National Joint Registry
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National Joint Registry for England and Wales

2nd Annual Report | September 2005

…realising the potential

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Prepared by

The Royal College of Surgeons
Clinical Effectiveness Unit
Jan van der Meulen
James Lewsey
Sarah Hardoon

&

The NJR Centre, Harwell
Fiona Davies, Martin Pickford, Holly Firmin, Leigh Mapledoram, Claire Newell, Sandra Hasler, Ian Calcutt, Lee Sims, with support from the rest of the NJR Centre team

&

The NJR Editorial Board for the 2nd Annual Report
Paul Gregg
Martyn Porter
Tim Wilton
Colin Thomson
Andy Crosbie
Mick Borroff
John Timperley
Peter Howard
Mark Noterman
Jan van der Meulen
Fiona Davies

The National Joint Registry (NJR) Centre
Building 329
Harwell
Didcot
Oxfordshire OX11 0QJ
England

Website: **www.njrcentre.org.uk**
Helpline: **0845 345 9991**
Fax: **0845 345 9992**
Email: **enquiries@njrcentre.org.uk**

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Foreword

As Chairman of the NJR Steering Committee, it is my pleasure to present the 2nd Annual Report covering the calendar year 2004. This is a year that has seen a significant increase in the submission of completed records. During the 2004 data collection period[1], a total of 93,885 submissions were received, an average of 7,824 procedures per month compared to an average of 5,200 per month for the 2003 data collection period. By December 2004, 381 centres were participating in data collection, an increase of 41 centres over the previous year.

Bringing the statistics as up to date as possible, on 24 June 2005 the 200,000th record was entered into the NJR system and by the end of July a total of 212,107 records had been entered, highly gratifying figures. The average consent rate for that month was 72.9%, and 98.8% of all hospitals on the NJR database had submitted data by the end of July 2005.

However, much remains to be done if the data we have collected are to realise their full potential in improving orthopaedic care. In particular, we need to increase patient consent and the collection of NHS numbers for consented patients. This must be our main objective for 2005 and a number of measures are under active consideration to enable us to do this urgently.

I again record my thanks to my Vice Chair, Professor Paul Gregg who has been tireless in his efforts to take the project forward. I also pay tribute to the work of the Regional Clinical Co-ordinators who continue to give of their time unstintingly. Their advice and support is very much appreciated. This project has been carried through with enthusiasm and dedication by AEA Technology plc and I record my thanks to them.

Bill Darling
Chair, NJR Steering Committee

It gives me great pleasure to join Bill Darling, again, in presenting the 2nd Annual Report of the NJR.

Significant progress has been made since publication of the 1st Annual Report. Almost all hospitals in England and Wales, both in the NHS and independent sector, have submitted data to the NJR. There are now 2,400[2] new records entered each week.

Other significant developments during the year include the introduction of Minimum Dataset version 2 (MDS v2), development of the bulk upload facility, and an agreement to provide each hospital on request with a bar code reader to facilitate the entry of implant data via the new bar code reader facility.

This year has seen significant input from the NJR to the work of the Orthopaedic Data Evaluation Panel (ODEP) in providing a comprehensive view of hips available on the UK market and their compliance with NICE benchmarks.

The expansion of the Regional Audit Co-ordinator team from 5 to 7 RACs has allowed increased communication between the NJR Centre and individual hospitals. The RACs will have a key role to play, in the future, in achieving complete

[1] The 2004 data collection period relates to hip and knee replacement procedures that took place between 1 January and 31 December 2004 inclusive and that were entered onto the NJR database by 28 February 2005. These data were then used in analyses for the 2nd Annual Report

The 2003 data collection period relates to hip and knee replacement procedures that took place between 1 April and 31 December 2003 inclusive and that were entered onto the NJR database by 31 March 2004. These data were then used in analyses for the 1st Annual Report

(Data for both 2003 and 2004 have continued to be entered onto the NJR database beyond these end dates, although they could not contribute to the 1st and 2nd Annual Report analyses respectively.)

[2] This weekly submission rate is the average rate over the previous four weeks. The figure given is for July 2005

registration of all hip and knee replacements, in rolling out the NJR Data Integrity Audit process across all units and, in particular, in improving the NJR patient consent rates recorded.

This report also includes the results from the first Patient Reported Outcome Measurement Studies (PROMS) survey, which was carried out in a group of 20,000 patients who had previously undergone replacement of a hip or knee joint. This postal survey achieved an excellent response rate of 88% that, presumably, indicates the importance that patients attach to this initiative. A second, and much more detailed, longitudinal study is planned for 2006, with a pilot starting in August 2005.

The application of the NJR levy[3] continues to work extremely well and has provided a sound financial basis for the running and further development of the NJR.

Despite the significant progress during the past year, much still needs to be done in the future. In particular, there remain a number of hospitals which only enter a small percentage of the hip and knee replacements they perform and consent rates remain disappointingly low. Unless this can be significantly improved upon in the future, it will not be possible to achieve some of the main aims of the NJR.

I would like to add my sincere thanks to those of Bill Darling for all the hard work and support of the many people who have been involved in this very ambitious project. In particular, I would like to thank Bill, in his role as Chair of the NJR Steering Committee, for his on-going support and the very fair and transparent way in which he continues to conduct the functioning of the Steering Committee. Surgeon involvement, outwith the main Steering Committee, is facilitated in a number of ways, but particularly via the Regional Clinical Co-ordinators. This continues to bring positive results.

I maintain my belief that the NJR will be good for patients and we must remain conscious of the surgeons' responsibility to be accountable to them. They have every right to expect openness with regard to professional performance. I hope that the continued and increased participation in the NJR will send a clear signal of the orthopaedic surgical profession's commitment to this.

Paul Gregg
Vice Chair, NJR Steering Committee

[3] The costs associated with ongoing operation and development of the NJR are funded through a levy placed on the sale of specific total hip and total knee prostheses

Executive Summary

Introduction

This is the 2nd Annual Report of the National Joint Registry (NJR) for England and Wales. The NJR collects information on total hip and knee replacements carried out in both the NHS and independent sectors.

Report structure

The report is structured in three parts for ease of use:

- Part 1 reports on key activities that took place between 1 January 2004 and 31 July 2005 that were not included in the 1st Annual Report
- Part 2 focuses on data analysis and interpretation. Data available for analysis covers 21 months and has allowed a wider range of analyses to be carried out. Reflecting developments in technologies and techniques, analyses examine, for example, the prevalence of hip resurfacing and use of minimally invasive surgery. Although early findings must be regarded as preliminary, their possible implications are of interest
- Part 3 of the report provides appendices to support both Part 1 text and Part 2 analyses. The web version of the report also includes additional appendices to support both Parts 1 and 2

Highlighting developments

The intense activity of the set-up period of the NJR has continued, but spread across a broader range of areas.

- As development of the NJR has progressed, a structure of advisory groups and sub committees has evolved to support the work of the Steering Committee. These are the:
  - NJR Outlier Performance Advisory Group (NOPAG)
  - NJR Research Sub Committee (NJR RSC)
  - Patient Reported Outcomes Measurement Studies (PROMS) group. *Part 1, s3.5*
- Further development of the Minimum Dataset was carried out to enhance future data analysis and subsequent interpretation to improve patient outcomes. MDS v2 also aims to provide a more objective measure of epidemiological case mix and complexity. Overall, MDS v2 provides a more comprehensive dataset yet requires fewer but more targeted fields to be completed. In parallel, the data entry system has evolved to become more user friendly and make data entry easier. *Part 1, s7.1*
- As a consequence of listening to early feedback, major developments initiated in 2004 included the development of a bar code reader facility and a bulk data upload facility. Also, the number of surgeon default techniques available has been expanded. All of these developments reduce both time needed for data entry and the likelihood of errors. *Part 1, s7.2*

- The NJR has continued to focus on increasing data submission and consent rates. A number of key initiatives have supported this including a Patient Consent Initiative and piloting of the Data Integrity Audit process. *Part 1, s7.3, s7.5 and s7.6*

- Following an initial survey of stakeholder reporting requirements, a stakeholder reporting strategy was developed. Establishment of the NJR stakeholder reporting process will enable stakeholder groups to obtain information they need quickly, easily and in a convenient format. In Phase 1, standard reports are in preparation for: hospital management; the NHS Purchasing and Supply Agency (PASA); manufacturers and suppliers; and surgeons. *Part 1, s8.2*

- NJR StatsOnline - a web facility for viewing and downloading NJR statistics - was launched in May 2005. It initially made data available for NHS hospitals and treatment centres. Subsequently agreement was reached with the vast majority of independent sector organisations to make their equivalent data openly available. It is understood that this is the first time that independent sector data has been voluntarily released in this way - a positive endorsement of the aims of the NJR. *Part 1, s8.3*

- The Orthopaedic Data Evaluation Panel (ODEP) was established by NHS PASA to provide an independent assessment of the clinical outcomes data, submitted by implant manufacturers, regarding the compliance of brands of total hip and hip resurfacing prostheses with the NICE benchmarks for the effectiveness of different brands of hip prostheses. The NJR's input in to the ODEP process has proved of great value. In 2005, an exercise was undertaken comparing NJR entries with products submitted for ODEP evaluation. The result was that a considerable number of products were identified as being implanted, but not put forward to ODEP. This NJR input has allowed building on the work of ODEP to provide a comprehensive view of hips available on the UK market and their compliance with the benchmarks set by NICE. Detailed results from ODEP's assessments can be found at Part 2, Section 8. *Part 1, s12.3 and Part 2, s8*

- A PROMS (Patient Reported Outcomes Measurement Studies) interim study took place in the first half of 2005. It satisfied two main aims:

  – Examining how patients viewed the outcome of their joint replacement at least one year after surgery

  – Providing an initial test of the logistics for running a postal patient reported outcomes survey on patients whose data had been entered into the NJR database

  An overall response rate of 88% was achieved which is very encouraging. *Part 1, s11 and Part 2, s12*

Data quality, analysis and interpretation

The table opposite summarises the data used in the majority of analyses in Part 2 of the report, i.e. data related to hip and knee replacement procedures carried out in England and Wales from 1 January to 31 December 2004 inclusive and entered into the NJR database by 28 February 2005.

	Hips		Knees		Total	
	Number	(%)	Number	(%)	Number	(%)
Country						
England	47,427	(96.8)	43,603	(97.1)	91,030	(97.0)
Wales	1,560	(3.2)	1,295	(2.9)	2,855	(3.0)
Type of procedure						
Primary	44,262	(90.4)	42,791	(95.3)	87,053	(92.7)
Revision	4,516	(9.2)	1,966	(4.4)	6,482	(6.9)
Re-operation other than revision	209	(0.4)	141	(0.3)	350	(0.4)
Type of treatment provider						
NHS hospital	30,990	(63.2)	29,592	(65.9)	60,582	(64.5)
Independent hospital	16,203	(33.1)	13,333	(29.7)	29,536	(31.5)
NHS treatment centre	1,118	(2.3)	1,186	(2.6)	2,304	(2.5)
Independent treatment centre	676	(1.4)	787	(1.8)	1,463	(1.5)
Total	**48,987**		**44,898**		**93,885**	

Key findings (for 2004 unless stated otherwise)

- 60% of relevant NHS hip and knee replacements were entered into the NJR in 2004. Consent to enter patient personal details (forename, surname, date of birth, postcode and NHS number) was obtained for 65% of all procedures entered. NHS numbers were available for 70% of patients who gave consent. *Part 2, s4.1, s4.2 and s4.3*
  - 171 hospitals (45% of those obtaining consent) obtained a consent rate of at least 80% of procedures entered, with 31 of those achieving 100% consent rates
  - At 24 hospitals, NHS numbers were available for all consenting patients
- Primary hip replacement
  - Mean age of patients was 68 years. *Part 2, s5.1*
  - Overall, more consenting patients were female than male (59%). *Part 2, s5.1*
  - The most common indication for surgery was osteoarthritis, present in 94% of patients. *Part 2, s5.1*
  - Most procedures used cement (77% used femoral cement and 56% used acetabular cement). *Part 2, s5.3*
  - 6.5% of all procedures used minimally invasive surgery. *Part 2, s5.3*
  - 8% of procedures recorded were performed on 'young' patients (under 55 years). *Part 2, s5.5*
  - 88 different brands of acetabular cups and 101 different brands of femoral stems were recorded. 574 combinations of cup brand and stem brand were recorded. 9,718 procedures (25%) used 'mixed and matched' cup-stem combinations. *Part 2, s8.1 and s8.3*
- Primary knee replacement
  - Mean age of patients was 70 years. *Part 2, s6.1*
  - Overall, more consenting patients were female than male (56%). *Part 2, s6.1*
  - The most common indication for surgery was osteoarthritis, present in 96% of patients. *Part 2, s6.1*
  - 6.1% of procedures used minimally invasive surgery. *Part 2, s6.3*
  - 3.7% of procedures recorded were known to have been performed on 'young' patients (under 55 years). *Part 2, s6.5*
  - 33 different brands of total condylar knee prostheses were recorded. In addition, 10 brands of unicondylar prostheses, 3 brands of patello-femoral replacement prostheses and 7 brands of hinged prostheses were recorded. *Part 2, s9.1*

Revisions

- For hip revisions, the mean age of patients was 69 years. Overall, more consenting patients were female than male (57%). The most common indication for a hip revision was aseptic loosening, present in 79% of patients. *Part 2, s7.1*
- For knee revisions, the mean age of patients was 70 years. Overall, more consenting patients were female than male (52%). The most common indication for a knee revision was aseptic loosening, present in 59% of patients. *Part 2, s7.1*
- At this early stage of the NJR, 122 hip revision or re-operation procedures performed between 1 April 2003 and 31 December 2004 are linked to a primary procedure in the database. 54 knee revision or re-operation procedures performed over this time period are linked. *Part 2, s7.5*

Mortality of hip and knee replacement patients

- 31,060 primary hip replacement patients with operation dates between 1 April 2003 and 31 December 2004 have NHS numbers. A date of death was traced for 533 (1.7%) of these patients through the National Strategic Tracing Service (NSTS) in March 2005. *Part 2, s11.1*
- 203 of the 31,060 primary hip replacement patients have a date of death within 3 months of their operation. This corresponds to an overall 3-month mortality rate of 0.64% (0.56%, 0.73%). Males had a higher 3-month mortality rate than females (0.69% versus 0.60%). The 3-month mortality rate increased with age, as might be expected. *Part 2, s11.1.1*
- 29,857 primary knee replacement patients with operation dates between 1 April 2003 and 31 December 2004 have NHS numbers. A date of death was traced for 474 (1.6%) of these patients through the NSTS. *Part 2, s11.2*
- 153 of the 29,857 primary knee replacement patients have a date of death within 3 months of their operation. This corresponds to an overall 3-month mortality rate of 0.49% (0.42%, 0.58%). 3-month mortality amongst male primary knee replacement patients was higher than for females. The risk of death within 3 months increased with age. *Part 2, s11.2.1*

Patient-reported outcomes - interim study

Hips:

- Of the 10,000 survey questionnaires sent to patients, 9,942 could be linked with data in the NJR database. Of these, questionnaires sent to 8,922 patients who had undergone a unilateral primary procedure could be considered. *Part 2, s12.2*
- 7,838 (88%) of eligible patients returned their survey questionnaires
- The 91% of returned questionnaires from which the Oxford Hip Score could be calculated, suggest that about 30% of patients have no or hardly any problems related to their hip replacement. However, 6.1% of patients had an Oxford Hip Score suggesting that they have moderate to severe problems. *Part 2, s12.2.1*
- Of 7,705 patients who responded to the question, 90% were satisfied with their hip replacement and 3.5% were not satisfied. *Part 2, 12.2.2*

Knees:

- Of the 10,000 survey questionnaires sent to patients, 9,935 could be linked with data in the NJR database. Of these, questionnaires sent to 9,417 patients who had undergone a unilateral primary knee procedure could be considered. *Part 2, s12.3*
- 8,231 (87%) of eligible patients returned their survey questionnaires
- The 88% of returned questionnaires from which the Oxford Knee Score could be calculated, suggest that slightly less than 10% of patients have no or hardly any problems related to their knee replacement. However, 11% of patients had an Oxford Knee Score suggesting that they have moderate to severe problems. *Part2, s12.3.1*
- Of 8,095 patients who responded to the question, 82% were satisfied with their knee replacement and 7% were not satisfied. *Part 2, s12.3.2*

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PART 3 - APPENDICES

Part 1

The NJR - One Year On

1 Introduction

1.1 Aims of the 2nd Annual Report

This is the second Annual Report of the National Joint Registry (NJR) for England and Wales. Following the successful launch of the first Annual Report at the British Orthopaedic Association (BOA) Annual Congress in September 2004, the NJR has become increasingly established within the orthopaedic arena and is already proving to be a useful resource.

Since the launch of the NJR's data collection system in April 2003, development of the registry has continued in a number of areas and usage of NJR data has progressively increased. The range of stakeholders who are actively engaged with the NJR has also grown. The NJR is dedicated to meeting the needs of all its stakeholders, including patients and the public, the orthopaedic surgical profession, orthopaedic implant suppliers, regulatory bodies, purchasing bodies, hospital management, research bodies and commissioners of healthcare services (Strategic Health Authorities, PCTs, GPs). With such a wide variety of existing and future users of the NJR data we have focused on producing a report with the following aims in mind:

- To provide easily accessible and understandable analysis of the data collected and held on the NJR database
- To make information available to stakeholders to enable them to make informed choices
- To highlight key aspects of the continued development and establishment of the NJR

NJR fact

An average of 7,824 procedures were entered per month for the 2004 data collection period compared to 5,200 per month for the 2003 data collection period. *Part 2, Section 2*

1.2 Structure of the report

Responding to positive feedback from readers, we have retained the overall structure used for the 1st Annual Report.

- Part 1 reports on key activities and developments that took place between 1 January 2004 and 31 July 2005 that were not included in the 1st Annual Report
  - This is of value in informing the reader of the contexts in which the NJR sits and how its data are being and will be used. It also demonstrates how issues raised in relation to data and analyses described in Part 2 have and are continuing to be addressed. For example, there is reporting of continuing activities such as an NJR Patient Consent Initiative and the evolving Data Integrity Audit process and their early outcomes
- For analyses in Part 2 of the report, the focus is on analysis of data relating to operations that took place between 1 January and 31 December 2004 inclusive, and entered into the NJR by 28 February 2005
  - Comparison against data for operations performed between 1 April and 31 December 2003 inclusive has been carried out where considered of value. Similarly, analyses of data collected over the combined timeframe (i.e. operations carried out between 1 April 2003 and 31 December 2004 inclusive and entered into the NJR by 28 February 2005) have been carried out where considered of value and if feasible[1]
- Part 3 of the report provides appendices to support the contents of Parts 1 and 2
  - Where these appendices are extensive they are included in the version of the Annual Report available on the NJR website, at www.njrcentre.org.uk but not in the printed version

[1] Feasibility is dependent on data fields and options within the fields being linkable between Minimum Dataset version 1 (MDS v1) and MDS v2

– Appendix 9 provides a glossary of technical terms used in this report

1.3 Focus on analyses

The 1st Annual Report set the scene for future reporting and introduced the reader to the development, functioning and scope of the NJR. It introduced the NJR, highlighted key features of the developmental phase, and described issues faced and how they had been addressed or the planned approaches. Data analyses were limited and concentrated on provision of descriptive statistics. However, they provided a good indication of the usability of the NJR dataset and its potential for use in future analysis.

The increased volume of data available for analysis - covering 21 months compared to just 9 months for the 1st Annual Report - has allowed a wider range of analyses to be carried out and brings a greater confidence in findings, although these must still be regarded as preliminary. Reflecting developments in technologies and techniques, analyses examine, for example, the prevalence of hip resurfacing and use of minimally invasive surgery, as well as changes in providers of hip and knee replacement procedures. The possible implications of these early results are of particular interest.

To avoid unnecessary repetition, the reader is referred to the content of last year's report where relevant.

2 Background to the NJR

2.1 Why was the NJR set up?

Hip and knee joints comprise by far the largest number of joint replacements used in the UK. There are many different implant brands and types - some new, some well established - which have often lacked data on their long-term effectiveness. The orthopaedic community and its stakeholders recognised the need to collect data to measure the long-term effectiveness of implants for all implant types used in hip and knee joint replacement surgery. In 2001, it was announced that the Department of Health would set up a National Joint Registry for hip and knee replacements, covering both the NHS and independent sectors in England and Wales.

Following an initial six month set-up and development phase, the NJR data collection system was launched on 1 April 2003. Subsequently the NJR 1st Annual Report was published in September 2004, providing the first analyses of data submitted to the system and available to all.

For further information on the background to the NJR please refer to the 1st Annual Report.

2.2 Aims of the Registry

The NJR supports the Department of Health and Welsh Assembly Government's work in:

- Monitoring the performance of healthcare providers in delivering hip and knee operations
- Monitoring the effectiveness of hip and knee implant components and the surgical techniques which are used in hip and knee replacement operations
- Providing information to assist patient choice

The aims of the NJR as stated at its inception are to:

- Highlight in real time any brand of prosthesis showing high failure rates and allow prompt removal from the market, if necessary
- Ensure patients obtain the best clinical care during and following their joint replacement operation
- Improve evidence-based purchasing of joint replacement implants for orthopaedic units/hospitals
- Provide patients, clinicians, healthcare purchasers/commissioners, regulators and implant suppliers with evidence of which are the best performing implants
- Improve surgical practice through the identification of best practice in orthopaedic units/hospitals
- Ensure NHS and other healthcare resources are best used

The above aims have been supplemented, largely to ensure that the NJR is best placed to achieve its overall goal of optimised patient outcomes. Thus, additional underpinning aims are to:

- Recognise the wider stakeholder community and the roles they play in the continued development and functioning of the NJR to realise its full potential
- Ensure awareness of how the NJR might support current and future developments in the UK health sector

3 Current structure of the Registry

3.1 Steering Committee

The NJR Steering Committee, which has an independent chair, oversees the NJR's activities. The Cabinet Office recently undertook a review of a wide range of public bodies and committees. One result of this review was the decision that the NJR Steering Committee should have the status of an Advisory Non-Departmental Public Body (ANDPB). This decision relates to the Committee's role in giving expert independent advice to Ministers, for example, by setting the NJR's work programme or making recommendations on the value of the NJR levy.

3.1.1 Composition of the Steering Committee

The Steering Committee currently comprises 15 full members, 5 members with observer status and a representative of the contractor, representing a broad range of stakeholder groups as follows:

- Independent chair (1)
- the surgical professions (5)
- patient groups (2)
- industry (orthopaedic implant suppliers) (2)
- public health and epidemiology (1)
- theatre nurses (1)
- NHS Trust management (1)
- Independent healthcare providers (1)
- NHS Purchasing and Supply Agency (observer status) (1)
- the Medicines and Healthcare products Regulatory Agency (1)
- Department of Health (observer status) (2)
- Welsh Assembly Government (observer status) (1)
- AEA Technology (contractor) (1)

- Scottish Executive (observer status) (1)

Part 3, Appendix 1 provides full details of the membership of the Steering Committee.

3.1.2 Production of annual reports

ANDPBs are required to produce annual reports and make them publicly available. In future years, the requirement for the NJR Steering Committee to produce an annual report will be integrated with that of the National Joint Registry itself providing annual reporting. That is, a single document will be produced that satisfies all annual reporting requirements.

For the current year only, the annual report of the NJR Steering Committee is being produced as a standalone document, that is accessible via the NJR website (www.njrcentre.org.uk). It will be available from September 2005.

3.2 NJR Centre

The contract to develop and run the NJR was awarded to AEA Technology plc. This is carried out via Momenta, a business unit of AEA Technology that brings together expertise on developing, implementing and managing programmes on behalf of Government and other public bodies. Momenta set up the NJR Centre at its Harwell site near Oxford, from where all work under the NJR programme is managed and co-ordinated. By the very nature of what it has been set up to achieve, the NJR must operate effectively at local, regional and national levels in both England and Wales. This is facilitated by two regional networks - the Regional Clinical Co-ordinator (RCC) network and the Regional Audit Co-ordinator (RAC) team.

3.3 Regional Clinical Co-ordinator network

The RCC network was established to promote the Registry and drive this initiative forward throughout England and Wales. RCCs are practising orthopaedic surgeons who act at a strategic level within trusts and hospitals.

RCCs have been appointed in close alignment with the Strategic Health Authority areas in England and the three NHS regions in Wales. Their role comprises the following elements:

- To provide continued support to the functioning of the NJR
- To facilitate feedback to orthopaedic surgeons
- To communicate between the regionally based hospitals/orthopaedic units/treatment centres, the NJR Centre and NJR Steering Committee
- To provide representation on organising committees for NJR-related events
- To host training roadshows and regional seminars
- To provide input to determining appropriate reporting, analysis and interpretation of NJR data
- To establish regular interaction with relevant RACs in support of meeting the requirements of the RCC role

Membership of the RCC network currently stands at 35, with a further position about to be filled. Full details are provided in Part 3, Appendix 2.

3.4 Regional Audit Co-ordinator team

The RAC team was set up to provide field-based links between hospitals and the NJR Centre, with the ultimate goal being for all eligible hospitals in England and Wales to be submitting consented complete and high-quality datasets of all relevant procedures. The team has expanded from five to seven RACs, giving complete coverage across England and Wales split into the RAC regions ‘South West England and South East Wales’, ‘North East England’, ‘North West England’, ‘Central England’, ‘South East England’, ‘Mid and North Wales and the Borders’ and ‘East England’.

Key activities during the last year include piloting a Data Integrity Audit process and taking a lead role in the Patient Consent Initiative. Further details can be found in Sections 7.3 to 7.6.

3.5 Roles of advisory groups and sub committees

As development of the NJR has progressed, a structure of advisory groups and sub committees has evolved to support the work of the Steering Committee. These are the:

- NJR Outlier Performance Advisory Group (NOPAG)
- NJR Research Sub Committee (NJR RSC)
- Patient Reported Outcomes Measurement Studies (PROMS) group

Membership is predominantly from the NJR Steering Committee and the RCC network, supplemented by external expertise as necessary. The NJR Centre provides secretariat support. Membership details are provided in Part 3, Appendices 3A to 3C.

3.5.1 NJR Outlier Performance Advisory Group (NOPAG)

NOPAG has been set up to consider the usability of NJR data and its significance in identifying outlier performance - in relation to prosthesis performance, surgical technique, surgical unit performance and individual surgeon performance.

NOPAG comprises a sub group of the Steering Committee representing the surgical profession, orthopaedic device industry, the MHRA and the Department of Health. Its role will evolve over time but details of early activities are provided in Section 9.

Membership of NOPAG can be found in Part 3, Appendix 3A.

3.5.2 NJR Research Sub Committee (NJR RSC)

Over time the data held in the NJR database will become increasingly valuable to the research community. The primary function of the NJR RSC is to stimulate the use of NJR data for research. To do so, the NJR RSC is exploring how procedures can be developed to support the research community in making best use of the data held on the NJR database. Details of the current work programme can be found in Section 10.

The NJR RSC is a sub committee of the NJR Steering Committee representing the surgical profession, patient groups, the research community and the Department of Health. It includes representation from outside the NJR Steering Committee.

Membership of the NJR RSC can be found in Part 3, Appendix 3B.

3.5.3 Patient Reported Outcomes Measurement Studies (PROMS) group

The PROMS group was set up to implement a system whereby patients who have undergone hip or knee replacement surgery - for which data has been entered into the NJR database and who have given their consent - can be asked to take part in postal surveys to obtain their feedback.

The core purposes of the patient reported outcomes process are:

- To demonstrate patient benefit from total hip/total knee replacement
- Surveillance: using outcomes data to improve quality standards for:
  a) Components
  b) Surgical technique
  c) Surgical/hospital performance

- To listen to patients
- To contribute to internal audit within hospitals

The PROMS group has initiated and overseen an interim study. Details of this study are provided in Section 11, with findings being reported in Part 2, Section 12.

The PROMS group includes representation from the surgical profession, public health and epidemiology and patient groups.

Membership of the NJR PROMS group can be found in Part 3, Appendix 3C.

4 Registry funding

4.1 Costs for the on-going operation and development of the NJR

The costs associated with on-going operation and development of the NJR are funded through a levy placed on the sale of total hip and total knee prostheses. These arrangements apply to all NHS trusts and independent healthcare hospitals in England and Wales, as well as NHS and independently funded treatment centres.

The levy is set by the Steering Committee on an annual basis and for the first three years of NJR operation (i.e. 1 April 2003 to 31 March 2006) the levy has been set at £25.00 per joint (inclusive of VAT).

The levy includes an administration fee to cover the costs of the orthopaedic suppliers collecting and processing the levy. This administration fee is included in the calculation of the levy.

The administration fee has been set by the Steering Committee for the first two years of NJR operation at £2.50 per joint (excluding VAT) and £1.70 (excluding VAT) in year three. The mechanism for levy collection by the suppliers is to be reviewed by the Steering Committee during Financial Year 2005/06.

4.2 Principles of levy collection

The agreed principle of funding is that the supplier of a joint prosthesis collects a levy payment (the NJR levy) from the purchasing NHS Trust or independent healthcare provider for each prosthesis sold (see Box 1 for definitions of applicable prostheses).

Within 10 working days of the end of each calendar month, implant suppliers inform the NJR Centre of the number of applicable prostheses sold during that month. The NJR Centre uses this information to provide a statement of account to the Department of Health.

The Department invoices suppliers for the amount of the NJR element of the levy minus the NJR administration fee. The invoice includes VAT on the NJR element only. Suppliers make payment to the Department of Health within 30 days of the date of the invoice.

4.3 Definition of prostheses for NJR levy payment

Proposals for the definition of prostheses for NJR levy payment were agreed to minimise the administrative burden on collecting the levy for different components that may comprise a total joint prosthesis.

Box 1: **Prostheses for NJR levy payment**

The purchase of a one-piece (monobloc) acetabular cup or a modular acetabular cup shell component attracts an NJR levy payment for a total hip prosthesis.

The purchase of any knee femoral component (including the femoral component of a unicompartmental knee or patello-femoral joint prosthesis) or one piece knee prosthesis attracts an NJR levy payment for a knee prosthesis

Patient-specific custom implants are excluded from levy collection.

Where NHS Trusts or independent healthcare hospitals wish to purchase joint prostheses from UK or overseas suppliers that are not currently registered as suppliers of component information to the NJR Centre, they are required to inform the MHRA and NJR Centre of their intentions. This is to ensure that appropriate arrangements may be made to secure payment of the NJR levy and that the correct prosthesis details and product codes are made available within the NJR database.

4.4 What does the funding cover?

The purpose of the levy is to cover the costs associated with ongoing operation and development of the NJR.

The main part of the levy funds the work programme, carried out and managed by the NJR Centre, with some elements being subcontracted. The levy is agreed in advance of the financial year to which it applies. This requires not only the envisaged activity for the year to be determined and costed, but also potential additional requirements to be predicted.

If the level of levy funds collected in one year is found to be higher than needed (for example, if the number of levyable components sold in the period was higher than predicted) then the levy may be reduced in the following year. Conversely, if the levies collected are insufficient to cover authorised costs in one year then this would be taken into account in calculating the levy for the following year.

5 NJR strategy and implementation plan

The NJR Strategy was agreed by the Steering Committee during 2004. The purpose of the strategy is to:

- Provide a clear statement of intent to focus the combined efforts of all stakeholders to achieve a common goal
- Facilitate budgeting and finance decisions
- Provide clarity for communications and avoid misunderstandings
- Drive forward realistic expectations
- Enable strategic and operational plans to be compiled on a longer, more sustainable timeframe
- Ensure development of the NJR is implemented efficiently

The overarching strategy objectives relate to:

- Increasing the consent rate, compliance and quality of data supply
- Development of the IT system to facilitate easier data supply and analysis
- Meeting stakeholders' information requirements

The strategy gives detailed objectives for the short to medium term (1 - 3 years) and the longer term (5 - 10 years). The strategy objectives for the short to medium term relate to developing the infrastructure for data supply, stimulating data supply, providing stability, and generating information to start the process of improving patient outcomes. The strategy objectives for the longer term build on the short to medium term objectives and essentially relate to developing the scientific use of the NJR data through evolving the data set, establishing a library of information meeting the various stakeholder needs, quantifying the benefits achieved for patients, and promoting the value of the NJR.

The NJR Implementation plan was developed from the NJR strategy. It focused on the strategic objectives identified for the short to medium term and detailed the associated activities and milestones to July 2005. Longer term objectives were included as they are key to the overall success of the NJR; however, it was recognised that the nature and timing of their implementation would be guided by the way in which the short term objectives were met.

The major activity areas under each overarching strategy objective are:

Increasing the compliance and quality of data supply

- Patient Consent Initiative (PCI)
- Hip Owner's Manual
- Strengthening the Regional Audit Co-ordinator team

Development of the IT system to facilitate easier data supply and analysis

- Developing consistent use of bar codes
- Developing a bulk upload system
- Developing a Public Key Infrastructure (PKI) system (see Section 8.1 for further detail)

Meeting stakeholders' information requirements

- Establishing the NJR Annual Report as a flagship deliverable
- Providing tailored reports/information to stakeholders
- Improving the value of the NJR to patients

The specific actions carried out under each of the activity areas listed above are described within the appropriate sections of this report.

6 Stakeholders

6.1 Raising awareness and communications

The NJR aims, benefits and key developments are shared with stakeholders using a number of channels including events, press releases, articles in the health sector press, the NJR website, direct mail and the NJR newsletter - 'Joint Approach'.

The NJR Centre communicates directly with hospital key contacts to ensure they are kept up-to-date with NJR developments and data provision requirements. Information is disseminated via the Regional Audit Co-ordinator team and direct mailings.

NJR fact

A total of 93,885 procedures were entered into the NJR for the 2004 data collection period. *Part 2, Section 2*

6.1.1 Website - www.njrcentre.org.uk

The website is the main resource available to all stakeholder groups for accessing the latest NJR information, and is designed so that visitors are signposted to the section that caters specifically to their information needs.

The website details the information necessary for healthcare providers to implement the NJR at a local level and provides registered users with direct access to the data entry system. Information on the patient and public area of the website is also made available to Welsh language users.

A new section - NJR StatsOnline - was introduced in May 2005 and provides website users with summary NJR statistics. See Section 8.3 for further details.

6.1.2 Events

The NJR exhibits and gives presentations at various stakeholder conferences and events throughout the year, including for example:

- The British Orthopaedic Association (BOA) Annual Congress
- The British Association for Surgery of the Knee (BASK) Annual Meeting
- The British Hip Society (BHS) Annual Meeting
- The National Association of Theatre Nurses (NATN) - now Association for Peri-operative Practice (AfPP) - Speciality Conference

The NJR Centre also manages its own events with particular stakeholder groups where specialist or more detailed information needs to be exchanged. For example, an annual meeting is held with orthopaedic implant suppliers, and regional events are arranged as required.

These events provide an excellent opportunity to interact with stakeholders, take account of their evolving needs and capture their valuable feedback.

6.1.3 Journals

Press releases and articles are provided to relevant publications and sector-specific journals to raise awareness of the NJR and its key developments with wider audiences. For example, the NJR 1st Annual Report and the launch of NJR StatsOnline generated interest from publications such as British Orthopaedic News and Orthopaedic Product News.

6.1.4 Joint Approach - the NJR newsletter

The NJR newsletter is published quarterly and carries the latest messages and supporting information to hospital staff and orthopaedic implant suppliers who are involved in collecting and submitting data. Each issue also features a patient-centred article on its back page.

Joint Approach - the NJR newsletter

"I have always found Joint Approach and every other publication interesting and informative. Publications where statistics are provided are particularly useful in enabling me to compare our hospital with others.

The NJR Help Desk staff are always extremely pleasant and helpful."

Christine Lawrence - Data Input Manager, Eastbourne District General Hospital

The newsletter is distributed to key contacts within hospitals and to orthopaedic implant suppliers for their internal circulation. It is also made available to all stakeholders via the NJR website, including Welsh language users.

6.1.5 Good practice guides and case studies

NJR good practice guides and case studies are designed to help share good practice by providing useful hints and tips for successful data collection. Good practice guides outline the basic principles that underpin NJR requirements and case studies show how various aspects of NJR data collection are currently being managed within hospitals.

Current guides and case studies include:

- Patient consent - good practice guide
- Collecting patient consent by post
- Raising the visibility of NJR consent in hospital records
- Implementing the 'Unseen consent' process

These publications are distributed by direct mail, the NJR website and the NJR Regional Audit Co-ordinators.

NJR fact

381 centres submitted data in the 2004 data collection period, an increase of 41 compared to the 2003 data collection period.
Part 2, Section 3

6.1.6 Communication activities

Major communication exercises were undertaken to promote and support the following NJR activities:

- Release of MDS version 2 (April 2004)
- Launch of the NJR 1st Annual Report (September 2004)
- Raising the importance of patient consent and the need to capture patient personal details
- Launch of the new surgeon default techniques (April 2005)
- Availability of NJR statistics via NJR StatsOnline (May 2005)

NJR fact

There have been 25,000 downloads of the full NJR 1st Annual Report (from the NJR website) since its launch in September 2004.

6.2 Hip Owner's Manual

The Hip Owner's Manual is a handbook that patients can use to keep a record of their implant and operation details. The manual provides room for patients and their clinicians to record information about their health and experiences of the healthcare pathway, from initial assessment through to post-operative follow-up.

The manual was originally developed under the ownership and guidance of the NHS Information Authority (NHSIA). During this period, an initial small-scale pilot study was undertaken in two hospitals in early 2004. The pilot results showed that both patients and clinicians supported the development and implementation of the manual, and the content has subsequently been amended to incorporate their feedback. Further development of the manual was transferred to the NJR during 2004.

Since then, the manual has been updated to include information about the NJR and is now being piloted on a larger scale throughout England and Wales over a three month period. Assuming a successful outcome, the launch and distribution of the final version to interested hospitals is being planned.

NJR fact

48,987 hip and 44,898 knee procedures were submitted in the 2004 data collection period. *Part 2, Section 2*

6.3 NJR website developments

The NJR website is a key communications tool and its content and structure is developed in line with NJR activities. The website currently receives around 200,000 requests for page or document downloads per year. It is updated on a regular basis to include relevant and up-to-date information, including for example:

- The latest versions of NJR forms used by hospitals for data collection purposes, i.e. the NJR patient consent form, MDS v2 proformas and surgeon default technique forms
- NJR publications, provided as pdf format for easy download, e.g. newsletters, leaflets and posters
- Details of events that the NJR attends or hosts
- Minutes of NJR Steering Committee meetings
- Amendments to the listing of RACs and RCCs and their contact details

New website pages were added throughout the reporting period and include:

- MDS v2 - included the changes hospitals needed to make to be ready to switch from collecting MDS v1 data to submitting MDS v2 data
- Regional Audit Co-ordinators - contains an RAC location map and contact details
- Implant components - relates to entering component details to the NJR Data Entry System
- NJR 1st Annual Report - includes the full report (and supporting appendices) and the related summary report, as well as a reader feedback section
- MHRA medical device alerts - signposts patients to the relevant contact for further information
- Surgeon default techniques - details the management of the suite of techniques that can now be set-up on the NJR Data Entry System
- Bulk upload - provides the XSD and XML instance files that are required to create a bulk upload file and the guidance documents needed for set-up and routine use

NJR StatsOnline, introduced on 3 May 2005, was the most significant development and forms a totally new area of the website. Further details can be found in Section 8.3.

7 Data collection and data quality

7.1 MDS developments

7.1.1 From MDS v1 to MDS v2

A review of Minimum Dataset version 1 (MDS v1) identified the need for a number of essential changes to data fields collected by the NJR. These changes will enhance future data analysis and subsequent interpretation to improve patient outcomes. The revised dataset - MDS v2 - also aims to provide a more objective measure of epidemiological case mix and complexity.

The 'look and feel' of the data entry system was changed for MDS v2 to become more user friendly and help make data entry easier. Overall, MDS v2 provides a more comprehensive dataset yet requires fewer but more targeted data fields to be completed.

The development of MDS v2 involved all stakeholder groups represented on the NJR Steering Committee, including surgical opinion of British Hip Society (BHS) and British Association for Surgery of the Knee (BASK) representatives.

MDS v2 takes into consideration whether a primary procedure should be defined as Primary or Complex Primary. It also expands the amount of information collected on patient demographics, indications for surgery and details of the actual surgical techniques employed during the procedure. Importantly, MDS v2 also includes details of any 'Re-operations other than Revision' performed after the initial primary procedure. These include, for example, operations resulting from infection or dislocation of the prosthetic components.

MDS v2 was launched on 1 April 2004. Both versions of the dataset then ran in parallel to allow sufficient time for all users to familiarise themselves with the new dataset and, wherever possible, to switch over to MDS v2 on a timescale to suit their circumstances.

7.1.2 What changed?

The features that changed were:

- The NJR minimum dataset - the core set of data fields that are collected by the NJR
- The minimum dataset proformas - the paper forms used to capture data in theatre prior to electronic data submission
- The NJR Data Entry System - the IT system used to submit NJR data electronically

The original proformas covered hip and knee procedures for primary and a revision procedure, a total of 4 separate proformas. MDS v2 proformas expanded considerably the range of procedures recorded, in particular all revision types were captured. The range of proformas available is detailed in Box 2.

The four MDS v2 proformas can be found in Appendix 4 of the web version of this report. (See NJR website at www.njrcentre.org.uk.)

7.1.3 Review of proformas and associated guidance

Findings from the pilot NJR Data Integrity Audits and analyses for the current report have confirmed that there are a small number of NJR data fields where one or more of the following apply:

- The meaning of the field and options available to select are being interpreted differently by different hospitals/individuals
- The supporting guidance to a field needs to be strengthened
- The data field title, options available for selection, and supporting guidance (which may have been originally determined as long ago as September 2002) may not fully reflect current definitions used elsewhere in the health sector
- The importance of accurate data entry (e.g. for fields that are critical to future case mix adjusted analyses) is not fully appreciated
- There needs to be a wider understanding of the NJR's aims and input required from non-

Box 2: **MDS v2 proformas**

Hip Proformas

Two proformas were introduced for hip operations.

H1 used for Primary or Complex Primary hip operations.

H2 used for:

- Hip single stage revision
- Hip revision (Stage 1 of 2 stage revision)
- Hip revision (Stage 2 of 2 stage revision)
- Hip Girdlestone excision arthroplasty
- Hip re-operation other than revision

Knee Proformas

Two proformas relate specifically to knee operations.

K1 for Primary or Complex Primary knee operations.

K2 used for:

- Knee single stage revision
- Knee revision (Stage 1 of 2 stage revision)
- Knee revision (Stage 2 of 2 stage revision)
- Knee conversion to arthrodesis
- Knee amputation
- Knee re-operation other than revision

orthopaedic staff (e.g. patient physical status (defined in terms of American Society of Anesthesiologists (ASA) grade) should be recorded at time of operation and not, say, at pre-assessment clinic and it should be the grade as defined by the anaesthetist present during the operation)

Work has commenced on a thorough review of the data fields, the related proformas and the NJR Data Entry System screens. It must be emphasized that the purpose of this activity is to increase the robustness of data entry for MDS v2 and not to create a new NJR dataset.

7.2 Electronic data input

A key feature of the NJR programme is that feedback is actively sought from system users, whether they be surgeons, other theatre staff, data entry personnel, hospital management etc. This feeds into a continuous improvement process of 'fine tuning' the system. As a consequence of listening to early feedback received, some major developments were initiated in 2004. These include the development of a bar code reader facility and a bulk data upload facility. More recently, the number of surgeon default techniques available has been expanded.

7.2.1 Bar code reader facility

The NJR bar code reader facility is a data entry method which aims to reduce the time taken to enter component information into the NJR and to reduce errors which occur when entering component product code and lot number information manually.

Successful pilots of the bar code system have been completed at both hospital and supplier locations, and a full roll out of the system is scheduled for August 2005. The bar code readers have been purchased and a support package negotiated which will minimise disruption in the event that the hardware develops a fault and ensure that the hospitals have access to a replacement scanner while repairs take place. All hospitals will be provided with one bar code reader on request at no charge.

The largest challenge for this development project has been the accuracy of the bar code and component information available. A significant amount of testing has been conducted to ensure that the maximum number of bar codes can be resolved to a product code stored on the NJR when scanned. The processes and systems used for this testing exercise will be used further after the roll out of the facility to increase the number of products

Bar code reader facility

"The National Joint Registry's bar code reader system is a welcome development as it is easy to use and saves data entry time. I was pleased to be asked to pilot the system. The support and information given by the NJR team through the pilot phase and now with the live system has been excellent at all times."

Paul Allen - Theatre Data Manager for The National Joint Registry, Royal Berkshire Hospital

that can be scanned and to test problem bar codes that are encountered. Analysis of the volume of components has been conducted which has helped in formulating the plan to make more suppliers (and their codes) available to the bar code system.

7.2.2 Bulk upload facility

The NJR bulk upload facility allows a hospital, which already captures data digitally that is required by the NJR, to transfer the data as a file containing multiple records to the NJR database. Bulk upload avoids the need to manually input data to the NJR, and so helps to preserve data quality whilst also saving time.

The control files for the facility were released in late 2004 and a fully functioning test version of the facility was launched in January 2005. This test system enables hospitals and software developers to check the compatibility between their own system and the NJR database and to help during the development process with any changes that may be needed. The NJR Centre is working closely with a number of hospitals and software providers to achieve 'live' usage of the facility.

7.2.3 Surgeon default techniques

MDS v1 of the NJR database was designed to incorporate a surgeon default technique. This facility gave the surgeon the ability to enter, as a default, their technique most often used when performing a primary hip or knee procedure. Once this technique had been recorded on the NJR it negated the need for the operative technique fields to be completed every time a new procedure was entered into the NJR in cases where a surgeon indicated that they had used their default technique. The introduction of MDS v2 required the expansion of this facility.

With effect from 3 May 2005, surgeons were able to enter separate default techniques for the range of procedure types shown in Box 3.

Box 3: Surgeon default techniques

Hip default techniques

- Primary total prosthetic replacement using cement
- Primary total prosthetic replacement not using cement
- Primary resurfacing arthroplasty of joint
- Primary total prosthetic replacement not classified elsewhere (e.g. hybrid)

Knee default techniques

- Primary total prosthetic replacement using cement
- Primary total prosthetic replacement not using cement
- Unicondylar knee replacement
- Patello-femoral replacement
- Primary total prosthetic replacement not classified elsewhere (e.g. hybrid)

Using MDS v1, the NJR Data Entry System only allowed surgeons to create their default techniques via their own NJR user accounts. However, not all surgeons completed their default technique online, which could cause difficulties for a hospital's data entry staff as, if mandatory fields are not completed, records can not be submitted to the NJR. To help remedy this situation the ability to create the surgeon's default technique online has been opened up to Hospital Data Managers (HDMs), providing they have the surgeon's permission. An HDM can now enter the appropriate default techniques on behalf of those surgeons associated with their hospital via their own HDM account.

7.3 Patient Consent Initiative (PCI)

Obtaining consent for patient personal details to be held on the secure NJR database is a vital step in the data collection process. In accordance with the Data Protection Act, patient personal details (surname, forename, date of birth, postcode and NHS number) can only be recorded on the system if the patient has signed an NJR patient consent form and indicated 'Yes' to giving their consent to having their personal details recorded

Recording personal details is critical for:

- Allowing linkage of primary procedures with subsequent re-operations/revisions
- Enabling those patients who have received an implant which is later found to be faulty, to be traced more easily
- Determining the working life of specific prostheses
- Inviting patients to participate in patient reported outcomes measurement surveys

Patient consent therefore remains a key priority area for the NJR. To further emphasize the focus in this area, the Patient Consent Initiative (PCI) was initiated via an internal NJR Centre workshop in December 2004, at which the NJR Centre committed to delivering a significant sustained increase in the NJR patient consent rate.

The PCI explored the key factors influencing the collection and submission of patient consent details and proposed a number of options to address those where the greatest impact was expected. Progressing the PCI has involved joint commitment from the NJR Centre, RCCs and the orthopaedic units targeted. Examples of the PCI workstreams are summarised below:

- Communications - the NJR Centre has focused on developing material to increase awareness and to provide guidance to both patients and hospital staff. See Section 6.1.5 for further detail

NJR fact

Between March and end of July 2005, at the request of hospitals, the NJR Centre distributed 30,000 copies of the NJR Patient Consent leaflet.

- 'Task force' activity - the NJR Centre, RACs and RCCs have targeted a number of hospitals with sizeable throughput of NJR-related orthopaedic procedures that have experienced a range of difficulties in embedding the NJR patient consent process within their systems. In combination with the Data Integrity Audit process, this workstream has had a positive effect on previous 'nil returners' (those hospitals that have not submitted any completed records onto the NJR database) and hospitals struggling to keep a consistent level of compliance
- Integrating NJR consent into local processes - a number of hospitals have experienced logistical difficulties in collecting NJR consent in addition to the other consent forms and associated documentation to be worked through with the patient. The NJR has assisted in putting in place new systems of integrated consent whereby patients and hospital staff minimise the number of consent forms required

Patient Consent Initiative - postal consent

"Patient consent is part of the integrated care pathway. We now write to patients in advance of arrival to request consent and we have also been writing to previous patients retrospectively to ensure their involvement. It's proving to work very well."

Julie Burgoyne - Acting Manager, Birkdale Clinic, Rotherham, South Yorkshire

"We realise the importance of collecting NJR patient consent and make every effort to ask our patients to participate. If NJR consent is missed at the preoperative assessment, we follow this up by posting a consent form to the patient following their operation."

Henry Lumley - Assistant General Manager Musculoskeletal Directorate, North Bristol NHS Trust's Southmead Hospital (Avon Orthopaedic Centre)

- Postal consent - it was found that some hospitals post the NJR consent form to patients prior to surgery, thereby providing time for patients to digest the information and come to hospital ready with any questions. In addition, postal consent has been promoted via RACs and associated guidance and is being increasingly used as a way of collecting retrospective consent. Retrospective consent refers to obtaining NJR patient consent post-operatively where if, for any reason, it has not been possible to take a patient through the patient consent process pre-operatively, often at pre-operative assessment clinic. Retrospective consent is usually obtained on the ward post-operatively, by post or at a follow-up clinic appointment. This contributes to what is colloquially known as the 'three-pronged approach to NJR consent' - ideally, consent is obtained pre-operatively but, if not, it can be obtained later on the ward or via subsequent postal contact.

NJR fact

45% of centres that submitted data during the 2004 data collection period, obtained an NJR consent rate of at least 80%.
31 centres achieved 100% consent rates.
Part 2, Section 4.2

Work on the PCI has proceeded in parallel with other activity aimed at:

- Increasing data submission rates
- Increasing the percentage of submissions with NJR patient consent
- Increasing completion of non-mandatory data fields (e.g. NHS number and postcode in consented records)
- Checking and improving the quality of data submission

There has been marked improvement in all of the above areas in the first half of 2005, which is reflected in the following sections.

7.4 The evolving role of the RAC team

The role of the RAC team has expanded within the NJR programme. To support this expansion, the team has been increased to a total of seven individuals.

The RAC team is sometimes referred to as the NJR data quality team, when working under the direction of the NJR Data Quality Manager. This is a key area of their remit. RACs have strong relationships in their geographic regions with the users of the NJR data entry system, orthopaedic department managers and their staff, theatre staff etc. This is important in helping to develop and maintain robust protocols. The RACs often work in partnership with the relevant RCCs to

help obtain and maintain the 'buy-in' of the surgical profession.

Good working relationships at a group level with the main independent sector healthcare providers has led to empowerment of these groups from the highest level downwards to drive home the importance of the NJR within each of their hospitals. Connections established with NHS Elect and the National Implementation Team has driven improvements in compliance with the requirements of the NJR within the treatment centres in the NHS and independent sectors respectively.

