National Joint Registry
www.njrcentre.org.uk

National Joint Registry for England and Wales
3rd Annual Clinical Report

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Executive Summary

The 3rd National Joint Registry Annual Clinical Report (2005) provides an analysis of the data on hip and knee replacement procedures carried out between 1 January and 31 December 2005 inclusive and collected by the National Joint Registry (NJR) by 28 February 2006. The analysis is on procedures carried out in England and Wales in the NHS and independent healthcare sectors. Comparisons are made with the 2004 data reported in the 2nd National Joint Registry Annual Report.

NJR Reports

This NJR 3rd Annual Clinical Report has a companion publication, the NJR Annual Report 2005-06, which covers the continued development of the National Joint Registry (NJR), its performance on data collection and reporting, and the involvement of surgeons and other stakeholders. Further information about the performance on data collection of individual hospitals and treatment centres can be viewed on the StatsOnline section of the NJR website (www.njrcentre.org.uk). The website also holds copies of these and previous annual reports.

Data Quality and Interpretations

The total number of hip and knee replacement procedures undertaken in 2005 recorded on NJR was 124,036. This was an increase of 32% over the 93,885 recorded in 2004, which was mainly due to an increase in the records submitted to the registry. The case ascertainment rate of procedures entered onto the NJR has grown year on year since the registry was launched in April 2003.

In 2005, the NJR:

- Recorded an estimated 77% (124,036) of all procedures undertaken in 2005 in England and Wales compared with 60% (93,885) in 2004
- Received data from 99% (403) of NHS and independent hospitals and treatment centres performing hip and knee replacement procedures in 2005
- Recorded 58% of records with patient consent for their personal identifiers to be entered on the registry and the NHS number, so records of revision and re-operations can be linked to records of the primary procedure

The analysis in this report is on the data recorded on the NJR and, as such, can only be related to that data. Some data fields are optional, hence information in these specific areas is incomplete. The number of records on revisions and re-operations that can be linked to the primary operation data on NJR is currently too small to formulate any conclusions.

It is vital that obtaining patient consent and submitting data to the NJR becomes routine for all NHS and independent hospitals and treatment centres carrying out hip and knee replacement operations.

Key Findings (2005 data)

The table provides an overview of the hip and knee replacement data collected for procedures carried out in 2005.

2005 hip and knee replacement procedures entered onto NJR by 28 February 2006

2005	Hips		Knees		Total	
	n	%	n	%	n	%
Total	61,881		62,155		124,036	
Country						
England	59,419	96%	59,689	96%	119,108	96%
Wales	2,462	4%	2,466	4%	4,928	4%
Type of procedure						
Primary	55,812	90%	59,037	95%	114,849	93%
Revision	5,769	9%	2,824	5%	8,593	7%
Re-operation other than revision	300	0%	294	0%	594	0%
Type of treatment provider						
NHS hospital	38,049	61%	38,981	63%	77,030	62%
Independent hospital	20,096	32%	18,923	30%	39,019	31%
NHS treatment centre	2,070	3%	2,313	4%	4,383	4%
Independent treatment centre	1,666	3%	1,938	3%	3,604	3%
Total	61,881		62,155		124,036	

Hip Procedures

- Primary hip replacement
  - Mean age of patients was 68 years (age on 75% of records), 60% were female
  - 12% were under 55 years of age
  - Osteoarthritis was the most common indication for surgery – 94% of patients
  - Most procedures used cement (73% used femoral cement, 53% used acetabular cement)
  - 99% of patients were recommended at least one type of thromboprophylaxis. 77% at least one type of mechanical prophylaxis, 80% at least one type of chemical
- Hip revisions and re-operations
  - 9% of all hip procedures were revisions (5,769) and re-operations (300)
  - Mean age of patients undergoing revisions was 70 years, 55% were female
  - Most common indication for revision was aseptic loosening recorded for 63% of patients
  - Records of 332 revisions and 46 re-operations between 1 April 2003 and 31 December 2005 could be linked to a primary hip procedure on NJR
- Prostheses recorded in hip procedures
  - 110 different brands of acetabular cups and 129 different brand of femoral stems were recorded, an increase of 10% over 2004. 794 different combinations of cup and stem brands were recorded, a 38% increase over 2004. 25% of procedures with recorded cup and stem brand reported 'mixed and matched' cup-stem combinations

Knee Procedures

- Primary knee replacement
  - Mean age of patients was 70 years (age on 73% of records), 57% were female
  - 6% were under 55 years of age
  - Osteoarthritis was the most common indication for surgery – 97% of patients
  - 99% of patients were recommended at least one type of thromboprophylaxis
- Knee revisions and re-operations
  - 5% of all knee procedures were revisions (2,824) and re-operations (294)
  - Mean age of patients undergoing revisions was 70 years, 51% were male
  - Most commonly recorded indication for revision was aseptic loosening recorded for 46% of patients
  - Records of 219 revisions and 50 re-operations between 1 April 2003 and 31 December 2005 could be linked to a primary knee procedure on NJR
- Prostheses recorded in knee procedures
  - 51 brands of total condylar knee prostheses were recorded. In addition, 15 brands of unicondylar prostheses, 5 brands of patello-femoral replacement prostheses and 12 brands of hinged prostheses. This was an increase on those recorded in 2004

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Introduction

1.1 General

This National Joint Registry Annual Clinical Report (2005) focuses on detailed analysis of the data registered for the calendar year 2005[1].

The companion publication – the NJR Annual Report 2005-06 – covers the development of the National Joint Registry (NJR), its performance on data collection/reporting, and the involvement of surgeons and other stakeholders (see www.njrcentre.org.uk). The National Joint Registry was set up to improve patient care by finding out more about hip and knee joint replacement implants and surgery. It is doing this by building up a database of information. In the future, the registry will be able to provide information on implant performance, joint replacement surgery and best practice for patients, surgeons, hospitals, manufacturers and healthcare regulatory agencies.

The registry was launched in April 2003 and good progress has been made working towards these aims. There are several issues relating to the quality and completeness of data. Some of these issues will be overcome as the amount of data grows; others need attention now, so the data can be utilised to full benefit to improve patient care. These are highlighted below and in the body of the report.

1.2 Data Collection

The NJR data collection system holds data for England and Wales, on hip and knee joint replacement surgery carried out by both the NHS and independent healthcare providers. By 31 December 2005, a total of 263,404 operations had been recorded on the NJR database since its inception in April 2003.

In 2005, the NJR recorded 124,036 hip and knee replacement procedures carried out and recorded on NJR by 28 February 2006. Based on a comparison with knee and hip implants sold in the same period (161,735), this is an estimated 77% of all hip and knee replacement procedures performed in the NHS and independent sector in England and Wales in 2005. The estimated ascertainment rate for the 2004 data in the 2nd NJR Annual Report was 60%.

Ascertainment rates should be born in mind when seeking to interpret the analyses and information in this report.

There are relatively few NJR records on hip and knee replacement revision procedures and fewer still that can be linked to other records, where available, on the same individual.

Such record linkage using the NHS number, based on informed consent of patients, is necessary to help exploit the full potential of the data to meet the aims of the NJR. 58% of NJR records in 2005 and 50% of records between 1 April 2003 and 31 December 2005 had both informed consent of patients to record personal details on the Register, and the patient's NHS number – needed to allow records on the same patient to be linked both within NJR and with other databases such as Hospital Episode Statistics (HES) and Patient Episode Database Wales (PEDW).

These and other factors relating to the completeness and quality of the data, currently limit the robustness and power of the data, and thus limit the conclusions that can be confidently drawn.

1.3 Data Analysis

The overview of the 2005 data and the comparison with similar 2004 data (National Joint Registry for England and Wales 2nd Annual Report – www.njrcentre.org.uk) in this report is likely to be of general interest to a wide range of people – patients, healthcare professionals, NHS and independent healthcare organisations, manufacturers and others. There is much detailed analysis that is of interest and relevance to orthopaedic surgeons.

The report is organised in chapters including summary data; an analysis of the number and type of primary and revision hip and knee joint replacement procedures recorded on the NJR; further detail on type of procedure, surgical practice adopted, patient physiological status and characteristics, type of anaesthetic; and untoward intra-operative events. Size and type of prosthesis used are presented.

Commentary and interpretation is given, within the limits of the data. Percentages are presented rounded to the nearest whole number in most instances. Where judged relevant, occasionally small numbers are broken down further. All tables and figures relate to calendar year 2005 unless otherwise stated.

1.4 Summary

The analysis presented in this report gives insight into a large-scale complex area of clinical work affecting patients, healthcare professionals and manufacturers. Most hip and knee implants are expected to have a lifespan of approximately 10 years[2]; therefore, revision procedures for hip and knee replacement are most likely to occur 10 years after the primary procedure.

In preparing this report, care has been taken to present the data as clearly and concisely as possible, with a level of interpretation that can be supported. Data quality and completeness are discussed and some of this is also covered in the companion publication – NJR Annual Report 2005-06. As the volume and quality of data within the NJR increases, so will the range of meaningful analyses and the findings.

[1] The cut-off for data entry was 28 February 2006

[2] National Institute for Health and Clinical Excellence – NICE benchmark

The data in this, and subsequent chapters, is based on the data in the NJR which is submitted by the NHS and independent hospitals and treatment centres in England and Wales. This report is about the data collected during 2005, the Registry's third year, and relates to hip and knee replacement procedures undertaken between 1 January and 31 December 2005 inclusive (entered on the National Joint Registry by 28 February 2006).

This chapter looks at the quality of the 2005 data including ascertainment rate and linkability and provides summary analyses. It looks at participating hospitals and treatment centres, the number of procedures by hospital, case mix, overall numbers and operation types for hip and knee joint replacement procedures and, finally, it considers types of facility where the surgery is carried out and the funding.

2.1 Data Quality

Ascertainment Rate

The NJR has recorded 124,036 hip and knee joint replacement procedures carried out in 2005[3], which, based on a comparison with knee and hip implants sold within the same period (161,735), represents 77% of all hip and knee joint replacement procedures performed in NHS and independent hospitals/treatment centres (TCs) in England and Wales in 2005.

This represents an improvement over the 2004 figures – 93,885 procedures recorded by 28 February 2005[4] and 155,450 implants sold – an ascertainment rate of 60%.

Whilst there was an increase of 32% (30,151) in the number of procedures recorded on the NJR from 2004 to 2005 (recorded by the end of February in the following year), the number of procedures carried out, based on implants sold, increased by only 4% (6,285). This indicates that the increase is likely to be mainly due to an increase in procedures recorded on NJR due to improved reporting rather than an increase in surgical activity.

The target ascertainment rate has been set at 95% of all hip and knee joint replacement procedures entered on to NJR by 2008.

Linkability – Consent and NHS Number

One of the aims of the NJR is the provision of information on the performance of implants in hip and knee joint replacement surgery. Information on revision procedures for the removal and replacement of one or more components of a total joint implant is an important source of such information, which can then be linked with data about the primary procedure and other relevant information.

To achieve this, the NJR data needs to record that the patient has given informed consent to their personal identifiers (e.g. NHS number, date of birth) being entered on the database. NJR records can then be linked with each other and with other data sources, such as the Hospital Episode Statistics (HES) and Patient Episodes Database Wales (PEDW).

For the 2005 NJR data, only 58% of records had entries on both patient consent and NHS number and 50% for records on NJR between 1 April 2003 and 31 December 2006, thus limiting analysis of the patient journey, including details of previous procedures, and the durability of the individual implants.

Other Data Quality Issues

Completeness of the dataset for each procedure, including those fields whose completion is optional has an important bearing on the depth of analysis that can be undertaken. Where there is insufficient data, analysis has been omitted from the report. Analysis has been included in some circumstances, with clearly stated caveats. It should also be noted that no analysis has been undertaken of the distribution of missing data.

There are some anomalies in respect of implant type used versus procedure recorded. This issue needs to be addressed in fine-tuning of the data collection.

Improvement in Data Quality and Completeness

Improvement in data quality is a key focus for the NHS and the independent sector. Hospitals and treatment centres are expected to submit all hip and knee replacement procedures to the NJR. Details of the number of procedures submitted and the patient consent rate for each NHS hospital and treatment centre and most independent sector hospitals and treatment centres are on the NJR website (www.njrcentre.org.uk) on the StatsOnline pages.

[3] A further 1,654 procedures carried out in 2005 have been recorded on the NJR since 28 February 2006.

[4] A further 5,897 procedures carried out in 2004 were entered onto the NJR after 28 February 2005.

2.2 Hospitals/Treatment Centres Participating in NJR

Table 1 below shows the number of hospitals and treatment centres that participated in providing data to the NJR: 403 hospitals/treatment centres (TCs) participated (381 in 2004); 57% were NHS facilities. As would be expected, NHS hospitals/TCs are undertaking more procedures on average than independent hospitals/TCs. Although there is a high proportion of participating hospitals/TCs in every category, the 77% ascertainment rate indicates that not all procedures for each hospital/TC are recorded.

Table 2 opposite shows the number of procedures undertaken per year by different hospitals.

Table 1

Total number of hospitals and treatment centres in England and Wales which could participate in the NJR and proportion actually participating in 2005

2005	Total (England and Wales)	Participating in the NJR 2005
NHS hospitals	224	220
England	208	204
Wales	16	16
Independent hospitals	167	167
England	161	161
Wales	6	6
NHS treatment centres	9	9
England	9	9
Wales	0	0
Independent treatment centres	8	7
England	8	7
Wales	0	0
	408	403

Table 2

Number of participating hospitals (excluding treatment centres) by number of procedures for 2005 compared with 2004

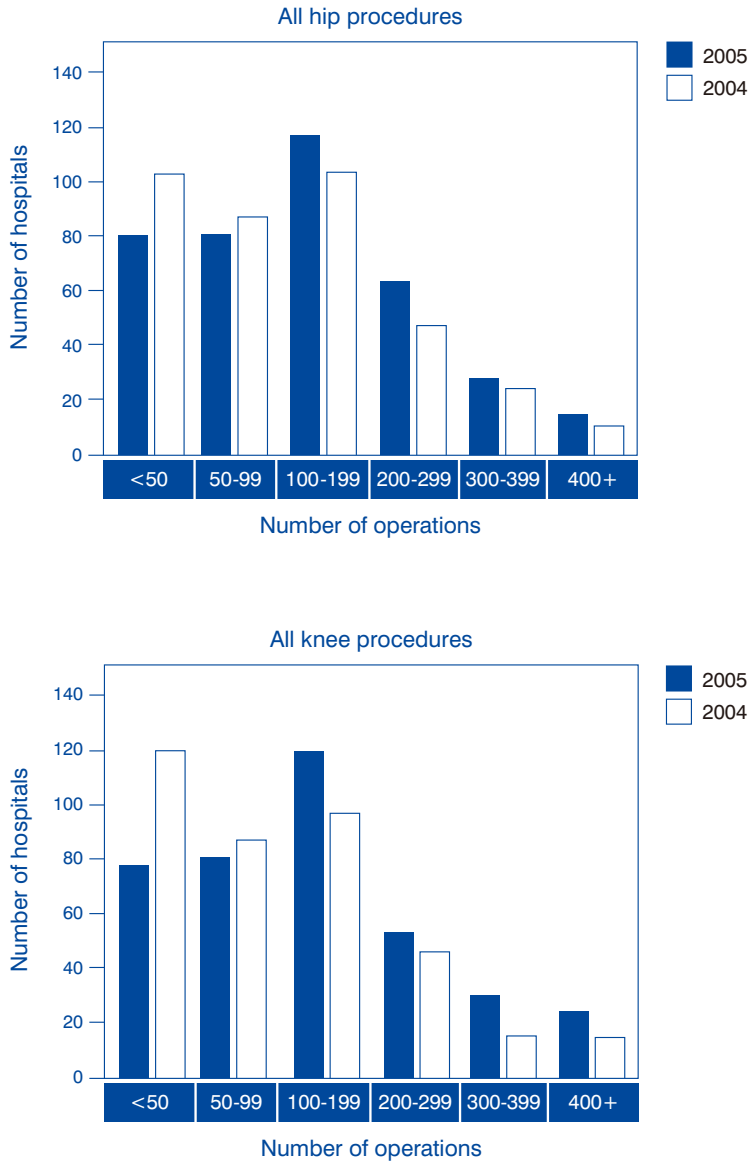
2005	Number of procedures recorded in NJR in 2005									
	Total number of hospitals	< 50	50 - 99	100 - 199	200 - 299	300 - 399	400+	Median per unit	Min	Max
All operations										
Hospitals entering hip replacements	386	80	80	115	67	29	15	122	1	1,226
Hospitals entering knee replacements	381	77	81	120	51	31	21	122	1	1,429
Primary operations										
Hospitals entering primary hip replacements	386	87	82	120	67	18	12	111	1	1,037
Hospitals entering primary knee replacements	381	80	82	121	53	25	20	117	1	1,396
	Total number of hospitals	1	2 - 4	5 - 9	10 - 19	20 - 49	50+	Median per unit	Min	Max
Revison/re-operation										
Hospitals entering revision / re operation hip replacements	318	30	79	55	63	63	28	9	1	224
Hospitals entering revision / re operation knee replacements	302	50	89	66	51	40	6	5	1	115

2004	Number of procedures recorded in NJR in 2004									
	Total number of hospitals	< 50	50 - 99	100 - 199	200 - 299	300 - 399	400+	Median per unit	Min	Max
All operations										
Hospitals entering hip replacements	388	108	91	105	47	26	11	98	1	1,106
Hospitals entering knee replacements	382	119	92	98	44	14	15	88	1	826
Primary operations										
Hospitals entering primary hip replacements	388	115	93	107	52	12	9	93	1	936
Hospitals entering primary knee replacements	382	121	91	100	45	11	14	87	1	773
	Total number of hospitals	1	2 - 4	5 - 9	10 - 19	20 - 49	50+	Median per unit	Min	Max
Revison/re-operation										
Hospitals entering revision / re-operation hip replacements	316	41	73	61	66	57	18	8	1	274
Hospitals entering revision / re-operation knee replacements	283	47	94	69	44	24	5	5	1	90

Whilst this data is incomplete, a range of workload is recorded. Some hospitals have recorded many hundreds of procedures within a category, while others have recorded very few procedures. About 80 centres recorded undertaking less than 1 hip procedure a week for hips and similarly for knees. 30 centres have reported only one hip revision during 2005, and 50 centres only one knee revision. This may be the result of poor compliance with the NJR data requirements within hospitals or a true variation. Outcome information is not available to assess the impact of this. Figure 1 displays the 2005 data, compared with 2004 data, in a bar chart.

Figure 1

Number of participating hospitals by number of procedures for 2005 compared with 2004.



There appears to have been a reduction in the numbers of hospitals undertaking small numbers of procedures. However, some hospitals have recorded undertaking less than 1 primary procedure per week, and some only 1 revision procedure per year. Further work is to be undertaken to elucidate the position.

2.3 Summary Analyses for 2005

This section presents a summary of the procedures recorded for hip and knee replacements carried out during 2005, including the procedures types, the funding sources for the procedures, the characteristics of the patients, and how these vary according to the type of provider (hospital or treatment centre, NHS and independent).

Overall Summary

The following table looks at the data analysed for 2005.

