



Italian Arthroplasty Registry Project

Approaching
data quality

**APPROACHING
DATA QUALITY**

Third Report 2016
Addendum

English version of Tables and Figures

Stefania Bellino
and Marina Torre

Executive Summary

Introduction

The *fil rouge* leading the 2016 RIAP Report is the word *quality*. In the previous reports, we focused on conceiving and developing the Registry and on the data collection that started in few Italian Regions, and furtherly extended to 13 out of 21. This third report points out that focusing on the quality of the collected data, both clinical and related to medical devices identification, is crucial. Therefore, starting from this year, a multidisciplinary Editorial Board will edit the RIAP Annual Report, to assure that results are presented taking into account the different points of view.

The total number of joint arthroplasties is steadily growing worldwide and represents an emerging challenge for the national health systems. Ageing, increase of obesity and arthritis prevalence, indication for surgery in patients even younger are only some of the leading causes of this trend. Policy makers and surgeons need reliable results to support the setting out of national health strategies and the selection of the most effective and safer devices. These will be available only if they are based on high quality data. Registries collecting high quality data will assist the implementation of an effective national medical devices vigilance and surveillance system.

The full report is published in Italian. In this addendum Tables and Figures of Chapters 4 and 5 (Statistical analyses on joint arthroplasty from national Hospital Discharge Records (HDR) database 2001-2014, and Data collected by the Registry in 2015) are translated into English for a comprehensive international reading.

Organization of the Report

The Report 2016 is arranged just like the previous editions: five Chapters and Appendices (seven, this year) including technical documents and information about the Project activities.

Chapter 1 briefly describes the Project, its structure and the data collection flow; Chapter 2 summarizes the procedures for the identification and characterization of medical devices through the RIAP-MD Library, a key tool of the Registry architecture implemented in cooperation with Manufacturers. Chapter 3 is an updating of the activities carried out by the participating Regions. Chapter 4 shows the analyses performed on the national HDR database for hip, knee and shoulder arthroplasties (Tables 4.1-4.31 and Figures 4.1-4.13). Finally, Chapter 5 shows the data collected by the 206 hospitals from the Regions and Autonomous Provinces participating in the RIAP project in 2015, eight and two respectively (hip and knee arthroplasties, Tables 5.1-5.20).

HDR data analysis

METHODS

The HDR national database was browsed and all the records referring to procedures coded with the following ICD-9-CM codes were selected:

- Hip: 81.51, 81.52, 81.53, 00.70, 00.71, 00.72, 00.73, 00.85, 00.86, 00.87
- Knee: 81.54, 81.55, 00.80, 00.81, 00.82, 00.83, 00.84
- Shoulder: 81.80, 81.81
- Other joints: 81.56, 81.57, 81.59, 81.73, 81.84, 81.97

The following analyses were performed:

- Time trends in hip, knee and shoulder arthroplasties – both main and secondary procedures – carried out from 2001 to 2014, and incidence rate
- Primary and revision joint replacements (main procedures) by patient characteristics, primary diagnosis, type of discharge, hospital length of stay and hospitalization burden
- Distributions of the hospitals by volume of interventions for primary total hip (THR), knee (TKR) and shoulder (TSR) replacements, for hip and knee revisions, and for partial shoulder replacements. Hospital was defined as low-volume hospital if

performing less than or equal to 50 procedures/year (primary total hip¹ or primary total knee replacements), less than or equal to 10 procedures/year (hip or knee revision surgeries), less than or equal to 4 procedures/year (primary total or partial shoulder replacements)

- Inter-regional mobility measured by means of attraction and escape indexes for elective primary total replacements (hip, knee, shoulder)

RESULTS

In 2014, 175,290 arthroplasties were performed, 56.8% hip, 38.4% knee, 3.8% shoulder, and 1.0% other joints. Like in other countries, the total number of joint replacements unceasingly increased within the time range 2001-2014. Specifically, during the last year the number of primary and revision procedures increased by 2.2% for hip, 4.0% for knee, 12.6% for shoulder and 7.0% for other joints (Table 4.1 and Figures 4.1-4.4).

The volume of activity of every Region and the distribution of hospitals by class of volume are

¹ Glassou EN et al., Association between hospital procedure volume and risk of revision after total hip arthroplasty: a population-based study within the Nordic Arthroplasty Register Association database. *Osteoarthritis and Cartilage* 2016, 24:419-426.

shown for primary and revision hip replacements (Tables 4.2-4.4, Figures 4.5-4.6), primary and revision knee replacements (Tables 4.12-4.14, Figures 4.8-4.9), and shoulder replacements (Tables 4.22-4.24, Figures 4.11-4.12). The proportion of low-volume hospitals was 45% for THR and 54% for TKR.

The distribution of the procedures and the characteristics of the hospitals and patients are shown in Tables 4.5-4.11 (hip), 4.15-4.21 (knee), and 4.25-4.31 (shoulder).

Noticeably, the inter-regional mobility for elective primary interventions (hip, knee, and shoulder) is still high, although northern regions have an attraction index remarkably higher than the escape index (Figure 4.7, 4.10 and 4.13).

Registry data analysis

METHODS

Definitions

- *Regional participation rate*: Hospitals that submitted to the Registry at least one procedure/Hospitals in the Region that performed at least one procedure
- *Regional completeness rate*: Number of procedures submitted to the Registry/ Number of procedures performed in the Region

- *Hospital completeness rate*: Number of procedures submitted by each hospital to the Registry/Number of procedures performed in each hospital

Data quality check

The quality of the collected data was checked out both syntactically and semantically. The syntactical check rejected the records in which information such as sex, age, type of hospital, joint, side, procedure, diagnosis, previous procedure, approach, fixation was missing. Instead, the semantical check rejected the records reporting procedures that included either values not accepted by the protocol or both revision and primary diagnoses, or if a primary intervention was paired with a revision diagnosis and vice versa. A crosscheck between diagnosis and previous procedure was performed and when resulted incompatible was classified as such.

Relating to the implanted medical devices, only primary procedures data were analyzed and the linked records included only if the following criteria were satisfied:

- The reference codes of the implanted devices were available in RIAP-MD Library
- No double components (for example two heads) were recorded

- Each procedure should have at least four components for a total hip arthroplasty, three components for a total knee arthroplasty.

RESULTS

The 52,009 procedures (Hip: 30,500, Knee: 21,509) recorded in 2015 by the National Registry represented about 30% of the national volume. The average completeness rate in the participating Regions was 61.9% (range 4.0%-98.6%) for hip and 59.0% (range 1.7%-100.0%) for knee; 48,135 procedures were included in the analyses (92.6%: 93.2% for hip and 93.7% for knee) (Table 5.1). Hospital completeness rates varied among Regions ranging from 4.0% to 100.0% for hip replacements and from 1.5% to 100.0% for knee replacements (Tables 5.2-5.3). Table 5.4 compares the distributions of the procedures recorded by RIAP in 2015 and by HDR in 2014, by joint and type of surgery. Tables 5.5-5.16 present the results of the analyses referred to the type of procedure (Tables 5.5 for hip and 5.11 for knee), type of provider (Tables 5.6 for hip and 5.12 for knee), patients' characteristics, and surgical practice, as well as diagnosis for primary and revision procedures (Hip: Tables 5.7-5.10; Knee: Tables 5.11-5.16).

The analysis of the implanted medical devices considered 27,880 primary procedures out of 38,704 satisfying the semantical and syntactical requirements: 12,611 hip (63.3%) and 15,269 knee (81.2%) (Tables 5.17-5.20).

Future perspectives

In 2017, a new informatics infrastructure will support the surgeons participating in the Registry, in order to reduce the burden connected to data input and to enhance data quality.

Some Regions are about to start, January 2017, the data collection for shoulder replacements; the list of the variables to be collected has been approved by the Italian Society of Shoulder and Elbow Surgery. In addition, a new cooperation has just started with the Italian Society of Ankle and Foot to define the information needed to set up the Ankle Arthroplasty National Registry.

Thanks to the collaboration with the Manufacturers, RIAP-MD Library currently counts about 55,000 reference codes. The cooperation with the International Consortium of Orthopaedic Registries provided useful information, regarding the classification adopted within the Global Library, which allows the undertaking of future steps such as linking each device to its technical attributes. Towards a European per-

spective, arrangements were recently agreed with the National Joint Registry of England and Wales to assess a possible cooperation to share RIAP-MD Library information within the joint component database organized by the National Joint Registry and the EndoProthesenRegister Deutschland.

Currently, the RIAP Working Group is increasing the dissemination activity to raise awareness of health professionals about the usefulness of the Registry and to include the largest possible number of Regions in the network. As soon as the law establishing the National Registry of the implanted prostheses is approved, the participation will be mandatory. Hence, it is hoped that both the participation and completeness rates in every Region will increase

to levels close to 100%. In addition, given its characteristics, the RIAP model based on HDR integrated by a specific additional Minimum Data Set, could be applied to other implanted medical devices.

The association between low-volume activity and negative outcomes is known. The proportion of low-volume hospitals (45% for THR and 54% for TKR) is quite large and spread throughout the country. Hopefully, the full implementation of the registry in all the Regions, providing reliable data on outcomes, will also result in the decrease of this proportion. In the meantime, if the responsible authorities decided to make data of hospitals volume public, the patients would be offered useful information to choose the hospital where to be treated.

Index of Tables

CHAPTER 4 - Joint arthroplasties: Hospital Discharge Records analysis

- Table 4.1 Joint arthroplasty in Italy (main and secondary procedures)
- Table 4.2 Hip. Arthroplasties performed in the Italian regions (main and secondary procedures)
- Table 4.3 Hip. Primary total replacement: number of hospitals by region and class of volume (main and secondary procedures)
- Table 4.4 Hip. Revision: number of hospitals by region and class of volume (main and secondary procedures)
- Table 4.5 Hip. Distribution of arthroplasties (main procedure)
- Table 4.6 Hip. Demographic characteristics by type of procedure
- Table 4.7 Hip. Arthroplasties by main diagnosis (ICD-9-CM)
- Table 4.8 Hip. Primary and revision procedures by type of discharge
- Table 4.9 Hip. Length of stay (days) by procedure and region
- Table 4.10 Hip. Primary and revision procedures by hospitalization burden
- Table 4.11 Hip. Primary and revision procedures by hospitalization burden. Details of the *Other* value of Table 4.10
- Table 4.12 Knee. Arthroplasties performed in the Italian regions (main and secondary procedures)
- Table 4.13 Knee. Primary total replacement: number of hospitals by region and class of volume (main and secondary procedures)
- Table 4.14 Knee. Revision: number of hospitals by region and class of volume (main and secondary procedures)
- Table 4.15 Knee. Distribution of arthroplasties (main procedure)
- Table 4.16 Knee. Demographic characteristics by type of procedure
- Table 4.17 Knee. Arthroplasties by main diagnosis (ICD-9-CM)
- Table 4.18 Knee. Primary and revision procedures by type of discharge
- Table 4.19 Knee. Length of stay (days) by procedure and region
- Table 4.20 Knee. Primary and revision procedures by hospitalization burden
- Table 4.21 Knee. Primary and revision procedures by hospitalization burden. Details of the *Other* value of Table 4.20
- Table 4.22 Shoulder. Arthroplasties performed in the Italian regions (main and secondary procedures)
- Table 4.23 Shoulder. Primary total replacement: number of hospitals by region and class of volume (main and secondary procedures)

- Table 4.24 Shoulder. Primary partial replacement: number of hospitals by region and class of volume (main and secondary procedures)
- Table 4.25 Shoulder. Distribution of arthroplasties (main procedure)
- Table 4.26 Shoulder. Demographic characteristics by type of procedure
- Table 4.27 Shoulder. Arthroplasties by main diagnosis (ICD-9-CM)
- Table 4.28 Shoulder. Primary procedures by type of discharge
- Table 4.29 Shoulder. Length of stay (days) by procedure and region
- Table 4.30 Shoulder. Primary procedures by hospitalization burden
- Table 4.31 Shoulder. Primary procedures by hospitalization burden. Details of the *Other* value of Table 4.30

CHAPTER 5 - Joint arthroplasties: RIAP data analysis

- Table 5.1 Participation rate and completeness of the regions involved in the RIAP project (2015)
- Table 5.2 Hip. Completeness of the hospitals participating in the RIAP project (2015)
- Table 5.3 Knee. Completeness of the hospitals participating in the RIAP project (2015)
- Table 5.4 Procedures distribution. Comparison between 2014 HDR data and 2015 evaluable RIAP data
- Table 5.5 Hip. Type of procedure
- Table 5.6 Hip. Procedures by type of provider
- Table 5.7 Hip. Demographic characteristics by type of procedure
- Table 5.8 Hip. Surgical practice for primary procedures
- Table 5.9 Hip. Primary replacements by diagnosis and previous surgery
- Table 5.10 Hip. Revision procedures by diagnosis and previous surgery
- Table 5.11 Knee. Type of procedure
- Table 5.12 Knee. Procedures by type of provider
- Table 5.13 Knee. Demographic characteristics by type of procedure
- Table 5.14 Knee. Surgical practice for primary procedures
- Table 5.15 Knee. Primary replacements by diagnosis and previous surgery
- Table 5.16 Knee. Revision procedures by diagnosis and previous surgery
- Table 5.17 Hip. Primary total replacement: type of implanted medical device
- Table 5.18 Hip. Primary total replacement: bearing surface
- Table 5.19 Knee. Primary total replacement: type of implanted medical device
- Table 5.20 Knee. Primary total replacement: implant of patella

Index of Figures

CHAPTER 4 - Joint arthroplasties: Hospital Discharge Records analysis

- Figure 4.1 Temporal trend of elective primary joint replacements in Italy
- Figure 4.2 Hip. Incidence rates per 100,000 population by type of procedure
- Figure 4.3 Knee. Incidence rates per 100,000 population by type of procedure
- Figure 4.4 Shoulder. Incidence rates per 100,000 population by type of procedure
- Figure 4.5 Hip. Primary total replacement: percentage of hospitals by region and volume of activity
- Figure 4.6 Hip. Revision: percentage of hospitals by region and volume of activity
- Figure 4.7 Hip. Elective primary total replacement: inter-regional mobility index (%), a) attraction index, b) escape index
- Figure 4.8 Knee. Primary total replacement: percentage of hospitals by region and volume of activity
- Figure 4.9 Knee. Revision: percentage of hospitals by region and volume of activity
- Figure 4.10 Knee. Primary total replacement: inter-regional mobility index (%), a) attraction index, b) escape index
- Figure 4.11 Shoulder. Primary total replacement: percentage of hospitals by region and volume of activity
- Figure 4.12 Shoulder. Primary partial replacement: percentage of hospitals by region and volume of activity
- Figure 4.13 Shoulder. Elective primary total replacement: inter-regional mobility index (%), a) attraction index, b) escape index

Table 4.1. Joint arthroplasties in Italy (main and secondary procedures)

ICD-9-CM Codes	Procedures	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	% (*)
	Hip	72,575	76,653	78,859	82,844	84,961	87,260	88,249	89,074	89,979	92,112	92,943	95,081	97,399	99,497	2.5
81.51	Total hip replacement	45,792	48,793	51,311	54,442	55,599	57,612	58,650	58,786	59,528	59,764	60,712	62,361	64,056	66,045	2.9
	<i>Total hip replacement (elective)</i>	39,144	41,396	43,419	45,764	46,561	48,157	49,104	49,289	49,923	50,394	51,422	52,940	54,624	56,561	2.9
81.52	Partial hip replacement	20,768	21,358	21,020	21,657	22,402	22,418	22,326	23,069	22,542	23,953	24,177	24,324	24,998	25,313	1.5
	<i>Hip resurfacing(*)</i>	-	-	-	-	-	-	-	-	303	476	157	94	96	70	-25.4
81.53	Revision of hip replacement(**)	6,015	6,502	6,528	6,745	6,960	7,230	7,273	7,219	7,606	7,919	7,897	8,302	8,249	8,069	2.3
	Knee	28,056	32,704	37,703	43,093	46,257	50,651	55,123	57,706	58,628	60,761	60,973	63,214	64,763	67,365	7.0
81.54	Total knee replacement	26,787	31,039	35,799	40,904	43,785	47,986	52,116	54,395	54,778	56,808	56,977	58,979	60,261	62,886	6.8
81.55	Revision of knee replacement(***)	1,269	1,665	1,904	2,189	2,472	2,665	3,007	3,311	3,850	3,953	3,996	4,235	4,502	4,479	10.2
	Shoulder	1,539	1,673	1,851	2,259	2,506	2,879	3,239	3,409	3,757	4,298	4,655	5,145	5,853	6,588	11.8
81.80	Total shoulder replacement	695	798	934	1,239	1,455	1,688	2,036	2,175	2,515	2,965	3,444	3,793	4,421	5,307	16.9
	<i>Total shoulder replacement (elective)</i>	405	503	634	868	1,080	1,331	1,620	1,773	2,073	2,355	2,784	3,011	3,464	4,089	19.5
81.81	Partial shoulder replacement	844	875	917	1,020	1,051	1,191	1,203	1,234	1,242	1,333	1,211	1,352	1,432	1,281	3.3
	Other joints	871	988	1,062	1,394	1,940	2,041	1,915	1,696	1,665	1,623	1,739	1,674	1,720	1,840	5.9
81.56	Total ankle replacement	96	116	150	175	178	256	267	282	254	251	296	313	330	389	11.4
81.57	Replacement of joint of foot and toe	336	409	435	489	649	673	736	720	571	614	608	483	507	526	3.5
81.59	Revision of joint replacement of lower extremity, not elsewhere classified	219	189	183	363	707	599	383	153	201	133	111	90	103	103	-5.6
81.73	Total wrist replacement	45	45	46	50	63	86	74	75	61	54	76	84	69	54	1.4
81.84	Total elbow replacement	92	147	163	214	250	321	320	316	411	404	438	451	478	499	13.9
81.97	Revision of joint replacement of upper extremity	83	82	85	103	93	106	135	150	167	167	210	253	233	269	9.5
	Total	103,041	112,018	119,475	129,590	135,664	142,831	148,526	151,885	154,029	158,794	160,310	165,114	169,735	175,290	4.2