The ultimate goal for the RAC team is for all eligible hospitals in England and Wales to be submitting consented, complete and high quality data. To achieve this, there are three main streams of RAC activity, although these necessarily overlap:

- Hospital compliance
- Patient consent
- Data quality

Prior to the first members of the RAC team starting work in their regions in February 2004, 71% of all hospitals on the NJR database had submitted data (at least one record) and the weekly submission rate was 1,130. By the end of July 2005, 98.8% of all hospitals on the NJR database had submitted data and the average weekly submission rate was 2,400[2]. Of the six 'nil returners':

- one is a newly opened treatment centre that has requested all its records be put in edit while they obtain retrospective consent
- one hospital only carries out a small number of relevant trauma procedures a year, which will be uploaded every six months via another hospital in the same trust
- one hospital only has three or four relevant operations a year
- two hospitals and one treatment centre can be genuinely classed as long term 'nil returners'

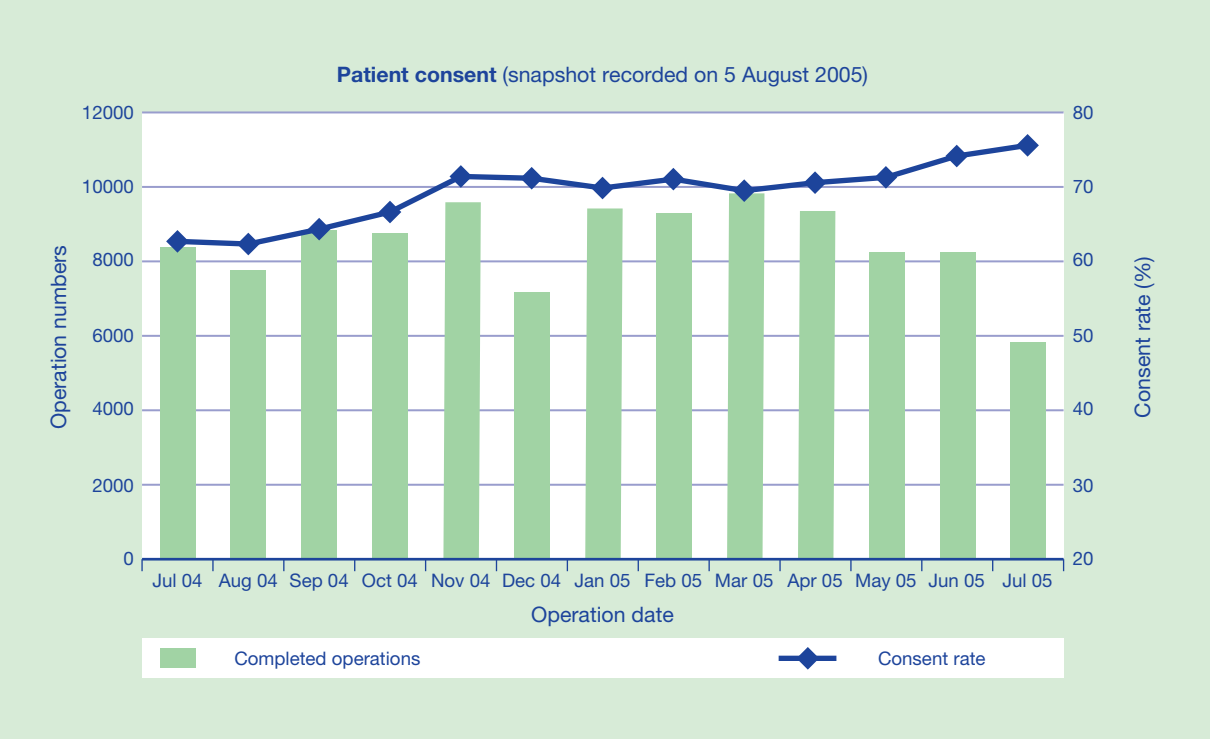
The 1st Annual Report showed that NJR patient consent had been obtained for only 62.8% of operations that were entered[3]. RAC initiatives on patient consent (via the Patient Consent Initiative itself, the Data Integrity Audit process, or general daily activity) have yielded improvement in the consent rate. Historically, NJR consent statistics have been based on the date that records were submitted to the NJR. This gives a monthly consent rate of 72.9% for data submitted in July 2005. However, one or two large units submitting large quantities of unconsented records - for example, when clearing a backlog of stored proformas - can have a marked negative impact on the overall NJR patient consent rate. Consent statistics are now also calculated based on date of operation. This allows the NJR Centre to monitor the consent processes established in units at a given time, which is a more useful indicator of performance.

When measured against date of operation, it is encouraging to see a marked and sustained upward trend in consent rate (Graph 1). However, there is still a long way to go to obtain the consent rate required to allow the NJR to achieve its fundamental aims. See Part 2, Section 4 for further detail.

[2] This weekly submission rate is the average rate over the previous four weeks

[3] For hip and knee replacement procedures that took place between 1 April and 31 December 2003 inclusive and were entered into the NJR database by 31 March 2004

Graph 1: Consent rate based on operation date (MDS v2 data only)



The RACs continuously monitor the submission and consent rates of units under their supervision. Changes in staff or hospital circumstances (especially financial) can result in decreasing levels of input from units that previously have achieved good levels of compliance. Experience shows that the earlier these effects are spotted and followed up by an RAC, supported as necessary by other NJR Centre staff and the RCC, the quicker the difficulties can be resolved and previous performance restored.

Piloting of the NJR Data Integrity Audit process started in February 2005. This process is assisting RACs in helping units to improve the quality of data submitted. The audit process is described in detail in Section 7.5.

Other key activities that the RACs are well placed to support include piloting of the Hip Owner's Manual (from June 2005 onwards) - see Section 6.2, and integrating the PROMS process within selected units in the pilot phase of the PROMS cohort outcomes study - see Section 11. The RACs act as the primary conduit of communication between the units piloting these processes and the NJR Centre. Their knowledge and hands-on experience is invaluable in these projects.

7.5 NJR Data Integrity Audit process

7.5.1 NJR audit aims

The overall aims of the NJR Data Integrity Audit process are to:

- Assess the integrity of the data that a unit submits to the NJR by checking the robustness of the processes within each unit to ensure complete submission of quality data
- Initiate improvement to units' existing processes to increase data completeness and quality

7.5.2 Piloting the audit process

The audit pilot began in February 2005, following approval of the pilot methodology by the NJR Steering Committee. Audit forms were developed and reports created for each hospital on their aggregated responses to a subset of

the MDS v2 dataset. The pilot phase saw the testing of three types of audit:

- Hospital visit audit
- Self-assessment audit
- Senior House Officer (SHO) audit

The rationale for piloting three different types of audit was to allow comparison of the apparent effectiveness of the audit against the units' perception of the (in)convenience to them in performing the audit.

Hospital visit audits entail the relevant RAC visiting the unit. The unit's NJR process is clarified and the report on aggregated operation data is discussed. Training is provided, if necessary. An audit report is written with recommended actions, both for the unit and the RAC/NJR Centre.

Self-assessment audit was only piloted at units where:

- The RAC had recently visited and could confirm the robustness of the unit's NJR processes, i.e.:
  - All procedures were thought to be captured
  - Consent levels were very high
  - The report on the unit's aggregated operation data showed no issues regarding the understanding of MDS v2

An audit report is written by the RAC with recommendations, if any. However, when deemed necessary, the self-assessment has been followed up by a hospital visit audit.

The SHO audit involved a random sample of submitted procedures being compared with the patients' case notes. For each procedure, the SHO was supplied with the patient's hospital identifier, date of operation, procedure type and side of operation. The SHO was required to complete the relevant NJR MDS v2 proforma based on the information found in the patient's notes and return it to the NJR Centre. The two datasets - the SHO generated dataset and the data record held in the NJR database - were to be compared for consistency.

As at 15 July 2005, the following number of audits had been initiated and completed:

- 98 hospital visit audits had been initiated and 53 reports completed
  - These audit visits highlighted the importance of face-to-face interactions with a wide range of staff. They allow problems to be tackled in a hands-on manner, and 'hidden' issues to be identified more easily than via phone or email contact
- 41 self-assessment audits had been initiated and 18 reports completed
- 5 SHO audits had been initiated and feedback from 3 units had been received
  - The value of this style of audit was appreciated, but not necessarily in the existing format
  - The RCC network supports the continuation of SHO audits and is working with the NJR Centre to rework the format of SHO audits and pilot them in selected hospitals later in the year

The feedback from the units being audited was positive. They appreciated the feedback on the quality and completeness of data they had already submitted and were keen to implement recommended improvements/changes to their current NJR processes to improve quality and completeness.

The results of the pilot were sufficiently positive for the Steering Committee to endorse continuation of the NJR Data Integrity Audit process through site visits and the proposed new format of SHO audits.

Hospital visit audits

"I have found it very helpful and encouraging that the work carried out here at Neath Port Talbot Hospital is moving in the right direction and it was very satisfying to hear that my efforts to 'get everyone on board' here have been fruitful.

Equally the hints and advice given to me during and after the audit visit have been very helpful - all I need is time to put recommendations into place."

Theresa Worth - Surgical Care Practioner, Neath Port Talbot Hospital, Bro Morgannwg NHS Trust

"I feel that the audit has been useful in highlighting problem areas, both within the Trust and on the NJR side. It was also useful for us to have the chance to meet with you and especially that your visit coincided with an Orthopaedic Audit meeting, so that an opportunity was provided for you to discuss issues when all the consultants, registrars, etc. were together. Also, Margaret Byrne and I are pleased that you have included the comments we made on the data entry system; hopefully, if similar comments are made by people in other Trusts, it may enable the NJR to make changes which will benefit all concerned with data entry, etc."

Note: The NJR Centre has since acted on the feedback received about the data entry system.

Georgina Stockwell - Secretary to Matron for Surgery & Orthopaedics and Hospital Data Manager, Queens Hospital, Burton

SHO audits

"The SHO audit for the NJR is a stress-free procedure and SHOs should be able to work through the forms without any problems. Audit is a requirement of an SHO rotation. It's far more beneficial that they carry out a useful and 'real' audit on the NJR rather than us taking time to construct a test audit activity. I am happy for the next SHO on rotation to carry out the NJR-related audit again in 6 months' time."

Mr Molitor - MS FRCS Consultant Orthopaedic Surgeon, North Lincolnshire & Goole NHS Trust

7.6 Progress in data submission and consent rates in 2005

7.6.1 Patient Consent Initiative vs Data Integrity Audit

It is impossible to fully distinguish between the effects of the Patient Consent Initiative and those of the Data Integrity Audit process, particularly where PCI activity has identified that a hospital should receive an early audit or, conversely, that an early audit has highlighted particular concerns with a hospital's NJR patient consent processes.

Bearing in mind the above caveat, it has been calculated that there has been a 6% increase in NJR compliance during FY2005/06 Qtr 1 (i.e. numbers of records submitted versus numbers of records expected to be submitted). Also, 34 hospitals that were identified as being the poorest in terms of obtaining NJR patient consent have been key targets for the RACs. This list was compiled in relation to data submitted between 1 April and 6 May 2005. Progress was measured against a second comparison period, from 6 June to 11 July 2005. Consent rose from 33% to 49% for the 34

hospitals (a rise of 16%), while the consent rate for the NJR as a whole rose from 65% to 71% during the same period (a rise of 6%).

7.6.2 Importance of the NHS number

As emphasized in Section 7.3, the ability to achieve the main aims of the NJR relies on the need to collect linkable operations. A patient operation history is obtained by being able to link all of their NJR-related operations (primaries, re-operations and revisions). Linkage is via the patient's NHS number. This can only be available if a patient has given their consent. Even then, it is not a mandatory field as the information is not always readily available in a unit, particularly in the independent sector. Providing sufficient and accurate other patient identifiers are provided, missing NHS numbers can be obtained from the National Strategic Tracing Service. However, missing and inaccurate data mean that a considerable number of NHS numbers cannot be traced. So the optimum solution is: to maximise patient consent => maximise collection of complete and accurate NHS numbers within units => maximise collection of complete and accurate other patient identifiers within units, particularly the postcode as this is a critical link for obtaining missing NHS numbers.

The RAC team has focused effort on increasing the submission of NHS numbers and an upward trend can be seen in Graph 2. Although positive, this is not sufficient and steps are being taken to obtain authorisation to make the postcode mandatory, where patient consent has been obtained.

7.6.3 Progress at the unit level

To establish a clear view of progress made by trusts, hospitals and treatment centres in terms of data submission and patient consent rates, the Steering Committee agreed that relevant statistics should be published in this, the 2nd Annual Report. A full breakdown of the statistics is available in Appendix 5 in three tables covering:

- NHS hospitals and treatment centres in England
- NHS hospitals in Wales
- Independent sector hospitals and treatment centres

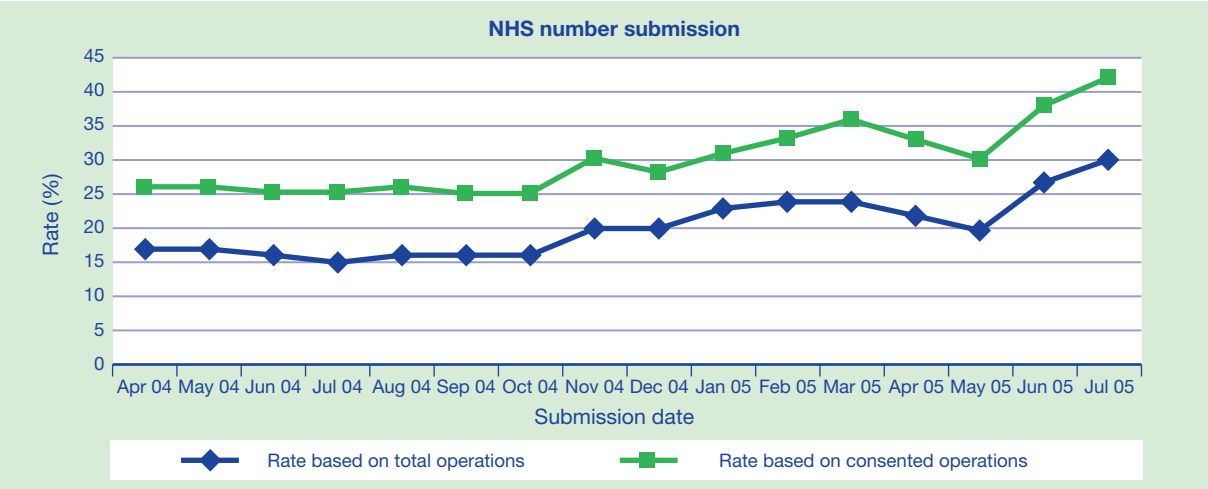
The breakdown is at the level of individual hospitals and treatment centres, except for comparison against HES figures for the NHS sector in England, which is at trust level.

Calculating the statistics

For this assessment of progress, compliance with the NJR has been measured by taking into account both the data submission rate and the patient consent rate.

The data submission rate is calculated by comparing the number of records actually

Graph 2: NHS number submission (MDS v2 data only)



submitted to the NJR with the number of records expected (i.e. Hospital Episode Statistics (HES)/Patient Episode Database Wales (PEDW) data for the NHS in England and Wales respectively, and 'expected number of records' figures for the independent sector). The patient consent rate is the percentage of records submitted with patient consent.

The patient consent rate has been included as a total for 2004 and to illustrate progress comparative figures are included for the first quarter (1 January to 31 March inclusive) and second quarter (1 April to 30 June inclusive) of 2005.

General trends

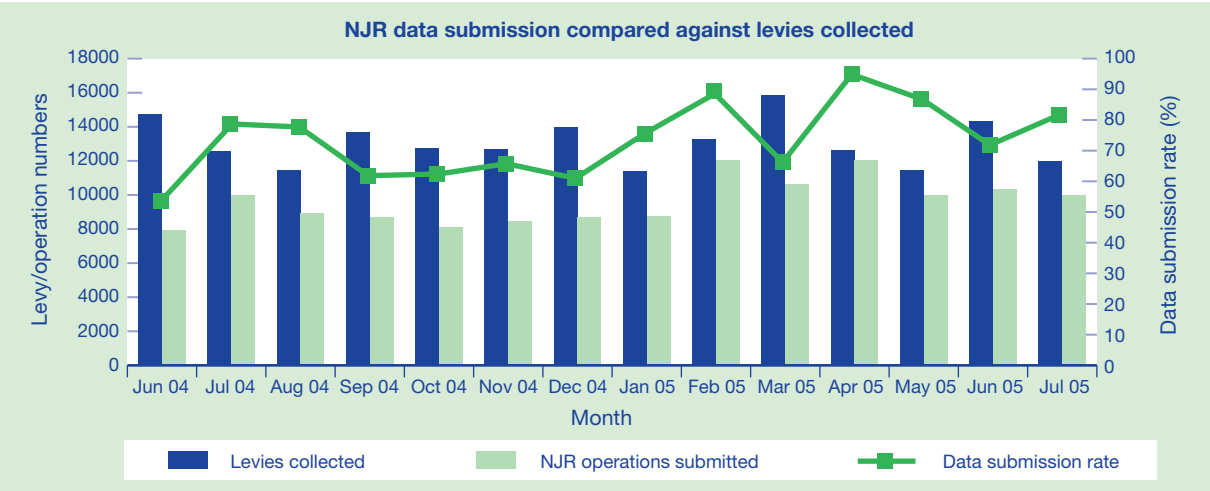
Graph 1 (Section 7.4) shows an overall positive trend in the consent rate, and that it has increased consistently every month since March 2005. However, looking at the statistics at the level of individual units (see tables in Appendix 5) indicates that the picture is more complex. Although it would be unwise to read too much into these statistics, a general assessment of the tables indicates that there are no specific trends evident in the data. Fluctuations in the percentage of records submitted with patient consent are frequent and there are a number of underlying factors that could influence the peaks and troughs. Close contact with hospitals has shown that these factors can include:

- Staff turnover - leaving a unit or being allocated new duties at short notice and much of the 'corporate knowledge' of the NJR process leaving with them
- Staff holiday or sick leave - often one person or a very small team may be responsible for the collection and submission of NJR data. Planned or unexpected leave can have an adverse effect on data submission in that period
- Changes in hospital procedures - at data collection and/or data entry stages
- Input of older records collected prior to an NJR consent process being embedded within a hospital
- Some hospitals - particularly those with lower volumes of NJR procedures - submitting data only when they consider that a sufficient batch of records has built up (perhaps two or three times a year)

7.6.4 Comparison of data submission vs levies collected

An alternative method for assessing completeness of data submission is to compare the number of levies collected from purchasers of implants in a given period against the total number of procedures entered into the NJR. Graph 3 illustrates both levy and procedure volumes, and data entry rate.

Graph 3: NJR data submission levels compared against levies collected



7.6.5 Current linkability of records

In Part 2, Section 4.4, the total percentage of linkable procedures for 2004 is estimated as A x B x C, where:

A = % of NHS procedures[4], recorded in HES/PEDW, that were entered into the NJR ('case ascertainment')

B = % of those procedures entered for which NJR consent was obtained (consent rate)

C = % of those procedures where the patient gave consent for which NHS numbers were available

Allowing for the apparent similarity between case ascertainment calculated by comparison with HES/PEDW and that calculated by comparison with levy payments, it appears reasonable to estimate 2005 linkability - as it stands in mid 2005 - by calculating the product of:

$A_{Mid\ 2005}$ (%) = [average monthly number of operations with operation date within the period 1 January to 30 June 2005 inclusive and entered into the NJR database before 1 August 2005 / average monthly levy return for the year 1 July 2004 to 30 June 2005 inclusive] x 100

B (%) = average monthly consent rate for 1 January to 30 June 2005 inclusive

C (%) = average monthly NHS number rate for 1 January to 30 June 2005 inclusive

Calculating A - Case ascertainment

Number of operations with operation date in first 6 months of 2005 (i.e. 1 January to 30 June 2005 inclusive) and submitted before 1 August 2005 = 54,701

Monthly average of operations in first 6 months of 2005 = 9,117

Average monthly levy for 12 months period, 1 July 2004 to 30 June 2005 = 13,045

Therefore, $A_{Mid\ 2005}$ = 69.9%

Note: The reader should note that the figure of 69.9% relates to a point in time that was only one month beyond the end of the operation period being considered. So only one month beyond the end of period was allowed for outstanding records to be submitted. This compares with the two months allowed at the end of 2004 (i.e. to 28 February 2005) for data to be submitted and included in Part 2 analyses. Also, hospitals were actively encouraged to submit their 2004 data by the end of this two month window. At this mid stage of 2005, there have been no similar communications related to 2005 data. Case ascertainment of approaching 80% might have been expected if both of these measures had been introduced. This is similar to the value at 1 August 2005 for all operations submitted in 2005, that is, with an operation date between 1 April 2003 and 30 June 2005.

Calculating B - Consent rate

Of the 54,701 submitted records referred to above, 54,127[5] were potentially available for providing to the National Strategic Tracing Service. Of these, 38,500 records were consented and so could be sent to NSTS to obtain missing NHS numbers and correct erroneous NHS numbers where sufficient and accurate other patient identifiers are provided (see Section 7.6.2).

B = [38,500 / 54,127] x 100 = 71.1%

Calculating C - NHS Number

Of the 38,500 records submitted with patient consent, 27,632 had an NHS number or an NHS number was subsequently traced using NSTS.

C = [27,632 / 38,500] x 100 = 71.8%

[4] An estimate of overall case ascertainment (NHS and independent sectors combined) can be obtained by comparing the number of hip and knee procedures in the NJR with the total number of levies collected from hospitals. When calculated for 2004 data in Part 2 of the report, this gave an estimated overall case ascertainment identical to that calculated for the NHS via HES/PEDW comparison, suggesting that case ascertainment in the independent sector is similar to that in the NHS

[5] The difference of 574 records is due to the data download taking place during a working day (when 54,127 relevant records were held). A further 574 records were submitted by 12 midnight but these were received after the consented records in the downloaded dataset were prepared for sending to NSTS

Calculating the linkability percentage

Linkability percentage $_{\text{Mid 2005}}$ is therefore:

$A_{\text{Mid 2005}}$ x B x C = 69.9% x 71.1% x 71.8% = 35.7%

based on operations that took place between 1 January and 30 June 2005 inclusive, and that were entered into the NJR before 1 August 2005.

This shows a marked improvement in linkability at the midpoint of 2005, when compared with the linkability percentage for 2004 of 27% and for 2003 of 21% (see Part 2, Section 4.4).

Looking to the future

Although the above findings are encouraging, there is still a long way to go and more radical ways of addressing data submission and patient consent issues are being examined by the NJR Steering Committee and the NJR Centre.

8 Developments in data reporting

8.1 Data retrieval and PKI development

From Summer 2005, the introduction of a PKI Hardware Security Module (HSM) allows for secure on-line user verification, enabling surgeons to retrieve patient identifiable data on-line from the NJR database.

The aim of this development is to provide surgeons with on-line access to encrypted case and personal data that was previously available only through an off-line decryption process. The existing password authentication process is retained. When authorised users access encrypted data it is read from the database, decrypted on the HSM and presented on screen.

This development is a further example of the NJR's functionality being adapted to meet specific user requirements in direct response to feedback received from surgeons, including members of the RCC network.

8.2 NJR stakeholder reporting

8.2.1 Phase 1 of stakeholder survey

For the NJR to improve patient outcomes, it is essential that relevant information is available to, and widely used by, all stakeholders. The NJR is working with stakeholder groups to identify their requirements and enable them to obtain the information they need quickly, easily and in a convenient format.

To establish the full range of NJR reporting requirements, the NJR stakeholder landscape has been reviewed and stakeholder groups invited to participate in a survey of their information and data requirements.

Stakeholder groups taking part in the first phase of the survey were:

- Surgeons
- Hospital managers
- The NHS Purchasing and Supply Agency (PASA)

- The Orthopaedic Data Evaluation Panel (ODEP - part of PASA)
- The Medicines and Healthcare products Regulatory Agency (MHRA)
- Suppliers and manufacturers of orthopaedic components

The survey was conducted through questionnaires, workshops and face-to-face interviews. Members of each group were invited to specify:

- The content of 'standard' reports for each stakeholder group
  - These are the regular reports, with costs covered by the levy, that provide the routine information required by the group members
- Their preferred reporting mechanism
  - Including format, delivery channel (web, e-mail, paper etc) and frequency
- Any additional reporting requirements (the costs of which would not be covered by the levy)

The outcome of the survey (summarised in Table 1) indicated that all stakeholders had an immediate need for information to:

- Meet audit and governance requirements
- Inform planning and budgeting
- Ensure compliance with regulatory requirements
- Benchmark performance

Table 1: NJR information requested by stakeholders

Issue/theme	Stakeholder group	Examples of information requested
▮ Outcomes	▮ All	▮ Revision rates ▮ Survivorship ▮ Mortality rates ▮ Complications ▮ Patient satisfaction
▮ Factors affecting outcomes	▮ All	▮ Patient demographics ▮ Implant type ▮ Procedure (technique, indications, complications) ▮ Post-operative events
▮ Meeting audit/governance requirements/ planning and budgeting ▮ Checking consistency with own data ▮ Cost effectiveness, value for money, efficiency	▮ Hospital management ▮ Surgeons ▮ Suppliers ▮ PASA	▮ Number of procedures, at hospital and individual level, by type, including: – implant data – date of procedure – technique – use of facilities
▮ Compliance with regulatory requirements ▮ Implant usage and effectiveness	▮ Hospital management ▮ MHRA ▮ ODEP ▮ Suppliers	▮ Numbers of procedures by: – type – implant data, (implant usage and effectiveness/performance) – surgical practice
▮ Performance measurement, monitoring and benchmarking	▮ MHRA ▮ PASA/ODEP ▮ Hospital management ▮ Surgeons ▮ Suppliers ▮ Patients	▮ Numbers of procedures by: – type – implant data, (implant usage and effectiveness/performance) – surgical practice
▮ Research	▮ Surgeons ▮ Hospital management ▮ Suppliers	▮ Numbers and details of procedures

In the longer term, all stakeholders considered reporting of outcomes to be of the highest importance. It was recognised, however, that reliable outcome data may not start to be available from the NJR before 2007. In the interim, the NJR is working with the Royal College of Surgeons and NOPAG to develop and agree methods that will ensure future analysis and reporting of outcomes is accurate and robust.

8.2.2 Phase 1 of stakeholder reporting

The survey revealed much common ground between stakeholder groups in terms of their proposed use of NJR data, but it also indicated that each group required information tailored to the particular needs of its members. It is evident that there is considerable scope to encourage and facilitate the use of NJR data by developing standard reports that add value for stakeholders by presenting information in ways that are appropriate for each group. To this end, the NJR is developing a portfolio of standard reports, beginning with reporting for:

- Hospital managers
- NHS PASA
- Manufacturers and suppliers
- Surgeons

Initially, these reports have been designed to provide the information requirements of each particular group as identified through the survey. These initial versions are being reviewed with the relevant stakeholders to ensure they fully meet their needs and are of lasting value and relevance.

Access to standard reports will be through a password-protected, secure area on the NJR website, in keeping with the desire of the majority of stakeholders to receive the reports electronically. Each report will be updated on a regular basis. Initially this will be done quarterly (late October 2005, January 2006). This will enable stakeholders to become familiar with, and provide feedback on, the reports without becoming overloaded with data. In addition, it will provide the NJR Centre with sufficient opportunity to incorporate stakeholders' feedback.

The frequency of reporting will be reviewed in consultation with stakeholders over the period to March 2006 and updated to reflect users' evolving needs as appropriate.

8.2.3 Reporting to support surgeon appraisal

Surgeons have always been able to access any data they enter into the NJR. Recent developments in IT (described in Section 8.1) have improved the data retrieval mechanism, making it easier and simpler for surgeons to obtain the information they need. In addition, the specific reporting requirements of surgeons have been identified through their participation in the first phase of the NJR survey of stakeholder reporting requirements (as described in Section 8.2.2).

A second dimension of surgeon reporting addresses surgeon appraisal. In the NHS, all surgeons in England and Wales undergo an annual appraisal with a senior manager - often the clinical director - of the hospitals or treatment centres where they practise. The appraisal has several parts, one of which requires the surgeon to provide evidence to support their record of good medical practice.

Feedback from surgeons included in the first phase of stakeholder consultations identified a demand for evidence to support the annual appraisal process. The NJR is working with the surgical profession to design and develop a tailored report that would provide orthopaedic surgeons with the information they need to complete the part of the appraisal relating to good medical practice for hip and knee replacement procedures in a single, convenient step.

Initial discussions have focused on providing information to a surgeon that would constitute:

- Evidence of participation in the NJR
- Evidence that their performance was consistent with current national good practice, including for example:
  - Workload and caseload
  - Case mix (hips/knees/revisions)

Reporting for surgeons

"Surgeons have been submitting their data to the NJR for over two years and they are now keen to get something back. The NJR has information on surgical techniques, implant selection and NICE compliance that may provide individual surgeons with a description of their own practice and national data for comparison. This feedback may assist annual appraisal, facilitate clinical governance and improve NJR compliance."

Martyn Porter - President of the British Hip Society, BHS representative on NJR Steering Committee and NJR Regional Clinical Co-ordinator

- Patient demographics
- Default techniques and variations
- Choice of prostheses (are they compliant with NICE guidance?)
- Re-operations/readmissions/unusual occurrences
- Lead and non-lead practice

Confidentiality of patient information is of paramount importance to the NJR. To support surgeon reporting while maintaining data security, a PKI solution has been implemented (see Section 8.1) that ensures each surgeon only has access to their own data. In addition, to accommodate the increasing demand for information from the NJR, a data warehouse has been established that will enable the system to respond more quickly to user requests.

With these IT solutions in place, the appraisal reports are currently being piloted and it is expected that they will be available in an agreed format via the NJR website in time for the 2006 appraisal round.

8.2.4 Phase 2 of stakeholder survey

The first phase of the NJR consultation on stakeholder reporting focussed on those groups having a direct, immediate and continuing involvement with the NJR. The second phase of the consultation has been launched with the aim of engaging the wider regulatory framework, commissioners of healthcare services and those stakeholders with a lesser direct involvement in the early stages of the NJR but who will benefit by being able to obtain the information they need from the NJR to make informed decisions.

Stakeholder groups involved in the second phase include:

- The Healthcare Commission
- The National Institute for Health and Clinical Excellence (NICE)
- Strategic Health Authorities (SHAs)
- PCTs
- GPs
- Patient organisations - including Patient & Public Involvement in Health (PPIH) Forums
- British Orthopaedic Association Patient Liaison Group (BOA PLG)
- Intermediaries - e.g. Arthritis Care
- All Wales Community Health Councils (CHCs)

It is recognised that SHAs may play a valuable role in communicating information from the NJR to the hospitals and treatment centres in their region. Many SHAs have established orthopaedic networks to share good practice. Such networks represent an important conduit to publicise the work of the NJR and to communicate information to practitioners.

From the NJR's perspective, the views of representative patient organisations, GPs, CHCs and intermediaries will help establish how information, beyond that already available through NJR StatsOnline, might be provided to support patient choice.

The second phase of consultation is in progress. The results are expected towards the end of 2005, with tailored reports being piloted early in 2006.

8.3 NJR StatsOnline

NJR StatsOnline is a web facility for viewing and downloading NJR statistics and has been developed as part of the NJR website. This resource was launched on 3 May 2005 and initially made data available for NHS hospitals and treatment centres in England and Wales.

Data for independent hospitals and treatment centres was made available from 4 July 2005. This was assisted by the efforts of the Independent Healthcare Forum, who obtained the agreement of all their members for their data (as described below) to be made available on NJR StatsOnline at an individual unit level. It is understood that this is the first time that independent sector data has been voluntarily released in this way and it is viewed as a positive endorsement of the NJR.

Data is now only excluded from NJR StatsOnline for a very small number of independent hospitals that have not yet confirmed their agreement to making their data openly available.

Hospitals are now able to compare their own NJR statistics with those from other hospitals in the same NJR region or NHS trust. NJR StatsOnline should also help hospitals and treatment centres assess whether they have submitted all relevant hip and knee replacement operations to the NJR. This web facility also allows patients to look up how many hip and knee replacement operations have been registered on the NJR by their local hospital or treatment centre.

NJR fact

Since the launch of NJR StatsOnline on 3 May 2005, there have been 2,500 downloads of CSV files of data from the NJR website. **[as at 15 August 2005]**

NJR StatsOnline

"NJR StatsOnline is a helpful and easy-to-use tool that encourages patients to access information about the participation in the NJR of hospitals in their area. The map search facility allows current data to be at a patient's fingertips instantly."

Terry Garrett - British Orthopaedic Association, Patient Liaison Group

The statistics currently available include the:

- Total number of operations submitted to the NJR
- Number of hip procedures
- Number of knee procedures
- NJR patient consent rate (% of submitted records that have NJR patient consent)

Data is provided for whole calendar months and updated on a monthly basis. Summary data tables are also available.

Statistics can be found by searching:

- For a named hospital (or treatment centre)
- By NJR region - this will list all the NHS hospitals and treatment centres in the region of your choice
- By NHS trust - this will list all the NHS hospitals and treatment centres in the Trust
- By independent healthcare provider organisation

This is the first phase of development for NJR StatsOnline; its content will evolve over time, taking account of user feedback. Early feedback from hospitals shows that the existence of NJR StatsOnline and the fact that it is accessible to all has:

- Considerably increased awareness of the NJR
- Been a valuable tool to gain senior management support for the NJR

- Encouraged hospitals to take necessary actions to improve their data submission and consent rates

Additional information will be made available in the coming months. The NJR Centre will manage the development of NJR StatsOnline to maintain clarity and ease of use as the quantity of data being made available grows.

8.4 Responding to enquiries

The NJR Centre predominantly receives enquiries via the NJR Helpline and the RAC network. The NJR website also provides users with a facility to register their queries and provide feedback.

Media enquiries received by the NJR Centre are either managed directly, or passed to the Department of Health and Welsh Assembly Government as appropriate.

8.4.1 NJR Helpline

The Helpline manages the majority of enquiries directly, especially those of a more general nature. When queries are more technical or specialised they are directed to specific individuals within the NJR Centre as appropriate.

The NJR Helpline mainly receives phone calls from hospital staff who use the Data Entry System. In the main, the Helpline receives very few calls from the general public, although, the mailings that formed part of the PROMS interim study (see Section 11) prompted more Helpline enquiries from this stakeholder group. (Helpline staff were specifically briefed to be able to handle the types of calls that the study generated.)

8.4.2 RAC network

RACs have established direct links with key contacts in each of the hospitals in their regions, hence they are well placed to manage enquiries specific to a particular hospital.

Direct contact with the RACs is promoted via NJR publications and communications, and RAC contact details are also made available via the Helpline and the NJR website.

8.4.3 Types of enquiries

The majority of Helpline calls relate to Data Entry System user accounts. For example, the Helpline registers new users on the NJR system and provides them with their user ID and passwords once the appropriate authorisation has been established. The most frequent type of call, however, is where a user has forgotten their password. In this instance, the Helpline will confirm their user ID and reset their memorable data and password on their behalf.

The Helpline also receives enquiries from hospital staff who have particular data entry queries. Helpline advisers use a 'duplicate' system (a system that mirrors the 'live' system) to work through individual user data entry queries. This means that they can help the user work through data entry difficulties step-by-step. The RACs receive similar enquiries and where necessary provide training on the use of the NJR Data Entry System, by phone, email or by visiting the hospital.

The RACs also manage the more detailed queries from hospitals regarding the local implementation of the NJR within their own hospital systems and processes. RACs can draw on assistance from other members of the NJR Centre as required, for example, where specialist orthopaedic knowledge or IT support and guidance is needed.

Increasingly the NJR Centre is receiving requests for data. To date, the NJR Centre has responded to requests on a case-by-case basis seeking Steering Committee and Department of Health/Welsh Assembly Government approval where appropriate. However, the evolving stakeholder reporting strategy is likely to reduce the number of ad-hoc requests for data. (Requests for access to data for research purposes is referred to in Section 10.)

9 NJR Outlier Performance Advisory Group (NOPAG) - early work

9.1 What is outlier performance?

A broad definition of an outlier is an observation that lies outside the expected or usual distribution of the total observations. Outliers are essentially observations that deviate from the normal expectations. There can of course be exceptions to the rule that would naturally fall outside the normal expectations. Detecting outliers is not a simple procedure and assumptions cannot be made about all outliers as there may be a number of extenuating circumstances to consider.

9.2 Applying outlier performance to the NJR

In terms of the NJR and the data available, identification of outlier performance will be useful in measuring variables such as prosthesis performance, surgical technique, surgical unit (hospitals and treatment centres) performance and individual surgeon performance. It is in the interest of patients, surgeons, implant manufacturers and other stakeholders that such assessments are made. The ultimate aim is to enable outlier performers to be detected at the earliest possible date whilst at the same time setting 'trigger levels' to avoid an unreasonable number of false positives being identified but not missing genuine outlier performance.

The intention is then to:

- Identify the apparently poorer performing prostheses, surgical techniques, surgical units and surgeons
- Take appropriate steps to determine whether this is genuine under-performance or if there are extenuating circumstances. In relation to surgeon performance, it will be essential to take full account of case mix and other relevant factors
- Pursue the required protocols - sets of separate protocols will be drawn up to cover outlier prosthesis, surgical technique, hospital and surgeon performance - and review actions taken and their outcomes

In doing so, stakeholders can learn from experience and take steps to modify procedures, equipment, care pathways or designs as appropriate.

9.3 Application of continuous monitoring methods

Initial investigations have been carried out to assess various methods of continuous monitoring and their application to NJR data. The Royal College of Surgeons' Clinical Effectiveness Unit will be presenting a paper at the BOA Annual Congress in September 2005 that introduces continuous monitoring methods, and describes their trial application to a dataset of patients who had received a 3M Capital Hip in the 1990s (i.e. pre-NJR) to assess the value of the CUSUM (cumulative sum) monitoring method.

Identifying outlier performance will be an increasingly important role for the NJR in years to come. At this stage in the Registry's development, the data held on the NJR database covers a limited time period and the linkability of records is less than optimal (see Part 2, Section 4) - there is some way to go in terms of reaching peak value in terms of highlighting trends over time. However, it is important that NOPAG takes a long-term perspective and initiates monitoring systems that can be established now and that will track outlier performance into the future.

9.4 Gaining the support of stakeholders

Application of any monitoring of NJR data will only be successful if it is fully accepted by the vast majority of stakeholders, both at the individual level and that of their representative bodies. These organisations must be fully engaged in developing systems and processes that their members will accept as being fair and equitable. They must be capable of being applied even-handedly regardless of sector (NHS or independent), size/type of unit, whether or not a surgeon is permanently UK-based and

so on. It is also important that patients and public - the NJR's ultimate stakeholders - understand and have confidence in what is proposed.

9.5 Narrowing the initial focus

It is clear that NOPAG's potential remit is very wide and hence progress could be slow if work was carried forward on all fronts simultaneously. It was agreed with the former Health Minister, Lord Warner and the BOA that the initial focus should be on agreeing a procedure with the BOA that would be followed if monitoring of data held by the NJR identifies a surgeon with outlier performance. This positive initiative would help to build confidence amongst patients whilst ensuring that all relevant circumstances are taken fully into account. The initial meeting is scheduled for August 2005.

Work is continuing on setting out the aims of NOPAG in terms of priorities, and determining the order in which they are to be addressed, suitable targets and associated delivery schedules.

9.6 Accentuating the positive

In all of the above, the importance of identifying and making use of positive outlier performance must not be forgotten. Much of the NJR's value comes from identifying and sharing good practice across England and Wales, whether it be related to surgeon, surgical technique, hospital or implant performance. This will be an important feature of the NJR's future work plans.

10 NJR Research Sub Committee (NJR RSC) - early work

Over the coming year the NJR RSC will lay its foundations and set the framework for the future programme for the committee. The exact format of the programme cannot be developed until there are sufficiently well researched indicators of which areas are considered highest priority. At the outset, the NJR RSC identified three key workstreams, which are detailed below.

10.1 Identification of priority areas for research

Prior to initiating a programme of sponsored research it will be essential to carry out an investigation of the research landscape. In doing so this will help the NJR RSC to identify gaps in the landscape and highlight priority areas for research. The final report published following the investigation will be made publicly available.

10.2 Developing a programme of research

The Department of Health has agreed in principle to support a programme of NJR-sponsored research funded by the NJR levy.

Once the NJR has identified priority areas for research, a sponsorship programme will be developed to support proposed research projects/programmes. The NJR RSC recognises that priority areas for research will shift and therefore will build in the necessary flexibility to the programme to cover this.

Setting the programme will involve producing a timetable for calls for research and developing procedures for how calls will be administered.

10.3 Developing protocols for access to NJR data

The NJR RSC agreed that no organisation should be given access to NJR data without suitable protocols, controls and contracts first being in place. A set of data access protocols are therefore under development to ensure that controls are put in place to ensure that access

to NJR data is carefully controlled. In the future, requests for access to anonymised data will be submitted to the NJR via an application form, to be made available on the NJR website. Applications will be considered by the NJR RSC, with recommendations going forward to the NJR Steering Committee for endorsement.

The NJR RSC aims to have a successful system implemented before the end of 2005 to ensure that the research community can access the data required.

10.4 Ensuring the future of the NJR RSC

The future of the NJR RSC in terms of its success in making accurate data available for research and in providing support for the research community is dependent on the overall function of the NJR and the input of quality data. The research supported by the NJR RSC will provide vital indicators to stakeholders of the success of hip and knee replacement. It is therefore also important that the NJR continues to encourage the submission of quality data and to highlight the importance of collecting patient consent.

The NJR RSC will work within strict guidelines concerning conflict of interest issues and will abide by rules governing research ethics. It will regularly review the composition of the sub committee to ensure that all relevant stakeholder groups are represented, particularly in the light of findings from the research landscape work.

The NJR RSC is expected to play a vital role in the future of joint replacement and related research. Use of NJR data for research is one of the significant motivators behind establishing a database of hip and knee replacements and an interesting future lies ahead.

11 Patient Reported Outcome Measurement Studies (PROMS) group - early work

11.1 Interim study

The PROMS interim study, which took place in the first half of 2005, had two main aims:

- To examine how patients viewed the outcome of their joint replacement at least one year after the surgery
- To provide an initial test of the logistics for running a postal patient reported outcomes survey on a cohort of joint replacement recipients whose data had been entered into the NJR database - e.g. What percentage response rate would be obtained?, What levels of completeness would be found in the responses?, How much effort would be required for the various stages of the study?

Analyses were undertaken by the Royal College of Surgeons' Clinical Effectiveness Unit, with the study and its results being described in detail in Part 2, Section 12. In terms of the logistics, the overall response rate was very encouraging - a 75% response to the initial mailing, with a second mailing resulting in a further increase to a total response rate of 88%. In addition, the vast majority of the questionnaires received had been completed accurately.

The NJR Helpline received approximately 200 telephone calls from recipients of the questionnaire. The majority of the questions related to the questionnaire itself, with a small number relating to clinical matters. In the case of clinical enquiries, the caller was advised to contact their GP or consultant.

The interim study has already proved valuable in informing the operational elements of undertaking the more extensive and logistically complex PROMS cohort outcomes study outlined in Section 11.2. The response levels achieved by the interim study also inform the scale required of further studies of this type.

11.2 PROMS cohort outcomes study

In 2004, the PROMS group established the need to conduct a longitudinal cohort study to assess the patient-reported outcomes following hip and knee joint replacement surgery. Longitudinal data, (i.e. collecting baseline data before surgery and outcomes data after surgery), is the only way of providing scientifically sound information on outcome.

The aims of the study are to:

- Determine the predictors of outcome of knee and hip replacements in a representative sample of procedures conducted in England and Wales
- Establish the economic impact of knee and hip replacement procedures

At this stage, it is expected that the full cohort study will entail:

- Collecting longitudinal data on 10,000 hip and 10,000 knee joint replacements from a random sample of surgical units, the sample being designed to be representative of current practice
- Sampling to be stratified on:
  - Hospital type - teaching hospital; district general hospitals (serving populations above and below 500k); specialist orthopaedic hospital; independent hospital; treatment centre (divided into NHS and independent sectors)
  - Geographical location and patient demographics - major city, urban, rural, ethnic mix, age mix
  - Units known to undertake specialist or new procedures (e.g. minimally invasive surgery)
  - Volume of procedures per surgeon within the unit
- Patient self-completion questionnaires being obtained pre-operatively, and at 3 months and 12 months post-operatively
- Questionnaires to include data on pain and function (using Oxford hip and knee scores), Quality of Life (EuroQOL EQ-5D), comorbidity (Arthritis Impact scales) and healthcare utilisation
- Involvement of approximately 150 sites, each contributing 50-100 hip and knee replacements

The cohort outcomes study is much more extensive than the interim study and overcomes that study's main limitation of not collecting any pre-operative data. However, the high level of response to the interim study is an indication of the willingness and enthusiasm of recipients of hip and knee joint replacements to participate in studies that will improve the outcomes for future patients.

The main cohort outcomes study is intended to follow on from a pilot or Phase 1 study. This first phase will involve three or four hospitals, collecting pre-operative and 3-month post-operative data from up to 300 hip and 300 knee patients. It is due to start in August 2005.

12 Examples of other NJR activities

The NJR and its representatives - including the Steering Committee, its sub committees and advisory groups, the RCC and RAC networks and the NJR Centre - are involved in a wide range of regular, ad-hoc, pre-planned and short notice activities. This section provides a few examples of activities that have occurred during the last year.

12.1 NJR response to the Healthcare Commission consultation exercise

The Healthcare Commission's proposals for a new system of assessment that is replacing the star rating system were subject to a 12 week consultation ending in early 2005. The NJR Centre provided a response on behalf of the NJR. This led to an initial informal meeting, with the Commission showing considerable interest in the potential scope for NJR data to support its assessment criteria (for assessing performance against the new core standards). A technical meeting has since been held, where the NJR Centre and the Commission looked in more detail at what data might be of interest, and how it might be used. Work is starting on preparation of a draft information sharing protocol for consideration by the NJR Steering Committee.

12.2 NJR role in the Patient Safety Observatory (PSO) stakeholder group

The National Patient Safety Agency (NPSA) set up the Patient Safety Observatory (PSO) stakeholder group in September 2004. The NJR was invited to join the group in early 2005.

The PSO stakeholder group is a forum for representatives from different organisations who hold information relevant to identifying patient safety risks so that they can work collaboratively through the NPSA's Observatory model. The PSO is starting to draw together information from different sources in new ways to quantify, characterise and prioritise patient safety issues.

Activities of the stakeholder group include advising of new data sets and sources of information relevant to the PSO as they become aware of them, and reviewing the sharing, use and analysis of data and advising on best practice.

The NJR's membership of this group is already proving valuable in building wider awareness of the NJR as well as extending the NJR's network of stakeholders and useful contacts.

12.3 NJR role in the Orthopaedic Data Evaluation Panel (ODEP)

ODEP was established by NHS PASA to provide an independent assessment of the clinical outcomes data, submitted by implant manufacturers, regarding the compliance of brands of total hip and hip resurfacing prostheses with the NICE benchmarks for the effectiveness of different brands of hip prostheses. Of the six members of the ODEP committee, two are also members of the NJR Steering Committee, two are NJR Regional Clinical Co-ordinators and one is the NJR Centre's orthopaedic adviser. This has helped greatly in integrating PASA, ODEP and NJR data to mutual benefit. Full details of the work of ODEP and linkage of ODEP and NJR data is provided in Part 2, Section 8.

Early value of NJR data

"I was very happy to see the NJR begin to collect data back in April 2003 and like many people was not really expecting anything of real use for at least five years. However, I was wrong and I am already impressed by its capabilities. Over the past six months we have been receiving NJR component data enabling us to generate reports for NHS trusts identifying trends in their implant usage. This has allowed the trusts to ensure that they get improved value from their implant contracts.

The NJR's input in to the Orthopaedic Data Evaluation Panel (ODEP) process has also proved of great value. Earlier this year an exercise was undertaken comparing NJR entries with products submitted for ODEP evaluation. The result was that in excess of 60 products were identified as being implanted, but not put forward to ODEP. This NJR input has allowed us to build on the work of ODEP and provide a comprehensive view of hips available on the UK market and their compliance with the benchmarks set by NICE."

Andy Smallwood - NHS Purchasing and Supply Agency (NHS PASA)

13 Looking ahead

As the volume of data collected increases and the range of analyses that can be undertaken grows, attention is already being paid to the timeframe for preparation of the NJR's 3rd Annual Report as well as to the nature of preparatory activities.

For the 1st Annual Report, data included in analyses related to hip and knee replacement procedures that took place between 1 April and 31 December 2003 inclusive and were entered into the NJR database by 31 March 2004.

For the current report, units were allowed until 28 February 2005 to enter data related to procedures carried out in 2004 (and earlier), if they were to be included in analyses.

For analyses of 2005 data, it has been agreed that a deadline of 28 February 2006 should provide an optimum balance between wanting to maximise the entry of 2005 (and earlier) data while also allowing sufficient time to carry out a wider range of analyses and to follow-up interesting initial results. As data submission by units is becoming more timely, it is expected that the vast majority of 2005 data will be submitted within the period 1 January 2005 to 28 February 2006.

Trialling of analyses of interest will take place in Autumn/Winter 2005.

Part 2

Analyses and Interpretation

1 Introduction

Section 2 of Part 2 of this Annual Report summarises the data entered into the NJR in 2004 that have been used to compile this report. In Section 3, the different types of participating orthopaedic units are compared. Section 4 details data completeness, in terms of case ascertainment (the proportion of relevant procedures performed that were entered into the NJR), NJR patient consent rates and NHS number availability. Data completeness in 2004 is compared with that in 2003.

Sections 5 and 6 describe the data on primary hip replacement procedures and primary knee replacement procedures respectively. Included are details of patient characteristics, lead surgeon characteristics, surgical practice and untoward intra-operative events. The different primary procedure types are compared. For primary hip interventions, the operation types are total hip replacement (THR) using cement, THR not using cement, THR with hybrid fixation and resurfacing hip arthroplasty. For primary knee replacement interventions, the operation types are total knee replacement (TKR) using cement, TKR not using cement, TKR using hybrid fixation, unicondylar procedures and patello-femoral replacements. Sections 5.5 and 6.5 look specifically at primary procedures performed on 'young' patients (under 55 years). In discussion sections, comparisons are drawn between 2004 and 2003 results.

Section 7 covers hip and knee revision procedures and other re-operation procedures. In Section 7.5, revision procedures linked to a primary procedure in the NJR database are described.

Types and brands of prostheses used in hip and knee replacement procedures (both primary and revision procedures) are examined in Sections 8 and 9. Section 8 includes a report on how well the different brands of hip prostheses comply with NICE guidelines on primary total hip replacement and hip resurfacing arthroplasty (as evaluated by the 'Orthopaedic Data Evaluation Panel'). Section 10 summarises bone cement and bone substitute use.

The mortality of hip and knee replacement patients is the subject of Section 11, with the focus on 3-month mortality rates.

The final Section summarises the results of the Patient Reported Outcomes Measurements Study (PROMS) survey, capturing views of patients in the NJR database on the outcome of their joint replacement one year after surgery.

2 Number of primary and revision joint replacement procedures (hip and knee) in the NJR

Table 1 describes the joint arthroplasties included in this 2nd Annual Report. These are procedures from the 2004 data collection period, defined as joint replacements performed from 1 January 2004 to 31 December 2004 inclusive and entered into the NJR by 28 February 2005. The 2004 data comprised a total of 93,885 joint replacements. This corresponds to an average of 7,824 procedures per month. For the 2003 data (described in the 1st Annual Report) that included arthroplasties performed during the nine-month period from 1 April 2003 to 31 December 2003 and entered by 31 March 2004, the monthly average was 5,200 procedures.

