0.4
MITUS - ENDO-MODEL UNICONDYLAR SLED - Link	6	0.3
UNI BUK - ALL POLY - Biometmerck	5	0.2
ADVANCE - UNICOMPARTMENTAL - ALL POLY - Wright	4	0.2
PRESERVATION UNI - Depuy	4	0.2
UC-PLUS SOLUTION - ALL POLY - Endoplus	3	0.1
DURACON UNI - Howmedica	2	0.1
ACCURIS - UNI – Smith & Nephew	1	0.0
AMC - UNI - Corin Medical	1	0.0
GKS - ONE - Permedica	1	0.0
GKS - ONE - Permedica+UC-PLUS SOLUTION - Endoplus	1	0.0
Unknown	10	0.5
<b>Total</b>	<b>2075</b>	<b>100.0</b>

## 15.2 Bi-tricompartmental knee prosthesis

Prostheses used in patients admitted between 1<sup>st</sup> July 2000 and 31 December 2005, primary surgery

TYPE OF PROSTHESIS	N.	%
NEXGEN – Zimmer	3936	26.5
PROFIX – Smith & Nephew	2494	16.8
P.F.C –DePuy	1196	8.0
SCORPIO – Stryker Howmedica	876	5.9
INTERAX – Stryker Howmedica	689	4.6
T.A.C.K. – Link	630	4.2
LCS – DePuy	474	3.2
GENESIS II – Smith & Nephew	406	2.7
ADVANCE – Wright	364	2.5
GENIUS TRICCC – Dediene Santé	359	2.4
913 – Cremascoli	357	2.4
OPTETRACK – Exactech	354	2.4
ROTAGLIDE – Corin Medical	345	2.3
GEMINI MK II – Link	319	2.1
PERFORMANCE – Kirschner Biomet Merck	265	1.8
NUOVA DURACON II – Stryker Howmedica	216	1.5
AGC – Kirschner Biomet Merck	182	1.2
HLS – EVOLUTION – Tornier	176	1.2
ENDO-MODEL – Link	162	1.1
RO.C.C. – Biomet Merck France	155	1.0
G. K. S. – Permedica	142	1.0
CONTINUUM KNEE SYSTEM – Stratec Medical	140	0.9
SCORE – Amplitude	125	0.8
MULTIGEN - Lima	75	0.5
CONSENSUS – Hayes Medical.	42	0.3
Other	285	1.9
Unknown	116	0.8
<b>TOTAL</b>	<b>14880</b>	<b>100.0</b>



### 15.3 Revision prosthesis

Prostheses used in patients admitted between 1<sup>st</sup> July 2000 and 31 December 2005, in total revision surgery

TYPE OF PROSTHESIS	N.	%
NEXGEN – Zimmer	227	28.2
ENDO-MODEL – Link	126	15.7
P.F.C. – DePuy	86	10.7
AGC – Kirschner Biomet Merck	68	8.4
PROFIX – Smith & Nephew	64	8.0
INTERAX – Stryker Howmedica	28	3.5
OPTETRACK – Exactech	26	3.2
G. K. S. – Permedica	23	2.9
MODULAR ROTATING HINGE – Stryker Howmedica	20	2.5
NUOVA DURACON II – Stryker Howmedica	18	2.2
RT-PLUS - Endoplus	16	2.0
S-ROM NRH - DePuy	11	1.4
SCORPIO – Stryker Howmedica	10	1.2
NON NOTO	10	1.2
GENIUS TRICCC – Dedienne Santé	9	1.1
GENUFITT – Lafitt (fem comp and insert)+ EFDIOS – Citieffe (Tibial comp)	8	1.0
C. K. S. – Stratec Medical	7	0.9
ADVANCE – Wright	7	0.9
913 – Cremascoli	6	0.7
ROTAGLIDE – Corin Medical	6	0.7
T.A.C.K. – Link	4	0.5
CEDIOR – Sulzer	2	0.2
Other	23	2.9
<b>TOTAL</b>	<b>805</b>	<b>100.0</b>