(*) Annual growth rate

(**) ICD-9-CM codes introduced on 1 January 2009: 00.85, 00.86, 00.87

(***) ICD-9-CM codes introduced on 1 January 2009: 00.70, 00.71, 00.72, 00.73

(***) ICD-9-CM codes introduced on 1 January 2009: 00.80, 00.81, 00.82, 00.83, 00.84

Table 4.2. Hip. Arthroplasties performed in the Italian regions (main and secondary procedures)

	Total replacement (elective)		Total replacement (emergency)		Partial replacement		Revision		TOTAL	
	N	%	N	%	N	%	N	%	N	%
Italy	56,631	56.9	9,484	9.5	25,313	25.4	8,069	8.1	99,497	100.0
Piedmont	5,178	9.1	843	8.9	1,979	7.8	706	8.8	8,706	8.8
Valle d'Aosta	150	0.3	10	0.1	85	0.3	12	0.2	257	0.3
Lombardy	13,188	23.3	1,118	11.8	5,199	20.5	1,844	22.9	21,349	21.5
AP Bolzano	1,065	1.9	86	0.9	179	0.7	124	1.5	1,454	1.5
AP Trento	591	1.0	52	0.6	329	1.3	63	0.8	1,035	1.0
Veneto	5,946	10.5	776	8.2	2,227	8.8	775	9.6	9,724	9.8
Friuli Venezia Giulia	1,770	3.1	178	1.9	843	3.3	240	3.0	3,031	3.1
Liguria	1,700	3.0	723	7.6	574	2.3	341	4.2	3,338	3.4
Emilia-Romagna	4,928	8.7	523	5.5	1,653	6.5	784	9.7	7,888	7.9
Tuscany	4,963	8.8	747	7.9	2,074	8.2	744	9.2	8,528	8.6
Umbria	836	1.5	127	1.3	566	2.2	104	1.3	1,633	1.6
Marche	1,218	2.1	341	3.6	659	2.6	196	2.4	2,414	2.4
Lazio	4,343	7.7	1,032	10.9	2,060	8.1	628	7.8	8,063	8.1
Abruzzi	1,272	2.2	286	3.0	648	2.6	133	1.7	2,339	2.4
Molise	179	0.3	18	0.2	156	0.6	24	0.3	377	0.4
Campania	2,779	4.9	874	9.2	1,490	5.9	394	4.9	5,537	5.6
Apulia	2,132	3.8	536	5.7	1,507	6.0	333	4.1	4,508	4.5
Basilicata	290	0.5	45	0.5	274	1.1	33	0.4	642	0.7
Calabria	687	1.2	275	2.9	628	2.5	83	1.0	1,673	1.7
Sicily	2,519	4.4	752	7.9	1,643	6.5	391	4.9	5,305	5.3
Sardinia	897	1.6	142	1.5	540	2.1	117	1.5	1,696	1.7

Table 4.3. Hip. Primary total replacement: number of hospitals by region and class of volume (main and secondary procedures)

	Class of volume of total replacements					TOTAL
	1-50	51-100	101-200	201-300	>300	
Italy	343	204	135	49	23	754
Piedmont	11	20	15	5	2	53
Valle d' Aosta	0	2	0	0	0	2
Lombardy	38	34	18	11	9	110
AP Bolzano	2	2	5	1	0	10
AP Trento	4	2	2	0	0	8
Veneto	11	15	13	8	3	50
Friuli Venezia Giulia	1	6	6	2	0	15
Liguria	6	4	4	1	2	17
Emilia-Romagna	25	16	12	3	2	58
Tuscany	17	12	12	6	4	51
Umbria	6	6	3	0	0	15
Marche	8	6	5	1	0	20
Lazio	48	17	13	3	1	82
Abruzzi	10	6	4	1	0	21
Molise	3	2	0	0	0	5
Campania	47	16	8	2	0	73
Apulia	20	12	7	2	0	41
Basilicata	6	1	1	0	0	8
Calabria	15	2	2	1	0	20
Sicily	52	17	3	2	0	74
Sardinia	13	6	2	0	0	21

Table 4.4. Hip. Revision: number of hospitals by region and class of volume (main and secondary procedures)

	Class of volume of revisions				TOTAL
	1-10	11-25	26-50	>50	
Italy	447	158	39	24	668
Piedmont	25	18	4	2	49
Valle d'Aosta	1	1	0	0	2
Lombardy	59	29	4	10	102
AP Bolzano	4	3	0	1	8
AP Trento	2	4	0	0	6
Veneto	20	19	7	1	47
Friuli Venezia Giulia	5	8	2	0	15
Liguria	7	7	0	2	16
Emilia-Romagna	33	12	5	1	51
Tuscany	24	12	5	4	45
Umbria	8	3	1	0	12
Marche	12	6	1	0	19
Lazio	58	8	4	2	72
Abruzzi	16	3	0	0	19
Molise	4	0	0	0	4
Campania	49	6	2	1	58
Apulia	31	6	3	0	40
Basilicata	6	0	0	0	6
Calabria	14	2	0	0	16
Sicily	53	8	1	0	62
Sardinia	16	3	0	0	19

Table 4.5. Hip. Distribution of arthroplasties (main procedure)

		N	%
ICD-9-CM codes	Arthroplasty	96,147	
81.51	Total hip replacement	64,666	
	Total hip replacement (elective)	55,461	85.8
	Total hip replacement (emergency)	9,205	14.2
81.52	Partial hip replacement	24,613	
	Revision	6,868	
81.53	Revision of hip replacement, not otherwise specified	3,013	43.9
00.70	Revision of hip replacement, both acetabular and femoral components	1,090	15.9
00.71	Revision of hip replacement, acetabular component	1,397	20.3
00.72	Revision of hip replacement, femoral component	759	11.1
00.73	Revision of hip replacement, acetabular liner and/or femoral head only	609	8.9

Table 4.6. Hip. Demographic characteristics by type of procedure

	Total replacement (elective)		Total replacement (emergency)		Partial replacement		Revision		TOTAL	
	N	%	N	%	N	%	N	%	N	%
Patients	54,671		9,107		24,364		5,850		93,992	
Procedures	55,461		9,205		24,613		6,868		96,147	
Gender										
Males	25,255	45.5	2,426	26.4	6,480	26.3	2,591	37.7	36,752	38.2
Females	30,206	54.5	6,779	73.6	18,133	73.7	4,277	62.3	59,395	61.8
Age by gender										
Males										
Mean age	65.4		72.2		82.4		69.6		69.2	
Standard deviation	11.9		12.0		9.6		12.3		13.2	
Median age	67		74		84		72		71	
Interquartile range	58-74		65-81		79-88		63-78		61-79	
Females										
Mean age	69.5		74.7		83.9		73.4		74.8	
Standard deviation	10.8		9.9		7.3		10.7		11.6	
Median age	71		75		85		75		76	
Interquartile range	64-77		69-82		80-89		68-81		68-83	
Class of age										
Males										
<45	1,426	5.7	51	2.1	53	0.8	114	4.4	1,644	4.5
45 - 54	3,212	12.7	163	6.7	82	1.3	208	8.0	3,665	10.0
55 - 64	5,815	23.0	364	15.0	127	2.0	408	15.8	6,714	18.3
65 - 74	8,598	34.0	716	29.5	602	9.3	802	31.0	10,718	29.2
75 - 84	5,745	22.8	781	32.2	2,594	40.0	896	34.6	10,016	27.3
≥ 85	459	1.8	351	14.5	3,022	46.6	163	6.3	3,995	10.9
Females										
<45	768	2.5	23	0.3	21	0.1	66	1.5	878	1.5
45 - 54	2,160	7.2	194	2.9	68	0.4	188	4.4	2,610	4.4
55 - 64	5,373	17.8	771	11.4	227	1.3	494	11.6	6,865	11.6
65 - 74	10,804	35.8	2,174	32.1	1,203	6.6	1,283	30.0	15,464	26.0
75 - 84	9,907	32.8	2,507	37.0	7,424	40.9	1,734	40.5	21,572	36.3
≥ 85	1,194	4.0	1,110	16.4	9,190	50.7	512	12.0	12,006	20.2

Table 4.7. Hip. Arthroplasties by main diagnosis (ICD-9-CM)

	Males		Females		TOTAL	
	N	%	N	%	N	%
Primary total replacement	27,681		36,985		64,666	
Osteoarthritis	23,871	86.2	28,442	76.9	52,313	80.9
Fracture of neck of femur	2,390	8.6	6,731	18.2	9,121	14.1
Other disorders of bone and cartilage	896	3.2	987	2.7	1,883	2.9
Fracture of other and unspecified parts of femur	90	0.3	168	0.5	258	0.4
Other and unspecified disorders of joint	76	0.3	103	0.3	179	0.3
Complications peculiar to certain specified procedures	54	0.2	132	0.4	186	0.3
Late effects of musculoskeletal and connective tissue injuries	53	0.2	104	0.3	157	0.2
Other congenital anomalies of limbs	46	0.2	83	0.2	129	0.2
Other and unspecified arthropathies	46	0.2	30	0.1	76	0.1
Other orthopedic aftercare	15	0.1	26	0.1	41	0.1
Fracture of pelvis	19	0.1	20	0.1	39	0.1
Other derangement of joint	16	0.1	15	0.0	31	0.0
Other diagnoses (N. 75, freq <0.1% on total)	109	0.4	144	0.4	253	0.4
Primary partial replacement	6,480		18,133		24,613	
Fracture of neck of femur	5,976	92.2	17,148	94.6	23,124	94.0
Fracture of other and unspecified parts of femur	122	1.9	365	2.0	487	2.0
Other disorders of bone and cartilage	97	1.5	220	1.2	317	1.3
Osteoarthritis	137	2.1	127	0.7	264	1.1
Complications peculiar to certain specified procedures	31	0.5	59	0.3	90	0.4
Late effects of musculoskeletal and connective tissue injuries	11	0.2	55	0.3	66	0.3
Secondary malignant neoplasm of other specified sites	15	0.2	19	0.1	34	0.1
Fracture of humerus	4	0.1	13	0.1	17	0.1
Other diseases of lung	8	0.1	7	0.0	15	0.1
Multiple fractures involving both lower limbs, lower with upper limb, and lower limb(s) with rib(s) and sternum	0	0.0	13	0.1	13	0.1
Other diagnoses (N. 80, freq <0.1% on total)	79	1.2	107	0.6	186	0.8

Follow

Table 4.7. Follow

	Males		Females		TOTAL	
	N	%	N	%	N	%
Revision	2,591		4,277		6,868	
Complications peculiar to certain specified procedures	2,308	89.1	3,771	88.2	6,079	88.5
Fracture of other and unspecified parts of femur	43	1.7	92	2.2	135	2.0
Fracture of neck of femur	29	1.1	93	2.2	122	1.8
Osteoarthritis	40	1.5	72	1.7	112	1.6
Organ or tissue replaced by other means	41	1.6	70	1.6	111	1.6
Other orthopedic aftercare	22	0.9	29	0.7	51	0.7
Developmental dislocation of joint, pelvic region and thigh	14	0.5	24	0.6	38	0.6
Other and unspecified disorders of joint	16	0.6	17	0.4	33	0.5
Other derangement of joint	8	0.3	17	0.4	25	0.4
Other disorders of bone and cartilage	5	0.2	19	0.4	24	0.4
Late effects of musculoskeletal and connective tissue injuries	6	0.2	16	0.4	22	0.3
Other complications of procedures not elsewhere classified	12	0.5	7	0.2	19	0.3
Disorders of muscle, ligament, and fascia	5	0.2	10	0.2	15	0.2
Fracture of pelvis	4	0.2	6	0.1	10	0.2
Bacterial infection in conditions classified elsewhere and of unspecified site	3	0.1	4	0.1	7	0.1
Malignant neoplasm of bone and articular cartilage	4	0.2	3	0.1	7	0.1
Arthropathy associated with infections	3	0.1	4	0.1	7	0.1
Osteomyelitis, periostitis, and other infections involving bone	3	0.1	4	0.1	7	0.1
Other and unspecified arthropathies	3	0.1	3	0.1	6	0.1
Secondary malignant neoplasm of other specified sites	4	0.2	1	0.0	5	0.1
Other acquired deformities of limbs	2	0.1	2	0.1	4	0.1
Symptoms involving cardiovascular system	4	0.2	0	0.0	4	0.1
Other diagnoses (N. 20, freq <0.1% on total)	12	0.6	13	0.3	25	0.3

Table 4.8. Hip. Primary and revision procedures by type of discharge

	Total replacement (elective)		Total replacement (emergency)		Partial replacement		Revision		TOTAL	
	N	%	N	%	N	%	N	%	N	%
Type of discharge	55,461	57.7	9,205	9.6	24,612	25.6	6,868	7.1	96,109	100.0
Dead	67	0.1	138	1.5	711	2.9	68	1.0	981	1.0
Ordinary discharge	29,218	52.7	5,118	55.6	13,204	53.7	3,744	54.5	51,266	53.3
Discharge to a residential health care	761	1.4	507	5.5	1,868	7.6	185	2.7	3,320	3.5
Discharge to hospital at home	84	0.2	30	0.3	71	0.3	16	0.2	201	0.2
Discharge against medical advice	70	0.1	45	0.5	107	0.4	19	0.3	241	0.3
Transfer to an acute admission unit of a different hospital	1,253	2.3	280	3.0	885	3.6	210	3.1	2,626	2.7
Transfer in the same hospital	13,093	23.6	925	10.1	1,853	7.5	1,299	18.9	17,167	17.9
Transfer to an inpatient rehabilitation hospital	10,720	19.3	2,021	22.0	5,417	22.0	1,269	18.5	19,418	20.2
Discharge to a nursing home	195	0.4	141	1.5	496	2.0	58	0.8	889	0.9

Table 4.9. Hip. Length of stay (days) by procedure and region

Arthroplasty	Total replacement (elective)		Total replacement (emergency)		Partial replacement		Revision	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
	55,461		9,205		24,613		6,868	
Italy	8.3	4.7	12.3	6.2	13.0	7.4	13.4	11.2
Piedmont	8.3	4.2	13.2	6.5	14.3	8.2	14.3	11.0
Valle d'Aosta	7.4	5.4	13.4	2.9	13.5	8.9	16.3	11.7
Lombardy	7.4	4.0	11.7	5.9	12.8	7.9	11.6	10.7
AP Bolzano	8.5	4.0	11.4	6.8	11.4	7.2	13.4	9.9
AP Trento	6.7	2.8	10.3	5.9	11.3	5.6	10.2	6.4
Veneto	9.4	4.7	13.8	6.9	15.9	8.8	15.0	10.5
Friuli Venezia Giulia	8.8	3.7	13.6	6.8	15.4	7.9	14.6	12.1
Liguria	7.5	6.7	13.8	7.1	14.8	8.7	13.2	11.1
Emilia-Romagna	9.3	4.2	12.1	6.2	12.5	6.5	12.6	9.1
Tuscany	7.9	2.8	10.2	4.0	11.2	5.0	11.7	11.4
Umbria	8.3	3.4	11.7	7.6	11.2	6.5	12.0	5.6
Marche	10.0	5.0	14.9	6.1	15.0	8.7	15.9	12.9
Lazio	8.8	6.7	10.7	5.9	12.5	7.9	15.0	13.0
Abruzzi	7.9	4.5	11.7	5.1	12.0	5.6	12.8	9.8
Molise	9.8	8.2	15.5	6.4	15.7	6.1	17.2	13.1
Campania	9.0	4.7	13.0	6.2	12.5	5.7	14.3	11.0
Apulia	8.4	4.3	11.8	5.9	12.5	7.1	15.2	13.8
Basilicata	8.4	2.8	10.0	4.0	9.0	3.4	11.5	6.5
Calabria	8.6	4.5	11.5	5.5	11.0	4.7	15.7	11.6
Sicily	7.8	5.0	11.5	6.1	11.9	6.1	13.8	11.6
Sardinia	10.1	7.5	15.2	6.9	14.7	7.2	21.0	16.5

Table 4.10. Hip. Primary and revision procedures by hospitalization burden

	Total replacement (elective)		Total replacement (emergency)		Partial replacement		Revision		TOTAL	
	N	%	N	%	N	%	N	%	N	%
Hospitalization burden	55,461		9,205		24,612		6,868		96,146	
National Health System	52,840	95.3	8,986	97.6	24,382	99.1	6,577	95.8	92,785	96.5
Other	2,621	4.7	219	2.4	230	0.9	291	4.2	3,361	3.5

Table 4.11. Hip. Primary and revision procedures by hospitalization burden. Details of the *Other* value of Table 4.10