48,987 (52%) of the procedures in the 2004 data were performed on hips and 44,898 (48%) were performed on knees. This hip/knee division is close to that found for 2003 data (53% hips/47% knees). The percentage of arthroplasties entered in the 2004 period that are revision operations (6.9%) is also similar to that in the previous period (7.0%).

Table 1 - *Hip and knee replacement procedures carried out in England and Wales from 1 January 2004 until 31 December 2004 and entered into the NJR database by 28 February 2005, according to country, type of procedure, provider type and funding*

	Hips		Knees		Total	
	Number	(%)	Number	(%)	Number	(%)
Country						
England	47,427	(96.8)	43,603	(97.1)	91,030	(97.0)
Wales	1,560	(3.2)	1,295	(2.9)	2,855	(3.0)
Type of procedure						
Primary	44,262	(90.4)	42,791	(95.3)	87,053	(92.7)
Revision	4,516	(9.2)	1,966	(4.4)	6,482	(6.9)
Re-operation other than revision	209	(0.4)	141	(0.3)	350	(0.4)
Bilateral[1]	140	(0.3)	293	(0.7)	433	(0.5)
Unilateral	48,707	(99.7)	44,312	(99.3)	93,019	(99.5)
Type of treatment provider						
NHS hospital	**30,990**	**(63.2)**	**29,592**	**(65.9)**	**60,582**	**(64.5)**
NHS funding	26,965	(55.0)	25,994	(57.9)	52,959	(56.4)
Independent funding	1,276	(2.6)	692	(1.5)	1,968	(2.1)
Unknown funding[2]	2,749	(5.6)	2,906	(6.5)	5,655	(6.0)
Independent hospital	**16,203**	**(33.1)**	**13,333**	**(29.7)**	**29,536**	**(31.5)**
NHS funding	4,105	(8.4)	4,969	(11.1)	9,074	(9.7)
Independent funding	10,352	(21.1)	6,766	(15.1)	17,118	(18.2)
Unknown funding[2]	1,746	(3.6)	1,598	(3.5)	3,344	(3.6)
NHS treatment centre	**1,118**	**(2.3)**	**1,186**	**(2.6)**	**2,304**	**(2.5)**
NHS funding	1,065	(2.2)	1,136	(2.5)	2,201	(2.3)
Independent funding	3	(0.01)	1	(0.002)	4	(0.004)
Unknown funding[2]	50	(0.1)	49	(0.1)	99	(0.1)
Independent treatment centre	**676**	**(1.4)**	**787**	**(1.8)**	**1,463**	**(1.5)**
NHS funding	627	(1.3)	731	(1.6)	1,358	(1.4)
Independent funding	41	(0.1)	41	(0.1)	82	(0.1)
Unknown funding[2]	8	(0.02)	15	(0.03)	23	(0.02)
Total	**48,987**		**44,898**		**93,885**	

3 Description of orthopaedic units in England and Wales

Table 2 overleaf shows the number of participating hospitals and treatment centres, in both the NHS and independent sector. As in the 1st Annual Report, a participating hospital is defined as having entered at least one hip or knee procedure into the NJR during the data collection period. 381 centres in total participated in the 2004 data collection period, an increase of 41 centres compared to the 2003 data collection period. The participation rate for independent hospitals was higher than for NHS hospitals (99% of independent hospitals entering procedures versus 90% of NHS hospitals).

The different types of treatment providers (hospitals versus treatment centres and independent sector units versus NHS units) are compared in tables 3 and 4. Joint replacement patients in the independent sector tended to have a better physical status[3] than those in the NHS sector, with larger proportions of patients having a physical status of 'fit and healthy' and smaller proportions with a physical status of 'incapacitating systemic disease'. Those undergoing operations in independent treatment centres tended to have the best physical status, where patients were classed as 'fit and healthy' for 40% of hip procedures and 36% of knee procedures.

[1] Bilateral operations are counted as two procedures in the NJR database. Therefore, while 433 bilateral operations were performed overall, these are counted as 866 procedures in other areas of the table. Then total number of procedures = total number of unilateral procedures + (2 x total number of bilateral operations)

[2] Type of funding was an optional question. Where funding is classed as unknown this question was not answered by the centre registering the procedure

[3] Patient physical status according to American Society of Anaesthesiology scoring system (ASA grade)

Table 2 - *Total number of hospitals and treatment centres in England and Wales able to participate in the NJR and proportions actually participating in 2004*

	Total in England and Wales[4]	Participating in the NJR in 2004[5] (%)	
NHS hospitals	**228**	**205**	**(89.9)**
England	212	191	(90.1)
Wales	16	14	(87.5)
Independent hospitals	**168**	**166**	**(98.8)**
England	162	161	(99.4)
Wales	6	5	(83.3)
NHS treatment centres	**9**	**7**	**(77.8)**
England	9	7	(77.8)
Wales	0	0	-
Independent treatment centres	**3**	**3**	**(100.0)**
England	3	3	(100.0)
Wales	0	0	-

12% of hip procedures and 5% of knee procedures in NHS hospitals were revision operations. This represents a larger proportion of the total number of procedures carried out than for the other provider types. Joint replacements performed in independent treatment centres were more likely to be cementless than those performed in other treatment provider types. In NHS and independent hospitals and NHS treatment centres, total hip replacement (THR) using cement was the most common hip procedure type (roughly 50% of all procedures performed). THR not using cement was the next most frequently performed, constituting between 17% and 28% of hip procedures. For independent treatment centres, however, the reverse is seen with 53% of procedures performed being THRs not using cement and 17%, THR using cement.

Total knee replacements (TKR) not using cement were uncommon in NHS and independent hospitals (6.9% and 6.8%) and rare in NHS treatment centres (0.9%) but constituted roughly 1 in 5 knee procedures performed in independent treatment centres. The proportion of operations that were bilateral was highest in independent hospitals. Bilateral operations were rare in treatment centres. 28% of hip procedures and 42% of knee procedures in independent hospitals were funded by the NHS (where funding was reported). Over 90% of joint arthroplasties in NHS hospitals and in both independent and NHS treatment centres were NHS funded.

4 This is the total number of providers able to perform joint replacement and thus able to participate in the NJR, not the total number of providers in the sector/country. Providers are excluded if, for example, they do not have an orthopaedic unit. Note also that this table refers to 2004 and numbers of providers able to participate may now (in 2005) be different. For example, in 2004 there were only 3 independent treatment centres able to participate. The number of independent treatment centres has since risen as more have opened post December 2004

5 Participating in 2004 implies that the hospital entered at least one procedure for the 2004 data collection period i.e. the hospital entered by 28 February 2005 at least one procedure performed from 1 January 2004 to 31 December 2004 inclusive

6 Patient physical status according to American Society of Anaesthesiology scoring system (ASA grade)

7 It is unlikely that so many patients will have been of physical status P4 or P5 before surgery. Hence, for procedures with patient ASA grade P4 or P5 this data item may have been mis-entered

8 A hybrid is a procedure where the femoral prosthesis is cemented and the acetabular prosthesis is not cemented. In a reverse hybrid procedure, the acetabular prosthesis is cemented whilst the femoral prosthesis is not cemented.

9 Revision entered into NJR using MDS version 1 which did not distinguish between different types of procedures

10 Only entered using MDS version 2 so numbers given may not reflect the true proportions performed in each centre type

11 Bilateral operations are counted as two procedures in the NJR database. Therefore, while 140 bilateral hip operations were performed overall, these are counted as 280 procedures in other areas of the table

12 Based on that subset of procedures entered into the NJR using MDS version 2 and for which the item was recorded. Data item not present in MDS version 1

13 Type of funding was an optional question. Numbers based on a subset of patients for which this question was answered. Numbers where the question was unanswered are given in table 1, categorised as 'unknown funding'

14 Figures for waiting list initiative/patient choice and for tertiary referral should be interpreted with caution as hospitals may have been interpreting the term in different ways when submitting data

Table 3 - *Key patient characteristics and procedure details according to type of orthopaedic unit for hip procedures in 2004*

	Provider Type									
	NHS hospitals		Independent hospitals		NHS treatment centres		Independent treatment centres		Total	
	Number	(%)	Number	(%)	Number	(%)	Number	(%)	Number	(%)
Patient physical status[6]										
P1 - Fit and healthy	8,263	(26.7)	6,123	(37.8)	302	(27.0)	273	(40.4)	14,961	(30.5)
P2 - Mild disease, not incapacitating	17,811	(57.5)	8,895	(54.9)	658	(58.9)	390	(57.7)	27,754	(56.7)
P3 - Incapacitating systemic disease	4,617	(14.9)	1,123	(6.9)	147	(13.1)	13	(1.9)	5,900	(12.0)
P4/P5 - Life threatening or expected to die within 24 hours[7]	299	(0.9)	62	(0.4)	11	(1.0)	0	(0)	372	(0.8)
Procedure type										
Primary procedure	**27,120**	**(87.5)**	**15,379**	**(94.9)**	**1,088**	**(97.3)**	**675**	**(99.9)**	**44,262**	**(90.4)**
Total replacement using cement	15,719	(50.7)	7,555	(46.6)	602	(53.8)	116	(17.2)	23,992	(49.0)
Total replacement not using cement	5,239	(16.9)	3,052	(18.8)	310	(27.7)	356	(52.7)	8,957	(18.3)
Hybrid or reverse hybrid total replacement[8]	3,703	(11.9)	2,188	(13.5)	114	(10.2)	150	(22.2)	6,155	(12.6)
Resurfacing arthroplasty	2,459	(8.0)	2,584	(15.8)	62	(5.6)	53	(7.8)	5,158	(10.5)
Revision procedure	**3,681**	**(11.9)**	**805**	**(5.0)**	**30**	**(2.7)**	**0**	**(0)**	**4,516**	**(9.2)**
Single stage revision	2,150	(6.9)	499	(3.1)	18	(1.6)	0	(0)	2,667	(5.4)
Revision (stage 1 of two-stage revision)	167	(0.5)	16	(0.1)	0	(0)	0	(0)	183	(0.4)
Revision (stage 2 of two-stage revision)	218	(0.7)	22	(0.1)	2	(0.2)	0	(0)	242	(0.5)
Girdlestone excision arthroplasty	40	(0.1)	1	(0.006)	0	(0)	0	(0)	41	(0.08)
Unclassified revision[9]	1,106	(3.7)	267	(1.6)	10	(0.9)	0	(0)	1,383	(2.8)
Re-operation other than revision[10]	**189**	**(0.6)**	**19**	**(0.1)**	**0**	**(0)**	**1**	**(0.1)**	**209**	**(0.4)**
Bilateral or unilateral										
Bilateral[11]	48	(0.2)	91	(0.6)	1	(0.1)	0	(0)	140	(0.3)
Unilateral	30,894	(99.8)	16,021	(99.4)	1,116	(99.9)	676	(100)	48,707	(99.7)
Primary procedure complexity[12]										
Regular primary	18,075	(94.9)	10535	(97.4)	717	(96.6)	577	(98.8)	29904	(95.9)
Complex primary	964	(5.1)	280	(2.6)	25	(3.4)	7	(1.2)	1,276	(4.1)
Funding[13]										
NHS funding	26,965	(95.5)	4,105	(28.4)	1,065	(99.7)	627	(93.9)	32,762	(73.7)
Independent funding	1,276	(4.5)	10,352	(71.6)	3	(0.3)	41	(6.1)	11,672	(26.3)
Waiting list initiative/patient choice[12,14]										
Yes	1,789	(10.1)	2,564	(29.9)	155	(33.8)	367	(66.7)	4,875	(17.8)
No	15,975	(89.9)	6,015	(70.1)	303	(66.2)	183	(33.3)	22,476	(82.2)
Tertiary Referral[12,14]										
Yes	856	(4.9)	611	(7.5)	29	(8.0)	326	(59.4)	1,822	(6.9)
No	16,583	(95.1)	7,570	(92.5)	333	(92.0)	223	(40.6)	24,709	(93.1)
Total	**30,990**		**16,203**		**1,118**		**678**		**48,987**	

Table 4 - *Key patient characteristics and procedure details according to type of treatment provider for knee procedures in 2004*

	Provider Type									
	NHS hospitals		Independent hospitals		NHS treatment centres		Independent treatment centres		Total	
	Number	(%)	Number	(%)	Number	(%)	Number	(%)	Number	(%)
Patient physical status[15]										
P1 - Fit and healthy	6,852	(23.2)	3,903	(29.3)	274	(23.1)	285	(36.2)	11,314	(25.2)
P2 - Mild disease, not incapacitating	18,024	(60.9)	8,362	(62.7)	735	(62.0)	489	(62.1)	27,610	(61.5)
P3 - Incapacitating systemic disease	4,535	(15.3)	1,032	(7.7)	161	(13.6)	11	(1.4)	5,739	(12.8)
P4/P5 - Life threatening or expected to die within 24 hours[16]	181	(0.6)	36	(0.3)	16	(1.3)	2	(0.3)	235	(0.5)
Procedure type										
Primary procedure	**27,882**	**(94.2)**	**12,950**	**(97.1)**	**1,172**	**(98.8)**	**787**	**(100)**	**42,791**	**(95.3)**
Total replacement using cement	22,911	(77.4)	9,994	(75.0)	1,064	(89.7)	553	(70.3)	34,522	(76.9)
Total replacement not using cement	2,040	(6.9)	906	(6.8)	11	(0.9)	151	(19.2)	3,108	(6.9)
Hybrid total replacement procedure[17]	538	(1.8)	321	(2.4)	30	(2.5)	47	(6.0)	936	(2.1)
Unicondylar knee replacement	2,155	(7.3)	1,561	(11.7)	58	(4.9)	33	(4.2)	3,807	(8.5)
Patello-femoral replacement	238	(0.8)	168	(1.2)	9	(0.8)	3	(0.3)	418	(0.9)
Revision procedure	**1,587**	**(5.4)**	**365**	**(2.7)**	**14**	**(1.2)**	**0**	**(0)**	**1,966**	**(4.4)**
Single stage revision	826	(2.8)	209	(1.6)	8	(0.7)	0	(0)	1,043	(2.3)
Revision (stage 1 of two-stage revision)	121	(0.4)	17	(0.1)	1	(0.08)	0	(0)	139	(0.3)
Revision (stage 2 of two-stage revision)	211	(0.7)	25	(0.2)	1	(0.08)	0	(0)	237	(0.5)
Conversion to knee fusion (arthrodesis)	2	(0.007)	2	(0.02)	0	(0)	0	(0)	4	(0.009)
Amputation	1	(0.003)	0	(0)	0	(0)	0	(0)	1	(0.002)
Unclassified revision[18]	426	(1.4)	112	(0.8)	4	(0.3)	0	(0)	542	(1.2)
Re-operation other than revision[19]	**123**	**(0.4)**	**18**	**(0.2)**	**0**	**(0)**	**0**	**(0)**	**141**	**(0.3)**
Bilateral or unilateral										
Bilateral[20]	102	(0.3)	188	(1.4)	3	(0.3)	0	(0)	293	(0.7)
Unilateral	29,388	(99.7)	12,957	(98.6)	1,180	(99.7)	787	(100)	44,312	(99.3)
Primary procedure complexity[21]										
Regular primary	18,904	(96.9)	8,890	(98.0)	796	(98.0)	704	(99.6)	29,294	(97.4)
Complex primary	596	(3.1)	182	(2.0)	16	(2.0)	3	(0.4)	797	(2.6)
Funding[22]										
NHS funding	25,994	(97.4)	4,969	(42.3)	1,136	(99.9)	731	(94.7)	32,830	(81.4)
Independent funding	692	(2.6)	6,766	(57.7)	1	(0.1)	41	(5.3)	7,500	(18.6)
Waiting list initiative/patient choice[21,23]										
Yes	2,014	(12.2)	2,855	(42.0)	188	(39.1)	478	(72.0)	5,535	(22.7)
No	14,481	(87.8)	3,936	(58.0)	293	(60.9)	186	(28.0)	18,896	(77.3)
Tertiary Referral[21,23]										
Yes	666	(4.1)	408	(6.5)	34	(8.9)	431	(65.2)	1,539	(6.5)
No	15,484	(95.9)	5,915	(93.5)	346	(91.1)	230	(34.8)	21,975	(93.5)
Total	**29,592**		**13,333**		**1,186**		**787**		**44,898**	

[15] Patient physical status according to American Society of Anaesthesiology scoring system (ASA grade)

[16] It is unlikely that so many patients will have been of physical status P4 or P5 before surgery. Hence, for procedures with patient ASA grade P4 or P5 this data item may have been mis-entered.

[17] A hybrid knee operation is one where either the femoral or tibial side of the joint receives a cemented prosthetic component and the other receives a cementless component.

[18] Revision entered into NJR using MDS version 1 which did not distinguish between different types of procedures

[19] Only entered using MDS version 2 so numbers given may not reflect the true proportions performed in each centre type

[20] Bilateral operations are counted as two procedures in the NJR database. Therefore, while 293 bilateral knee operations were performed overall, these are counted as 586 procedures in other areas of the table

[21] Based on that subset of procedures entered into the NJR using MDS version 2 and for which the item was recorded. Data item not present in MDS version 1

[22] Type of funding was an optional question. Numbers based on a subset of patients for which this question was answered. Numbers where the question was unanswered are given in table 1, categorised as 'unknown funding'

[23] Figures for waiting list initiative/patient choice and for tertiary referral should be interpreted with caution as hospitals may have been interpreting the term in different ways when submitting data

Table 5 - *Number of participating hospitals according to number of procedures entered over the 2004 data collection period*

	Number of procedures performed 1 Jan 2004 to 31 December 2004 and entered into NJR by 28 February 2005					
	<50	50-99	100-199	200-299	300-399	400+
Hospitals entering hip replacements (%) (n=378)	113 (29.9)	92 (24.3)	95 (25.1)	44 (11.6)	23 (6.1)	11 (2.9)
Hospitals entering knee replacements (%) (n=374)	124 (33.2)	96 (25.7)	86 (23.0)	41 (11.0)	13 (3.5)	14 (3.6)

Of the 381 hospitals participating in 2004, 378 entered at least one hip procedure and 374 entered at least one knee procedure (table 5). More than half of all hospitals entered 100 or fewer hip procedures, but 2.9% entered more than 400 hip procedures. Volume of knee replacement procedures was similarly distributed.

4 Data completeness

4.1 Procedures entered into the NJR (case ascertainment)

'Case ascertainment' is the proportion of all relevant joint replacement procedures performed in England and Wales that are actually included in the NJR.

An estimate of the 'case ascertainment' for the NHS sector is found by comparing the number of hip and knee replacement procedures performed in 2004 in NHS Trusts that were entered into the NJR with the number of procedures recorded in Hospital Episode Statistics (HES) and the Patient Episode Database, Wales (PEDW) over a similar time period[24] (table 6). HES/PEDW data were available for all 158 Trusts. As table 6 shows, whilst HES/PEDW statistics suggest 105,732 procedures would have been performed in 2004[25], only 62,886 were recorded in the NJR. This corresponds to a 'case ascertainment' of 60%. This means that only 60% of the total number of procedures performed in NHS centres in 2004 is included in this Annual Report. Case ascertainment for hip procedures was roughly the same as that for knee procedures.

In the 1st Annual Report, the case ascertainment for NHS centres was stated as being 51%. Thus, the percentage for 2004, whilst still moderate, represents a reasonable improvement on last year and suggests a trend towards complete data entry, as the NJR becomes increasingly well established.

No HES/PEDW equivalent is available at present for independent hospitals[26] to make similar statements about case ascertainment in the independent sector. However, an estimate of overall case ascertainment (NHS and independent sectors combined) may be obtained by comparing the number of hip and knee procedures in the NJR with the total number of levies collected from hospitals.

Table 6 - *Number of joint replacements expected from HES/PEDW data compared with number entered into the NJR for 2004*

	Hip procedures		Knee procedures		All procedures	
	Expected number of procedures	Number entered into NJR (%)	Expected number of procedures	Number entered into NJR (%)	Expected number of procedures	Number entered into NJR (%)
NHS Trusts in England (n = 146)	49,622	31,034 (62.5)	50,988	29,893 (58.6)	100,610	60,927 (60.6)
NHS Trusts in Wales (n = 12)	2,514	1,074 (42.7)	2,608	885 (33.9)	5,122	1,959 (38.2)
All NHS Trusts (n = 158)	**52,136**	**32,108 (61.6)**	**53,596**	**30,778 (57.4)**	**105,732**	**62,886 (59.5)**

[24] HES data for the 12-month period April 2003 - March 2004; PEDW data for the 12-month period April 2003 - March 2004

[25] In fact, the HES/PEDW numbers are an approximation since they are derived from different 12-month periods to that covered in this NJR 2nd Annual Report

[26] The NJR Centre is collecting independent sector comparator data for 2004 direct from organisations/hospitals

A levy is collected each time specific hip or knee components are purchased (see 'Levyable implants' in Glossary). A single levyable component is normally used in each hip procedure that should be entered into the NJR database., although there are some exceptions, e.g. when custom-made implants are used, when a revision operation does not involve removal and replacement of the acetabular cup. However, the number of levies invoiced by suppliers gives a good approximation to total number of procedures undertaken. The equivalent situation applies to knee procedures, where it is the femoral component that attracts a levy charge.

The number of levies collected from purchasers of implants in 2004 was 155,450. A total of 93,885 procedures were entered into the NJR (NHS and independent sector combined). This gives an estimated overall case ascertainment of 60%, suggesting that case ascertainment in the independent sector is similar to that in the NHS.

4.2 Consent

The NJR contains data on the joint replacement procedure, the implants used and the patients receiving them. Data on the procedure may be entered regardless of whether patient consent is obtained. However, patient identifiers (name, date of birth, gender, postcode and NHS number) are only recorded in the NJR if the patient gives consent.

Patient identifiers are essential for analysing outcomes and revision rates (of key interest in later reports as follow-up time increases). This is because NHS numbers can be derived from patient identifiers (if not provided at time of data collection) and then be used to link a primary procedure with any subsequent future operations performed on the same patient. Identifiers are also needed for a patient to be eligible for participation in feedback processes such as the Patient Reported Outcomes Measurements Study (PROMS) survey, described in Section 12.

In the event of a prosthesis in use being found to perform unsatisfactorily, there is a serious danger that patients implanted with the prosthesis will not be traceable through the NJR system unless these key patient identifiers are consistently and invariably entered.

It should be noted that for patient identifiers to be included in the NJR database, two steps need to occur. Firstly the patient must have provided specific NJR-related consent and secondly, the record of this consent needs to be available to the person at the centre entering the data onto the NJR.

Table 7 shows that of the 93,885 procedures entered into the NJR in 2004, patient consent was obtained for 60,831, corresponding to a consent rate of 65%. The consent rate for

Table 7 - *Consent rates for hip and knee procedures according to country, provider type and procedure type performed in 2004*

	Hip procedures		Knee procedures		All procedures	
	Total number of procedures	Number for which patient consent obtained (%)	Total number of procedures	Number for which patient consent obtained (%)	Total number of procedures	Number for which patient consent obtained (%)
Country						
England	47,427	30,376 (64.0)	43,603	28,221 (64.7)	91,030	58,597 (64.4)
Wales	1,560	1,221 (78.3)	1,295	1,013 (78.2)	2,855	2,234 (78.2)
Provider type						
NHS hospital	30,990	19,860 (64.1)	29,592	19,457 (65.8)	60,582	39,317 (64.9)
Independent hospital	16,203	11,139 (68.7)	13,333	9,095 (68.2)	29,536	20,234 (68.5)
NHS treatment centre	1,118	339 (30.3)	1,186	378 (31.9)	2,304	717 (31.1)
Independent treatment centre	676	259 (38.3)	787	304 (38.6)	1,463	563 (38.5)
Procedure type						
Primary	44,262	28,897 (65.3)	42,791	27,962 (65.3)	87,053	56,859 (65.3)
Revision	4,725	2,700 (57.1)	2,107	1,272 (60.4)	6,832	3,972 (58.1)
Total	**48,987**	**31,597 (64.5)**	**44,898**	**29,234 (65.1)**	**93,885**	**60,831 (64.8)**

Table 8 - *Number of hospitals according to consent rates for 2004*

	Consent rate					
	0	1 - 19%	20 - 39%	40 - 59%	60 - 79%	80%+
Number of hospitals (%) (n=381)	25 (6.6)	35 (9.2)	43 (11.3)	59 (15.5)	48 (12.6)	171 (44.8)

operations performed in England was 64%, whilst that in Wales was 78%. Overall, consent rates in the independent sector were higher than those in the NHS sector. Consent rates for treatment centres (both independent (39%) and NHS (31%)) were considerably lower than for hospitals (independent hospitals 69%, NHS hospitals 65%). The consent rate for primary arthroplasties was higher than the consent rate for revision procedures (65% compared to 58%). It is currently required that consent is re-obtained for revision or re-operation procedures, even if consent has already been obtained for a prior procedure performed on the same patient.

The consent rate for 2004 is similar to that for 2003 (63%).

A summary of consent rates for each of the 381 participating hospitals is given in table 8. High consent rates were possible with 45% of hospitals obtaining consent for at least 80% of procedures and 31 hospitals achieving 100% consent rates. At the other end of the scale, 25 hospitals (7%; of which 17 were NHS hospitals, 7 were independent hospitals and one was an independent treatment centre) failed to obtain consent for any procedure entered into the NJR. This pattern of consent is broadly similar to that observed in 2003.

4.3 NHS number availability

As stated in the previous section, to link a primary procedure to a subsequent revision procedure, an NHS number must be recorded in the NJR for both operations. NHS numbers may only be entered where the patient gives consent. However, even if a patient gives consent, the NHS number may not have been recorded. If this is the case, given other patient identifiers available for consenting patients (postcode, date of birth, name), an NHS number may be traced using the NHS Strategic Tracing Service (NSTS). Even then, an NHS number may not be found for a consenting patient, for example if there are insufficient other patient identifiers or if patient identifiers have been incorrectly recorded.

Table 9 shows that of the 60,831 procedures where patient consent was obtained, an NHS number was given or traced (hence the procedure could be linked) for 42,534 (70%).

Table 9 - *Number of consented hip and knee procedures performed in 2004 with NHS numbers available according to country, provider type and procedure type*

	Hip procedures		Knee procedures		All procedures	
	Number for which patient consent obtained	Number of procedures with NHS number available (%)	Number for which patient consent obtained	Number of procedures with NHS number available (%)	Number for which patient consent obtained	Number of procedures with NHS number available (%)
Country						
England	30,376	21,227 (69.9)	28,221	20,132 (71.3)	58,597	41,359 (70.6)
Wales	1,221	627 (51.4)	1,013	548 (54.1)	2,234	1,175 (52.6)
Provider type						
NHS hospital	19,860	14,004 (70.5)	19,457	14,031 (72.1)	39,317	28,035 (71.3)
Independent hospital	11,139	7,551 (67.8)	9,095	6,352 (69.8)	20,234	13,903 (68.7)
NHS treatment centre	339	269 (79.4)	378	251 (66.4)	717	520 (72.5)
Independent treatment centre	259	30 (11.6)	304	46 (15.1)	563	76 (13.5)
Procedure type						
Primary	28,897	20,112 (69.6)	27,962	19,773 (70.7)	56,859	39,885 (70.1)
Revision	2,700	1,742 (64.5)	1,272	907 (71.3)	3,972	2,649 (66.7)
Total	**31,597**	**21,854 (69.2)**	**29,234**	**20,680 (70.7)**	**60,831**	**42,534 (69.9)**

Table 10 - *Number of hospitals according to percentage of NHS numbers available for consenting patients for 2004*

	Percentage of NHS numbers available for consenting patients					
	0	1 - 19%	20 - 39%	40 - 59%	60 - 79%	80%+
Number of hospitals (%) (n=356[27])	15 (4.2)	26 (7.3)	32 (9.0)	33 (9.3)	67 (18.8)	183 (51.4)

The percentage with NHS numbers was higher in England than in Wales (71% compared with 53%). The percentage was particularly low (just 14%) for independent treatment centres. For other provider types the percentage was around 70%.

The percentage for 2004 is a slight improvement on that found for 2003 (65%).

The percentage of consented procedures for which NHS numbers were available for individual hospitals is shown in table 10. In an improvement on 2003, more than half of hospitals achieved NHS number percentages of over 80% (last year the figure was one third of hospitals). At 24 hospitals, NHS numbers were available for all consenting patients.

4.4 Total number of linkable procedures

In the previous sections, three percentages relating to data completeness are given:

- Percentage of NHS procedures, recorded in HES/PEDW, that were entered into the NJR ('case ascertainment')
- Percentage of those procedures entered for which consent was obtained (consent rate)
- Percentage of those procedures where the patient gave consent for which NHS numbers were available

The product of these three percentages is an estimate of the percentage of all relevant procedures performed in 2004 that have been entered into the NJR and may be linked via an NHS number to other procedures performed on the same patient. This is called the 'linkable percentage'. The calculation of this percentage assumes that the case ascertainment for the independent sector is equal to that for the NHS sector, which is reasonable given that the estimate of case ascertainment for all procedures based on levy data is close to that for NHS procedures based on HES/PEDW data (see Section 4.1)[28].

Table 11 gives the linkable percentage for 2004 alongside that for 2003. The combination of the different percentages to create the overall linkable percentage is illustrated in graph 1 for both 2004 and 2003. The linkable percentage for 2004 is 27%, an increase from the 21% for 2003. In practice, this means that of all joint replacement procedures performed in England and Wales in 2004, 27% may be linked to other operations. This is provided of course that the future operation is also entered into the NJR with an NHS number.

The percentage of future procedures that are actually linked in the NJR to primary procedures (the 'linked revisions') may be lower. The worst case scenario is if we assume the likelihood of a future operation being entered into the NJR with an NHS number to be independent of whether the corresponding primary procedure has been entered with an NHS number. Then the proportion of linked revisions is 27% x 27% = 7%. An actual observed estimate of this percentage of linked revisions in the NJR is found by considering that group of revision operations for which a date for the primary procedure is given as falling within the period from 1 April 2003 to 31 December 2004 (the 2003 and 2004 data collection periods combined). 'Date of primary procedure' is an optional data item for revision procedures. Since the primary procedure is recorded as having been performed during the combined data collection period, the

[27] The 25 hospitals that had consent rates of zero are not included in table 10

[28] Case ascertainment based on HES/PEDW data is used in the calculation of the linkable percentages of table 11 instead of that based on levy data (even though the levy data figure is for all procedures as opposed to just those performed in the NHS) to allow for fairer comparison with 2003 data (which only used HES/PEDW data) and because breakdown of levy data by country and hip/knees was not available for 2004 data)

Table 11 - *The percentage of joint replacement procedures performed in England and Wales that have been entered into the NJR with NHS numbers and so are linkable ('linkable percentage') for the 2003 and 2004 data collection periods*

	% all procedures entered into NJR	x	% consent obtained	x	% with NHS numbers	=	% linkable procedures (linkable percentage)
Previous data collection period (2003)							
All procedures	51.3%		62.8%		65.1%		21%
Current data collection period (2004)							
All procedures	59.5%		64.8%		69.9%		27%
Hip procedures	61.6%		64.5%		69.2%		27%
Knee procedures	57.4%		65.1%		70.7%		26%
England	60.6%		64.4%		70.6%		28%
Wales	38.2%		78.2%		52.6%		16%

percentage of these revision procedures which are linked to a primary procedure in the database via NHS numbers is an estimate of the true proportion of revisions that are linked in the NJR. Consider as an example all hip revisions recorded in the NJR. As shown in table 12 overleaf, there are 585 hip revisions with a primary procedure date within the data collection period. Of these, 99 are actually linked to primary procedures in the database. This suggests an overall observed proportion of linked hip revisions in the NJR of 99/585 = 17% (one in six).

Whilst better than the initial estimate of 7%, a percentage of 17% is still inadequate. The NJR would not be able to trace all patients possessing a prosthesis with unsatisfactory performance or patients operated on by a surgeon or hospital under scrutiny. In addition, reliable analyses of outcomes and revision rates are impossible, without a risk of bias. In particular, there is a risk of false conclusions being drawn due to the missing data. For example, analysis of the small number of primary procedures for which a revision procedure can already be found in the database (see Section 7.5) revealed primary procedures performed by one particular surgeon to be more likely to be revised than those performed by other surgeons (more primary procedures of this surgeon could be linked to a revision in the database than for other surgeons). However, closer inspection showed the linkable percentage for this surgeon to be much higher than the average and so the high number of linked revision procedures found for this surgeon was in fact because the data entered by this surgeon was far more complete, rather than that the surgeon was underperforming. Indeed, calculation of the linkable percentage for each NHS trust reveals wide variation between centres: roughly half of all NHS trusts had a linkable percentage for 2004 data of less than 25%. At the same time, however, 4.4% of trusts had a linkable percentage of 80% or more and a linkable percentage of over 95% was recorded for one trust, showing that the high linkable percentage needed for analysis of revision rates can be achieved.

Graph 1 - *Percentage of joint replacement procedures performed in England and Wales that were entered into the NJR, have patient consent and are linkable for the 2003 and 2004 data collection periods*

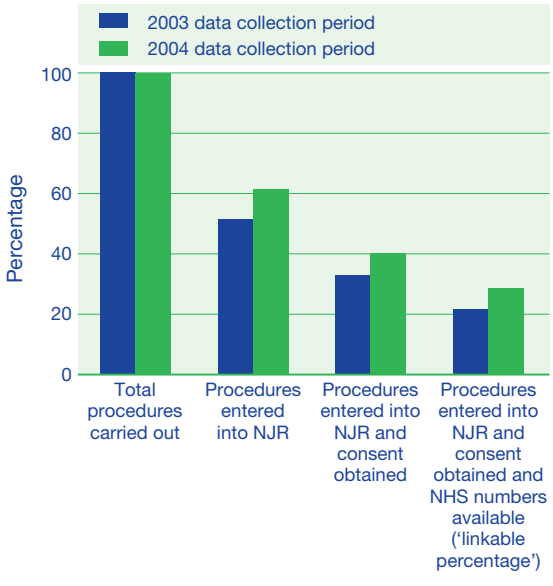


Table 12 - *Hip revision operations in the NJR with a primary procedure date recorded as being within the 2003 or 2004 data collection period according to whether they may be linked to a primary procedure in the database (comprising both 2003 and 2004 data)*

Hip revision operations with primary procedure date within data collection period		
	Frequency	Percent
Not linked to primary procedure	486	83.1
Linked to primary procedure	99	16.9
Total	**585**	

5 Primary hip replacement procedures

This section summarises the data obtained on all 44,262 primary hip replacements performed between 1 January 2004 and 31 December 2004 inclusive in England and Wales, and that were entered into the NJR database by 28 February 2005.

The primary hip replacement interventions comprised 23,992 (54%) total hip replacement (THR) procedures using cement, 8,957 (20%) THR procedures not using cement, 6,155 (14%) hybrid or reverse hybrid procedures[29], and 5,158 (12%) resurfacing arthroplasties.

5.1 Description of patient characteristics

Table 13 shows that the mean age of primary hip replacement patients in the NJR and who had procedures performed in 2004 was 68 years. Patients undergoing a resurfacing arthroplasty procedure were the youngest group on average.

59% of consenting patients were female. The same pattern is seen for each procedure type with the exception of resurfacing arthroplasty, where almost two-thirds of consenting patients were male.

The general medical condition of the majority of patients receiving a total hip replacement (THR) (cemented, cementless or hybrid) was 'mild disease'[30]. In contrast, most resurfacing patients (61%) were 'fit and healthy'. Osteoarthritis was the most frequently reported indication for surgery, present in 94% of all patients.

Waiting list initiatives or patient choice[31] motivated 19% of procedures. 6.3% of procedures (where reported) were the result of tertiary referral[31]. 0.3% of primary hip replacements were bilateral, and more right hips were operated on than left hips.

Looking at females alone who received a resurfacing arthroplasty, the mean age at operation was 54.4 years. 90% of females having resurfacing operations were aged 65 or under. However, there were females reportedly having this operation up to the age of 89.5 years.

5.2 Description of surgeons

The lead surgeon was a consultant in 82% of all procedures (table 14 on page 62). For resurfacing arthroplasty procedures, this percentage was 96%. Where the lead surgeon was not a consultant but an associate specialist, staff grade or clinical assistant[32], a consultant assisted in 11% of such procedures. Where the lead surgeon was a specialist registrar or senior house officer, a consultant assisted roughly half of the time.

2.2% of procedures were performed by a lead surgeon recorded as belonging to a non-UK surgical team[32]. The lead surgeon was least likely to come from an overseas surgical team if the procedure was a resurfacing arthroplasty, where as few as 1 in 1000 procedures involved an overseas surgeon. The lead surgeon was a locum in 5.2% of procedures.

5.2.1 Number of primary hip replacements per surgeon

The number of primary hip replacement procedures performed per surgeon was estimated[33] by counting each time a particular surgeon was declared as being the lead surgeon for a primary procedure. There were 2,052 different lead surgeons in total on the database, declared as lead surgeons for between 1 and 381 primary hip procedures. 1,328 were consultants, with an average of 27 procedures each (table 16 on page 62), 123 surgeons were associate specialists, staff grade or clinical

Table 13 - *Patient characteristics for primary hip replacement procedures in 2004, according to type of procedure*

	Patient Procedure									
	Total replacement using cement		Total replacement not using cement		Hybrid or reverse hybrid[29]		Resurfacing arthroplasty		Total	
Age, years (consenting patients only)[34]										
Mean (sd)	72.2	(9.2)	65.1	(11.0)	67.5	(10.7)	55.0	(9.3)	68.1	(11.3)
Inter-quartile range	66.8 - 78.5		58.7 - 72.4		61.2 - 74.6		49.5 - 61.1		61.2 - 76.0	
	Number	(%)	Number	(%)	Number	(%)	Number	(%)	Number	(%)
Gender (consenting patients only)[35]										
Male	5,575	(35.4)	2,489	(43.1)	1,496	(38.8)	2,208	(63.3)	11,768	(40.8)
Female	10,189	(64.6)	3,281	(56.9)	2,359	(61.2)	1,278	(36.7)	17,107	(59.2)
Physical status[36]										
P1 - Fit and healthy	5,817	(24.3)	3,018	(33.7)	1,938	(31.5)	3,146	(61.0)	13,919	(31.5)
P2 - Mild disease, not incapacitating	14,752	(61.5)	4,983	(55.6)	3,531	(57.4)	1,867	(36.2)	25,133	(56.8)
P3 - Incapacitating systemic disease	3,217	(13.4)	898	(10.0)	652	(10.6)	135	(2.6)	4,902	(11.1)
P4/P5 - Life threatening disease/ expected to die within 24hrs[37]	206	(0.8)	58	(0.7)	34	(0.5)	10	(0.2)	308	(0.6)
Indications for surgery[38]										
Osteoarthritis	22,548	(94.0)	8,381	(93.6)	5,651	(91.8)	4,871	(94.4)	41,451	(93.7)
Avascular necrosis	774	(3.2)	341	(3.8)	242	(3.9)	183	(3.6)	1,540	(3.5)
Congenital dislocation/dysplasia of hip	181	(0.8)	189	(2.1)	121	(2.0)	168	(3.3)	659	(1.5)
Fractured neck of femur	344	(1.4)	108	(1.2)	85	(1.4)	13	(0.3)	550	(1.2)
Seropositive rheumatoid arthritis	243	(1.0)	67	(0.8)	63	(1.0)	15	(0.3)	388	(0.9)
Failed internal fixation	190	(0.8)	82	(0.9)	61	(1.0)	13	(0.3)	346	(0.8)
Other hip trauma	48	(0.2)	20	(0.2)	27	(0.4)	20	(0.4)	115	(0.3)
Previous arthrodesis	6	(0.03)	6	(0.1)	2	(0.03)	3	(0.1)	17	(0.04)
Other[39]	559	(2.3)	255	(2.9)	206	(3.4)	146	(2.8)	1,166	(2.6)
Side										
Bilateral[40]	45	(0.2)	28	(0.3)	32	(0.5)	30	(0.6)	134	(0.3)
Left, unilateral	10,640	(44.4)	4,108	(46.0)	2,769	(45.2)	2,468	(48.1)	19,985	(45.3)
Right, unilateral	13,263	(55.4)	4,793	(53.7)	3,322	(54.3)	2,631	(51.3)	24,009	(54.4)
Waiting list initiative/patient choice[41,31]										
Yes	2,289	(17.5)	1,259	(23.8)	719	(21.5)	413	(14.1)	4,680	(19.0)
No	10,788	(82.5)	4,029	(76.2)	2,619	(78.5)	2,516	(85.9)	19,952	(81.0)
Tertiary referral[41,31]										
Yes	534	(4.2)	414	(8.1)	235	(7.3)	309	(10.8)	1,492	(6.3)
No	12,156	(95.8)	4,666	(91.9)	3,002	(92.7)	2,543	(89.2)	22,367	(93.7)
Total	**23,992**		**8,957**		**6,155**		**5,158**		**44,262**	

[29] A hybrid is a procedure where the femoral prosthesis is cemented and the acetabular prosthesis is not cemented. In a reverse hybrid, the acetabular prosthesis is cemented whilst the femoral prosthesis is not cemented

[30] Classification of general medical condition according to the American Society of Anaesthesiology scoring system (ASA grade)

[31] Figures for waiting list initiative/patient choice and for tertiary referral should be interpreted with caution as hospitals may have been interpreting the term in different ways when submitting data

[32] Definitions of staff positions are provided in the Glossary

[33] May underestimate true numbers due to lack of data completeness (see Section 4)

[34] Statistics based on that subset of procedures for which patient consent was obtained and a plausible date of birth recorded in the NJR or obtained from the NSTS (28,805 primary hip procedures). Where the date of birth recorded in the NJR differed from that in the NSTS, the latter was selected as the more reliable

[35] Statistics based on that subset of procedures for which patient consent was obtained and sex was recorded in the NJR or obtained from the NSTS (28,875 primary hip procedures). Where the sex recorded in the NJR differed from that in the NSTS, the latter was selected as the more reliable

[36] Patient physical status according to American Society of Anaesthesiology scoring system (ASA grade)

[37] It is unlikely that so many patients will have been of physical status P4 or P5 before surgery. Hence, for procedures with patient ASA grade P4 or P5 this data item may have been mis-entered

[38] More than one indication may be selected per procedure, so these values add up to more than 100%

[39] Other indications for surgery included fractured acetabulum, ankylosing spondylitis, failed hemi-arthroplasty, previous infection, psoriatic arthropathy, slipped upper femoral epiphysis, trauma and seronegative rheumatoid arthritis

[40] Bilateral operations are classed as two procedures. Therefore, the 134 bilateral primary hip procedures reported count as 268 procedures elsewhere in the table

[41] Based on that subset of procedures entered into the NJR using MDS version 2 and for which the item was recorded. Data item not present in MDS version 1

Table 14 - *Characteristics of lead surgeons performing primary hip replacement procedures in 2004, according to type of procedure*

	Patient Procedure									
	Total replacement using cement		Total replacement not using cement		Hybrid or reverse hybrid		Resurfacing arthroplasty		Total	
	Number	(%)	Number	(%)	Number	(%)	Number	(%)	Number	(%)
Lead surgeon grade[42]										
Consultant	18,445	(76.9)	7,633	(85.2)	5,029	(81.7)	4,954	(96.0)	36,061	(81.5)
Associate Specialist/Staff Grade/ Clinical Assistant[43]	2,877	(12.0)	908	(10.1)	341	(5.5)	54	(1.1)	4,180	(9.4)
With consultant assistance	316	(11.0)	106	(11.7)	29	(8.5)	14	(25.9)	465	(11.1)
Without consultant assistance	2,561	(89.0)	802	(88.3)	312	(91.5)	40	(74.1)	3,715	(88.9)
SPR/SHO/Other[44]	2,670	(11.1)	416	(4.7)	785	(12.8)	150	(2.9)	4,021	(9.1)
With consultant assistance	1,255	(47.0)	213	(51.2)	354	(45.1)	91	(60.7)	1,913	(47.6)
Without consultant assistance	1,415	(53.0)	203	(48.8)	431	(54.9)	59	(39.3)	2,108	(52.4)
Lead surgeon from non-UK surgical team[45]										
Yes	407	(1.7)	319	(3.6)	235	(3.8)	4	(0.1)	965	(2.2)
No/not selected	23,585	(98.3)	8,638	(96.4)	5,920	(96.2)	5,154	(99.9)	43,297	(97.8)
Lead surgeon is a locum										
Yes	1,424	(5.9)	590	(6.6)	231	(3.8)	67	(1.3)	2,312	(5.2)
No	22,568	(94.1)	8,367	(93.4)	5,924	(96.2)	5,091	(98.7)	41,950	(94.8)
Total	**23,992**		**8,957**		**6,155**		**5,158**		**44,262**	

assistants with 21 procedures each and 601 were specialist registrars, senior house officers and other grades with 9 procedures each. A number of surgeons (376, of which 177 were consultants) have been recorded as lead surgeon for only 1 or 2 procedures over the 12 months. Tables 15 and 16 and graph 2 give further information on the volume of procedures entered for each surgeon.

Graph 2 - *Distribution of the number of primary hip procedures performed*[46] *in 2004 and entered into the NJR by 28 February 2005 per consultant*

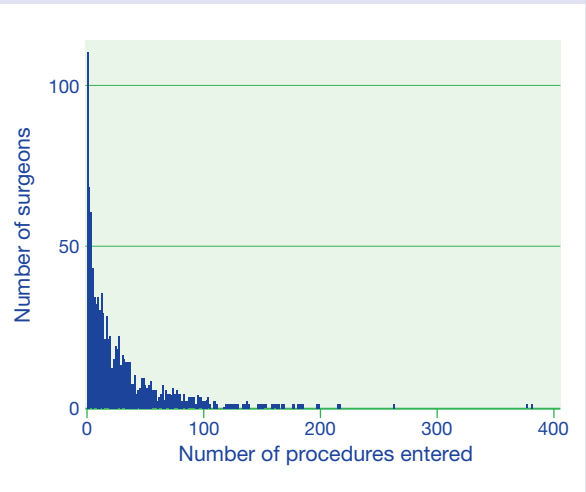


Table 15 - *Mean number of primary hip replacement procedures per surgeon*

	Mean number of procedures (sd)
Lead surgeon grade	
Consultant (n = 1,328)	27 (35)
Associate Specialist/Staff Grade/ Clinical Assistant[43] (n = 123)	21 (25)
SPR/SHO/Other (n = 601)	9 (15)
All grades (n = 2,052)	**22 (31)**

Table 16 - *Number of primary hip replacements entered into the NJR in 2004 per surgeon*

	Number of primary hip replacements entered into the NJR per surgeon				
	< 25	25 - 49	50 - 99	100 - 199	200 +
Number of surgeons (%)					
Consultant (n = 1,328)	838 (63.1)	262 (19.7)	179 (13.5)	44 (3.3)	5 (0.4)
Associate Specialist/Staff Grade/ Clinical Assistant (n = 123)	88 (71.5)	24 (19.5)	9 (7.3)	2 (1.7)	0 (0)
SPR/SHO/Other (n = 601)	552 (91.9)	33 (5.5)	12 (2.0)	4 (0.6)	0 (0)

Table 17 - *Characteristics of surgical practice for primary hip replacement procedures in 2004, according to procedure type*

	Patient Procedure									
	Total replacement using cement		Total replacement not using cement		Hybrid or reverse hybrid		Resurfacing arthroplasty		Total	
	Number	(%)	Number	(%)	Number	(%)	Number	(%)	Number	(%)
Laminar flow theatre										
Yes	20,841	(94.6)	7,886	(93.6)	5,452	(94.1)	4,545	(95.1)	38,724	(94.4)
No	1,182	(5.4)	538	(6.4)	344	(5.9)	232	(4.9)	2,296	(5.6)
General anaesthesia used[47]										
Yes	13,388	(55.8)	5,031	(56.2)	3,789	(61.6)	3,637	(70.5)	25,845	(58.4)
No	10,604	(44.2)	3,926	(43.8)	2,366	(38.4)	1,521	(29.5)	18,417	(41.6)
Epidural anaesthesia used[47]										
Yes	4,088	(17.0)	1,278	(14.3)	1,215	(19.7)	805	(15.6)	7,386	(16.7)
No	19,904	(83.0)	7,679	(85.7)	4,940	(80.3)	4,353	(84.4)	36,876	(83.3)
Nerve block anaesthesia used[47]										
Yes	2,319	(9.7)	1,010	(11.3)	589	(9.6)	579	(11.2)	4,497	(10.2)
No	21,673	(90.3)	7,947	(88.7)	5,566	(90.4)	4,579	(88.8)	39,765	(89.8)
Spinal anaesthesia used[47]										
Yes	11,476	(47.8)	3,771	(42.1)	2,785	(45.3)	1,982	(38.4)	20,014	(45.2)
No	12,516	(52.2)	5,186	(57.9)	3,370	(54.7)	3,176	(61.6)	24,248	(54.8)
Sedation used[47,48]										
Yes	1,660	(9.9)	566	(8.6)	408	(9.7)	253	(7.0)	2,887	(9.3)
No	15,066	(90.1)	6,056	(91.4)	3,800	(90.3)	3,371	(93.0)	28,293	(90.7)
Patient position										
Lateral	18,702	(78.0)	7,267	(81.1)	5,749	(93.4)	4,979	(96.5)	36,697	(82.9)
Supine	5,290	(22.0)	1,690	(18.9)	406	(6.6)	179	(3.5)	7,565	(17.1)
Incision										
Anterior/Antero-Lateral/Lateral	16,603	(69.2)	5,867	(65.5)	3,267	(53.1)	1,430	(27.7)	27,167	(61.4)
Posterior	7,389	(30.8)	3,090	(34.5)	2,888	(46.9)	3,728	(72.3)	17,095	(38.6)
Trochanteric osteotomy										
With	1,596	(6.7)	193	(2.2)	171	(2.8)	168	(3.3)	2,128	(4.8)
Without	22,396	(93.4)	8,764	(97.9)	5,984	(97.2)	4,990	(96.7)	42,134	(95.2)
Complex osteotomy[48]										
With	102	(0.6)	15	(0.2)	10	(0.2)	15	(0.4)	142	(0.5)
Without	16,624	(99.4)	6,607	(99.8)	4,198	(99.8)	3,609	(99.6)	31,038	(99.5)
Incision length[48]										
Greater than 10 cm	11,955	(85.6)	4,081	(73.3)	2,867	(82.0)	2,775	(91.4)	21,678	(83.2)
Less than or equal to 10cm	2,015	(14.4)	1,485	(26.7)	630	(18.0)	260	(8.6)	4,390	(16.8)
Femoral bonegraft used										
Yes	334	(1.4)	180	(2.0)	54	(0.9)	101	(2.0)	669	(1.5)
No	23,658	(98.6)	8,777	(98.0)	6,101	(99.1)	5,057	(98.0)	43,593	(98.5)

Continued on page 64

[42] It is possible that the number of lead surgeons who were consultants is an overestimate as a consultant may have been declared the lead for any procedures under his consultancy, even if he was not actually performing them

[43] Definitions of staff positions are provided in the Glossary

[44] Other grades reported included 'fellow', 'clinical lecturer', 'professor' and 'locum consultant'

[45] Numbers for "lead surgeon from non-UK surgical team" should be interpreted with caution as data quality checks revealed some misinterpretation of this data item. The percentage from overseas is likely to be an over-estimate

[46] Number of procedures 'performed' estimated as number for which the surgeon was declared lead surgeon

[47] More than one type of anaesthesia may be used for a single procedure

[48] Based on a sub sample of procedures entered into the NJR using MDS version 2 and for which this data item was completed

Table 17 - *Characteristics of surgical practice for primary hip replacement procedures in 2004, according to procedure type (continued)*

	Patient Procedure									
	Total replacement using cement		Total replacement not using cement		Hybrid or reverse hybrid		Resurfacing arthroplasty		Total	
	Number	(%)	Number	(%)	Number	(%)	Number	(%)	Number	(%)
Acetabular bonegraft used										
Yes	1,254	(5.2)	693	(7.7)	585	(9.5)	259[49]	(5.0)	2,791	(6.3)
No	22,738	(94.8)	8,264	(92.3)	5,570	(90.5)	4,899	(95.0)	41,471	(93.7)
Femoral cement used										
Yes	23,992	(100)	0	(0)	5,846	(95.0)	4,405	(85.4)	34,243	(77.4)
No	0	(0)	8,957	(100)	309	(5.0)	753	(14.6)	10,019	(22.6)
Acetabular cement used										
Yes	23,992	(100)	0	(0)	309	(5.0)	58319	(11.3)	24,884	(56.2)
No	0	(0)	8,957	(100)	5,846	(95.0)	4,575	(88.7)	19,378	(43.8)
Minimally invasive surgery used										
Yes	1,042	(4.6)	1,010	(11.8)	350	(5.9)	331	(6.7)	2,733	(6.5)
No	21,858	(95.4)	7,524	(88.2)	5,569	(94.1)	4,577	(93.3)	39,528	(93.5)
Image guided surgery used										
Yes	131	(0.6)	74	(0.9)	38	(0.7)	36	(0.7)	279	(0.7)
No	22,263	(99.4)	8,253	(99.1)	5,764	(99.3)	4,774	(99.3)	41,054	(99.3)
Total	**23,992**		**8,957**		**6,155**		**5,158**		**44,262**	

5.3 Description of surgical practice in primary hip replacement procedures

Table 17 shows that 95% of procedures took place in a laminar flow theatre, as recommended by British Orthopaedic Association guidance. Patients were primarily positioned laterally (for 83% of procedures). For total hip replacement procedures (cemented, cementless or hybrid), the incision was mostly anterior, antero-lateral or lateral. Conversely, for resurfacing arthroplasties, the incision was predominantly posterior (in 72% of procedures). Trochanteric osteotomy was recorded for 5% of procedures, and a complex osteotomy recorded for 0.5% of procedures. A general anaesthesia was the form of anaesthesia most frequently used in all procedure types (in isolation or in conjunction with a regional anaesthesia), used in 58% of cases. Bone grafts were infrequently used. Of hybrid procedures, 5% were reverse hybrid (where the one cemented component is the acetabular cup as opposed to the femoral stem). Whilst the use of image guided surgery remains low (at 0.7%), the percentage of all procedures using a form of minimally invasive surgery is 6.5%. Indeed, for cementless total hip replacements, almost 12% of procedures used a minimally invasive surgery technique.