#### 15.4 Relationship between joint components

Number of knee prosthesis arthroplasty performed on patients admitted to hospital between 1st July 2000 and 31<sup>st</sup> December 2005, **according to femoral-tibial component stabilization**

Component relationship	Primary unicom.		Primary bi/tricomp.		Total revision		Total	
	N.	%	N.	%	N.	%	N.	%
Non stabilized	2073	100.0	7104	47.8	107	13.4	9284	52.3
Posterior stabilized	-	-	7492	50.4	360	44.9	7852	44.2
Pivot	-	-	214	1.4	245	30.6	459	2.6
Hinge	-	-	64	0.4	89	11.1	153	0.9
<b>Total</b>	<b>2.073</b>	<b>100.0</b>	<b>14.874</b>	<b>100.0</b>	<b>801</b>	<b>100.0</b>	<b>17.748</b>	<b>100.0</b>

\* 12 data are missing (0.1%)

#### 15.5 Articular coupling

Number of knee prosthesis arthroplasty performed on patients admitted to hospital between 1st July 2000 and 31<sup>st</sup> December 2005, **according to articular coupling**

Articular coupling	Primary unicom.		Primary bi/tricomp.		Total revision		Total	
	N.	%	N.	%	N.	%	N.	%
Metal-poly	2020	97.4	14763	99.2	799	99.3	17582	99.0
Cer-poly	36	1.7	117	0.8	6	0.7	159	0.9
Other	19	0.9	-	-	-	-	19	0.1
<b>Total</b>	<b>2075</b>		<b>14880</b>		<b>805</b>		<b>17760</b>	

#### 15.6 Articular insert

Number of knee prosthesis arthroplasty performed on patients admitted to hospital between 1st July 2000 and 31<sup>st</sup> December 2005, **according to articular insert**

Type of insert	Primary unicom.		Primary bi/tricomp.		Total revision		Total	
	N.	%	N.	%	N.	%	N.	%
Fix	1511	72.9	10335	69.5	692	86.4	12538	70.7
Mobile	561	27.1	4538	30.5	109	13.6	5208	29.3
<b>Total</b>	<b>2072</b>		<b>14873</b>		<b>801</b>		<b>17746</b>	

\* 14 data are missing (0.1%)

### 15.7 Prosthesis fixation

Number of knee prosthesis arthroplasty performed on patients admitted to hospital between 1st July 2000 and 31<sup>st</sup> December 2005, **according to prosthesis fixation**

Fixation	Primary unicom.		Primary bi/tricom p.		Total revision		Total	
	N.	%	N.	%	N.	%	N.	%
Cemented	1787	86.2	12975	87.2	775	96.8	15537	87.5
Cementless	267	12.9	1114	7.5	16	2.0	1397	7.9
Fem cementless + tib cemented	12	0.6	758	5.1	6	0.7	776	4.4
Femorale cem + tib cementless	7	0.3	29	0.2	4	0.5	40	0.2
<b>Total*</b>	<b>2.073</b>		<b>14.876</b>		<b>801</b>		<b>17.750</b>	

\* 10 data are missing (0.1 %)

### 15.8 Fixation of femoral component

Number of knee prosthesis arthroplasty performed on patients admitted to hospital between 1st July 2000 and 31<sup>st</sup> December 2005, **according to femoral component fixation**

Fixation of femoral component	Primary unicom.		Primary bi/tricom.		Total revision		Total	
	N.	%	N.	%	N.	%	N.	%
Cemented	1794	86.5	12202	82.02	184	23.0	14180	79.9
Cementless without screw	279	13.5	1807	12.15	16	2.0	2102	11.8
Cemented with intramedullary stem	-		802	5.39	595	74.3	1397	7.9
Cementless with intramedullary stem	-		63	0.42	6	0.7	69	0.4
Cementless with screw	-	-	2	0.01	-	-	2	0.0
<b>Total*</b>	<b>2.073</b>		<b>14.876</b>		<b>801</b>		<b>17.750</b>	

\*22 data are missing (0.1%)

## 15.9 Fixation of tibial component

Number of knee prosthesis arthroplasty performed on patients admitted to hospital between 1st July 2000 and 31<sup>st</sup> December 2005, **according to tibial component fixation**