	Total replacement (elective)		Total replacement (emergency)		Partial replacement		Revision		TOTAL	
	N	%	N	%	N	%	N	%	N	%
Hospitalization burden	2,621		219		230		291		3,361	
Patient's contribution for the accommodation payment	913	34.8	30	13.7	63	27.4	77	26.5	1,083	32.2
Reimbursement	112	4.3	9	4.1	3	1.3	15	5.2	139	4.1
Solvent	1,102	42.0	82	37.4	84	36.5	142	48.8	1,410	42.0
Surgeon's fee charged to patient	183	7.0	17	7.8	27	11.7	13	4.5	240	7.1
Surgeon's fee and accommodation charged to patient	259	9.9	16	7.3	19	8.3	30	10.3	324	9.6
Foreigners charged to NHS	25	1.0	54	24.7	30	13.0	3	1.0	112	3.3
Indigent foreigners charged to NHS	24	0.9	8	3.7	1	0.4	2	0.7	35	1.0
Other	3	0.1	3	1.4	3	1.3	9	3.1	18	0.5

Table 4.12. Knee. Arthroplasties performed in the Italian regions (main and secondary procedures)

	Total replacement		Revision		TOTAL	
	N	%	N	%	N	%
Italy	62,886	93.4	4,479	6.6	67,365	100.0
Piedmont	4,509	7.2	320	7.1	4,829	7.2
Valle d'Aosta	121	0.2	1	0.0	122	0.2
Lombardy	13,586	21.6	1,160	25.9	14,746	21.9
AP Bolzano	800	1.3	58	1.3	858	1.3
AP Trento	564	0.9	31	0.7	595	0.9
Veneto	6,937	11.0	443	9.9	7,380	11.0
Friuli Venezia Giulia	1,640	2.6	98	2.2	1,738	2.6
Liguria	1,649	2.6	131	2.9	1,780	2.6
Emilia-Romagna	4,167	6.6	424	9.5	4,591	6.8
Tuscany	6,004	9.6	503	11.2	6,507	9.7
Umbria	1,291	2.1	95	2.1	1,386	2.1
Marche	1,617	2.6	76	1.7	1,693	2.5
Lazio	4,337	6.9	296	6.6	4,633	6.9
Abruzzi	1,739	2.8	85	1.9	1,824	2.7
Molise	229	0.4	8	0.2	237	0.4
Campania	2,963	4.7	160	3.6	3,123	4.6
Apulia	3,067	4.9	158	3.5	3,225	4.8
Basilicata	376	0.6	25	0.6	401	0.6
Calabria	1,135	1.8	53	1.2	1,188	1.8
Sicily	4,671	7.4	309	6.9	4,980	7.4
Sardinia	1,484	2.4	45	1.0	1,529	2.3

Table 4.13. Knee. Primary total replacement: number of hospitals by region and class of volume (main and secondary procedures)

	Class of volume of total replacements					TOTAL
	1-50	51-100	101-200	201-300	>300	
Italy	404	154	119	37	33	747
Piedmont	26	10	12	3	2	53
Valle d' Aosta	1	1	0	0	0	2
Lombardy	53	24	18	7	10	112
AP Bolzano	4	2	3	1	0	10
AP Trento	3	2	3	0	0	8
Veneto	20	12	10	2	5	49
Friuli Venezia Giulia	2	6	5	2	0	15
Liguria	7	4	3	0	2	16
Emilia-Romagna	34	16	5	0	4	59
Tuscany	19	12	10	5	5	51
Umbria	6	5	4	1	0	16
Marche	10	6	3	2	0	21
Lazio	50	15	12	1	1	79
Abruzzi	12	5	1	1	2	21
Molise	4	0	1	0	0	5
Campania	51	12	6	1	0	70
Apulia	26	4	7	4	0	41
Basilicata	5	1	2	0	0	8
Calabria	15	2	0	2	1	20
Sicily	43	12	11	3	1	70
Sardinia	13	3	3	2	0	21

Table 4.14. Knee. Revision: number of hospitals by region and class of volume (main and secondary procedures)

	Class of volume of revisions				TOTAL
	1-10	11-25	26-50	>50	
Italy	444	72	29	6	551
Piedmont	30	11	1	0	42
Valle d'Aosta	1	0	0	0	1
Lombardy	64	9	12	3	88
AP Bolzano	6	1	0	0	7
AP Trento	7	0	0	0	7
Veneto	30	10	2	1	43
Friuli Venezia Giulia	10	4	0	0	14
Liguria	9	1	2	0	12
Emilia-Romagna	37	5	2	1	45
Tuscany	29	6	6	1	42
Umbria	12	0	1	0	13
Marche	13	1	0	0	14
Lazio	43	5	2	0	50
Abruzzi	10	3	0	0	13
Molise	4	0	0	0	4
Campania	38	3	0	0	41
Apulia	28	4	0	0	32
Basilicata	6	0	0	0	6
Calabria	11	1	0	0	12
Sicily	43	8	1	0	52
Sardinia	13	0	0	0	13

Table 4.15. Knee. Distribution of arthroplasties (main procedure)

		N	%
ICD-9-CM codes	Arthroplasty	96,147	
81.54	Totale knee replacement	61,923	
	Revision	3,884	
81.55	Revision of knee replacement, not otherwise specified	1,668	42.9
00.80	Revision of knee replacement, total (all components)	1,493	38.4
00.81	Revision of knee replacement, tibial component	191	4.9
00.82	Revision of knee replacement, femoral component	96	2.5
00.83	Revision of knee replacement, patellar component	238	6.1
00.84	Revision of total knee replacement, tibial insert	198	5.1

Table 4.16. Knee. Demographic characteristics by type of procedure

	Total replacement		Revision		TOTAL	
	N	%	N	%	N	%
Patients	60,855		3,276		64,131	
Procedures	61,923		3,884		65,807	
Gender						
Males	19,574	31.6	1,155	29.7	20,729	31.5
Females	42,349	68.4	2,729	70.3	45,078	68.5
Age by gender						
Males						
Mean age	69.5		67.9		69.4	
Standard deviation	9.3		11.3		9.4	
Median age	71		70		71	
Interquartile range	65-76		63-76		65-76	
Females						
Mean age	70.7		70.2		70.7	
Standard deviation	8.0		9.5		8.1	
Median age	72		71		72	
Interquartile range	66-76		65-77		66-76	
Class of age						
Males						
<45	314	1.6	49	4.2	363	1.8
45 - 54	940	4.8	78	6.8	1,018	4.9
55 - 64	3,409	17.4	211	18.3	3,620	17.5
65 - 74	8,647	44.2	481	41.7	9,128	44.0
75 - 84	5,992	30.6	309	26.8	6,301	30.4
≥ 85	272	1.4	27	2.3	299	1.4
Females						
<45	217	0.5	42	1.5	259	0.6
45 - 54	1,243	2.9	111	4.1	1,354	3.0
55 - 64	6,888	16.3	467	17.1	7,355	16.3
65 - 74	19,383	45.8	1,153	42.3	20,536	45.6
75 - 84	13,925	32.9	879	32.2	14,804	32.8
≥ 85	693	1.6	77	2.8	770	1.7

Table 4.17. Knee. Arthroplasties by main diagnosis (ICD-9-CM)

	Males		Females		TOTAL	
	N	%	N	%	N	%
Total replacement	19,574		42,349		61,923	
Osteoarthritis	18,867	96.4	41,103	97.1	59,970	96.9
Other acquired deformities of limbs	259	1.3	578	1.4	837	1.4
Other disorders of bone and cartilage	81	0.4	166	0.4	247	0.4
Complications peculiar to certain specified procedures	48	0.3	106	0.3	154	0.3
Other and unspecified disorders of joint	39	0.2	108	0.3	147	0.2
Internal derangement of knee	74	0.4	52	0.1	126	0.2
Other and unspecified arthropathies	25	0.1	41	0.1	66	0.1
Osteochondropathies	39	0.2	23	0.1	62	0.1
Malignant neoplasm of bone and articular cartilage	27	0.1	20	0.1	47	0.1
Other derangement of joint	27	0.1	13	0.0	40	0.1
Other diagnoses (N, 40, freq <0,1% on total)	88	0.5	139	0.3	227	0.4
Revision	1,155		2,729		3,884	
Complications peculiar to certain specified procedures	938	81.2	2,251	82.5	3,189	82.1
Osteoarthritis	66	5.7	184	6.7	250	6.4
Organ or tissue replaced by other means	46	4.0	83	3.0	129	3.3
Other disorders of bone and cartilage	22	1.9	45	1.7	67	1.7
Other orthopedic aftercare	20	1.7	38	1.4	58	1.5
Other derangement of joint	11	1.0	27	1.0	38	1.0
Internal derangement of knee	9	0.8	23	0.8	32	0.8
Arthropathy associated with infections	11	1.0	6	0.2	17	0.4
Other and unspecified arthropathies	6	0.5	10	0.4	16	0.4
Fracture of other and unspecified parts of femur	2	0.2	10	0.4	12	0.3
Other acquired deformities of limbs	1	0.1	10	0.4	11	0.3
Osteomyelitis, periostitis, and other infections involving bone	7	0.6	4	0.2	11	0.3
Other disorders of bone and cartilage	1	0.1	5	0.2	6	0.2
Fracture of tibia and fibula	1	0.1	5	0.2	6	0.2

Follow

Table 4.17. Follow

	Males		Females		TOTAL	
	N	%	N	%	N	%
Dislocation of knee	1	0.1	5	0.2	6	0.2
Malignant neoplasm of bone and articular cartilage	1	0.1	4	0.2	5	0.1
Bacterial infection in conditions classified elsewhere and of unspecified	0	0.0	4	0.2	4	0.1
Osteochondropathies	0	0.0	4	0.2	4	0.1
Sprains and strains of knee and leg	2	0.2	1	0.0	3	0.1
Other disorders of synovium, tendon, and bursa	0	0.0	2	0.1	2	0.1
Fitting and adjustment of other device	1	0.1	1	0.0	2	0.1
Fracture of patella	0	0.0	2	0.1	2	0.1
Late effects of musculoskeletal and connective tissue injuries	1	0.1	1	0.0	2	0.1
Septicemia	1	0.1	1	0.0	2	0.1
Other diagnoses (N, 10, freq <0,1% on total)	7	0.6	3	0.1	10	0.3

Table 4.18. Knee. Primary and revision procedures by type of discharge

	Total replacement		Revision		TOTAL	
	N	%	N	%	N	%
Type of discharge	55,461	57.7	6,868	7.1	96,109	100.0
Dead	33	0.1	7	0.2	40	0.1
Ordinary discharge	32,601	52.7	2,162	55.7	34,763	52.8
Discharge to a residential health care	542	0.9	38	1.0	580	0.9
Discharge to hospital at home	83	0.1	2	0.1	85	0.1
Discharge against medical advice	65	0.1	4	0.1	69	0.1
Transfer to an acute admission unit of a different hospital	1,060	1.7	74	1.9	1,134	1.7
Transfer in the same hospital	15,784	25.5	1,016	26.2	16,800	25.5
Transfer to an inpatient rehabilitation hospital	11,577	18.7	570	14.7	12,147	18.5
Discharge to a nursing home	178	0.3	11	0.3	189	0.3

Table 4.19. Knee. Length of stay (days) by procedure and region

Arthroplasty	Total replacement		Revision	
	61,923		3,884	
	Mean	S.D.	Mean	S.D.
Italy	7.7	3.7	9.8	7.6
Piedmont	7.5	3.8	10.1	8.3
Valle d'Aosta	5.1	3.3	4.0	-
Lombardy	6.8	3.3	7.6	5.2
AP Bolzano	9.3	3.2	12.0	7.3
AP Trento	7.2	3.9	11.0	8.8
Veneto	8.2	4.0	11.1	10.2
Friuli Venezia Giulia	8.8	3.8	11.9	7.4
Liguria	6.8	3.5	12.0	10.8
Emilia-Romagna	9.0	3.5	10.9	7.5
Tuscany	7.9	2.5	9.6	4.7
Umbria	7.3	3.3	10.3	7.3
Marche	9.3	3.5	11.6	7.7
Lazio	8.1	4.9	9.9	6.1
Abruzzi	7.1	3.0	8.1	5.5
Molise	6.6	2.7	13.7	6.2
Campania	8.5	3.8	10.7	6.2
Apulia	7.9	3.2	11.4	10.3
Basilicata	8.6	3.2	15.3	20.2
Calabria	8.1	3.7	9.8	11.1
Sicily	7.0	3.4	9.3	6.8
Sardinia	8.4	4.4	14.7	17.0

Table 4.20. Knee. Primary and revision procedures by hospitalization burden

	Total replacement		Revision		TOTAL	
	N	%	N	%	N	%
Hospitalization burden					65,807	
National Health System	60,127	97.1	3,780	97.3	63,907	97.1
Other	1,796	2.9	104	2.7	1,900	2.9

Table 4.21. Knee. Primary and revision procedures by hospitalization burden. Details of the *Other* value of Table 4.20

	Total replacement		Revision		TOTAL	
	N	%	N	%	N	%
Hospitalization burden	1,796		104		1,900	
Patient's contribution for the accommodation payment	879	48.9	67	64.4	946	49.8
Reimbursement	75	4.2	2	1.9	77	4.1
Solvent	664	37.0	25	24.0	689	36.3
Surgeon's fee charged to patient	72	4.0	3	2.9	75	3.9
Surgeon's fee and accommodation charged to patient	78	4.3	2	1.9	80	4.2
Foreigners charged to NHS	17	1.0	4	3.9	21	1.1
Indigent foreigners charged to NHS	10	0.6	1	1.0	11	0.6
Other	1	0.1	0	0.0	1	0.1

Table 4.22. Shoulder. Arthroplasties performed in the Italian regions (main and secondary procedures)

	Total replacement (elective)		Total replacement (emergency)		Partial replacement		TOTAL	
	N	%	N	%	N	%	N	%
Italy	4,089	62.1	1,218	18.5	1,281	19.4	6,588	100.0
Piedmont	332	8.1	107	8.8	59	4.6	498	7.6
Valle d'Aosta	3	0.1	3	0.3	0	0.0	6	0.1
Lombardy	789	19.3	232	19.1	271	21.2	1,292	19.6
AP Bolzano	21	0.5	4	0.3	21	1.6	46	0.7
AP Trento	42	1.0	12	1.0	20	1.6	74	1.1
Veneto	432	10.6	173	14.2	240	18.7	845	12.8
Friuli Venezia Giulia	116	2.8	26	2.1	25	2.0	167	2.5
Liguria	99	2.4	32	2.6	19	1.5	150	2.3
Emilia-Romagna	550	13.5	113	9.3	101	7.9	764	11.6
Tuscany	418	10.2	73	6.0	104	8.1	595	9.0
Umbria	92	2.3	23	1.9	25	2.0	140	2.1
Marche	117	2.9	51	4.2	21	1.6	189	2.9
Lazio	338	8.3	75	6.2	104	8.1	517	7.9
Abruzzi	92	2.3	32	2.6	46	3.6	170	2.6
Molise	4	0.1	5	0.4	4	0.3	13	0.2
Campania	170	4.2	35	2.9	46	3.6	251	3.8
Apulia	182	4.5	114	9.4	68	5.3	364	5.5
Basilicata	21	0.5	7	0.6	9	0.7	37	0.6
Calabria	43	1.1	25	2.1	10	0.8	78	1.2
Sicily	199	4.9	68	5.6	51	4.0	318	4.8
Sardinia	29	0.7	8	0.7	37	2.9	74	1.1

Table 4.23. Shoulder. Primary total replacement: number of hospitals by region and class of volume (main and secondary procedures)

	Class of volume of total replacements					TOTAL
	1-4	5-9	10-14	15-24	≥25	
Italy	221	105	60	51	54	491
Piedmont	14	8	8	5	5	40
Valle d' Aosta	2	0	0	0	0	2
Lombardy	36	24	7	8	12	87
AP Bolzano	4	3	0	0	0	7
AP Trento	5	2	1	1	0	9
Veneto	7	6	9	12	7	41
Friuli Venezia Giulia	2	3	3	1	1	10
Liguria	8	1	1	1	1	12
Emilia-Romagna	17	8	8	5	7	45
Tuscany	14	8	2	2	7	33
Umbria	3	4	3	2	0	12
Marche	11	4	1	1	2	19
Lazio	26	6	5	4	4	45
Abruzzi	8	5	1	1	1	16
Molise	1	1	0	0	0	2
Campania	17	4	2	4	1	28
Apulia	12	8	3	2	3	28
Basilicata	2	1	0	1	0	4
Calabria	4	3	2	1	0	10
Sicily	21	5	3	0	3	32
Sardinia	7	1	1	0	0	9

Table 4.24. Shoulder. Primary partial replacement: number of hospitals by region and class of volume (main and secondary procedures)

	Class of volume of partial replacements					TOTAL
	1-4	5-9	10-14	15-24	≥25	
Italy	247	52	14	16	1	330
Piedmont	26	1	0	0	0	27
Valle d'Aosta	0	0	0	0	0	0
Lombardy	45	12	3	4	0	64
AP Bolzano	2	1	1	0	0	4
AP Trento	6	1	0	0	0	7
Veneto	18	5	4	7	0	34
Friuli Venezia Giulia	6	2	0	0	0	8
Liguria	3	2	0	0	0	5
Emilia-Romagna	22	3	0	2	0	27
Tuscany	14	3	0	1	1	19
Umbria	3	1	1	0	0	5
Marche	6	2	0	0	0	8
Lazio	27	6	1	0	0	34
Abruzzi	8	2	2	0	0	12
Molise	1	0	0	0	0	1
Campania	13	2	0	1	0	16
Apulia	15	3	1	1	0	20
Basilicata	4	0	0	0	0	4
Calabria	6	0	0	0	0	6
Sicily	16	4	0	0	0	20
Sardinia	6	2	1	0	0	9