The types of intended post-operative thrombo-phrophylaxis regime (recommended at time of operation) are shown in table 18. More than one method may be recommended for a particular patient. The most common mechanical method recommended was TED stockings (intended for use following 54% of procedures) and low molecular weight heparin was the most frequently recommended chemical method, intended for use after half of all procedures.

[49] Would expect numbers using acetabular cement or bone graft to be 0 for resurfacing procedures. Anomalous results possibly due to misuse of surgeon default techniques in the data entry system (the surgeon default technique for total replacements has been used for resurfacing procedures)

[50] More than one method may be recommended for a particular patient so numbers add up to more than the total number of procedures

[51] Where the free-text field 'Other chemical methods' was completed, responses (quoted here exactly as entered into the field) included 'Cefoxine', 'Gentamicin wash', 'Clexane', 'Arixtra' and 'Clopidogrel'

[52] Where the free-text field 'Other mechanical methods' was completed, responses (quoted here exactly as entered into the field) included 'calf stimulators', 'av impulse boots', 'early mobilisation', 'elevated feet' and 'flowtrons'

[53] Based on that sub sample of procedures entered using MDS version 2

[54] Would expect numbers to be 0 for resurfacing procedures. Anomalous results possibly due to misuse of surgeon default techniques in the data entry system (the surgeon default technique for total replacements has been used for resurfacing procedures)

Table 18 - *Thrombo-phophylaxis regime for primary hip patients in 2004 recommended at time of operation, according to procedure type*

Thrombo-phrophylaxis regime[50]	Frequency of use (%)									
	Total replacement using cement		Total replacement not using cement		Hybrid or reverse hybrid		Resurfacing arthroplasty		Total	
	Number	(%)	Number	(%)	Number	(%)	Number	(%)	Number	(%)
Aspirin	5,198	(21.7)	2,088	(23.3)	1,920	(31.2)	1,494	(29.0)	10,700	(24.2)
Chloroquine	10	(0.04)	4	(0.04)	3	(0.1)	0	(0)	17	(0.04)
Low dose heparin	535	(2.2)	394	(4.4)	315	(5.1)	123	(2.4)	1,367	(3.1)
Low molecular weight heparin	12,378	(51.6)	4,743	(53.0)	2,807	(45.6)	2,197	(42.6)	22,125	(50.0)
Pentasaccharide	172	(0.7)	63	(0.7)	60	(1.0)	60	(1.2)	355	(0.8)
Warfarin	664	(2.8)	176	(2.0)	165	(2.7)	326	(6.3)	1,331	(3.0)
Other chemical[51]	215	(0.9)	100	(1.1)	76	(1.2)	86	(1.7)	477	(1.1)
Foot pump	5,269	(22)	2,383	(26.6)	1,810	(29.4)	1,189	(23.1)	10,651	(24.1)
Intermittent calf compression	5,580	(23.3)	1,989	(22.2)	971	(15.8)	913	(17.7)	9,453	(21.4)
TED stockings	12,093	(50.4)	5,396	(60.2)	3,430	(55.7)	3,005	(58.3)	23,924	(54.1)
Other mechanical[52]	356	(1.5)	57	(0.6)	79	(1.3)	59	(1.1)	551	(1.2)
None selected	877	(3.7)	180	(2.0)	209	(3.4)	150	(2.9)	1,416	(3.2)
Total	**5,158**		**23,992**		**8,957**		**6,155**		**44,262**	

Table 19 gives details of the cementing techniques employed, where the procedure involved use of acetabular and/or femoral cement. In the majority of procedures using cement, pulsatile/powered lavage was used (over 90% for both femoral and acetabular components). Overall, a cement pressuriser was used for acetabular cement in 72% of procedures. Cement was mixed using vacuum mixing or fume extraction (instead of the traditional open bowl method) over 90% of the time.

Table 19 - *Cementing techniques used in cemented primary hip replacement procedures in 2004, according to procedure type*

Femoral cement used								
	Total replacement using cement		Hybrid or reverse hybrid		Resurfacing arthroplasty		Total	
	Number	(%)	Number	(%)	Number	(%)	Number	(%)
Pulsatile/powered lavage used	22,273	(92.8)	5,440	(93.1)	3,992	(90.6)	31,705	(92.6)
Proximal seal used with gun[53]	11,669	(69.8)	3,210	(80.4)	453	(15.0)[57]	15,332	(64.6)
Cement used retrograde[44]	13,792	(82.5)	3,407	(85.3)	575	(19.0)[57]	17,774	(74.9)
Mixing for femoral cement								
Open bowl and spatula	1,319	(5.5)	415	(7.1)	1,199	(27.2)	2,933	(8.6)
Vacuum mixing or fume extraction	22,673	(94.5)	5,431	(92.9)	3,206	(72.8)	31,310	(91.4)
Total	**23,992**		**5,846**		**4,405**		**34,243**	
Acetabular cement used								
	Total replacement using cement		Hybrid		Resurfacing arthroplasty		Total	
	Number	(%)	Number	(%)	Number	(%)	Number	(%)
Pulsatile/powered lavage used	22,039	(91.9)	241	(78.0)	523	(89.7)[54]	22,803	(91.6)
Cement pressuriser used	17,368	(72.4)	185	(59.9)	328	(56.3)[54]	17,881	(71.9)
Mixing for acetabular cement								
Open bowl and spatula	1,705	(7.1)	54	(17.5)	93	(16.0)[54]	1,852	(7.4)
Vacuum mixing or fume extraction	22,287	(92.9)	255	(82.5)	490	(84.0)[54]	23,032	(92.6)
Total	**23,992**		**309**		**583**		**24,884**	

Table 20 - *Reported untoward intra-operative events for primary hip replacement patients in 2004, according to procedure type*

Untoward intra operative event[55,56]	Frequency of occurrence (%)									
	Total replacement using cement		Total replacement not using cement		Hybrid or reverse hybrid		Resurfacing arthroplasty		Total	
	Number	(%)	Number	(%)	Number	(%)	Number	(%)	Number	(%)
Calcar crack	26	(0.2)	72	(1.1)	9	(0.2)	11	(0.3)	118	(0.4)
Pelvic penetration	38	(0.2)	8	(0.1)	11	(0.3)	7	(0.2)	64	(0.2)
Shaft fracture	9	(0.1)	18	(0.3)	1	(0.02)	0	(0)	28	(0.1)
Shaft penetration	9	(0.1)	6	(0.1)	4	(0.1)	0	(0)	19	(0.1)
Trochanteric fracture	40	(0.2)	33	(0.5)	11	(0.3)	0	(0)	84	(0.3)
Other[57]	17	(0.1)	18	(0.3)	7	(0.2)	4	(0.1)	46	(0.2)
None specified	16,611	(99.3)	6,537	(98.7)	4,172	(99.1)	3,613	(99.7)	30,933	(99.2)
Total	**16,726**		**6,622**		**4,208**		**3,624**		**31,180**	

5.4 Description of untoward intra-operative events

Table 20 shows that untoward events occurring during the hip replacement operation were rare, with none specified in over 99% of procedures. A calcar crack was the most commonly reported untoward intra-operative event (4 in every 1000 procedures). Untoward events were more frequently reported for cementless total hip replacements than cemented, hybrid or resurfacing procedures. A calcar crack was reported to have occurred during 1.1% of cementless total hip replacements, and a trochanteric fracture (the next most commonly reported event), during 0.5% of cementless procedures. The untoward intra-operative event rate might be an underestimate due to non-response.

5.5 Description of primary hip replacement procedures in young patients

This section summarises patient characteristics of and procedures performed on 'young' patients (under 55 years, using the American Hip Society age cut-off). Of the 44,128 primary hip replacement patients, 3,450 (8%) were young patients. This corresponds to 3,471 procedures since 42 procedures were bilateral. Resurfacing arthroplasty was the most common procedure type in this age group: 46% of primary procedures performed on young patients were resurfacing arthroplasty procedures (table 21). By comparison, 7.5% of primary procedures performed on patients aged 55 or over (figure not shown) were resurfacing operations. The frequent use of resurfacing arthroplasties in young patients is remarkable given the current lack of evidence about its long term outcome.

Table 21 - *Procedure type for 'young' patients[58]*

'Young' patients		
	Number	(%)
Procedure type		
Total hip replacement using cement	611	(17.6)
Total hip replacement not using cement	853	(24.6)
Hybrid or reverse hybrid	422	(12.2)
Resurfacing arthroplasty	1,585	(45.6)
Total	**3,471**	

In this sub group of young patients, there were more males than females (53% male). The majority (60%) of young patients had a physical status of 'fit and healthy'. Osteoarthritis remains the most common indication for operation (85% of procedures), although an increased percentage of patients in this age group had avascular necrosis (7.7%) or congenital dislocation/dysplasia of the hip (7.6%) as an indication. Most young patients were given a general anaesthetic (70%). More incisions were posterior as opposed to anterior, antero-latero or supine for this sub group, reflecting the high proportion of resurfacing procedures. The percentages of procedures in young patients involving minimally invasive surgery and image guided surgery are largely similar to those for primary hip procedures in

patients over 55 (6.4% and 0.4% as compared to 7.1% and 0.6%).

5.6 Discussion

Comparison with 2003 data

In this section, the 2004 data on primary hip replacement procedures is compared with the 2003 data detailed in the 1st Annual Report. Overall, findings for 2004 are consistent with those for 2003, although there are some differences.

The breakdown of primary hip procedures according to the different procedure types in 2004 was broadly similar to that in 2003. THR using cement remains the most commonly entered procedure type, though to a lesser extent: 54% of all primary procedures in 2004 compared with 63% in 2003. The proportion of THR procedures not using cement has grown slightly from 16% in 2003 to 20% in 2004, and there has also been a small increase in the percentage of hybrid procedures (11% to 14%). Likewise, the percentage of resurfacing procedures has risen marginally (10% to 12%).

Characteristics of patients undergoing primary hip replacements in 2004 are unchanged from 2003. Characteristics of surgeons performing the procedures are also unchanged, except for an increase in the numbers of surgeons reported as coming from overseas surgical teams.

In terms of surgical practice for primary hip procedures, the most noteworthy change is an increase in the use of minimally invasive surgery, from 3.9% in 2003 to 6.5% in 2004. The use of femoral bone grafts and the use of cement have dropped slightly (the drop in cement use reflecting the overall fall in the percentage of procedures that were THR using cement). Otherwise, surgical practice in 2004 is consistent with that in 2003. The frequencies with which the different thrombo-phrophylaxis regimes were recommended are again largely unchanged from 2003. However, the percentage of procedures where no thrombo-phrophylaxis regime at all was recommended has fallen from 8.3% to 3.2%.

6 Primary knee replacement procedures

This section summarises the data obtained on all 42,791 primary knee replacements performed between 1 January 2004 and 31 December 2004 inclusive in England and Wales that were entered into the NJR database by 28 February 2005. There were 34,522 (81%) total knee replacement (TKR) procedures using cement, 3,108 (7.3%) TKRs not using cement, 936 (2.2%) TKR using hybrid[59] fixation, 3,807 (8.9%) unicondylar procedures and 418 (1.0%) patello-femoral replacements.

6.1 Description of patient characteristics

Table 22 overleaf shows that the mean age of patients receiving primary knee replacements was 70 years. Patients undergoing patello-femoral procedures were the youngest group, with mean age 63 years. There were more female patients than male patients (56% female, 44% male). The general medical condition of the majority of patients (62%) was 'mild disease, not incapacitating'[59]. Osteoarthritis was the most common indication for surgery, present in 96% of all patients. Overall, 52% of operations were on the right knee, whilst 0.7% were bilateral. Bilateral operations were most likely if the operation was a patello-femoral replacement (3.7% of these procedures being bilateral).

[55] More than one may be selected per procedure so numbers add up to more than the total number of procedures

[56] Based on a sub sample of procedures entered into the NJR using MDS version 2

[57] Where the free-text field 'Other untoward intra-operative events' was completed, responses (quoted exactly as entered into the field) included 'bleeding', 'collapse of femoral head cyst', 'cement too fast' and 'hypoxia on pressurising the cement'

[58] Patients under 55 years, in line with the American hip Society cut-off

[59] Classification of general medical condition according to the American Society of Anaesthesiology scoring system (ASA grade)

Table 22 - *Patient characteristics for primary knee replacement procedures in 2004, according to procedure type*

	Patient procedure					
	Total replacement using cement	Total replacement not using cement	Hybrid[60]	Unicondylar knee replacement	Patello-femoral replacement	Total
Age, years (consenting patients only)[61]						
Mean (sd)	71.0 (9.1)	69.5 (9.6)	69.5 (9.8)	65.0 (9.6)	62.9 (10.9)	70.3 (9.4)
Inter-quartile range	65.0 - 77.5	63.4 - 76.5	63.7 - 76.6	58.2 - 72.1	56.1 - 70.7	64.2 - 77.1
	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)
Gender (consenting patients)[62]						
Male	9,703 (42.7)	921 (47.1)	252 (43.2)	1,253 (52.5)	53 (19.9)	12,182 (43.6)
Female	13,044 (57.3)	1,033 (52.9)	332 (56.8)	1,134 (47.5)	214 (80.1)	15,757 (56.4)
Physical status[63]						
P1 - Fit and healthy	8,213 (23.8)	818 (26.3)	270 (28.9)	1,411 (37.1)	155 (37.1)	10,867 (25.4)
P2 - Mild disease, not incapacitating	21,573 (62.5)	1,864 (60.0)	543 (58.0)	2,122 (55.7)	238 (56.9)	26,340 (61.6)
P3 - Incapacitating systemic disease	4,548 (13.2)	416 (13.4)	115 (12.3)	260 (6.8)	25 (6.0)	5,364 (12.5)
P4 - Life threatening/expected to die within 24hrs[64]	188 (0.5)	10 (0.3)	8 (0.8)	14 (0.4)	0 (0)	220 (0.5)
Indications for surgery[65]						
Osteoarthritis	33,027 (95.7)	2,989 (96.2)	900 (96.2)	3,770 (99.0)	400 (95.7)	41,086 (96.0)
Avascular necrosis	163 (0.5)	5 (0.2)	5 (0.5)	15 (0.4)	0 (0)	188 (0.4)
Rheumatoid arthritis	1,100 (3.2)	109 (3.5)	23 (2.5)	7 (0.2)	3 (0.7)	1,242 (2.9)
Trauma	70 (0.2)	6 (0.2)	3 (0.3)	4 (0.1)	2 (0.5)	85 (0.2)
Other[66]	631 (1.8)	39 (1.3)	22 (2.4)	29 (0.8)	18 (4.3)	739 (1.7)
Side						
Bilateral[67]	204 (0.6)	28 (0.9)	2 (0.2)	40 (1.1)	15 (3.7)	289 (0.7)
Left	16,263 (47.4)	1,486 (48.2)	430 (46.1)	1,877 (49.8)	191 (47.3)	20,247 (47.6)
Right	17,852 (52.0)	1,566 (50.9)	501 (53.7)	1,849 (49.1)	198 (49.0)	21,966 (51.7)
Waiting list initiative/patient choice[68,69]						
Yes	4,447 (23.9)	355 (21.6)	181 (28.5)	421 (20.5)	21 (9.6)	5,425 (23.4)
No	14,162 (76.1)	1,286 (78.4)	455 (71.5)	1,632 (79.5)	198 (90.4)	17,733 (76.6)
Tertiary referral[68,69]						
Yes	1,130 (6.3)	53 (3.4)	72 (11.8)	93 (4.6)	25 (11.5)	1,373 (6.2)
No	16,718 (93.7)	1,528 (96.6)	540 (88.2)	1,913 (95.4)	192 (88.5)	20,891 (93.8)
Total	**34,522**	**3,108**	**936**	**3,807**	**418**	**42,791**

[60] A hybrid procedure is one where either the femoral or tibial side of the joint receives a cemented prosthetic component and the other side receives a cementless component

[61] Statistics based on that subset of procedures for which patient consent was obtained and a plausible date of birth recorded in the NJR or obtained from the NSTS (27,870 primary knee procedures). Where date of birth recorded in the NJR differed from that in the NSTS, the latter was selected as the more reliable

[62] Statistics based on that subset of procedures for which patient consent was obtained and sex was recorded in the NJR or obtained from the NSTS (27,939 primary knee procedures). Where sex recorded in the NJR differed from that in the NSTS, the latter was selected as the more reliable

[63] Patient physical status according to American Society of Anaesthesiology scoring system (ASA grade)

[64] It is unlikely that so many patients will have been of physical status P4 or P5 before surgery. Hence, for procedures with patient ASA grade P4 or P5 this data item may have been mis-entered

[65] More than one indication may be selected per procedure so these values add up to more than 100%

[66] Other indications for surgery included previous infection and failed internal fixation

[67] Bilateral operations are classed as two procedures. Therefore, the 289 bilateral primary knee procedures count as 578 procedures elsewhere in the table

[68] Based on that subset of procedures entered into the NJR using MDS version 2 and for which the item was recorded. Data item not present in MDS version 1

[69] Figures for waiting list initiative/patient choice and for tertiary referral should be interpreted with caution as hospitals may have been interpreting the term in different ways when submitting data

[70] Numbers of lead surgeons from non-UK surgical teams should be interpreted with caution as data quality checks revealed some misinterpretation of this data item. The percentage from overseas is likely to be an overestimate

[71] It is possible that the number of lead surgeons who were consultants is an overestimate as a consultant may have been declared the lead for any procedures under his consultancy, even if he was not actually performing them due to misinterpretation of the data item

[72] Other grades reported included 'fellow', 'professor' and 'locum consultant'

[73] Definitions of staff positions are provided in the Glossary

Table 23 - *Characteristics of lead surgeons performing primary knee replacement procedures in 2004, according to type of procedure*

	Patient procedure					
	Total replacement using cement	Total replacement not using cement	Hybrid	Unicondylar knee replacement	Patello-femoral replacement	Total
	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)
Lead surgeon grade[71]						
Consultant	26,830 (77.7)	2,382 (76.6)	724 (77.4)	3,457 (90.8)	394 (94.3)	33,787 (79.0)
Associate specialist/Staff grade/ Clinical Assistant	2,398 (7.0)	308 (9.9)	119 (12.7)	115 (3.0)	3 (0.7)	2,943 (6.9)
With consultant assistance	123 (5.1)	7 (2.3)	5 (4.2)	12 (10.4)	1 (33.3)	148 (5.0)
Without consultant assistance	2,275 (94.9)	301 (97.7)	114 (95.8)	103 (89.6)	2 (66.7)	2,795 (95.0)
SPR/SHO/Other[72]	5,294 (15.3)	418 (13.5)	93 (9.9)	235 (6.2)	21 (5.0)	6,061 (14.1)
With consultant assistance	2,308 (43.6)	178 (42.6)	49 (52.7)	118 (50.2)	17 (81.0)	2,670 (44.1)
Without consultant assistance	2,986 (56.4)	240 (57.4)	44 (47.3)	117 (49.8)	4 (19.0)	3,391 (55.9)
Lead surgeon from non-UK surgical team[70]						
Yes	918 (2.7)	66 (2.1)	54 (5.8)	44 (1.2)	0 (0)	1,082 (2.5)
No/not selected	33,604 (97.3)	3,042 (97.9)	882 (94.2)	3,763 (98.8)	418 (100)	41,709 (97.5)
Lead surgeon is a locum						
Yes	2,298 (6.7)	288 (9.3)	44 (4.7)	98 (2.6)	3 (0.7)	2,731 (6.4)
No	32,224 (93.3)	2,820 (90.7)	892 (95.3)	3,709 (97.4)	415 (99.3)	40,060 (93.6)
Total	**34,522**	**3,108**	**936**	**3,807**	**418**	**42,791**

6.2 Description of surgeons

Overall, the lead surgeon was a consultant in 79% of procedures (table 23). For unicondylar knee replacements, a consultant was the lead surgeon 91% of the time, and for patello-femoral replacements, this figure was 94%. As would be expected, where the lead surgeon was not a consultant, but an associate specialist, staff grade or clinical assistant, a consultant assisted with the operation in only 5% of the cases. Where the lead surgeon was a specialist registrar, senior house officer or other grade, a consultant assisted 44% of the time. The lead surgeon was reported as coming from an overseas team for 2.5% of procedures[70]. In 6.4% of procedures, the lead surgeon was a locum.

6.2.1 Number of primary knee replacements per surgeon

The number of primary knee replacement procedures performed per surgeon was calculated by counting each time a particular surgeon was declared as being the lead surgeon for a primary procedure. There were 2,150 lead surgeons in total on the database for knee procedures. The number of primary knee replacements entered per surgeon over the 12-month reporting period ranged from 1 to 354. 1,350 lead surgeons were consultants and 118 were associate specialists, staff grades or clinical assistants, with an average of 25 procedures each (table 25 overleaf). Specialist registrars, senior house officers or other grades were declared as lead surgeon for far fewer procedures (an average of 9 per surgeon). 393 (of which 166 were consultants) have been recorded as lead surgeon for just 1 or 2 procedures entered. Tables 24 and 25 and graph 3 further illustrate the number of procedures entered.

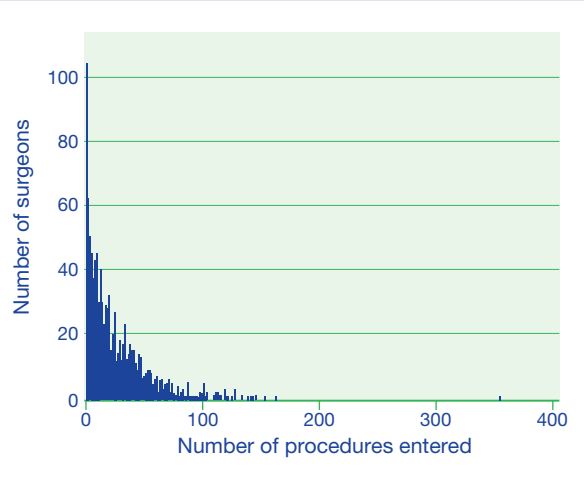
Table 24 - *Mean number of primary knee replacement procedures per surgeon*

	Mean number of procedures (sd)
Lead surgeon grade	
Consultant (n = 1,350)	25 (27)
Associate Specialist/Staff Grade/ Clinical Assistant[73] (n = 118)	25 (33)
SPR/SHO/Other (n = 682)	9 (12)
All grades (n = 2,150)	**20 (25)**

Table 25 - *Number of primary knee replacements entered into the NJR per surgeon in 2004*

	Number of primary knee replacements entered into the NJR per surgeon				
	< 25	25 - 49	50 - 99	100 - 199	200 +
Number of surgeons (%)					
Consultant (n = 1,350)	853 (63.2)	303 (22.4)	161 (11.9)	32 (2.4)	1 (0.07)
Associate Specialist/Staff Grade/ Clinical Assistant (n = 118)	79 (67.0)	21 (17.8)	15 (12.7)	2 (1.7)	1 (0.8)
SPR/SHO/Other (n = 682)	635 (93.1)	32 (4.7)	15 (2.2)	0 (0)	0 (0)

Graph 3 - *Distribution of the number of primary knee procedures performed[74] in 2004 and entered into the NJR by 28 February 2005 per consultant*



6.3 Description of surgical practice in primary knee replacements

Table 26 gives details of surgical techniques used for each type of primary knee replacement procedure. Overall, 94% of procedures took place in a laminar flow theatre. General anaesthesia was the most frequently used type of anaesthesia (55%). Spinal anaesthesia was the next most commonly used (42%). The surgical approach was primarily medial parapatellar (for 93% of procedures). It was rare for use of a femoral or tibial bone graft to have been reported. Of the 761 hybrid procedures for which cementing details were given[75], 83% involved a cemented tibial component, whilst the femoral component was not cemented. The remaining 17% involved a cemented femoral component, whilst tibial cement was not used. Image guided surgery was used infrequently (1.1% of procedures). Minimally invasive surgery was used in 6.1% of all procedures. There was wide variation in the frequency of use of minimally invasive surgery for the different procedure types: 1.3% of TKR procedures without cement and 2.6% of TKR procedures using cement compared with 43% of unicondylar replacements.

The types of intended thrombo-phophylaxis regime recommended at time of operation are shown in table 27 on page 72. As for primary hip procedures, the most commonly recommended chemical regime was low molecular weight heparin (48% of procedures). TED stockings was the most frequently chosen mechanical method (55% of procedures).

Table 28 on page 72 details the cement mixing techniques used[76]. For each component (whether the femur, tibia or patella) vacuum mixing was used for 90-91% of procedures.

[74] Number of procedures 'performed' estimated as number for which the surgeon was declared lead surgeon

[75] Details of which components used cement were only available for procedures entered using MDS version 2

[76] A response was only available for those procedures entered using MDS version 2 and for which this optional question was answered

[77] More than one type of anaesthesia may be used for a single procedure

[78] Based on a sub-sample of procedures entered into the NJR using MDS version 2 and for which this data item was completed

[79] Other surgical approaches given included intra-vastus, insall, tri vector and mid vastus

Table 26 - *Characteristics of surgical practice for primary knee replacement procedures in 2004, according to procedure type*

	Patient procedure					
	Total replacement using cement	Total replacement not using cement	Hybrid	Unicondylar knee replacement	Patello-femoral replacement	Total
	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)
Laminar flow theatre						
Yes	30,118 (94.8)	2,435 (87.5)	843 (95.7)	3,218 (94.3)	371 (95.6)	36,985 (94.2)
No	1,665 (5.2)	348 (12.5)	38 (4.3)	194 (5.7)	17 (4.4)	2,262 (5.8)
General anaesthesia used[77]						
Yes	18,615 (53.9)	1,609 (51.8)	475 (50.8)	2,462 (64.7)	279 (66.8)	23,440 (54.8)
No	15,907 (46.1)	1,499 (48.2)	461 (49.2)	1,345 (35.3)	139 (33.2)	19,351 (45.2)
Epidural anaesthesia used[77]						
Yes	6,356 (18.4)	449 (14.5)	191 (20.4)	575 (15.1)	65 (15.6)	7,636 (17.8)
No	28,166 (81.6)	2,659 (85.5)	745 (79.6)	3,232 (84.9)	353 (84.4)	35,155 (82.2)
Nerve block anaesthesia used[77]						
Yes	6,717 (19.5)	669 (21.5)	153 (16.4)	723 (19.0)	99 (23.7)	8,361 (19.5)
No	27,805 (80.5)	2,439 (78.5)	783 (83.6)	3,084 (81.0)	319 (76.3)	34,430 (80.5)
Spinal anaesthesia used[77]						
Yes	14,774 (42.8)	1,396 (44.9)	403 (43.1)	1,246 (32.7)	132 (31.6)	17,951 (42.0)
No	19,748 (57.2)	1,712 (55.1)	533 (56.9)	2,561 (67.3)	286 (68.4)	24,840 (58.0)
Sedation used[77,78]						
Yes	1,910 (7.9)	185 (8.5)	52 (6.8)	186 (6.8)	17 (6.1)	2,350 (7.8)
No	22,234 (92.1)	1,981 (91.5)	709 (93.2)	2,556 (93.2)	261 (93.9)	27,741 (92.2)
Surgical Approach						
Lateral parapatellar	665 (1.9)	58 (1.9)	12 (1.3)	109 (2.9)	6 (1.4)	850 (2.0)
Medial parapatellar	32,078 (92.9)	2,918 (93.9)	816 (87.2)	3,519 (92.4)	399 (95.5)	39,730 (92.9)
Sub-Vastus	564 (1.6)	87 (2.8)	39 (4.2)	32 (0.8)	6 (1.4)	728 (1.7)
Other[79]	1,215 (3.6)	45 (1.4)	69 (7.3)	147 (3.9)	7 (1.7)	1,483 (3.4)
Femoral bone graft used[77]						
Yes	147 (0.6)	46 (2.1)	10 (1.3)	9 (0.3)	1 (0.4)	213 (0.7)
No	23,997 (99.4)	2,120 (97.9)	751 (98.7)	2,733 (99.7)	277 (99.6)	29,878 (99.3)
Tibial bone graft used[77]						
Yes	162 (0.7)	51 (2.4)	9 (1.2)	6 (0.2)	1 (0.4)	229 (0.8)
No	23,982 (99.3)	2,115 (97.6)	752 (98.8)	2,736 (99.8)	277 (99.6)	29,862 (99.2)
Tibial cement used[77]						
Yes	24,144 (100)	0 (0)	633 (83.2)	2,673 (97.5)	79 (28.4)	27,529 (91.5)
No	0 (0)	2,166 (100)	128 (16.8)	69 (2.5)	199 (71.6)	2,562 (8.5)
Femoral cement used[77]						
Yes	24,144 (100)	0 (0)	128 (16.8)	2,676 (97.6)	257 (92.5)	27,205 (90.4)
No	0 (0)	2,166 (100)	633 (83.2)	66 (2.4)	21 (7.5)	2,886 (9.6)
Minimally invasive surgery used						
Yes	865 (2.6)	38 (1.3)	26 (2.9)	1,511 (43.4)	32 (8.0)	2,472 (6.1)
No	32,088 (97.4)	2,854 (98.7)	871 (97.1)	1,967 (56.6)	366 (92.0)	38,146 (93.9)
Image guided surgery used						
Yes	355 (1.1)	36 (1.2)	18 (2.0)	51 (1.5)	6 (1.5)	466 (1.1)
No	32,580 (98.9)	2,856 (98.8)	872 (98.0)	3,404 (98.5)	393 (98.5)	40,105 (98.9)
Total	**34,522**	**3,108**	**936**	**3,807**	**418**	**42,791**

Table 27 - *Thrombo-phrophylaxis regime for primary knee patients recommended at time of operation in 2004, according to procedure type*

Thrombo-phrophylaxis regime[80]	Frequency of use (%)									
	Total replacement using cement		Total replacement not using cement		Hybrid		Unicondylar knee replacement		Patello-femoral replacement		Total	
	Number	(%)	Number	(%)	Number	(%)	Number	(%)	Number	(%)	Number	(%)
Aspirin	9,020	(26.1)	696	(22.4)	108	(11.5)	1,057	(27.8)	128	(30.6)	11,009	(25.7)
Chloroquine	24	(0.1)	0	(0)	0	(0)	1	(0)	0	(0)	25	(0.1)
Low dose heparin	957	(2.8)	111	(3.6)	8	(0.9)	55	(1.4)	9	(2.2)	1,140	(2.7)
Low molecular weight heparin	16,643	(48.2)	1,640	(52.8)	534	(57.1)	1,626	(42.7)	150	(35.9)	20,593	(48.1)
Pentasaccharide	235	(0.7)	18	(0.6)	2	(0.2)	37	(1.0)	5	(1.2)	297	(0.7)
Warfarin	495	(1.4)	36	(1.2)	5	(0.5)	48	(1.3)	11	(2.6)	595	(1.4)
Other chemical[81]	347	(1.0)	13	(0.4)	8	(0.9)	23	(0.6)	13	(3.1)	404	(0.9)
Foot pump	8,430	(24.4)	873	(28.1)	341	(36.4)	964	(25.3)	129	(30.9)	10,737	(25.1)
Intermittent calf compression	7,194	(20.8)	726	(23.4)	141	(15.1)	853	(22.4)	104	(24.9)	9,018	(21.1)
TED stockings	18,941	(54.9)	1,745	(56.1)	500	(53.4)	2,157	(56.7)	240	(57.4)	23,583	(55.1)
Other mechanical[82]	417	(1.2)	38	(1.2)	9	(1.0)	19	(0.5)	3	(0.7)	486	(1.1)
None selected	1,233	(3.6)	118	(3.8)	21	(2.2)	230	(6.0)	16	(3.8)	1,618	(3.8)
Total	**34,522**		**3,108**		**936**		**3,807**		**418**		**42,791**	

Table 28 - *Mixing techniques used for cemented primary knee replacement procedures in 2004, according to procedure type*

Cement mixing technique	Patient procedure									
	Total replacement using cement		Hybrid		Unicondylar knee replacement		Patello-femoral replacement		Total	
	Number	(%)	Number	(%)	Number	(%)	Number	(%)	Number	(%)
Femoral cement										
Fume extraction only	814	(3.4)	8	(6.3)	55	(2.1)	3	(1.2)	880	(3.2)
Open bowl and spatula	1,432	(5.9)	22	(17.2)	186	(7.0)	14	(5.4)	1,654	(6.1)
Vacuum mixing	21,898	(90.7)	98	(76.6)	2,435	(91.0)	240	(93.4)	24,671	(90.7)
Total	**24,144**		**128**		**2,676**		**257**		**27,205**	
Tibial cement										
Fume extraction only	810	(3.4)	7	(1.1)	56	(2.1)	0	(0)	873	(3.2)
Open bowl and spatula	1,449	(6.0)	30	(4.7)	190	(7.1)	7	(8.9)	1,676	(6.1)
Vacuum mixing	21,885	(90.6)	596	(94.2)	2,427	(90.8)	72	(91.1)	24,980	(90.7)
Total	**24,144**		**633**		**2,673**		**79**		**27,529**	
Patella cement										
Fume extraction only	391	(3.8)	3	(1.1)	7	(1.7)	4	(1.6)	405	(3.6)
Open bowl and spatula	655	(6.3)	25	(9.1)	30	(7.1)	10	(4.1)	725	(6.4)
Vacuum mixing	9,284	(89.9)	246	(89.8)	385	(91.2)	229	(94.2)	10,231	(90.1)
Total	**10,330**		**274**		**422**		**243**		**11,361**	

[80] More than one method may be recommended for a particular patient so numbers add up to more than the total number of procedures

[81] Where the free-text field 'Other chemical methods' was completed, responses (quoted exactly as entered into the field) included 'Atrixta', 'Clexane', 'Dextran', 'Gentamicin wash', 'Clopidogrel' and 'Fragmin'

[82] Where the free-text field 'Other mechanical methods' was completed, responses (quoted exactly as entered into the field) included 'calf stimulators', 'av impulse boots', 'early mobilisation', 'elevated feet' and 'flowtrons'

[83] More than one may be selected per procedure so numbers add up to more than the total number of procedures

[84] Based on a sub sample of procedures entered into the NJR using MDS version 2

[85] Other reported untoward intra-operative events included notching of the femur and failed tourniquet

[86] The actual numbers of procedures performed on young patients may be higher as age could only be determined for consenting patients, so there may be additional young patients amongst those who did not give consent

[87] Figures for patients over 55 years not shown

[88] Patients under 55 years

Table 29 - *Reported untoward intra-operative events for primary knee replacement patients in 2004, according to procedure type*

Untoward intra operative event[83,84]	Frequency of occurrence (%)					
	Total replacement using cement	Total replacement not using cement	Hybrid	Unicondylar knee replacement	Patello-femoral replacement	Total
	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)
Fracture	38 (0.2)	3 (0.1)	3 (0.4)	2 (0.1)	0 (0)	46 (0.2)
Patella tendon avulsion	10 (0.04)	1 (0.1)	0 (0)	0 (0)	0 (0)	11 (0.04)
Ligament injury	10 (0.04)	2 (0.1)	0 (0)	0 (0)	0 (0)	12 (0.04)
Other[85]	58 (0.2)	6 (0.3)	2 (0.3)	6 (0.2)	0 (0)	72 (0.2)
None specified	24,024 (99.5)	2,154 (99.5)	756 (99.3)	2,733 (99.7)	278 (100)	29,945 (99.5)
Total	**24,144**	**2,166**	**761**	**2,742**	**278**	**30,091**

6.4 Description of untoward intra-operative events

Table 29 shows the frequency and types of untoward intra-operative events reported. Very few events were reported. Fracture was the most frequently reported adverse event. There was little variation in the probability of an untoward event for the different procedure types, except that for patello-femoral replacements, no intra-operative complications at all were recorded. The untoward intra-operative event rate might be an underestimate due to non-response.

6.5 Description of primary knee replacement procedures in young patients

This section summarises characteristics of 'young patients', defined as those less than 55 years of age. 1,575 (3.7%) of the 42,791 primary knee replacement procedures were known to have been performed on patients less than 55 years old[86] (table 30). Considerably fewer TKRs using cement were performed on young patients than on patients over 55 (65% versus 82%[87]). The proportion of procedures that were unicondylar replacements in young patients was much higher (21%) than for patients over 55 (7.8%). The proportion of procedures that were patello-femoral replacements was also marginally higher (3.8% to 0.8%).

Table 30 - *Procedure type for 'young' patients[88]*

'Young patients'		
	Number	(%)
Procedure type		
Total knee replacement using cement	1,022	(64.9)
Total knee replacement not using cement	114	(7.2)
Hybrid	46	(2.9)
Unicondylar knee replacement	334	(21.2)
Patello-femoral replacement	59	(3.8)
Total	**1,575**	

55% of young patients were female (similar to the proportion of females overall, for all procedures). By far the most common indication for surgery for procedures on young patients was osteoarthritis (92% of procedures), followed by rheumatoid arthritis (8% of the time). Other indications (alone or in addition to rheumatoid arthritis and osteoarthritis) were reported for less than 1% of procedures. General anaesthesia was given for 62% of procedures. The surgical approach used for this age group was predominantly medial parapatellar (92% of procedures). 1.3% of procedures in young patients used image guided surgery. 10% of procedures in young patients involved minimally invasive surgery, a greater proportion than for patients over 55 (5.3%), reflecting the high numbers of unicondylar replacements in young patients.

6.6 Discussion

Comparison with 2003 data

Patient characteristics were distributed similarly to that in 2003. The characteristics of the lead surgeons were also largely consistent with those found in 2003. A slightly larger percentage of the lead surgeons in 2004 were Specialist Registrars, Senior House Officers or other grades (14% in 2004 compared with 10% in 2003). More lead surgeons came from an overseas surgical team.

Surgical practice and use of thrombo-phrophylaxis regime in 2004 reflected that in 2003, with no noteworthy changes.

7 Revision of hip and knee replacements

This section summarises the data on revision procedures and other re-operations on both hips and knees that were performed between 1 January 2004 and 31 December 2004 inclusive, and entered into the NJR by 28 February 2005. Revision operations captured include both single stage and two-stage procedures, hip Girdlestone procedures, knee conversion to a fused knee joint (arthrodesis) and lower limb amputation.

A total of 4,516 hip revision procedures were entered into the NJR over this time period. 2,667 (59%) were classed as single stage revision operations, 183 (4.1%) were stage 1 of a two-stage process, 242 (5.4%) were stage 2, and 41 (0.9%) were Girdlestone excision arthroplasties. The remainder (31%) were revision procedures entered using MDS version 1, where no distinction was made about the type of procedure[89]. An additional 209 procedures were re-operations other than revision (detailed in Section 7.4).

There were 1,966 knee revision procedures. 1,043 (53%) were single stage revisions. 139 (7.1%) and 237 (12%) were stage 1 and stage 2 of two-stage procedures respectively. Four procedures entailed conversion to arthrodesis and one amputation was recorded. The remaining 542 procedures (28%) were unclassified[89]. 141 re-operations other than revision (Section 7.4) were also entered.

Analysis of the subset of these revision and re-operation procedures that are linked to a primary procedure also in the database is summarised in Section 7.5.

7.1 Description of patient characteristics for revision procedures

Table 31 gives characteristics of patients undergoing some form of hip revision procedure[90]. The mean age of hip revision patients was 69 years. There were more female than male patients (57% to 43%). For over three quarters of revision procedures the patient general medical condition was classed as 'fit and healthy' or with 'mild disease, not incapacitating'. Overall, aseptic loosening was the most common indication for revision (for 79% of all procedures), followed by lysis (25%) and pain (16%). Infection was a frequently given indication for hip Girdlestone procedures (63%) and for two-stage revision procedures (64%).

Table 32 on page 76 summarises characteristics of patients undergoing knee revision procedures[90]. The mean age of these patients was 70 years. For 82% of procedures the patient had an overall general medical condition of 'fit and healthy' or 'mild disease, not incapacitating'. Overall, aseptic loosening was the most common indication for revision, given for 59% of procedures. Pain (18%) and lysis (17%) were the next most common indications. Infection was also frequently reported (15%). As expected, it was the most common indication for two-stage procedures (81%) and for conversion to arthrodesis (three out of the four cases).

Table 31 - *Patient characteristics for hip revision procedures in 2004, according to procedure type*

	Patient procedure									
	Hip single stage revision		Hip Revision (stage 1 of 2 stage)		Hip Girdlestone		Hips unclassified[91]		All hip revision procedures	
Age (consenting patients only)[92]										
Mean (sd)	69.7	(12.1)	67.4	(12.7)	69.3	(16.1)	69.1	(12.0)	69.4	(12.1)
Inter-quartile range	63.1 - 78.3		61.4 - 75.6		60.6 - 79.0		62.6 - 77.7		62.8 - 78.1	
	Number	(%)	Number	(%)	Number	(%)	Number	(%)	Number	(%)
Gender (consenting patients only)[93]										
Male	683	(41.4)	53	(48.6)	4	(22.2)	326	(45.4)	1,066	(42.7)
Female	968	(58.6)	56	(51.4)	14	(77.8)	392	(54.6)	1,430	(57.3)
Patient physical status[94]										
P1 - Fit and healthy	571	(21.4)	33	(18)	1	(2.4)	353	(25.5)	958	(22.4)
P2 - Mild disease, not incapacitating	1,509	(56.6)	97	(53)	17	(41.5)	765	(55.3)	2,388	(55.9)
P3 - Incapacitating systemic disease	550	(20.6)	50	(27.3)	21	(51.2)	251	(18.1)	872	(20.4)
P4/P5 - Life threatening/expected to die within 24h[95]	37	(1.4)	3	(1.6)	2	(4.9)	14	(1.1)	56	(1.3)
Waiting list initiative/Patient choice[96,97]										
Yes	160	(7.3)	12	(7.7)	3	(9.1)	N/A	N/A	175	(7.4)
No	2,023	(92.7)	143	(92.3)	30	(90.9)	N/A	N/A	2,196	(92.6)
Tertiary referral[96,97]										
Yes	239	(11.1)	30	(20.3)	8	(26.7)	N/A	N/A	277	(11.9)
No	1,908	(88.9)	118	(79.7)	22	(73.3)	N/A	N/A	2,048	(88.1)
Indications for revision[98]										
Aseptic loosening	2,343	(87.9)	127	(69.4)	30	(73.2)	867	(62.7)	3,367	(78.8)
Lysis	849	(31.8)	55	(30.1)	12	(29.3)	137	(9.9)	1,053	(24.6)
Pain	459	(17.2)	29	(15.8)	13	(31.7)	186	(13.4)	687	(16.1)
Dislocation/subluxation	363	(13.6)	8	(4.4)	10	(24.4)	156	(11.3)	537	(12.6)
Periprosthetic fracture	201	(7.5)	12	(6.6)	4	(9.8)	81	(5.9)	298	(7.0)
Infection	37	(1.4)	117	(63.9)	26	(63.4)	113	(8.2)	293	(6.9)
Malalignment	216	(8.1)	11	(6.0)	3	(7.3)	26	(1.9)	256	(6.0)
Fractured acetabulum	72	(2.7)	1	(0.5)	0	(0)	20	(1.4)	93	(2.2)
Fractured stem	59	(2.2)	2	(1.1)	0	(0)	18	(1.3)	79	(1.8)
Fractured femoral head	12	(0.4)	0	(0)	0	(0)	6	(0.4)	18	(0.4)
Incorrect sizing/head socket mismatch	9	(0.3)	2	(1.1)	0	(0)	6	(0.4)	17	(0.4)
Other[99]	566	(21.2)	9	(4.9)	3	(7.3)	224	(16.2)	802	(18.8)
Side										
Left	1,260	(47.2)	87	(47.5)	17	(41.5)	658	(47.7)	2,022	(47.3)
Right	1,407	(52.8)	96	(52.5)	24	(58.5)	719	(52.1)	2,246	(52.6)
Bilateral[100]	0	(0)	0	(0)	0	(0)	3	(0.2)	3	(0.1)
Total	**2,667**		**183**		**41**		**1,383**		**4,274**	

[89] Procedures entered using MDS version 1, where no distinction was made about the type of revision procedure

[90] Stage 2 of two-stage revision procedures are omitted to avoid potential doubling of patient information, where both the 1st and 2nd stage of a two-stage procedure have been entered into the NJR

[91] Revision procedures entered using MDS version 1 were not classified

[92] Statistics based on that subset of procedures for which patient consent was obtained and a plausible date of birth recorded in the NJR or obtained from the NSTS (2,492 revision procedures). Where the date of birth recorded in the NJR differed from that in the NSTS, the latter was selected as the more reliable

[93] Statistics based on that subset of procedures for which patient consent was obtained and sex was recorded in the NJR or obtained from the NSTS (2,496 revision procedures). Where the sex recorded in the NJR differed from that in the NSTS, the latter was selected as the more reliable

[94] Patient physical status according to American Society of Anaesthesiology scoring system (ASA grade)

[95] It is unlikely that so many patients will have been of physical status P4 or P5 before surgery. Hence, for procedures with patient ASA grade P4 or P5 this data item may have been mis-entered

[96] Based on that subset of procedures entered into the NJR using MDS version 2 and for which the item was recorded. Data item not present in MDS version 1

[97] Figures for waiting list initiative/patient choice and for tertiary referral should be interpreted with caution as hospitals may have been interpreting the term in different ways when submitting data

[98] More than one indication may be selected for a single procedure so these numbers add up to more than the total number of procedures

[99] Other indications for revision included dissociation of liner and wear of acetabular/polyethylene component

[100] Bilateral operations are classed as two procedures. Therefore, the 3 bilateral operations reported count as 6 procedures elsewhere in the table

Table 32 - *Patient characteristics for knee revision procedures in 2004, according to procedure type*

	Patient procedure					
	Knee single stage revision	Knee revision (stage 1 of 2-stage)	Knee conversion to arthrodesis	Knee amputation	Unclassified[101] replacement	All knee revision procedures
Age (consenting patients only)[102]						
Mean (sd)	70.7 (9.6)	71.2 (8.9)	64.3[103]	82.5[103]	69.7 (9.9)	70.4 (9.7)
Inter-quartile range	64.5 - 77.9	67.5 - 75.5			62.8 - 77.1	64.1 - 77.7
	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)
Gender[104]						
Male	317 (48.1)	43 (59.7)	0 (0)	0 (0)	142 (46.6)	502 (48.4)
Female	342 (51.9)	29 (40.3)	1 (100)	1 (100)	163 (53.4)	536 (51.6)
Patient physical status[105]						
P1 - Fit and healthy	227 (21.8)	21 (15.1)	0 (0)	0 (0)	137 (25.3)	385 (22.3)
P2 - Mild disease, not incapacitating	612 (58.7)	78 (56.1)	2 (50.0)	0 (0)	343 (63.3)	1035 (59.9)
P3 - Incapacitating systemic disease	199 (19.1)	38 (27.3)	2 (50.0)	1 (100)	61 (11.3)	301 (17.4)
P4 - Life threatening[106]	5 (0.4)	2 (1.5)	0 (0)	0 (0)	1 (0.1)	8 (0.4)
Waiting list initiative/patient choice[107,108]						
Yes	78 (9.3)	8 (6.7)	1 (33.3)	0 (0)	N/A N/A	87 (9.0)
No	762 (90.7)	111 (93.3)	2 (66.7)	1 (100)	N/A N/A	876 (91.0)
Tertiary referral[107,108]						
Yes	103 (12.5)	21 (18.4)	0 (0)	0 (0)	N/A N/A	124 (13.2)
No	718 (87.5)	93 (81.6)	3 (100)	1 (100)	N/A N/A	815 (86.8)
Indications for revision[109]						
Aseptic loosening	755 (72.4)	36 (25.9)	0 (0)	0 (0)	221 (40.8)	1012 (58.5)
Pain	189 (18.1)	9 (6.5)	1 (25.0)	0 (0)	112 (20.7)	311 (18.0)
Lysis	233 (22.3)	39 (28.1)	0 (0)	0 (0)	29 (5.4)	301 (17.4)
Wear of polyethylene component	223 (21.4)	10 (7.2)	0 (0)	0 (0)	59 (10.9)	292 (16.9)
Instability	196 (18.8)	4 (2.9)	0 (0)	0 (0)	79 (14.6)	279 (16.1)
Infection	37 (3.5)	113 (81.3)	3 (75.0)	1 (100)	101 (18.6)	255 (14.7)
Malalignment	117 (11.2)	2 (1.4)	0 (0)	0 (0)	20 (3.7)	139 (8.0)
Dislocation/subluxation	71 (6.8)	3 (2.2)	0 (0)	0 (0)	19 (3.5)	93 (5.4)
Periprosthetic fracture	30 (2.9)	0 (0)	0 (0)	0 (0)	16 (3.0)	46 (2.7)
Implant fracture	19 (1.8)	2 (1.4)	0 (0)	0 (0)	20 (3.7)	41 (2.4)
Other[110]	149 (14.3)	8 (5.8)	0 (0)	0 (0)	97 (17.9)	254 (14.7)
Side						
Bilateral[111]	1 (0.1)	0 (0)	0 (0)	0 (0)	2 (0.4)	3 (0.2)
Left	491 (47.1)	64 (46.0)	1 (25.0)	1 (100)	256 (47.4)	813 (47.1)
Right	550 (52.8)	75 (54.0)	3 (75.0)	0 (0)	282 (52.2)	910 (52.7)
Total	**1,043**	**139**	**4**	**1**	**542**	**1,729**

7.2 Description of surgeons performing revision procedures

The lead surgeon was a consultant in 91% of hip revision procedures (table 33). Hip Girdlestone excision arthroplasties were performed by a consultant in all but one case. It was rare for a lead surgeon to come from an overseas surgical team which reflects the fact that surgeons from overseas surgical teams are most likely to operate in independent treatment centres, which carry out mainly primary procedures.