Fixation of tibial component	Primary unicom.		Primary bi/tricomp.		Total revision		Total	
	N.	%	N.	%	N.	%	N.	%
Cemented	1773	85.5	11197	75.3	146	18.2	13116	73.9
Cemented with intramed stem	-	-	2536	17.0	636	79.3	3172	17.9
Cementless without screw	19	0.9	1037	7.0	7	0.9	1063	6.0
Cemented without screw	255	12.3	34	0.2	8	1.0	297	1.7
Cementless with intramed stem	-	-	72	0.5	5	0.6	77	0.4
Cemented with screw	26	1.3	-	-	-	-	26	0.1
<b>Total*</b>	<b>2.073</b>		<b>14.876</b>		<b>802</b>		<b>17.751</b>	

\* 22 data are missing (0.1%)

## 15.10 Bone cement

Bone cement used for fixation of knee prosthesis is Surgical Simplex P in 40.0% of cases.

Bone cement loaded with antibiotic is used in 14.0% of cases.

## 15.11 Surgical technique

The most commonly used **surgical approach is the antero-medial** (88.2 %) regardless of type of operation

### Surgery of patella (non- prosthetic)

Number of surgery on patella performed on patients admitted to hospital between 1st July 2000 and 31<sup>st</sup> December 2005, during prosthetization of the knee

Type of surgery of patella	Number	%
None	9244	50.5
Patella-plasty	4758	25.9
Denervation of patella	3081	16.8
Both	1252	6.8
<b>Total</b>	<b>18.335</b>	<b>100.0</b>

### Use of bone grafts (data collected since 2002)

Number of knee prosthesis arthroplasty performed on patients admitted to hospital between 1st January 2002 and 31<sup>st</sup> December 2005, according to **type of operation and use of bone grafts**

Bone grafts	Primary unicom.		Primary bi/tricomp.		Total revision	
	N.	%	N.	%	N.	%
Not used	1420	100.0	10134	99.1	492	89.8
Femoral	-	-	48	0.5	17	3.1
Tibial and femoral	-	-	37	0.4	24	4.4
Tibial	-	-	5	0.0	15	2.7
<b>Total*</b>	<b>1.420</b>		<b>10.224</b>		<b>548</b>	

\* 2465 data are missing (16.8 %)

### Use of augmentation blocks (data collected since 2002)

Number of knee prosthesis arthroplasty performed on patients admitted to hospital between 1st January 2002 and 31<sup>st</sup> December 2005, according to **use of augmentation blocks**.

Augmentation blocks	Primary bi/tricomp.		Total revision	
	N.	%	N.	%
Non used	11908	99.4	349	54.5
Tibial	48	0.4	79	12.3
Femoral	22	0.2	138	21.5
Tibial and femoral	4	0.0	75	11.7
<b>Total*</b>	<b>11.982</b>		<b>641</b>	

\*238 data missing (1.8% )

## 16. Antibiotic prophylaxis

List of active principles used in preoperative antibiotic prophylaxis in cases of **knee arthroplasty**. (data registered since 2002)

Active principle	Percentage
AMPICILLIN	1.6
AMPICILLIN + GENTAMICIN	1.0
AMPICILLIN + SULBACTAM	1.0
AMPICILLIN + SULBACTAM + GENTAMICIN	4.0
CEFAMANDOL	0.1
CEFAMANDOL + GENTAMICIN	0.1
CEFAZOLIN	25.0
CEFAZOLIN + GENTAMICIN	2.1
CEFAZOLIN + TOBRAMICIN	17.1
CEFEPIME	0.7
CEFODIZIMA	2.5
CEFOTAXIME	2.1
CEFOTAXIME + LEVOFLOXACINA	1.9
CEFTIZOXIMA	0.8
CEFTRIAZONE	7.5
CEFTRIAZONE + GENTAMICIN	0.9
CEFUROXIMA	8.1
CIPROFLOXACINA	1.8
GENTAMICIN	0.8
LEVOFLOXACINA	1.4
TEICOPLANINA	3.8
TEICOPLANINA + NETILMICINA	0.2
VACOMICIN	1.2
VACOMICIN + GENTAMICIN	6.7
ALTRO	7.4
<b>Total</b>	<b>100.0</b>

Active principles used for the prophylaxis are the same as for hip, even if in different percentage.