Table 4.25. Shoulder. Distribution of arthroplasties (main procedure)

		N	%
ICD-9-CM codes	Arthroplasty	6,323	
81.80	Total shoulder replacement	5,179	
	Total replacement (elective)	4,006	77.4
	Total replacement (emergency)	1,173	22.6
81.81	Partial shoulder replacement	1,144	

Table 4.26. Shoulder. Demographic characteristics by type of procedure

	Total replacement (elective)		Total replacement (emergency)		Partial replacement		TOTAL	
	N	%	N	%	N	%	N	%
Patients	3,965		1,166		1,113		6,244	
Procedures	4,006		1,173		1,144		6,323	
Gender								
Males	1,171	29.2	170	14.5	384	33.6	1,725	27.3
Females	2,835	70.8	1,003	85.5	760	66.4	4,598	72.7
Age by gender								
Males								
Mean age	68.5		72.3		62.9		67.6	
Standard deviation	9.4		10.4		13.6		10.9	
Median age	70		74		64		70	
Interquartile range	64-75		67-79		55-72		62-75	
Females								
Mean age	72.7		75.0		70.9		72.9	
Standard deviation	7.4		7.1		10.8		8.1	
Median age	74		76		73		74	
Interquartile range	69-77		71-80		65-79		69-78	
Class of age								
Males								
<45	31	2.7	3	1.8	33	8.6	67	3.9
45 - 54	81	6.9	7	4.1	53	13.8	141	8.2
55 - 64	196	16.7	24	14.1	107	27.9	327	19.0
65 - 74	551	47.1	52	30.6	118	30.7	721	41.8
75 - 84	299	25.5	70	41.2	65	16.9	434	25.2
≥ 85	13	1.1	14	8.2	8	2.1	35	2.0
Females								
<45	17	0.6	0	0.0	16	2.1	33	0.7
45 - 54	36	1.3	11	1.1	42	5.5	89	1.9
55 - 64	254	9.0	68	6.8	114	15.0	436	9.5
65 - 74	1,261	44.5	357	35.6	275	36.2	1,893	41.2
75 - 84	1,194	42.1	499	49.8	266	35.0	1,959	42.6
≥ 85	73	2.6	68	6.8	47	6.2	188	4.1

Table 4.27. Shoulder. Arthroplasties by main diagnosis (ICD-9-CM)

	Males		Females		TOTAL	
	N	%	N	%	N	%
Total replacement	1,341		3,838		5,179	
Osteoarthritis	840	62.6	2,093	54.5	2,933	56.6
Fracture of humerus	168	12.5	986	25.7	1,154	22.3
Other disorders of synovium, tendon, and bursa	81	6.0	161	4.2	242	4.7
Other and unspecified arthropathies	48	3.6	113	2.9	161	3.1
Other disorders of bone and cartilage	39	2.9	82	2.1	121	2.3
Complications peculiar to certain specified procedures	32	2.4	72	1.9	104	2.0
Other and unspecified disorders of joint	25	1.9	76	2.0	101	2.0
Peripheral enthesopathies and allied syndromes	36	2.7	63	1.6	99	1.9
Late effects of musculoskeletal and connective tissue injuries	20	1.5	55	1.4	75	1.5
Other derangement of joint	15	1.1	38	1.0	53	1.0
Fracture of scapula	9	0.7	29	0.8	38	0.7
Dislocation of shoulder	3	0.2	29	0.8	32	0.6
Organ or tissue replaced by other means	5	0.4	6	0.2	11	0.2
Other orthopedic aftercare	5	0.4	5	0.1	10	0.2
Rheumatoid arthritis and other inflammatory polyarthropathies	3	0.2	4	0.1	7	0.1
Sprains and strains of shoulder and upper arm	2	0.2	4	0.1	6	0.1
Secondary malignant neoplasm of other specified sites	3	0.2	2	0.1	5	0.1
Crystal arthropathies	1	0.1	3	0.1	4	0.1
Malignant neoplasm of bone and articular cartilage	1	0.1	3	0.1	4	0.1
Other diagnoses (N.14, freq <0.1% on total)	5	0.4	14	0.4	19	0.4
Partial replacement	384		760		1,144	
Fracture of humerus	114	29.7	387	50.9	501	43.8
Osteoarthritis	97	25.3	184	24.2	281	24.6
Other disorders of synovium, tendon, and bursa	71	18.5	67	8.8	138	12.1
Other disorders of bone and cartilage	17	4.4	26	3.4	43	3.8
Complications peculiar to certain specified procedures	17	4.4	16	2.1	33	2.9
Peripheral enthesopathies and allied syndromes	15	3.9	13	1.7	28	2.5

Follow

Table 4.27. Follow

	Males		Females		TOTAL	
	N	%	N	%	N	%
Sprains and strains of shoulder and upper arm	6	1.6	10	1.3	16	1.4
Dislocation of shoulder	14	3.7	2	0.3	16	1.4
Other and unspecified disorders of joint	3	0.8	10	1.3	13	1.1
Malignant neoplasm of bone and articular cartilage	6	1.6	7	0.9	13	1.1
Other and unspecified arthropathies	5	1.3	3	0.4	8	0.7
Late effects of musculoskeletal and connective tissue injuries	1	0.3	6	0.8	7	0.6
Other orthopedic aftercare	5	1.3	1	0.1	6	0.5
Other derangement of joint	3	0.8	2	0.3	5	0.4
Fracture of neck of femur	0	0.0	5	0.7	5	0.4
Organ or tissue replaced by other means	1	0.3	4	0.5	5	0.4
Fracture of scapula	0	0.0	4	0.5	4	0.4
Secondary malignant neoplasm of other specified sites	3	0.8	1	0.1	4	0.4
III-defined fractures of upper limb	0	0.0	2	0.3	2	0.2
Osteomyelitis, periostitis, and other infections involving bone	1	0.3	1	0.1	2	0.2
Certain adverse effects not elsewhere classified	0	0.0	1	0.1	1	0.1
Other congenital anomalies of limbs	0	0.0	1	0.1	1	0.1
Other and unspecified disorders of joint	0	0.0	1	0.1	1	0.1
Sprains and strains of sacroiliac region	0	0.0	1	0.1	1	0.1
Epilepsy	1	0.3	0	0.0	1	0.1
Fracture of radius and ulna	0	0.0	1	0.1	1	0.1
Fracture of clavicle	0	0.0	1	0.1	1	0.1
Dislocation of hip	1	0.3	0	0.0	1	0.1
Symptoms involving cardiovascular system	0	0.0	1	0.1	1	0.1
Toxoplasmosis	0	0.0	1	0.1	1	0.1
Benign neoplasm of bone and articular cartilage	0	0.0	1	0.1	1	0.1
Malignant neoplasm of connective and other soft tissue	1	0.3	0	0.0	1	0.1
Malignant neoplasm of trachea, bronchus, and lung	1	0.3	0	0.0	1	0.1
Burn of upper limb, except wrist and hand	1	0.3	0	0.0	1	0.1

Table 4.28. Shoulder. Primary procedures by type of discharge

	Total replacement (elective)		Total replacement (emergency)		Partial replacement		TOTAL	
	N	%	N	%	N	%	N	%
Type of discharge	4,006		1,173		1,144		6,323	
Dead	1	0.0	3	0.3	0	0.0	4	0.1
Ordinary discharge	3,729	93.1	1,066	90.9	1,076	94.1	5,871	92.9
Discharge to a residential health care	8	0.2	17	1.5	7	0.6	32	0.5
Discharge to hospital at home	3	0.1	4	0.3	3	0.3	10	0.2
Discharge against medical advice	3	0.1	1	0.1	1	0.1	5	0.1
Transfer to an acute admission unit of a different hospital	20	0.5	13	1.1	11	1.0	44	0.7
Transfer in the same hospital	171	4.3	27	2.3	12	1.1	210	3.3
Transfer to an inpatient rehabilitation hospital	69	1.7	33	2.8	31	2.7	133	2.1
Discharge to a nursing home	2	0.1	9	0.8	3	0.3	14	0.2

Table 4.29. Shoulder. Length of stay (days) by procedure and region

Arthroplasty	Total replacement (elective)		Total replacement (emergency)		Partial replacement	
	4,006		1,173		1,144	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Italy	5.6	3.4	9.7	5.8	7.4	8.2
Piedmont	5.9	2.9	8.3	6.7	6.1	3.6
Valle d'Aosta	5.0	2.6	8.0	4.6	-	-
Lombardy	5.5	2.9	9.6	5.0	9.0	11.2
AP Bolzano	6.9	2.2	11.3	3.7	11.2	6.8
AP Trento	4.5	1.7	9.5	4.3	4.9	2.4
Veneto	6.8	4.2	11.0	6.4	5.5	6.5
Friuli Venezia Giulia	5.2	3.1	11.9	9.5	5.3	5.1
Liguria	3.4	4.0	11.3	7.5	7.7	3.2
Emilia-Romagna	5.0	2.5	9.0	5.9	7.0	4.3
Tuscany	4.8	1.4	8.2	5.6	6.3	3.8
Umbria	4.7	2.7	8.8	2.9	5.0	4.0
Marche	3.4	2.4	7.9	7.2	4.8	2.1
Lazio	6.5	4.9	10.7	6.2	10.0	14.5
Abruzzi	5.6	4.2	9.8	4.4	7.3	5.6
Molise	12.3	4.3	12.8	2.8	8.0	2.8
Campania	8.0	5.1	10.9	4.9	6.2	4.6
Apulia	5.7	3.2	9.4	3.9	7.4	7.2
Basilicata	4.5	2.0	9.8	6.2	10.3	5.6
Calabria	6.0	2.8	7.9	3.0	9.5	3.8
Sicily	5.4	3.4	10.9	5.7	8.0	3.6
Sardinia	7.4	3.9	10.8	3.3	10.1	7.6

Table 4.30. Shoulder. Primary procedures by hospitalization burden

	Total replacement (elective)		Total replacement (emergency)		Partial replacement		TOTAL	
	N	%	N	%	N	%	N	%
Hospitalization burden	4,006		1,173		1,144		6,323	
National Health System	3,843	95.9	1,147	97.8	1,112	97.2	6,102	96.5
Other	163	4.1	26	2.2	32	2.8	221	3.5

Table 4.31. Shoulder. Primary procedures by hospitalization burden. Details of the *Other* value of Table 4.30

	Total replacement (elective)		Total replacement (emergency)		Partial replacement		TOTAL	
	N	%	N	%	N	%	N	%
Hospitalization burden	163		26		32		221	
Patient's contribution for the accommodation payment	89	54.6	8	30.8	12	37.5	109	49.3
Reimbursement	4	2.5	0	0.0	0	0.0	4	1.8
Solvent	50	30.7	11	42.3	10	31.3	71	32.1
Surgeon's fee charged to patient	4	2.5	1	3.9	2	6.3	7	3.2
Surgeon's fee and accomodation charged to patient	16	9.8	5	19.2	4	12.5	25	11.3
Foreigners charged to NHS	0	0.0	1	3.9	3	9.4	4	1.8
Indigent foreigners charged to NHS	0	0.0	0	0.0	1	3.1	1	0.5

Table 5.1. Participation rate and completeness of the regions involved in the RIAP project (2015)

Regions	Joint	N. hospitals RIAP	N. hospitals HDR	Participation (%)	N. hospital admissions RIAP	N. hospital admissions HDR	Completeness (%)
Lombardy	Hip	112	112	100.0	20,359	20,651	98.6
	Knee	112	112	100.0	14,467	14,581	99.2
AP Bolzano	Hip	8	10	80.0	1,492	1,529	97.6
	Knee	8	10	80.0	917	958	95.7
AP Trento	Hip	7	8	87.5	837	1,082	77.4
	Knee	5	8	62.5	40	620	6.5
Tuscany	Hip	1	45	2.2	383	8,840	4.3
	Knee	1	45	2.2	156	7,072	2.2
Marche	Hip	12	19	63.2	1,028	2,402	42.8
	Knee	12	21	57.1	861	1,603	53.7
Abruzzi	Hip	2	22	9.1	90	2,242	4.0
	Knee	2	22	9.1	32	1,903	1.7
Apulia	Hip	43	43	100.0	4,636	4,657	99.5
	Knee	43	43	100.0	3,286	3,287	100.0
Basilicata	Hip	2	6	33.3	348	657	53.0
	Knee	2	6	33.3	301	417	72.2
Calabria	Hip	11	20	55.0	690	1,712	40.3
	Knee	10	20	50.0	671	1,228	54.6
Sicily	Hip	8	72	11.1	637	5,479	11.6
	Knee	8	71	11.3	778	4,809	16.2
Total	Hip	206	357	57.7	30,500	49,251	61.9
	Knee	203	358	56.7	21,509	36,478	59.0

Participation rate: number of hospitals participating in the RIAP out of number of hospitals included in the Hospital Discharge Records (HDR)

Completeness: number of admissions recorded in RIAP out of number of admissions recorded in HDR

Table 5.2. Hip. Completeness of the hospitals participating in the RIAP project (2015)

Regions	Hospitals	Completeness (%)
Lombardy	Casa di Cura S. Francesco, Bergamo	100.6
	Casa di Cura Beato Luigi Talamoni, Lecco	100.0
	Casa di Cura Beato Palazzolo, Bergamo	100.0
	Casa di Cura Figlie di S. Camillo, Cremona	100.0
	Casa di Cura G.B. Mangioni, Lecco	100.0
	Casa di Cura Igea, Milano	100.0
	Casa di Cura Policlinico, Monza	100.0
	Casa di Cura S. Maria delle Grazie, Voghera (PV)	100.0
	Casa di Cura S. Pio X, Milano	100.0
	Clinica San Carlo, Paderno Dugnano (MI)	100.0
	IRCCS Policlinico San Donato Milanese (MI)	100.0
	Istituti Clinici Zucchi Spa, Monza	100.0
	Istituti Ospitalieri, Cremona	100.0
	Istituto Clinico S. Ambrogio Spa, Milano	100.0
	Istituto Clinico S. Siro Spa, Milano	100.0
	Istituto Clinico Beato Matteo, Vigevano (PV)	100.0
	Istituto Clinico Città di Brescia, Brescia	100.0
	Istituto Clinico Città Studi, Milano	100.0
	Istituto Clinico S. Anna, Brescia	100.0
	Istituto Clinico S. Rocco Spa, Ome (BS)	100.0
	Istituto Clinico Villa Aprica Spa, Como	100.0
	Nuovo Ospedale di Broni-Stradella (PV)	100.0
	Ospedale Caduti Bollatesi, Bollate (MI)	100.0
	Ospedale Carlo Ondoli, Angera (VA)	100.0
	Ospedale Civico di Codogno (LO)	100.0
	Ospedale Civile di Voghera (PV)	100.0
	Ospedale Civile G. Fornaroli, Magenta (MI)	100.0
	Ospedale Civile La Memoria di Gavardo (BS)	100.0
	Ospedale Costantino Cantù, Abbiategrasso (MI)	100.0
	Ospedale di Chiavenna (SO)	100.0

Follow

Table 5.2. Follow

Regions	Hospitals	Completeness (%)
Lombardy (follow)	Ospedale di Circolo, Rho (MI)	100.0
	Ospedale di Cuggiono (MI)	100.0
	Ospedale di Desenzano (BS)	100.0
	Ospedale di Manerbio (BS)	100.0
	Ospedale di Treviglio-Caravaggio (BG)	100.0
	Ospedale G. Salvini, Garbagnate Milanese (MI)	100.0
	Ospedale Galmarini, Tradate (VA)	100.0
	Ospedale Generale Provinciale, Saronno (VA)	100.0
	Ospedale L. Sacco, Milano	100.0
	Ospedale M.O. Antonio Locatelli, Piaro (BG)	100.0
	Ospedale Morelli, Sondalo (SO)	100.0
	Ospedale Moriggia Pelascini, Gravedona (CO)	100.0
	Ospedale Pesenti Fenaroli, Alzano Lombardo (BG)	100.0
	Ospedale S. Antonio Abate, Cantù (CO)	100.0
	Ospedale S. Gerardo, Monza	100.0
	Ospedale Sacra Famiglia - Fatebenefratelli, Erba (CO)	100.0
	Ospedale San Pellegrino, Castiglione delle Stiviere (MN)	100.0
	Ospedale SS. Capitanio e Gerosa, Lovere (BG)	100.0
	Ospedale SS. Trinità, Romano di Lombardia (BG)	100.0
	Ospedale Valcamonica, Edolo (BS)	100.0
	Ospedale Valcamonica, Esine (BS)	100.0
	PO Centro Traumatologico Ortopedico, Milano	100.0
	PO di Carate Brianza (MB)	100.0
	PO di Chiari (BS)	100.0
	PO di Gardone Val Trompia (BS)	100.0
	PO di Iseo (BS)	100.0
	PO di Montichiari (BS)	100.0
	PO Spedali Civili di Brescia	100.0
	Policlinico S. Matteo, Pavia	100.0
	Policlinico San Marco, Osio Sotto (BG)	100.0