Table 3

Hip and knee replacement procedures carried out in England and Wales in January to December 2005 (recorded on the NJR database by 28 February 2006), by country, type of procedure, provider type and funding

2005	Hips		Knees		Total	
	n	%	n	%	n	%
Total	61,881		62,155		124,036	
Country						
England	59,419	96%	59,689	96%	119,108	96%
Wales	2,462	4%	2,466	4%	4,928	4%
Type of procedure						
Primary	55,812	90%	59,037	95%	114,849	93%
Revision	5,769	9%	2,824	5%	8,593	7%
Re-operation other than revision	300	0%	294	0%	594	0%
Laterality						
Bilateral*	268	0%	654	1%	922	1%
Unilateral	61,613	100%	61,501	99%	123,114	99%
Type of treatment provider						
NHS hospital	**38,049**	**61%**	**38,981**	**63%**	**77,030**	**62%**
NHS funding	31,837	84%	32,982	85%	64,819	84%
Independent funding	1,334	4%	721	2%	2,055	3%
Unknown funding	4,878	13%	5,278	14%	10,156	13%
Independent hospital	**20,096**	**32%**	**18,923**	**30%**	**39,019**	**31%**
NHS funding	6,228	31%	7,897	42%	14,125	36%
Independent funding	10,551	53%	7,525	40%	18,076	46%
Unknown funding	3,317	17%	3,501	19%	6,818	17%
NHS treatment centre	**2,070**	**3%**	**2,313**	**4%**	**4,383**	**4%**
NHS funding	1,668	81%	1,948	84%	3,616	83%
Independent funding	6	0%	6	0%	12	0%
Unknown funding	396	19%	359	16%	755	17%
Independent treatment centre	**1,666**	**3%**	**1,938**	**3%**	**3,604**	**3%**
NHS funding	1,609	97%	1,837	95%	3,446	96%
Independent funding	0	0%	1	0%	1	0%
Unknown funding	57	3%	100	5%	157	4%
Total	61,881		62,155		124,036	

* 922 procedures are 461 pairs of bilaterals

2

Overview of Hip and Knee Joint Replacement Procedures – 2005

There has been an overall increase of 32% (124,036 – 93,885) in hip and knee replacements reported in 2005 compared with 2004. Numbers of knee procedures recorded have increased relatively more than numbers of hip procedures since 2004, and the split is now almost exactly 50/50 (61,881 hip and 62,155 knee). The percentage of all revision procedures is similar to 2004, comprising 9.3% for hips (9.2% in 2004) and 4.5% for knees (4.4% in 2004).

Provider Type and Funding

Of all 124,036 reported procedures, 70,502 (66%) took place in NHS facilities, compared with (62,886) 67% in 2004 (Table 3). The number of procedures in 2005 with funding information recorded was 106,150 (86%), of which 86,006 (81%) were recorded as NHS funded, which includes procedures in NHSTCs and ISTCs (77% in 2004).

Of the 70,502 procedures in NHS facilities, 2,067 (3%) were recorded as independently funded (similar to 2004). 20% (17,571) of NHS funded procedures (86,006) took place in independent sector facilities (16% in 2004).

Hip Replacement Procedures

In 2005, 55,812 primary hip procedures were recorded (Table 4): an increase of 26% over 2004. This increase in numbers is likely to be (in the main) a reflection of the improvement in ascertainment rate compared with 2004, rather than a true increase in the incidence of hip replacement in the population. This assumes however that the overall ascertainment rates (77% for 2005 and 60% for 2004) are smoothly distributed across all types of procedure.

Of the 55,812 primary hip procedures, the types of procedure recorded were as follows (see Table 4, opposite):

- 28,602 – 51% Cemented total hip replacement
- 13,955 – 25% Cementless total hip replacement
- 8,232 – 15% Hybrid, or reverse hybrid total hip replacement
- 2,746 – 5% Primary resurfacing
- 2,277 – 4% Others

Revision procedures totalled 5,769, of which 4,689 (81%) were recorded in NHS hospitals; 962 (17%) in independent sector hospitals, with 102 and 16 in NHSTCs and ISTCs respectively. As 90% of hip implants are expected to last 10 years, normally hip joint revision procedures would not be expected to be undertaken before that time. There were, however, 332 hip revision procedures recorded on NJR since April 2003 that had patient consent and NHS number, and were linked to primary procedures within the NJR database[5]. This small number of linked revisions provides a very limited amount of information on the relationship between primaries and revisions.

There were 300 re-operations other than revisions.

[5] NJR holds information on hip and knee replacement procedures performed since 1 April 2003.

Table 4

Patient characteristics and hip procedure details, 2005, by type of hospital/treatment centre

2005	Provider type									
	NHS hospitals		Independent hospitals		NHS treatment centres		Independent treatment centres		Total	
	n	%	n	%	n	%	n	%	n	%
Total	38,049		20,096		2,070		1,666		61,881	
Patient physical status										
P1 – Fit and healthy	8,191	22%	6,286	31%	416	20%	583	35%	15,476	25%
P2 – Mild disease, not incapacitating	22,586	59%	12,169	61%	1,388	67%	1,015	61%	37,158	60%
P3 – Incapacitating systemic disease	6,831	18%	1,554	8%	249	12%	66	4%	8,700	14%
P4 – Life threatening disease	409	1%	78	0%	15	1%	2	0%	504	1%
P5 – Not expected to survive 24 hours	32	0%	9	0%	2	0%	0	0%	43	0%
Procedure type										
Primary procedure*	**33,098**	**87%**	**19,099**	**95%**	**1,967**	**95%**	**1,648**	**99%**	**55,812**	**90%**
Total replacement using cement	17,269	52%	9,566	50%	1,059	54%	708	43%	28,602	51%
Total replacement not using cement	8,231	25%	4,672	24%	512	26%	540	33%	13,955	25%
Hybrid or reverse hybrid total replacement	4,852	15%	2,688	14%	316	16%	376	23%	8,232	15%
Primary resurfacing	2,746	8%	2,173	11%	80	4%	24	1%	5,023	9%
Revision procedure	**4,689**	**12%**	**962**	**5%**	**102**	**5%**	**16**	**1%**	**5,769**	**9%**
Hip single stage revision	3,975	85%	883	92%	95	93%	15	94%	4,968	86%
Hip revision (Stage 1 of 2)	273	6%	22	2%	5	5%	0	0%	300	5%
Hip revision (Stage 2 of 2)	364	8%	54	6%	2	2%	1	6%	421	7%
Hip girdlestone	77	2%	3	0%	0	0%	0	0%	80	1%
Re-operation other than revision	**262**	**1%**	**35**	**0%**	**1**	**0%**	**2**	**0%**	**300**	**0%**
Bilateral or unilateral										
Bilateral	116	0%	150	1%	2	0%	0	0%	268	0%
Unilateral	37,933	100%	19,946	99%	2,068	100%	1,666	100%	61,613	100%
Primary procedure complexity**										
Hip primary	31,340	82%	18,609	93%	1,861	90%	1,637	98%	53,447	86%
Hip complex primary	1,758	5%	487	2%	106	5%	11	1%	2,362	4%
Not recorded	0	0%	3	0%	0	0%	0	0%	3	0%
Funding***										
NHS funding	31,837	96%	6,228	37%	1,668	100%	1,609	100%	41,342	78%
Independent funding	1,334	4%	10,551	63%	6	0%	0	0%	11,891	22%
Not recorded	4,878		3,317		396		57		8,648	
Waiting list initiative/patient choice***										
Yes	2,726	9%	5,871	38%	237	24%	1,364	85%	10,198	21%
No	28,624	91%	9,690	62%	756	76%	245	15%	39,315	79%
Not recorded	6,699		4,535		1,077		57		12,368	
Tertiary referral***										
Yes	1,572	5%	1,261	8%	64	7%	793	50%	3,690	8%
No	29,521	95%	13,719	92%	874	93%	778	50%	44,892	92%
Not recorded	6,956		5,116		1,132		95		13,299	
Total	38,049		20,096		2,070		1,666		61,881	

* Derived field for primary procedures
** MDS 1 did not collect this
*** Non-compulsory question. Not completed for all procedures

The data on hip replacement procedures is discussed in more detail in Chapter 3.

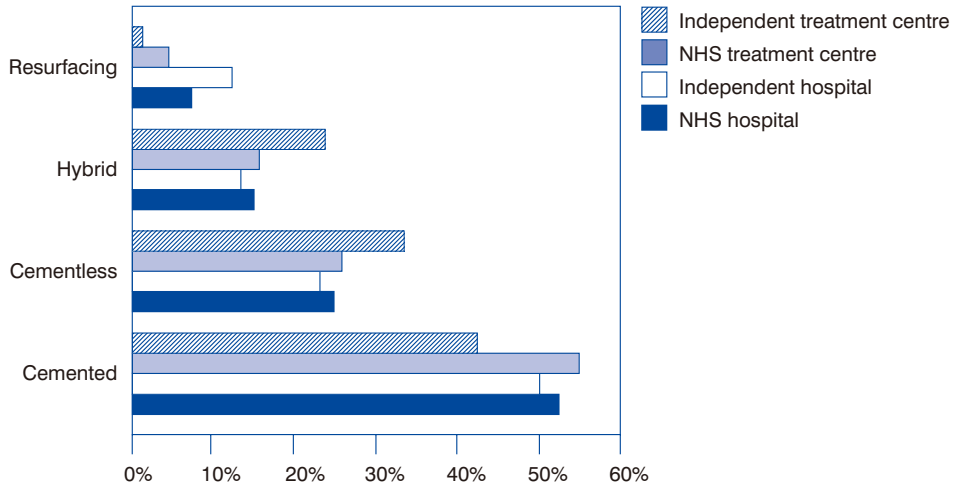
Comparison Across Provider Types – Hip Procedures

NHS hospitals (33,098 Primary Hip Replacements) and Independent hospitals (19,099 Primary Hip Replacements) have a similar distribution of type of primary procedure used, with a slightly lower percentage of primary resurfacings in NHS hospitals, (8%, 2,746 of all hip primaries in NHS hospitals against 11%, 2,173 independent hospitals), although the difference is less than in 2004 (9% vs 17%).

The comparison of the TCs shows some differences. Out of 1,967 primary hip procedures recorded in NHS TCs, 1,059 (54%) were total hip replacements (THRs) using cement: equivalent figures for ISTCs are 1,648 total primary hip procedures, with 708 THRs using cement (43%). In contrast to the hospital figures above, NHS TCs recorded a higher percentage of primary resurfacing procedures (4%, 80) than ISTCs (1%, 24). Independent hospitals undertook more resurfacing procedures as a proportion of total primary procedures than NHS hospitals (11%, 2,173 vs 8%, 2,746) (Figure 2).

Figure 2

Primary hip operation type by provider type 2005



Knee Replacement Procedures

In 2005, 59,037 primary knee replacement procedures were recorded (Table 5): an increase of 38% over 2004, and more than the number of primary hip replacements. This increase is probably accounted for by the increase in ascertainment rate but could also reflect an increase in numbers of knee procedures undertaken.

The breakdown by type of implant was:

- 49,621 – 84% Cemented primary total knee replacement
- 3,991 – 7% Cementless total knee replacement
- 924 – 2% Hybrid total knee replacement
- 3,892 – 7% Unicondylar knee replacement
- 609 – 1% Patello-femoral replacement

Of the 2,824 revision knee procedures, 2,267 (80%) were performed in NHS hospitals, 508 (22%) in independent sector hospitals: 44 in NHSTCs and 5 in ISTCs. As with revision hip replacement procedures, the number of revisions recorded since April 2003 that had patient consent and NHS number for linking records was small at 219.

The remaining 294 procedures in 2005 were re-operations other than revisions.

Table 5

Patient characteristics and knee procedure detail, 2005, by type of hospital/treatment centre

2005	Provider type									
	NHS hospitals		Independent hospitals		NHS TCs		Independent TCs		Total	
	n	%	n	%	n	%	n	%	n	%
Total	38,981		18,923		2,313		1,938		62,155	
Patient physical status										
P1 – Fit and healthy	6,635	17%	4,802	25%	350	15%	713	37%	12,500	20%
P2 – Mild disease, not incapacitating	25,038	64%	12,509	66%	1,658	72%	1,150	59%	40,355	65%
P3 – Incapacitating systemic disease	6,980	18%	1,568	8%	286	12%	75	4%	8,909	14%
P4 – Life threatening disease	302	1%	35	0%	19	1%	0	0%	356	1%
P5 – Not expected to survive 24 hours	26	0%	9	0%	0	0%	0	0%	35	0%
Procedure type										
Primary procedure*	**36,471**	**94%**	**18,376**	**97%**	**2,259**	**98%**	**1,931**	**100%**	**59,037**	**95%**
Total replacement using cement	30,816	84%	14,934	81%	2,069	92%	1,802	93%	49,621	84%
Total replacement not using cement	2,522	7%	1,327	7%	43	2%	99	5%	3,991	7%
Hybrid total replacement	503	1%	350	2%	65	3%	6	0%	924	2%
Unicondylar knee replcement	2,254	6%	1,544	8%	76	3%	18	1%	3,892	7%
Patello-femoral replacement	376	1%	221	1%	6	0%	6	0%	609	1%
Revision procedure	**2,267**	**6%**	**508**	**3%**	**44**	**2%**	**5**	**0%**	**2,824**	**5%**
Single stage revision	1,584	70%	427	84%	30	68%	3	60%	2,044	72%
Revision (stage 1 of 2)	275	12%	29	6%	3	7%	2	40%	309	11%
Revision (stage 2 of 2)	396	17%	51	10%	11	25%	0	0%	458	16%
Amputation	2	0%	0	0%	0	0%	0	0%	11	0%
Conversion to arthrodesis	10	0%	1	0%	0	0%	0	0%	2	0%
Re-operation other than revision	**243**	**1%**	**39**	**0%**	**10**	**0%**	**2**	**0%**	**294**	**0%**
Bilateral or unilateral										
Bilateral	228	1%	424	2%	2	0%	0	0%	654	1%
Unilateral	38,753	99%	18,499	98%	2,311	100%	1,938	100%	61,501	99%
Primary procedure complexity**										
Knee primary	35,257	90%	18,032	95%	2,197	95%	1,924	99%	57,410	92%
Knee complex primary	1,214	3%	342	2%	62	3%	7	0%	1,625	3%
Not recorded	0	0%	2	0%	0	0%	0	0%	2	0%
Funding***										
NHS funding	32,982	98%	7,897	51%	1,948	100%	1,837	100%	44,664	84%
Independent funding	721	2%	7,525	49%	6	0%	1	0%	8,253	16%
Not recorded	5,278		3,501		359		0		9,138	
Waiting list initiative/patient choice***										
Yes	3,334	11%	7,196	50%	288	27%	1,647	90%	12,465	26%
No	28,317	89%	7,126	50%	773	73%	189	10%	36,405	74%
Not recorded	7,330		4,601		1,252		102		13,285	
Tertiary referral***										
Yes	1,249	4%	1,193	9%	79	8%	1,038	57%	3,559	7%
No	30,055	96%	12,385	91%	868	92%	775	43%	44,083	93%
Not recorded	7,677		5,345		1,366		125		14,513	
Total	38,981		18,923		2,313		1,938		62,155	

* Derived field for primary procedures
** MDS 1 did not collect this
*** Non-compulsory question. Not completed for all procedures

Knee joint replacement procedures are looked at in more detail in Chapter 4.

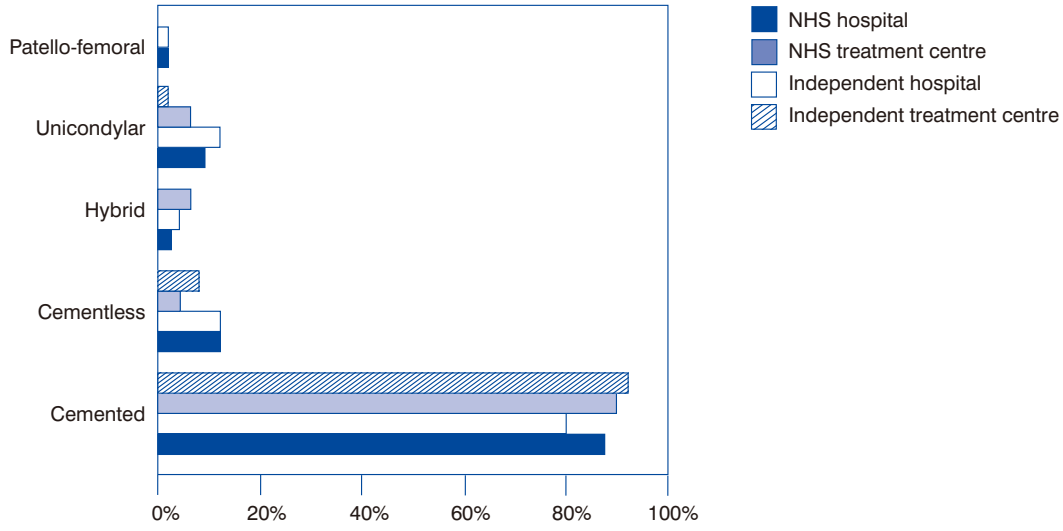
Comparison Across Provider Types – Knee Procedures

NHS hospitals recorded 36,471 primary knee replacements and independent sector hospitals 18,376. The distribution of types of procedure in the different hospital settings shows no marked differences. There is a small difference in proportion of primary unicondylar knee replacements carried out – 2,254 (6%) in NHS hospitals and 1,544 (8%) in independent hospitals; this is less than in 2004 (12% vs 8%).

Treatment centres recorded much smaller numbers of primary knee replacements – 2,259 for NHSTCs and 1,931 for ISTCs – showing a higher proportion of cemented total knee replacements (TKRs) than the hospitals, and a lower proportion of uncemented TKRs.

Figure 3

Primary knee operation type by provider type 2005

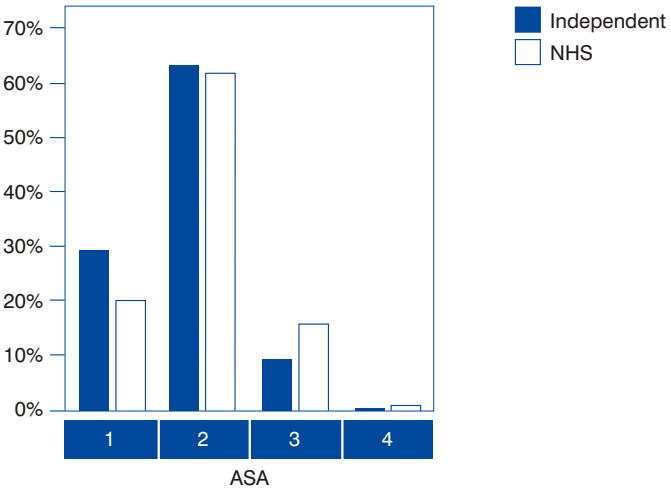


Case Mix: Patients Undergoing Hip and Knee Procedures

One measure of case mix is the patient's physiological status as measured by the American Society of Anaesthesiologists (ASA) grading system[6]. The ASA grade, as recorded, varied across provider types. In general, independent hospitals/TCs recorded physiologically fitter patients (Figure 4). This is especially noticeable for the ASA P3 grade patients, where more than 80% were treated in NHS establishments (81%, 7,080 hip; 82%, 8,909 knee), compared with the proportion of patients treated in NHS establishments (65%, 40,119 hip: 66%, 41,294 knee). Only 4% of hip and knee patients in independent treatment centres were ASA P3/4, compared with 13% P3/4 in NHS treatment centres (Tables 4 and 5).

Figure 4

Patient physical status based on ASA grade according to provider type: all hip and knee procedures 2005



[6] ASA grades are: P1 – Fit and healthy; P2 – Mild disease, not incapacitating; P3 – Incapacitating systemic disease; P4 – Life threatening disease; P5 – Not expected to survive 24 hours.