### Way of administration

Multiple administrations are used in 85.6% of cases

## 17. Blood transfusion

Number of surgery between **01/01/2004** and **31/12/2005**, according to type of surgery and blood transfusion.

Type of surgery	None		Autologus (recovery)		Homologous		Autologous and Homologous	
	N.	%	N.	%	N.	%	N.	%
Unicomp	606	71.2	214	25.2	25	2.9	6	0.7
bi/tricomp.	615	9.8	4258	67.8	620	9.9	790	12.6
Revision	65	15.2	182	42.4	131	30.5	51	11.9

\*1066 data missing (12.3%)

## 18. Complications occurred during hospitalization

The rate of complications in **primary unicompartmental surgery** carried out on patients hospitalized between July 1st 2000 and December 31st 2005

Types of complication	Unicomp		bi/tricomp.		Revision		Removal		Total	
	N.		N.		N.		N.		N.	
<b>Intra-operative</b> Femoral fracture, fr tibial tuberosity, rupture patella tendon, rupture collateral ligaments	-	-	42	0.3	12	1.2	1	0.5	55	0.3
<b>Post-op. general</b> anemia, hyperpyrexia, minor respiratory	23	1.1	451	3.4	39	3.9	-	-	513	2.8
<b>Post-operative local</b> hematoma, DVT, dislocation. prosthesis	8	0.4	187	1.4	22	2.2	3	1.5	220	1.2

### 18.1 Deaths occurred during hospitalization

Rate of deaths in knee prosthetic surgery carried out on patients hospitalized between July 1<sup>st</sup> 2000 and December 31st 2005.

Type of surgery	Deaths	Number of surgery	Percentage
Primary bi/tricomp.	17	14.880	0.1
Primary uni	-	2.075	-
Revision	2	1.011	0.2
removal	-	204	-

*Registered deaths occurred during hospitalization*

## 19. Duration of pre-operative hospitalization

Days of pre-operative hospitalization (mean, minimal, maximal) according to type of operations and year of operation year 2001

Year 2001			
Type of operation	N.	Mean	Range
Primary bi/tricomp.	1976	2.0	0-40
Primary unicomp.	220	2.3	0-13
Revision	140	3.1	0-24

Days of pre-operative hospitalization (mean, minimal, maximal) according to type of operations and year of operation year 2005

Year 2005			
Type of operation	N.	Mean	Range
Primary bi/tricomp.	3789	1.4	0-30
Primary unicomp.	539	1.2	0-13
Revision	279	2.8	0-77



## 20. Analysis of survival of primary surgery

### 20.1 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, pathology, type of prosthesis (bi/tri comp ves unicomp), type of insert (fix vs mobile) and volume of operations performed in the hospital.

All primary hip arthroplasties performed in the region between July 2000 and December 2005 were analyzed.

COX PROPORTIONAL RISK MODEL	
<b>Variabiles</b>	
<i>Dependent:</i> Follow-up	
<i>Independent:</i> Age,gender, diagnosis, type of prosthesis, type of insert	
<b>Number of valid observations 16899</b>	
Non revised: 16617	
Revised: 282	
Chi-square: 58.472 $p= 0.0001$	
VARIABLE	SIGNIFICANCE ( P )
<b>Gender</b> (Males vs females)	<b>NS</b> (0.095)
<b>Age</b> (less than 70 yrs vs more than 70 yrs)	<b>S</b> (0.001)
<b>Diagnosis</b> (arthrosis vs other)	<b>NS</b> (0.505)
<b>Type of prosthesis</b> (bi-tri compartmental vs uni)	<b>S</b> (0.0001)
<b>Type of insert</b> (Fix vs mobile)	<b>S</b> (0.002)
<b>Hospitals</b> (less than 50 operations/year vs more than 50 operations/year )	<b>NS</b> (0.90)

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.