Follow

Table 5.2. Follow

Regions	Hospitals	Completeness (%)
Lombardy (follow)	Policlinico San Pietro, Ponte S. Pietro (BG)	100.0
	Polo Chirurgico Capitanio, Milano	100.0
	Ospedale di Suzzara (MN)	99.7
	Casa di Cura Mater Domini, Castellanza (VA)	99.7
	Fondazione Poliambulanza, Brescia	99.6
	Istituto Ortopedico Galeazzi Spa, Milano	99.6
	Ospedale di Circolo, Busto Arsizio (VA)	99.6
	Ospedale di Circolo A. Manzoni, Lecco	99.5
	Ospedale di Sondrio	99.4
	Ospedale Civile di Legnano (MI)	99.4
	Ospedale Papa Giovanni XXIII, Bergamo	99.4
	Istituto Clinico Humanitas, Rozzano (MI)	99.3
	Ospedale Civile di Vigevano (PV)	99.3
	Casa di Cura S. Clemente, Mantova	99.1
	Ospedale Maggiore, Crema (CR)	99.1
	PO di Oglio PO, Casalmaggiore (CR)	99.0
	IRCCS Multimedica, Milano	99.0
	Ospedale S. Antonio Abate, Gallarate (VA)	98.9
	Ospedale Niguarda Ca' Granda, Milano	98.7
	Ospedale Bolognini, Seriate (BG)	98.6
	Casa di Cura S. Camillo, Cremona	98.6
	Ospedale di Circolo S.L. Mandic, Merate (LC)	98.6
	IRCCS S. Raffaele, Milano	98.5
	Ospedale Luini Confalonieri, Luino (VA)	98.4
	Ospedale di Vizzolo Predabissi (MI)	98.2
	Ospedale S. Maria delle Stelle, Melzo (MI)	98.2
	Istituto di Cura Città di Pavia, Pavia	98.1
	Ospedale Uboldo, Cernusco sul Naviglio (MI)	97.7
	Ospedale Causa Pia Luvini di Cittiglio, Cittiglio (VA)	97.7
	Ospedale Civile di S. Giovanni Bianco (BG)	97.6

Follow

Table 5.2. Follow

Regions	Hospitals	Completeness (%)
Lombardy (follow)	PO di Desio (MB)	97.5
	Ospedale Erba-Renaldi-Menaggio (CO)	97.4
	PO di Giussano (MB)	96.5
	Ospedale di Circolo e Fondazione Macchi, Varese	96.3
	PO di Vimercate (MB)	95.9
	Ospedale Fatebenefratelli e Oftalmico, Milano	95.8
	Cliniche Gavazzeni Spa, Bergamo	95.7
	Istituto Ortopedico Gaetano Pini, Milano	95.7
	Ospedale S. Paolo, Milano	93.1
	Casa di Cura La Cittadella Sociale, Pieve del Cairo (PV)	92.6
	Clinica Castelli, Bergamo	92.6
	Fondazione IRCCS Ca' Granda - Ospedale Maggiore Policlinico, Milano	92.6
	Ospedale S. Carlo Borromeo, Milano	92.1
	Casa di Cura S. Camillo, Brescia	91.3
	Casa di Cura S. Maria di Castellanza (VA)	90.9
	Ospedale S. Anna, Como	90.8
	Casa di Cura S. Giovanni, Milano	90.6
	Ospedale Carlo Poma, Mantova	90.1
	Ospedale Civile Destra Secchia, Pieve di Coriano (MN)	89.6
	Ospedale Maggiore di Lodi	81.8
Ospedale Bassini, Cinisello Balsamo (MI)	80.0	
COF Lanzo Hospital, Ramponio Verna (CO)	77.0	
AP Bolzano	Ospedale di San Candido	100.0
	Ospedale di Vipiteno	100.0
	Ospedale di Bolzano	99.6
	Ospedale di Brunico	98.8
	Ospedale di Bressanone	96.6
	Casa di Cura Privata S. Maria	96.3
	Ospedale di Merano	95.9
	Ospedale di Silandro	92.7

Follow

Table 5.2. Follow

Regions	Hospitals	Completeness (%)
AP Trento	Ospedale di Cavalese	100.0
	Ospedale San Camillo, Trento	99.4
	Ospedale di Trento	95.8
	Ospedale di Cles	94.0
	Ospedale di Rovereto	79.0
	Ospedale di Tione	69.4
	Ospedale di Borgo Valsugana	61.5
Tuscany	AOU Pisana, Pisa	62.2
Marche	Ospedale Civile E. Profili, Fabriano (AN)	95.5
	Ospedale di Fermo, Fermo	94.9
	Casa di Cura Villa Serena, Jesi (AN)	94.7
	Casa di Cura Villa Pini Sanatrix Gestion, Civitanova Marche (MC)	93.7
	Casa di Cura Villa Igea, Ancona	80.2
	PO ZT4, Senigallia (AN)	77.4
	Ospedale S. Maria della Misericordia, Urbino	64.7
	PO Umberto I, Ancona	47.3
	Ospedale San Salvatore, Pesaro	28.5
	Ospedali Riuniti di Jesi, Jesi (AN)	28.1
Casa di cura Villa San Marco, Ascoli Piceno	13.0	
Abruzzi	Ospedale Generale Di Zona, Civitanova Marche (MC)	12.7
	PO Clinicizzato SS. Annunziata, Chieti	34.4
Apulia	Ospedale G. Bernabeo, Ortona	19.0
	PO G. Tatarella, Cerignola (FG)	100.0
	PO S. Caterina Novella, Galatina (LE)	100.0
	PO Sacro Cuore di Gesù, Gallipoli (LE)	100.0
	PO Orientale, Manduria (TA)	100.0
	PO Valle d'Itria, Martina Franca (TA)	100.0
	EE Miulli, Acquaviva (BA)	100.0
	EE Cardinale G. Panico, Triggiano (BA)	100.0
	Casa di Cura S. Maria, Bari	100.0

Follow

Table 5.2. Follow

Regions	Hospitals	Completeness (%)
Apulia (follow)	Casa Di Cura Villa Lucia, Conversano (BA)	100.0
	Casa di Cura Villa Bianca, Lecce	100.0
	Casa di Cura Bernardini, Taranto	100.0
	Casa di Cura F. D'Amore, Taranto	100.0
	Casa di Cura San Camillo, Taranto	100.0
	Casa di Cura Anthea, Bari	100.0
	Casa Bianca Hospital, Cassano	100.0
	CBH Presidio Mater Dei, Bari	100.0
	Casa di Cura Città di Lecce	100.0
	PO Umberto I, Altamura (BA)	100.0
	PO San Paolo, Bari	100.0
	PO Umberto I, Corato (BA)	100.0
	PO Don Tonino Bello, Molfetta (BA)	100.0
	PO San Giacomo, Monopoli (BA)	100.0
	PO S. Maria degli Angeli, Putignano (BA)	100.0
	PO Ostuni (BR)	100.0
	PO Camberlingo, Francavilla-Ceglie (BR)	100.0
	PO T. Masselli Mascia, San Severo (FG)	100.0
	PO S. Camillo De Lellis, Manfredonia (FG)	100.0
	PO S. Giuseppe da Copertino, Copertino-Nardò (LE)	100.0
	PO Veris delli Ponti, Scorrano (LE)	100.0
	PO F. Ferrari, Casarano (LE)	100.0
	PO Occidentale, Castellaneta (TA)	100.0
	PO Di Venere, Bari	100.0
	PO A. Perrino, Brindisi	100.0
	PO Vito Fazzi, Lecce	100.0
PO SS. Annunziata, Taranto	100.0	
PO L. Bonomo, Andria-Canosa (BT)	100.0	
PO Monsignor R. Dimiccoli, Barletta	100.0	
PO Bisceglie, Trani (BT)	100.0	

Follow

Table 5.2. Follow

Regions	Hospitals	Completeness (%)
Apulia (follow)	Cliniche Riunite Villa Serena e San Francesco, Foggia	100.0
	PO San Marco, Grottaglie (TA)	100.0
	IRCCS Casa Sollievo della Sofferenza, San Giovanni Rotondo (FG)	100.0
	AOU Policlinico, Bari	100.0
	AOU Ospedali Riuniti, Foggia	100.0
Basilicata	AOR San Carlo (PZ)	71.2
	Ospedale Madonna Delle Grazie (MT)	33.9
Calabria	AO Mater Domini P.U., Catanzaro	100.0
	Casa di Cura Villa Serena, Catanzaro	100.0
	PO Lamezia Terme (CZ)	100.0
	Casa di Cura Scarnati, Cosenza	96.0
	Casa di Cura Villa Caminiti, Reggio Calabria	96.0
	PO Rossano-Corigliano (CS)	89.0
	Istituto Ortopedico del Mezzogiorno d'Italia, Reggio Calabria	76.0
	PO S. Maria degli Ungheresi, Polistena (RC)	62.0
	Casa di Cura Cascini, Cosenza	49.0
	AO di Cosenza	32.7
Sicily	AO Pugliese Ciaccio, Catanzaro	4.0
	IOMI F. Scalabrino Ganzirri, Messina	100.0
	San Raffaele-G. Giglio, Cefalù (PA)	86.6
	Ospedale Maria Paternò Arezzo, Ragusa	86.0
	PO M. Chiello, Piazza Armerina (EN)	72.1
	PO Umberto I, Enna	56.2
	PO Gravina e S. Pietro, Caltagirone (CT)	40.7
	Policlinico Giaccone, Palermo	13.4
Casa di Cura S. Barbara Sogesa, Gela (CL)	8.7	

Table 5.3. Knee. Completeness of the hospitals participating in the RIAP project (2015)

Regions	Hospitals	Completeness (%)
Lombardy	Casa di Cura Beato Palazzolo, Bergamo	102.5
	Casa di Cura Beato Luigi Talamoni, Lecco	100.0
	Casa di Cura Igea, Milano	100.0
	Casa di Cura S. Camillo, Cremona	100.0
	Casa di Cura S. Maria delle Grazie, Voghera (PV)	100.0
	Casa di Cura S. Pio X, Milano	100.0
	Clinica San Carlo, Paderno Dugnano (MI)	100.0
	Istituto Clinico S. Ambrogio Spa, Milano	100.0
	Istituto Clinico Beato Matteo, Vigevano (PV)	100.0
	Istituto Clinico Città Studi, Milano	100.0
	Nuovo Ospedale di Broni-Stradella (PV)	100.0
	Ospedale Bassini, Cinisello Balsamo (MI)	100.0
	Ospedale Caduti Bollatesi, Bollate (MI)	100.0
	Ospedale Carlo Poma, Mantova	100.0
	Ospedale Civico di Codogno (LO)	100.0
	Ospedale Civile di S. Giovanni Bianco (BG)	100.0
	Ospedale Civile di Vigevano (PV)	100.0
	Ospedale Civile di Voghera (PV)	100.0
	Ospedale Civile G. Fornaroli, Magenta (MI)	100.0
	Ospedale Civile La Memoria di Gavardo (BS)	100.0
	Ospedale Costantino Cantù, Abbiategrosso (MI)	100.0
	Ospedale di Chiavenna (SO)	100.0
	Ospedale di Circolo A. Manzoni, Lecco	100.0
	Ospedale di Circolo, Busto Arsizio (VA)	100.0
	Ospedale di Circolo, Rho (MI)	100.0
	Ospedale di Cuggiono (MI)	100.0
	Ospedale di Desenzano (BS)	100.0
	Ospedale di Manerbio (BS)	100.0
	Ospedale di Sondrio	100.0
	Ospedale di Treviglio-Caravaggio (BG)	100.0

Follow

Table 5.3. Follow

Regions	Hospitals	Completeness (%)
Lombardy (follow)	Ospedale di Vizzolo Predabissi (MI)	100.0
	Ospedale Fatebenefratelli e Oftalmico, Milano	100.0
	Ospedale G. Salvini, Garbagnate Milanese (MI)	100.0
	Ospedale Galmarini, Tradate (VA)	100.0
	Ospedale Generale Provinciale, Saronno (VA)	100.0
	Ospedale L. Sacco, Milano	100.0
	Ospedale Luini Confalonieri, Luino (VA)	100.0
	Ospedale M.O. Antonio Locatelli, Piario (BG)	100.0
	Ospedale Maggiore, Crema (CR)	100.0
	Ospedale Niguarda Ca' Granda, Milano	100.0
	Ospedale Pesenti Fenaroli, Alzano Lombardo (BG)	100.0
	Ospedale S. Antonio Abate, Gallarate (VA)	100.0
	Ospedale S. Gerardo, Monza	100.0
	Ospedale S. Maria delle Stelle, Melzo (MI)	100.0
	Ospedale SS. Capitanio e Gerosa, Lovere (BG)	100.0
	Ospedale SS. Trinità, Romano di Lombardia (BG)	100.0
	Ospedale Uboldo, Cernusco sul Naviglio (MI)	100.0
	Ospedale Valcamonica, Edolo (BS)	100.0
	Ospedale Valcamonica, Esine (BS)	100.0
	PO di Carate Brianza (MB)	100.0
	PO di Chiari (BS)	100.0
	PO di Desio (MB)	100.0
	PO di Gardone Val Trompia (BS)	100.0
	PO di Giuszano (MB)	100.0
	PO di Montichiari (BS)	100.0
	PO di Oglio PO, Casalmaggiore (CR)	100.0
	PO Spedali Civili di Brescia	100.0
	Policlinico S. Matteo, Pavia	100.0
	Policlinico San Marco, Osio Sotto (BG)	100.0
	Polo Chirurgico Capitanio, Milano	100.0

Follow

Table 5.3. Follow

Regions	Hospitals	Completeness (%)
Lombardy (follow)	Casa di Cura Policlinico, Monza	99.9
	Istituto Clinico Humanitas, Rozzano (MI)	99.8
	Istituti Clinici Zucchi Spa, Monza	99.8
	Fondazione Poliambulanza, Brescia	99.7
	Istituto Clinico Villa Aprica Spa, Como	99.6
	Casa di Cura Mater Domini, Castellanza (VA)	99.4
	Istituto Clinico S. Rocco Spa, Ome (BS)	99.4
	Policlinico San Pietro, Ponte S. Pietro (BG)	99.3
	IRCCS Policlinico San Donato Milanese (MI)	99.3
	Istituto Ortopedico Galeazzi Spa, Milano	99.3
	Ospedale San Pellegrino, Castiglione delle Stiviere (MN)	99.2
	Casa di Cura S. Francesco, Bergamo	99.1
	Istituto Clinico S. Siro Spa, Milano	99.0
	Casa di Cura S. Clemente, Mantova	99.0
	PO Centro Traumatologico Ortopedico, Milano	99.0
	Ospedale di Suzzara (MN)	99.0
	Casa di Cura Figlie di S. Camillo, Cremona	98.9
	COF Lanzo Hospital, Ramponio Verna (CO)	98.9
	Ospedale Civile di Legnano (MI)	98.7
	Ospedale Papa Giovanni XXIII, Bergamo	98.6
	Ospedale Carlo Ondoli, Angera (VA)	98.6
	Istituto Clinico S. Anna, Brescia	98.4
	Ospedale di Circolo S.L. Mandic, Merate (LC)	98.2
	Istituti Ospitalieri, Cremona	98.1
	Istituto Clinico Città di Brescia, Brescia	98.1
	PO di Iseo (BS)	97.0
	Ospedale Morelli, Sondalo (SO)	96.8
	PO di Vimercate (MB)	96.7
	Istituto di Cura Città di Pavia, Pavia	96.6
	Ospedale Sacra Famiglia - Fatebenefratelli, Erba (CO)	96.5

Follow

Table 5.3. Follow

Regions	Hospitals	Completeness (%)
Lombardy (follow)	Ospedale di Circolo e Fondazione Macchi, Varese	95.8
	Ospedale Civile Destra Secchia, Pieve di Coriano (MN)	95.7
	Cliniche Gavazzeni Spa, Bergamo	95.1
	Casa di Cura S. Camillo, Brescia	94.1
	Ospedale S. Anna, Como	94.1
	IRCCS Multimedica, Milano	93.8
	Casa di Cura S. Giovanni, Milano	93.3
	Clinica Castelli, Bergamo	92.3
	IRCCS S. Raffaele, Milano	92.3
	Ospedale S. Antonio Abate, Cantù (CO)	92.3
	Casa di Cura G.B. Mangioni, Lecco	91.8
	Ospedale Erba-Renaldi-Menaggio (CO)	91.7
	Istituto Ortopedico Gaetano Pini, Milano	91.2
	Ospedale Bolognini, Seriate (BG)	90.4
	Casa di Cura S. Maria di Castellanza (VA)	90.3
	Ospedale Maggiore di Lodi	90.0
	Ospedale S. Paolo, Milano	89.5
	Fondazione IRCCS Ca' Granda - Ospedale Maggiore Policlinico, Milano	87.5
	Ospedale Moriggia Pelascini, Gravedona (CO)	85.7
	Ospedale Causa Pia Luvini di Cittiglio, Cittiglio (VA)	83.0
Casa di Cura La Cittadella Sociale, Pieve del Cairo (PV)	78.4	
Ospedale S. Carlo Borromeo, Milano	66.7	
AP Bolzano	Casa di Cura Privata S. Maria	100.0
	Ospedale di Bolzano	100.0
	Ospedale di Vipiteno	100.0
	Ospedale di Bressanone	99.4
	Ospedale di San Candido	98.6
	Ospedale di Brunico	97.7
	Ospedale di Silandro	94.3
	Ospedale di Merano	93.3