3

Hip Replacement Procedures

3.1 Primary Hip Replacement Procedures

Patient Characteristics

The basic characteristics and indications for surgery, shown in Table 6 are similar to 2004:

- Mean age 68 years, 40% male
- 86% ASA P1/2, 13% P3
- Indication recorded for surgery:
  - 94% osteoarthritis
  - 3% avascular necrosis
- 746 (1%) of primary operations carried out for fractured neck of femur, and should be considered emergencies

Table 6

Patient characteristics for primary hip replacement procedures in 2005 by type of procedure

2005	Patient procedure									
	Total replacement using cement		Total hip replacement not using cement		Hybrid or reverse hybrid total replacement		Primary resurfacing		Total	
	28,602		13,955		8,232		5,023		55,812	
Age, years (consenting patients only) n	21,296		10,524		6,094		3,728		41,642	
Mean (sd)	72 (10)		65 (12)		67 (12)		55 (10)		68 (12)	
Interquartile range	67 - 79		59 - 73		60 - 75		50 - 61		61 - 76	
	n	%	n	%	n	%	n	%	n	%
Gender (consenting patients only) n	21,289		10,522		6,093		3,728		41,632	
Male	7,517	35%	4,530	43%	2,447	40%	2,349	63%	16,843	40%
Female	13,772	65%	5,992	57%	3,646	60%	1,379	37%	24,789	60%
Patient physical status										
P1 – Fit and healthy	5,393	19%	4,112	29%	2,257	27%	2,698	54%	14,460	26%
P2 – Mild disease not incapacitating	18,501	65%	8,142	58%	4,922	60%	2,127	42%	33,692	60%
P3 – Incapacitating systemic disease	4,459	16%	1,580	11%	992	12%	184	4%	7,215	13%
P4 – Life threatening disease	234	1%	106	1%	55	1%	12	0%	407	1%
P5 – Expected to die within 24hrs	15	0%	15	0%	6	0%	2	0%	38	0%
Indications for surgery										
Osteoarthritis	27,068	95%	13,036	93%	7,557	92%	4,801	96%	52,462	94%
Ankylosing spondylitis	83	0%	56	0%	30	0%	27	1%	196	0%
Avascular necrosis	763	3%	504	4%	319	4%	102	2%	1,688	3%
Congenital dislocation/dysplasia of hip	193	1%	314	2%	164	2%	126	3%	797	1%
Failed hemi-arthroplasty	79	0%	22	0%	34	0%	0	0%	135	0%
Failed internal fixation	202	1%	118	1%	70	1%	3	0%	393	1%
Fractured acetabulum	46	0%	49	0%	36	0%	12	0%	143	0%
Fractured neck of femur	395	1%	189	1%	156	2%	6	0%	746	1%
Other hip trauma	38	0%	39	0%	24	0%	4	0%	105	0%
Other inflammatory arthropathy	141	0%	64	0%	54	1%	30	1%	289	1%
Perthes	26	0%	70	1%	34	0%	10	0%	140	0%
Previous arthrodesis	9	0%	10	0%	7	0%	0	0%	26	0%
Infection	25	0%	13	0%	17	0%	5	0%	60	0%
Psoriatic arthropathy	17	0%	10	0%	10	0%	3	0%	40	0%
Seropositive rheumatoid arthritis	286	1%	91	1%	87	1%	15	0%	479	1%
Slipped upper femoral epiphesis	31	0%	45	0%	34	0%	51	1%	161	0%
Other	237	1%	133	1%	86	1%	52	1%	508	1%
Side										
Bilateral	62	0%	112	1%	38	0%	52	1%	264	0%
Left, unilateral	12,746	45%	6,331	45%	3,722	45%	2,385	47%	25,184	45%
Right, unilateral	15,794	55%	7,512	54%	4,472	54%	2,586	51%	30,364	54%
Waiting list initiative										
Yes	5,312	24%	2,431	22%	1,460	22%	618	15%	9,821	22%
No	17,144	76%	8,705	78%	5,294	78%	3,581	85%	34,724	78%
Not recorded	6,146		2,819		1,478		824		11,267	
Tertiary referral										
Yes	1,186	5%	822	7%	663	0%	355	9%	3,026	7%
No	20,713	95%	10,151	93%	5,969	90%	3,756	91%	40,589	93%
Not recorded	6,703		2,982		1,600		912		12,197	
Total	28,602		13,955		8,232		5,023		55,812	

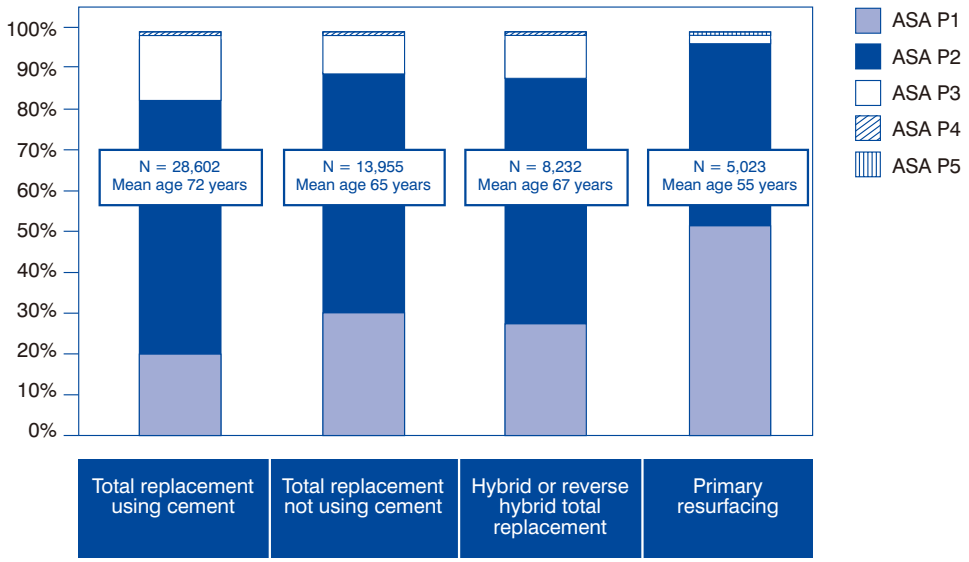
Operation Type

From Table 6 above, the 28,602 primary total hip replacement (THR) procedures using cement form 51% of the total, compared with 23,992 (54%) in 2004. There were 13,955 cementless THR procedures, 25% of the total (8,957, 20% for 2004). The proportion of primary resurfacings recorded dropped slightly, from 12% (5,158) in 2004 to 9% (5,023) in 2005 (but note the data collection and data analysis issues highlighted in Chapter 1).

Patients undergoing primary resurfacings were younger and fitter, using the American Association of Anaesthesiologists (ASA) grade system, (mean age 55 years; 54% ASA P1) compared with mean age 68 years and 26% ASA P1 overall. Those undergoing primary THR using cement were the oldest and least fit (mean age 72 years; 19% ASA P1). Figure 5 showing the distribution of ASA grade across operation types.

Figure 5

Patient physical status based on ASA grade according to procedure type: primary hip replacements 2005



Bilateral operations remain very uncommon, forming less than 0.5% of the total.

Patients Under 55 Years of Age

This section focuses on those 41,642 (75%) patients whose age was recorded (see Table 6 above). It should be born in mind that these may not be representative of all patients. Table 7 below shows some characteristics of primary hip replacements for patients under 55 years of age.

12% of the 41,642 hip procedures were in patients were under 55 years, ranging from 4% of THRs using cement to 46% of primary resurfacings. Of the 5,091 patients recorded as below 55 years, 1,712 (34%) had a primary resurfacing procedure, compared with 6% of those over 55.

Table 7

Primary hip replacement procedures in patients under 55 years in 2005

2005	Patient procedure									
	Total replacement using cement		Total hip replacement not using cement		Hybrid or reverse hybrid total replacement		Primary resurfacing		Total	
	n	%	n	%	n	%	n	%	n*	%
Age	21,296		10,524		6,094		3,728		41,642	
Under 55 years at operation	939	4%	1,651	16%	789	13%	1,712	46%	5,091	12%
55+ at operation	20,357	96%	8,873	84%	5,305	87%	2,016	54%	36,551	88%

* Consenting patients only

Table 8 below, provides information on the indications for surgery in these two groups, and shows that congenital factors and avascular necrosis were relatively more common in younger patients.

Table 8

Indications for primary hip replacement by age group in 2005

Indication		
	Under 55	55 and over
Osteoarthritis	85%	96%
Avascular Necrosis	7%	3%
Congenital	7%	1%
Total	5,091	36,551

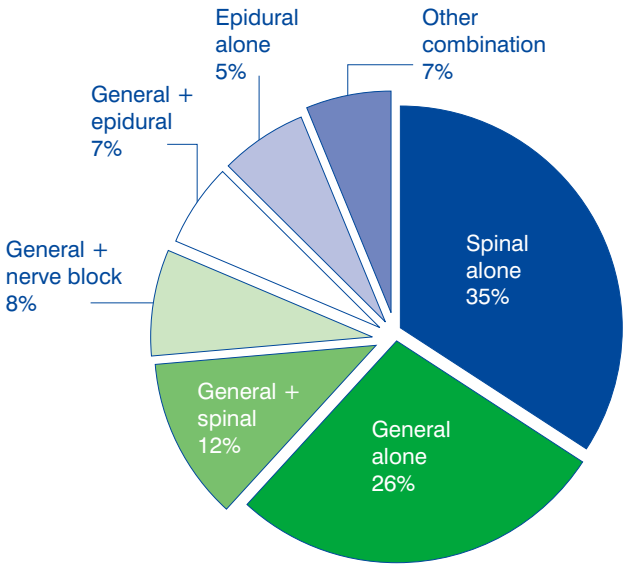
Use of Anaesthetics

The recording of anaesthetics is an optional field. Of the anaesthetics recorded 26% of procedures were carried out under general anaesthetic (GA) alone; 40% used regional block without GA (Figure 6 and Table 9 opposite). Nerve blocks were used in only 11% of cases overall (with or without GA).

Recording of sedation is not considered to be reliable, since it was noted as being used in only 12% of cases, yet 46% of cases were recorded as not having a general anaesthetic component, so would have been expected to have sedation.

Figure 6

Anaesthetic type: primary hip replacements 2005



Description of Surgical Technique

Within the limitations of the data currently being collected, no major changes in surgical practice since 2004 have been identified (Table 9).

Table 9

Surgical practice for primary hip replacement procedures, by type of procedure – 2005

2005	Patient procedures									
	Total replacement using cement		Total hip replacement not using cement		Hybrid or reverse hybrid talent replacement		Primary resurfacing		Total	
	n	%	n	%	n	%	n	%	n	%
	28,602		13,955		8,232		5,023		55,812	
Laminar flow theatre										
Yes	23,781	97%	12,036	96%	7,162	97%	4,338	97%	47,317	97%
No	683	3%	533	4%	227	3%	124	3%	1,567	3%
Not recorded	4,138		1,386		843		561		6,928	
Any anaesthetic recorded**	27,016	94%	13,052	94%	7,799	95%	4,788	95%	52,658	94%
General anaesthesia used	14,243	53%	6,656	51%	4,448	57%	3,331	70%	28,678	54%
Epidural anaesthesia used	4,406	16%	1,901	15%	1,515	19%	754	16%	8,576	16%
Nerve block anaesthesia used	2,986	11%	1,349	10%	790	10%	582	12%	5,707	11%
Spinal anaesthesia used	14,343	53%	6,773	52%	4,142	53%	2,164	45%	27,422	52%
Sedation used*	3,640	13%	1,439	11%	907	12%	407	9%	6,393	12%
Patient position										
Lateral	23,262	81%	11,606	83%	7,784	95%	4,873	97%	47,525	85%
Supine	5,340	19%	2,349	17%	448	5%	150	3%	8,287	15%
Incision										
Anterior/Antero-lateral/Lateral	6,004	21%	3,160	23%	1,194	15%	450	9%	10,808	19%
Lateral (inc Hardinge)	12,825	45%	5,522	40%	2,678	33%	713	14%	21,738	39%
Posterior	9,773	34%	5,273	38%	4,360	53%	3,860	77%	23,266	42%
Trochanteric osteotomy										
Yes	1,717	6%	184	1%	103	1%	131	3%	2,135	4%
No	26,885	94%	13,771	99%	8,129	99%	4,892	97%	53,677	96%
Complex osteotomy*										
Yes	210	1%	36	0%	18	0%	26	1%	290	1%
No	28,392	99%	13,919	100%	8,214	100%	4,997	99%	55,522	99%
Incision length										
Greater than 10cm	21,371	89%	8,918	77%	6,206	88%	4,110	94%	40,605	86%
Up to 10cm	2,767	11%	2,592	23%	837	12%	252	1%	6,448	14%
Not recorded	4,463		2,445		1,188		660		8,756	
Femoral bonegraft used										
Yes	172	1%	167	1%	25	0%	41	1%	405	1%
No	28,429	99%	13,788	99%	8,206	100%	4,981	99%	55,404	99%
Acetabular bonegraft used										
Yes	869	3%	729	5%	528	6%	136	3%	2,262	4%
No	27,732	97%	13,226	95%	7,703	94%	4,886	97%	53,547	96%
Femoral cement used										
Yes	28,602	100%	0	0%	7,829	95%	4,547	91%	40,978	73%
No	0	0%	13,955	100%	403	5%	476	9%	14,834	27%
Acetabular cement used										
Yes	8,602	100%	0	0%	403	5%	299	6%	29,304	53%
No	0	0%	13,955	100%	7,829	95%	4,724	94%	26,508	47%
Minimally invasive surgery**										
Yes	1,073	4%	1,478	12%	359	5%	214	5%	3,124	6%
No	24,944	96%	10,929	88%	7,139	95%	4,425	95%	47,437	94%
Not recorded	2,585		1,548		734		384		5,251	
Image guided surgery**										
Yes	90	0%	82	1%	36	0%	18	0%	226	0%
No	24,957	100%	11,755	99%	7,202	100%	4,442	100%	48,356	100%
Not recorded	3,555		2,118		994		563		7,230	
	28,602		13,955		8,232		5,023		55,812	

* Not recorded in MDS1: missing for 3 patients ** optional field

Cement Techniques

The details of cementing techniques are not mandatory data fields, and the data are *incomplete*, particularly in the case of the use of pulsatile/powered lavage, and so no reliable comparison can be made with 2004. The percentages reported are of cases where the data are available.

Table 10

Cementing techniques used in cemented primary hip procedures in 2005 according to procedure type

2005 Femoral cement used								
	Total hip replacement using cement		Hybrid total replacement		Primary resurfacing		Total	
	n	%	n	%	n	%	n	%
	28,602		7,829		4,547		40,978	
Pulsatile / powered lavage*								
Yes	21,323	90%	5,341	87%	3,111	84%	29,775	89%
No	2,296		829		591		3,716	
Not recorded	4,983		1,659		845		7,487	
Proximal seal used with gun**								
Yes	20,693	72%	6,225	80%	450	10%	27,368	67%
No	7,905		1,603		4,096		13,604	
Not recorded	4		1		1		6	
Femoral cement used retrograde								
Yes	24,946	87%	6,877	88%	763	17%	32,586	80%
No	3,652		951		3,783		8,386	
Not recorded	4		1		1		6	
Mixing for femoral cement								
Open bowl and spatula	896	3%	445	6%	1,043	23%	2,384	6%
Vacuum mixing or fume extraction	27,705	97%	7.384	94%	3,504	77%	38,593	94%
Not recorded	1		0		0		1	
Acetabular cement used								
	Total hip replacement using cement		Reverse hybrid total replacement		Primary resurfacing		Total	
	n	%	n	%	n	%	n	%
	28,602		403		299		29,304	
Pulsatile / powered lavage								
Yes	21,058	90%	249	81%	214	89%	21,521	90%
No	2,434		58		27		2,519	
Not recorded	5,110		96		58		5,264	
Cement pressuriser used								
Yes	20,801	73%	270	67%	141	47%	21,212	72%
No	7,800		133		158		8,091	
Not recorded	1		0		0		1	
Mixing for acetabular cement								
Yes	978	3%	10	2%	16	5%	1,004	3%
No	27,623	97%	393	98%	283	95%	28,299	97%
Not recorded	1		0		0		1	

* not complete information
** only for MDS2

Pulsatile/powered lavage was used in approximately 90% of cases, where its use was recorded, using both acetabular and femoral cement. Retrograde femoral cementing techniques were used in 80% of cases and vacuum mixing/fume extraction in more than 90% of cases recorded.

Within the different procedure types, the figures for primary resurfacing are a little different. In particular, cement pressurisers, proximal seals, and retrograde femoral technique were used less often than for other procedures.

Minimally Invasive Surgery (MIS)

Recording of minimally invasive surgery (MIS) is a non-mandatory field. Table 9 (page 27) shows that 3,124 primary procedures (6% of the total of 50,561) were recorded as MIS. Table 11 shows the MIS and the non-MIS groups split by procedure and by incision length.

Table 11

Minimally invasive surgery in primary hip replacement procedures by type of procedure, 2005

2005	Patient procedure									
	Total hip replacement using cement		Total hip replacement not using cement		Hybrid or reverse hybrid total replacement		Primary resurfacing		Total	
	n	%	n	%	n	%	n	%	n	%
	26,017		12,407		7,498		4,639		50,561	
Not minimally invasive	**24,944**	**96%**	**10,929**	**88%**	**7,139**	**95%**	**4,425**	**95%**	**47,437**	**94%**
Total incision length > 10cm	20,892	91%	8,620	87%	6,020	91%	3,954	97%	39,486	91%
Total incision length <= 10cm	2,035	9%	1,340	13%	605	9%	136	3%	4,116	9%
Not recorded	2,017		969		514		335		3,835	
Minimally invasive	**1,073**	**4%**	**1,478**	**12%**	**359**	**5%**	**214**	**5%**	**3,124**	**6%**
Total incision length > 10cm	317	31%	190	14%	126	37%	86	43%	719	24%
Total incision length <= 10cm	704	69%	1,204	86%	219	63%	114	57%	2,241	76%
Not recorded	52		84		14		14		164	

Overall 9% of those NOT classified as minimally invasive (4,116 out of 43,602 with incision length recorded) had a short total incision length (10cm and under). Of those classed as minimally invasive, 24% (719 out of 2,960 with incision length recorded) had a long (over 10cm) incision length. These figures suggest inconsistency in the definition of MIS.

Of those classed as MIS that had a short incision length (2,241), primary resurfacing accounted for 5% (114), and hybrid procedures for 10% (219), cementless THR for 54% (1,204) and cemented THR 31% (704).