Relative risk is compared older than 70yrs. Younger have greater risk.

<b>Age</b>	<b>Relative risk rate</b>	<b>Confidence interval 95%</b>		<b>Significance (p)</b>
Less than 70yrs	1.5	1.2	1.95	0.0001

Relative risk is compared to fix insert. Mobile inserts have greater risk.

<b>Insert</b>	<b>Relative risk rate</b>	<b>Confidence interval 95%</b>		<b>Significance (p)</b>
Mobile	1.5	1.15	1.9	0.002

Relative risk is compared to bicompartamental. Unicompartmental prostheses have greater risk.

<b>Type of prosthesis</b>	<b>Relative risk rate</b>	<b>Confidence interval 95%</b>		<b>Significance (p)</b>
Uni compartmental	2.0	1.5	2.7	0.0001

## 20.2 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 2005 in the first column, 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.

Type of operation	Number of operations	N. of revisions performed in the same hospital	N. of revisions performed in a different hospital	% revision
Primary bicompartamental	13240	151	44	1.5
Primary tri-compartmental	1640	21	3	1.5
Primary unicomp.	2075	51	13	3.1
Total revision	805	32	7	4.8
<b>Total</b>	<b>17.760</b>	<b>255</b>	<b>67</b>	<b>1.8</b>

In 21.2% 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.

## 20.3 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 their initial condition (prosthesis in place) over time.

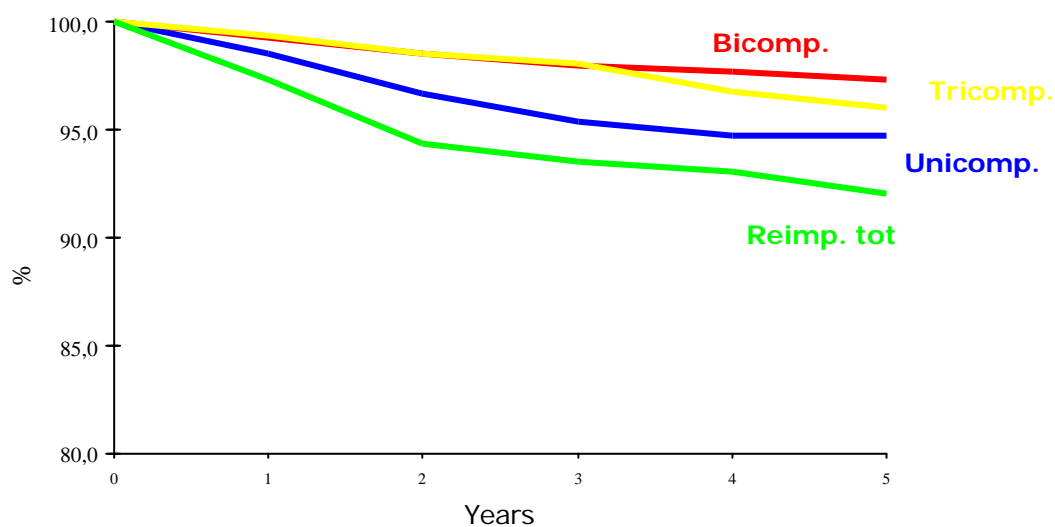
The following paragraphs show the survival curves calculated separately for primary uni , bi/tri compartmental and total joint revision.

## 20.4 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.

Type of surgery	N. implants	N. revisions	% revisions
Primary bicompartamental	13.240	195	1.5
Primary tri-compartmental	1.640	24	1.5
Primary unicomp.	2.075	64	3.1
Total revision	805	39	4.8