For 94% of knee revision procedures, the lead surgeon was consultant (table 34 overleaf). Where the lead surgeon was an associate specialist, staff grade or clinical assistant, a consultant assisted 29% of the time. A consultant assisted in 66% of procedures performed by a Specialist Registrar, Senior House Officer or other grade. Again, it was uncommon for the surgeon to come from an overseas team or to be a locum.

Table 33 - *Characteristics of lead surgeons performing hip revision procedures in 2004, according to type of procedure*

	Patient procedure									
	Hip single stage revision		Hip Revision (stage 1 of 2 stage)		Hip Girdlestone		Hips unclassified		All hip revision procedures	
	Number	(%)	Number	(%)	Number	(%)	Number	(%)	Number	(%)
Lead surgeon grade[112]										
Consultant	2,400	(90.0)	168	(91.8)	40	(97.6)	1,259	(91.0)	3,867	(90.5)
Associate specialist/Staff grade/ Clinical Assistant[113]	105	(3.9)	8	(4.4)	1	(2.4)	52	(3.8)	166	(3.9)
With consultant assistance	1	(1.0)	0	(0)	0	(0)	7	(13.5)	8	(4.8)
Without consultant assistance	104	(99.0)	8	(100)	1	(100)	45	(86.5)	158	(95.2)
SPR/SHO/Other	162	(6.1)	7	(3.8)	0	(0)	72	(5.2)	241	(5.6)
With consultant assistance	87	(53.7)	3	(42.9)	0	(0)	37	(51.4)	127	(52.7)
Without consultant assistance	75	(46.3)	4	(57.1)	0	(0)	35	(48.6)	114	(47.3)
Lead surgeon from non-UK surgical team[114]										
Yes	8	(0.3)	0	(0)	0	(0)	0	(0)	8	(0.2)
No/not selected	2,659	(99.7)	183	(100)	41	(100)	1,383	(100)	4,266	(99.8)
Lead surgeon is a locum										
Yes	39	(1.5)	2	(1.1)	0	(0)	23	(1.7)	64	(1.5)
No	2,628	(98.5)	181	(98.9)	41	(100)	1,360	(98.3)	4,210	(98.5)
Total	**2,667**		**183**		**41**		**1,383**		**4,274**	

[101] Revision procedures entered using MDS version 1 were not classified

[102] Statistics based on that subset of procedures for which patient consent was obtained and a plausible date of birth recorded in the NJR or obtained from the NSTS (1,035 revision procedures). Where the date of birth recorded in the NJR differed from that in the NSTS, the latter was selected as the more reliable

[103] Only 1 observation so no sd or inter quartile range

[104] Statistics based on that subset of procedures for which patient consent was obtained and sex was recorded in the NJR or obtained from the NSTS (1,038 revision procedures). Where the sex recorded in the NJR differed from that in the NSTS, the latter was selected as the more reliable

[105] Patient physical status according to American Society of Anaesthesiology scoring system (ASA grade)

[106] It is unlikely that so many patients will have been of physical status P4 before surgery. Hence, for procedures with patient ASA grade P4 or P5 this data item may have been mis-entered

[107] Based on that subset of procedures entered into the NJR using MDS version 2 and for which the item was recorded. Data item not present in MDS version 1

[108] Figures for waiting list initiative/patient choice and for tertiary referral should be interpreted with caution as hospitals may have been interpreting the term in different ways when submitting data

[109] More than one indication may be selected for a single procedure so these numbers add up to more than the total number of procedures

[110] Other indications for knee revisions included patella maltracking, component dissociation, stiffness and incorrect sizing

[111] Bilateral operations are classed as two procedures. Therefore, the 3 bilateral operations reported count as 6 procedures elsewhere in the table

[112] It is possible that the number of lead surgeons who were consultants is an over estimate as a consultant may have been declared the lead for any procedures under his consultancy, even if he was not actually performing them

[113] Definitions of staff positions are provided in the Glossary

[114] Numbers for 'lead surgeon from non-UK surgical team' should be interpreted with caution as data quality checks revealed some misinterpretation of this data item. The percentage from overseas is likely to be an over-estimate

Table 34 - *Characteristics of lead surgeons performing knee revision procedures in 2004, according to type of procedure*

	Patient procedure					
	Knee single stage revision	Knee revision (stage 1 of 2-stage)	Knee conversion to arthrodesis	Knee amputation	Unclassified replacement	All knee revision procedures
	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)
Lead surgeon grade[115]						
Consultant	987 (94.6)	128 (92.1)	4 (100)	1 (100)	504 (93.0)	1624 (93.9)
Associate specialist/Staff grade/ Clinical Assistant[116]	14 (1.3)	3 (2.2)	0 (0)	0 (0)	14 (2.6)	31 (1.8)
With consultant assistance	1 (7.1)	1 (33.3)			7 (50)	9 (29.0)
Without consultant assistance	13 (92.9)	2 (66.7)			7 (50)	22 (71.0)
SPR/SHO/Other	42 (4.1)	8 (5.7)	0 (0)	0 (0)	24 (4.4)	74 (4.3)
With consultant assistance	28 (66.7)	4 (50)			17 (70.8)	49 (66.2)
Without consultant assistance	14 (33.3)	4 (50)			7 (29.2)	25 (33.8)
Lead surgeon from non-UK surgical team[117]						
Yes	2 (0.2)	0 (0)	0 (0)	0 (0)	0 (0)	2 (0.1)
No/not selected	1,041 (99.8)	139 (100)	4 (100)	1 (100)	542 (100)	1,727 (99.9)
Lead surgeon is a locum						
Yes	11 (1.1)	0 (0)	0 (0)	0 (0)	11 (2.0)	22 (1.3)
No	1,032 (98.9)	139 (100)	4 (100)	1 (100)	531 (98.0)	1707 (98.7)
Total	**1,043**	**139**	**4**	**1**	**542**	**1,729**

7.3 Description of implants removed in revision procedures

Table 35 shows implants that were taken out of patients during hip revision procedures (single stage procedures, stage 1 of two-stage procedures and hip Girdlestone excision arthroplasties). A cemented cup was removed in 58% of all revision procedures that reported removal of an acetabular component. The stem had been cemented in 55% of procedures that reported removal of a stem. In 39% of revisions, a femoral head was removed (with or without removal of a stem). In 23% of procedures, a femoral head and stem and an acetabular cup or shell or liner were all reportedly removed together. In 31% of procedures, a cup and stem was removed, but not a head (for example, where the stem removed was monobloc). A femoral head was removed without removing the stem as well in 12% of procedures.

Table 35 - *Implants removed during hip revision procedures*

Reported implants removed		
	Number	(%)
Cemented stem	1,585	(54.8)
Cement removed?		
Yes	1,283	(80.9)
No	129	(8.1)
Part	173	(10.8)
Uncemented stem	427	(14.8)
Cemented cup	1,666	(57.6)
Cement removed?		
Yes	1,578	(94.7)
No	45	(2.7)
Part	43	(2.6)
Uncemented cup shell	453	(15.7)
Uncemented cup liner	569	(19.7)
Femoral head	1,138	(39.4)
Total	**2,891**	

Implants removed during knee revision procedures (single stage revision, stage 1 of two-stage, amputation and conversion to arthrodesis) are given in table 37. 74% of

[115] It is possible that the number of lead surgeons who were consultants is an over estimate as a consultant may have been declared the lead for any procedures under his consultancy, even if he was not actually performing them

[116] Definitions of staff positions are provided in the Glossary

[117] Numbers for 'lead surgeon from non-UK surgical team' should be interpreted with caution as data quality checks revealed some misinterpretation of this data item. The percentage from overseas is likely to be an over-estimate

[118] Included cemented spacer. For many procedures, the brand of the component removed was entered in the field 'other' component

[119] Implants removed could instead be a hinged knee or a simple exchange of tibial insert or other component as described in table 37

[120] Since re-operation procedures will often take place out of normal working hours, and often in emergency theatres the data is likely to be very fragmented at this stage of the evolution of the NJR

Table 36 - *Combinations of implants removed during hip revision procedures*

Reported combinations of implants removed	Number	(%)
Femoral head alone	61	(2.1)
Femoral stem alone (includes monobloc stems with no separate head)	325	(11.2)
Acetabular cup or shell and/or liner alone	390	(13.5)
Femoral head + femoral stem	135	(4.7)
Acetabular cup or shell and/or liner + femoral head	293	(10.1)
Acetabular cup or shell and/or liner + femoral stem	903	(31.2)
Acetabular cup or shell and/or liner + femoral head + femoral stem	649	(22.5)
None	135	(4.7)
Total	**2,891**	

Table 37 - *Implants removed during knee revision procedures*

	Total	
	Number	(%)
Cemented femoral component	881	(74.2)
Bicondylar	681	(57.4)
Patello femoral	39	(3.3)
Unicompartmental	161	(13.6)
Uncemented femoral component	99	(8.3)
Bicondylar	80	(6.7)
Patello femoral	1	(0.1)
Unicompartmental	18	(1.5)
Cemented tibial component	857	(72.2)
Bicondylar	695	(58.6)
Unicompartmental	162	(13.6)
Uncemented tibial component	75	(6.3)
Bicondylar	62	(5.2)
Unicompartmental	13	(1.1)
Hinged knee	5	(0.4)
Cemented patella button	302	(25.4)
Uncemented patella button	28	(2.4)
Simple exchange of tibial insert/ meniscal component	117	(9.9)
Bicondylar	92	(7.8)
Unicompartmental	25	(2.1)
Other component[118]	97	(8.2)
Total	**1,187**	

revision procedures involved removal of a cemented femoral component. An uncemented femoral component was removed in 8.3% of procedures and an uncemented tibial component was removed in 6.3% of procedures. A tibial component and a femoral component and a patella button were all removed in 22% of procedures. In over half of

Table 38 - *Combinations of implants removed in revision knee replacement procedures*

Reported combinations of implants removed	Number	(%)
Femoral component alone	78	(6.6)
Tibial component alone	68	(5.7)
Patella button alone	26	(2.2)
Femoral component and tibial component	601	(50.6)
Femoral component and patella button	41	(3.5)
Tibial component and patella button	3	(0.3)
Femoral component and tibial component and patella button	260	(21.9)
None of the above[119]	110	(9.2)
Total	**1,187**	

procedures, a femoral component and a tibial component were removed but no patella button was reportedly removed. It is not clear whether a patellar component was left in situ in these cases or whether none was present in the first place.

7.4 Description of re-operations other than revision procedures

Table 39 overleaf summarises the types of re-operations performed on hips, after an initial replacement procedure[120]. Only centres where procedures were entered using MDS version 2 will have entered re-operation procedures, as this was not an option in MDS version 1. 10% of re-operations involved wound exploration and 10% were reported as open reduction of a dislocation. 71% of re-operations had other descriptions, outside of the list of options given and included reconstruction of abductor, closed reduction of dislocation, removal of screws and application of a posterior lipped augmentation device (PLAD), used in socket augmentation.

The types of re-operations performed after knee replacement procedures are given in table 40 overleaf. Knee re-operations included resurfacing of the patella (48% of cases), manipulation under anaesthesia (MUA) (11%), washout (11%) and soft tissue repair/realignment (7.1%).

Table 39 - *Types of hip re-operations entered into the NJR database*

Type of re-operation	Number	(%)
Wound exploration	20	(9.6)
Open reduction of dislocation	20	(9.6)
Socket augmentation	19	(9.1)
Orif femur	12	(5.7)
Excision of heterotopic bone	5	(2.4)
Orif trochanter	5	(2.4)
Focal bonegraft only (femur)	2	(1.0)
Focal bone graft only (acetabulum)	1	(0.5)
Other procedure[121]	148	(70.8)
Total	**209**	

Table 40 - *Types of knee re-operations entered into the NJR database*

Type of re-operation	Number	(%)
Resurfacing of patella	68	(48.2)
Manipulation under anaesthesia	16	(11.3)
Washout	16	(11.3)
Soft tissue repair/realignment	10	(7.1)
Wound debridement	6	(4.3)
Orif peri-prosthetic fracture	3	(2.1)
Other procedure[122]	39	(27.7)
Total	**141**	

Characteristics of patients undergoing hip and knee re-operations are given in table 41. The average age of both hip and knee patients was 71 years. Two-thirds of hip re-operation patients were female, whereas slightly less than half (47%) of knee re-operation patients were female. A physical status of 'fit and healthy' or 'mild disease, not incapacitating' was declared for 73% of hip patients and for 83% of knee patients. There were no bilateral re-operation procedures.

Table 42 shows that the lead surgeon was a consultant in 53% of hip re-operations and 78% of knee re-operations. These are lower proportions than for revision procedures and this reflects the non-elective nature of many of the interventions for these complications. The lead surgeon was rarely from an overseas surgical team, which again reflects the fact that surgeons from overseas surgical teams are most likely to operate in independent treatment centres, which specialise in elective surgery. A locum performed 2.4% of hip re-operations and 2.8% of knee re-operations.

Table 41 - *Characteristics of patients undergoing hip and knee re-operations*

	Hip re-operation		Knee re-operation	
Age (consenting patients only)[123]				
Mean (sd)	70.8	(11.4)	71.0	(9.5)
Inter quartile range	64.3 - 78.7		66.6 - 77.0	
	Number	(%)	Number	(%)
Gender (consenting patients only)[124]				
Male	25	(35.7)	43	(53.1)
Female	45	(64.3)	38	(46.9)
Patient physical status[125]				
P1 - Fit and healthy	34	(16.3)	33	(23.4)
P2 - Mild disease, not incapacitating	118	(56.5)	84	(59.6)
P3 - Incapacitating systemic disease	53	(25.4)	20	(14.2)
P4/P5 - Life threatening/expected to die within 24h[126]	4	(1.8)	4	(2.8)
Waiting list initiative/Patient choice[127,128]				
Yes	8	(5.8)	13	(11.9)
No	130	(94.2)	96	(88.1)
Tertiary referral[127,128]				
Yes	17	(12.4)	10	(9.3)
No	120	(87.6)	97	(90.7)
Side				
Bilateral	0	(0)	0	(0)
Left, unilateral	89	(42.6)	70	(49.6)
Right, unilateral	120	(57.4)	71	(50.4)
Total	**209**		**141**	

Table 42 - *Characteristics of lead surgeons performing hip or knee re-operation procedures*

	Hip re-operation		Knee re-operation	
	Number	(%)	Number	(%)
Lead surgeon grade[129]				
Consultant	111	(53.1)	110	(78.0)
Associate specialist/Staff Grade/Clinical Assistant[130]	71	(34.0)	11	(7.8)
With consultant assistance	1	(1.4)	0	(0)
Without consultant assistance	70	(98.6)	11	(100)
SPR/SHO/Other	27	(12.9)	20	(14.2)
With consultant assistance	9	(33.3)	10	(50)
Without consultant assistance	18	(66.7)	10	(50)
Lead surgeon from non-UK surgical team[131]				
Yes	1	(0.5)	0	(0)
No/not selected	208	(99.5)	141	(100)
Lead surgeon is a locum				
Yes	5	(2.4)	4	(2.8)
No	204	(97.6)	137	(97.2)
Total	**209**		**141**	

7.5 Revisions linkable with NJR primary procedures

Section 4 described how a revision procedure may be linked to a primary procedure in the NJR database via the patient NHS number, provided the NHS number is entered for both procedures.

This section summarises the data on those revision procedures in the NJR database that are linked in this way to a primary procedure already in the database (entered in 2004 or earlier).

So far, in Part 2, only 2004 data have been tabulated. In this section, as numbers are small, any revisions so far in the NJR database, performed in either 2003 or 2004, which are linked to a primary procedure, are considered.

122 hip revision or re-operation procedures performed between 1 April 2003 and 31 December 2004 are linked to a primary procedure in the database. 54 knee revision or re-operation procedures performed over this time period are linked.

Numbers are still low (because the likelihood of a revision taking place within the first 21 months after a primary procedure is low and because the numbers that may be linked - the 'linkable fraction'[132] - is low). As a result, at this stage, analysis is limited to a descriptive account of the linked procedures.

7.5.1 Description of linked hip procedures

It is possible for a single primary procedure to be linked to more than one revision/re-operation

[121] Where the free-text field 'Other hip re-operations' was completed, responses (quoted exactly as entered into the field) included 'reconstruction of abductor', 'closed reduction of dislocation', 'removal of screws' and 'application of PLAD' (posterior lipped augmentation device)

[122] Where the free-text field 'Other knee re-operations' was completed, responses (quoted exactly as entered into the field) included 'draining of abscess', 'exploration', 'lateral release', 're-cutting of tibia' and 'replacement of spacer'

[123] Statistics based on that subset of procedures for which patient consent was obtained and a plausible date of birth recorded in the NJR or obtained from the NSTS (70 hip procedures, 81 knee procedures). Where the date of birth recorded in the NJR differed from that in the NSTS, the latter was selected as the more reliable

[124] Statistics based on that subset of procedures for which patient consent was obtained and sex was recorded in the NJR or obtained from the NSTS (70 hip procedures, 81 knee procedures). Where the sex recorded in the NJR differed from that in the NSTS, the latter was selected as the more reliable

[125] Patient physical status according to American Society of Anaesthesiology scoring system (ASA grade)

[126] It is unlikely that so many patients will have been of physical status P4 or P5 before surgery. Hence, for procedures with patient ASA grade P4 or P5 this data item may have been mis-entered

[127] Based on that subset of procedures entered into the NJR using MDS version 2 and for which the item was recorded. Data item not present in MDS version 1

[128] Figures for waiting list initiative/patient choice and for tertiary referral should be interpreted with caution as hospitals may have been interpreting the term in different ways when submitting data

[129] It is possible that the number of lead surgeons who were consultants is an overestimate as a consultant may have been declared the lead for any procedures under his consultancy, even if he was not actually performing them

[130] Definitions of staff positions are provided in the Glossary

[131] Numbers for 'lead surgeon from non-UK surgical team' should be interpreted with caution as data quality checks revealed some misinterpretation of this data item. The percentage from overseas is likely to be an over-estimate

[132] Percentage of all relevant hip and knee revision/re-operation procedures performed in England and Wales that may be linked to the corresponding primary procedure in the NJR database via patient NHS number (see Section 4)

procedure (if a second or third revision takes place). This was the case for 7 primary hip procedures, where in each case two revision procedures were linked to the same primary procedure. Only the first revision/re-operation to have taken place is considered here. The descriptions that follow are therefore based on 115 linked procedures.

12 of the 115 linked hip procedures were re-operations other than revision. The types of re-operations are given in table 43. Manipulation under anaesthesia of a dislocated total hip replacement was the most common linked re-operation.

Table 43 - *Re-operations linked to primary hip procedures in the NJR database*

Re-operation procedure type	Number
Manipulation under anaesthesia of dislocated total hip replacement	4
Wound exploration	2
Wound exploration + excision heterotopic bone + lavage insertion	1
Wound exploration + removal of retained drain (caught in stitch)	1
Wound exploration + exchange head/ liner implantation antibiotic sponge	1
Open reduction and internal fixation (ORIF) of femoral fracture	1
Exchange liner and head for dislocation	1
Conversion to cemented	1
Total	**12**

Characteristics of the 103 revision procedures are shown in table 44. Just over half of the revision procedures (where specified) were single stage revisions. 3 procedures were stage 2 of two-stage revisions and 2 procedures were stage 1 of a two-stage. Both the 1 and 2 stages are included here (unlike in the descriptions of all revisions) as the information available shows that the procedures are all for different patients.

Table 44 - *Characteristics of hip revision procedures linked to primary procedures*

Hip patients	Number	(%)
Gender		
Male	47	(45.6)
Female	56	(54.4)
Time from primary to revision, days		
Median	39	
Inter-quartile range	10 - 149	
Revision operation details		
Revision procedure type		
Single stage revision	53	(51.5)
Stage 1 of two-stage revision	2	(1.9)
Stage 2 of two-stage revision	3	(2.9)
Girdlestone excision arthroplasty	2	(1.9)
Not specified[133]	43	(41.8)
Indications for revision		
Dislocation	48	(46.6)
Aseptic loosening	16	(15.5)
Periprosthetic fracture	16	(15.5)
Malalignment	15	(14.6)
Infection	13	(12.6)
Pain	4	(3.9)
Incorrect size	2	(1.9)
Fractured head of femur	1	(1.0)
Fractured stem	1	(1.0)
Others	10	(9.7)
Primary operation details		
Primary procedure type		
Total replacement using cement	39	(37.9)
Total replacement not using cement	36	(35.0)
Hybrid procedure	16	(15.5)
Resurfacing arthroplasty	12	(11.6)
Primary procedure complexity		
Primary	29	(28.2)
Complex primary	4	(3.9)
Not specified	70	(67.9)
Age at primary operation, years		
Mean (sd)	65.4	(11.7)
Inter-quartile range	56.7 - 74.03	
Patient physical status at primary operation[134]		
P1 - Fit and healthy	24	(23.3)
P2 - Mild disease, not incapacitating	65	(63.1)
P3 - Incapacitating systemic disease	14	(13.6)

Continued page 83

[133] Revisions entered using MDS version 1, which did not allow specification of revision procedure type

[134] Patient physical status according to American Society of Anaesthesiology scoring system (ASA grade)

[135] It is possible that the number of lead surgeons who were consultants is an overestimate as a consultant may have been declared the lead for any procedures under his consultancy, even if he was not actually performing them

[136] Definitions of staff positions are provided in the Glossary

[137] Numbers for 'lead surgeon from non-UK surgical team' should be interpreted with caution as data quality checks revealed some misinterpretation of this data item. The percentage from overseas is likely to be an over-estimate

Table 44 - *Characteristics of hip revision procedures linked to primary procedures (continued)*

Hip patients	Number	(%)
Indication for primary procedure		
Osteoarthritis	93	(90.3)
Avascular necrosis	5	(4.9)
Fractured neck of femur	5	(4.9)
Congenital dislocation/dysplasia of hip	2	(1.9)
Other hip trauma	1	(1.0)
Seropositive rheumatoid arthritis	1	(1.0)
Others	4	(3.9)
Minimally invasive surgery used for primary procedure		
Yes	10	(9.7)
No	92	(89.3)
Not selected	1	(1.0)
Image guided surgery used for primary procedure		
No	100	(90.9)
Not selected	3	(9.1)
Lead surgeon grade for primary procedure[135]		
Consultant	87	(84.5)
Associate specialist/Staff Grade/ Clinical Assistant[136]	9	(8.7)
With consultant assistance	1	(11.1)
Without consultant assistance	8	(88.9)
SPR/SHO/Other	7	(6.8)
With consultant assistance	5	(71.4)
Without consultant assistance	2	(28.6)
Lead surgeon from non-UK surgical team for primary[137]		
Yes	3	(2.9)
No/not selected	100	(97.1)
Lead surgeon for primary procedure is a locum		
Yes	5	(4.9)
No	98	(95.1)
Total	**103**	

The most common indication for revision was dislocation (47%). This reflects the fact that all the linked revisions are early revisions due to the short follow-up. Indeed, the median time from primary to revision procedure was 39 days.

54% of patients with linked hip procedures were female. 38% of the linked revisions were linked to primary total replacements using cement. 35% were linked to primary total replacements not using cement. 1 in 10 linked primary procedures were performed using minimally invasive surgery. Image guided surgery was not used in any of the linked primary procedures. The lead surgeon for the primary procedure was a consultant 85% of the time.

7.5.2 Description of linked knee procedures

Three of the 54 primary knee procedures were linked to two different revision/re-operation procedures. In the descriptions that follow, only the earliest revision is considered, leaving 51 procedures in total.

9 procedures were re-operations other than revision, listed in table 45. Resurfacing of the patella was the most common re-operation type.

Table 45 - *Re-operations linked to primary knee procedures in the NJR database*

Re-operation procedure type	Number
Resurfacing of patella	4
Open reduction and internal fixation (ORIF) for periprosthetic fracture	1
Manipulation under anaesthesia	1
Addition of patella button	2
Not specified	1
Total	**9**

42 procedures were revision procedures (57% single stage revisions, 7.1% stage 1 and 7.1% stage 2 of two-stage revision procedures, and the remainder unspecified). Table 46 overleaf shows characteristics of these linked knee revisions. Again, both stage 1 and stage 2 of two-stage procedures are included as none correspond to the same patient.

The most common indications for revision were aseptic loosening (29%) and infection (29%), followed by instability (14%) and pain (14%). 62% of patients with linked knee procedures were male. The median time to revision was 210 days.

55% of primary procedures were total knee replacements using cement. Total knee replacement procedures not using cement were rare (2.4%). 41% of primary procedures were unicondylar replacements. Minimally invasive surgery was used in 12% of primary procedures. Image guided surgery was not used in any of the linked primary procedures. A consultant performed 93% of primary procedures.

Table 46 - *Characteristics of knee revision procedures linked to primary procedures*

Knee patients	Number	(%)
Gender		
Male	26	(61.9)
Female	16	(38.1)
Time from primary to revision, days		
Median	210	
Inter-quartile range	120 - 273	
Revision operation details		
Revision procedure type		
Single stage revision	24	(57.1)
Stage 1 of two-stage revision	3	(7.1)
Stage 2 of two-stage revision	3	(7.1)
Not specified[138]	12	(28.7)
Indications for revision operation		
Aseptic loosening	12	(28.6)
Infection	12	(28.6)
Instability	6	(14.3)
Pain	6	(14.3)
Lysis	4	(9.5)
Wear of polyethylene component	3	(7.1)
Malalignment	2	(4.8)
Periprosthetic fracture	1	(2.4)
Others	3	(7.1)
Primary operation details		
Primary procedure type		
Total replacement using cement	23	(54.8)
Total replacement not using cement	1	(2.4)
Hybrid procedure	0	(0)
Unicondylar replacement	17	(40.5)
Patello-femoral replacement	1	(2.3)
Primary procedure complexity		
Primary	6	(14.3)
Complex primary	0	(0)
Not specified	36	(85.7)
Age at primary operation, years		
Mean (sd)	63.6	(10.6)
Inter-quartile range	56.0 - 70.93	
Patient physical status at primary operation[139]		
P1 - Fit and healthy	13	(31.0)
P2 - Mild disease, not incapacitating	18	(42.9)
P3 - Incapacitating systemic disease	11	(26.1)
Indications for primary procedure		
Osteoarthritis	42	(100)
Others	1	(2.4)

[138] Revisions entered using MDS version 1, which did not allow specification of revision procedure type

[139] Patient physical status according to American Society of Anaesthesiology scoring system (ASA grade)

[140] It is possible that the number of lead surgeons who were consultants is an overestimate as a consultant may have been declared the lead for any procedures under his consultancy, even if he was not actually performing them

Table 46 - *Characteristics of knee revision procedures linked to primary procedures (continued)*

Knee patients	Number	(%)
Lead surgeon grade at primary operation[140]		
Consultant	39	(92.9)
Associate specialist/Staff Grade/ Clinical Assistant[141]	1	(2.4)
With consultant assistance	1	(100)
Without consultant assistance	0	(0)
SPR/SHO/Other	2	(4.7)
With consultant assistance	2	(100)
Without consultant assistance	0	(0)
Lead surgeon from non-UK surgical team for primary[142]		
No/not selected	42	(100)
Lead surgeon at primary operation is a locum		
Yes	1	(2.4)
No	41	(97.6)
Minimally invasive surgery used for primary procedure		
Yes	5	(11.9)
No	36	(85.7)
Not selected	1	(2.4)
Image guided surgery used for primary procedure		
No	41	(97.6)
Not selected	1	(2.4)
Total	**42**	

7.6 Discussion

Comparison with 2003 data

Characteristics of patients and of lead surgeons for hip and knee revision procedures in 2004 closely reflect those found for procedures in 2003.

Comparison of linked procedures with all procedures

The linked revisions will have all taken place within 18 months of the primary procedure (due to the short follow-up time). Therefore, characteristics of these linked procedures should reflect those of 'early' revisions.

[141] Definitions of staff positions are provided in the Glossary

[142] Numbers for 'lead surgeon from non-UK surgical team' should be interpreted with caution as data quality checks revealed some misinterpretation of this data item. The percentage from overseas is likely to be an over-estimate

A key difference between the linked primary hip procedures and all primary hip procedures is the type of procedure performed: whilst 54% of all primary hip procedures were total hip replacements using cement, only 38% of primary procedures linked to a revision were total replacements using cement. The percentage of procedures that were total hip replacements not using cement is higher for linked primary procedures than for all primary procedures (35% versus 20%). Another difference is the use of minimally invasive surgery, reportedly employed in 10% of linked primary procedures, compared with 6.5% of all primary procedures. The higher incidence of minimally invasive surgery use may be explained by the fact that this technique is currently more commonly used in total hip replacements not using cement. Otherwise linked primary procedure characteristics, including lead surgeon characteristics, are broadly in line with characteristics of all primary hip procedures.

Patients with linked hip procedures tended to be younger at their primary procedure than other hip patients. The most frequent indications for linked revisions are noticeably different from that for all revisions: dislocation was the most common indication for a linked revision, whilst aseptic loosening was the most common indication for all revisions. Periprosthetic fracture, malalignment, and infection were more frequently given indications for linked revisions than for all revisions. The difference in indications is expected since the linked revisions are 'early' revisions (within 18 months of the primary); whereas all other revisions entered may have taken place any length of time after the primary procedure. In other respects, the linked revisions possess similar characteristics to other revision procedures, including the type of revision procedure (single stage, two-stage etc).

Linked knee primary procedures differ from other primary knee procedures in terms of patient gender and physical status, procedure type, minimally invasive surgery use and lead surgeon grade. Close to two thirds of linked knee patients were male. By contrast, females represent the majority of all primary knee patients and the male/female split for all revision patients is fairly even. Fewer linked procedures were total replacement using cement (55% versus 81% for all primary procedures) and many more were unicondylar replacements (41% versus 8.9%). Linked patients generally had a poorer physical status than other knee patients (74% versus 87% classed as ASA grade 1 or 2: 'fit and healthy' or 'mild disease, not incapacitating'). Again, minimally invasive surgery tended to be used more frequently in linked primary procedures than in all procedures (12% versus 6%). A consultant was more likely to lead or assist in a linked primary procedure than in all primary procedures. Other linked primary procedure characteristics were broadly similar to those for all primary knee procedures.

Linked knee patients were on average seven years younger than the mean age of all knee patients at the primary procedure. The most common indications for a linked revision differ to those for all revision procedures: Aseptic loosening was identified as a cause in over half of all revision procedures, but in only 29% of linked revisions. Infection was an indication for 29% of linked revisions, compared with 15% of all revisions. Procedure type (single stage, two-stage etc) for linked revision procedures resembled that for all revision procedures.

All comparisons above should be interpreted with extreme caution as numbers of linked procedures are small (particularly for knee procedures) and so percentages in tables are not precise. All the more important, comparisons are likely to be biased due to varying 'linkable percentages' for different groups of patients. The high prevalence of a certain characteristic amongst the linked procedures (e.g. minimally invasive surgery use for primary procedures) may well be because procedures with this characteristic are more likely to be linked in the database (higher linkable percentage) than because the characteristic is actually associated with a greater risk of revision.

Potential future analyses

As mentioned in Section 7.5, analysis of linked procedures is limited to descriptive tables because of the low numbers of procedures and low 'linkable percentage'[143]. In future years, with a higher linkable percentage, the linked procedures can be used to compute revision risks and ascertain risk factors for revision. In addition, implementation of a 'continuous monitoring scheme' would be possible.

There is a need for a system to monitor new prosthesis components once introduced into clinical practice and to give early warning of poor performance. Continuous monitoring methods include a group of statistical testing procedures that may be used for just such purposes. A newly introduced prosthesis component is continuously monitored by charting a measure of the risk of revision (compared to some benchmark) over time, based on the cumulative evidence of consecutive patients implanted with this component. If the measure crosses some pre-specified boundary, an alert is issued that the component may be underperforming.

The NJR provides an opportunity for centralised use of these continuous monitoring methods. This would support the climate of prosthesis innovation, while assuring that poorly performing new prostheses would be identified quickly. These continuous monitoring methods could also be used to monitor outcomes of hospitals, surgeons or particular surgical procedures.

[143] Percentage of all relevant hip and knee revision/re-operation procedures performed in England and Wales that may be linked to the corresponding primary procedure in the NJR database via patient NHS number (see Section 4)

[144] 'Brand' refers to a manufacturer's product description, e.g. Charnley Elite

[145] This total includes cemented and cementless prostheses and resurfacing cups and heads

[146] On 1 April 2005 NICE joined with the Health Development Agency to become the new National Institute for Health and Clinical Excellence (also known as NICE)

[147] National Institute for Clinical Excellence (2000) Technology Appraisal Guidance - No.2 Guidance on the selection of prostheses for primary total hip replacement

[148] National Institute for Clinical Excellence (2000) Technology Appraisal Guidance - No.44 Guidance on the use of metal on metal hip resurfacing arthroplasty

8 Prostheses used in hip replacement procedures (primary and revision)

8.1 Brands[144] of prostheses entered into the NJR

In total, for the 2004 data collection period, 88 different brands of acetabular cups and 101 different brands of femoral stems were recorded in the NJR[145].

8.2 The role of the NJR in the implementation of the NICE guidelines on the choice of primary hip and resurfacing prostheses

8.2.1 Background

In April 2000 The National Institute for Clinical Excellence[146] (NICE) issued guidance on the selection of prostheses for primary total hip replacement[147]. This guidance established benchmarks for the effectiveness of different brands of total hip prostheses. This was

Table 47 - *ODEP criteria for categorising products in relation to NICE's benchmarks - version 4 January 2005*

Pre-entry benchmark products	
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
Products that do not meet the benchmark should only be used as part of a clinical trial	*Unacceptable evidence*

followed, two years later, by similar guidance on the use of hip resurfacing arthroplasty[148].

The NHS Purchasing and Supply Agency (PASA) was given the responsibility of assisting trusts with the implementation of these guidelines by collating the views of all manufacturers regarding compliance with the NICE benchmarks and making them available to the NHS. However, it soon became apparent that various parties, including hospitals, surgeons and manufacturers were interpreting the guidance differently.

Therefore, in December 2002, PASA established the 'Orthopaedic Data Evaluation Panel' (ODEP) to provide an independent assessment of the clinical outcomes data, submitted by implant manufacturers, regarding the compliance of brands of total hip and hip resurfacing prostheses with the NICE benchmarks, referred to above.

The committee was to be chaired by a senior member of the British Orthopaedic Association.

Other members of the ODEP committee would include:

- A representative of the British Hip Society
- A representative of PASA
- A trust Medical Director
- A representative of the Royal College of Surgeons - Clinical Effectiveness Unit
- A representative of the NJR Centre

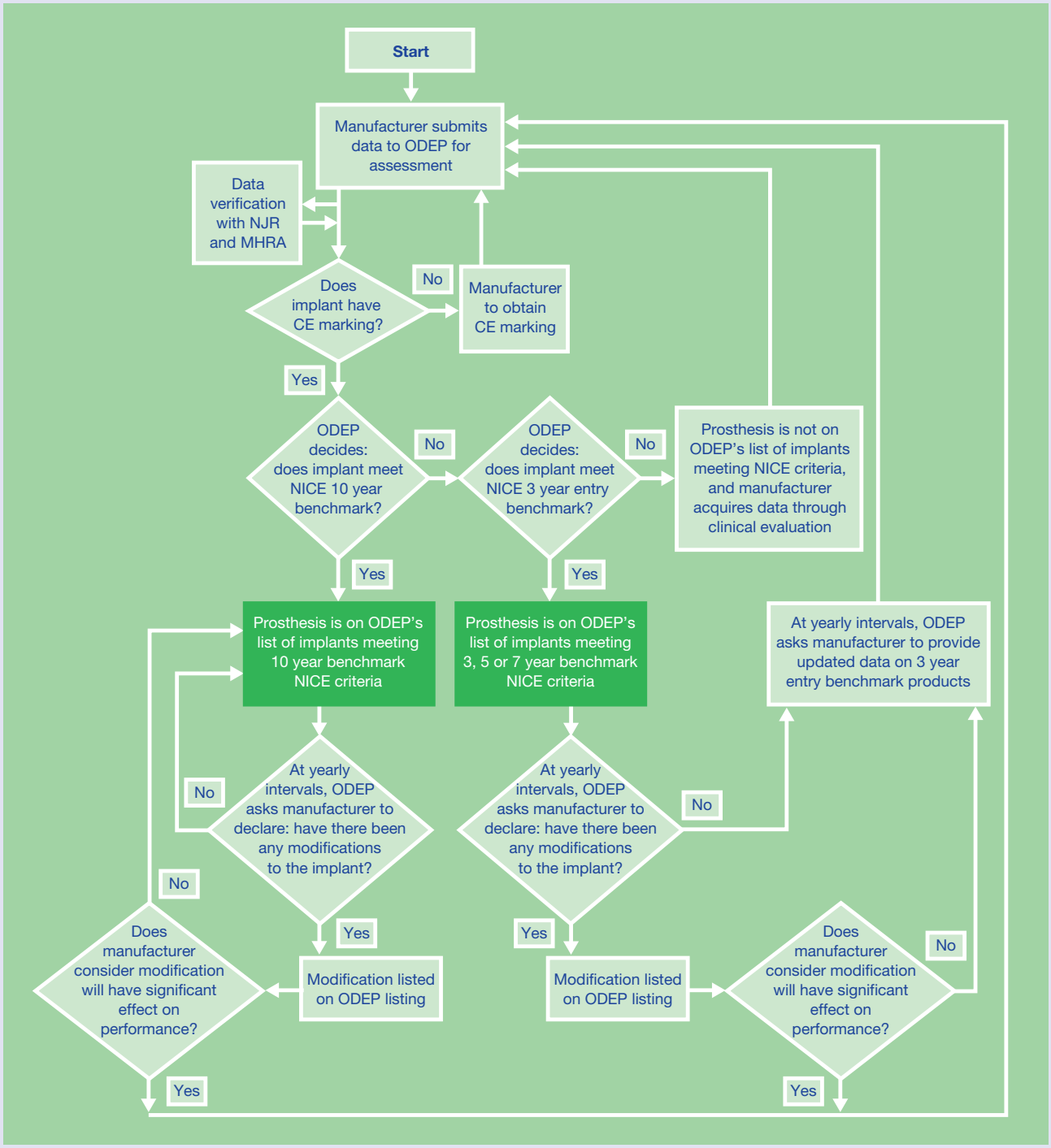
The first task of this group was to ensure that both industry and the surgical community had a common understanding of the NICE guidance on the clinical outcomes data required for compliance. Following extensive dialogue between ODEP and industry representatives through the Association of British Healthcare Industries, a document was produced outlining the ODEP criteria for product categorisation against the NICE benchmarks. This has undergone a series of amendments and improvements and the definitive version is shown in Table 47.

Entry benchmark		Full benchmark	
5 years	**7 years**	**10 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 – All product failures 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 A – Acceptable evidence* – Failure rate of 7% or less – Kaplan Meier survivorship submitted – 95% confidence intervals to include benchmark – All UK implanting centres identified – All product failures 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 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 – Weak evidence – Acceptable failure rate – Study results submitted – Failures identified	*Level B – Weak evidence* – Acceptable failure rate – Study results submitted – Failures identified	*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	
Unacceptable evidence	*Unacceptable evidence*	*Unacceptable evidence*	**NICE benchmark**

Once this classification had been agreed by all parties, ODEP worked with industry to develop a standard data extraction template which could be used by all manufacturers, to summarise the clinical outcomes data being submitted for any hip stem, cup or resurfacing device from peer reviewed publications or from unpublished clinical studies.

The ODEP committee reviewed the claims for each brand and assigned a rating based upon the table 47 (3A, 5B, Unacceptable etc). It was agreed from the outset that it was only the responsibility of ODEP to assess the quality and quantity of the data as submitted. It was solely the responsibility of the company submitting the file to warrant the validity and completeness of the content.

A flow diagram was used by the committee when reviewing submissions. This is shown below:



Examination of this chart and of the ODEP criteria shows the potential importance of NJR data in such assessments:

1) All criteria levels state that all implantations of product should be entered into the NJR

2) The NJR database would highlight any usage of brands for which no clinical data has been submitted to ODEP

3) The NJR could also highlight widespread usage of products that have been classified as still being at the pre-market entry phase

8.2.2 Results of ODEP assessments

December 2003 saw the first submissions from industry in support of products considered to meet the NICE ten year benchmark. This was followed in March 2004 by the publication of a list of such products approved by ODEP. Following further reviews, a full list was published in March 2005 showing the ODEP evaluations of all products for which it had received submissions. This list was launched at a meeting of the British Hip Society in the same month. It included details on 65 brands of femoral stems and 59 acetabular cups.

There were some notable absentees from the list and ODEP worked with the NJR to perform a gap analysis between products submitted to ODEP, and brands recorded as being implanted by the NJR database. This resulted in ODEP questioning the status of an additional 45 cup and 40 femoral stem brands. Comments and revised submissions from several manufacturers were reviewed by ODEP in June 2005. Several of these implants were intended for revision only and were outside the scope of current NICE guidance.

The latest listings for all brands currently being used by hospitals in England and Wales can be seen in Appendix 7 in Part 3 of this report or by visiting the NHS PASA website on www.pasa.nhs.uk/orthopaedics/odepdatabase/

8.2.3 Analysis of results

Analysis of the summary data shows that the usage of products meeting the full ten year benchmark as recommended by NICE is as follows[149]:

Cemented Stems - 72.5 % (9 brands out of 45 seen on NJR database)

Cementless Stems - 58.1 % (5 brands out of 48 seen on NJR database)

Cemented Cups - 53.6 % (7 brands out of 41 seen on NJR database)

Cementless Cups - 0.0 % (0 brands out of 39 seen on NJR database)

It must be restated here that 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.

However, it must be recognised that there are 22 brands of femoral stem, 27 brands of acetabular cup and two brands of resurfacing prostheses for which there have been no submissions to ODEP. Submissions for a further 22 brands of stem,19 brands of cup and four brands of resurfacing prostheses contain only up to a maximum of three years clinical outcomes data or contain unacceptable longer-term outcome data; these prostheses therefore fail to meet the benchmarks set by NICE. One important role of the NJR is in monitoring of the performance of these newer technologies.

8.2.4 Brand sales of conventional total hips and resurfacing prostheses

Tables 48 - 52 overleaf and on page 92 show the most frequently used brands in England and Wales during 2004, as assessed by their rate of entry into the NJR database. For reference, their individual level of assessment according to ODEP criteria is also included.

[149] Figures taken from tables in Appendix 6 in Part 3 of the report

Table 48 - *The 20 cemented cup brands entered most frequently into the NJR in 2004 for hip replacement procedures*

Manufacturer	Brand	Number used (%)	ODEP rating
DePuy	Elite Plus Ogee	3,711 (15.0)	10A
Stryker Howmedica Osteonics	Contemporary Duration	3,540 (14.3)	5A
DePuy	Charnley	3,167 (12.8)	10A
DePuy	Charnley Ogee	2,837 (11.4)	10A
Stryker Howmedica Osteonics	Exeter Duration Cup	2,374 (9.6)	10A
DePuy	Elite Plus	1,499 (6.0)	5B
Biomet	Stanmore Arcom	1,019 (4.1)	10A
Zimmer	ZCA	955 (3.9)	7A
Smith & Nephew	Opera	778 (3.1)	5B
Joint Replacement Instrumentation Ltd	JRI	733 (3.0)	10B
Corin	Cenator	599 (2.4)	3A
DePuy	Ultima	567 (2.3)	7A
DePuy	Wroblewski Golf Ball	529 (2.1)	3B
Centerpulse	Muller Low Profile	527 (2.1)	not submitted
Waldemar Link	Flange	292 (1.2)	not submitted
DePuy	Wroblewski Angle Bore	262 (1.1)	7B
Waldemar Link	Interplanta	175 (0.7)	10A
Biomet	Apollo	168 (0.7)	pre-entry
Biomet	CMK	168 (0.7)	10C
Centerpulse	Muller Full Profile	153 (0.6)	not submitted
Others		729 (2.9)	
Total		**24,782**	

Table 49 - *The 20 cementless cup brands entered most frequently into the NJR in 2004 for hip replacement procedures*

Manufacturer	Brand	Number used (%)	ODEP rating
Zimmer	Trilogy	3,489 (21.0)	7A
Joint Replacement Instrumentation Ltd	CSF	3,201 (19.3)	10B
DePuy	Duraloc	2,659 (16.0)	7A
Stryker Howmedica Osteonics	Trident	1,467 (8.8)	pre-entry
DePuy	Pinnacle	1,112 (6.7)	3A
Smith & Nephew	Reflection	701 (4.2)	7B
Stryker Howmedica Osteonics	ABG II UHMWPE/Duration	631 (3.8)	3A
Stryker Howmedica Osteonics	ABG II Ceramic System	545 (3.3)	pre-entry
Endo Plus (UK) Limited	EP-Fit	462 (2.8)	3A
Stryker Howmedica Osteonics	Secur-Fit	259 (1.6)	5A
Centerpulse	Fitmore	259 (1.6)	7B
B Braun / Aesculap	Plasma Cup	227 (1.4)	not submitted
Centerpulse	Allofit	211 (1.3)	5A
Wright Medical UK Ltd	Anca Ace	198 (1.2)	3A
Endo Plus (UK) Limited	Bicon-Plus	190 (1.1)	7A
DePuy	Ultima	150 (0.9)	3A
Biomet	Exceed	144 (0.9)	pre-entry
Biomet	Mallory Head	123 (0.7)	3A
Surgicraft	Atlas-Split	87 (0.5)	not submitted
Centerpulse	CLS	82 (0.5)	10C
Other		407 (2.5)	
Total		**16,604**	

Table 50 - *The 20 cemented stem brands entered most frequently into the NJR in 2004 for hip replacement procedures*

Manufacturer	Brand	Number used (%)	ODEP rating
Stryker Howmedica Osteonics	Exeter	13,808 (44.9)	10A
DePuy	Charnley	5,248 (17.1)	10A
DePuy	C Stem	2,826 (9.2)	5A
Zimmer	CPT	2,000 (6.5)	7A
Biomet	Stanmore	1,232 (4.0)	10A
DePuy	Elite Plus	866 (2.8)	5A
Joint Replacement Instrumentation Ltd	Furlong Modular	633 (2.1)	10C
Waldemar Link	SP II	580 (1.9)	10A
Stryker Howmedica Osteonics	Omnifit Cemented	533 (1.7)	10A
Centerpulse	Muller Modular	489 (1.6)	10A
Centerpulse	MS-30	358 (1.2)	5B
Smith & Nephew	Spec- EF	228 (0.7)	10A
Zimmer	Versys	216 (0.7)	3A
Endo Plus (UK) Limited	CPS Plus	205 (0.7)	3A
Biomet	Biomet Mainstream Muller	185 (0.6)	pre-entry
Biomet	CMK	181 (0.6)	10C
DePuy	Ultima Straight Cemented Stem	179 (0.6)	10C
DePuy	Ultima TPS Cemented Stem	164 (0.5)	5A
Biomet	Olympia	108 (0.4)	5B
B Braun/Aesculap	Centrament	98 (0.3)	3B
Other		585 (1.9)	
Total		**30,722**	

Table 51 - *The 20 cementless stem brands entered most frequently into the NJR for 2004 hip replacement procedures*

Manufacturer	Brand	Number used (%)	ODEP rating
Joint Replacement Instrumentation Ltd	Furlong-HAC	3,098 (30.1)	10A
DePuy	Corail	2,362 (23)	10A
Stryker Howmedica Osteonics	ABG2	720 (7.0)	pre-entry
DePuy	S-Rom	575 (5.6)	5B
Zimmer	VerSys Fibremetal Taper Coat (FMT)	558 (5.4)	3A
Endo Plus (UK) Limited	SL-Plus	448 (4.4)	7A
Stryker Howmedica Osteonics	Omnifit HA	277 (2.7)	10A
Biomet	Bimetric	228 (2.2)	10B
Wright Medical UK Ltd	Ancafit	216 (2.1)	3A
Centerpulse	CLS	213 (2.1)	10A
Smith & Nephew	Synergy	212 (2.1)	not submitted[150]
Biomet	Taperloc	144 (1.4)	10B
Stryker Howmedica Osteonics	Accolade	121 (1.2)	3B
Biomet	Aura II stem	111 (1.1)	pre-entry
B Braun/Aesculap	Bicontact Stem	105 (1.0)	10C
DePuy	Solution	97 (0.9)	revision stem[151]
Stryker Howmedica Osteonics	Restoration	94 (0.9)	revision stem[151]
Waldemar Link	Davies	90 (0.9)	not submitted
DePuy	KAR	88 (0.9)	revision stem[151]
Finsbury	Freeman	82 (0.8)	10C
Other		438 (4.3)	
Total		**10,277**	

[150] More precisely, insufficient detail in original submission so will be re-submitting

[151] Prostheses designed solely for use in revision procedures have not been rated by ODEP

Table 52 - *Brands of resurfacing heads entered into the NJR in 2004*

Manufacturer	Brand	Number used (%)	ODEP rating
Smith & Nephew	Birmingham Hip Resurfacing Device	3,508 (74.4)	5A
Corin	Cormet 2000	638 (13.5)	pre-entry
Depuy	ASR	257 (5.4)	pre-entry
Wright Medical UK Ltd	Conserve	137 (2.9)	3A
Centerpulse	Durom	133 (2.8)	pre-entry
Finsbury	Adept	27 (0.6)	not submitted
Biomet	Recap	8 (0.2)	pre-entry
International Orthopaedics Ltd	Icon	8 (0.2)	pre-entry
Total		**4,716**	

For a complete list of the usage of all brands please refer to Appendix 7 in Part 3 of this report.

8.2.5 NJR and ODEP - the future

A review meeting was held with NICE in July 2005. Following this meeting, NICE has issued a statement with the agreement of all parties concerned:

"NICE acknowledges the notable achievements of the NHS Purchasing and Supply Agency (PASA) in gathering data related to benchmarking, and the establishment of the Orthopaedic Data Evaluation Panel (ODEP).

NICE believes that, with the continued support of the British Orthopaedic Association, British Hip Society and Association of British Healthcare Industries, both PASA and the National Joint Registry (NJR) will continue to play vital roles in developing valuable databases on the performance of hip prostheses. Their respective successes in collecting information from manufacturers and in attaining a high compliance rate amongst orthopaedic surgeons have enabled the development of highly regarded databases.

ODEP has independently established data collection methods based on the original NICE guidance, and the Institute supports their initiative and acknowledges the need for continued development which assists implementation of the guidance."

NICE has indicated that they will review the situation again in 2008.

The above endorsement of ODEP's initiative means that the ODEP committee will become the main body for the evaluation of clinical outcomes data of hip and hip resurfacing prostheses pertaining to the market in England and Wales. NJR data will become a key tool to be used by the committee and manufacturers especially for evaluating the clinical outcomes of newer brands and technologies in the early years of their usage.

The classifications, published by the ODEP committee, have created a lot of interest in both the UK and overseas. As a result PASA is currently in discussion with the British Orthopaedic Association regarding the possibility of extending the evaluation process to include total knee and other joint prostheses.