Thromboprophylaxis

The great majority of records (99%) noted that thromboprophylaxis was recommended, suggesting an increase since 2004 of under 97%. (Table 12)

Table 12

Thromboprophylaxis regime for primary hip replacement patients recommended at time of operation in 2005 according to procedure

2005	Patient procedure									
	Total hip replacement using cement		Total hip replacement not using cement		Hybrid or reverse hybrid total replacement		Primary resurfacing		Total	
	28,602		13,955		8,232		5,023		55,812	
	n	%	n	%	n	%	n	%	n	%
Aspirin	6,470	23%	3,175	23%	2,580	31%	1,326	26%	13,551	24%
Chloroquine	5	0%	3	0%	1	0%	4	0%	13	0%
Low dose heparin	389	1%	497	4%	403	5%	126	3%	1,415	3%
Low molecular weight heparin	16,638	58%	7,971	57%	4,163	51%	2,372	47%	31,144	56%
Pentasaccharide	296	1%	185	1%	93	1%	80	2%	654	1%
Warfarin	705	2%	252	2%	209	3%	191	4%	1,357	2%
Other chemical	335	1%	112	1%	105	1%	216	4%	768	1%
Foot pump	7,350	26%	4,033	29%	2,689	33%	1,315	26%	15,387	28%
Intermittent calf compression	7,609	27%	3,340	24%	1,610	20%	1,121	22%	13,680	25%
TED stockings	16,246	57%	8,825	63%	5,182	63%	3,078	61%	33,331	60%
Other mechanical	295	1%	70	1%	72	1%	30	1%	467	1%
None recorded	401	1%	107	1%	43	1%	31	1%	582	1%
	28,602		13,955		8,232		5,023		55,812	

Figure 7

Percentage of all primary hip procedures where different methods of thromboprophylaxis were recommended in 2005

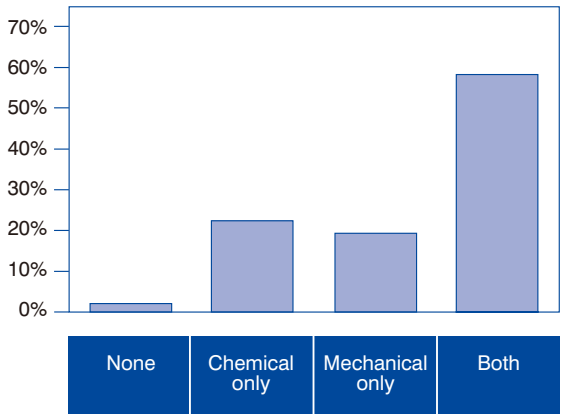


Figure 8

Relative use of chemical methods of thromboprophylaxis in primary hip replacement in 2005 (NB more than one may be used per procedure)

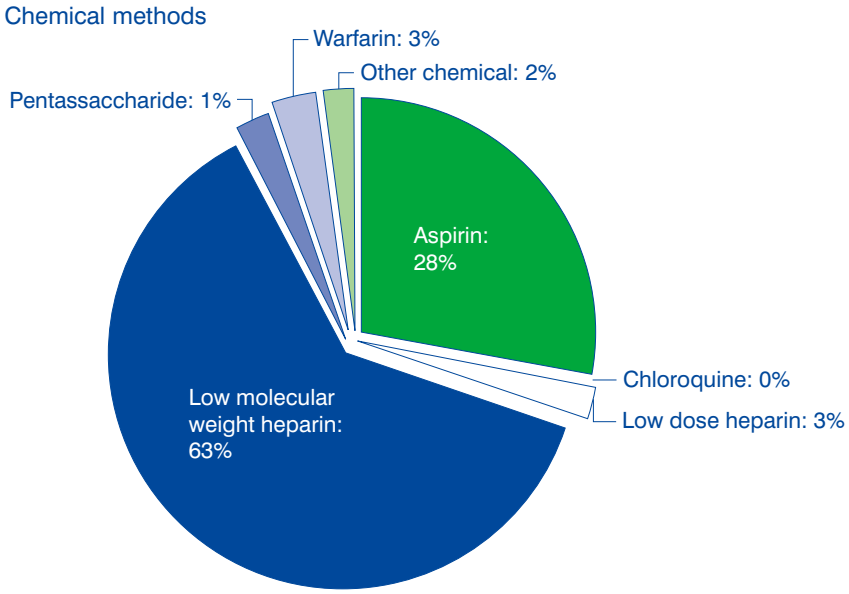
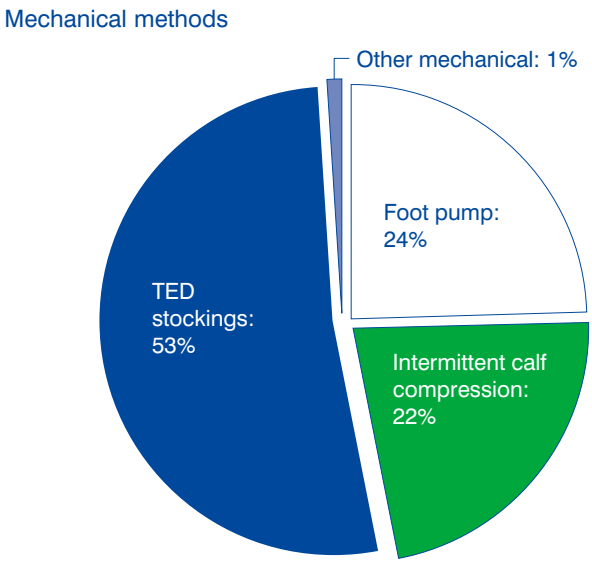


Figure 9

Relative use of mechanical methods of thromboprophylaxis in primary hip replacement in 2005 (NB more than one may be used per procedure)



Almost 60% of patients had some combination of mechanical and chemical techniques planned.[7] 77% of cases in 2005 had at least one mechanical technique planned. In 60% of all procedures TED stockings were planned, and in 27% foot pumps, 25% intermittent compression.

The guideline also states that the evidence on risk/benefit for chemical techniques is less clear. In 80% of cases in 2005, at least one chemical technique was used. In 56% of all procedures LMW heparin was planned, and in 24% aspirin.

Untoward Intra-Operative Events

Of the 621 untoward intra-operative events recorded, 476 were classed in one of the five specific options on the MDS2 form[8] and 145 were recorded as 'other' (Table 13). The pattern of untoward events was very similar to 2004. The most common was calcar crack: 4 per 1,000 procedures, same as for 2004.

[7] The BOA guideline suggests that mechanical techniques, being free from side effects, should be used in the majority of cases.

[8] The MDS2 version of the NJR minimum data set was introduced on 1 April 2004, officially replacing the original version, MDS1 on 1 June 2004. In April 2005 MDS1 was closed.

Table 13

Reported untoward intra-operative events for primary hip replacement patients in 2005 according to procedure type

2005	Patient procedure									
	Total hip replacement using cement		Total hip replacement not using cement		Hybrid or reverse hybrid total replacement		Primary resurfacing		Total	
	n	%	n	%	n	%	n	%	n*	%
	28,601		13,955		8,231		5,022		55,809	
Calcar crack	53	0.2%	138	1.0%	18	0.2%	5	0.1%	214	0.4%
Pelvic penetration	59	0.2%	16	0.1%	12	0.1%	1	0.0%	88	0.2%
Shaft fracture	11	0.0%	26	0.2%	8	0.1%	1	0.0%	46	0.1%
Shaft penetration	11	0.0%	4	0.0%	3	0.0%	0	0.0%	18	0.0%
Trochanteric fracture	57	0.2%	40	0.3%	13	0.2%	0	0.0%	110	0.2%
Other	59	0.2%	39	0.3%	30	0.4%	17	0.3%	145	0.3%
None specified	28,357	99.1%	13,697	98.2%	8,149	99.0%	4,998	99.5%	55,201	98.9%
	28,601		13,955		8,231		5,022		55,809	

NB: More than one event may be recorded for a patient
* Data only available for MDS2, hence 3 cases omitted

There were 145 records tagged as 'other' with additional events recorded in the text. This gave a total of 171 procedures with an 'other' untoward intra-operative event recorded. Analysis of the text in the 'other' field shows there were 50 events recorded as 'other' that actually fit into one of the pre-defined options. 35 events were discarded for the following reasons:

- 20 were recorded as having been recorded in the hospital notes – 'see notes' (or equivalent) but no other information was supplied

  The fact that these events were recorded in the notes may imply that they were regarded at the time as serious and therefore required formal documentation

- 13 events were discarded from classification as irrelevant e.g. 'poor quality bone', 'Routine' etc
- 2 appeared to be related to knee replacements (rather than hips)

The remaining 86 were grouped into 7 suggested new categories. Table 14 shows the re-categorisation.

Table 14

Untoward Intra-operative events during primary hip replacement procedures 2005

Untoward intra-operative event	From 'other' group	From preset options	Total
Calcar crack	1	214	215
Pelvic penetration/crack	30	88	118
Trochanteric/other problem	7	110	117
Femoral penetration/crack	12	64	76
Component positioning (incorrect/problematic component positioning)	25	0	25
Equipment failure (broken instruments, equipment not available)	14	0	14
Surgical mishap (broken knife blades, cutting of sciatic nerve, etc)	13	0	13
Bleeding	11	0	11
Anaesthetic/CVS including hypotension/hypoxia/cardiac arrest (2)	10	0	10
Cement problems	9	0	9
Dislocation	4	0	4

Many events in the 'other' category could have been coded within the main classification but also important clinical events such as cardiac arrest, bleeding, hypoxia, major surgical mishap do not fall into the predefined categories. Some NJR records contain no data but refer to an event recorded only in hospital notes. This needs to be considered when the dataset is reviewed.

3.2 Hip Revisions and Other Re-operations

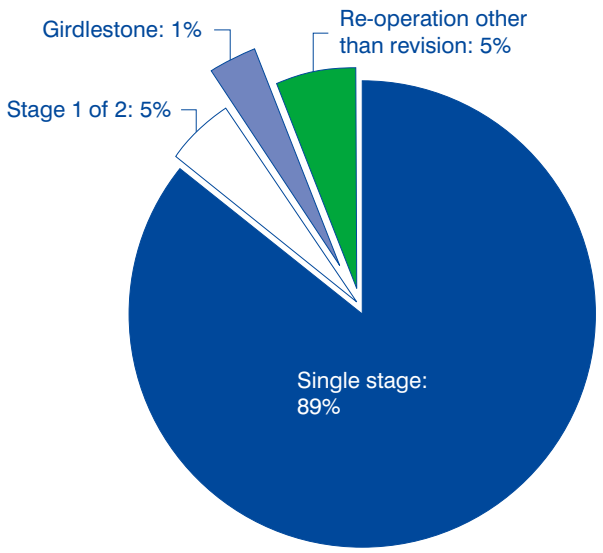
Overall Numbers

6,069 revision and other re-operation procedures were recorded: an increase of 28% over 2004 (Table 15). This is almost exactly the same as the increase in ascertainment. Hip replacement revision procedures represented 9% of all hip procedures recorded on NJR in 2005.

Figure 10 below shows the distribution of re-operation procedures, excluding those which are stage 2 of a 2-stage procedure. The majority (89%) were single stage revisions.

Figure 10

Hip revisions and other re-operations 2005



Patient Characteristics: Revisions

The following discussion of hip revisions excludes procedures which are the second stage of a 2-stage revision, leaving 5,348 procedures of the total 5,769 revision procedures recorded.

Table 15

Patient characteristics for hip single stage and stage 1 revision procedures in 2005, according to procedure type

2005	Patient procedure							
	Hip single stage revision		Hip revision (stage 1 of 2)		Hip girdlestone		Total	
	4,968		300		80		5,348	
Age, years (consenting patients only) n	3,311		197		48		3,556	
Mean (sd)	71 (12)		68 (11)		73 (11)		70 (12)	
Interquartile range	64 - 79		61 - 76		69 - 80		64 - 79	
	n	%	n	%	n	%	n	%
Gender (consenting patients only) n	3,311		197		48		3,556	
Male	1,469	44%	106	54%	18	38%	1,593	45%
Female	1,842	56%	91	46%	30	63%	1,963	55%
Patient physical status								
P1 – Fit and healthy	844	17%	60	20%	6	8%	910	17%
P2 – Mild disease, not incapacitating	2,876	58%	149	50%	37	46%	3,062	57%
P3 – Incapacitating systemic disease	1,177	24%	84	28%	32	40%	1,293	24%
P4 – Life threatening disease	68	1%	7	2%	5	6%	80	1%
P5 – Not expected to survive 24 hours	3	0%	0	0%	0	0%	3	0%
Indications for surgery								
Aseptic loosening	3,232	65%	88	29%	32	40%	3,352	63%
Lysis	1,095	22%	54	18%	8	10%	1,157	22%
Pain	953	19%	40	13%	16	20%	1,009	19%
Dislocation/subluxation	663	13%	12	4%	20	25%	695	13%
Periprosthetic fracture	408	8%	11	4%	6	8%	425	8%
Infection	83	2%	220	73%	35	44%	338	6%
Malalignment	330	7%	1	0%	1	1%	332	6%
Fractured acetabulum	124	2%	3	1%	2	3%	129	2%
Fractured stem	84	2%	3	1%	1	1%	88	2%
Fractured femoral head	36	1%	1	0%	0	0%	37	1%
Incorrect sizing / head socket mismatch	42	1%	1	0%	0	0%	43	1%
Wear of acetabular component	666	13%	4	1%	1	1%	671	13%
Dissociation of liner	46	1%	1	0%	0	0%	47	1%
Other	243	5%	7	2%	4	5%	254	5%
Side								
Bilateral*	4	0%	0	0%	0	0%	4	0%
Left, unilateral	2,318	47%	147	49%	35	44%	2,500	47%
Right, unilateral	2,646	53%	153	51%	45	56%	2,844	53%
Waiting list initiative**								
Yes	323	8%	13	5%	3	5%	339	8%
No	3,761	92%	235	95%	52	95%	4,048	92%
Tertiary referral**								
Yes	530	13%	40	16%	10	18%	580	13%
No	3,558	87%	203	84%	47	82%	3,808	87%
Total	4,968		300		80		5,348	

* 4 bilaterals means 2 pairs ** Non-compulsory question. Not completed for all procedures

Table 15 shows that the basic characteristics and indications for surgery have not changed significantly, apart from a slight increase in average ASA category. Not surprisingly, those undergoing revision were older and less physiologically fit than primary hip replacement patients.

The data for 2005 are summarised below:

- Mean age 70, 45% male
- ASA
- 74% P1/2 (78% in 2004)
- 24% P3 (20% in 2004)
- 1% P4 (1% in 2004)

Linked Hip Revisions and Re-operations

The linked dataset (see Tables 16 and 17) is a very small subset of the revisions captured by NJR that could be linked with a primary procedure recorded in NJR, where the individual patient had given consent and their NHS number was on the NJR database for both the revision and primary procedure records. For NJR records between 1 April 2003 and 31 March 2005, 50% had patient consent and NHS number.

Since the expected lifespan of 90% of hip joint replacements is 10 years and since the NJR dataset did not exist before April 2003, only a small number of hip revisions on NJR would be expected to have a primary hip replacement operation recorded on NJR.

From the 12,610 hip revision procedures recorded between 1 April 2003 and 31 December 2005, only 332 hip replacement revision records were found that could be linked to the primary procedure record on the NJR database. The median time for this subset of revisions is 71 days and inter-quartile range 21 – 286 days.

A further 46 linked re-operation records other than revision were also found. Details of the latter are shown in Table 18.

Table 16

Characteristics of hip revision procedures linked to primary procedures 2003 – 2005 (i)

Hip patients		
	332	
Age, years at primary procedure		
Mean (sd)	65 (12)	
Interquartile range	58 - 74	
	n	%
Gender		
Male	168	51%
Female	164	49%
Patient physical status at primary procedure		
P1 – Fit and healthy	95	29%
P2 – Mild disease, not incapacitating	189	57%
P3 – Incapacitating systemic disease	46	14%
P4 – Life threatening disease	2	1%
P5 – Not expected to survive 24 hours	0	0%
Time from primary to revision in days		
Median	71	
Interquartile range	21 - 286	
Revision operation details	n	%
Revision procedure type		
Single stage revision	244	73%
Hip revision (Stage 1 of 2)	20	6%
Hip revision (Stage 2 of 2)	22	7%
Hip girdlestone	4	1%
Not specified	42	13%
Indications for revision*		
Dislocation	107	32%
Aseptic loosening	62	19%
Periprosthetic fracture	51	15%
Malalignment	44	13%
Infection	45	14%
Pain	32	10%
Incorrect size	9	3%
Fractured head of femur	5	2%
Fractured stem	7	2%
Others	51	15%
	332	

* Each procedure can have more than one indication

Table 17

Characteristics of hip revision procedures linked to primary procedures 2003 – 2005 (ii)

Hip patients		
	332	
Primary operation details	n	%
Indications for primary*		0%
Osteoarthritis	301	91%
Avascular necrosis	17	5%
Fractured neck of femur	7	2%
Failed internal fixation	6	2%
Congenital dislocation/dysplasia of hip	5	2%
Other hip trauma	3	1%
Seropositive rheumatoid arthritis	5	2%
Other	18	5%
Primary procedure type		
Total replacement using cement	110	33%
Total replacement not using cement	112	34%
Total replacement hybrid	57	17%
Resurfacing arthroplasty	53	16%
Primary procedure complexity		
Primary	206	62%
Complex primary	14	4%
Not specified	112	34%
Minimally invasive procedure used for primary		
Yes	28	8%
No	288	87%
Not selected	16	5%
Image guided surgery used for primary		0%
No	311	94%
Not selected	21	6%
	332	

* Each procedure can have more than one indication

Table 18

Re-operations other than revision linked to primary hip procedures in the NJR database 2003 – 2005

2005				
	46			
Re-operation procedure type	n	%	n	%
Wound exploration alone	9	20%		
Open reduction of dislocation	3	7%		
ORIF femur	3	7%		
Wound exploration + excision heterotopic bone + lavage insertion	1	2%		
Wound exploration + removal of retained drain (caught in stitch)	1	2%		
Wound exploration + debridement and lavage hip wound	1	2%		
Open reduction of dislocation + socket augmentation	1	2%		
Socket augmentation	1	2%		
ORIF trochanter	1	2%		
Other re-operation	25	54%		
MUA			8	17%
Closed reduction of dislocation			6	13%
Closed reduction under anaesthetic			1	2%
Conversion to cemented			1	2%
Debridement of infected THR			1	2%
Exchange liner + head for dislocation			1	2%
Re-attachment of glutemus muscle			1	2%
Reduction dislocated THR and abductor tenot			1	2%
Replacement of tilted socket			1	2%
No procedure recorded			4	9%
	46			

Table 19

Primary procedure types amongst linked hip revision procedures (2003 – 2005) and amongst all primary hip procedures (2005)

Primary hip procedure	% of linked revisions (2003 – 2005)	% of all primaries (2005)
	332	55,812
Cemented THR	33%	51%
Uncemented THR	34%	25%
Hybrid THR	17%	15%
Primary resurfacing	16%	9%
	100%	100%

The data in Table 19 compares primary hip procedures for linked hip revisions with linked revisions recorded on the NJR between 1 April 2003 and 31 December 2005, with all primary hip procedures recorded on NJR for 2005. The data indicates fewer linked revisions in the cemented THR primary group, but more linked revision data is required and more information about primary procedures in the year the primary procedure was carried out before any conclusions can be drawn.

Indications for Surgery: Hip Revisions

The most common indications of all hip revisions (5,769) are shown in Table 20. The total number of single stage procedures in 2005 was 4,968 and two-stage was 300.

Table 20

Indications for hip revision surgery according to single stage or two stage procedure: 2004 and 2005

Indications for single stage revision – hips	2005	2004*
	4,968	2,667
Aseptic loosening	65%	88%
Lysis	22%	32%
Pain	19%	17%
Indications for two stage revision – hips	**2005**	**2004**
	300	183
Infection	73%	64%
Aseptic loosening	29%	69%
Lysis	18%	30%

* In 2004 1,383 procedures on MDS1 were not classified

Using the linked data set of linked revisions (332) it is possible to examine the indications for revision related to the primary surgery as shown in Table 21 below.