Follow

Table 5.3. Follow

Regions	Hospitals	Completeness (%)
AP Trento	Ospedale di Trento	13.5
	Ospedale di Rovereto	10.3
	Ospedale San Camillo, Trento	6.8
	Ospedale di Tione	1.8
	Ospedale di Cavalese	1.5
Tuscany	A.O.U. Pisana, Pisa	40.3
Marche	Ospedale Civile E. Profili, Fabriano (AN)	100.0
	Casa di Cura Villa Serena, Jesi (AN)	93.8
	Casa di Cura Villa Pini Sanatrix Gestion, Civitanova Marche (MC)	90.2
	Ospedale di Fermo, Fermo	87.9
	Ospedale S. Maria della Misericordia, Urbino	87.3
	Casa di Cura Villa Igea, Ancona	83.5
	PO ZT4, Senigallia (AN)	68.3
	Ospedale Generale Di Zona, Civitanova Marche (MC)	66.7
	Presidio Ospedaliero Umberto I°, Ancona	66.7
	Ospedale San Salvatore, Pesaro	60.7
Abruzzi	Ospedali Riuniti di Jesi, Jesi (AN)	28.8
	Casa di cura Villa San Marco, Ascoli Piceno	11.8
	PO Clinicizzato SS. Annunziata, Chieti	41.4
	Ospedale G. Bernabeo, Ortona	17.4
Apulia	PO G. Tatarella, Cerignola (FG)	100.0
	PO S. Caterina Novella, Galatina (LE)	100.0
	PO Sacro Cuore di Gesù, Gallipoli (LE)	100.0
	PO Orientale, Manduria (TA)	100.0
	PO Valle d'Itria, Martina Franca (TA)	100.0
	EE Miulli, Acquaviva (BA)	100.0
	EE Cardinale G. Panico, Triggiano (BA)	100.0
	Casa di Cura S. Maria, Bari	100.0
	Casa Di Cura Villa Lucia, Conversano (BA)	100.0
Casa di Cura Villa Bianca, Lecce	100.0	

Follow

Table 5.3. Follow

Regions	Hospitals	Completeness (%)
Apulia (follow)	Casa di Cura Bernardini, Taranto	100.0
	Casa di Cura F. D'Amore, Taranto	100.0
	Casa di Cura San Camillo, Taranto	100.0
	Casa di Cura Anthea, Bari	100.0
	Casa Bianca Hospital, Cassano	100.0
	CBH Presidio Mater Dei, Bari	100.0
	Casa di Cura Città di Lecce	100.0
	PO Umberto I, Altamura (BA)	100.0
	PO San Paolo, Bari	100.0
	PO Umberto I, Corato (BA)	100.0
	PO Don Tonino Bello, Molfetta (BA)	100.0
	PO San Giacomo, Monopoli (BA)	100.0
	PO S. Maria degli Angeli, Putignano (BA)	100.0
	PO Ostuni (BR)	100.0
	PO Camberlingo, Francavilla-Ceglie (BR)	100.0
	PO T. Masselli Mascia, San Severo (FG)	100.0
	PO S. Camillo De Lellis, Manfredonia (FG)	100.0
	PO S. Giuseppe da Copertino, Copertino-Nardò (LE)	100.0
	PO Veris delli Ponti, Scorrano (LE)	100.0
	PO F. Ferrari, Casarano (LE)	100.0
	PO Occidentale, Castellaneta (TA)	100.0
	PO Di Venere, Bari	100.0
	PO A. Perrino, Brindisi	100.0
	PO Vito Fazzi, Lecce	100.0
	PO SS. Annunziata, Taranto	100.0
	PO L. Bonomo, Andria-Canosa (BT)	100.0
	PO Monsignor R. Dimiccoli, Barletta	100.0
	PO Bisceglie, Trani (BT)	100.0
	Cliniche Riunite Villa Serena e San Francesco, Foggia	100.0
	PO San Marco, Grottaglie (TA)	100.0

Follow

Table 5.3. Follow

Regions	Hospitals	Completeness (%)
	IRCCS Casa Sollievo della Sofferenza, San Giovanni Rotondo (FG)	100.0
	AOU Policlinico, Bari	100.0
	AOU Ospedali Riuniti, Foggia	100.0
Basilicata	Ospedale Madonna Delle Grazie (MT)	88.5
	AOR San Carlo (PZ)	56.6
Calabria	Casa di Cura Villa Caminiti, Reggio Calabria	100.0
	Istituto Ortopedico del Mezzogiorno d'Italia, Reggio Calabria	100.0
	PO Lamezia Terme (CZ)	100.0
	PO Rossano-Corigliano (CS)	100.0
	Casa di Cura Scarnati, Cosenza	98.0
	Casa di Cura Villa Serena, Catanzaro	95.0
	AO Mater Domini P.U., Catanzaro	93.0
	PO S. Maria degli Ungheresi, Polistena (RC)	40.0
	Casa di Cura Cascini, Cosenza	37.0
	AO Pugliese Ciaccio, Catanzaro	8.0
Sicily	IOMI F. Scalabrino Ganzirri, Messina	100.0
	PO Gravina e S. Pietro, Caltagirone (CT)	93.3
	Ospedale Maria Paternò Arezzo, Ragusa	81.4
	COT - Cure Ortopediche Traumatologiche, Messina	68.7
	San Raffaele-G. Giglio, Cefalù (PA)	66.2
	Casa di Cura S. Barbara Sogesa, Gela (CL)	55.4
	Ospedale Generale di Zona, Lentini (SR)	13.2
	PO M. Chiello, Piazza Armerina (EN)	6.0

Table 5.4. Procedures distribution. Comparison between 2014 HDR data and 2015 evaluable RIAP data

	HDR (2014)		RIAP (2015 evaluable data)	
	N	%	N	%
Total procedures	166,862		48,135	
Hip	99,497	59.6	28,415	59.0
Total replacement and resurfacing	66,115	66.4	19,911	70.1
Total replacement (elective)	56,561	85.5	17,854	89.7
Total replacement (emergency)	9,484	14.3	2,057	10.3
Partial replacement	25,313	25.4	6,831	24.0
Revision	8,069	8.1	1,673	5.9
Knee	67,365	40.4	19,720	41.0
Total replacement	62,886	93.4	18,793	95.3
Revision	4,479	6.6	927	4.7

Table 5.5. Hip. Type of procedure

	N	%
Total procedures	28,415	
Total replacement	19,911	70.2
Total replacement (elective)	17,854	89.7
Total replacement (emergency)	2,057	10.3
Partial replacement	6,831	24.0
Revision (total or partial)	1,319	4.6
Removal of prosthesis	348	1.2
Conversion from partial to total replacement	2	0.0
Spacer revision	4	0.0

Table 5.6. Hip. Procedures by type of provider

	Total replacement (elective)		Total replacement (emergency)		Partial replacement		Revision (*)		TOTAL	
	N	%	N	%	N	%	N	%	N	%
Provider	17,854		2,057		6,831		1,673		28,415	
Public	6,613	37.0	1,494	72.6	5,355	78.4	607	36.3	14,069	49.5
Private, accredited	11,154	62.5	558	27.1	1,473	21.6	1,056	63.1	14,241	50.1
Private, not accredited	87	0.5	5	0.2	3	0.0	10	0.6	105	0.4

(*) Revision (total or partial), removal of prosthesis, conversion from partial to total replacement, spacer revision

Table 5.7. Hip. Demographic characteristics by type of procedure

	Total replacement (elective)		Total replacement (emergency)		Partial replacement		Revision (*)		TOTAL	
	N	%	N	%	N	%	N	%	N	%
Gender	17,854		2,057		6,831		1,673		28,415	
Males	8,103	45.4	601	29.2	1,926	28.2	647	38.7	11,277	39.7
Females	9,751	54.6	1,456	70.8	4,905	71.8	1,026	61.3	17,138	60.3
Age by gender(**)										
Males										
Mean age	65.2		70.4		80.6		70.1		68.5	
Standard deviation	12.1		12.4		12.1		12.4		13.5	
Median age	67		72		84		72		70	
Interquartile range	58-74		63-79		77-88		63-79		60-78	
Females										
Mean age	69.3		73.1		84.0		72.3		74.1	
Standard deviation	11.1		9.4		7.4		11.2		11.9	
Median age	71		74		85		74		76	
Interquartile range	63-77		67-79		80-89		65-81		67-83	
Class of age by gender										
Males										
	8,103		601		1,926		647		11,277	
<45	477	5.9	22	3.7	34	1.8	18	2.8	551	4.9
45 - 54	988	12.2	37	6.2	79	4.1	65	10.0	1,169	10.4
55 - 64	1,708	21.1	99	16.5	85	4.4	88	13.6	1,980	17.6
65 - 74	2,557	31.6	185	30.8	148	7.7	173	26.7	3,063	27.2
75 - 84	1,758	21.7	174	29.0	656	34.1	192	29.7	2,780	24.7
≥ 85	127	1.6	64	10.6	863	44.8	55	8.5	1,109	9.8
n.a.	488	6.0	20	3.3	61	3.2	56	8.7	625	5.5
Females										
	9,751		1,456		4,905		1,026		17,138	
<45	260	2.7	8	0.5	8	0.2	12	1.2	288	1.7
45 - 54	688	7.1	40	2.7	19	0.4	58	5.7	805	4.7
55 - 64	1,610	16.5	178	12.2	54	1.1	139	13.5	1,981	11.6
65 - 74	3,207	32.9	532	36.5	315	6.4	275	26.8	4,329	25.3
75 - 84	2,999	30.8	493	33.9	1,930	39.3	353	34.4	5,775	33.7
≥ 85	398	4.1	151	10.4	2,435	49.6	109	10.6	3,093	18.0
n.a.	589	6.0	54	3.7	144	2.9	80	7.8	867	5.1

(*) Revision (total or partial), removal of prosthesis, conversion from partial to total replacement, spacer revision

(**) AP Bolzano data have not been included because not available

Table 5.8. Hip. Surgical practice for primary procedures

	Total replacement (elective)		Total replacement (emergency)		Partial replacement		Revision (*)		TOTAL	
	N	%	N	%	N	%	N	%	N	%
Operated side	17,854		2,057		6,831		1,673		28,415	
Right	9,708	54.4	1,033	50.2	3,377	49.4	872	52.1	14,990	52.8
Left	7,880	44.1	1,020	49.6	3,446	50.4	793	47.4	13,139	46.2
Bilateral	266	1.5	4	0.2	8	0.1	8	0.5	286	1.0
Approach	17,854		2,057		6,831		1,673		28,415	
Anterior	2,666	14.9	102	5.0	270	4.0	83	5.0	3,121	11.0
Anterolateral	2,158	12.1	502	24.4	1,647	24.1	233	13.9	4,540	16.0
Lateral	3,510	19.7	517	25.1	2,128	31.2	370	22.1	6,525	23.0
Posterolateral	9,373	52.5	932	45.3	2,727	39.9	971	58.0	14,003	49.3
Other	147	0.8	4	0.2	59	0.9	16	1.0	226	0.8
Fixation	17,854		2,057		6,831		1,673		28,415	
Cemented (stem + cup)	758	4.2	149	7.2	302	4.4	75	4.5	1,284	4.5
Cementless (stem + cup)	15,941	89.3	1,552	75.4	2,321	34.0	1,051	62.8	20,865	73.4
Hybrid (cemented stem and cementless cup)	387	2.2	205	10.0	2,008	29.4	46	2.7	2,646	9.3
Reverse hybrid (cementless stem and cemented cup)	125	0.7	66	3.2	85	1.2	85	5.1	361	1.3
Only cemented stem	5	0.0	8	0.4	915	13.4	31	1.9	959	3.4
Only cementless stem	39	0.2	17	0.8	931	13.6	109	6.5	1,096	3.9
Only cemented cup	17	0.1	0	0.0	7	0.1	32	1.9	56	0.2
Only cementless cup	371	2.1	25	1.2	128	1.9	140	8.4	664	2.3
Incorrectly coded	211	1.2	35	1.7	134	2.0	104	6.2	484	1.7

(*) Revision (total or partial), removal of prosthesis, conversion from partial to total replacement, spacer revision

Note: incorrectly coded data could be included because hip partial replacement does not foresee cup implant

Table 5.9. Hip. Primary replacements by diagnosis and previous surgery

	Total replacement (elective)		Total replacement (emergency)		Partial replacement		TOTAL	
	N	%	N	%	N	%	N	%
Diagnosis	17,854		2,057		6,831		26,742	
Primary osteoarthritis	15,380	86.1			283	4.1	15,663	58.6
Post-traumatic osteoarthritis	355	2.0			41	0.6	396	1.5
Rheumatoid arthritis	90	0.5			0	0.0	90	0.3
Neoplasia	41	0.2			27	0.4	68	0.3
Aseptic necrosis of femoral head	745	4.2			18	0.3	763	2.9
Congenital dislocation/hip dysplasia	613	3.4			7	0.1	620	2.3
Perthes disease or epiphysiolysis	39	0.2			0	0.0	39	0.1
Fractured neck of femur	0	0.0	1,994	96.9	6,306	92.3	8,300	31.0
Septic coxitis	1	0.0			0	0.0	1	0.0
Pseudoarthrosis neck fracture related	16	0.1			9	0.1	25	0.1
Other	219	1.2			71	1.0	290	1.1
Previous surgery inconsistent with primary procedure (a)	141	0.8	13	0.6	40	0.6	194	0.7
Previous surgery incorrectly coded	214	1.2	50	2.4	29	0.4	293	1.1
Previous surgery	17,854		2,057		6,831		26,742	
None	15,778	88.4	1,832	89.1	6,090	89.2	23,700	88.6
Osteosynthesis	228	1.3	33	1.6	46	0.7	307	1.1
Osteotomy	87	0.5	2	0.1	1	0.0	90	0.3
Arthrodesis	2	0.0	0	0.0	0	0.0	2	0.0
Other	1,404	7.9	127	6.2	625	9.1	2,156	8.1
Previous surgery inconsistent with primary procedure (a)	141	0.8	13	0.6	40	0.6	194	0.7
Previous surgery incorrectly coded	214	1.2	50	2.4	29	0.4	293	1.1

(a) Inconsistent previous surgery: total or partial replacement, spacer or prosthesis removal (Girdlestone)

Table 5.10. Hip. Revision procedures by diagnosis and previous surgery

	Revision (*)	
	N	%
Diagnosis	1,673	
Pain	88	5.3
Osteolysis	53	3.2
Wear	106	6.3
Implant breakage acetabulum	4	0.2
Implant breakage acetabular insert	4	0.2
Implant breakage head	4	0.2
Implant breakage modular neck	3	0.2
Implant breakage stem	3	0.2
Implant breakage spacer	0	0.0
Prosthesis dislocation	156	9.3
Periprosthetic fracture	164	9.8
Infection	102	6.1
Prosthesis removal	23	1.4
Acetabular cup aseptic loosening	353	21.1
Femoral stem aseptic loosening	169	10.1
Total aseptic loosening	113	6.8
Osteoarthritis progression	0	0.0
Other	80	4.8
Previous surgery inconsistent with revision (a)	202	12.1
Diagnosis incorrectly coded	46	2.7
Previous surgery	1,673	
Total hip replacement	1,143	68.3
Revision of hip replacement	65	3.9
Spacer or prosthesis removal	127	7.6
Partial hip replacement	94	5.6
Other	41	2.5
Previous surgery inconsistent with revision (a)	202	12.1
Previous surgery incorrectly coded	1	0.1

(*) Revision (total or partial), removal of prosthesis, conversion from partial to total replacement, spacer revision

(a) Inconsistent previous surgery: none, osteosynthesis, ostectomy, arthrodesis

Table 5.11. Knee. Type of procedure

	N	%
Total procedures	19,720	
Primary	18,793	95.3
Total	15,858	84.4
Unicondylar	2,935	15.6
Revision	927	4.7
Total revision	268	28.9
Partial revision	623	67.2
Primary patello-femoral implant on pre-existing prosthesis	14	1.5
Removal of prosthesis	17	1.8
Spacer revision	5	0.5

Table 5.12. Knee. Procedures by type of provider

	Total replacement		Revision (*)		TOTAL	
	N	%	N	%	N	%
Provider	18,793		927		19,720	
Public	5,144	27.4	236	25.5	5,380	27.3
Private, accredited	13,600	72.4	688	74.2	14,288	72.5
Private, not accredited	49	0.3	3	0.3	52	0.3

(*) Total or partial revision, primary patello-femoral implant on pre-existing prosthesis, removal of prosthesis, spacer revision

Table 5.13. Knee. Demographic characteristics by type of procedure

	Primary		Revision (*)		TOTAL	
	N	%	N	%	N	%
Gender	18,793		927		19,720	
Males	5,840	31.1	277	29.9	6,117	31.0
Females	12,953	68.9	650	70.1	13,603	69.0
Age by gender(**)						
Males	5,626		342		5,968	
Mean age	69.4		68.6		69.4	
Standard deviation	9.2		10.0		9.3	
Median age	71		70		71	
Interquartile range	65-76		64-76		63-77	
Females	12,661		817		13,478	
Mean age	70.7		70.5		70.7	
Standard deviation	8.2		9.0		8.2	
Median age	72		71		74	
Interquartile range	66-76		66-77		67-80	
Class of age by gender						
Males	5,840		277		6,117	
<45	72	1.2	3	1.1	75	1.2
45 - 54	289	4.9	19	6.9	308	5.0
55 - 64	1,000	17.1	48	17.3	1,048	17.1
65 - 74	2,373	40.6	108	39.0	2,481	40.6
75 - 84	1,673	28.6	70	25.3	1,743	28.5
≥ 85	84	1.4	4	1.4	88	1.4
n.a.	349	6.0	25	9.0	374	6.1
Females	12,953		650		13,603	
<45	54	0.4	6	0.9	60	0.4
45 - 54	422	3.3	27	4.2	449	3.3
55 - 64	1,986	15.3	102	15.7	2,088	15.3
65 - 74	5,497	42.4	260	40.0	5,757	42.3
75 - 84	4,301	33.2	211	32.5	4,512	33.2
≥ 85	183	1.4	11	1.7	194	1.4
n.a.	510	3.9	33	5.1	543	4.0