8.3 The most frequently entered combinations of cups and stems

For 39,174 hip replacement procedures in the 2004 data, both the cup and stem brand was known[152]. A total of 574 different combinations of cup brand and stem brand were recorded for these procedures. The 20 combinations most frequently entered into the NJR are listed in table

[152] For other procedures the cup and/or stem brand was missing e.g. because the component was custom made or there was conflicting information in the database as to the brand used

[153] The highlighted stem-cup combinations are those that involve 'mixing and matching'

[154] This is less than the total number of relevant hip procedures due to the usage of monobloc stems that do not require a separate head. Also, for some heads entered, the size or material used was unknown

[155] Less than 55 years old at operation, according to the American Hip Society cut-off

53. The most common cup-stem brand combination recorded was the Exeter V40 stem combined with the Contemporary Duration cup.

Highlighted in the table are those combinations where the stem brand manufacturer is different from the cup brand manufacturer - combinations that involve 'mixing and matching'. Of the 39,174 procedures included in this section, 9,718 (25%) used 'mixed and matched' cup-stem combinations.

8.4 Femoral head material and size

Of the 36,567[154] femoral heads recorded in the NJR, roughly three quarters were made of metal (table 54). The remainder were ceramic (alumina or zirconia). This is very similar to the figures found for the 2003 data (76% metal).

Looking at just the 'young' patients (less than 55 years old), there is a much more even split between metal and ceramic use. Ceramic heads have actually been used more frequently than metal heads in this age group, with 42% being metal.

Table 55 overleaf shows the frequency of the different femoral head sizes in the 2004 data. The 28 mm head size is by far the most commonly used (in 72% of all procedures using heads). For 'young' patients the 28 mm head is also the most frequently used.

Table 54 - *Frequency of material chosen for femoral heads for procedures performed in 2004*

Material	Number used (%) - all patients	Number used (%) - 'young' patients[155]
Metal	27,575 (75.4)	751 (42.3)
Ceramic	8,992 (24.6)	1,023 (57.7)
Total	**36,567[154]**	**1,774**

Table 53 - *The 20 stem and cup combinations most frequently entered into the NJR in 2004[153]*

Stem manufacturer	Stem brand	Cup manufacturer	Cup brand	Frequency	Mixed and matched?
Stryker Howmedica Osteonics	Exeter V40	Stryker Howmedica Osteonics	Contemporary Duration	2,920	no
Joint Replacement Instrumentation Ltd	Furlong-HAC	Joint Replacement Instrumentation Ltd	CSF	2,808	no
DePuy	Charnley	DePuy	Charnley	2,576	no
Stryker Howmedica Osteonics	Exeter V40	Stryker Howmedica Osteonics	Exeter Duration Cup	2,245	no
Stryker Howmedica Osteonics	Exeter V40	DePuy	Elite Plus Ogee	2,140	yes
DePuy	Charnley	DePuy	Charnley Ogee	1,995	no
DePuy	Corail	DePuy	Duraloc	1,416	no
Stryker Howmedica Osteonics	Exeter V40	Zimmer	Trilogy	1,031	yes
Biomet	Stanmore	Biomet	Stanmore Arcom	843	no
Stryker Howmedica Osteonics	Exeter V40	Stryker Howmedica Osteonics	Trident	795	no
Zimmer	CPT	Zimmer	ZCA	759	no
Stryker Howmedica Osteonics	Exeter V40	DePuy	Elite Plus	728	yes
Zimmer	CPT	Zimmer	Trilogy	678	no
DePuy	Corail	DePuy	Pinnacle	582	no
Joint Replacement Instrumentation Ltd	Furlong Modular	Joint Replacement Instrumentation Ltd	JRI	576	no
Zimmer	VerSys Fibremetal Taper Coat (FMT)	Zimmer	Trilogy	528	no
DePuy	C Stem	DePuy	Elite Plus Ogee	519	no
Stryker Howmedica Osteonics	Exeter V40	Corin	Cenator	450	yes
Stryker Howmedica Osteonics	Omnifit Cemented	Stryker Howmedica Osteonics	Contemporary Duration	412	no
DePuy	C Stem	DePuy	Duraloc	396	no
	Other combinations			14,777	
Total				**39,174**	

Table 55 - *Frequency of femoral head sizes for procedures performed in 2004*

Head size	Number used (%) - all patients	Number used (%) - 'young' patients
22.225 mm	2,380 (6.5)	125 (7.0)
26.00 mm	3,915 (10.7)	81 (4.6)
28.00 mm	26,290 (71.9)	1,229 (69.3)
32.00 mm	2,427 (6.6)	173 (9.8)
Other size	1,555 (4.3)	166 (9.3)
Total	**36,567**[154]	**1,774**

Table 56 shows that ceramic femoral heads used tended to be larger in size than metallic heads with 94% of ceramic heads being in the larger two sizes (28 mm and 32 mm), compared with 73% of metallic heads.

Table 56 - *Frequency of femoral head sizes according to material used for procedures performed in 2004*

Head size	Metal	Ceramic
	Number used (%)	Number used (%)
22.225 mm	2,031 (7.4)	349 (3.9)
26.00 mm	3,915 (14.2)	0 (0)
28.00 mm	18,980 (68.8)	7,310 (81.3)
32.00 mm	1,273 (4.6)	1,154 (12.8)
Other size	1,376 (5.0)	179 (2.0)
Total	**27,575**	**8,992**

8.5 Discussion

Comparison with 2003 data

The total number of brands entered into the NJR has increased. 88 different brands of acetabular cups and 101 different brands of femoral stems were recorded in the NJR in 2004, compared with 78 cup brands and 91 stem brands in 2003[156]. A total of 22 brands of cups and 28 brands of stems are new in the 2004 data, whilst there are 12 brands of cups and 18 brands of stems that appeared in data from 2003 and that do not appear in the 2004 data[157].

The most frequently used brands of cups and stems (as assessed by their rate of entry into the NJR database) are unchanged. The DePuy range of Ogee cemented cups, Zimmer Trilogy cementless cup, Stryker Howmedica Osteonics Exeter V40 cemented stem and the JRI Furlong HAC cementless stem are each the most frequently used of their type (cemented cups, cementless cups, cemented stems and cementless stems respectively) in both years. Brands of resurfacing prostheses in 2004 occupy similar shares of the market as in 2003. There are two brands of resurfacing prostheses new to the 2004 data.

The most common cup and stem brand combinations appearing in the 2004 data also appeared as common combinations in the 2003 data. The percentage of 'mixed and matched' cup-stem combinations is slightly larger than for the 2003 data collection period (25% versus 22%).

Size and material of femoral heads used in 2004 are largely on a par with heads used in 2003.

[156] Numbers include resurfacing heads and cups and revision stems (hence larger than numbers reported in 1st Annual Report which excluded these prosthesis types)

[157] Figures should be interpreted with caution as brand names may have changed and some brands have been redefined so that, e.g. a single brand in 2003 has been subdivided into two separate brands in 2004

[158] 'Brand' refers to a manufacturer's product description, e.g. PFC Sigma, and may reflect the name of a knee replacement system with various technical options under the same name

[159] Refers to procedures entered into the NJR. Fixed/mobile bearing inserts may exist for brands where 'no' is given here, but no procedures in the NJR had this particular tibial insert type

9 Prostheses used in knee replacement procedures (primary and revision)

9.1 Brands[158] of prostheses entered most frequently into the NJR

For the 2004 data collection period, a total of 33 different brands of total condylar knee prostheses were recorded. In addition, 10 brands of unicondylar prostheses, three brands of patello-femoral replacement prostheses and seven brands of hinged prostheses were recorded.

Table 57 gives the 20 brands of total condylar knee replacement prostheses entered most frequently into the NJR in the 2004 data collection period for TKR and hybrid procedures. The PFC Sigma was the most frequently entered brand, constituting 36% of the total number of prostheses entered. The AGC, followed by the NEXGEN, were the next most commonly reported brands.

The brands of unicondylar prostheses entered into the NJR in 2004 for unicondylar procedures are listed in table 58 overleaf. The Oxford unicondylar knee was by far the most frequently entered brand, used in over three quarters of unicondylar procedures.

Three brands of patello-femoral joint replacements were entered into the NJR in 2004 (table 59 overleaf). The Avon was used in 91% of patello-femoral replacements and the Lubinus in 8% of procedures.

Brands of hinged prostheses entered into the NJR in 2004 are shown in table 60 overleaf. Both one-piece hinged prostheses and hinged prostheses comprising separate components are given. Over half of all hinged prostheses entered were branded as Endo Hinge and were mostly rotating one-piece total hinged knees.

Table 57 - *The 20 total condylar knee brands entered most frequently into the NJR in 2004 for total knee replacements and hybrid primary and revision procedures*

Manufacturer	Brand	Number used (%)	Fixed bearing tibial insert?[159]	Mobile bearing tibial insert?[159]	Cemented?	Cementless?
DePuy	PFC Sigma	14,101 (36.2)	yes	yes	yes	yes
Biomet	AGC	5,158 (13.3)	yes	yes	yes	yes
Zimmer	NEXGEN	4,723 (12.1)	yes	yes	yes	yes
Stryker Howmedica Osteonics	Kinemax	3,418 (8.8)	yes	yes	yes	no
Stryker Howmedica Osteonics	Scorpio	2,346 (6.0)	yes	yes	yes	yes
DePuy	LCS	2,158 (5.5)	no	yes	yes	yes
Wright Cremascoli Ortho	IB II	987 (2.5)	yes	no	yes	yes
Smith & Nephew	Genesis II	889 (2.3)	yes	yes	yes	yes
Endo Plus (UK) Limited	Endoplus	770 (2.0)	yes	yes	yes	yes
Smith & Nephew	Profix	700 (1.8)	yes	no	yes	yes
Corin	Rotaglide+	607 (1.6)	yes	yes	yes	yes
Wright Cremascoli Ortho	Advance	422 (1.1)	yes	no	yes	yes
Biomet	Maxim	402 (1.0)	no	yes	yes	no
DePuy	AMK	400 (1.0)	yes	no	yes	yes
Centerpulse	NK2	299 (0.8)	yes	no	yes	yes
Smith & Nephew	Genesis	217 (0.6)	yes	yes	yes	no
Stryker Howmedica Osteonics	Duracon	199 (0.5)	yes	no	yes	yes
Intavent - Orthofix	Orthofix Medial	136 (0.3)	yes	no	yes	yes
Finsbury	Rotation Knee	126 (0.3)	yes	no	yes	no
Centerpulse	FS	114 (0.3)	yes	yes	yes	yes
Others		750 (1.9)				
Total		**38,922**				

Table 58 - *The unicondylar knee brands entered into the NJR in 2004 for unicondylar knee procedures*

Manufacturer	Brand	Number used (%)	Cemented?	Cementless?
Biomet	Oxford Phase III	2,877 (76.0)	yes	yes
DePuy	Preservation	329 (8.7)	yes	no
Zimmer	MG Uni	264 (7.0)	yes	no
Waldemar Link	Sled	109 (2.9)	yes	no
Corin	ACM/Uniglide	89 (2.4)	yes	yes
Stryker Howmedica Osteoni	Euis	42 (1.1)	yes	no
Smith & Nephew	Genesis	35 (0.9)	yes	yes
Endo Plus (UK) Limited	UC-Plus	26 (0.7)	yes	no
Wright Cremascoli Ortho	Advance	15 (0.4)	no	yes
DePuy	PFC Sigma	1 (0.03)	yes	no
Total		**3,787**		

Table 59 - *The patello-femoral joint brands entered into the NJR in 2004 for patello-femoral joint replacement procedures*

Manufacturer	Brand	Number used (%)
Stryker Howmedica Osteoni	Avon	353 (90.7)
Waldemar Link	Lubinus	32 (8.2)
Corin	Leicester	4 (1.1)
Total		**389**

9.2 Usage of fixed versus mobile bearing tibial inserts

Tibial inserts used in total condylar procedures on all patients were predominantly fixed bearing (86% of all procedures using tibial inserts, compared with 15% involving mobile bearing tibial inserts, as shown in table 61 opposite). Looking only at 'young patients' (less than 55 years old), fixed bearings remain the more frequently chosen component type.

9.3 Patella resurfacing

The patella was resurfaced in 14,847 procedures in 2004. This is 37% of the 40,673 total knee replacements and hybrid primary and revision procedures.

9.4 Discussion

Comparison with 2003 data

There are four brands of total condylar prostheses that are new to the 2004 data, whilst seven brands of total condylar prostheses that appeared in 2003 do not appear in 2004. There is one additional unicondylar prosthesis brand in the 2004 data and another unicondylar prosthesis brand no longer appears. There is also one new patello-femoral joint knee brand[160].

The most frequently used total condylar knee brand (PFC Sigma) and unicondylar knee brand (Oxford) (as assessed by their rate of entry into

Table 60 - *The hinged prostheses brands entered into the NJR in 2004*

Manufacturer	Brand	All hinged prostheses		Fixed total hinged knee (one piece)		Rotating total hinged knee (one piece)		Hinged/linked knee (separate components)	
		Number	(%)	Number	(%)	Number	(%)	Number	(%)
Waldemar Link	Endo Hinge	173	(51.5)	5	(35.7)	167	(70.8)	1	(1.2)
Stryker Howmedica Osteonics	MRH	76	(22.6)	0	(0)	69	(29.2)	7	(8.1)
DePuy	Noiles	35	(10.4)	0	(0)	0	(0)	35	(40.7)
Biomet	Stanmore	32	(9.5)	9	(64.3)	0	(0)	23	(26.7)
Endo Plus (UK) Limited	RT-Plus	14	(4.2)	0	(0)	0	(0)	14	(16.3)
Stanmore Implants Worldwide	Smiles	5	(1.5)	0	(0)	0	(0)	5	(5.8)
Wright Cremascoli Ortho	Guardian	1	(0.3)	0	(0)	0	(0)	1	(1.2)
Total		**336**		**14**		**236**		**86**	

Table 61 - *Usage of fixed versus mobile bearing tibial inserts in 2004*

Tibial insert type	Number used (%) - all patients		Number used (%) - 'young' patients	
Fixed bearing	27,645	(85.5)	779	(80.5)
Mobile bearing	4,677	(14.5)	189	(19.5)
Total	**32,322**		**968**	

the NJR database) were also the most frequently used in 2003. Likewise, the Avon remains the most commonly entered brand of patello-femoral joint replacement. One difference to 2003 is the addition of a third brand, the Leicester, to the list of patello-femoral joint brands.

The percentage of tibial inserts that are mobile bearing has increased slightly from 12% in 2003 to 15% in 2004.

The prevalence of patella resurfacing procedures in 2004 was largely unchanged from 2003 (37% compared to 39%).

10 Cement and bone substitute use

10.1 Cement use

Table 62 shows that the majority (89%) of procedures entered into the NJR in 2004 involving cement, where reported, used antibiotic-loaded cement, as opposed to non-antibiotic. Manufacturers of antibiotic-loaded cement are given in table 63. The most commonly reported manufacturer of antibiotic-loaded cement was Schering-Plough, reportedly used in 57% of procedures where a cement brand was given. Schering-Plough was also the most commonly reported manufacturer of non-antibiotic cement (table 64 overleaf).

More than one packet of cement could be entered for a particular procedure. For knee procedures, between 1 and 11 packets were entered for a single procedure. For hip procedures, up to 10 packets were entered.

Table 62 - *Type of cement used in hip and knee replacement procedures entered into the NJR in 2004, where recorded*

Cement type	Hip procedures		Knee procedures		All procedures	
	Number	(%)	Number	(%)	Number	(%)
Antibiotic	27,110	(85.4)	31,727	(91.5)	58,837	(88.6)
Non-antibiotic	3,465	(10.9)	2,823	(8.1)	6,288	(9.5)
Mixture[161]	1,175	(3.7)	107	(0.4)	1,282	(1.9)
Total	**31,750**		**34,657**		**66,407**	

Table 63 - *Manufacturers of antibiotic-loaded bone cement recorded for hip and knee replacement procedures entered into the NJR in 2004*

Manufacturer	Hip procedures		Knee procedures		All procedures	
	Number	(%)	Number	(%)	Number	(%)
Schering-Plough	13,281	(49.0)	19,756	(62.4)	33,037	(56.9)
Biomet	4,498	(16.6)	6,928	(21.9)	11,426	(19.7)
Stryker Howmedica Osteonics	5,488	(20.2)	1,982	(6.3)	7,470	(12.9)
DePuy	3,055	(11.3)	3,017	(9.5)	6,072	(10.5)
Midland Medical Technologies Ltd	19	(0.1)	2	(0.01)	21	(0.04)
Mathys Orthopaedics Ltd	1	(0.004)	0	(0)	1	(0.002)
Mixture[162]	768	(2.8)	42	(0.1)	810	(1.4)
Total	**27,110**		**31,685**		**58,027**	

[160] Figures should be interpreted with caution as brand names may have changed and some brands have been redefined so that, e.g. a single brand in 2003 has been subdivided into two separate brands in 2004

[161] Mixture implies both antibiotic and non-antibiotic cement was recorded as having been used in a single procedure

[162] Mixture implies cement from more than one manufacturer was recorded as having been used in a single procedure

Table 64 - *Manufacturers of non-antibiotic bone cement recorded for hip and knee replacement procedures entered into the NJR in 2004*

Manufacturer	Hip procedures		Knee procedures		All procedures	
	Number	(%)	Number	(%)	Number	(%)
Schering-Plough	818	(23.6)	1,479	(52.4)	2,297	(36.5)
Stryker Howmedica Osteonics	1,633	(47.1)	426	(15.1)	2,059	(32.7)
Biomet	367	(10.6)	514	(18.2)	881	(14.0)
DePuy	399	(11.5)	401	(14.2)	800	(12.7)
Corin	56	(1.6)	0	(0)	56	(0.9)
Centerpulse	2	(0.1)	0	(0)	2	(0.03)
Mixture[162]	190	(5.5)	3	(0.1)	193	(3.1)
Total	**3,465**		**2,823**		**6,288**	

Table 65 - *Manufacturers of bone substitutes recorded as having been used in hip and knee replacement procedures entered into the NJR in 2004*

Manufacturer	Hip procedures		Knee procedures		All procedures	
	Number	(%)	Number	(%)	Number	(%)
DePuy	34	(20.9)	5	(21.7)	39	(21.4)
Stryker Howmedica Osteonics	27	(16.6)	9	(39.1)	36	(19.8)
Endo Plus (UK) Limited	31	(19.0)	0	(0)	31	(17.0)
Wright Cremascoli Ortho	27	(16.6)	2	(8.7)	29	(15.9)
ApaTech Products	20	(12.3)	2	(8.7)	22	(12.1)
Corin	18	(11.0)	4	(17.4)	22	(12.1)
Joint Replacement Instrumentation Ltd	2	(1.2)	1	(4.3)	3	(1.6)
Mixture[163]	4	(2.5)	0	(0)	4	(2.2)
Total	**163**		**23**		**182**	

10.2 Bone substitute use

Table 65 lists the manufacturers of bone substitutes entered into the NJR for hip and knee procedures in 2004. Bone substitutes were recorded for just 182 (0.2%) of the 93,885 hip and knee procedures. Of these procedures, 21% used bone substitutes manufactured by DePuy and 20% used bone substitutes manufactured by Stryker Howmedica Oseteonics.

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

11 Mortality of hip and knee replacement patients

This section looks at death following a hip or knee replacement procedure. Statistics are based on the subgroup of patients with NHS numbers (entered into the NJR or traced via NSTS), for whom a date of death can be traced through the NSTS.

2003 data is combined with 2004 data to give more precise results (since the number of procedures is greater).

11.1 Mortality of primary hip replacement patients

31,060 primary hip replacement patients with operation dates between 1 April 2003 and 31 December 2004 have NHS numbers. A date of death was traced for 533 (1.7%) of these patients through the NSTS at the latest check[164].

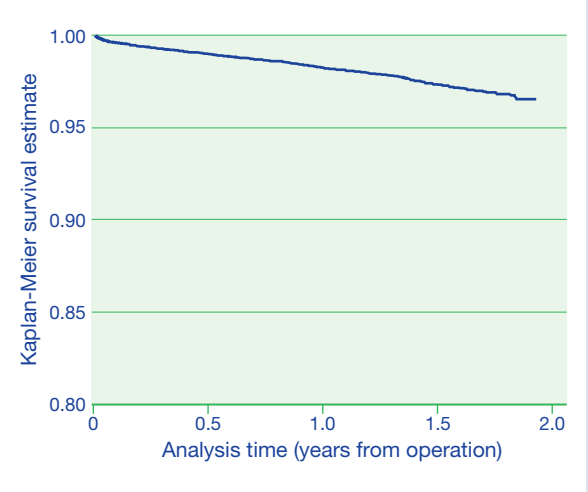
Graphs 4, 5 and 6 show Kaplan-Meier survival curves for survival from death over the 18 months of follow-up after primary hip replacement procedures, overall and stratified according to gender and age.

[163] Mixture implies bone substitutes from more than one manufacturer were recorded as having been used in a single procedure

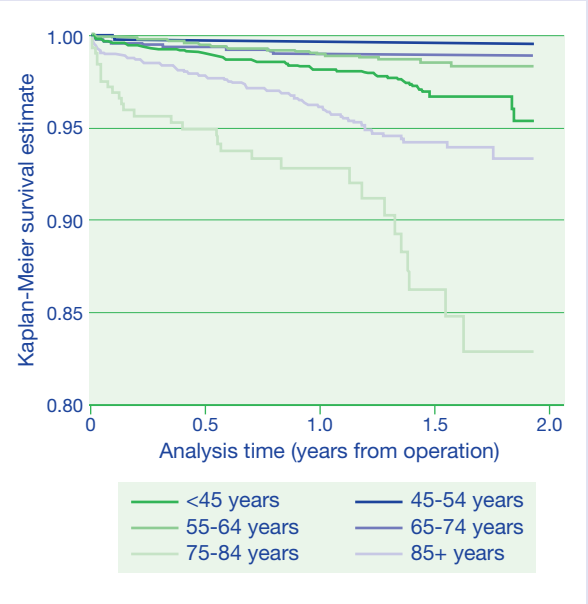
[164] Deaths were last checked through NSTS on 6 March 2005

[165] Obtained from survival analysis, taking into account the differing lengths of time patients have been in the NJR database

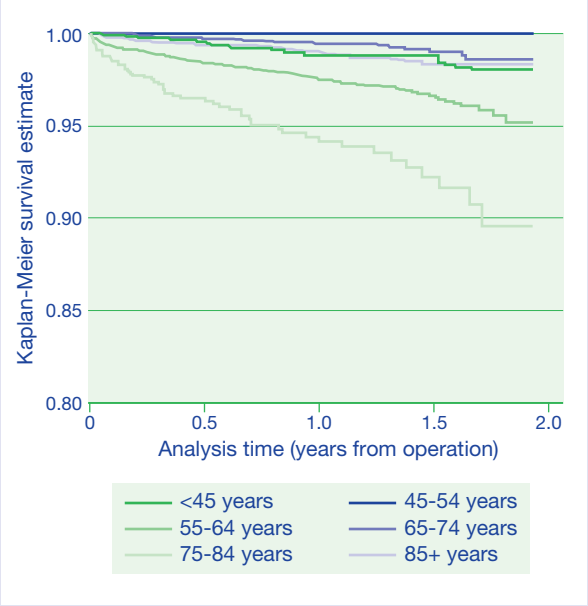
Graph 4 - *Survival from death of all primary hip replacement patients with NHS number recorded in the NJR*



Graph 5 - *Survival from death of male primary hip replacement patients, according to age*



Graph 6 - *Survival from death of female primary hip replacement patients, according to age*



11.1.1 3-month and 1-year mortality rates

203 of the 31,060 primary hip replacement patients have a date of death within 3 months of their operation. This corresponds to an overall 3-month mortality rate of 0.64% (0.56%, 0.73%)[165]. The 1-year mortality rate is 1.70% (1.54%, 1.87%).

Table 66 overleaf shows 3-month mortality rates after primary hip replacement operations according to age, gender, procedure type and certain types of surgical practice used in the procedure. Males had a higher 3-month mortality rate than females (0.69% versus 0.60%). The 3-month mortality rate increased with age, as might be expected. 3-month mortality rates did not vary to a great extent according to use of minimally invasive surgery and use of image guided surgery. Risk of death within 3-months did vary according to procedure type. 3-month mortality following a resurfacing arthroplasty procedure was lower than for the other procedure types. It is important to note that these mortality rates have not been adjusted to take account of possible differences in case-mix between the various categories of patients. For example, resurfacing arthroplasty patients tend to be younger than patients undergoing other procedures.

Age-gender specific 3-month mortality rates are given in table 67 overleaf.

Table 66 - *3-month mortality rates for primary hip replacement patients according to gender, age and surgical practice*

	Total number of hip patients with NHS numbers	Number dying within 3 months of operation	3-month mortality rate[166], as a percentage (95% CI)
Gender			
Male	12,598	91	0.69 (0.56, 0.85)
Female	18,462	112	0.60 (0.50, 0.73)
Age group			
<45 years	968	1	0.10 (0.01, 0.73)
45-54 years	2,614	9	0.35 (0.18, 0.66)
55-64 years	7,183	10	0.14 (0.08, 0.26)
65-74 years	11,399	55	0.48 (0.37, 0.63)
75-84 years	7,687	91	1.15 (0.93, 1.41)
85+ years	1,209	37	2.90 (2.09, 4.02)
Use of thrombo-phophylaxis regime recommended			
No	907	3	0.33 (0.11, 1.02)
Yes	30,153	200	0.65 (0.56, 0.75)
Procedure type			
Total replacement using cement	17,821	140	0.78 (0.66, 0.92)
Total replacement not using cement	6,087	31	0.48 (0.33, 0.69)
Hybrid	3,989	28	0.68 (0.47, 0.99)
Resurfacing arthroplasty	3,163	4	0.13 (0.05, 0.34)
Minimally invasive surgery used			
No	28,619	183	0.62 (0.54, 0.72)
Yes	1,848	14	0.76 (0.45, 1.28)
Image guided surgery used			
No	29,907	193	0.63 (0.55, 0.73)
Yes	216	1	0.46 (0.07, 3.24)
Total	**31,060**	**203**	**0.64 (0.56, 0.73)**

Table 67 - *Age-gender specific 3-month mortality rates for primary hip replacement patients*

	Total number of hip patients with NHS numbers	Number dying within 3 months of operation	3-month mortality rate[166], as a percentage (95% CI)
Males			
<45 years	521	1	0.19 (0.03, 1.35)
45-54 years	1,351	6	0.45 (0.20, 0.99)
55-64 years	3,341	5	0.15 (0.06, 0.36)
65-74 years	4,642	27	0.58 (0.40, 0.85)
75-84 years	2,414	36	1.41 (1.01, 1.97)
85+ years	329	16	4.28 (2.56, 7.12)
Females			
<45 years	447	0	0[167]
45-54 years	1,263	3	0.24 (0.08, 0.74)
55-64 years	3,842	5	0.13 (0.05, 0.31)
65-74 years	6,757	28	0.42 (0.29, 0.60)
75-84 years	5,273	55	1.03 (0.79, 1.34)
85+ years	880	21	2.39 (1.56, 3.64)
Total	**31,060**	**203**	**0.64 (0.56, 0.73)**

[166] Calculated using survival analysis, taking into account the differing lengths of time patients have been in the NJR database

[167] No confidence interval can be calculated if the incidence of deaths is 0

[168] Deaths were last checked through NSTS on 6 March 2005

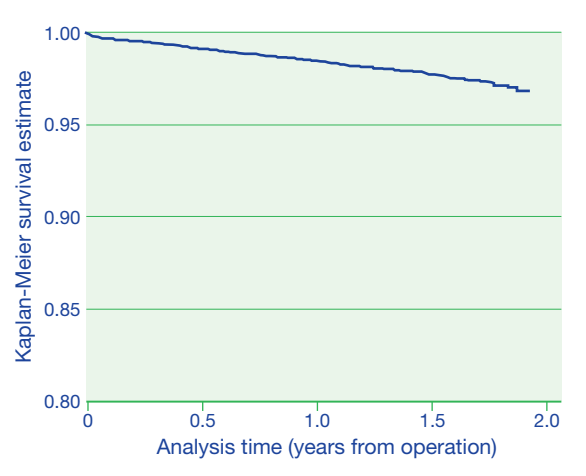
[169] Obtained from survival analysis, taking into account the differing lengths of time patients have been in the NJR database

11.2 Mortality of primary knee replacement patients

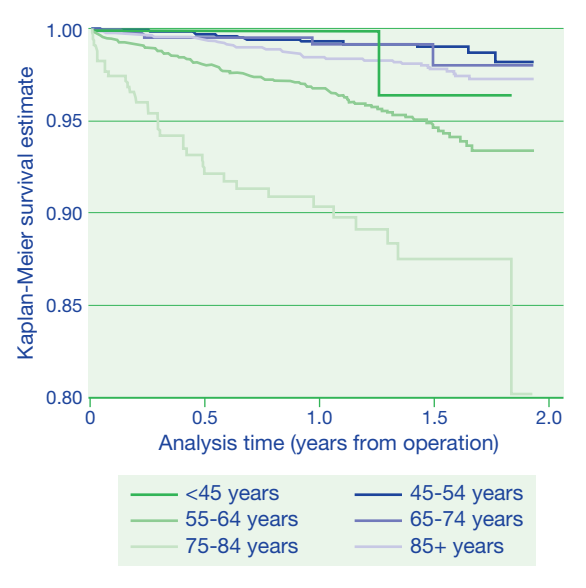
29,857 primary knee replacement patients with operation dates between 1 April 2003 and 31 December 2004 have NHS numbers. A date of death was traced for 474 (1.6%) of these patients through the NSTS at the latest check[168].

Graphs 7, 8 and 9 show Kaplan-Meier survival curves for survival from death over the 18 months of follow-up after primary knee replacement procedures, overall and stratified according to gender and age.

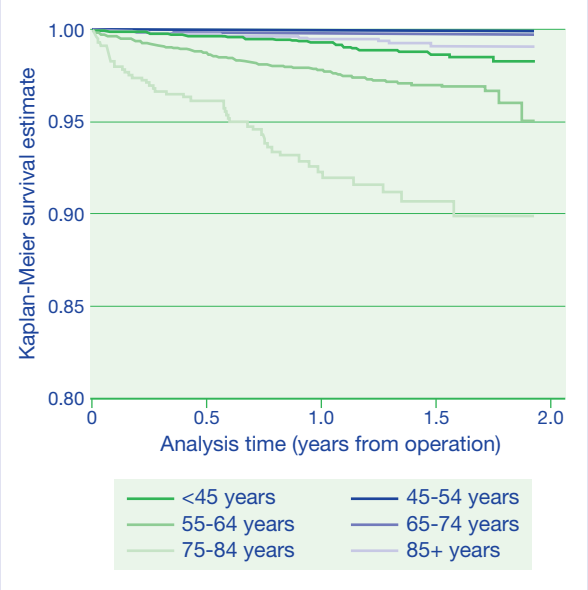
Graph 7 - *Survival from death of primary knee replacement patients*



Graph 8 - *Survival from death of male primary knee replacement patients, according to age*



Graph 9 - *Survival from death of female primary knee replacement patients, according to age*



11.2.1 3-month mortality rates

153 of the 29,857 primary knee replacement patients have a date of death within 3 months of their operation. This corresponds to an overall 3-month mortality rate of 0.49% (0.42%, 0.58%)[169]. The 1-year mortality rate is 1.58% (1.42%, 1.75%).

Table 68 overleaf shows 3-month mortality rates after primary knee replacement operations according to age, gender, procedure type and certain types of surgical practice used in the procedure. 3-month mortality amongst male primary knee replacement patients was higher than for females. The risk of death within 3 months increased with age. Little difference in the 3-month mortality rate was seen depending on whether image guided surgery was used or not (0.61% versus 0.49%). However, there was a reduced risk of death within 3-months if minimally invasive surgery was used (0.52% versus 0.12%). The 3-month mortality rate was lowest for hybrid and unicondylar procedures and highest for total replacements using cement. Again, these are all unadjusted mortality rates and so should be interpreted with caution. In particular, the lower mortality rates for hybrid and unicondylar procedures may reflect the fact that these procedures tend to be used in younger patients.

Table 68 - *3-month mortality rates for primary knee replacement patients according to gender, age and surgical practice*

	Total number of knee patients with NHS numbers	Number dying within 3 months of operation	3-month mortality rate[170], as a percentage (95% CI)
Gender			
Male	13,109	77	0.54 (0.42, 0.68)
Female	16,748	76	0.45 (0.36, 0.57)
Age group			
<45 years	244	0	0[171]
45-54 years	1,377	2	0.15 (0.04, 0.58)
55-64 years	6,535	8	0.12 (0.06, 0.24)
65-74 years	11,511	28	0.22 (0.15, 0.32)
75-84 years	9,132	79	0.82 (0.66, 1.03)
85+ years	1,058	36	3.42 (2.48, 4.71)
Use of thrombo-phophylaxis regime recommended			
No	885	2	0.23 (0.06, 0.90)
Yes	28,972	151	0.50 (0.42, 0.59)
Procedure type			
Total replacement using cement	24,550	142	0.55 (0.47, 0.65)
Total replacement not using cement	2,022	7	0.35 (0.17, 0.73)
Hybrid	610	0	0[171]
Unicondylar	2,397	3	0.13 (0.04, 0.39)
Patello-femoral replacement	278	1	0.36 (0.05, 2.52)
Minimally invasive surgery used			
No	27,420	148	0.52 (0.44, 0.61)
Yes	1,735	2	0.12 (0.03, 0.46)
Image guided surgery used			
No	28,824	148	0.49 (0.42, 0.58)
Yes	330	2	0.61 (0.15, 2.41)
Total	**29,857**	**153**	**0.49 (0.42, 0.58)**

Age-gender specific 3-month mortality rates are given in table 69.

Table 69 - *Age-gender specific 3-month mortality rates for primary knee replacement patients*

	Total number of knee patients with NHS numbers	Number dying within 3 months of operation	3-month mortality rate[170], as a percentage (95% CI)
Males			
<45 years	107	0	0[171]
45-54 years	596	2	0.34 (0.08, 1.35)
55-64 years	3,156	3	0.10 (0.03, 0.29)
65-74 years	5,310	18	0.28 (0.17, 0.47)
75-84 years	3,585	38	0.95 (0.68, 1.33)
85+ years	355	16	4.54 (2.81, 7.31)
Females			
<45 years	137	0	0[171]
45-54 years	781	0	0[171]
55-64 years	3,379	5	0.15 (0.06, 0.36
65-74 years	6,201	10	0.16 (0.09, 0.30)
75-84 years	5,547	41	0.74 (0.55, 1.01)
85+ years	703	20	2.85 (1.85, 4.38)
Total	**29,857**	**153**	**0.49 (0.42, 0.58)**

12 Patient-reported outcomes measurement - interim study

12.1 Patient reported outcomes at least one year after a hip or knee replacement

In March 2005, the NJR carried out a postal survey in a group of 10,000 patients who had undergone a replacement of a hip joint and in a group of 10,000 patients who had undergone a replacement of a knee joint in England or Wales between April and December 2003. The aim of this survey was to examine how patients viewed the outcome of their joint replacement at least one year after the surgery. The questionnaire contained the Oxford Hip Score or the Oxford Knee Score.[173] Both instruments consist of 12 questions on problems and symptoms related to the joint replacement in the last four weeks. They were developed to be completed by patients having a joint replacement. The answer to each question is rated on a scale ranging from 1 to 5 with higher scores indicating more severe problems. The scores for each question are added to generate an overall score between 12 and 60.

Patients were also asked whether they had experienced problems other than those addressed in the Oxford Hip or Knee Scores and whether they were satisfied with their prosthesis. The survey questionnaire that was used for patients who had undergone a hip replacement was broadly similar to the one that was used for the National Total Hip Replacement Outcome Study. This study was carried out in more than 13,000 patients who had undergone a primary total hip replacement in a 12-month period in 1996-1997 in three regions in England.[174]

Appendix 8 of the web version of this report provides copies of the full survey packages, the version sent to hip patients and the version sent to knee patients. (See NJR website at www.njrcentre.org.uk)

12.2 Outcomes after a primary unilateral hip replacement

Of the 10,000 survey questionnaires that were sent out, 9,942 could be linked with data in the NJR database. A further 1,084 questionnaires were excluded for the following reasons:

- 791 had been sent to patients who had a revision procedure
- 139 had been sent to patients who had undergone a bilateral procedure (some of which were in combination with a revision procedure on the other side)
- 90 had been sent to patients who had already received a questionnaire for an earlier operation

As a result, questionnaires sent to 8,922 patients who had undergone a unilateral primary procedure could be considered. Of these questionnaires, 7,838 (88%) were returned, 1,060 (12%) were not, and 24 (0.3%) had been sent to patients who had subsequently moved.

To evaluate the generalisability of the results, a comparison was made between the characteristics of the patients who returned the questionnaire, the characteristics of patients who did not and the characteristics of the other patients operated on in the same period who were not sent a questionnaire (table 70 overleaf). This comparison revealed only small differences between these three groups. The patients who had not returned the questionnaire were slightly younger than the other groups.

12.2.1 Oxford Hip Score

The mean total Oxford Hip Score could be calculated in 7,130 of the 7,838 patients who

[170] Calculated using survival analysis, taking into account the differing lengths of time patients have been in the NJR database

[171] No confidence interval can be calculated if the incidence of deaths is 0

[172] Calculated using survival analysis to take account of censoring

[173] Questionnaire on the perceptions of patients about total hip replacement - Dawson J, Fitzpatrick R, Carr A, Murray D. *Journal of Bone and Joint Surgery(Br) 1998 (78-B: 185-190);* Questionnaire on the perceptions of patients about total knee replacement - Dawson J, Fitzpatrick R, Murray D, Carr A. *Journal of Bone and Joint Surgery(Br) 1998 (80-B: 63-69)*

[174] National Total Hip Replacement Outcome Study. Final report to the Department of Health, January 2000 - A Joint Report from The Royal College of Surgeons of England and the British Orthopaedic Association

Table 70 - *Patient characteristics for primary hip replacement procedures in 2003, according to participation in the patient outcome survey*

	Questionnaire returned		Questionnaire not returned		Questionnaire not sent		Total	
	Number	(%)	Number	(%)	Number	(%)	Number	(%)
NHS Trusts or independent sector hospital								
NHS	5,317	(67.8)	761	(70.2)	9,088	(64.9)	15,166	(66.1)
Independent sector	2,312	(29.5)	295	(27.2)	3, 920	(28.0)	6,527	(28.5)
Unknown	209	(2.7)	28	(2.6)	999	(7.1)	1,2364	(5.4)
Patient procedure								
Total hip replacement using cement	4,897	(62.5)	627	(57.8)	8,039	(57.4)	13,563	(59.2)
Total hip replacement not using cement	1,275	(16.3)	185	(17.1)	2,064	(14.7)	3,524	(15.4)
Total hip replacement not classified (e.g. hybrid)	951	(12.1)	132	(12.2)	2,316	(16.5)	3,399	(14.8)
Resurfacing arthroplasty	715	(9.1)	140	(12.9)	1,588	(11.3)	2,443	(10.6)
Age, years (consenting patients only)								
Mean (sd)	68.5	(10.6)	65.2	(13.6)	68.3	(11.9)	68.2	(11.3)
< 65 years	2,663	(34.0)	491	(45.3)	1,7823	(35.3)	4,977	(35.3)
65 to 70 years	1,441	(18.4)	153	(14.1)	885	(17.1)	2,479	(17.6)
70 to 80 years	2,704	(34.5)	305	(28.1)	1,680	(32.5)	4,689	(33.3)
≥80 years	1,030	(13.1)	135	(12.5)	7677	(15.1)	1,942	(13.8)
Gender (consenting patients only)								
Male	3,137	(40.0)	457	(42.2)	2,108	(40.7)	5,702	(40.5)
Female	4,701	(60.0)	626	(57.8)	3,065	(59.3)	8,392	(59.5)
Physical status								
P1 - Fit and healthy	2,803	(35.8)	373	(34.4)	5,273	(37.7)	8,449	(36.9)
P2 - Mild disease, not incapacitating	4,291	(54.7)	581	(53.6)	7,337	(52.4)	12,209	(53.3)
P3 - Incapacitating systemic disease	717	(9.2)	124	(11.4)	1,325	(9.5)	2,166	(9.5)
P4/P5 - Life threatening disease/expected to die within 24hrs	27	(0.3)	6	(0.6)	72	(0.5)	105	(0.5)
Indications for surgery								
Osteoarthritis	7,418	(94.6)	981	(90.5)	13,078	(93.4)	21,477	(93.7)
Other	420	(5.4)	1032	(9.5)	929	(6.6)	1,452	(6.3)
Total	**7,838**		**1,084**		**14,007**		**22,929**	

returned a questionnaire (91%). The total score was unavailable in the remaining patients because of missing answers to one or more of the 12 questions. In reading the following results it should be remembered that *lower* scores correspond to *better* outcomes.

The mean score was 20.5 (sd 9.6) and the median 17 (inter-quartile range 13 to 25). 19.3% of the patients had an Oxford Hip Score of 12, the lowest possible score, and 9.2% a score of 13, the next lowest possible score, which suggests that about 30% of the patients have no or hardly any problems related to their hip replacement (graph 10). On the other hand, 6.1% of the patients had an Oxford Hip Score of 40 or above, which indicates that these patients have moderate to severe problems.

Patients who had their hip replacement in the independent sector had an Oxford Hip Score

Graph 10 - *Distribution of the Oxford Hip Score in 7,130 patients who underwent a unilateral primary hip replacement*

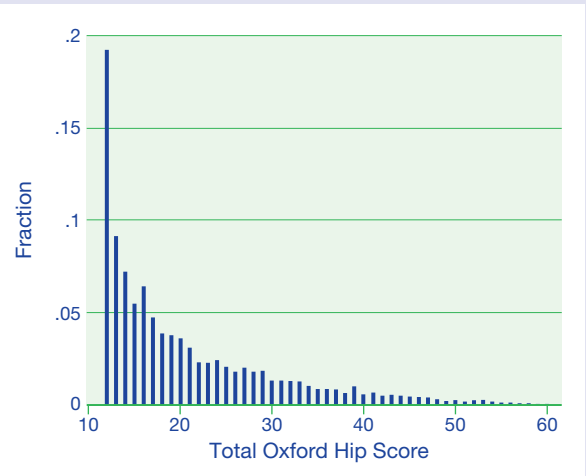


Table 71 - *Mean Oxford Hip Score according to patient characteristics in 7,130 patients who underwent a unilateral primary hip replacement*

	Percentage	Oxford Hip Score
NHS Trusts or independent sector hospital		
NHS	67.5	21.7
Independent sector	29.9	17.9
Unknown	2.6	20.3
Age, years (consenting patients only)		
< 65 years	35.2	19.5
65 to 70 years	18.9	19.9
70 to 80 years	33.9	21.0
≥ 80 years	12.0	23.2
Gender (consenting patients only)		
Male	41.2	19.4
Female	58.9	21.3
Physical status		
P1 - Fit and healthy	36.7	18.7
P2 - Mild disease, not incapacitating	54.3	21.1
P3 - Incapacitating systemic disease	8.7	24.9
P4/P5 - Life threatening disease/expected to die within 24hrs	0.3	22.6
Indications for surgery		
Osteoarthritis	94.8	20.4
Other	5.2	22.6
Total (sd)		**20.5 (9.6)**

that was on average about 4 points lower than NHS patients (table 71). This may reflect the case-mix of patients treated in the independent sector. Patients who were older and patients whose physical status was poorer at the time of surgery had higher Oxford Hip Scores. The Oxford Hip Score of patients who had a total hip replacement with cement was lower than for patients who underwent another procedure (table 72 overleaf). Posterior incisions were linked to lower Oxford Hip Scores.

The most commonly mentioned severe problems were related to pain in the operated hip, difficulties putting on socks or tights, difficulties doing the household shopping alone, painful walking, and limping (table 73 overleaf).

12.2.2 Further operations and other post-operative problems

Of the 7,838 patients who returned a questionnaire, 482 (6.2%) indicated that they already had undergone another procedure or operation on their hip, and 1,119 (14%) indicated that they believed that another operation or procedure was planned for the future. These percentages are remarkably high, which may be partly due to patients interpreting terms such as 'procedure' and 'operation' rather broadly. Furthermore, 221 patients (2.8%) indicated that their prosthesis had dislocated and 1,321 (17%) that they had experienced 'other problems'. In total, 2,480 patients (32%) indicated having at least one of these four above-mentioned setbacks.

Of the 7,705 patients who responded to the question, 6,923 (90%) were satisfied with their hip replacement and 267 (3.5.%) were not satisfied. The remaining 515 patients were not sure (6.7%).

12.2.3 Discussion

The comparison of the characteristics of the patients who returned a survey questionnaire with those who did not, demonstrated that there were no major differences although the patients who had received but did not return the questionnaire seemed to be slightly younger. The results seem therefore a valid reflection of outcomes at least one year after the hip replacement for all patients who were included in the NJR.

Table 72 - *Mean Oxford Hip Score according to surgical practice in 7,130 patients who underwent a unilateral primary hip replacement*

	Percentage	Oxford Hip Score
Patient procedure		
Total hip replacement using cement	61.6	17.1
Total hip replacement not using cement	16.7	21.6
Total hip replacement not classified (e.g. hybrid)	12.2	19.7
Resurfacing arthroplasty	9.5	19.3
Lead surgeon grade		
Consultant	81.5	21.8
Associate Specialist/Staff Grade/Clinical Assistant	8.5	20.2
Specialist Registrar/Senior House Officer	10.0	22.4
Laminar flow theatre		
Yes	94.8	20.5
No	4.2	20.6
Unknown	1.0	20.1
General anaesthesia used		
Yes	62.2	20.1
No	37.8	21.2
Patient position		
Lateral	77.4	20.2
Supine	22.6	21.7
Incision		
Anterior/Antero-Lateral/Lateral	66.5	21.4
Posterior	33.5	18.9
Minimally invasive surgery used		
Yes	4.5	19.7
No	95.6	20.6
Total (sd)		**20.5 (9.6)**

Table 73 - *Symptoms experienced according to individual items of the Oxford Hip Score in 7,838 patients who underwent a unilateral primary hip replacement (all items had missing values, but always less than 4.4%)*

		Percentage
1	Moderate or severe pain in the operated hip	10.5
2	Extremely difficult or impossible to wash and dry oneself	3.7
3	Extremely difficult or impossible to get in a car or to use public transport	4.0
4	Extremely difficult or impossible to put on socks, stockings or tights	11.6
5	Extremely difficult or impossible to do household shopping alone	13.0
6	Only able to walk around house or not at all before pain from hip becomes severe	11.6
7	Extremely difficult or impossible to climb a flight of stairs	7.1
8	Very painful or unbearable to stand up from chair after a meal	3.5
9	Limping most or all of the time	15.6
10	Sudden severe pain from affected hip most days or every day	4.3
11	Pain from operated hip interferes greatly or totally with usual work	6.7
12	Pain from hip in bed has been troubling most nights or every night	7.0

Overall, patients seemed to be happy with their surgery as about 90% indicated that they were satisfied. However, closer consideration of the results reveals a more mixed picture. On the one hand, 30% of the patients indicated that they had no or hardly any problems related to their hip replacement, but also slightly more than 20% said that they had already had another operation on their hip or that one was planned in the future, with a further 17% indicating that they had 'other problems'. Analysis of the individual items of the Oxford Hip Score suggests that these problems might be related to pain and activities that require a good mobility.

The mean Oxford Hip Score of 20.5 found in the NJR study is similar to the 12-month results of 22.4 (sd 7.7) found in the National Total Hip Replacement Outcome Study.[174] The slightly lower score might reflect that since the time of the National Total Hip Replacement Outcome Study (1996-1997) waiting times for surgery have come down reducing wait-related patient disability at the time of surgery. This improved pre-operative status is linked with an improved post-operative outcome.

12.3 Outcomes after a primary unilateral knee replacement

Of the 10,000 survey questionnaires that were sent out, 9,935 could be linked with data in the NJR database. A further 518 questionnaires were excluded for the following reasons:

- 412 had been sent to patients who had a revision procedure
- 80 had been sent to patients who had undergone a bilateral procedure (some of which in combination with a revision procedure on the other side)
- 26 had been sent to patients who had already received a questionnaire for an earlier operation

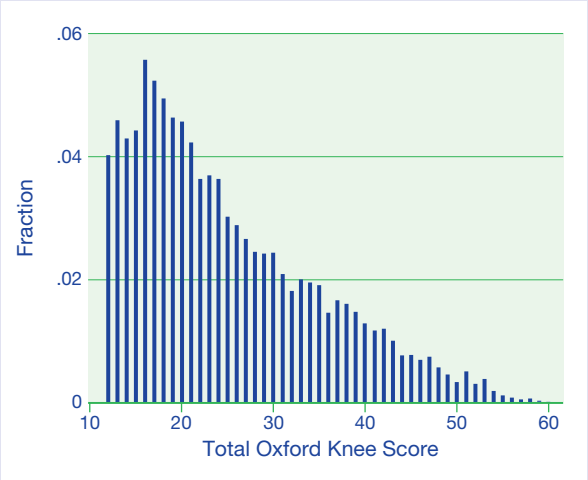
As a result, questionnaires sent to 9,417 patients who had undergone a unilateral primary procedure could be considered. Of these questionnaires, 8,231 (87%) were returned, 1,161 (12%) were not, and 25 (0.3%) had been sent to patients who had subsequently moved.

To evaluate the generalisability of the results, a comparison was made between the characteristics of the patients who returned the questionnaire, the characteristics of patients who did not and the characteristics of the other patients operated on in the same period who were not sent a questionnaire (table 74 overleaf). This comparison revealed only small differences between these three groups. The patients who had been sent a questionnaire were more often treated in the NHS than those who had not been sent a questionnaire.

12.3.1 Oxford Knee Score

The mean total Oxford Knee Score could be calculated in 7,229 of the 8,231 patients who returned a questionnaire (88%). The total score was unavailable in the remaining patients because of missing answers to one or more of the 12 questions. The mean score was 25.0 (sd 10.1) and the median 22 (inter-quartile range 17 to 31). 4.0% of the patients had an Oxford Knee Score of 12, the lowest possible score, and 4.6% a score of 13, the one but lowest possible score, which suggests that slightly less than 10% of the patients have no or hardly any problems related to their knee replacement (graph 11). On the other hand, 11% of the patients had an Oxford Knee Score of 40 or above, which indicates that these patients have moderate to severe problems.

Graph 11 - *Distribution of the Oxford Knee Score in 7,229 patients who underwent a unilateral primary knee replacement*



Patients who had their knee replacement in the independent sector had an Oxford Knee Score that was on average about 4 points lower than NHS patients (table 75 overleaf). The youngest and the oldest age group had higher Oxford Knee Scores than the other age-groups. The Oxford Knee Score was higher in patients whose physical status was poorer at the time of surgery. The Oxford Knee Score in patients who had a patello-femoral replacement was higher than in the patients who underwent other procedures (table 76 on page 110).