### Survival curves



## Results in detail

Uni-compartmental			
Years	% in site	i.c. 95%	
0	100.0	100.0	100.0
1	98.5	97.9	99.1
2	96.7	95.8	97.6
3	95.4	94.2	96.6
4	94.7	93.3	96.1
5	94.7	93.3	96.1
Bi-compartmental			
Years	% in site	i.c. 95%	
0	100.0	100.0	100.0
1	99.3	99.2	99.5
2	98.5	98.3	98.8
3	98.0	97.7	98.3
4	97.7	97.3	98.0
5	97.4	96.9	97.8
Tri-compartmental			
Years	% in site	i.c. 95%	
0	100.0	100.0	100.0
1	99.3	98.9	99.8
2	98.6	97.9	99.3
3	98.0	97.1	99.0
4	96.8	95.3	98.3
5	96.0	93.9	98.2
Total revision			
Years	% in site	i.c. 95%	
0	100.0	100.0	100.0
1	97.3	96.1	98.5
2	94.4	92.5	96.2
3	93.5	91.4	95.6
4	93.1	90.8	95.3
5	92.0	89.0	95.0

At 5 years follow-up there is a significant difference between uni-compartmental and bi-compartmental

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 bi-tricompartamental

Cause of revision	Rate	Percentage	% distribution of cause of failure
Septic loosening	<b>73/14.880</b>	0.49	33.4
Total aseptic loosening	<b>46/14.880</b>	0.31	21.0
Tibial loosening	<b>18/14.880</b>	0.12	8.2
Insert loosening	<b>20/14.880</b>	0.13	9.1
Femoral loosening	<b>13/14.880</b>	0.09	5.9
Pain without loosening	<b>15/14.880</b>	0.10	6.9
Luxation	<b>11/14.880</b>	0.07	5.0
Stiffness	<b>4/14.880</b>	0.03	1.8
Unknown	<b>5/14.880</b>	0.03	2.3
Bone fracture	<b>3/14.880</b>	0.02	1.4
Other	<b>11/14.880</b>	0.07	5.0
<b>Total</b>	<b>219/14.880</b>	<b>1.47</b>	<b>100.0</b>

#### Primary uni-compartmental

Cause of revision	Rate	Percentage	% distribution of cause of failure
Total loosening	<b>18/2.075</b>	0.87	28.0
Pain without loosening	<b>16/2.075</b>	0.77	25.0
Tibial aseptic loosening	<b>8/2.075</b>	0.39	12.5
Septic loosening	<b>6/2.075</b>	0.29	9.4
Femoral aseptic loosening	<b>6/2.075</b>	0.29	9.4
Usura inserto	<b>4/2.075</b>	0.19	6.3
Bone fracture	<b>2/2.075</b>	0.1	3.1
Other	<b>4/2.075</b>	0.19	6.3
<b>Total</b>	<b>64/2.075</b>	<b>3.1</b>	<b>100.0</b>

Rate of revision for bi-tricompartamental prosthesis according to type of insert

Poly insert	N.	Removals	rate	Percentage
Fix	11.846	178	178/11.846	1.5
Mobile	5.098	104	104/5.098	2.0

## 20.5 Second time surgery for patella replacement

In rare cases the bicompartamental prosthesis was turned into a tricompartmental one, with the addition of the patella component, in a second surgical operation. This was done in 33 cases (of 13,240 bicompartamental prostheses recorded in the RIPO) The following table shows the details of these 33 reoperations that were not considered as bicompartamental prosthesis failures.

Primary bi-compartmental prosthesis	Reason for patellar prosthetisation	Time before re-operation
913 - PS - Cremascoli Wright	arthrosis	3.0 years
ADVANCE Medial Pivot - Wright	condromalacia	294 days
ADVANCE Medial Pivot - Wright	arthrosis	0.9 years
OPTETRAK – CRUCIATE RETAINED - Exactech	Patellar pain	2.7 years
GEMINI MK II - Link	Patellar pain	1.9 years
GENIUS TRICCC - Dedienne Sante	Patellar pain	93 days
GENIUS TRICCC - Dedienne Sante	Patellar pain	140 days
GENIUS TRICCC - Dedienne Sante	Patellar pain	182 days
GENIUS TRICCC - Dedienne Sante	Patellar pain	237 days
GENIUS TRICCC - Dedienne Sante	Patellar pain	276 days
GENIUS TRICCC - Dedienne Sante	?	297 days
GENIUS TRICCC - Dedienne Sante	Patellar pain	1.3 years
GENIUS TRICCC - Dedienne Sante	Patellar pain	1.5 years
HLS - EVOLUTION ROTATOIRE - Tornier	?	1.0 years
INTERAX - ISA - Stryker Howmedica	Patellar pain	1.0 years
INTERAX - ISA - Stryker Howmedica	Patellar pain	1.8 years
MULTIGEN PS - Lima	Patellar pain	1.2 years
NEXGEN - CR - Zimmer	Patellar pain	2.0 years
NEXGEN - LPS - Zimmer	Patellar pain	267 days
NEXGEN - LPS - Zimmer	Patellar pain	1.6 years
NEXGEN - LPS - Zimmer	Patellar pain	1.6 years
OPTETRAK - POSTERIOR STABILIZED - Exactech	Patellar pain	1.2 years
PFC - CVD - De Puy Johnson & Johnson	Patellar pain	1.8 years