(*) Total or partial revision, primary patello-femoral implant on pre-existing prosthesis, removal of prosthesis, spacer revision

(**) AP Bolzano data have not been included because not available

Table 5.14. Knee. Surgical practice for primary procedures

	Primary		Revision (*)		TOTAL	
	N	%	N	%	N	%
Operated side	18,793		927		19,720	
Right	10,002	53.2	472	50.9	10,474	53.1
Left	8,617	45.9	451	48.7	9,068	46.0
Bilateral	174	0.9	4	0.4	178	0.9
Approach	18,793		927		19,720	
Medial parapatellar	16,387	87.2	826	89.1	17,213	87.3
Lateral parapatellar	409	2.2	16	1.7	425	2.2
Mid-vastus	754	4.0	33	3.6	787	4.0
Minimally invasive Mid-Vastus	701	3.7	25	2.7	726	3.7
Quad-sparing	69	0.4	1	0.1	70	0.4
Sub-Vastus	181	1.0	9	1.0	190	1.0
Minimally invasive Sub-Vastus	39	0.2	3	0.3	42	0.2
V Quadriceps	1	0.0	1	0.1	2	0.0
Tibial tuberosity osteotomy	25	0.1	7	0.8	32	0.2
Other	227	1.2	6	0.6	233	1.2
Fixation	18,793		927		19,720	
Cemented	13,132	69.9	439	47.4	13,571	68.8
Cementless	3,619	19.3	216	23.3	3,835	19.4
Hybrid (cementless femoral component and cemented tibial component)	773	4.1	60	6.5	833	4.2
Only patella	7	0.0	33	3.6	40	0.2
Other	475	2.5	24	2.6	499	2.5
Inconsistent with the type of procedure(**)	787	4.2	155	16.7	942	4.8

(*) Total or partial revision, primary patello-femoral implant on pre-existing prosthesis, removal of prosthesis, spacer revision

(**) Primary: only cemented femoral component, only cementless femoral component, only cemented tibial component, only cementless tibial component, no fixed component. Revision: no fixed component

Table 5.15. Knee. Primary replacements by diagnosis and previous surgery

	Primary	
	N	%
Diagnosis	18,793	
Primary osteoarthritis	17,247	91.8
Post-traumatic osteoarthritis	272	1.4
Rheumatoid arthritis	125	0.7
Neoplasia	15	0.1
Osteonecrosis	199	1.1
Other	473	2.5
Previous surgery inconsistent with primary procedure (a)	462	2.5
Previous surgery	18,793	
None	16,272	86.6
Osteotomy	3	0.0
Arthroscopy	134	0.7
Arthrodesis	479	2.5
Other	1,443	7.7
Previous surgery inconsistent with primary procedure (a)	462	2.5

(a) Inconsistent previous surgery: primary total, primary unicondylar, prosthesis reimplantation, spacer

Table 5.16. Knee. Revision procedures by diagnosis and previous surgery

	Revision (*)	
	N	%
Diagnosis	927	
Aseptic loosening (more components)	211	22.8
Femoral component aseptic loosening	42	4.5
Tibial component aseptic loosening	91	9.8
Patellar component aseptic loosening	1	0.1
Wear	31	3.3
Dislocation	20	2.2
Instability	37	4.0
Periprosthetic fracture	14	1.5
Implant breakag prosthesis	9	1.0
Implant breakag spacer	0	0.0
Infection	143	15.4
Rigidity	22	2.4
Osteoarthritis progression	19	2.0
Pain	205	22.1
Other	15	1.6
Previous surgery inconsistent with revision (a)	55	5.9
Previous surgery incorrectly coded	12	1.3
Previous surgery	1,021	
Total replacement	565	60.9
Primary unicondylar	119	12.8
Removal of prosthesis	59	6.4
Spacer revision	56	6.0
Other	61	6.6
Previous surgery inconsistent with revision (a)	55	5.9
Previous surgery incorrectly coded	12	1.3

(*) Total or partial revision, primary patello-femoral implant on pre-existing prosthesis, removal of prosthesis, spacer revision

(a) Inconsistent previous surgery: none, osteotomy

Table 5.17. Hip. Primary total replacement: type of implanted medical device

	Total replacement (elective)		Total replacement (emergency)		TOTAL	
	N	%	N	%	N	%
Cup	11,525		1,086		12,611	
Cemented for primary procedure	198	1.7	60	5.5	258	2.0
metal	196	99.0	60	100.0	256	99.2
polyethylene	1	0.5	0	0.0	1	0.4
other	1	0.5	0	0.0	1	0.4
Cementless for primary procedure	9,068	78.7	767	70.6	9,835	78.0
metal	8,318	91.7	694	90.5	9,012	91.6
other	750	8.3	73	9.5	823	8.4
Cementless for revision	2,259	19.6	259	23.8	2,518	20.0
Insert	11,525		1,086		12,611	
Polyethylene	8,220	71.3	925	85.2	9,145	3.3
Ceramic	3,290	28.5	157	14.5	3,447	96.7
Metal	15	0.1	4	0.4	19	0.6
Head	11,525		1,086		12,611	
For partial replacement	1,301	11.3	55	5.1	1,356	10.8
ceramic	1,151	88.5	42	76.4	1,193	88.0
metal	150	11.5	13	23.6	163	12.0
For total replacement	10,224	88.7	1,031	94.9	11,255	89.2
ceramic	9,514	93.1	875	84.9	10,389	92.3
metal	710	6.9	156	15.1	866	7.7
Stem	11,525		1,086		12,611	
Cemented for primary procedure	539	4.7	136	12.5	675	5.4
non-modular straight	496	92.0	126	92.6	622	92.1
non-modular anatomical	29	5.4	4	2.9	33	4.9
modular	9	1.7	6	4.4	15	2.2
conservative	5	0.9	0	0.0	5	0.7
Cementless for primary procedure	10,731	93.1	935	86.1	11,666	92.5
non-modular straight	7,296	68.0	699	74.8	7,995	68.5
non-modular anatomical	494	4.6	53	5.7	547	4.7
modular	867	8.1	151	16.1	1,018	8.7
conservative	2,074	19.3	32	3.4	2,106	18.1
Cemented for revision	0	0.0	1	0.1	1	0.0
Cementless for revision	254	2.2	13	1.2	267	2.1
Large resections	1	0.0	1	0.1	2	0.0

Table 5.18. Hip. Primary total replacement: bearing surface

	Total replacement (elective)		Total replacement (emergency)		TOTAL	
	N	%	N	%	N	%
Bearing surface (head/insert)	11,525		1,086		12,611	
Ceramic-Polyethylene	7,383	64.1	758	69.8	8,141	64.6
Ceramic-Ceramic	3,273	28.4	157	14.5	3,430	27.2
Metal-Polyethylene	837	7.3	167	15.4	1,004	8.0
Metal-Ceramic	17	0.1	0	0.0	17	0.1
Ceramic-Metal	9	0.1	2	0.2	11	0.1
Metal-Metal	6	0.1	2	0.2	8	0.1

Table 5.19. Knee. Primary total replacement: type of implanted medical device

	Primary	
	N	%
Femoral component	15,269	
Bicondylar	13,597	89.0
cemented	11,679	85.9
cementless	1,552	11.4
cementable	366	2.7
Unicondylar	1,480	9.7
Revision	192	1.3
Tibial insert	15,269	
Bicondylar	13,434	88.0
mobile	4,043	30.1
fixed	9,391	69.9
Unicondylar	1,444	9.5
Revision	391	2.6
mobile	93	23.8
fixed	298	76.2
Tibial component	15,269	
Cemented bicondylar	11,670	76.4
mobile	3,055	26.2
fixed	8,615	73.8
Cementless bicondylar	1,014	6.6
mobile	823	81.2
fixed	191	18.8
Cementable mobile bicondylar	302	2.0
mobile	266	88.1
fixed	36	11.9
Unicondylar	1,490	12.9
Revision	793	5.2
mobile	75	9.5
fixed	718	90.5

Table 5.20. Knee. Primary total replacement: implant of patella

	N	%
Implant	15,269	
No patella	13,679	89.6
With patella	1,590	10.4

Figure 4.1. Temporal trend of elective primary joint replacements in Italy

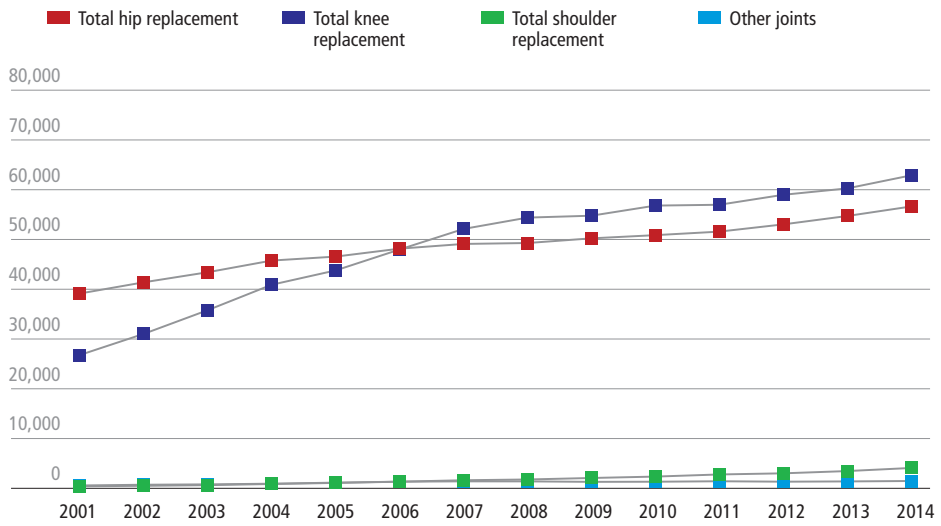


Figure 4.2. Hip. Incidence rates per 100,000 population by type of procedure

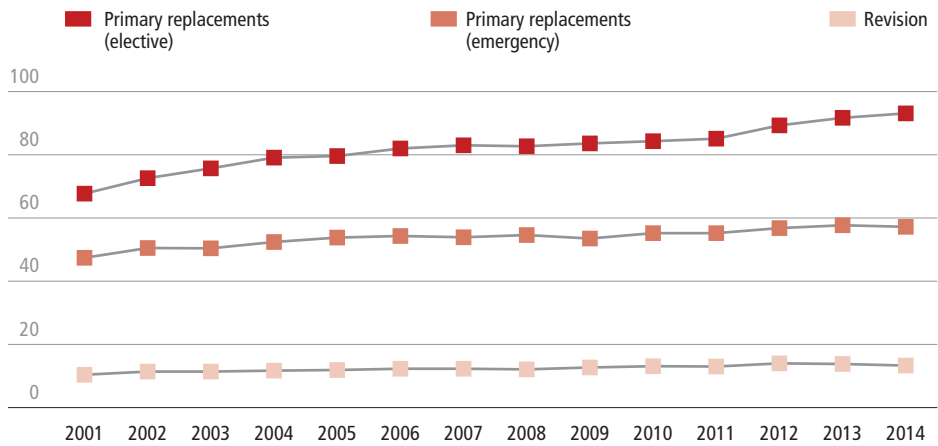


Figure 4.3. Knee. Incidence rates per 100,000 population by type of procedure

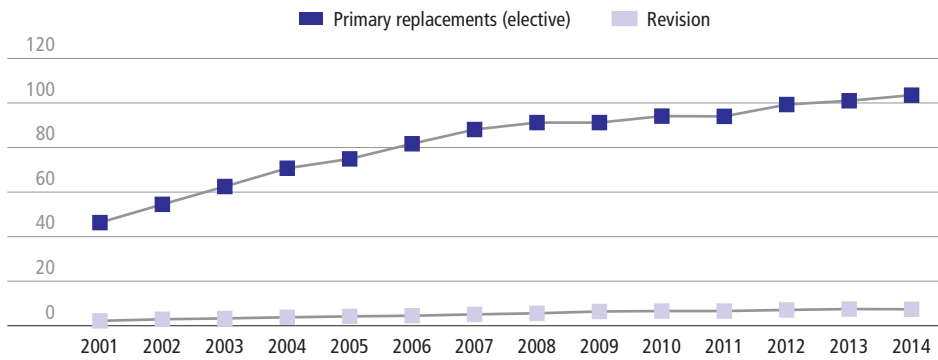


Figure 4.4. Shoulder. Incidence rates per 100,000 population by type of procedure

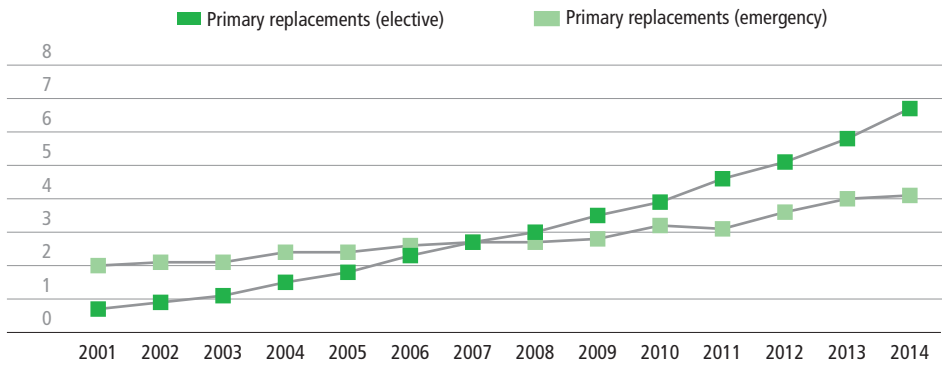


Figure 4.5. Hip. Primary total replacement: percentage of hospitals by region and volume of activity

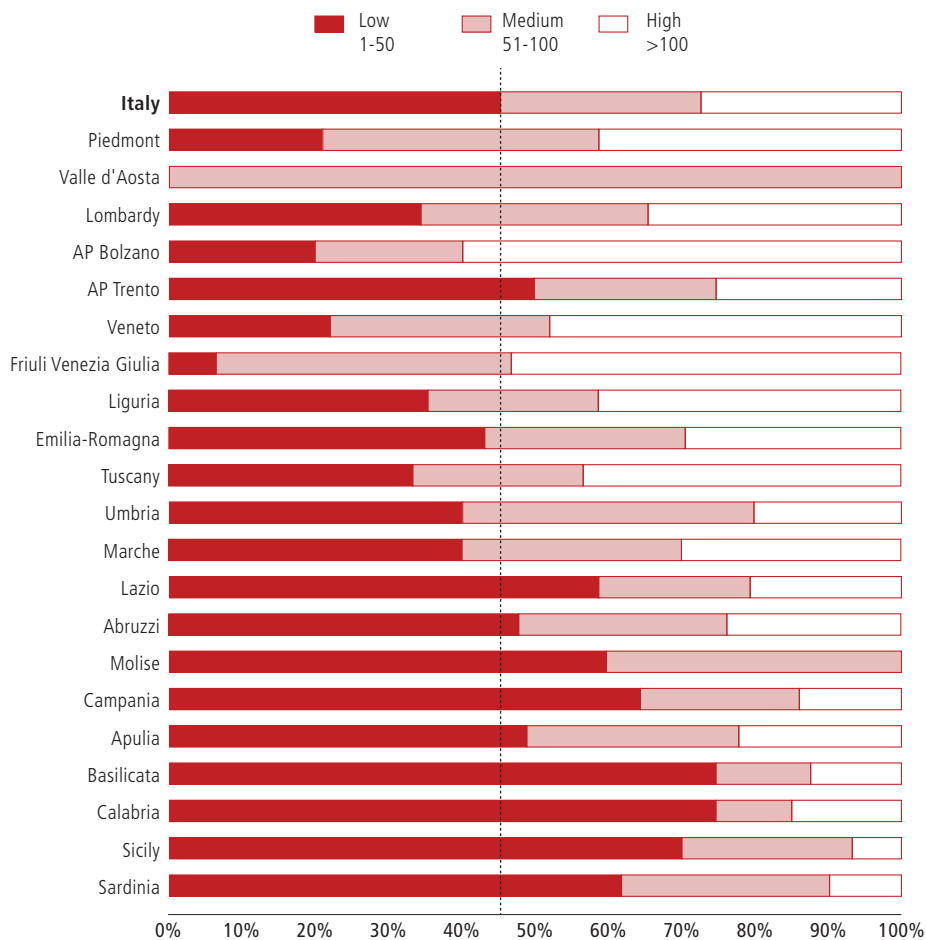


Figure 4.6. Hip. Revision: percentage of hospitals by region and volume of activity