Table 21

Indications for linked hip revisions according to original primary surgery 2003 – 2005

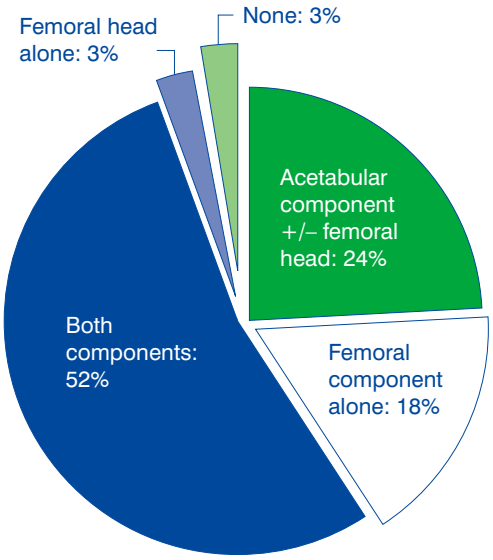
Primary hip procedure	Indication to revision						
	n	Dislocation	Aseptic loosening	Fracture implant	Fracture (peri-prosthetic)	Infection	Pain
Cemented	110	44%	4%	5%	2%	22%	10%
Un-cemented	112	31%	19%	3%	2%	11%	6%
Hybrid	57	27%	25%	2%	2%	12%	5%
Resurfacing	53	6%	23%	8%	6%	4%	21%

Components Removed

Almost a quarter of the components removed were acetabular alone, and 18% femoral stem (+/- head). Figure 11 details the components removed.

Figure 11

Components Removed During Hip Revision Procedures 2005



Re-operations other than Revision

300 operations were 'other than revision'. 131 were recorded using the categories on MDS2, and 169 using text in the 'other' box. These text entries show that although some actually fitted into one of the available categories, some new ones may be required.

Table 21 details the available categories, and Table 22 below shows a *suggested future categorisation* that has been expanded to take account of entries in the 'other' box.

Table 22

Types of hip re-operations in 2005

2005		
	300	
Type of re operation*	n	%
Socket augmentation	44	15%
Wound exploration	41	14%
Open reduction of dislocation	36	12%
ORIF femur	16	5%
Excision of heterotopic bone	11	4%
ORIF trochanter	10	3%
Focal bone graft only (femur)	2	1%
Focal bone graft only (acetabulum)	1	0%
Other procedure	169	56%
	300	

* A procedure can have more than one re-operation type recorded. There were 330 types of operation recorded for 300 procedures

15 inappropriate entries categorised below were ignored:

- 6 knee replacements
- 5 stage1 (or 2) of 2
- 3 total revisions
- 1 recorded as 'metastatic Cancer' with no other details

Table 23

Types of re-operation other than revision: hips 2005[9]

2005		
	300	
Type of re operation	n	%
Closed reduction of dislocation	62	21%
Socket augmentation/acetabular revision/PLAD	61	20%
Wound exploration/debridement (non specific)	52	17%
Open reduction of dislocation	36	12%
Orif femur	16	5%
Orif trochanter/other periprosthetic	16	5%
Change liner/head	13	4%
Excision of heterotopic bone	12	4%
Conversion	10	3%
Wound exploration/debridement (infected)	10	3%
Other	10	3%
Soft tissue repair	7	2%
Neck of femur	5	2%
Focal bone graft only	3	1%
Femoral revision	2	1%

From this new classification it can be seen that reduction of dislocation (62 closed, 36 open) and procedures to revise/modify the acetabular component (61) accounted for almost half of the re-operations other than revision.

Wound exploration accounted for just over 20% (62) of procedures; details were mostly undefined although 10 were specified for infection. About 10% (37) of procedures were as a result of fracture.

Table 24 opposite shows the characteristics of the patients who underwent these 300 procedures. They were generally less physiologically fit than those undergoing primary hip procedures and hip revisions (30%, 91 ASA P3 compared with 13%, 7,215 and 24%, 1,293 respectively).

[9] A procedure can have more than one re-operation type recorded. There were 330 types of operation recorded for 300 procedures.

Table 24

Characteristics of patients undergoing hip re-operations other than revision in 2005

2005		
	300	
Age, years (consenting patients only) n	167	
Mean (sd)	69 (13)	
Interquartile range	63 - 78	
	n	%
Gender (consenting patients only)		
Male	68	41%
Female	99	59%
Patient physical status		
P1 – Fit and healthy	36	12%
P2 – Mild disease, not incapacitating	163	54%
P3 – Incapacitating systemic disease	91	30%
P4 – Life threatening disease	10	3%
P5 – Not expected to survive 24 hours	0	0%
Side		
Bilateral	0	0%
Left, unilateral	138	46%
Right, unilateral	162	54%
Waiting list initiative/patient choice*		
Yes	13	6%
No	220	94%
Tertiary referral*		
Yes	22	9%
No	213	91%
	300	

* Non-compulsory question. Not completed for all procedures

3.3 Prostheses Used in Hip Procedures

Summary

In 2005, 110 different brands of acetabular cups and 129 different brands of femoral stems were recorded: an increase of 10% over 2004 for both stems and cups. This could be a result of new suppliers entering the market, the introduction of new brands by existing suppliers and/or improved reporting.

Background

In the NJR 2nd Annual Report of 2004 (pages 86 – 92 available on NJR website www.njrcentre.org), a full description was given of the National Institute for Health and Clinical Excellence (NICE) guidance on the selection of prostheses for primary total hip replacement and hip resurfacing arthroplasty, and the subsequent setting up of the Orthopaedic Data Evaluation Panel (ODEP) of the NHS Purchasing and Supply Agency.

Orthopaedic Data Evaluation Panel of the NHS Purchasing and Supply Agency (ODEP) provides an independent assessment of clinical outcomes data, submitted by implant manufacturers, on the compliance of brands of total hip and hip resurfacing prostheses with the NICE (National Institute for Health and Clinical Excellence) benchmarks for the effectiveness of primary total hip prostheses.

ODEP's main function is to provide an independent assessment of the clinical outcomes data, submitted by manufacturers of prostheses, on the compliance of brands of total hip and hip resurfacing prostheses, with the NICE benchmarks for the effectiveness of primary total hip prostheses. ODEP produced criteria for assessing compliance of products with the NICE guidance, and these are attached for ease of reference (Appendix B).

NICE has indicated that the situation will be reviewed in 2008.

Results of ODEP Assessments

The ODEP committee reviewed the clinical data submissions and as a result, 92 brands of femoral stems and 77 brands of acetabular cups received ODEP ratings. There are however, 33 brands of acetabular cup and 37 brands of femoral stem currently being used in England and Wales for which no data has been submitted to the ODEP committee. This is currently being investigated.

The latest listings for all brands currently being used by hospitals in England and Wales can be seen by visiting the NHS PASA website on www.pasa.nhs.uk/orthopaedics/odepdatabase/

Analysis of Results

Analysis of the summary data shows that the usage of products meeting the full ten year (10A) benchmark as recommended by NICE is as follows:

- Cemented Stems: 69.0%
  (made up of 9 brands out of 66 recorded on NJR)
- Cementless Stems: 69.6%
  (made up 7 brands out of 63 recorded on NJR)
- Cemented Cups: 46.7%
  (made up 8 brands out of 48 recorded on NJR)
- Cementless Cups: 11.2%
  (made up 1 brand out of 52 recorded on NJR)

These percentages are only based on clinical outcomes data already submitted to the ODEP committee. Manufacturers may submit additional data that could result in these percentages being revised in the future.

Comparison with the 2004 figures shows an improvement of 8% in the usage of cementless prostheses fully compliant with NICE guidelines, and a similar decline for cemented prostheses.

Brand Sales of Conventional Total Hips and Resurfacing Prostheses

Tables 25 – 30 show the most frequently used brands in England and Wales during 2005, as assessed by their rate of entry into NJR. The level of assessment according to ODEP criteria is given in the final column.

Table 30 provides a summary of procedures where brands of re-surfacing acetabular cups have been used in combination with a conventional stem and a large femoral head, which was not included in the 2004 data report.

Table 25

20 cemented cup brands entered most frequently during 2005 for hip replacements

2005				
Manufacturer	Brand	Number used	%	ODEP rating
		28,992		
Stryker Howmedica Osteonics	Contemporary	5,376	19%	5A
DePuy	Elite Plus Ogee	4,454	15%	10A
DePuy	Charnley Cemented Cup	3,159	11%	10A
DePuy	Charnley Ogee	2,568	8.9%	10A
Stryker Howmedica Osteonics	Exeter Duration	2,502	8.6%	10A
DePuy	Elite Plus Cemented Cup	1,901	6.6%	5B
Smith & Nephew	Opera	1,112	3.8%	5B
Zimmer	ZCA	948	3.3%	7A
Zimmer	Low Profile Muller	750	2.6%	5B
Joint Replacement Instrumentation Ltd	Furlong Cemented Cup	687	2.4%	10B
DePuy	Wrobleski Golf Ball	660	2.3%	3B
Corin	Cenator Cemented Cup	652	2.2%	3A
DePuy	Ultima Cemented Cup	607	2.1%	7A
Biomet	Stanmore-Arcom	600	2.1%	10A
Stryker Howmedica Osteonics	ODC	482	1.7%	pre-entry
Biomet	Apollo	379	1.3%	pre-entry
Biomet	M2A Cemented Cup	295	1.0%	pre-entry
Waldemar Link	Link Flange Cup	260	0.9%	not submitted
Waldemar Link	Interplanta	259	0.9%	10A
Zimmer	Zimmer Cemented Cup	204	0.7%	7B
Others	Number of Brands (28)	1,137	3.9%	
Total		28,992		

Table 26

20 cementless cup brands entered most frequently during 2005 for hip replacements

2005				
Manufacturer	Brand	Number used	%	ODEP rating
		22,818		
Zimmer	Trilogy	4,350	19%	7A
Joint Replacement Instrumentation Ltd	CSF	3,533	15%	10B
DePuy	Pinnacle	3,376	15%	3A
Stryker Howmedica Osteonics	Trident	3,198	14%	3A
DePuy	Duraloc Cementless Cup	2,550	11%	10A
Stryker Howmedica Osteonics	ABG II Cementless Cup	1,024	4.5%	3A
Endo Plus (UK) Limited	EPF-Plus	846	3.7%	3A
Smith & Nephew	Reflection Cementless	741	3.2%	7B
B Braun / Aesculap	Plasmacup Cementless Cup	370	1.6%	not submitted
Stryker Howmedica Osteonics	Secure Fit Cementless Cup	317	1.4%	5A
Zimmer	Allofit	284	1.2%	5A
Joint Replacement Instrumentation Ltd	Furlong Cementless Cup	273	1.2%	10B
Endo Plus (UK) Limited	Polar Cementless Cup	238	1.0%	not submitted
Biomet	Mallory-Head Cementless Cup	226	1.0%	3A
Biomet	Exceed	172	0.8%	pre-entry
Endo Plus (UK) Limited	Bicon-Plus	166	0.7%	7A
Wright Medical UK Ltd	Anacfit Cementless Cup	145	0.6%	3A
Zimmer	Trabecular Metal Cementless Cup	131	0.6%	pre-entry
Surgicraft	Split Cup	96	0.4%	not submitted
Zimmer	CLS Cementless Cup	70	0.3%	10C
Others	Number of Brands (32)	712	3.1%	
Total		22,818		

Table 27

20 cemented stem brands entered most frequently during 2005 for hip replacements

2005				
Manufacturer	Brand	Number used	%	ODEP rating
		36,720		
Stryker Howmedica Osteonics	Exeter	18,199	50%	10A
DePuy	Charnley Cemented Stem	5,043	14%	10A
DePuy	C-Stem Cemented Stem	3,923	11%	7B
Zimmer	CPT	2,417	6.6%	7A
Biomet	Stanmore Modular	887	2.4%	10A
DePuy	Elite Plus Cemented Stem	668	1.8%	5A
Waldemar Link	SP11	643	1.8%	10A
Joint Replacement Instrumentation Ltd	Furlong Cemented Stem	587	1.6%	10C
Zimmer	MS-30	453	1.2%	5B
DePuy	S-Rom Cemented Stem	386	1.1%	7B
Zimmer	Muller STR Stem	302	0.8%	10A
Zimmer	ZMR Cemented Stem	281	0.8%	pre-entry
DePuy	Ultima Cemented Stem	234	0.6%	5A
Zimmer	Versys Cemented Stem	229	0.6%	3A
Smith & Nephew	Spectron	227	0.6%	10A
Endo Plus (UK) Limited	CPS-Plus	214	0.6%	3A
Zimmer	Thrust Plate	148	0.4%	unacceptable
Zimmer	MEM	143	0.4%	5B
Smith & Nephew	CPCS	142	0.4%	pre-entry
Zimmer	P10 Muller	120	0.3%	10A
Others	Number of Brands (46)	1,474	4.0%	
Total		36,720		

Table 28

20 cementless stem brands entered most frequently during 2005 for hip replacements

2005				
Manufacturer	Brand	Number used	%	ODEP rating
		15,791		
DePuy	Corail	4,278	27%	10A
Joint Replacement Instrumentation Ltd	Furlong HAC	3,714	24%	10A
Endo Plus (UK) Limited	SL-Plus Cementless Stem	1,132	7.2%	10A
Stryker Howmedica Osteonics	Omnifit Cementless Stem	1,038	6.6%	10A
Stryker Howmedica Osteonics	ABG II Cementless Stem	898	5.7%	5B
Smith & Nephew	Synergy Cementless Stem	758	4.8%	5A
Zimmer	Versys Cementless Stem	555	3.5%	3A
Biomet	Bimetric Cementless Stem	534	3.4%	10A
Biomet	Mainstream Mull Cementless Stem	300	1.9%	pre-entry
Zimmer	CLS Cementless Stem	296	1.9%	10A
Wright Medical UK Ltd	Ancafit Cementless Stem	191	1.2%	3A
Biomet	Taperloc Cementless Stem	167	1.1%	10B
DePuy	S-Rom Cementless Stem	152	1.0%	5B
Wright Medical UK Ltd	Profemur Cementless Stem	149	0.9%	pre-entry
Stryker Howmedica Osteonics	Accolade	149	0.9%	3B
B Braun / Aesculap	Biocontact Cementless Stem	140	0.9%	10C
Biomet	Aura II Cementless Stem	127	0.8%	pre-entry
DePuy	KAR	125	0.8%	revision stem
DePuy	Solution Cementless Stem	111	0.7%	revision stem
DePuy	Summit Cementless Stem	101	0.6%	pre-entry
Others	Number of Brands (43)	876	5.5%	
Total		15,791		

Table 29

Brands of resurfacing heads entered into the NJR in 2005

2005				
Manufacturer	Brand	Number used	%	ODEP rating
		6,818		
Smith & Nephew	BHR Resurfacing Head	3,617	59%	5A
Corin	Cormet 2000 Resurfacing Head	736	12%	3A
DePuy	ASR Resurfacing Head	727	12%	pre-entry
Zimmer	Durom Resurfacing Head	408	6.6%	pre-entry
Wright Medical UK Ltd	Conserve	278	4.5%	3A
Finsbury	Adept Resurfacing Head	198	3.2%	pre-entry
Biomet	Recap Resurfacing Head	107	1.7%	pre-entry
International Orthopaedics Ltd	Icon	69	1.1%	pre-entry
Tricon / Medacta	Cornwall Resurfacing Head	12	0.2%	pre-entry
Van Straten Medical	Accis Resurfacing Head	1	0.0%	not submitted
Total		6,153		

Table 30

Procedures using a re-surfacing cup with a conventional femoral stem in 2005

2005			
Manufacturer	Brand	Number Used	%
		932	
Corin	Cormet 2000 Resurfacing Cup	356	38%
Smith & Nephew	BHR Resurfacing Cup	226	24%
Centerpulse	Durom Resurfacing Cup	171	18%
Biomet	Recap Resurfacing Cup	89	9.5%
Midland Medical Technologies	BHR Resurfacing Cup	88	9.4%
Wright Medical UK Ltd	Conserve Plus	2	0.2%
Total		932	

Combinations of Cups and Stems

For 49,247 hip replacement procedures in the 2005 data, both the cup and stem brand was known, and a total of 794 different combinations of cup and stem brands were recorded. This represents a 38% increase over 2004.
The 20 combinations most frequently entered into the NJR are listed in Table 31 overleaf. The most common cup-stem combination was the Exeter V40 stem combined with the Contemporary Duration cup.

Highlighted in the Table 31 are those combinations where the stem manufacturer is different from the cup manufacturer – a practice known as ‘mixing and matching’. Of the 49,247 procedures included in this chapter, 12,120 (25%) used ‘mixed and matched’ cup-stem Combinations, the same as in 2004.

Table 31

Mixed and matched cup-stem combinations recorded in the NJR in 2005

2005					
Stem manufacturer	Stem brand	Cup manufacturer	Cup brand	Frequency	Mix and match?
				49,247	
Stryker Howmedica Osteonics	Exeter V40	Stryker Howmedica Osteonics	Contemporary	5,126	No
Joint Replacement Instrumentation Ltd	Furlong HAC	Joint Replacement Instrumentation Ltd	CSF	3,096	No
Stryker Howmedica Osteonics	Exeter V40	DePuy	Elite Plus Ogee	2,734	Yes
DePuy	Charnley Cemented Stem	DePuy	Charnley Cemented Cup	2,519	No
Stryker Howmedica Osteonics	Exeter V40	Stryker Howmedica Osteonics	Exeter Duration	2,379	No
DePuy	Corail	DePuy	Pinnacle	2,246	No
Stryker Howmedica Osteonics	Exeter V40	Stryker Howmedica Osteonics	Trident	1,933	No
DePuy	Charnley Cemented Stem	DePuy	Charnley Ogee	1,885	No
Stryker Howmedica Osteonics	Exeter V40	Zimmer	Trilogy	1,359	Yes
DePuy	Corail	DePuy	Duraloc Cemented Cup	1,323	No
Zimmer	CPT	Zimmer	Trilogy	866	No
Stryker Howmedica Osteonics	Exeter V40	DePuy	Elite Plus Cemented Cup	841	Yes
Zimmer	CPT	Zimmer	ZCA	747	No
DePuy	C-Stem Cemented Stem	DePuy	Elite Plus Ogee	743	No
DePuy	C-Stem Cemented Stem	DePuy	Elite Plus Cemented Cup	666	No
Joint Replacement Instrumentation Ltd	Furlong Cemented Stem	Joint Replacement Instrumentation Ltd	Furlong Cemented Cup	548	No
Biomet	Stanmore Modular	Biomet	Stanmore-Arcom	538	No
Endo Plus (UK) Limited	SL-Plus Cementless Stem	Endo Plus (UK) Limited	EPF-Plus	525	No
Stryker Howmedica Osteonics	Exeter V40	Corin	Cenator Cemented Cup	510	Yes
Zimmer	Versys Cementless Stem	Zimmer	Trilogy	485	No
	Others (774)	Others		18,178	
Total				49,247	

Femoral Head Material and Size

Table 32 shows the relative usage of different femoral head materials in patients of different age groups. The figures are very similar to 2004 and demonstrate that there has been no change in surgical practice.

Table 32

Frequency of material chosen for femoral heads in procedures performed in 2005

2005				
Material	Number used (all patients)	%	Number of young patients	%
	47,269		2,769	
Metal	35,486	75.1%	1,207	44%
Ceramic	11,783	24.9%	1,562	56%
Total	47,269		2,769	

Table 33 shows the frequency of the different femoral head sizes. The main change compared with 2004 is an increase in the use of heads classified as 'Other' size. Preliminary analysis suggests an increase in the use of 36mm heads. This will be further investigated in the 2006 report.