Table 74 - *Patient characteristics for primary knee replacement procedures in 2003, according to participation in the patient outcome survey*

	Questionnaire returned		Questionnaire not returned		Questionnaire not sent		Total	
	Number	(%)	Number	(%)	Number	(%)	Number	(%)
NHS Trusts or independent sector hospital								
NHS	6,441	(78.3)	958	(80.8)	10,214	(71.5)	17,613	(74.3)
Independent sector	1,599	(19.4)	197	(16.6)	2,941	(20.6)	4,737	(20.0)
Unknown	191	(2.3)	31	(2.6)	1,136	(8.0)	1,358	(5.7)
Patient procedure								
Total knee replacement using cement	6,917	(84.0)	993	(83.7)	11,609	(81.2)	19,519	(82.3)
Total knee replacement not using cement	547	(6.7)	81	(6.8)	1,166	(8.2)	1,794	(7.6)
Total knee replacement not classified (e.g. hybrid)	113	(1.4)	14	(1.2)	141	(1.0)	268	(1.1)
Unicondylar knee replacement	584	(7.1)	87	(7.3)	1,221	(8.5)	1,892	(8.0)
Patello-femoral replacement	70	(0.9)	11	(0.9)	154	(1.0)	235	(1.0)
Age, years (consenting patients only)								
Mean (sd)	70.8	(8.9)	69.7	(10.6)	70.9	(9.7)	70.7	(9.3)
< 65 years	2,034	(24.7)	414	(34.9)	1,258	(25.9)	3,706	(26.0)
65 to 70 years	1,534	(18.6)	209	(17.6)	828	(17.3)	2,571	(18.0)
70 to 80 years	3,465	(42.1)	393	(33.1)	1,978	(40.7)	5,836	(40.9)
≥ 80 years	1,198	(14.6)	170	(14.3)	799	(16.4)	2,167	(15.2)
Gender (consenting patients only)								
Male	3,557	(43.2)	504	(42.5)	2,119	(43.5)	6,180	(43.3)
Female	4,671	(56.8)	681	(57.4)	2,750	(56.5)	8,102	(56.7)
Physical status								
P1 - Fit and healthy	2,338	(28.4)	313	(26.4)	4,790	(33.5)	7,441	(31.4)
P2 - Mild disease, not incapacitating	4,982	(60.5)	702	(59.2)	8,081	(56.6)	13,765	(58.1)
P3 - Incapacitating systemic disease	902	(11.0)	165	(13.9)	1,390	(9.7)	2,457	(10.4)
P4/P5 - Life threatening disease/expected to die within 24hrs	9	(0.1)	6	(0.5)	30	(0.2)	45	(0.2)
Indications for surgery								
Osteoarthritis	7,924	(96.3)	1,107	(93.3)	13,813	(96.7)	22,844	(96.4)
Other	307	(3.7)	79	(6.7)	478	(3.3)	864	(3.6)
Total	**8,231**		**1,186**		**14,291**		**23,708**	

The most commonly mentioned severe problem was kneeling. More than half of all patients indicated that kneeling was extremely difficult or impossible for them. The interpretation of this percentage is not straightforward as many patients are advised not to kneel after a knee replacement. Other frequently mentioned problems were related to pain in the operated knee, painful walking, limping, and difficulties doing the household shopping alone (table 77 on page 110).

12.3.2 Further operations and other post-operative problems

Of the 8,231 patients who returned a questionnaire, 610 (7.4%) indicated that they already had undergone another procedure or operation on their knee, and 1,476 (18%) indicated that they believed that a future operation was planned. These high percentages might be partly explained because of the use of rather vague terms such as 'procedure' and 'operation' in the questionnaire. Furthermore, 2,206 patients (27%) indicated that they had experienced 'other problems'. In total, 3,404 patients (41%) indicated having at least one of these three above-mentioned setbacks.

Of the 8,095 patients who responded to the question, 6,625 (82%) were satisfied with their knee replacement and 566 (7.0%) were not satisfied. The remaining 904 patients were not sure (11%).

Table 75 - *Mean Oxford Knee Score according to patient characteristics in 7,229 patients who underwent a unilateral primary knee replacement*

	Percentage	Oxford Knee Score
NHS Trusts or independent sector hospital		
NHS	77.9	25.7
Independent sector	19.7	22.0
Unknown	2.4	26.5
Age, years (consenting patients only)		
< 65 years	25.9	26.3
65 to 70 years	19.2	24.0
70 to 80 years	41.4	24.3
≥ 80 years	13.5	26.0
Gender (consenting patients only)		
Male	44.4	23.3
Female	55.6	26.4
Physical status		
P1 - Fit and healthy	28.6	23.9
P2 - Mild disease, not incapacitating	60.6	25.0
P3 - Incapacitating systemic disease	10.6	27.9
P4/P5 - Life threatening disease/expected to die within 24hrs	0.1	27.5
Indications for surgery		
Osteoarthritis	96.4	26.9
Other	3.6	24.9
Total (sd)		**25.0 (10.1)**

12.3.3 Discussion

The comparison of the characteristics of the patients who returned a survey questionnaire with those who did not, demonstrated that there were major no differences. The results seem therefore a valid reflection of outcomes at least one year after the knee replacement for all patients who were included in the NJR.

About 80% of the patients who had a knee replacement indicated that they were happy with the surgery. Overall, patients seemed to be less happy with a knee than with a hip replacement. This observation is supported by the observation that according to the Oxford Knee Score, only about 10% of the patients had no or hardly any problems related to their knee replacement. More than 20% said that they had already had another operation on their knee or that one was planned in the future, and about a quarter had indicated that they had 'other problems'. Analysis of the individual items of the Oxford Knee Score suggests that many of these setbacks might be related to the difficulties experienced with kneeling down and getting up again afterwards.

12.4 Brief summary of the analysis of 'free text' comments made by patients after having completed the Oxford Hip or Knee Score

The last item on the questionnaire that was used for the survey of patients who had undergone a hip or knee replacement between April and December 2003 invited them to make 'any other comments' about their operation or recovery.

To study these free text comments, 1,000 questionnaires each for hip and knee patients were randomly selected from the returned questionnaires and then analysed. About two thirds of the patients (65.5% of the hip patients and 64.8% of the knee patients) had provided comments. In this section, a brief summary of these comments is given. The comments are grouped according to whether they were positive or negative, and the most frequently mentioned benefits and comments are described. The full results of a qualitative analysis of the responses will be published separately. 'Framework analysis' will be used[175],

[175] Green J, Thorogood N. Qualitative Methods for Health Research. Sage Publications London 2005

Table 76 - *Mean Oxford Knee Score according to surgical practice in 7,229 patients who underwent a unilateral primary knee replacement*

	Percentage	Mean Oxford Knee Score
Patient procedure		
Total knee replacement using cement	83.6	25.0
Total knee replacement not using cement	6.7	25.7
Total knee replacement not classified (e.g. hybrid)	1.4	24.6
Unicondylar knee replacement	7.4	23.8
Patello-femoral replacement	0.9	30.3
Lead surgeon grade		
Consultant	76.6	24.7
Associate Specialist/Staff Grade/Clinical Assistant	8.3	26.1
Specialist Registrar/Senior House Officer	15.1	26.0
Laminar flow theatre		
Yes	94.5	25.0
No	4.7	25.1
Unknown	0.8	25.7
General anaesthesia used		
Yes	57.9	24.9
No	42.1	25.1
Skin incision		
Lateral	0.6	23.5
Supine	14.2	24.3
Midline	85.2	25.1
Fat pad removed		
Yes, fully	27.6	25.4
Yes, partially	56.5	25.0
No	16.0	24.2
Tourniquet used		
Yes	94.3	25.6
No	5.7	25.0
Minimally invasive surgery used		
Yes	6.1	23.9
No	93.9	25.1
Total (sd)		**25.0 (10.1)**

Table 77 - *Symptoms experienced according to individual items of the Oxford Knee Score in 8,231 patients who underwent a unilateral primary knee replacement (all items had missing values; 7.4% for item 7, and always less than 3.7% for all others)*

		Percentage
1	Moderate or severe pain in the operated knee	19.8
2	Extremely difficult or impossible to wash and dry oneself	3.9
3	Extremely difficult or impossible to get in a car or to use public transport	7.7
4	Only able to walk around house or not at all before pain from knee becomes severe	16.7
5	Very painful or unbearable to stand up from chair after a meal	7.0
6	Limping most or all of the time	13.4
7	Extremely difficult or impossible to kneel down and get up afterwards	57.0
8	Pain from knee in bed has been troubling most nights or every night	12.9
9	Pain from operated knee interferes greatly or totally with usual work	10.6
10	Most of time or always feeling that knee might suddenly 'give way'	5.1
11	Extremely difficult or impossible to do household shopping alone	15.9
12	Extremely difficult or impossible to climb a flight of stairs	11.4

an approach for analysing qualitative data with the aim of summarising and classifying the responses in a thematic framework.

For a correct interpretation of the results, it is important to realise that patients responded to the question asking whether they had 'any other comments' after they had completed the Oxford Hip or Knee Score and had answered questions directly asking whether they had had another operation, whether they had any other problems with their new joint replacement, and whether they were satisfied with their joint replacement.

12.4.1 Comments given by patients who had a hip replacement

Of the comments that were made, 46.5% were entirely positive in nature, 16.2% entirely negative, 35.2% mixed, and 2.1% neutral.

Examples of positive comments were:

- "My consultant was excellent. My new hip has made me feel 10 years younger and it is so good to not have the awful pain I had before the op."
- "I am very satisfied with the operation. I have even climbed the Sydney Harbour Bridge recently. I would add that I had good aftercare."

Examples of negative comments:

- "My left hip was replaced in May 2000. I feel this [the other hip replacement] was not a total success and adds to any problems I have at the moment."
- "If it was done earlier I would not have such a long op and not so long a recovery."

Examples of mixed comments:

- "It took a long time to get over the op, but it was worth it."
- "Although I don't have any problems, on the very odd occasion I suffer with a stiff leg/hip. I just have to walk a little to get normal mobility."

Examples of neutral comments:

- "I have asthma. This does not help with my walking. I get very breathless. I would like to walk better."
- "The hip replacement in December 2003 was on my right hip, the left one was replaced in 1997, so I now have both hips replaced."

The analysis indicated that the reduction in pain and improvement in daily function are important benefits for patients. On the other hand, pain, either located in the hip or back, was an important problem after the hip replacement. Some patients also mentioned that the recovery had taken longer than expected.

12.4.2 Comments given by patients who had a knee replacement

Of the comments that were made, 44.9% were entirely positive in nature, 17.1% entirely negative, 26.6% mixed, and 11.7% neutral.

Examples of positive comments were:

- "My knee operation has been a great success."
- "I am delighted to say my new knee has given me a new lease of life."

Example of negative comments:

- "I am very disappointed with my new replacement because I am limited to what I can do."
- "Disappointed [that] knee has not made better recovery and is still often extremely painful and hampers movement."

Example of mixed comments:

- "I am very satisfied with my knee replacement, at times it feels stiff but I can walk reasonably well, I cannot kneel as I was advised not to."
- "Yes, I do have difficulties but then again I am alive, which makes me grateful for the position I am in due to my health."

Examples of neutral comments:

- "I am partially sighted and therefore [some of the problems] refer to my disability rather than problems with my knee."
- "I am awaiting a new knee on my right knee in the near future."

Reduction in pain and improvement in daily function were mentioned as important benefits. The inability to kneel and knee pain were important ongoing problems. A number of patients also highlighted the lack of access to physiotherapy. Just as after hip replacements, some patients felt that the recovery had taken longer than expected.

12.4.3 Conclusion

This analysis roughly confirms the results of the Oxford Hip and Knee Scores that were presented earlier. It demonstrates that the majority of the patients are content with the outcome of their joint replacement. On the other hand, there is also a group of patients that is less happy mainly because they have a painful joint and are impaired in their daily functioning.

The proportions of positive and negative comments for knees are similar to that for hips, which is remarkable as patients who have had a knee replacement are often thought to be less satisfied than patients who have had a hip replacement.

Part 3

Appendices

APPENDIX 1

Membership of the NJR Steering Committee

Membership as at 31 July 2005	
Name	**Role/representing**
Bill Darling	Chair
Paul Gregg	Vice Chair
Judy Murray	British Orthopaedic Association (representing the surgical profession)
Martyn Porter	British Hip Society
Timothy Wilton	British Association for Surgery of the Knee
Jan van der Meulen	Royal College of Surgeons (representing the surgical profession)
Alex MacGregor	School of Medicine, Health Policy and Practice University of East Anglia (representing public health and epidemiology)
Wendy Walters	National Association of Theatre Nurses
Christine Edwards	Arthritis Care (patient group representative)
Colin Thomson	All Wales Community Health Councils (patient group representative)
Kenneth Bateman	Smith & Nephew Healthcare Ltd, ABHI (representing the orthopaedic device industry)
Mick Borroff	DePuy International Ltd, ABHI (representing the orthopaedic device industry)
Christine Miles	Royal Orthopaedic Hospital (representing NHS trust management)
Gunnar Nemeth	Capio Group (acting in an advisory role for the independent sector)
Mark Noterman	Department of Health (observer)
Ramila Mistry	Department of Health (observer)
Dominic Worsey	Welsh Assembly Government (observer)
Andrew Crosbie	Medicines and Healthcare products Regulatory Agency
Andrew Smallwood	NHS Purchasing and Supply Agency (observer)
Karen McNeill	Scottish Executive (observer)
Fiona Davies	AEA Technology (representing the contractor)

The following left the Steering Committee during the last year. They are thanked for their contributions.

Chris Dark	BUPA Hospitals (representing the Independent Healthcare Forum)
Stephen Chamberlain	Welsh Assembly Government
Martin Jones	Arthritis Care (patient group representative)

APPENDIX 2

Membership of the NJR Regional Clinical Co-ordinator network

Membership as at 31 July 2005	
Strategic Health Authority/Welsh NHS region	**Regional Clinical Co-ordinator**
ENGLAND	
Avon, Gloucestershire and Wiltshire Strategic Health Authority	Evert Smith (focusing on hips) John Newman (focusing on knees)
Bedfordshire and Hertfordshire Strategic Health Authority	Richard Rawlins
Birmingham and The Black Country Strategic Health Authority	David Dunlop
Cheshire and Merseyside Strategic Health Authority	Richard Parkinson
County Durham and Tees Valley Strategic Health Authority	John Anderson
Coventry, Warwickshire, Herefordshire and Worcestershire Strategic Health Authority	Kevin O'Dwyer
Cumbria and Lancashire Strategic Health Authority	Martyn Porter
Dorset and Somerset Strategic Health Authority	Nick Fiddian
Essex Strategic Health Authority	Godfrey Charnley
Greater Manchester Strategic Health Authority	David Sochart
Hampshire and Isle of Wight Strategic Health Authority	John Britton
Kent and Medway Strategic Health Authority	Philip Housden Hagen Jähnich
Leicestershire, Northamptonshire and Rutland Strategic Health Authority	Colin Esler
Norfolk, Suffolk and Cambridgeshire Strategic Health Authority	Keith Tucker
North and East Yorkshire and Northern Lincolnshire Strategic Health Authority	Mark Andrews Meng Khaw
North Central London Strategic Health Authority	John Skinner
North East London Strategic Health Authority	Gareth Scott
North West London Strategic Health Authority	John Hollingdale
Northumberland, Tyne and Wear Strategic Health Authority	Andrew McCaskie
Shropshire and Staffordshire Strategic Health Authority	Ian dos Remedios
South East London Strategic Health Authority	Mark Rowntree
South West London Strategic Health Authority	David Ward
South West Peninsula Strategic Health Authority	John Timperley
South Yorkshire Strategic Health Authority	Ian Stockley
Surrey and Sussex Strategic Health Authority	Guy Selmon Andrew Skyrme
Thames Valley Strategic Health Authority	Riyaz Jinnah
Trent Strategic Health Authority	Peter Howard
West Yorkshire Strategic Health Authority	Mark Emerton
WALES	
Mid and West Wales	David Woodnutt
North Wales	Replacement being appointed
South East Wales	Alun John Robin Rice

The following left the Regional Clinical Co-ordinator network during the last year. They are thanked for their contributions.

Patrick Li, Kenneth Tuson, Ian Smith

APPENDIX 3A

Membership of the NJR Outlier Performance Advisory Group (NOPAG)

Membership as at 31 July 2005	
Name	**Role/representing**
Bill Darling	Chair, NOPAG and Chair, NJR Steering Committee
Paul Gregg	Vice Chair, NJR Steering Committee
Judy Murray	British Orthopaedic Association (representing the surgical profession)
Martyn Porter	British Hip Society
Tim Wilton	British Association for Surgery of the Knee
Mick Borroff	Association of British Health-Care Industries and DePuy International Ltd (representing the orthopaedic device industry)
David Forsythe	Association of British Health-Care Industries and Stryker (representing the orthopaedic device industry)
Andy Crosbie	Medicines and Healthcare products Regulatory Agency (MHRA)
Mark Noterman	Department of Health, Standards and Healthcare Commission Relations team (DH Policy contact for the NJR)
Damian Jenkinson	Department of Health, Office of Deputy Chief Medical Officer

APPENDIX 3B

Membership of the NJR Research Sub Committee

Membership as at 31 July 2005	
Name	**Role/representing**
Jan van der Meulen	Chair, NJR Research Sub Committee Royal College of Surgeons (representing the surgical profession)
Bill Gillespie	Department of Health, R&D
Alex MacGregor	University of East Anglia, Population Health Group
Ian Learmonth	Association of Professors of Orthopaedic Surgery
Terry Garrett	British Orthopaedic Association, Patient Liaison Group
Martyn Porter	British Hip Society
Tim Wilton	British Association for Surgery of the Knee
Colin Esler	British Orthopaedic Association

APPENDIX 3C

Membership of the Patient Reported Outcomes Measurement Study (PROMS) Group

Membership as at 31 July 2005	
Name	**Role/representing**
Paul Gregg	Chair, PROMS group and Vice Chair, NJR Steering Committee
Colin Esler	RCC, Leicestershire, Northamptonshire and Rutland Strategic Health Authority
Alex MacGregor	University of East Anglia (representing public health and epidemiology)
Jan van der Meulen	Royal College of Surgeons, Clinical Effectiveness Unit
Richard Parkinson	RCC, Cheshire and Merseyside Strategic Health Authority
Martin Pickford	NJR Centre (NJR orthopaedic adviser)
John Timperley	RCC, South West Peninsula Strategic Health Authority
Anthony Vivian	British Orthopaedic Association, Patient Liaison Group

APPENDIX 4

MDS v2 Proformas

Available in the electronic copy of the report only

http://www.njrcentre.org.uk/documents/proforma/pro_index.htm

APPENDIX 5

Compliance with the requirements of the National Joint Registry

A5.1 Introduction to the tables

To establish a clear view of progress made by trusts, hospitals and treatment centres in terms of data submission and patient consent rates, the NJR Steering Committee agreed that relevant statistics should be published in this, the 2nd Annual Report.

A full breakdown of the statistics is available in three tables covering:

- NHS hospitals and treatment centres in England (Table A5.1)
- NHS hospitals in Wales (Table A5.2)
- Independent sector hospitals and treatment centres (Table A5.3)

The breakdown is at the level of individual hospitals and treatment centres, except for comparison against HES figures for the NHS sector in England, which is at trust level.

A5.2 Calculating the statistics

For this assessment of progress, compliance with the NJR has been measured by taking into account both the data submission rate and the NJR patient consent rate.

The data submission rate is calculated by comparing number of records actually submitted to the NJR with the number of records expected (Hospital Episode Statistics (HES)/Patient Episode Database Wales (PEDW) data for the NHS in England and Wales respectively, and 'expected number of records' figures for the independent sector). Note that HES/PEDW data were not available for all participating NHS trusts due to some closures, mergers, new trusts being created and changes of trust names since HES/PEDW statistics were compiled. The patient consent rate is the percentage of records submitted with NJR patient consent.

The patient consent rate has been included as a total for 2004 and to illustrate progress, comparative figures are included for the first quarter (1 January to 31 March inclusive) and second quarter (1 April to 30 June inclusive) of 2005.

A5.3 Which trust does Hospital X belong to?

Table entries are ordered by Trust or independent group name (in alphabetical order) initially. Within each trust/group, hospitals and treatment centres are listed in alphabetical order.

Many readers will want to check the statistics for particular hospitals and treatment centres. To assist, the reader is referred to Appendix 10, Reference lists of hospitals and treatment centres.

A5.4 Interpreting the tables - General

1. A complete record indicates one patient episode submitted electronically. The number of complete records may not always equal the sum total of records for hips and knees since more than one joint may be replaced during the same operation. (These figures exclude any incomplete records held in the NJR edit stack that are awaiting completion.)
2. Patient consent is required for personal details to be recorded on the NJR. A patient's personal details allow, for example, primary and revision operations to be linked, and help identify individuals that have received a specific implant if there is a need for urgent clinical review.
3. Where there are known supporting reasons for date being missing (e.g. a treatment centre having just opened, comparator data being provided in the wrong format) or unusually low values (e.g. a hospital having opened half way through the year in question), this is noted in the relevant table.
4. Column A - Complete records submitted for operations that took place between 1

January and 31 December 2004 inclusive and were entered into the NJR by 28 February 2005.

5. Column B - Complete records submitted for hip operations that took place between 1 January and 31 December 2004 inclusive and were entered into the NJR by 28 February 2005.

6. Column C - Complete records submitted for knee operations that took place between 1 January and 31 December 2004 inclusive and were entered into the NJR by 28 February 2005.

7. Column D - Percentage of records in Column A that have NJR patient consent.

8. Column E - Percentage of records submitted between 1 January and 31 March 2005 inclusive that have NJR patient consent, regardless of when the operations took place.

9. Column F - Percentage of records submitted between 1 April and 30 June 2005 inclusive that have NJR patient consent, regardless of when the operations took place.

10. Where 'N/A' is included in the tables, it indicates that an NJR patient consent rate could not be calculated as no data were entered into the NJR for the period concerned.

A5.5 Interpreting Table A5.1

1. Column G1 - Number of records expected for hip operations that took place between 1 January and 31 December 2004 inclusive (calculated from Hospital Episode Statistics (HES) for the year 1 April 2003 to 31 March 2004 inclusive).

2. Column G2 - Number of records expected for knee operations that took place between 1 January and 31 December 2004 inclusive (calculated from Hospital Episode Statistics (HES) for the year 1 April 2003 to 31 March 2004 inclusive).

3. Column G3 - NJR data submission rate (%) for 2004 = [Column A / (Column G1 + Column G2)] x 100. Note: the HES comparison is at trust level and not individual hospital level. For trusts that include more than one hospital, columns G1, G2 and G3 are completed for the first hospital listed under the trust that submitted data. If a trust has two hospitals (H1, H2), the Column A (Total) figure in the above calculation is Column A (H1) + Column A (H2).

A5.6 Interpreting Table A5.2

1. Column G1 - Number of records expected for hip operations that took place between 1 January and 31 December 2004 inclusive (calculated from Patient Episode Database Wales (PEDW) statistics for the year 1 April 2003 to 31 March 2004 inclusive).

2. Column G2 - Number of records expected for knee operations that took place between 1 January and 31 December 2004 inclusive (calculated from Patient Episode Database Wales (PEDW) statistics for the year 1 April 2003 to 31 March 2004 inclusive).

3. Column G3 - NJR data submission rate (%) for 2004 = [Column A / (Column G1 + Column G2)] x 100.

A5.7 Interpreting Table A5.3

1. Column G1 - Number of records expected for hip operations that took place between 1 January and 31 December 2004 inclusive. The 'expected records' figures are those provided to the NJR Centre by the hospital/treatment centre or group and are the numbers of hip operations carried out between 1 January and 31 December 2004 inclusive.

2. Column G2 - Number of records expected for knee operations that took place between 1 January and 31 December 2004 inclusive. The 'expected records' figures are those provided to the NJR Centre by the hospital/treatment centre or group and are the numbers of knee operations carried out between 1 January and 31 December 2004 inclusive.

3. Column G3 - NJR data submission rate (%) for 2004 = [Column A / (Column G1 + Column G2)] x 100.

A5.8 Comparator figures

For a number of reasons, caution should be applied when interpreting actual against expected submission rates. The comparator figures have been obtained from HES, from PEDW and from independent sector units. Numbers of procedures for the following OPCS4 procedure codes were requested:

Hips - OPCS4 procedure codes	Knees - OPCS4 procedure codes
W37.1	W40.1
A38.1	W41.1
W39.1	W42.1
W58.1	W52.1/Z84.4
W37.3	W52.1/Z84.6
W38.3	W40.3
W39.3	W41.3
W58.2	W42.3

The NJR collects data on surgical procedures which are not classified as joint replacement operations in the OPCS4 coding system. An example of this is 'Re-operation other than revision'. This could result in units having apparently >100% compliance.

Procedure classification used in the independent sector may differ from that used in the NHS (OPCS4 codes) and thus the comparator figures provided by an independent sector centre may not represent the same set of operations that an NHS hospital is compared against.

The NHS comparisons use HES and PEDW data for the year April 2003 to March 2004. If a unit's activity has increased or decreased since March 2004, then the compliance figure would be anomalously higher or lower than expected.

Within a unit, duplication of NJR data submission would result in the unit's apparent compliance being greater than expected. This issue is being addressed via the NJR Data Integrity Audit process and it is expected that any discrepancies of this type will decrease in future years.

In preparation for work on the 3rd Annual Report, the NJR Centre intends to liaise with the independent sector to determine whether a generic coding system can be applied to allow them to readily provide comparator data in a standard way for NJR purposes (i.e. with the data not being adversely affected by variations in the systems used by different groups).

A5.9 Hospital/treatment centres not included in tables

The following hospital/treatment centres did not open for NJR-related procedures until 2005. Therefore, they are excluded from Tables A5.1 to A5.3.

- Nuffield Hospitals
  - The Manor Hospital, Oxford
- Partnership Health Group Ltd
  - Barlborough NHS Treatment Centre
  - Peninsula NHS Treatment Centre
  - Shepton Mallet Treatment Centre

Table A5.1 - *NHS hospitals and treatment centres in England*

NHS Trust	Hospital	A Complete records submitted	B Complete records for hips	C Complete records for knees	D Records submitted with patient consent (%)	E Records submitted with patient consent (%) 1 Jan to 31 March 2005	F Records submitted with patient consent (%) 1 April to 30 June 2005	Comparison of data submitted to the NJR against HES data G1 HES hip data	G2 HES knee data	G3 NJR data submission rate (%)
Addenbrooke's	Addenbrooke's Hospital	0	0	0	N/A	N/A	N/A	275	264	0.00
Aintree Hospitals	University Hospital Aintree	260	137	123	87.31	77.77	80.43	220	197	62.35
Airedale	Airedale General Hospital	298	153	145	94.30	100	100	230	182	72.33
Ashford and St Peter's Hospitals	Ashford Hospital	0	0	0	N/A	N/A	N/A	325	419	0.00
Barking, Havering and Redbridge Hospitals	Harold Wood Hospital	0	0	0	N/A	N/A	N/A	399	492	14.14
Barking, Havering and Redbridge Hospitals	King George Hospital	63	21	42	0.00	0	0			
Barking, Havering and Redbridge Hospitals	Oldchurch Hospital	63	47	16	98.41	50	45.45			
Barnet and Chase Farm Hospitals	Barnet General Hospital	58	27	31	64.29	N/A	100	225	238	39.31
Barnet and Chase Farm Hospitals	Chase Farm Hospital	124	57	67	18.55	0	N/A			
Barnsley District General Hospital	Barnsley District General Hospital	14	6	8	100.00	83.33	84.61	170	234	3.47
Barts and The London	The Royal London Hospital	266	151	115	87.55	87.63	81.25	129	153	94.33
Basildon and Thurrock University Hospitals	Basildon Hospital	578	259	319	90.66	86.29	94.67	277	314	97.80
Bedford Hospitals	Bedford Hospital South Wing	54	33	21	59.26	44	50	145	142	18.82
Birmingham Heartlands and Solihull (teaching)	Solihull Hospital	904	432	472	56.12	49.77	45	451	590	86.84
Blackpool, Fylde and Wyre Hospitals	Blackpool Victoria Hospital	121	53	68	57.85	56.25	48.28	185	178	125.62
Blackpool, Fylde and Wyre Hospitals	South Shore Hospital	335	165	170	65.67	82.82	61.11			
Bolton Hospitals	The Royal Bolton Hospital	41	17	24	65.85	N/A	N/A	168	264	9.49
Bradford Hospitals	Bradford Royal Infirmary	273	128	145	64.10	88.8	81.76	268	304	47.73
Brighton and Sussex University Hospitals	Princess Royal Brighton	147	84	63	37.67	49.15	100	311	304	41.30
Brighton and Sussex University Hospitals	Royal Sussex County Hospital	107	41	66	49.00	60	100			

Table A5.1 - *NHS hospitals and treatment centres in England (continued)*

NHS Trust	Hospital	A Complete records submitted	B Complete records for hips	C Complete records for knees	D Records submitted with patient consent (%)	E Records submitted with patient consent (%) 1 Jan to 31 March 2005	F Records submitted with patient consent (%) 1 April to 30 June 2005	Comparison of data submitted to the NJR against HES data G1 HES hip data	G2 HES knee data	G3 NJR data submission rate (%)
Buckinghamshire Hospitals	Stoke Mandeville Hospital	296	140	156	87.16	87.03	76.9	371	413	92.47
Buckinghamshire Hospitals	Wycombe General Hospital	429	204	225	97.61	96.63	100			
Burton Hospitals	Queens Hospital	601	303	298	99.17	94.16	43.17	287	278	106.37
Calderdale and Huddersfield	Calderdale Royal Hospital	171	77	94	86.55	N/A	N/A	350	316	68.02
Calderdale and Huddersfield	Huddersfield Royal Infirmary	282	138	144	86.88	100	97.5			
Central Manchester and Manchester Children's University Hospitals	Manchester Royal Infirmary	2	2	0	100.00	N/A	N/A	129	207	0.60
Chelsea and Westminster Healthcare	Chelsea & Westminster Hospital	54	30	24	18.52	0	0	206	156	14.92
Chesterfield and North Derbyshire Royal Hospital	Chesterfield & North Derbyshire Royal Hospital	764	315	449	96.06	98.86	86.27	338	372	107.61
City Hospitals Sunderland	Royal Sunderland Hospital	257	142	115	69.26	86.47	34.5	305	262	45.33
Countess of Chester Hospital	Countess of Chester Hospital	298	159	139	83.50	77.06	63.27	225	258	61.70
County Durham and Darlington Acute Hospitals	Bishop Auckland Treatment Centre	100	40	60	71.00	100	79.45	500	502	40.82
County Durham and Darlington Acute Hospitals	Darlington Memorial Hospital	133	58	75	15.91	N/A	66.67			
County Durham and Darlington Acute Hospitals	University Hospital of North Durham	176	86	90	46.02	71.87	83.78			
Dartford and Gravesham	Darent Valley Hospital	457	247	210	13.13	27.46	31.46	209	205	110.39
Doncaster and Bassetlaw Hospitals	Bassetlaw Hospital	234	93	141	47.44	96.77	98.41	364	375	96.62
Doncaster and Bassetlaw Hospitals	Doncaster Royal Infirmary	480	219	261	85.83	97.8	90.27			
Dudley Group of Hospitals	Corbett Hospital	723	340	383	7.05	22.09	0	409	446	86.08
Dudley Group of Hospitals	Russells Hall Hospital	13	11	2	0.00	50	23.91			
Ealing Hospital	Ealing Hospital	35	10	25	0.00	0	33.33	53	81	26.12
East and North Hertfordshire	Lister Hospital	201	78	123	21.89	35.71	40.57	491	562	36.56
East and North Hertfordshire	Queen Elizabeth II Hospital	184	80	104	39.67	13.64	78.18			
East Cheshire	Macclesfield District General Hospital	273	143	130	89.30	86.36	78.18	205	228	63.05

Table A5.1 - *NHS hospitals and treatment centres in England (continued)*

NHS Trust	Hospital	A Complete records submitted	B Complete records for hips	C Complete records for knees	D Records submitted with patient consent (%)	E Records submitted with patient consent (%) 1 Jan to 31 March 2005	F Records submitted with patient consent (%) 1 April to 30 June 2005	Comparison of data submitted to the NJR against HES data G1 HES hip data	G2 HES knee data	G3 NJR data submission rate (%)
East Kent Hospitals	Queen Elizabeth The Queen Mother Hospital	87	42	45	27.59	4.35	4.76	531	587	62.52
East Kent Hospitals	William Harvey Hospital (Ashford)	612	330	282	70.26	89.27	71.07			
East Lancashire Hospitals	Blackburn Royal Infirmary	139	85	54	99.28	73.07	59.46	259	286	75.05
East Lancashire Hospitals	Burnley General Hospital	270	135	135	92.96	100	88.46			
East Somerset	Yeovil District Hospital	543	315	228	93.19	82.52	100	258	244	108.17
East Sussex Hospitals	Conquest Hospital	423	210	213	84.63	100	98.98	565	511	79.55
East Sussex Hospitals	Eastbourne District General Hospital	433	220	213	77.57	84.87	73.87			
Epsom and St Helier	Epsom General Hospital	61	35	26	100.00	N/A	N/A	361	377	27.51
Epsom and St Helier	South West London Elective Ortho Centre	101	47	54	19.80	22.92	16.87			
Epsom and St Helier	St Helier Hospital	41	35	6	48.78	N/A	N/A			
Essex Rivers Healthcare	Colchester General Hospital	113	80	33	100.00	96.77	3.27	419	400	13.80
Frimley Park Hospital	Frimley Park Hospital	341	149	192	80.65	81.31	84.21	332	264	57.21
Gateshead Health	Queen Elizabeth Gateshead	86	49	37	1.16	1.6	0	186	252	19.63
George Eliot Hospital	George Eliot Hospital - Acute Services	665	335	330	63.50	55.62	62.81	285	271	119.60
Gloucestershire Hospitals	Cheltenham General Hospital	71	42	29	22.54	100	79.59	831	661	50.07
Gloucestershire Hospitals	Gloucestershire Royal Hospital	32	18	14	12.50	0	93.54			
Gloucestershire Hospitals	Standish Hospital	644	336	308	15.06	0	N/A			
Good Hope Hospital	Good Hope Hospital	93	54	39	59.14	45.45	58.06	250	249	18.64
Guy's and St Thomas'	Guy's Hospital	184	87	97	3.87	0	0	235	322	33.03
Hammersmith Hospitals	Charing Cross Hospital	18	5	13	77.78	0	0	609	806	1.27
Hammersmith Hospitals	Ravenscourt Park TC	0	0	0	N/A	58.33	42.02			
Harrogate Health Care	Harrogate District Hospital	69	33	36	92.75	86.09	83.49	272	208	14.38
Heatherwood and Wexham Park Hospitals	Heatherwood Hospital	705	280	425	98.29	97.43	98.49	314	477	107.71
Heatherwood and Wexham Park Hospitals	Wexham Park Hospital	147	76	71	98.64	85.71	42.11			
Hereford Hospitals	Hereford County Hospital	424	237	187	96.92	73.04	8.85	229	124	120.11
Hinchingbrooke Health Care	Hinchingbrooke Hospital	504	327	177	98.81	98.82	78.51	245	240	103.92

Table A5.1 - *NHS hospitals and treatment centres in England (continued)*

NHS Trust	Hospital	A Complete records submitted	B Complete records for hips	C Complete records for knees	D Records submitted with patient consent (%)	E Records submitted with patient consent (%) 1 Jan to 31 March 2005	F Records submitted with patient consent (%) 1 April to 30 June 2005	Comparison of data submitted to the NJR against HES data G1 HES hip data	G2 HES knee data	G3 NJR data submission rate (%)
Homerton University Hospital	Homerton University Hospital	42	13	29	0.00	N/A	N/A	34	82	36.21
Hull and East Yorkshire Hospitals	Castle Hill Hospital	942	442	500	50.38	50.87	73.2	421	397	115.16
Ipswich Hospital	Ipswich Hospital	570	336	234	17.72	18.99	22.39	349	280	90.62
Isle of Wight Healthcare	St Mary's Hospital	396	181	215	95.69	90.72	87.38	301	282	67.92
James Paget Healthcare	James Paget Hospital	677	345	332	44.61	53.04	59.24	355	192	123.77
Kettering General Hospital	Kettering General Hospital	433	197	236	43.65	16.19	3.6	307	370	63.96
King's College Hospital	King's College Hospital (Denmark Hill)	0	0	0	N/A	N/A	N/A	257	298	0.00
King's College Hospital	Kings College Hospital TC	0	0	0	N/A	N/A	N/A			
Kings Lynn and Wisbech Hospitals	Queen Elizabeth Kings Lynn	219	111	108	57.08	52.63	59.74	229	203	50.69
Kingston Hospital	Kingston Hospital	0	0	0	N/A	N/A	N/A	229	201	0.00
Lancashire Teaching Hospitals	Chorley and South Ribble District General Hospital	260	120	140	98.84	98.5	N/A	286	358	58.70
Lancashire Teaching Hospitals	Royal Preston/Sharoe Green Hospitals	118	49	69	100.00	100	N/A			
Leeds Teaching Hospitals	Chapel Allerton Hospital	2	0	2	50.00	N/A	4.87	385	391	34.41
Leeds Teaching Hospitals	Leeds General Infirmary	104	51	53	68.27	69.23	28.69			
Leeds Teaching Hospitals	St James's University Hospital	154	82	72	87.01	68.42	51.64			
Leeds Teaching Hospitals	Wharfedale Hospital	7	5	2	85.71	100	8.3			
Luton and Dunstable Hospital	Luton & Dunstable Hospital	333	147	186	32.43	17.5	7.22	201	211	80.83
Maidstone and Tunbridge Wells	Kent & Sussex Hospital	327	189	138	40.37	57.25	93.23	304	254	124.37
Maidstone and Tunbridge Wells	Maidstone District General Hospital	367	174	193	100.00	100	100			
Mayday Healthcare	Mayday University Hospital	10	8	2	0.00	N/A	0	120	129	4.02
Medway	Medway Maritime Hospital	385	170	215	32.47	51.33	59.2	229	285	74.90
Mid Essex Hospital Services	Broomfield Hospital	5	3	2	0.00	0	9.6	260	296	0.90
Mid Staffordshire General Hospitals	Cannock TC	327	220	107	0.00	0	0	203	173	89.63
Mid Staffordshire General Hospitals	Staffordshire General Hospital	10	6	4	0.00	N/A	N/A			

Table A5.1 - *NHS hospitals and treatment centres in England (continued)*

NHS Trust	Hospital	A Complete records submitted	B Complete records for hips	C Complete records for knees	D Records submitted with patient consent (%)	E Records submitted with patient consent (%) 1 Jan to 31 March 2005	F Records submitted with patient consent (%) 1 April to 30 June 2005	Comparison of data submitted to the NJR against HES data G1 HES hip data	G2 HES knee data	G3 NJR data submission rate (%)
Mid Yorkshire Hospitals	Dewsbury Hospitals	249	110	139	79.52	83.33	51.51	407	457	29.63
Mid Yorkshire Hospitals	Pinderfields Hospitals	3	2	1	100.00	N/A	N/A			
Mid Yorkshire Hospitals	Pontefract General Infirmary	4	1	3	75.00	N/A	N/A			
Milton Keynes General Hospital	Milton Keynes General Hospital	0	0	0	N/A	N/A	N/A	139	166	0.00
Morecambe Bay Hospitals	Furness General Hospital	79	42	37	74.68	0	59	451	419	69.43
Morecambe Bay Hospitals	Royal Lancaster Infirmary	267	127	140	99.25	98.92	100			
Morecambe Bay Hospitals	Westmorland General Hospital	258	151	107	99.22	100	100			
Newham Healthcare	Newham General Hospital	139	63	76	100.00	100	100	50	75	111.20
Norfolk and Norwich University Hospital	Norfolk & Norwich Hospital	1324	693	631	38.99	37.5	45.4	824	597	93.17
North Bristol	Southmead Hospital	1739	889	850	48.01	32.38	81.51	788	852	106.04
North Cheshire Hospitals	Warrington Hospital	251	135	116	81.27	95.7	98.4	252	344	42.11
North Cumbria Acute Hospitals	Cumberland Infirmary	473	228	245	15.86	22.02	26.97	366	397	87.55
North Cumbria Acute Hospitals	West Cumberland Hospital	195	101	94	89.64	91.38	93.33			
North Hampshire Hospitals	North Hampshire Hospital	611	277	334	88.54	91.33	90.18	226	265	124.44
North Middlesex University Hospital	North Middlesex Hospital	156	70	86	95.51	100	100	67	93	97.50
North Staffordshire Hospital	City General Hospital	428	254	174	53.04	48.68	67	423	342	55.95
North Tees and Hartlepool	University Hospital of Hartlepool	354	131	223	98.59	100	95.09	288	424	84.83
North Tees and Hartlepool	University Hospital of North Tees	250	137	113	100.00	100	99.11			
North West London Hospitals	Central Middlesex Hospital	66	4	62	81.82	100	100	173	308	13.72
North West London Hospitals	Northwick Park Hospital	0	0	0	N/A	N/A	100			
Northamptonshire Healthcare	Northampton General Hospital	493	259	234	33.67	41.83	42.58	201	156	138.10
Northern Devon Healthcare	North Devon District Hospital	627	300	327	58.79	79.33	70.63	286	273	112.16

Table A5.1 - *NHS hospitals and treatment centres in England (continued)*

NHS Trust	Hospital	A Complete records submitted	B Complete records for hips	C Complete records for knees	D Records submitted with patient consent (%)	E Records submitted with patient consent (%) 1 Jan to 31 March 2005	F Records submitted with patient consent (%) 1 April to 30 June 2005	Comparison of data submitted to the NJR against HES data G1 HES hip data	G2 HES knee data	G3 NJR data submission rate (%)
Northern Lincolnshire and Goole Hospitals	Diana, Princess of Wales Hospital	160	86	74	92.50	95.69	98.43	450	451	88.01
Northern Lincolnshire and Goole Hospitals	Goole District Hospital (Acute)	70	27	43	94.29	92.16	100			
Northern Lincolnshire and Goole Hospitals	Goole Hospital TC	417	203	214	25.42	24.93	63.68			
Northern Lincolnshire and Goole Hospitals	Scunthorpe General Hospital	146	74	72	93.15	94.11	95			
Northumbria Health Care	Hexham General Hospital	232	113	119	48.71	40.54	45.61	530	646	106.89
Northumbria Health Care	North Tyneside General Hospital	496	224	272	59.07	73.33	68.37			
Northumbria Health Care	Wansbeck Hospital	529	244	285	85.82	99.15	99.43			
Nottingham City Hospital	Nottingham City Hospital	0	0	0	N/A	98.15	94.11	400	405	0.00
Nuffield Orthopaedic	Nuffield Orthopaedic Centre	622	349	273	0.00	0	1.13	1049	894	32.01
Oxford Radcliffe Hospital	Horton General Hospital	48	21	27	95.83	84.78	46.55	78	101	26.82
Pennine Acute Hospitals	North Manchester General Hospital	259	126	133	55.81	68.18	84.21	576	658	49.11
Pennine Acute Hospitals	Pennine Acute (Bury)	104	51	53	91.35	N/A	90.48			
Pennine Acute Hospitals	Rochdale Infirmary	88	42	46	3.41	N/A	N/A			
Pennine Acute Hospitals	Royal Oldham Hospital	155	60	95	17.42	20.83	27.11			
Peterborough & Stamford Hospitals (Foundation)	Edith Cavell Hospital	668	306	362	59.52	72.99	85.34	340	371	93.95
Plymouth Hospitals	Derriford Hospital	567	308	259	89.95	90.02	100	292	324	92.05
Portsmouth Hospitals	Queen Alexandra Hospital	0	0	0	N/A	N/A	80	852	913	35.64
Portsmouth Hospitals	Royal Hospital at Haslar TC	629	274	355	20.19	36.09	60.1			
Queen Elizabeth Hospital	Queen Elizabeth Hospital	257	146	111	71.21	97.82	93.83	145	102	104.05
Queen Mary's Sidcup	Queen Mary's Hospital	204	100	104	52.45	56	60.27	130	188	64.15
Queen's Medical Centre, Nottingham University Hospital	Queens Medical Centre, Nottingham University Hospital	757	336	421	96.96	96.29	95.75	291	327	122.49
Robert Jones and Agnes Hunt Orthopaedic and District Hospital	Robert Jones & Agnes Hunt Orthopaedic Hospital	1176	672	504	85.45	94.03	72.67	814	654	80.11

Table A5.1 - *NHS hospitals and treatment centres in England (continued)*

NHS Trust	Hospital	A Complete records submitted	B Complete records for hips	C Complete records for knees	D Records submitted with patient consent (%)	E Records submitted with patient consent (%) 1 Jan to 31 March 2005	F Records submitted with patient consent (%) 1 April to 30 June 2005	Comparison of data submitted to the NJR against HES data G1 HES hip data	G2 HES knee data	G3 NJR data submission rate (%)
Rotherham General Hospitals	Rotherham District General Hospital	167	117	50	83.33	79.41	80.18	229	199	39.02
Royal Berkshire and Battle Hospitals	Royal Berkshire Hospital	556	256	300	34.53	0	0	344	382	76.58
Royal Bournemouth and Christchurch Hospitals	Royal Bournemouth General Hospital	1392	719	673	87.48	92.17	93.56	788	631	98.10
Royal Cornwall Hospitals	Royal Cornwall Hospital (Treliske)	264	143	121	42.42	70.27	81.45	489	385	54.35
Royal Cornwall Hospitals	St Michael's Hospital	211	112	99	66.82	80.55	86.92			
Royal Devon and Exeter Healthcare	Royal Devon & Exeter Hospital (Wonford)	1029	616	413	33.50	76.55	90.49	690	643	77.19
Royal Free Hampstead	Royal Free Hospital	142	96	46	91.55	93.75	94.11	89	119	68.27
Royal Liverpool and Broadgreen University Hospitals	Broadgreen Hospital	600	289	311	33.83	57.77	62.09	256	326	104.47
Royal Liverpool and Broadgreen University Hospitals	The Royal Liverpool University Hospital	8	7	1	25.00	N/A	N/A			
Royal Orthopaedic Hospital	Royal Orthopaedic Hospital	1929	1104	825	78.56	89.88	87.22	663	774	134.24
Royal Surrey County Hospital	Royal Surrey County Hospital	109	67	42	33.94	64	79.75	190	205	27.59
Royal United Hospital Bath	Royal United Hospital	68	24	44	70.59	52.21	56.21	467	364	8.18
Royal West Sussex	St Richard's Hospital	527	274	253	79.54	69.81	80.61	301	328	83.78
Salford Royal Hospitals	Hope Hospital	97	63	34	0.00	0	0	152	181	29.13
Salisbury Health Care	Salisbury District Hospital	346	183	163	54.34	65.11	66.23	229	244	73.15
Sandwell and West Birmingham Hospitals	City Hospital	17	7	10	5.88	0	6	282	385	26.09
Sandwell and West Birmingham Hospitals	Sandwell General Hospital	157	69	88	0.00	0	N/A			
Scarborough and North East Yorkshire Health Care	Scarborough General Hospital	559	303	256	60.47	62.08	75.14	317	267	95.72
Sheffield Teaching Hospitals	Northern General Hospital	1060	541	519	35.85	61.5	60.56	698	728	74.33
Sherwood Forest Hospitals	Kings Mill Hospital	95	40	55	86.32	69.56	95.2	345	428	12.29
Sherwood Forest Hospitals	Newark Hospital	0	0	0	N/A	N/A	100			

Table A5.1 - *NHS hospitals and treatment centres in England (continued)*

NHS Trust	Hospital	A Complete records submitted	B Complete records for hips	C Complete records for knees	D Records submitted with patient consent (%)	E Records submitted with patient consent (%) 1 Jan to 31 March 2005	F Records submitted with patient consent (%) 1 April to 30 June 2005	Comparison of data submitted to the NJR against HES data G1 HES hip data	G2 HES knee data	G3 NJR data submission rate (%)
South Devon Health Care	Torbay TC	68	33	35	100.00	79.56	51.48	394	280	10.09
South Manchester University Hospitals	Wythenshawe Hospital	0	0	0	N/A	66.67	33.33	165	148	0.00
South Tees Hospitals	Friarage Hospital	310	151	159	89.94	96.15	97.53	313	347	100.61
South Tees Hospitals	The James Cook University Hospital	354	171	183	98.87	100	94.82			
South Tyneside Health Care	South Tyneside District General Hospital	285	149	136	50.53	65.06	91.36	83	114	144.67
South Warwickshire General Hospitals	Warwick Hospital	44	35	9	38.64	0	0	171	208	11.61
Southampton University Hospitals	Southampton General Hospital	0	0	0	N/A	N/A	N/A	342	439	0.00
Southend Hospital	Southend Hospital	0	0	0	N/A	91.17	98.97	290	267	0.00
Southern Derbyshire Acute Hospitals	Derby Royal Infirmary	118	92	26	99.15	N/A	54	611	565	10.03
Southport and Ormskirk Hospital	Ormskirk & District General Hospital	51	19	32	21.57	N/A	72.72	386	353	50.88
Southport and Ormskirk Hospital	Southport Formby District General Hospital	325	156	169	56.00	72.06	60.29			
St George's Healthcare	St George's Hospital	74	49	25	97.30	100	100	97	128	32.89
St Helens and Knowsley Hospitals	St Helens Hospital	163	65	98	15.95	19.86	0	177	182	60.45
St Helens and Knowsley Hospitals	Whiston Hospital	54	23	31	0.00	0	0			
St Mary's	St Mary's Hospital	1	0	1	100.00	23.59	0	65	76	0.71
Stockport	Stepping Hill Hospital	288	150	138	98.26	98.28	N/A	285	358	44.79
Surrey and Sussex Healthcare	Crawley Hospital	30	6	24	3.33	N/A	N/A	221	250	18.05
Surrey and Sussex Healthcare	East Surrey Hospital	55	42	13	34.55	33.33	55			
Swindon and Marlborough	The Great Western Hospital	737	351	386	54.55	100	99.51	365	337	104.99
Tameside and Glossop Acute Services	Tameside General Hospital	232	99	133	86.21	84.38	75.55	170	228	58.29

Table A5.1 - *NHS hospitals and treatment centres in England (continued)*

NHS Trust	Hospital	A Complete records submitted	B Complete records for hips	C Complete records for knees	D Records submitted with patient consent (%)	E Records submitted with patient consent (%) 1 Jan to 31 March 2005	F Records submitted with patient consent (%) 1 April to 30 June 2005	Comparison of data submitted to the NJR against HES data G1 HES hip data	G2 HES knee data	G3 NJR data submission rate (%)
Taunton and Somerset	Musgrove Park Hospital	493	268	225	49.70	92.49	87.57	397	367	64.53
The Hillingdon Hospital	Hillingdon Hospital	5	5	0	40.00	33.33	21.95	159	194	1.42
The Lewisham Hospital	University Hospital Lewisham	0	0	0	N/A	N/A	N/A	98	107	0.00
The Mid Cheshire Hospitals	Leighton Hospital	208	118	90	60.58	58.41	38.33	174	134	67.53
The Newcastle Upon Tyne Hospitals	Freeman Hospital	199	97	102	90.45	89.47	72.77	312	406	27.72
The Newcastle Upon Tyne Hospitals	Newcastle General Hospital	0	0	0	N/A	N/A	N/A			
The Princess Alexandra Hospital	Princess Alexandra Hospital	0	0	0	N/A	N/A	N/A	175	205	0.00
The Princess Royal Hospital	Princess Royal Hospital	393	216	177	82.70	94.66	89.81	206	159	107.67
The Royal National Orthopaedic Hospital	The Royal National Orthopaedic Hospital (Stanmore)	379	186	193	32.10	0	0	543	610	32.87
The Royal Wolverhampton Hospitals	New Cross Hospital	323	150	173	88.89	92.89	93.49	292	348	50.47
The Whittington Hospital	The Whittington Hospital	75	46	29	85.33	68.18	100	145	100	30.61
Trafford Healthcare	Trafford General Hospital	299	125	174	61.20	100	98.12	154	244	75.13
United Bristol Healthcare	Bristol Royal Infirmary	0	0	0	N/A	N/A	N/A	2	0	0.00
United Lincolnshire Hospitals	Grantham & District General Hospital	203	93	110	88.18	97.29	N/A	804	820	76.72
United Lincolnshire Hospitals	Lincoln County Hospital	507	242	265	74.75	75.75	90.91			
United Lincolnshire Hospitals	Louth County Hospital	220	114	106	96.82	91.34	78.95			
United Lincolnshire Hospitals	Pilgrim Hospital	316	152	164	96.84	100	100			
University College London Hospitals (Foundation)	Middlesex Hospital	95	57	38	14.89	22.22	100	237	256	84.58
University College London Hospitals (Foundation)	University College London Hospital TC	322	118	204	13.44	40.68	57.69			
University Hospitals Coventry and Warwickshire	Coventry & Warwickshire Hospital	229	108	121	0.00	0	N/A	424	474	43.76
University Hospitals Coventry and Warwickshire	Hospital of St Cross	164	98	66	0.00	0	N/A			