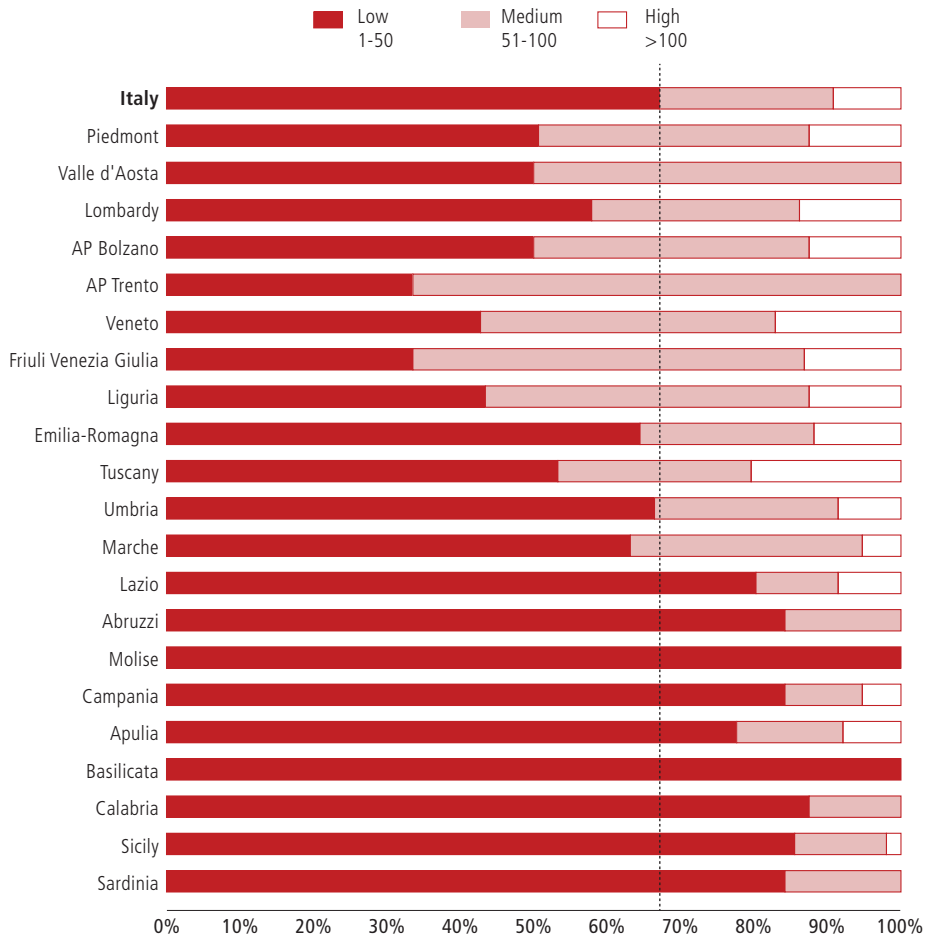


Figure 4.7. Hip. Elective primary total replacement: inter-regional mobility index (%), a) attraction index, b) escape index

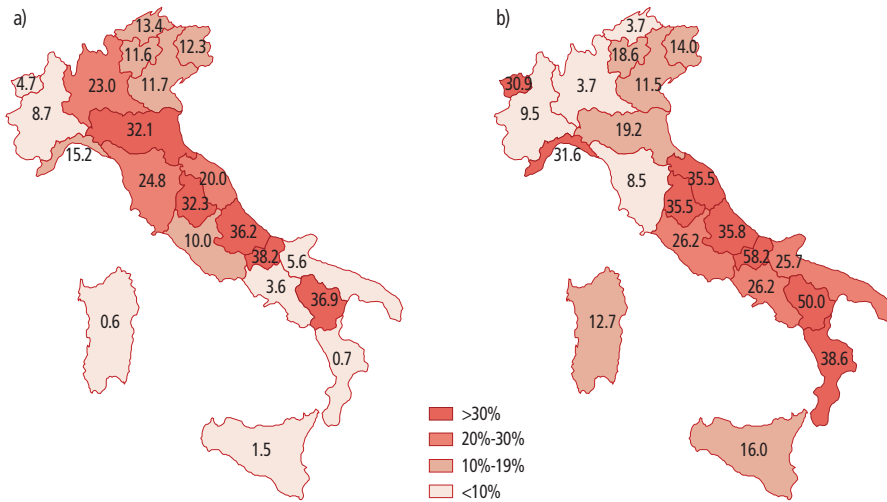


Figure 4.8. Knee. Primary total replacement: percentage of hospitals by region and volume of activity

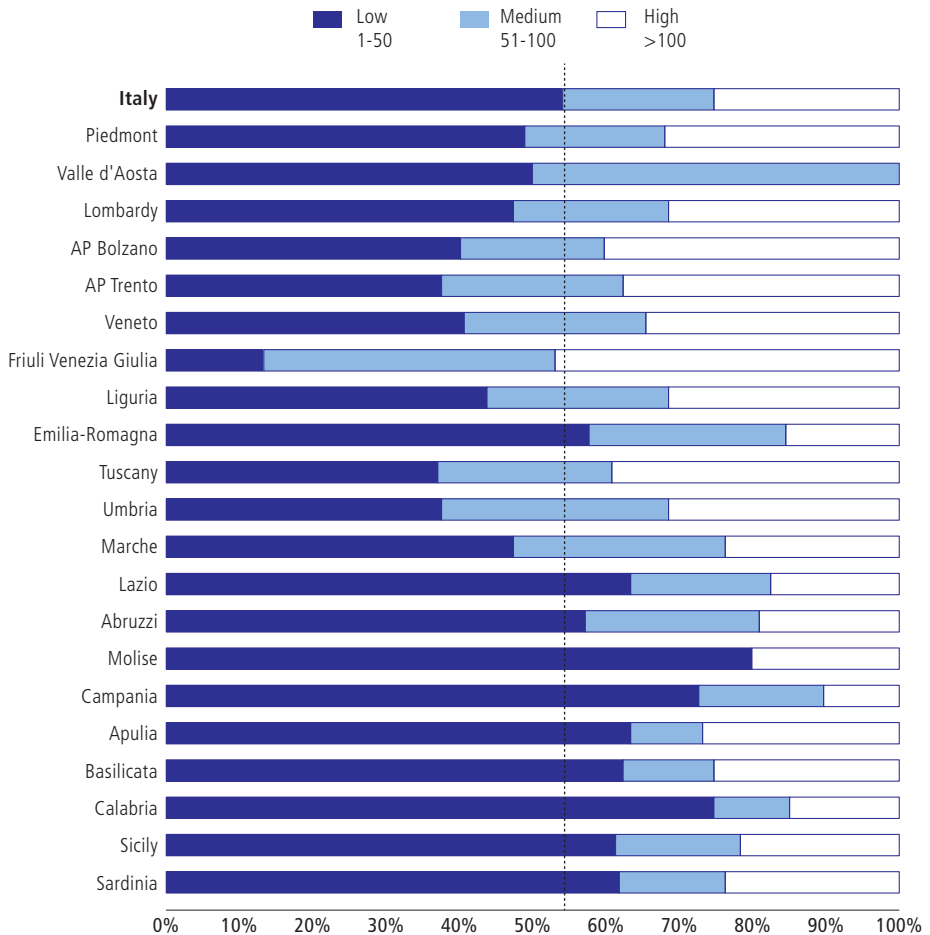


Figure 4.9. Knee. Revision: percentage of hospitals by region and volume of activity

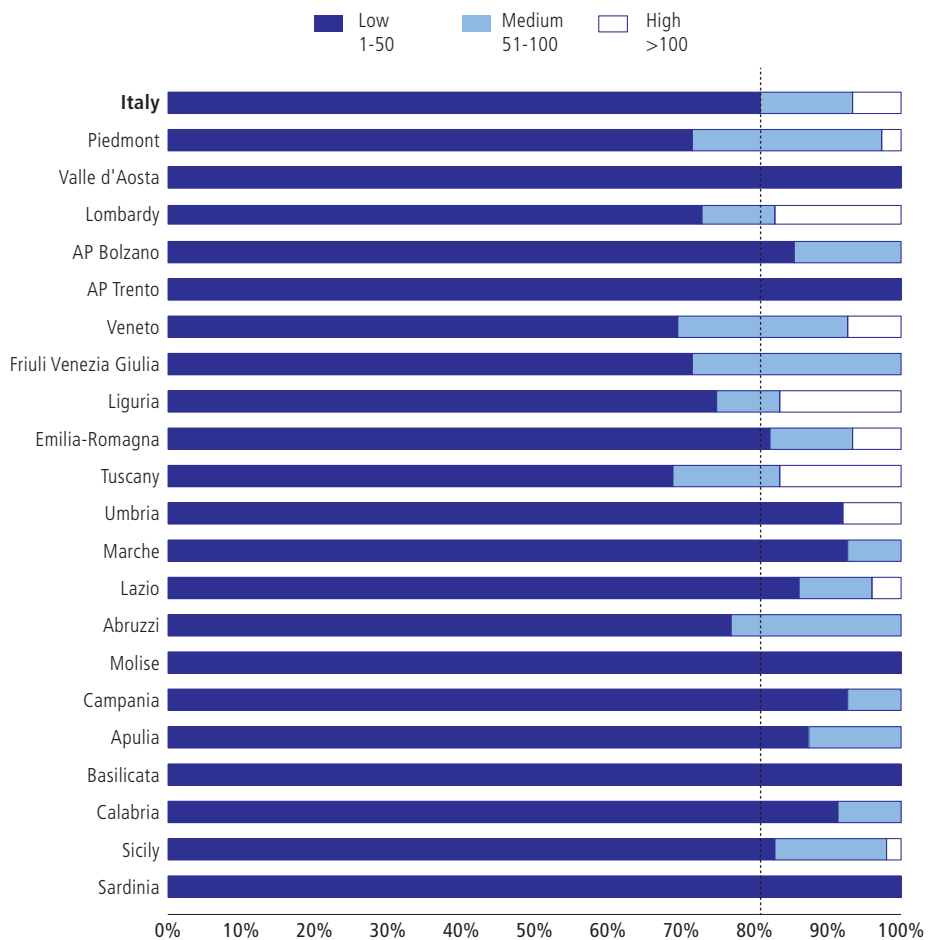


Figure 4.10. Knee. Primary total replacement: inter-regional mobility index (%), a) attraction index, b) escape index

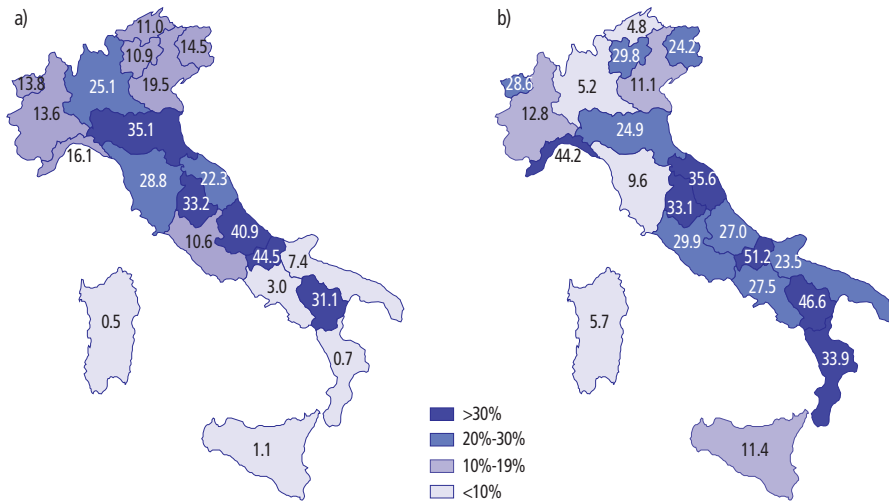


Figure 4.11. Shoulder. Primary total replacement: percentage of hospitals by region and volume of activity

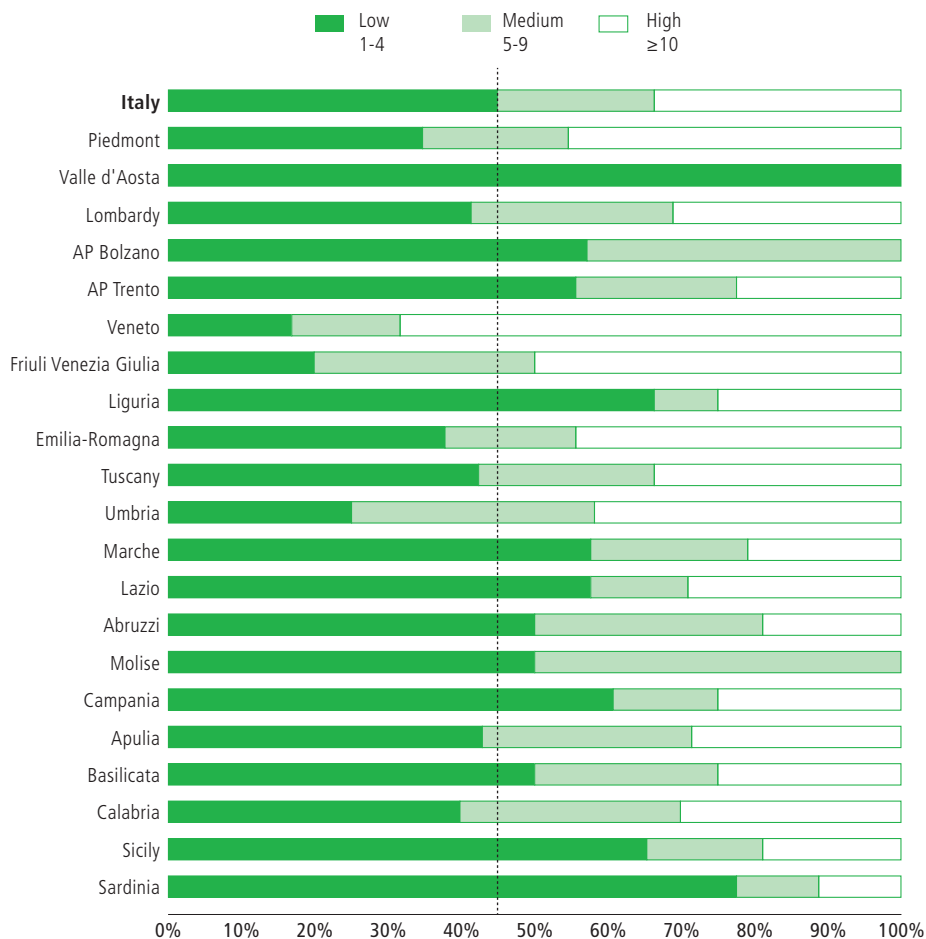


Figure 4.12. Shoulder. Primary partial replacement: percentage of hospitals by region and volume of activity

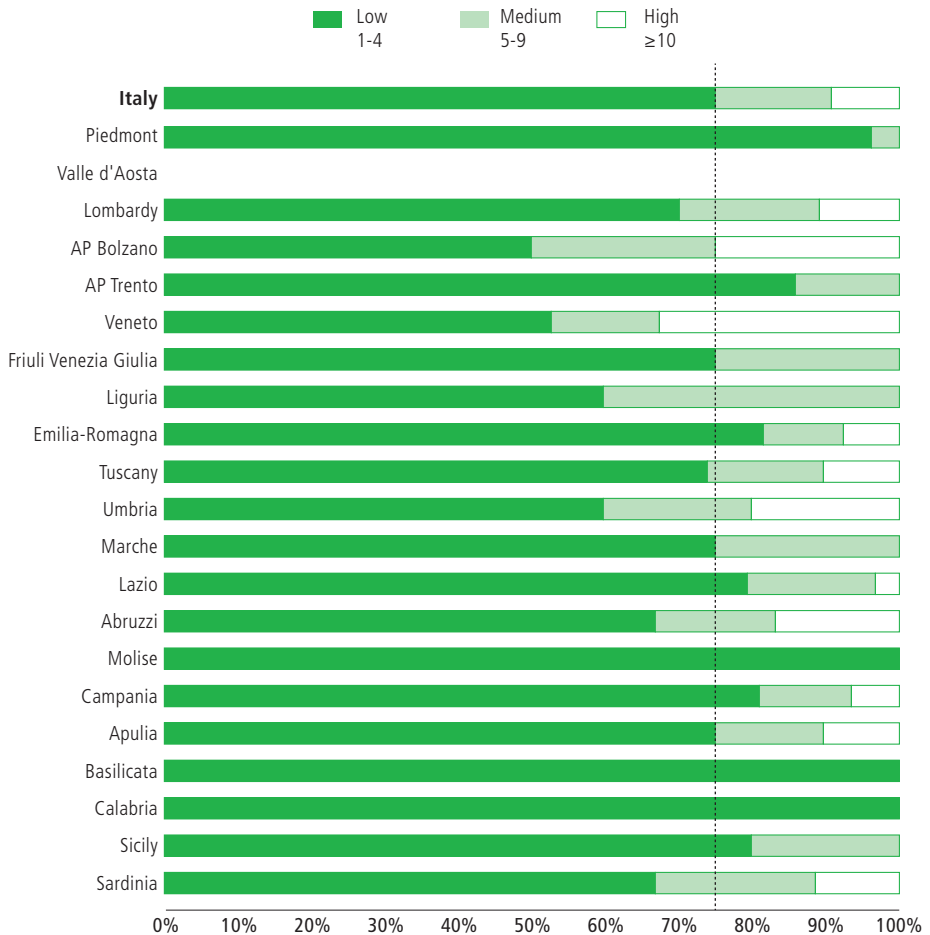


Figure 4.13. Shoulder. Elective primary total replacement: inter-regional mobility index (%), a) attraction index, b) escape index