Table 33

Frequency of femoral head sizes for procedures performed in 2005

2005				
Head size	Number used (all patients)	%	Number of young patients	%
	47,281		2,783	
22.25mm	2,424	5.1%	148	5.3%
26.00mm	3,499	7.4%	70	2.5%
28.00mm	33,968	72%	1,686	61%
32.00mm	4,053	8.6%	410	15%
Other size	3,337	7.1%	469	17%
Total	47,281		2,783	

Table 34

Frequency of femoral head sizes according to material used during 2005

2005				
Head Size	Metal	%	Ceramic	%
	35,486		11,783	
22.25mm	1,870	5.3%	554	4.7%
26.00mm	3,499	9.9%	0	0%
28.00mm	25,476	72%	8,492	72%
32.00mm	1,940	5.5%	2,113	18%
Other	2,701	7.6%	624	5.3%
Total	35,486		11,783	

Table 34, above, shows that 18% (2,113) of larger (32 mm) ceramic femoral heads used tended to be larger than metallic heads 5.5% (1,940).

The total number of brands of acetabular cups and femoral stems recorded in NJR has increased significantly. There are 110 brands of acetabular cups (88 in 2004) and 129 brands of femoral stems (101 in 2004). Although these figures show 22 new cup and 28 new stem brands, none of the brands recorded in 2004 failed to appear in 2005.

In addition to conventional re-surfacing procedures, there have been almost 1,000 procedures entered into the NJR whereby a re-surfacing cup has been used in conjunction with a large modular head and a conventional stem. The Cormet 2000 cup and Optimom head from Corin were the most commonly entered combination for this type of procedure.

Size and material of femoral heads used in 2005 are very similar to 2004.

4

Knee Replacement Procedures

4.1 Primary Knee Replacement Procedures

Patient Characteristics

There were 59,037 primary knee replacement procedures recorded in 2005. The basic characteristics and indications for surgery have not changed significantly from 2004 (Table 35).

- Mean age 70, 43% male
- 85% ASA P1/2, 14% P3
- Indications for primary surgery
  - 97% recorded osteoarthritis as an indication for surgery
  - 2% Rheumatoid arthritis

Table 35

Patient characteristics for primary knee replacement procedures in 2005, by type of procedure

2005	Patient procedure											
	Total replacement using cement		Total replacement not using cement		Hybrid		Unicondylar knee replacement		Patello-femoral replacement		Total	
	49,621		3,991		924		3,892		609		59,037	
Age, years (consenting patients only) n	36,539		2,780		764		2,773		432		43,288	
Mean (sd)	70 (10)		69 (11)		69 (11)		65 (10)		62 (11)		70 (10)	
Interquartile range	64 - 77		63 - 77		63 - 76		58 - 72		54 - 71		64 - 77	
	n	%	n	%	n	%	n	%	n	%	n	%
Gender (consenting patients only) n	36,527		2,779		764		2,772		432		43,274	
Male	15,579	43%	1,237	45%	350	46%	1,452	52%	102	24%	18,720	43%
Female	20,948	57%	1,542	55%	414	54%	1,320	48%	330	76%	24,554	57%
Patient physical status												
P1 – Fit and healthy	9,471	19%	998	25%	222	24%	1,154	30%	177	29%	12,022	20%
P2 – Mild disease not incapacitating	32,646	66%	2,421	61%	587	64%	2,415	62%	386	63%	38,455	65%
P3 – Incapacitating systemic disease	7,186	14%	549	14%	110	12%	314	8%	44	7%	8,203	14%
P4 – Life threatening disease	288	1%	23	1%	4	0%	8	0%	0	0%	323	1%
P5 – Expected to die within 24hrs	30	0%	0	0%	1	0%	1	0%	2	0%	34	0%
Indications for surgery												
Osteoarthritis	47,783	96%	3,884	97%	880	95%	3,861	99%	587	96%	56,995	97%
Avascular necrosis	194	0%	8	0%	7	1%	23	1%	1	0%	233	0%
Other inflammatory arthopathy	318	1%	19	0%	6	1%	1	0%	1	0%	345	1%
Infection	36	0%	2	0%	1	0%	0	0%	0	0%	39	0%
Rheumatoid arthritis	1,353	3%	82	2%	33	4%	2	0%	1	0%	1,471	2%
Trauma	256	1%	16	0%	7	1%	6	0%	4	1%	289	0%
Other	300	1%	24	1%	10	1%	11	0%	24	4%	369	1%
Side												
Bilateral	379	1%	79	2%	22	2%	133	3%	39	6%	652	1%
Left, unilateral	23,456	47%	1,894	47%	440	48%	1,934	50%	276	45%	28,000	47%
Right, unilateral	25,786	52%	2,018	51%	462	50%	1,825	47%	294	48%	30,385	51%
Waiting list initiative/patient choice												
Yes	10,676	27%	663	21%	226	31%	600	19%	78	16%	12,243	26%
No	28,234	73%	2,427	79%	503	69%	2,507	81%	398	84%	34,069	74%
Not recorded	10,711		901		195		785		133		12,725	
Tertiary referral												
Yes	2,895	8%	88	3%	25	4%	159	5%	55	11%	3,222	7%
No	34,994	92%	2,903	97%	672	96%	2,902	95%	424	89%	41,895	93%
Not recorded	11,732		1,000		227		831		130		13,920	
Total	49,621		3,991		924		3,892		609		59,037	

Operation Type

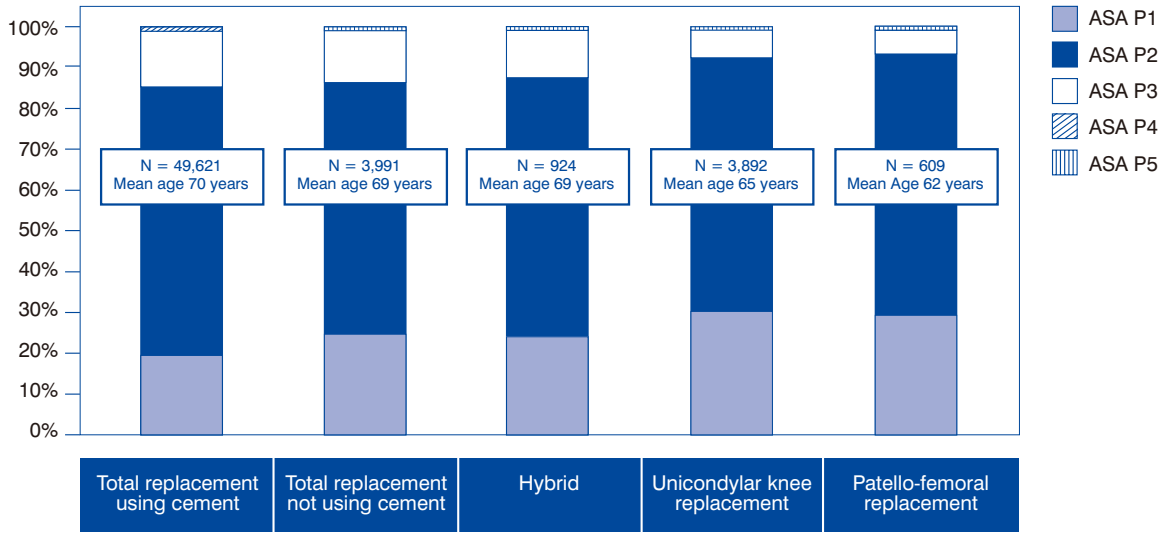
In Table 35, opposite, the 49,621 primary total knee replacement (TKR) procedures using cement form 84% of the total compared with 34,522 (81%) 2004. There were 3,991cementless TKRs, 7% of the total (as in 2004). The 3,892 unicondylar knee replacements were 7% of the total, down from 9% (3,807). There is however some evidence in the detail of the records, of misclassification of procedure type. This is an issue to be considered during a future review of the minimum dataset and data entry menus.

Figure 4 (Chapter 2) shows the distribution of primary knee replacements in different settings. Further analysis at hospital/TC level is needed to determine the range of surgical practice and to identify any outliers.

Figure 12 below shows that patients undergoing primary TKR using cement were of similar age but less fit (19% ASA P1) than those undergoing cementless TKRs (25% ASA P1). Patients undergoing unicondylar or patello-femoral replacements were the youngest and fittest.

Figure 12

Patient physical status based on ASA grade according to procedure type: primary knee replacements 2005



Bilateral operations remain very uncommon (1%).

Patients Under 55 years of Age

This chapter focuses on those 43,288 patients (73%) whose age was recorded (see Table 35 opposite). It should be born in mind that these may not be representative of all patients. Table 36 overleaf, shows some characteristics of the 6% (2,690) of these primary hip replacement patients who were under 55 years of age.

For cemented, cementless and hybrid primary TKRs, only 5%, 7% and 9%, respectively, of patients were under 55 years of age. For the 2,773 unicondylar replacement procedures 15% were under 55; and for the 432 patello-femoral replacements 27% were under 55 years of age.

Table 36

Primary knee replacement procedures in patients under 55 years – 2005

2005	Patient procedure											
	Total replacement using cement		Total replacement not using cement		Hybrid		Unicondylar knee replacement		Patello-femoral replacement		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
	36,539		2,780		764		2,773		432		43,288	
Age												
Under 55 years at operation	1,893	5%	199	7%	66	9%	414	15%	118	27%	2,690	6%
55+ at operation	34,646	95%	2,581	93%	698	91%	2,359	85%	314	73%	40,598	94%

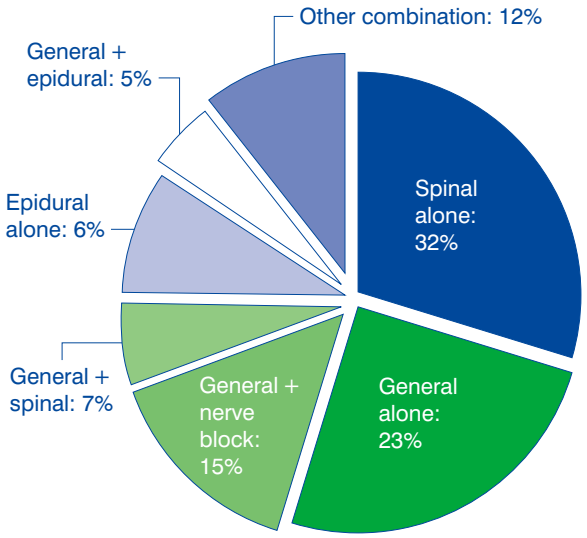
* Consenting patients only

Anaesthetics

23% of primary knee procedures were recorded as being carried out under general anaesthetic (GA) alone (Figure 13). 38% of procedures recorded as having used a regional block. Nerve blocks with GA were recorded in 15% of cases.

Figure 13

Anaesthetic type: primary knee replacements



Description of Surgical Technique

Within the limitations of the data currently being collected, no major changes in surgical practice since 2004 have been identified (Table 37).

Table 37

Surgical practice for primary knee replacement procedures, by type of procedure – 2005

2005	Patient procedure											
	Total replacement using cement		Total replacement not using cement		Hybrid		Unicondylar knee replacement		Patello-femoral replacement		Total	
	49,621		3,991		924		3,892		609		59,037	
	n	%	n	%	n	%	n	%	n	%	n	%
Laminar flow theatre												
Yes	41,971	97%	3,017	91%	777	95%	3,307	96%	518	96%	49,590	97%
No	1,247	3%	314	9%	40	5%	124	4%	19	4%	1,744	3%
Not recorded	6,403		660		107		461		72		7,703	
Any anaesthetic recorded**	46,900	95%	3,713	93%	898	97%	3,671	94%	564	93%	55,746	94%
General anaesthesia used	23,336	50%	1,825	49%	475	53%	2,395	65%	382	68%	28,413	51%
Epidural anaesthesia used	7,794	17%	615	17%	154	17%	449	12%	68	12%	9,080	16%
Nerve block anaesthesia used	10,138	22%	783	21%	257	29%	896	24%	162	29%	12,236	22%
Spinal anaesthesia used	23,420	50%	1,908	51%	387	43%	1,315	36%	192	34%	27,222	49%
Sedation used*	4,626	10%	414	11%	61	7%	313	9%	35	6%	5,449	10%
Surgical approach												
Lateral parapatellar	826	2%	93	2%	18	2%	127	3%	8	1%	1,072	2%
Medial parapatellar	45,930	93%	3,675	92%	794	86%	3,526	91%	564	93%	54,489	92%
Sub-vastus	792	2%	173	4%	96	10%	24	1%	15	2%	1,100	2%
Other	2,073	4%	50	1%	16	2%	215	6%	22	4%	2,376	4%
Femoral bonegraft used*												
Yes	203	0%	32	1%	5	1%	3	0%	3	0%	246	0%
No	49,418	100%	3,958	99%	919	99%	3,889	100%	605	99%	58,789	100%
Tibial bonegraft used*												
Yes	226	0%	60	2%	2	0%	4	0%	1	0%	293	0.5%
No	49,395	100%	3,930	98%	922	100%	3,888	100%	607	100%	58,742	100%
Femoral cement used												
Yes	49,621	100%	0	0%	143	15%	3,783	97%	541	89%	54,088	92%
No	0	0%	3,991	100%	781	85%	109	3%	68	11%	4,949	8%
Tibial cement used												
Yes	49,621	100%	0	0%	781	85%	3,785	97%	86	14%	54,273	92%
No	0	0%	3,991	100%	143	15%	107	3%	523	86%	4,764	8%
Patella cement used												
Yes	20,157	46%	180	5%	448	51%	299	10%	522	87%	21,606	42%
No	23,216	54%	3,183	95%	434	49%	2,607	90%	76	13%	29,516	58%
Not recorded	6,248		628		42		986		11		7,915	
Minimally invasive surgery												
Yes	1,597	4%	135	4%	8	1%	1,737	49%	53	9%	3,530	7%
No	43,269	96%	3,271	96%	816	99%	1,807	51%	505	91%	49,668	93%
Not recorded	4,755		585		100		348		51		5,839	
Image guided surgery												
Yes	660	1%	108	3%	11	1%	104	3%	3	1%	886	2%
No	44,141	99%	3,290	97%	810	99%	3,432	97%	555	99%	52,228	98%
Not recorded	4,820		593		103		356		51		5,923	
	49,621		3,991		924		3,892		609		59,037	

* Not recorded in MDS1: missing for 3 patients
** Optional field

Cement Techniques

Table 38 shows details of cementing techniques. These are not mandatory data fields, and the data are *incomplete*; no reliable comparison can be made with 2004. The percentages reported are of cases where the data are available.

Table 38

Cementing techniques used in cemented primary knee procedures in 2005 according to procedure type

2005	Total knee replacement using cement		Total knee replacement not using cement		Hybrid		Unicondylar knee replacement		Patello-femoral replacement		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
Femoral cement	99,242		0		143		3,783		540		54,088	
Fume extraction only	1,459	3%	0		5	3%	92	2%	14	3%	1,570	3%
Open bowl and spatula	1,752	4%	0		19	13%	152	4%	16	3%	1,939	4%
Vacuum mixing	46,410	94%	0		119	83%	3,539	94%	510	94%	50,578	94%
Tibial cement	49,621		0		781		3,785		85		54,272	
Fume extraction only	1,458	3%	0		30	4%	101	3%	7	8%	1,596	3%
Open bowl and spatula	1,824	4%	0		6	1%	152	4%	2	2%	1,984	4%
Vacuum mixing	46,339	93%	0		745	95%	3,532	93%	76	89%	50,692	93%
Patella cement	20,157		180		448		299		521		21,605	
Fume extraction only	694	3%	2	1%	34	8%	8	3%	12	2%	750	3%
Open bowl and spatula	677	3%	10	6%	6	1%	17	6%	17	3%	727	3%
Vacuum mixing	18,786	93%	168	93%	408	91%	274	92%	492	94%	20,128	93%

Minimally Invasive Surgery (MIS)

Recording of minimally invasive surgery (MIS) is a non-mandatory field. Table 37 (page 53) shows that 3,530 primary knee replacement procedures (7% of the total of 59,037) were recorded as MIS. The percentage ranged from 1% in hybrid knee replacements to 49% in unicondylar replacements. There were no data on MIS in primary knee replacement (as there were on incision length for hip procedures), to aid interpretation of the figures.

Thromboprophylaxis

Thromboprophylaxis for knees was very similar to that used for hip surgery. Only 1% of cases appear to have had no thromboprophylaxis planned at all, down from 4% in 2004.

Table 39

Thromboprophylaxis regime for primary knee replacement patients recommended at time of operation in 2005 according to procedure

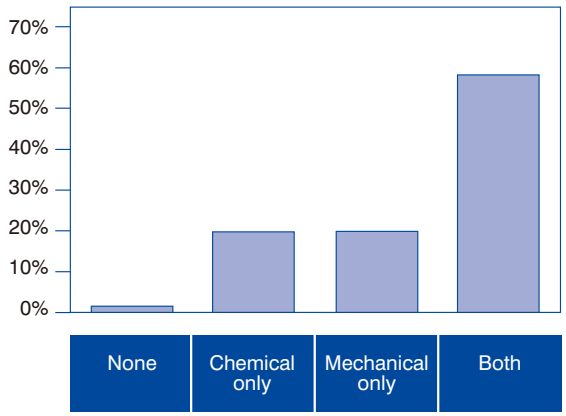
2005	Patient procedure											
	Total knee replacement using cement		Total knee replacement not using cement		Hybrid		Unicondylar knee replacement		Patello-femoral replacement		Total	
	49,621		3,991		924		3,892		609		59,037	
	n	%	n	%	n	%	n	%	n	%	n	%
Aspirin	13,183	27%	870	22%	162	18%	1,127	29%	184	30%	15,526	26%
Chloroquine	23	0%	1	0%	0	0%	2	0%	0	0%	26	0%
Low dose heparin	1,164	2%	69	2%	6	1%	75	2%	14	2%	1,328	2%
Low molecular weight heparin	27,583	56%	2,300	58%	412	45%	1,868	48%	242	40%	32,405	55%
Pentasaccharide	294	1%	18	0%	6	1%	35	1%	6	1%	359	1%
Warfarin	675	1%	48	1%	11	1%	30	1%	5	1%	769	1%
Other chemical	346	1%	11	0%	7	1%	23	1%	11	2%	398	1%
Foot pump	14,052	28%	1,638	41%	309	33%	1,002	26%	211	35%	17,212	29%
Intermittent calf compression	11,335	23%	888	22%	249	27%	941	24%	147	24%	13,560	23%
TED stockings	30,625	62%	2,789	70%	592	64%	2,446	63%	408	67%	36,860	62%
Other mechanical	488	1%	10	0%	9	1%	27	1%	7	1%	541	1%
None	608	1%	15	0%	15	2%	58	1%	8	1%	704	1%
	49,621		3,991		924		3,892		609		59,037	

Almost 60% of patients had some combination of mechanical and chemical techniques planned (Figure 14). 77% of cases in 2005 had at least one mechanical technique recorded. In 62% of all procedures TED stockings were planned, and in 29% foot pumps, 23% intermittent compression.

In 80% of cases in 2005, at least one chemical technique was planned. In 55% of all procedures LMW heparin was planned, and aspirin in 26%.

Figure 14

Thromboprophylaxis methods: primary knee replacements 2005



Untoward Intra-operative Events

Of the 282 untoward intra-operative events recorded, 154 were classed as one of the three specific options on the MDS2 form and 128 were recorded as 'other' (Table 40).