*it continues*

PFC - PS - De Puy Johnson & Johnson	Patellar pain	1.8 years
PFC - RP - PS - De Puy Johnson & Johnson	Patellar pain	0.9 years
PFC - UNI - DE PUY JOHNSON & JOHNSON	Patellar pain	3.5 years
PROFIX - CONFORMING - Smith & Nephew	Patellar pain	1.0 years
PROFIX - CONFORMING - Smith & Nephew	?	1.8 years
PROFIX - CONFORMING - Smith & Nephew	Patellar pain	2.4 years
PROFIX - MOBILE BEARING - Smith & Nephew	?	197 days
ROTAGLIDE - Corin Medical	Patellar pain	89 days
ROTAGLIDE - Corin Medical	Patellar pain	1.2 years
ROTAGLIDE - Corin Medical	Patellar luxation	2.0 years



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

The regional rate of patients with replacements under 70 years old is **61.3%** of the regional series.

The survival of unicompartmental prostheses at 4 years is 94.7% (I.C. 95% 93.3-96.1).

	Starting year	n.	% of patients younger than 70	% survival at 4 years	I.C. 95%
ALLEGRETTO UNI - Protek-Sulzer	2000	210	61.0	94.7	90.9-98.5
OXFORD UNICOMPARTMENTAL PHASE 3 - Biomet Merck	2000	561	64.3	94.0	90.8-97.3
EFDIOS – Citieffe	2000	259	55.6	96.2	93.7-98.7
Other	2000	1045	61.2	94.1	91.7-96.5

## 20.7 Analysis of the survival of bicompartamental prosthesis according to the most widely used commercial type in Emilia-Romagna

The regional rate of patients with knee replacements using bi-tricompartamental prostheses under 70 years old is **41.1%** of the regional series

The survival of bi-tricompartamental prostheses at 4 years is 97% (I.C. 95% 96.3-97.7).

	Starting year	n.	% of patients younger than 70	% survival at 4 years	I.C. 95%
NEXGEN – Zimmer	2000	3936	41.8	98.5	98.0-99.1
PROFIX – Smith & Nephew	2000	2494	45.3	98.1	97.2-99.0
P.F.C –DePuy	2000	1196	44.2	97.5	96.4-98.6
INTERAX – Stryker Howmedica	2000	689	34.3	95.6	93.8-97.4
T.A.C.K. – Link	2000	630	39.7	94.1	91.3-96.9
LCS – DePuy	2000	474	43.5	98.0	96.6-99.4
913 – Cremascoli	2000	357	44.8	97.7	95.0-100.0
GENIUS TRICCC – Dediene Santé	2000	359	25.9	95.9	92.5-99.4
ADVANCE – Wright	2000	364	29.1	-	-
OPTETRACK – Exactech	2000	354	39.3	96.1	92.5-99.7
ROTAGLIDE – Corin Medical	2000	345	33.1	94.4	91.4-97.4
PERFORMANCE – Kirschner Biomet Merck	2000	265	49.4	97.4	95.3-99.5
GENESIS II – Smith & Nephew	2000	406	48.1	98.0	95.8-100.0
NUOVA DURACON II – Stryker Howmedica	2000	216	33.9	97.2	94.8-99.6
Other	2000	2795	39.4	97.5	96.0-98.9