Table 40

Reported untoward intra-operative events for primary knee replacement patients in 2005 according to procedure type

2005	Patient procedure									
	Total knee replacement using cement		Total knee replacement not using cement		Hybrid		Unicondylar knee replacement		Patello-femoral replacement		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
	49,621		3,990		924		3,892		608		59,035	
Fracture	89	0.2%	5	0.1%	2	0.2%	9	0.2%	0	0.0%	105	0.2%
Patella tendon avulsion	15	0.0%	2	0.1%	0	0.0%	0	0.0%	0	0.0%	17	0.0%
Ligament injury	28	0.1%	1	0.0%	0	0.0%	3	0.1%	0	0.0%	32	0.1%
Other	101	0.2%	11	0.3%	2	0.2%	11	0.3%	3	0.5%	128	0.2%
None specified	49,389	99.5%	3,972	99.5%	920	99.6%	3,869	99.4%	605	99.5%	58,755	99.5%
	49,621		3,990		924		3,892		608		59,035	

NB More than one event may be recorded for a patient
* Data only available for MDS2, hence 2 cases omitted

There were 128 records tagged 'other' but, as with the analysis of hip procedures, additional procedures had an 'other' untoward intra-operative event described in the text making a total of 147 'other' entries and an overall total of 301 events. Table 41 below shows the re-categorisation for 274 of the events. The remaining 27 were discarded as described below:

- 14 were recorded as having been recorded in the hospital notes: 'see notes' (or equivalent) but no other information was supplied. The fact that these events were recorded in the notes may imply that they were regarded at the time as serious/required formal documentation
- 12 events were discarded from classification as irrelevant e.g. 'poor quality bone', 'routine' etc
- 1 appeared to be related to knee revision rather than primary
- The pattern of untoward events was very similar to 2004. The most common was fracture: 2 per 1,000 procedures as in 2004

Table 41

Untoward intra-operative events during primary knee replacement procedures 2005

Untoward intraoperative event	Total
Fracture	107
Other ligament injury	38
Notching of femur penetration of femur	28
Patella tendon avulaion	27
Equipment problems	27
Surgical mishap (damage to skin/vascular/neuro)	18
Component positioning	14
Bleeding	6
Cement problems	6
CVS problems/cardiac arrest	3
	274

4.2 Knee Revisions and other Re-operations

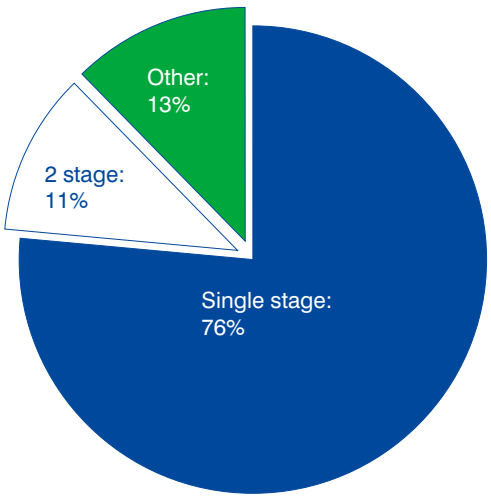
Overall Numbers

There were 3,118 knee revisions and other re-operation procedures recorded (Table 1) compared with 2,107 in 2004. Knee revisions and other re-operations represented 5% of all knee replacement procedures recorded in 2005, the same percentage as in 2004.

Figure 15 illustrates the distribution of re-operation procedures, excluding those which are stage 2 of a 2-stage procedure. The majority (76%) were single stage revisions.

Figure 15

Knee re-operations 2005



Patient Characteristics: Knee Revisions and Re-operations

Table 42 below excludes procedures which are the second stage of a 2-stage revision, leaving 2,366 procedures. This has been done to avoid potential double counting of patients who have had both stages of a 2-stage revision.

The basic characteristics and indications for surgery have not changed significantly from 2004, although more physiologically less fit patients were reported for re-operation.

Not surprisingly, patients for revision were older and less physiologically fit than those for primary replacement:

- Mean age 70, 51% male
- ASA
  - 77% P1/2 (82% in 2004)
  - 22% P3 (17% in 2004)
  - 1% P4 (0.4% in 2004)

Table 42

Patient characteristics for knee revision procedures, by procedure type 2005

2005	Patient procedure									
	Knee single stage revision		Knee revision (stage 1 of 2)		Knee conversion to arthrodesis		Knee amputation		Total	
	2,044		309		11		2		2,366	
Age, years (consenting patients only) n	1,427		212		6		1		1,646	
Mean (sd)	70 (10)		69 (10)		71 (7)		77 (0)		70 (10)	
Interquartile range	63 - 77		64 - 77		66 - 76		77 - 77		63 - 77	
	n	%	n	%	n	%	n	%	n	%
Gender										
Male	688	48%	143	67%	4	67%	0		835	51%
Female	739	52%	69	33%	2	33%	1		811	49%
Patient physical status										
P1 – Fit and healthy	321	16%	45	15%	1	9%	0	0%	367	16%
P2 – Mild disease, not incapacitating	1,269	62%	174	56%	7	64%	1	50%	1,451	61%
P3 – Incapacitating systemic disease	430	21%	87	28%	3	27%	1	50%	521	22%
P4 –- Life threatening disease	23	1%	3	1%	0	0%	0	0%	26	1%
P5 – Not expected to survive 24 hours	1	0%	0	0%	0	0%	0	0%	1	0%
Indications for surgery*										
Aseptic loosening	1,037	51%	48	16%	1	9%	0	0%	1,086	46%
Pain	364	18%	21	7%	1	9%	0	0%	386	16%
Lysis	348	17%	39	13%	0	0%	0	0%	387	16%
Wear of polyethylene component	411	20%	16	5%	0	0%	0	0%	427	18%
Instability	340	17%	23	7%	1	9%	0	0%	364	15%
Infection	55	3%	246	80%	5	45%	0	0%	306	13%
Malalignment	153	7%	3	1%	0	0%	0	0%	156	7%
Dislocation/subluxation	124	6%	7	2%	0	0%	0	0%	131	6%
Periprosthetic fracture	88	4%	2	1%	0	0%	0	0%	90	4%
Stiffness	92	5%	13	4%	1	9%	0	0%	106	4%
Implant fracture	42	2%	3	1%	0	0%	0	0%	45	2%
Component dissociation	42	2%	3	1%	0	0%	1	50%	46	2%
Other	159	8%	3	1%	2	18%	1	50%	165	7%
Side										
Bilateral**	2	0%	0	0%	0	0%	0	0%	2	0%
Left, unilateral	983	48%	153	50%	4	36%	2	100%	1,142	48%
Right, unilateral	1,059	52%	156	50%	7	64%	0	0%	1,222	52%
Waiting list initiative										
Yes	150	9%	18	7%	0	0%	0		168	9%
No	1,538	91%	236	93%	9	100%	2		1,785	91%
Tertiary referral										
Yes	215	13%	45	18%	2	20%	0		262	14%
No	1,453	87%	203	82%	8	80%	2		1,666	86%
Total	2,044		309		11		2		2,366	

* More than one indication may be recorded ** 2 bilaterals means 1 pair

Linked Knee Revisions

The linked data set (see Tables 43 and 44) is a small subset of the knee replacement revisions captured by NJR that could be linked with a primary procedure record in NJR. 219 linked revisions were found in the records between 1 April 2003 and 31 December 2005 inclusive from a total of 5,737 knee revisions recorded during that period. For this subset of knee revisions the median time was 317 days, inter-quartile range 175 – 551 days.

There were 50 linked re-operations other than revision. Details of linked re-operations are shown in Table 45.

Table 43

Characteristics of knee revision procedures linked to primary procedures 2003 – 2005 (i)

Knee patients		
	219	
Age, years at primary procedure		
Mean (sd)	65 (10)	
Interquartile range	59 - 71	
Gender (consenting patients only)		
Male	121	55%
Female	98	45%
Patient physical status at primary procedure		
P1 – Fit and healthy	65	30%
P2 – Mild disease, not incapacitating	115	53%
P3 – Incapacitating systemic disease	38	17%
P4 – Life threatening disease	1	0%
P5 – Not expected to survive 24 hours	0	0%
Time from primary to revision in days		
Median	317	
Interquartile range	175 - 551	
Revision operation details		
Revision procedure type		
Knee single stage revision	154	70%
Knee revision (Stage 1 of 2)	34	16%
Knee revision (Stage 2 of 2)	20	9%
Other revision	10	5%
Knee amputation	1	0%
Indications for revision*		
Aseptic loosening**	43	20%
Infection	62	28%
Dislocation	14	6%
Lysis***	8	4%
Instability	28	13%
Wear of polyethylene component	4	2%
Component dissociation	3	1%
Pain	48	22%
Malalignment	16	7%
Periprosthetic fracture	6	3%
Other	25	11%
	219	

* Each procedure can have more than one indication
** Aseptic loosening: in any of femur, tibia, patella
*** Lysis: in either femur or tibia

Table 44

Characteristics of knee revision procedures linked to primary procedures 2003 – 2005 (ii)

Knee patients		
	219	
Primary operation details		
Primary procedure type		
Total replacement using cement	165	75%
Total replacement not using cement	13	6%
Hybrid total replacement	1	0%
Unicondylar knee replacement	36	16%
Patello-femoral replacement	4	2%
Primary procedure complexity		
Primary	104	47%
Complex primary	9	4%
Not specified	106	48%
Indications for primary		
Osteoarthritis	212	97%
Avascular necrosis	1	0%
Infection	1	0%
Rheumatoid arthritis	4	2%
Trauma	2	1%
Other	5	2%
Minimally invasive procedure used for primary		
Yes	26	12%
No	181	83%
Not selected	11	5%
Image guided surgery used for primary		
Yes	9	4%
No	199	91%
Not selected	11	5%
	219	

* Each procedure can have more than one indication
** Aseptic loosening: in any of femur, tibia, patella
*** Lysis: in either femur or tibia

Table 45

Re-operations linked to primary knee procedures in the NJR database 2003 – 2005

2005		
	50	
Re-operation procedure type	n	%
MUA + Resurfacing of patella + PCL release	1	2%
MUA + washout + arthroscopy	1	2%
Washout + wound debridement	2	4%
Soft tissue repair/realignment + patella replace	1	2%
Resurfacing of patella + insertion of PFC patella button	1	2%
MUA alone	5	10%
Washout alone	3	6%
Wound debridement alone	2	4%
Soft tissue repair/replacement alone	1	2%
ORIF periprosthetic fracture	2	4%
Resurfacing of patella alone	16	32%
Other	15	30%
Addition of patella button	1	
Changing of the articular insert	1	
Dislocation	1	
Exploration L TKR and change plastic insert	1	
Exploration L TKR and change polyethelene insert	1	
Incompatible sizing of prosthesis	1	
Infection	1	
Loose body	1	
Patella button insertion	1	
Patella resurfacing	1	
PF Pain	1	
Removal of patella button	1	
Removal of scar tissue	1	
Removed of retained drain	1	
Tight patella	1	
	50	

Table 46

Primary procedure types amongst knee revision procedures (2003 – 2005) and amongst all primary knee procedures (2005)

Primary knee procedure	% Linked revisions (2003 - 2005)	% All primaries (2005)
	219	59,037
Cemented TKR	75%	84%
Uncemented TKR	6%	7%
Hybrid TKR	0%	2%
Unicondylar	16%	7%
Patello-femoral	2%	1%

Indications for Surgery – Knee Revisions

Table 42 above shows the indications for single stage knee revision (2,044 of all revisions). Table 47 illustrates the commonest indications for single or two stage revisions in 2005 and 2004.

Table 47

Indications for knee revision surgery according to single stage or two stage procedure: 2004 and 2005

Indications for single stage revision – knees	2005		2004	
	n	%	n	%
Aseptic loosening	1,037	51%	755	72%
Wear of polyethylene component	411	20%	223	21%
Pain	364	18%	189	18%
Lysis	348	17%	233	22%
	2,044	100%	1,043	100%
Indications for 2-stage revision – knees	**2005**		**2004**	
	n	%	n	%
Infection	246	80%	113	81%
Aseptic loosening	48	16%	36	26%
Lysis	39	13%	39	28%
	309	100%	139	100%

Using the linked data set of knee replacement revisions it is possible to examine the indications for revision related to the primary surgery (Table 48). The numbers are small, and so unlikely to be representative.

Table 48

Indications for knee revisions according to original primary surgery 2003 – 2005

Primary surgery	Indication for revision						
	n	Dislocation	Aseptic loosening	Fracture	Infection	Pain	Instability
Cemented	165	7%	20%	2%	34%	18%	15%
Uncemented	13	8%	15%	0%	15%	23%	15%
Hybrid	1	0%	0%	0%	100%	0%	0%
Unicondylar	36	6%	25%	6%	8%	42%	6%
Patello-femoral	4	0%	25%	25%	0%	25%	0%
	219	6%	20%	3%	28%	22%	13%

Table 49

Combinations of components removed: knee revision procedures 2005

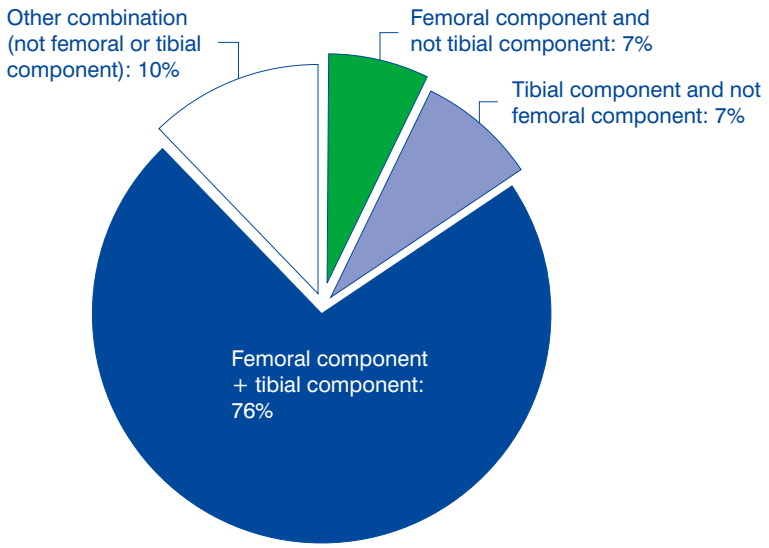
2005		
	2,366	
	n	%
Femoral component and not tibial component	164	7%
Tibial component and not femoral component	171	7%
Femoral component + tibial component	1,795	76%
Other combination (not femoral or tibial component)	236	10%
	2,366	

Components Removed

Table 49 and Figure 16 show the removed/revised components for knee revisions.

Figure 16

Combinations of components removed: knee revision procedures 2005



Three-quarters of knee revisions involved removal of both major components.

Re-operations other than Revision

294 knee re-operations 'other than revision' were recorded. 227 were recorded using the specific categories available on MDS2, and 99 using text in the 'other' box.

Table 50 shows the categories from the present list, and Table 51 overleaf shows a suggested new categorisation using the preset list and analysis of the 'Other' group based on this small sample.

Table 50

Types of knee re-operations entered into the NJR database in 2005 using present categories

2005		
	294	
Type of re-operation*	n	%
Resurfacing of patella	143	49%
Manipulation under anaesthesia	29	10%
Washout	23	8%
Wound debridement	16	5%
Soft tissue repair/realignment	14	5%
Orif peri-prosthetic fracture	2	1%
Other procedure	99	34%
	294	

* A procedure can have more than one re-operation type recorded. There were 326 types of operation recorded for 294 procedures

Table 51

Types of re-operation other than revision: knees 2005 using suggested new dataset

2005		
	294	
Type of re-operation*	n	%
Resurfacing of patella	143	49%
Arthroscopy/washout	32	11%
Soft tissue repair/realignment	32	11%
Manipulation under anaesthesia	30	10%
Tibial insert change	24	8%
Patella component change/adjustment	22	7%
Wound debridement	16	5%
Revision total/tibial/femoral/stage 1 of 2	7	2%
ORIF peri-prosthetic fracture	3	1%
Reduction of dislocation	3	1%
Conversion operation	2	1%
Infection	2	1%
Other procedure	10	3%
	294	

* A procedure can have more than one re-operation type recorded. There were 326 types of operation recorded for 294 procedures

From this classification it can be seen that changes to the patella (component/resurfacing) account for 49% (143) of re-operation other than revision.

Table 52 shows the characteristics of the patients undergoing these 294 knee re-operation procedures. They are generally less physiologically fit than those undergoing primary knee procedures but about the same as those undergoing knee revision procedures on average (20%, 28 ASA P3 compared with 14%, 8,203 and 22%, 521 respectively).

Table 52

Characteristics of patients undergoing knee re-operations other than revision 2005

2005		
	294	
Age, years (consenting patients only) n	192	
Mean (sd)	69 (12)	
Interquartile range	63 - 77	
	n	%
Gender (consenting patients only)		
Male	91	47%
Female	101	53%
Patient physical status		
P1 – Fit and healthy	45	15%
P2 – Mild disease, not incapacitating	191	65%
P3 – Incapacitating systemic disease	58	20%
P4 – Life threatening disease	0	0%
P5 – Not expected to survive 24 hours	0	0%
Side		
Bilateral	0	0%
Left, unilateral	142	48%
Right, unilateral	152	52%
Waiting list initiative/patient choice		
Yes	30	13%
No	196	87%
Tertiary referral		
Yes	22	10%
No	201	90%
	294	

4.3 Brands of Knee Replacement Prostheses Entered into the NJR

51 brands of total condylar knee prostheses were recorded. In addition, there were 15 brands of unicondylar prostheses, 5 brands of patello-femoral replacement prostheses and 12 brands of hinged prostheses. As for hips, this was a large increase on 2004, with many new brands being recorded.

Table 53 shows the 20 brands of total condylar knee replacement prostheses recorded most frequently for TKR and hybrid procedures.

Table 53

20 total condylar knee brands entered most frequently into the NJR in 2005 for total knee replacements and hybrid and revision procedures

2005							
Manufacturer	Brand	Number used	%	Fixed bearing tibial insert?	Mobile bearing tibial insert?	Cemented?	Cementless?
		54,609					
DePuy	PFC Sigma Bicondylar Knee	19,192	35%	Yes	Yes	Yes	Yes
Biomet	AGC	6,823	12%	Yes	Yes	Yes	Yes
Zimmer	Nexgen	6,752	12%	Yes	Yes	Yes	Yes
Stryker Howmedica Osteonics	Scorpio	5,329	9.8%	Yes	Yes	Yes	Yes
Stryker Howmedica Osteonics	Kinemax	2,964	5.4%	Yes	Yes	Yes	No
Endo Plus (UK) Limited	Endoplus Bicondylar Knee	2,513	4.6%	Yes	Yes	Yes	Yes
DePuy	LCS	2,367	4.3%	No	Yes	Yes	Yes
Smith & Nephew	Genesis 2	2,003	3.7%	Yes	Yes	Yes	Yes
Smith & Nephew	Profix	886	1.6%	Yes	No	Yes	Yes
Corin	Rotaglide+	682	1.2%	Yes	Yes	Yes	Yes
Biomet	Maxim	680	1.2%	No	Yes	Yes	No
Wright Medical UK Ltd	Advance Bicondylar Knee	634	1.2%	Yes	No	Yes	Yes
Wright Medical UK Ltd	Insal-Burstein 2	591	1.1%	Yes	No	Yes	Yes
Finsbury	MRK	422	0.8%	Yes	No	Yes	Yes
Zimmer	NK2 Bicondylar Knee	418	0.8%	Yes	No	Yes	Yes
Zimmer	Insal-Burstein 2	201	0.4%	Yes	No	Yes	No
Intavent - Orthofix	Optetrak	201	0.4%	Yes	No	Yes	Yes
Others	Number of brands (43)	1,951	3.6%				
Total		54,609					

Brands of unicondylar prostheses are shown in Table 54 below. 5 brands of patello-femoral joint replacements were entered into the NJR in 2005 (Table 55 below). Brands of hinged prostheses entered on NJR are shown in Table 56 opposite.

Table 54

Unicondylar knee brands entered into the NJR in 2005 for unicondylar knee procedures

2005					
Manufacturer	Brand	Number used	%	Cemented?	Cementless?
		5,372			
Biomet	Oxford III	3,981	74%	Yes	Yes
Zimmer	MG Uni	539	10%	Yes	No
DePuy	Preservation	298	5.5%	Yes	No
Corin	ACM/Uniglide	172	3.2%	Yes	Yes
Waldemar Link	Sled	138	2.6%	Yes	No
Stryker Howmedica Osteonics	EUIS	97	1.8%	Yes	No
Endo Plus (UK) Limited	UC-Plus	69	1.3%	Yes	No
Smith & Nephew	Genesis Uni	44	0.8%	Yes	Yes
Wright Medical UK Ltd	Advance Unicondylar Knee	18	0.3%	Yes	Yes
Mathys Orthopaedics Ltd	Mathys Unicondylar Knee	4	0.1%	Yes	Yes
Zimmer	NK2 Unicondylar Knee	4	0.1%	Yes	No
Biomet	Oxford Uni	4	0.1%	Yes	No
Biomet	Repicci	2	0.0%	Yes	Yes
DePuy	PFC Sigma Unicondylar Knee	1	0.0%	Yes	No
B Braun/Aesculap	E-Motion Unicondylar Knee	1	0.0%	Yes	Yes
Total		5,372			

Table 55

Patello-femoral joint brands entered into the NJR in 2005 for patello-femoral joint replacement procedures

2005			
Manufacturer	Brand	Number used	%
		585	
Stryker Howmedica Osteonics	Avon	458	78%
Wright Medical UK Ltd	FPV	89	15%
Waldemar Link	Lubinus PF	30	5.1%
Corin	Leicester	5	0.9%
Smith & Nephew	Competitor	3	0.5%
Total		585	

Usage of Fixed versus Mobile Bearing Tibial Inserts

Tibial inserts recorded in total condylar procedures were predominantly fixed bearing (83%, 38,885) of all procedures using tibial inserts, compared with 17% (7,931) involving mobile bearing tibial inserts, as shown in Table 57. However, for patients less than 55 years old, there appears to be an increase in the use of mobile bearings. Mobile bearings were used in 23% (388) of total knee replacements performed on this younger age group, a 4% increase over 2004.

Table 56

Fixed and rotating hinged knee brands 2005

2005			
Manufacturer	Brand	Number Used	%
		779	
Waldemar Link	Endo Rotating Hinge	438	56%
Stryker Howmedica Osteonics	MRH	123	16%
Zimmer	Nexgen Hinge Type	86	11%
DePuy	Noiles	47	6.0%
Endo Plus (UK) Limited	RT Plus	28	3.6%
Biomet	Birmingham ROT Hinge	23	3.0%
Waldemar Link	MC	15	1.9%
Biomet	Stanmore Hinge	12	1.5%
Waldemar Link	Endo Hinge	4	0.5%
Wright Medical UK Ltd	Guardian Hinged/Linked Knee	1	0.1%
Stanmore Implants Worldwide	Smiles Hinged/Linked Knee	1	0.1%
Biomet	OSS	1	0.1%
Total		779	

Table 57

Tibial insert type 2005

2005				
Tibial insert type	All patients	%	Young patients	%
	46,816		1,680	
Fixed bearing	38,885	83%	1,292	77%
Mobile bearing	7,931	17%	388	23%
Total	46,816		1,680	

5

Cement and Bone Substitute Use

Mortality

This chapter covers two final topics – cement and bone substitute use and mortality.

5.1 Cement and Bone Substitute Use

Cement Use

The majority (92%) of procedures involving cement used antibiotic-loaded rather than non antibiotic (Table 58), virtually the same as in 2004. Manufacturers of antibiotic-loaded cement and non-antibiotic cement are given in Tables 59 and 60.

More than one packet of cement could be entered for a particular procedure. For knee procedures, between 1 and 12 packets were entered for a single procedure. For hip procedures, up to 16 packets were entered.

Table 58

Type of cement used in hip and knee replacement procedures entered into the NJR in 2005

2005						
Cement type	Hip procedures	%	Knee procedures	%	All procedures	%
	46,816		1,680			
Antibiotic	49,950	90%	57,522	94%	107,472	92%
Non-antibiotic	5,671	10%	3,429	5.6%	9,100	7.8%
Total	55,621		60,951		116,572	

Table 59

Brands of antibiotic bone cement entered into the NJR in 2005

2005			
Manufacturer	Brand	Number	%
		112,334	
Schering-Plough	Palacos Antibiotic	69,158	62%
DePuy	CMW Antibiotic Loaded Cement	15,783	14%
Biomet	Palacos Antibiotic	15,150	13%
Stryker Howmedica Osteonics	Simplex Antibiotic	12,040	11%
Biomet	Osteopal Antibiotic	128	0.1%
Midland Medical Technologies Ltd	Wright Medical Bone Cement	37	0%
Heraeus Medical	Palacos	31	0%
Amplitude	Amplifix	5	0%
Biomet	Unknown	2	0%
Total		112,334	

Table 60

Brands of non-antibiotic bone cement entered into the NJR in 2005

2005			
Manufacturer	Brand	Number	%
		9,870	
Stryker Howmedica Osteonics	Simplex	3,889	39%
Schering-Plough	Palacos	2,904	29%
DePuy	CMW Bone Cement	1,774	18%
Biomet	Palacos	1,141	12%
Corin	Coriplast	58	0.6%
DePuy	Smartset	57	0.6%
Biomet	Osteopal	45	0.5%
Centerpulse	Sulcem	2	0%
Total		9,870	

Bone Substitute Use

Table 61 lists the manufacturers of bone substitutes for hip and knee procedures in 2005.

Table 61

Brands of synthetic bone substitute entered into the NJR in 2005

2005			
Manufacturer	Brand	Number	%
		452	
Endo Plus (UK) Limited	Endoplus Bone Substitute	235	52%
Stryker Howmedica Osteonics	Bonesave	80	18%
Wright Medical UK Ltd	Osteoset	41	9.1%
ApaTech Products	Apatech Bone Substitute	35	7.7%
Synthes	DBX	18	4.0%
Endo Plus (UK) Limited	Allogran (Endoplus)	16	3.5%
Joint Replacement Instrumentation Ltd	JRI Bone Substitute	9	2.0%
Synthes	Synthes Bone Substitute	4	0.9%
DePuy	Grafton	4	0.9%
Corin	Biofuse	4	0.9%
DePuy	Conduit	2	0.4%
Biomet	Endobon	2	0.4%
Stryker Howmedica Osteonics	OP 1	1	0.2%
Endo Plus (UK) Limited	Stimulan (Endoplus)	1	0.2%
Total		452	

Although the use of synthetic bone substitute remained relatively low, such products were reported as being used in 452 procedures during 2005, almost three times as many as in 2004.

One or two units of bone substitute were recorded for a single knee procedure, whilst up to 4 packets were entered for a hip procedure.

5.2 Mortality

Statistics in this section are based on the subgroup of patients with NHS number recorded, for whom a date of death had been recorded on the NHS Strategic Tracing Service (NSTS) by 31 January 2006. Data from 1 April 2003 to 31 January 2006 were included in the analysis to maximise the quality of the estimates.

Mortality Following Primary Hip Replacement

A total of 147,578 primary hip replacement patients were recorded in NJR between 1 April 2003 and 31 May 2006, 68,275 (46%) had an NHS number recorded and matched the NSTS 31 January 2006 timeframe. 1,115 (1.6%) of these 68,275 patients had had a date of death recorded on the NSTS. Based on this data, the 3 month and one year Kaplan-Meier mortality estimates have been calculated, as shown in Table 62.

Table 62

Mortality estimates for primary hip replacements 2003 – 2006

Time	Mortality estimate (95% confidence interval)
3 months	0.5% (0.4%, 0.5%)
1 year	1.4% (1.3%, 1.5%)

After adjustment for age, sex and ASA grade (Cox proportional hazards regression) the difference in survival was not significant.

Mortality following Primary Knee Replacement

A total of 148,321 primary knee replacement patient records for procedures between 1 April 2003 and 31 May 2006, 68,518 (46%) had an NHS number recorded and matched the NSTS 31 January 2006 timeframe. 1,090 (1.6%) had had a date of death recorded on the NSTS. Table 63 shows the 3 month and one year mortality estimated from this data.

Table 63

Mortality estimates for primary knee replacements 2003 – 2006

Time	Mortality estimate (95% confidence interval)
3 months	0.4% (0.3%, 0.4%)
1 year	1.3% (1.2%, 1.5%)

As for hip replacements, after adjustment for age, sex and ASA grade (Cox proportional hazards regression) the difference in survival was not significant.

Mortality statistics from the registry will continue to be monitored. However analysis is dependent on case ascertainment and linked data, which requires patient consent and the NHS number.

6

Appendix A

Glossary

A	
Acetabular component	The portion of a total hip replacement prosthesis that is inserted into the acetabulum – the socket part of a ball and socket joint
Acetabular cup (hip)	See Acetabular component
Acetabular prosthesis	See Acetabular component
Annual reports	Report on a 12 month period. There are two annual reports for the NJR – the NJR Annual Report 2005-06 and the NJR 3rd Annual Clinical Report (2005)
Arthroplasty	A procedure where natural joint, or part of a natural joint, is replaced by an artificial prosthesis
ASA	American Society of Anaesthesiology (ASA) scoring system for grading the overall physical condition of the patient as 'fit and healthy', 'mild disease, not incapacitating', 'incapacitating system disease' or 'life threatening disease'
B	
Bilateral operation	Operation performed on both sides, e.g. left and right knee procedures carried out during a single operation
Brand (of prosthesis)	The brand of a prosthesis (or implant) is the manufacturer's product name, e.g. the Charnley brand for hips, the Rotaglide Plus brand for knees
C	
Case ascertainment	Proportion of all relevant joint replacement procedures performed in England and Wales that are entered in the NJR
Case mix	Term used to describe the variation in the surgical practice in terms of factors such as indications for surgery, patient age, sex etc
Cement gun	A pressurised container used to insert bone cement into bony cavities
Cement pressuriser	A device used to aid surgeon in optimising the strength of adhesion between bone cement and bone
Cup	See Acetabular component
D	
Data collections periods for annual report analysis	The NJR Annual Report 2005-06 is about data collected between 1 April 2005 and 31 March 2006 – the 2005-06 financial year The NJR 3rd Annual Clinical Report (2005) analyses data on hip and knee procedures undertaken between 1 January and 31 December 2005 inclusive – the 2005 calendar year
Data quality	Completeness, accuracy and linkability of NJR data

F	
Femoral component (hip)	Part of total hip joint that is inserted into the femur (thigh bone) of the patient. It normally consists of a stem and head (ball)
Femoral component (knee)	Portion of a knee prosthesis that is used to replace the articulating surface of the femur (thigh bone)
Femoral head	Ball shaped portion of the femur that forms part of the ball and socket hip joint
Femoral prosthesis	Portion of a total joint replacement used to replace damaged parts of the femur (thigh bone)
Femoral stem	See Femoral component (hip)
H	
Head	See Femoral head
Healthcare provider	NHS or independent sector organisation that provides healthcare, in the case of the NJR, orthopaedic hip and knee replacement surgery
Hybrid procedure	Joint replacement procedure where cement is used on one articulated surface and the other is cementless
I	
Image guided surgery	Surgery performed by the surgeon, using real time images (normally x-rays) to help the alignment and positioning of prosthetic components
Indication (for surgery)	Reason for surgery. The NJR system allows for more than one indication to be recorded
L	
Laminar flow (in theatres)	System which ensures a continuous flow of 'clean' air around the patient during surgical procedures
Levy	Additional payment placed on the sales of specific hip and knee implants to cover the costs associated with on-going operations and development and development of the NJR
Linkable percentage	Linkable percentage is an estimate of the percentage of all relevant procedures that have been entered into the NJR and may be linked via NHS number to other procedures performed on the same patient
Linkable procedures	Procedures entered into the NJR database that are linkable to a patient's previous or subsequent procedures by the patient's NHS number
M	
MDS	Minimum data set, the set of data fields collected by the NJR. Some of the data fields are mandatory (i.e. they must be filled in). Fields that relate to patient personal details must only be completed where informed patient consent has been obtained
MDS 1 (MDSv1)	Minimum data set version one, used to collect data from 1 April 2003. MDS 1 closed to new data entry on 1 April 2005
MDS 1 (MDSv2)	Minimum data set version two, introduced on 1 April 2004. MDS 2 replaced MDS 1 as official data set on 1 June 2004

Minimally invasive surgery (MIS)	Surgery performed using special instruments that allow very small incisions to be made in the tissues of the patient
Mixing and matching	Also know as 'cross-breeding'. Hip replacement procedure where a surgeon chooses to implant a femoral component (incorporating a metallic or ceramic modular head) from one manufacturer with an acetabular component (incorporating a polyethylene bearing surface) from another
Modular	Component composed of more than one piece, e.g. a modular acetabular cup shell component

N

NHS	National Health Service
NICE	National Institute for Health and Clinical Excellence
NICE benchmark	See ODEP ratings
NJR	National Joint Registry for England and Wales. Since 1 April 2003, the NJR has collected and analysed data on hip and knee replacements. It covers both the NHS and independent healthcare sectors to ensure complete recording of national activity in England and Wales
NJR Centre	National co-ordinating centre for the NJR
NJR StatsOnline	Web facility for viewing and downloading NJR statistics on www.njrcentre.org.uk
NSTS	NHS Strategic Tracing Service. Used to source missing NHS numbers and to determine when patients recorded on the NJR have died

O

ODEP	Orthopaedic Data Evaluation Panel of the NHS Purchasing and Supply Agency (PASA)
ODEP ratings	ODEP ratings are the criteria for prostheses for primary total hip replacement product categorisation against NICE benchmarks. The categorisation based on the NICE benchmarks for products – *pre-entry* benchmark (products commercially available that are involved in postmarket clinical follow-up studies); *entry* benchmark (3 years, 5 years and 7 years; level A – acceptable evidence, level B – weak evidence); *full* benchmark (10 years; level A – strong evidence, level B – reasonable evidence, level C – weak evidence). Under each year is a level that is unacceptable evidence, where product should only be used as part of a clinical trial

P

PASA	NHS Purchasing and Supply Agency
Patella resurfacing	Replacement of the surface of the patella (knee cap) with a prosthesis
Patello-femoral knee replacement	Procedure involving replacement of femoral condyles and resurfacing of the patella
Patello-femoral prosthesis (knee)	Two piece knee prosthesis that provides a prosthetic articulation surface between the patella and femoral condyles
Patient consent	Patient personal details may only be submitted to the NJR where explicit informed patient consent has been given. If a patient does not give consent only the anonymous operation and implant data may be submitted
Patient physical status	See ASA

Patient procedure	Type of procedure carried out on a patient e.g. primary total prosthetic replacement using cement
PEDW	Patient Episode Database Wales, the Welsh equivalent to Hospital Episode Statistics (HES) in England
Primary hip/knee replacement	First total joint replacement operation performed on any individual patient
Prosthesis	Orthopaedic implant using joint replacement procedures, e.g. at total hip or a unicondylar knee
Pulsatile lavage	Pulsed jet of sterile water used to clean the bony surfaces prior to the implantation of a total joint replacement

R

Re-operation other than revision	Procedures following a primary replacement that do not require component removal or replacement
Resurfacing (hip)	Resurfacing of the femoral head with a surface replacement femoral prosthesis and insertion of an acetabular cup with or without cement
Resurfacing arthroplasty	See Resurfacing (hip)
Reverse hybrid procedure (hip)	Hip procedure where the acetabular prosthesis is cemented and the femoral prosthesis is not cemented
Revision hip/knee replacement	Operation performed to remove and replace one or more components of a total joint prosthesis for whatever reason

S

Stem	See Femoral component (hip)
Surgical approach	Surgical technique used by a surgeon to expose the bone prior to joint replacement whilst minimising the damage to surrounding tissues

T

TED stockings	Pressurised stockings worn by patients following surgery. These help to prevent blood clots forming in the blood vessels of the legs
THR	Total hip replacement (total hip arthroplasty). Replacement of the femoral head with a stemmed femoral prosthesis and the insertion of an acetabular cup, with or without cement
Thromboprophylaxis	Drug or other post-operative regime prescribed to patients with the aim of preventing blood clot formation in the postoperative period
TKR	Total knee replacement (total knee arthroplasty). Replacement of both tibial and both femoral condyles, with or without resurfacing of the patella and with or without cement
Total condylar knee	Type of knee prosthesis that replaces the complete contact area between the femur and the tibia of a patient

Treatment centre (TC)	Treatment centres are dedicated units that offer elective and short stay surgery and diagnostic procedures in specialities such as ophthalmology, orthopaedic and a range of other conditions. These include hip and knee replacements. Treatment centres may be NHS or privately funded
Trochanter	Bony protuberance of the femur found just below the femoral head
Trochanteric osteotomy	Temporary incision of the trochanter, used to aid exposure of hip joint during some types of total hip replacement
Type (of prosthesis)	Type of prosthesis is the generic description of a prosthesis e.g. modular cemented stem (hip), patella-femoral joint (knee)

U

Unicondylar arthroplasty	Replacement of one tibial condylar and one femoral condyl, with or without resurfacing of the patella
Unicondylar knee replacement	See Unicondylar arthroplasty
Unilateral operation	Operation performed on one side only e.g. left hip

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Appendix B

ODEP criteria for categorising products in relation to NICE's benchmarks – version 4 January 2005

Pre-entry benchmark products	Entry benchmark			Full benchmark	
Manufacturers are requested to keep ODEP informed of all commercially available prostheses that are involved in postmarket clinical follow-up studies. (This need not include products still in development) The details should consist of: Number of centres Number of surgeons Number of patients Methodology of study All UK implanting centres identified ODEP will then list these products for surgeons' information	**3 years** **Level A – Acceptable evidence** • Failure rate of 3% or less • Kaplan Meier survivorship submitted • 95% confidence intervals to include benchmark • All UK implanting centres identified • All product failures identified • A list provided of all studies (published or unpublished) including all initiated by the manufacturer • All English and Welsh data now being entered into NJR **Level B – Weak evidence** • Acceptable failure rate • Study results submitted • Failures identified	**5 years** **Level A – Acceptable evidence** • Failure rate of 5% or less • Kaplan Meier survivorship submitted • 95% confidence intervals to include benchmark • All UK implanting centres identified • Data beyond developing centre submitted • A list provided of all studies (published or unpublished) including all initiated by the manufacturer • All English and Welsh data now being entered into NJR **Level B – Weak evidence** • Acceptable failure rate • Study results submitted • Failures identified	**7 years** **Level A – Acceptable evidence** • Failure rate of 7% or less • Kaplan Meier survivorship submitted • 95% confidence intervals to include benchmark • All UK implanting centres identified • Data beyond developing centre/s submitted • A list provided of all studies (published or unpublished) including all initiated by the manufacturer • All English and Welsh data now being entered into NJR **Level B – Weak evidence** • Acceptable failure rate • Study results submitted • Failures identified	**10 years** **Level A – Strong evidence** • Failure rate of 10% or less • Cohort of more than 500 joints at start of study • All product failures identified • Kaplan Meier survivorship at 10 years on acceptable size cohort • Registry data or multicentre (3 or more centres including non developing) **Level B – Reasonable evidence** • Failure rate of 10% or less • Multicentre (more than one) data submitted • Data beyond developing centre/s submitted **Level C – Weak evidence** (products given two years to improve data or they are deemed unacceptable) • Failure rate of 10% or less • Study results submitted	
Products that do not meet the benchmark should only be used as part of a clinical trial	Unacceptable evidence	Unacceptable evidence	Unacceptable evidence	Unacceptable evidence	NICE benchmark

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