Table A5.1 - *NHS hospitals and treatment centres in England (continued)*

NHS Trust	Hospital	A Complete records submitted	B Complete records for hips	C Complete records for knees	D Records submitted with patient consent (%)	E Records submitted with patient consent (%) 1 Jan to 31 March 2005	F Records submitted with patient consent (%) 1 April to 30 June 2005	Comparison of data submitted to the NJR against HES data G1 HES hip data	G2 HES knee data	G3 NJR data submission rate (%)
University Hospitals of Leicester	Glenfield General Hospital	400	247	153	87.25	53.92	77.68	768	722	27.25
University Hospitals of Leicester	Leicester General Hospital	6	4	2	100.00	N/A	N/A			
Walsall Hospitals	Manor Hospital	138	65	73	93.43	81.81	92.68	225	225	30.67
West Dorset General Hospitals	Dorset County Hospital	615	328	287	36.60	80.91	100	298	288	104.95
West Hertfordshire Hospitals	Hemel Hempstead General Hospital	0	0	0	N/A	N/A	N/A	357	414	7.52
West Hertfordshire Hospitals	St Albans City Hospital	11	5	6	0.00	N/A	100			
West Hertfordshire Hospitals	Watford General Hospital	47	22	25	0.00	N/A	100			
West Suffolk Hospitals	West Suffolk Hospital	630	343	287	61.43	52.94	72.04	281	244	120.00
Weston Area Health	Weston General Hospital	536	269	267	78.88	91.25	87.96	340	296	153.46
Weston Area Health	Weston TC	440	223	217	80.23	84.67	92.38			
Whipps Cross University Hospital	Whipps Cross University Hospital	6	1	5	50.00	0	2.22	138	194	1.81
Winchester and Eastleigh Healthcare	Royal Hampshire County Hospital	209	101	108	43.54	51.56	76.71	127	159	73.08
Wirral Hospital	Arrowe Park Hospital	133	65	68	98.50	N/A	100	325	319	77.17
Wirral Hospital	Clatterbridge Hospital	364	186	178	99.45	100	100			
Worcestershire Acute Hospitals	The Alexandra Hospital	35	6	29	100.00	N/A	N/A	525	640	19.91
Worcestershire Acute Hospitals	Worcestershire Royal Hospital	197	162	35	92.86	83.05	97.5			
Worthing and Southlands Hospitals	Southlands Hospital	712	373	339	46.41	63.59	70	330	315	110.39
Worthing and Southlands Hospitals	Worthing Hospital	0	0	0	N/A	N/A	N/A			
Wrightington, Wigan and Leigh	Royal Albert Edward Infirmary	4	1	3	25.00	N/A	50	1004	725	91.50
Wrightington, Wigan and Leigh	Wrightington Hospital	1578	945	633	61.51	60.07	51.39			
York Health Services	York District General Hospital	1	1	0	100.00	N/A	50	359	335	0.14

Table A5.2 - *NHS hospitals in Wales*

NHS Trust	Hospital	A Complete records submitted	B Complete records for hips	C Complete records for knees	D Records submitted with patient consent (%)	E Records submitted with patient consent (%) 1 Jan to 31 March 2005	F Records submitted with patient consent (%) 1 April to 30 June 2005	Comparison of data submitted to the NJR against PEDW data		
								G1 PEDW hip data	G2 PEDW knee data	G3 NJR data submission rate (%)
Bro Morgannwg	Neath Port Talbot Hospital	141	64	77	96.45	99.34	98.68	139	164	46.53
Bro Morgannwg	Princess of Wales Hospital	28	17	11	50.00	72.22	50.00	203	206	6.85
Cardiff and Vale	Llandough Hospital	34	30	4	47.06	78.95	68.96	428	517	3.60
Carmarthenshire	Prince Philip Hospital	89	48	41	74.16	93.93	25.26	105	105	42.38
Carmarthenshire	West Wales General Hospital	118	61	57	93.22	50.00	90.47	76	87	72.39
Ceredigion and Mid Wales	Bronglais General Hospital	163	86	77	100.00	98.25	100.00	106	77	89.07
Conwy and Denbighshire	Abergele Hospital	41	23	18	0.00	0.00	0.00	179	176	11.83
Conwy and Denbighshire	Glan Clwyd General Hospital	1	1	0	0.00	N/A	0.00			
Gwent Healthcare	Nevill Hall Hospital	392	181	211	100.00	100.00	100.00	151	210	108.59
Gwent Healthcare	Royal Gwent Hospital	0	0	0	N/A	N/A	100.00	177	239	0.00
North East Wales	Wrexham Maelor Hospital	129	67	62	87.60	80.00	66.66	114	119	55.36
North Glamorgan	Prince Charles Hospital	0	0	0	N/A	N/A	100.00	92	95	0.00
North West Wales	Ysbyty Gwynedd	25	23	2	80.00	93.75	79.16	181	81	9.54
Pembroke and Derwen	Withybush General Hospital	188	104	84	87.23	100.00	100.00	134	112	76.42
Pontypridd and Rhondda	The Royal Glamorgan Hospital	101	52	49	100.00	95.23	100.00	145	161	33.01
Swansea	Morriston Hospital	509	317	192	99.80	100.00	100.00	284	259	93.74

Table A5.3 - *Independent sector hospitals and treatment centres*

Group name (where relevant)	Hospital	A Complete records submitted	B Complete records for hips	C Complete records for knees	D Records submitted with patient consent (%)	E Records submitted with patient consent (%) 1 Jan to 31 March 2005	F Records submitted with patient consent (%) 1 April to 30 June 2005	Comparison of data submitted to the NJR against numbers expected		
								G1 Hip numbers supplied by organisation	G2 Knee numbers supplied by organisation	G3 NJR data submission rate (%)
Abbey Group	Abbey Caldew Hospital	71	50	21	95.77	100	91.66	46	20	107.58
Abbey Group	Abbey Gisburne Hospital	222	118	104	54.05	34.92	36.2	No data provided		
Abbey Group	Abbey Sefton Hospital	0	0	0	N/A	N/A	0	42	14	0.00
Aspen Healthcare Limited	Holly House Hospital	236	141	95	80.43	90.46	90.76	141	90	97.88
Aspen Healthcare Limited	Parkside Hospital	81	31	50	82.72	80.76	N/A	89	82	47.37
Bettercare Group Ltd	The North Wales Medical Centre	0	0	0	N/A	N/A	N/A	37	21	0.00
Birkdale Clinic	Birkdale Clinic	46	21	25	31.11	75	83.33	19	32	90.20
BMI Healthcare	BMI Alexandra Hospital	137	62	75	56.93	76.32	76.47	205	226	31.79
BMI Healthcare	BMI Bath Clinic	419	240	179	96.65	100	94.33	282	210	85.16
BMI Healthcare	BMI Beardwood Private Hospital	61	27	34	98.36	N/A	100	76	66	42.96
BMI Healthcare	BMI Bishops Wood Hospital	21	16	5	0.00	20	30.77	62	69	16.03
BMI Healthcare	BMI Blackheath Hospital	65	36	29	3.08	0	23.81	83	55	47.10
BMI Healthcare	BMI Chatsworth Suite	61	42	19	85.25	69.23	71.42	48	28	80.26
BMI Healthcare	BMI Chaucer Hospital	231	152	79	64.35	79.17	83.33	164	87	92.03
BMI Healthcare	BMI Chelsfield Park Hospital	174	96	78	28.74	70	42.86	113	90	85.71
BMI Healthcare	BMI Clementine Churchill Hospital	95	44	51	60.00	N/A	N/A	106	124	41.30
BMI Healthcare	BMI Esperance	140	73	67	58.57	46	63.63	73	69	98.59
BMI Healthcare	BMI Fawkham Manor Hospital	70	43	27	45.71	N/A	0	59	32	76.92
BMI Healthcare	BMI Garden Hospital	10	4	6	100.00	N/A	N/A	7	11	55.56
BMI Healthcare	BMI Goring Hall Hospital	63	30	33	50.79	3.7	2.06	174	168	18.42
BMI Healthcare	BMI Hampshire Clinic	136	92	44	24.26	71.88	71.7	97	108	66.34
BMI Healthcare	BMI Highfield Hospital	293	130	163	87.03	81.76	81.7	143	169	93.91
BMI Healthcare	BMI Kings Oak Hospital	156	79	77	9.74	12.76	2	128	91	71.23
BMI Healthcare	BMI Manor Hospital	69	44	25	82.61	76.92	67.86	47	28	92.00
BMI Healthcare	BMI Nuneaton Private Hospital	101	51	50	66.34	100	80.77	59	50	92.66
BMI Healthcare	BMI Princess Margaret	111	78	33	71.17	75	57.89	118	121	46.44
BMI Healthcare	BMI Priory Hospital	354	271	83	91.24	98.14	95	285	93	93.65
BMI Healthcare	BMI Ridgeway Hospital	245	127	118	80.99	92.03	97.78	125	111	103.81
BMI Healthcare	BMI Runnymede Hospital	40	31	9	17.50	0	0	66	37	38.83

Table A5.3 - *Independent sector hospitals and treatment centres (continued)*

Group name (where relevant)	Hospital	A Complete records submitted	B Complete records for hips	C Complete records for knees	D Records submitted with patient consent (%)	E Records submitted with patient consent (%) 1 Jan to 31 March 2005	F Records submitted with patient consent (%) 1 April to 30 June 2005	Comparison of data submitted to the NJR against numbers expected		
								G1 Hip numbers supplied by organisation	G2 Knee numbers supplied by organisation	G3 NJR data submission rate (%)
BMI Healthcare	BMI Sandringham Hospital	286	170	116	74.13	82.35	91.37	169	116	100.35
BMI Healthcare	BMI Sarum Road Hospital	15	10	5	33.33	23.81	72.22	150	115	5.66
BMI Healthcare	BMI Saxon Clinic	109	69	40	39.45	27.77	85.71	87	64	72.19
BMI Healthcare	BMI Shelburne Hospital	48	19	29	97.83	100	100	23	30	90.57
BMI Healthcare	BMI Shirley Oaks Hospital	3	2	1	0.00	0	N/A	67	47	2.63
BMI Healthcare	BMI Sloane Hospital	49	20	29	12.24	33.33	30	38	81	41.18
BMI Healthcare	BMI South Cheshire Hospital	180	92	88	48.33	57.69	36.84	91	86	101.69
BMI Healthcare	BMI The Alexandra Hospital Victoria Park	52	17	35	67.31	N/A	2.78	137	170	16.94
BMI Healthcare	BMI The Beaumont Hospital	133	49	84	95.49	94.08	81.25	71	132	65.52
BMI Healthcare	BMI The Chiltern	146	87	59	96.53	100	100	131	74	71.22
BMI Healthcare	BMI The Droitwich Spa Hospital	220	136	84	100.00	100	100	144	112	85.94
BMI Healthcare	BMI The Harbour Hospital	69	51	18	18.84	20	N/A	85	28	61.06
BMI Healthcare	BMI The Paddocks	71	53	18	91.55	93.75	100	54	20	95.95
BMI Healthcare	BMI The Somerfield Hospital	170	87	83	80.00	100	84.93	91	81	98.84
BMI Healthcare	BMI Thornbury Hospital	364	214	150	89.56	100	99.05	214	164	96.30
BMI Healthcare	BMI Three Shires Hospital	209	128	81	0.48	0	0	139	83	94.14
BMI Healthcare	BMI Werndale Hospital	92	55	37	98.91	100	98.48	61	42	89.32
BMI Healthcare	BMI Winterbourne Hospital	199	111	88	49.75	100	64.41	114	89	98.03
BMI Healthcare	London Independent	37	14	23	21.62	82.69	35.71	15	22	100.00
BMI Healthcare	The BMI Park Hospital	177	104	73	28.25	84.38	80.3	191	140	53.47
BMI Healthcare	The Foscote Hospital	45	15	30	100.00	100	100	15	31	97.83
BUPA	BUPA Alexandra Hospital	81	21	60	100.00	100	63.63	52	71	65.85
BUPA	BUPA Cambridge Lea Hospital	501	313	188	96.20	94.64	76.19	260	217	105.03
BUPA	BUPA Clare Park Hospital	156	74	82	82.58	97.61	97.96	78	83	96.89
BUPA	BUPA Dunedin Hospital	89	59	30	62.92	65.85	85.29	57	48	84.76
BUPA	BUPA Fylde Coast Hospital	145	67	78	98.62	94.73	100	76	86	89.51
BUPA	BUPA Gatwick Park Hospital	138	71	67	83.33	86.84	41.77	148	90	57.98
BUPA	BUPA Hartswood Hospital	176	103	73	99.42	94.74	97.5	109	72	97.24
BUPA	BUPA Hospital Bristol	155	81	74	81.82	100	100	102	95	78.68
BUPA	BUPA Hospital Bushey	275	126	149	45.45	63.86	71.4	122	154	99.64
BUPA	BUPA Hospital Cardiff	558	272	286	21.58	98.98	100	320	429	74.50

Table A5.3 - *Independent sector hospitals and treatment centres (continued)*

Group name (where relevant)	Hospital	A Complete records submitted	B Complete records for hips	C Complete records for knees	D Records submitted with patient consent (%)	E Records submitted with patient consent (%) 1 Jan to 31 March 2005	F Records submitted with patient consent (%) 1 April to 30 June 2005	Comparison of data submitted to the NJR against numbers expected		
								G1 Hip numbers supplied by organisation	G2 Knee numbers supplied by organisation	G3 NJR data submission rate (%)
BUPA	BUPA Hospital Elland	229	132	97	64.32	100	97.46	128	96	102.23
BUPA	BUPA Hospital Harpenden	173	95	78	100.00	100	100	150	133	61.13
BUPA	BUPA Hospital Hastings	40	19	21	52.50	N/A	82.72	57	66	32.52
BUPA	BUPA Hospital Hull, East Riding	215	100	115	33.95	83.78	86.2	96	114	102.38
BUPA	BUPA Hospital Leeds	270	166	104	66.29	61.22	34.69	212	132	78.49
BUPA	BUPA Hospital Leicester	40	31	9	15.00	100	100	122	70	20.83
BUPA	BUPA Hospital Little Aston	224	134	90	54.71	93.88	91.67	133	98	96.97
BUPA	BUPA Hospital Manchester	210	92	118	100.00	100	100	95	134	91.70
BUPA	BUPA Hospital Norwich	534	249	285	2.06	62.61	59.52	288	294	91.75
BUPA	BUPA Hospital Portsmouth	134	80	54	29.10	46.8	100	143	80	60.09
BUPA	BUPA Hospital Southampton	261	121	140	86.59	91.07	92.95	117	146	99.24
BUPA	BUPA Hospital Washington	169	91	78	38.10	46.66	82.36	157	143	56.33
BUPA	BUPA Methley Park Hospital	137	89	48	99.27	100	100	99	53	90.13
BUPA	BUPA Murrayfield Hospital - Wirral	92	29	63	86.96	88.64	86.67	78	133	43.60
BUPA	BUPA North Cheshire Hospital	100	64	36	100.00	100	100	93	70	61.35
BUPA	BUPA Parkway Hospital	112	56	56	46.43	34.67	64.15	62	55	95.73
BUPA	BUPA Regency Hospital	187	98	89	87.17	78.38	90.91	77	90	111.98
BUPA	BUPA Roding Hospital	70	35	35	95.71	89.29	64.15	49	52	69.31
BUPA	BUPA South Bank Hospital	126	79	47	94.44	100	100	98	63	78.26
BUPA	BUPA St Saviours Hospital	168	93	75	0.00	0	0	97	79	95.45
BUPA	BUPA Tunbridge Wells Hospital	158	129	29	83.54	96.08	100	79	30	144.95
BUPA	BUPA Wellesley Hospital	51	36	15	86.27	96.97	97.82	98	42	36.43
BUPA	BUPA Yale Hospital	65	51	14	96.92	59.7	38.09	72	52	52.42
BUPA Treatment Centres	Redwood Diagnosis and Treatment Centre	548	275	273	58.21	64.22	98.01	No data provided		
Capio Group	All hospitals	3812	1978	1834	69.7			2153	2204	87.5
Capio Healthcare	Ashtead Hospital	187	108	79	85.03	48.39	27.5			
Capio Healthcare	Berkshire Independent Hospital	155	72	83	16.23	43.28	33.78			
Capio Healthcare	Capio Fulwood Hall Hospital	151	86	65	100.00	100	100			

Table A5.3 - *Independent sector hospitals and treatment centres (continued)*

Group name (where relevant)	Hospital	A Complete records submitted	B Complete records for hips	C Complete records for knees	D Records submitted with patient consent (%)	E Records submitted with patient consent (%) 1 Jan to 31 March 2005	F Records submitted with patient consent (%) 1 April to 30 June 2005	Comparison of data submitted to the NJR against numbers expected		
								G1 Hip numbers supplied by organisation	G2 Knee numbers supplied by organisation	G3 NJR data submission rate (%)
Capio Healthcare	Euxton Hall Hospital	189	100	89	100.00	100	100			
Capio Healthcare	Fitzwilliam Hospital	173	84	89	42.94	55.55	34.34			
Capio Healthcare	Mount Stuart House	326	175	151	42.64	100	100			
Capio Healthcare	New Hall Hospital	147	82	65	46.26	51.13	58.97			
Capio Healthcare	North Downs Hospital	165	120	45	80.61	84.48	100			
Capio Healthcare	Oaklands Hospital	129	80	49	96.88	81.9	55.55			
Capio Healthcare	Oaks Hospital	28	4	24	100.00	N/A	88.03			
Capio Healthcare	Park Hill Hospital	108	59	49	91.67	62.5	100			
Capio Healthcare	Pinehill Hospital	59	31	28	8.62	0	38.46			
Capio Healthcare	Renacres Hall Hospital	89	45	44	85.39	78.33	100			
Capio Healthcare	Rivers Hospital	269	95	174	52.70	83.33	82.14			
Capio Healthcare	Rowley Hall Hospital	38	14	24	28.95	0	0			
Capio Healthcare	Springfield Hospital	193	105	88	86.53	88.28	100			
Capio Healthcare	The Duchy Hospital	437	231	206	82.90	72.16	38.46			
Capio Healthcare	The Yorkshire Clinic	513	224	289	93.37	97.22	95.24			
Capio Healthcare	West Midlands Hospital	92	47	45	94.57	100	100			
Capio Healthcare	Winfield Hospital	148	94	54	41.22	21.21	41.38			
Capio Healthcare	Woodland Hospital	216	122	94	35.19	73.64	100			
Cromwell Clinic	Cromwell Clinic	39	35	4	100.00	100	100	No data provided		
Cromwell Hospital	Cromwell Hospital	38	17	21	30.30	100	100	17	16	115.15
Fairfield Independent Hospital	Fairfield Independent Hospital	12	5	7	41.67	8.33	0	30	19	24.49
HCA International Ltd	London Bridge Hospital	128	53	75	0.00	4.25	14.63	44	47	140.66
HCA International Ltd	The Lister Hospital	58	19	39	8.62	0	0	19	32	113.73
HCA International Ltd	The Princess Grace Hospital	220	207	13	33.03	14.19	3.7	395	55	48.89
HCA International Ltd	The Wellington Hospital	157	42	115	5.13	33.87	90.91	49	118	94.01
Hospital Management Trust	Claremont Hospital	326	136	190	67.08	35.48	42.86	205	270	68.63
Hospital Management Trust	Sancta Maria Hospital	30	18	12	100.00	100	100	44	37	37.04
Hospital Management Trust	St Hugh's Hospital	79	45	34	82.28	100	100	61	217	28.42
Hospital of St John and St Elizabeth	Hospital of St John and St Elizabeth	100	52	48	70.53	93.33	100	55	57	89.29
King Edward VII Hospital, Midhurst	King Edward VII Hospital, Midhurst	401	223	178	98.22	100	100	156	105	153.64

Table A5.3 - *Independent sector hospitals and treatment centres (continued)*

Group name (where relevant)	Hospital	A Complete records submitted	B Complete records for hips	C Complete records for knees	D Records submitted with patient consent (%)	E Records submitted with patient consent (%) 1 Jan to 31 March 2005	F Records submitted with patient consent (%) 1 April to 30 June 2005	Comparison of data submitted to the NJR against numbers expected		
								G1 Hip numbers supplied by organisation	G2 Knee numbers supplied by organisation	G3 NJR data submission rate (%)
King Edward VII Hospital Sister Agnes	King Edward VII Hospital Sister Agnes	474	364	110	93.04	85.82	84.61	245	62	154.40
Lourdes Hospital	Lourdes Hospital	10	2	8	0.00	0	N/A	38	28	15.15
Mount Alvernia Hospital	Mount Alvernia Hospital	149	93	56	97.99	100	96.55	93	56	100.00
Netcare UK Treatment Centres	Greater Manchester Surgical Centre	0	0	0	N/A	N/A	84.6	No data provided		
Nuffield Hospitals	Nuffield Hospital Cambridge	174	99	75	70.11	65.48	74.73	130	98	76.32
Nuffield Hospitals	Nuffield Hospital Derby	334	180	154	98.19	96.39	93.64	189	164	94.62
Nuffield Hospitals	Nuffield Hospital Harrogate	184	49	135	98.91	100	42.86	53	117	108.24
Nuffield Hospitals	Nuffield Hospital Haywards Heath	149	95	54	34.01	54.54	70.96	88	44	112.88
Nuffield Hospitals	Nuffield Hospital Ipswich	371	187	184	95.42	97.95	100	186	188	99.20
Nuffield Hospitals	Nuffield Hospital York	1	0	1	100.00	93.33	16.67	107	122	0.44
Nuffield Hospitals	The Acland Nuffield Hospital/The Manor Hospital	8	8	0	87.50	84.61	100	61	65	6.35
Nuffield Hospitals	The Birmingham Nuffield Hospital	277	267	10	99.63	N/A	N/A	217	135	78.69
Nuffield Hospitals	The Bournemouth Nuffield Hospital	452	234	218	48.89	59.69	47.78	272	246	87.26
Nuffield Hospitals	The Bristol Nuffield Hospital	379	186	193	46.79	89.61	90.7	199	198	95.47
Nuffield Hospitals	The Bury St Edmunds Nuffield Hospital	274	143	131	95.26	98.73	97.73	168	157	84.31
Nuffield Hospitals	The Cheltenham, Gloucester Nuffield Hospital	177	92	85	84.09	88.88	40	169	136	58.03
Nuffield Hospitals	The Chichester Nuffield Hospital	75	43	32	21.33	22.64	N/A	115	74	39.68
Nuffield Hospitals	The Cleveland Nuffield Hospital	507	273	234	99.20	99.35	98.46	228	227	111.43
Nuffield Hospitals	The Essex Nuffield Hospital	256	119	137	78.13	73.53	74.28	141	152	87.37
Nuffield Hospitals	The Exeter Nuffield Hospital	473	298	175	66.81	90.36	89.39	334	214	86.31
Nuffield Hospitals	The Grosvenor Nuffield Hospital	64	27	37	73.44	N/A	43.48	99	92	33.51

Table A5.3 - *Independent sector hospitals and treatment centres (continued)*

Group name (where relevant)	Hospital	A Complete records submitted	B Complete records for hips	C Complete records for knees	D Records submitted with patient consent (%)	E Records submitted with patient consent (%) 1 Jan to 31 March 2005	F Records submitted with patient consent (%) 1 April to 30 June 2005	Comparison of data submitted to the NJR against numbers expected		
								G1 Hip numbers supplied by organisation	G2 Knee numbers supplied by organisation	G3 NJR data submission rate (%)
Nuffield Hospitals	The Guildford Nuffield Hospital	172	43	129	91.28	96.83	98.31	56	134	90.53
Nuffield Hospitals	The HRH Princess Christian Nuffield Hospital	14	14	0	0.00	N/A	57.97	19	38	24.56
Nuffield Hospitals	The Huddersfield Nuffield Hospital	31	16	15	54.84	68.97	57.97	82	78	19.38
Nuffield Hospitals	The Hull Nuffield Hospital	190	108	82	89.84	91.55	98.19	102	116	87.16
Nuffield Hospitals	The Lancaster, Lakeland Nuffield Hospital	179	107	72	86.59	91.71	85.57	150	125	65.09
Nuffield Hospitals	The Leeds Nuffield Hospital	312	139	173	77.20	0	57.85	167	193	86.67
Nuffield Hospitals	The Leicester Nuffield Hospital	72	46	26	34.72	91.67	100	202	158	20.00
Nuffield Hospitals	The Lincoln Nuffield Hospital	185	116	69	98.38	100	100	126	71	93.91
Nuffield Hospitals	The Newcastle Nuffield Hospital	407	220	187	33.25	39.71	55.46	254	225	84.97
Nuffield Hospitals	The North London Nuffield Hospital	88	50	38	63.22	10.35	34.48	50	39	98.88
Nuffield Hospitals	The North Staffordshire Nuffield Hospital	93	31	62	78.49	36.36	77.46	143	150	31.74
Nuffield Hospitals	The Nottingham Nuffield Hospital	296	167	129	82.09	86.07	78.03	140	130	109.63
Nuffield Hospitals	The Plymouth Nuffield Hospital	340	179	161	53.55	57.63	51.35	189	189	89.95
Nuffield Hospitals	The Purey Cust Nuffield Hospital	67	42	25	14.93	20	N/A	107	122	29.26
Nuffield Hospitals	The Shropshire Nuffield Hospital	119	69	50	99.16	100	100	78	51	92.25
Nuffield Hospitals	The Somerset Nuffield Hospital	438	224	214	82.65	89.19	93.68	225	218	98.87
Nuffield Hospitals	The Sussex Nuffield Hospital	258	163	95	37.97	49.12	36.62	151	89	107.50
Nuffield Hospitals	The Thames Valley Nuffield Hospital	46	36	10	89.13	94.44	33.33	73	30	44.66
Nuffield Hospitals	The Tunbridge Wells Nuffield Hospital	150	52	98	76.67	82.69	76.47	56	103	94.34

Table A5.3 - *Independent sector hospitals and treatment centres (continued)*

Group name (where relevant)	Hospital	A Complete records submitted	B Complete records for hips	C Complete records for knees	D Records submitted with patient consent (%)	E Records submitted with patient consent (%) 1 Jan to 31 March 2005	F Records submitted with patient consent (%) 1 April to 30 June 2005	Comparison of data submitted to the NJR against numbers expected		
								G1 Hip numbers supplied by organisation	G2 Knee numbers supplied by organisation	G3 NJR data submission rate (%)
Nuffield Hospitals	The Warwickshire Nuffield Hospital	468	246	222	78.75	98.06	N/A	222	199	111.16
Nuffield Hospitals	The Wessex Nuffield Hospital	300	182	118	64.00	89.55	100	164	140	98.68
Nuffield Hospitals	The Woking Nuffield Hospital	47	45	2	0.00	0	0	112	96	22.60
Nuffield Hospitals	The Wolverhampton Nuffield Hospital	136	66	70	82.09	81.48	73.12	106	115	61.54
Nuffield Hospitals	The Wye Valley Nuffield Hospital	158	100	58	3.23	36.56	51.72	83	55	114.49
Partnership Health Group Ltd Treatment Centres	PHG Bassetlaw Treatment Centre	446	211	235	48.43	88.13	100	393	514	100.88
Partnership Health Group Ltd Treatment Centres	PHG Ilkeston Treatment Centre	469	190	279	5.97	50.47	34.29			
Partnership Health Group Ltd Treatment Centres	PHG Ilkeston Treatment Centre & PHG Bassetlaw Treatment Centre	915	401	514	26.56	72.38	77.88			
St Anthonys	St Anthonys	190	124	66	88.42	82.92	89.28	93	54	129.25
St Josephs Hospital	St Josephs Hospital	151	90	61	83.44	70.13	56.52	115	95	71.90
The Horder Centre for Arthritis	The Horder Centre for Arthritis	1434	726	708	89.78	86.96	94.08	693	586	112.12
The London Clinic	The London Clinic	80	58	22	53.75	36.66	13.79	82	47	62.02
The New Victoria Hospital	The New Victoria Hospital	125	73	52	88.80	96.55	84	67	48	108.70
The Orchard Hospital	The Orchard Hospital	29	17	12	55.17	0	0	50	32	35.37
Woodlands Hospital Darlington	Woodlands Hospital Darlington	352	177	175	0.85	0.83	53.62	107	97	172.55

APPENDIX 6

Numbers of brands of prostheses according to ODEP compliance

Cemented cups		
ODEP rating	Number of brands	Corresponding number of implants (%)
10A	7	13,286 (53.6)
10B	1	733 (3.0)
10C	3	228 (0.9)
7A	2	1,522 (6.1)
7B	3	392 (1.6)
5A	1	3,540 (14.3)
5B	3	2,279 (9.2)
3A	1	599 (2.4)
3B	1	529 (2.1)
Unacceptable	0	0 (0)
Pre-entry	2	185 (0.7)
Not submitted	16	1,485 (6.0)
Revision	1	4 (0.02)
Total	**41**	**24,782**

Cementless cups		
ODEP rating	Number of brands	Corresponding number of implants (%)
10A	0	0 (0)
10B	1	3,201 (19.3)
10C	2	141 (0.8)
7A	3	6,338 (38.2)
7B	3	980 (5.9)
5A	3	520 (3.1)
5B	0	0 (0)
3A	9	2,763 (16.6)
3B	1	6 (0.04)
Unacceptable	0	0 (0)
Pre-entry	5	2,211 (13.3)
Not submitted	11	409 (2.5)
Revision	1	35 (0.2)
Total	**39**	**16,604**

Cemented stems		
ODEP rating	Number of brands	Corresponding number of implants (%)
10A	9	22,269 (72.5)
10B	0	0 (0)
10C	5	1,073 (3.5)
7A	1	2,000 (6.5)
7B	0	0 (0)
5A	4	3,870 (12.6)
5B	2	466 (1.5)
3A	3	452 (1.5)
3B	1	98 (0.3)
Unacceptable	3	87 (0.3)
Pre-entry	5	296 (1.0)
Not submitted	10	92 (0.3)
Revision stem	2	19 (0.1)
Total	**45**	**30,722**

Cementless stems		
ODEP rating	Number of brands	Corresponding number of implants (%)
10A	5	5,967 (58.1)
10B	4	397 (3.9)
10C	2	187 (1.8)
7A	2	457 (4.4)
7B	0	0 (0)
5A	3	74 (0.7)
5B	1	575 (5.6)
3A	2	774 (7.5)
3B	2	131 (1.3)
Unacceptable	0	0 (0)
Pre-entry	6	937 (9.1)
Not submitted	12	430 (4.2)
Revision stem	9	348 (3.4)
Total	**48**	**10,277**

Resurfacing prostheses		
ODEP rating	Number of brands	Corresponding number of implants (%)
10A	0	0 (0)
10B	0	0 (0)
10C	0	0 (0)
7A	0	0 (0)
7B	0	0 (0)
5A	1	3,508 (74.4)
5B	0	0 (0)
3A	1	137 (2.9)
3B	0	0 (0)
Unacceptable	0	0 (0)
Pre-entry	4	1,036 (22.0)
Not submitted	2	35 (0.7)
Total	**8**	**4,716**

APPENDIX 7

Complete lists of prosthesis brands with frequency of entry into the NJR in 2004 and ODEP rating

Cemented cups			
Manufacturer	**Brand**	**Number used (%)**	**ODEP rating**
DePuy	Elite Plus Ogee	3,711 (15.0)	10A
Stryker Howmedica Osteonics	Contemporary Duration	3,540 (14.3)	5A
DePuy	Charnley	3,167 (12.8)	10A
DePuy	Charnley Ogee	2,837 (11.4)	10A
Stryker Howmedica Osteonics	Exeter Duration Cup	2,374 (9.6)	10A
DePuy	Elite Plus	1,499 (6.0)	5B
Biomet	Stanmore Arcom	1,019 (4.1)	10A
Zimmer	ZCA	955 (3.9)	7A
Smith & Nephew	Opera	778 (3.1)	5B
Joint Replacement Instrumentation Ltd	JRI	733 (3.0)	10B
Corin	Cenator	599 (2.4)	3A
DePuy	Ultima	567 (2.3)	7A
DePuy	Wroblewski Golf Ball	529 (2.1)	3B
Centerpulse	Muller Low Profile	527 (2.1)	not submitted
Waldemar Link	Flange	292 (1.2)	not submitted
DePuy	Wroblewski Angle Bore	262 (1.1)	7B
Waldemar Link	Interplanta	175 (0.7)	10A
Biomet	Apollo	168 (0.7)	pre-entry
Biomet	CMK	168 (0.7)	10C
Centerpulse	Muller Full Profile	153 (0.6)	not submitted
Ortho-ID	Polar Cup	119 (0.5)	not submitted
B Braun/Aesculap	Chirulen	93 (0.4)	not submitted
Biomet	Muller	92 (0.4)	not submitted
Smith & Nephew	Reflection	88 (0.4)	7B
Centerpulse	Metasul	62 (0.3)	not submitted
Orthodynamics/Symbios	Orthodynamics	42 (0.2)	7B
Finsbury	Freeman	33 (0.1)	10C
Biomet	Hedrocell	31 (0.1)	not submitted
DePuy	Charnley Evolution	30 (0.1)	not submitted
Centerpulse	SPC	29 (0.1)	not submitted
Endo Plus (UK) Limited	PE-Plus	27 (0.1)	10C
Waldemar Link	Snap-Fit	22 (0.1)	not submitted
Biomet	Mainstream Muller	17 (0.1)	pre-entry
Corin	HiNek	15 (0.1)	not submitted
Corin	CTi	8 (0.03)	not submitted
Zynergy Orthopaedics	Sovereign	6 (0.02)	not submitted
Corin	Metalok	5 (0.02)	not submitted
DePuy	Solution	4 (0.02)	revision[1]
Mathys Orthopaedics Ltd	CCB	3 (0.01)	10A
Biomet	Stanmore MMA	2 (0.01)	5B
Avatar	LFT	1 (0.004)	not submitted
Total		**24,782**	

[1] Prostheses designed solely for use in revision procedures have not been rated by ODEP

Cementless cups			
Manufacturer	**Brand**	**Number used (%)**	**ODEP rating**
Zimmer	Trilogy	3,489 (21.0)	7A
Joint Replacement Instrumentation Ltd	CSF	3,201 (19.3)	10B
DePuy	Duraloc	2,659 (16.0)	7A
Stryker Howmedica Osteonics	Trident	1,467 (8.8)	pre-entry
DePuy	Pinnacle	1,112 (6.7)	3A
Smith & Nephew	Reflection	701 (4.2)	7B
Stryker Howmedica Osteonics	ABG II UHMWPE/Duration	631 (3.8)	3A
Stryker Howmedica Osteonics	ABG II Ceramic System	545 (3.3)	pre-entry
Endo Plus (UK) Limited	EP-Fit	462 (2.8)	3A
Stryker Howmedica Osteonics	Secur-Fit	259 (1.6)	5A
Centerpulse	Fitmore	259 (1.6)	7B
B Braun/Aesculap	Plasma Cup	227 (1.4)	not submitted
Centerpulse	Allofit	211 (1.3)	5A
Wright Medical UK Ltd	Anca Ace	198 (1.2)	3A
Endo Plus (UK) Limited	Bicon-Plus	190 (1.1)	7A
DePuy	Ultima	150 (0.9)	3A
Biomet	Exceed	144 (0.9)	pre-entry
Biomet	Mallory Head	123 (0.7)	3A
Surgicraft	Atlas-Split	87 (0.5)	not submitted
Centerpulse	CLS	82 (0.5)	10C
DePuy	S-Rom	61 (0.4)	3A
Biomet	Avantage	59 (0.4)	10C
Biomet	Biomex	54 (0.3)	pre-entry
Corin	DC-Fit	51 (0.3)	not submitted
Biomet	Universal II	50 (0.3)	5A
Waldemar Link	McMinn	35 (0.2)	revision[1]
Wright Medical UK Ltd	Transcend	28 (0.2)	not submitted
Joint Replacement Instrumentation Ltd	FRF	25 (0.2)	3A
Biomet	Alize	20 (0.1)	7B
Amplitude	Saturn	6 (0.04)	3B
DePuy	Octopus	5 (0.03)	not submitted
DePuy	J-Loc	5 (0.03)	not submitted
Corin	SLF	2 (0.01)	not submitted
Mathys Orthopaedics Ltd	Unicup	1 (0.01)	pre-entry
Centerpulse	Pedestal	1 (0.01)	not submitted
DePuy	Omega	1 (0.01)	not submitted
Amplitude	Horizon	1 (0.01)	3A
Biomet	Eternity	1 (0.01)	not submitted
Corin	Bio-conical	1 (0.01)	not submitted
Total		**16,604**	

Cemented stems			
Manufacturer	**Brand**	**Number used (%)**	**ODEP rating**
Stryker Howmedica Osteonics	Exeter	13,808 (44.9)	10A
DePuy	Charnley	5,248 (17.1)	10A
DePuy	C Stem	2,826 (9.2)	5A
Zimmer	CPT	2,000 (6.5)	7A
Biomet	Stanmore	1,232 (4.0)	10A
DePuy	Elite Plus	866 (2.8)	5A
Joint Replacement Instrumentation Ltd	Furlong Modular	633 (2.1)	10C
Waldemar Link	SP II	580 (1.9)	10A
Stryker Howmedica Osteonics	Omnifit Cemented	533 (1.7)	10A
Centerpulse	Muller Modular	489 (1.6)	10A
Centerpulse	MS-30	358 (1.2)	5B
Smith & Nephew	Spec- EF	228 (0.7)	10A
Zimmer	Versys	216 (0.7)	3A
Endo Plus (UK) Limited	CPS Plus	205 (0.7)	3A
Biomet	Biomet Mainstream Muller	185 (0.6)	pre-entry
Biomet	CMK	181 (0.6)	10C
DePuy	Ultima Straight Cemented Stem	179 (0.6)	10C
DePuy	Ultima TPS Cemented Stem	164 (0.5)	5A
Biomet	Olympia	108 (0.4)	5B
B Braun/Aesculap	Centrament	98 (0.3)	3B
Centerpulse	Muller Monobloc	83 (0.3)	10A
Finsbury	Freeman	69 (0.2)	10C
Biomet	Bimetric	68 (0.2)	10A
Orthodynamics/Symbios	Logic	48 (0.2)	unacceptable
Smith & Nephew	CPCS	42 (0.1)	pre-entry
Biomet	Aura II	42 (0.1)	pre-entry
Corin	Cenator	31 (0.1)	3A
DePuy	Ultima Howse II Collared Stem	25 (0.1)	unacceptable
DePuy	Summit	21 (0.1)	pre-entry
DePuy	Wroblewski	18 (0.1)	revision stem[1]
Corin	Centrafix	18 (0.1)	not submitted
Centerpulse	CF-30	17 (0.1)	not submitted
Corin	Trifit	16 (0.1)	not submitted
Corin	Taperfit	14 (0.05)	unacceptable
Corin	Hi-Nek	14 (0.05)	not submitted
Zimmer	Mayo	14 (0.05)	5A
B Braun/Aesculap	Bicontact	11 (0.04)	10C
B Braun/Aesculap	Alfa	7 (0.02)	not submitted
Corin	Cti	7 (0.02)	not submitted
Zimmer	VerSys Heritage	6 (0.02)	pre-entry
Zynergy Orthopaedics	Sovereign	6 (0.02)	not submitted
Biomet	SHP	5 (0.02)	not submitted
Finsbury	Stemcup	1 (0.003)	not submitted
Midland Medical Technologies Ltd	tritaper	1 (0.003)	not submitted
Smith & Nephew	Echelon	1 (0.003)	revision stem[1]
Total		**30,722**	

[1] Prostheses designed solely for use in revision procedures have not been rated by ODEP

Cementless stems			
Manufacturer	**Brand**	**Number used (%)**	**ODEP rating**
Joint Replacement Instrumentation Ltd	Furlong-HAC	3,098 (30.1)	10A
DePuy	Corail	2,362 (23)	10A
Stryker Howmedica Osteonics	ABG2	720 (7.0)	pre-entry
DePuy	S-Rom	575 (5.6)	5B
Zimmer	VerSys Fibremetal Taper Coat (FMT)	558 (5.4)	3A
Endo Plus (UK) Limited	SL-Plus	448 (4.4)	7A
Stryker Howmedica Osteonics	Omnifit HA	277 (2.7)	10A
Biomet	Bimetric	228 (2.2)	10B
Wright Medical UK Ltd	Ancafit	216 (2.1)	3A
Centerpulse	CLS	213 (2.1)	10A
Smith & Nephew	Synergy	212 (2.1)	not submitted[2]
Biomet	Taperloc	144 (1.4)	10B
Stryker Howmedica Osteonics	Accolade	121 (1.2)	3B
Biomet	Aura II	111 (1.1)	pre-entry
B Braun/Aesculap	Bicontact	105 (1.0)	10C
DePuy	Solution	97 (0.9)	revision stem[1]
Stryker Howmedica Osteonics	Restoration	94 (0.9)	revision stem[1]
Waldemar Link	Davies	90 (0.9)	not submitted
DePuy	KAR	88 (0.9)	revision stem[1]
Finsbury	Freeman	82 (0.8)	10C
Zimmer	Versys Beaded	48 (0.5)	pre-entry
Corin	Proxima	41 (0.4)	5A
Smith & Nephew	Echelon	37 (0.4)	revision stem[1]
Orthodynamics/Symbios	Cannulok	35 (0.3)	not submitted
DePuy	IPS	32 (0.3)	5A
DePuy	Summit	31 (0.3)	pre-entry
Biomet	Conelock	25 (0.2)	revision stem[1]
Corin	Cfit	24 (0.2)	not submitted
Corin	Panatomic	24 (0.2)	not submitted
Centerpulse	Revitan	23 (0.2)	not submitted
Wright Medical UK Ltd	Profemur	23 (0.2)	pre-entry
Centerpulse	Alloclassic	17 (0.2)	10A
Biomet	Mallory Head	16 (0.2)	10B
Centerpulse	Wagner Type	10 (0.1)	3B
Stryker Howmedica Osteonics	ABG 1	9 (0.1)	7A
DePuy	AML	9 (0.1)	10B
Waldemar Link	CFP	8 (0.1)	not submitted
Corin	Hinek	6 (0.1)	not submitted
Stryker Howmedica Osteonics	T3	5 (0.05)	not submitted
Mathys Orthopaedics Ltd	CBC	4 (0.04)	pre-entry
Surgicraft	Esop	3 (0.03)	revision stem[1]
Stryker Howmedica Osteonics	Austn Moore	2 (0.02)	revision stem[1]
B Braun/Aesculap	Excia	1 (0.01)	revision stem[1]
Van Straten Medical	CCI	1 (0.01)	not submitted
Orthodynamics/Symbios	Bradley	1 (0.01)	revision stem[1]
Zimmer	Mayo	1 (0.01)	5A
Corin	Alphafit	1 (0.01)	not submitted
Corin	Trifit	1 (0.01)	not submitted
Total		**10,277**	

[2] More precisely, insufficient detail in original submission so will be re-submitting

APPENDIX 8

Patient-reported outcomes measurement - interim study

The National total knee replacement audit project questionnaire and the National total hip replacement audit project questionnaire - available in the electronic copy of the report only - http://www.njrcentre.org.uk/

APPENDIX 9

GLOSSARY

A	
ABHI	Association of British Health-Care Industries, the representative trade body for the UK medical device industry
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*
AfPP	Association for Perioperative Practice (incorporating the National Association of Theatre Nurses)
All Wales CHCs	All Wales Community Health Councils
ANDPB	Advisory Non Departmental Public Body
Arthritis Care	UK-wide voluntary organisation working with, and for, all people with arthritis
Arthroplasty	A procedure where a natural joint, or part of a natural joint, is replaced by an artificial prosthesis
Associate specialist	These surgeons carry out a wide range of surgical care, both on the ward, in the outpatient clinic and in the operating theatre. This might include complex surgery at which they have become expert. They work under the supervision of a consultant [i]

B	
Bar code reader facility	Introduced to allow electronic scanning of orthopaedic component labels and reduce the time required for entry of component data into the NJR database
BASK	British Association for Surgery of the Knee, a specialist society of the British Orthopaedic Association
BHS	British Hip Society, a specialist society of the British Orthopaedic Association
Bilateral operation	Operation performed on both sides, e.g. left and right knee procedures carried out during a single operation
BOA	British Orthopaedic Association
BOA PLG	British Orthopaedic Association Patient Liaison Group
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
Bulk data upload facility	A facility that has been developed to allow hospitals to collect the NJR dataset within their own internal systems and upload data at regular intervals to the NJR database

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 of different surgeons 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 the surgeon in optimising the strength of adhesion between bone cement and bone
CHAI	Commission for Healthcare Audit and Inspection, commonly known as the Healthcare Commission
Clinical assistant	A non-training grade post of doctor who is not a consultant, although may have previously been one. The doctor is employed doing orthopaedics (in this instance) either part-time or full-time and after a variable length of training
Completed operations	A completed operation is one where the details on the data record are complete and have been submitted, as compared to a record left in edit mode (see Edit mode)
Condyl	The two areas on the surface of the femur and tibia within the knee that articulate with each other
Consultant surgeon	The consultant is responsible for managing patients' care and is assisted by a team of doctors. The consultant has responsibility for the standards of care given to all patients by doctors in their team. Consultants usually specialise and may become highly skilled in one or two specific areas of surgery but they are also responsible for a wide range of emergencies admitted under their care. To become a consultant in the NHS, their name must be on the General Medical Council (GMC) specialist register. In teaching hospitals, consultants may be called professor, reader or senior lecturer [i]
CSV files	Comma separated values files that, for the NJR, put each data item for an operation on one line, separated by commas. The data file can be imported into a standard package for further formatting and interrogation
Cup	See *Acetabular component*

[i] Who's Who: a guide to hospital surgical staff. The Royal College of Surgeons of England Patient Liason Group. Reviewed September 2004. First published July 2001

D

Data collection periods (for Annual Report analyses)	The 2004 data collection period relates to hip and knee replacement procedures that took place between 1 January and 31 December 2004 inclusive and that were entered into the NJR database by 28 February 2005. These data were then used in analyses for the 2nd Annual Report. The 2003 data collection period relates to hip and knee replacement procedures that took place between 1 April and 31 December 2003 inclusive and that were entered into the NJR database by 31 March 2004. These data were then used in analyses for the 1st Annual Report. (Data for both 2003 and 2004 have continued to be entered into the NJR database beyond these end dates, although they could not contribute to the 1st and 2nd Annual Report analyses respectively.)
Data Entry System	The database system for entering surgical data into the NJR
Data Integrity Audit	Assessment of the robustness of the processes used to collect quality NJR data
Data quality	Completeness, accuracy and linkability of NJR data
Default techniques	The surgical techniques used most often by an individual surgeon when performing joint replacement

E

Edit mode	An incomplete set of data relating to an operation that is stored in a holding file (in the edit stack) within the NJR system, awaiting completion
Elective surgery	Surgical procedures which are planned and booked in advance

F

Femoral component (hip)	The part of a total hip joint that is inserted into the femur (thigh bone) of the patient. It normally consists of a stem and a head (ball)
Femoral component (knee)	The portion of a knee prosthesis that is used to replace the articulating surface of the femur (thigh bone)
Femoral head	The ball-shaped portion of the femur that forms part of the ball and socket hip joint
Femoral prosthesis	The portion of a total joint replacement used to replace damaged parts of the femur (thigh bone)
Femoral stem	See *Femoral component (hip)*
Finger packing (of cement)	The technique of manually inserting bone cement into bony cavities immediately prior to the insertion of a prosthesis

G

GP	General Practitioner

H

HDE	Hospital Data Entry, a user registered with the NJR who has been appointed by a hospital to enter its data
HDM	Hospital Data Manager, a user registered with the NJR who has been appointed by a hospital to have access rights to download hospital data via the NJR system (where surgeons have given their prior consent to their data being accessed)
Head	See *Femoral head*
Hemiarthroplasty	Replacement of only one articulating surface within a damaged joint. Such procedures are not included within the NJR database
HES	The Hospital Episode Statistics (HES) system is a database containing details of all patients admitted to NHS hospitals in England. HES covers all medical specialities and includes private patients treated in NHS hospitals. The NJR uses certain HES data for comparison purposes, e.g. the annual totals of different types of procedures performed by each NHS unit in England
Hip Owner's Manual	The Hip Owner's Manual is a handbook that patients can use to keep a record of their implant and operation details. The manual provides room for both patients and their clinicians to record information about their health and experiences of the healthcare pathway, from initial assessment through to post operative follow-up. The manual was originally developed under the ownership and guidance of the NHS Information Authority. Further development was transferred to the NJR during 2004
House Officer (HO)	Now more properly referred to as Pre-registration house officer (PRHO) - see *Pre-registration house officer (PRHO)*
Hybrid procedure	Joint replacement procedure where cement is used on one articulated surface and the other is cementless

I

IHF	Independent Healthcare Forum, (previously the Independent Healthcare Association). This organisation represents independent healthcare providers
Image-guided surgery	Surgery performed by the surgeon, using real time images (normally X-rays) to help with alignment and positioning of prosthetic components
Indication (for surgery)	Reason for surgery. The NJR system allows more than one indication to be recorded

L

Laminar flow (in theatres)	A system which ensures a continuous flow of 'clean' air around the patient during surgical procedures
Lead surgeon	Surgeon that directs and performs an operation, assisted by others. The lead surgeon may or may not also be the consultant in charge, i.e. the person who is ultimately responsible for the patient
Levy	Additional payment (currently £25.00 including VAT) placed on the sales of specific hip and knee implants to cover the costs associated with ongoing operations and development of the NJR
Levyable implants	The purchase of a one-piece (monobloc) acetabular cup or a modular acetabular cup shell component attracts an NJR levy payment for a total hip prosthesis. The purchase of any knee femoral component (including the femoral component of a unicompartmental knee or patello-femoral joint prosthesis) or one-piece knee prosthesis attracts an NJR levy payment for a knee prosthesis
Linkable percentage	The linkable percentage is an estimate of the percentage of all relevant procedures that have been entered into the NJR and may be linked via an NHS number to other procedures performed on the same patient. Linkable % = A x B x C where: A = % of all relevant joint replacement procedures performed in England and Wales that are entered into the NJR B = % of those procedures entered for which NJR consent was obtained C = % of those procedures where the patient gave consent for which NHS numbers are available
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.
LMWH	Low molecular weight heparin

M

MDS	Minimum Dataset, 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 v1	Minimum Dataset version 1, that was used to collect data from 1 April 2003. MDS v1 was closed to new data entry on 1 April 2005
MDS v2	Minimum Dataset version 2, that was introduced on 1 April 2004. MDS v2 replaced MDS v1 as the official NJR dataset on 1 June 2004
Menisci (mobile and fixed bearing types)	A mobile bearing knee is a design of knee prosthesis that has a tibial component combining a metal base plate and a polyethylene articulating surface that allows relative movement between the two surfaces. A fixed bearing knee is as described above but designed with a polyethylene articulating surface fixed to a metal baseplate that does not allow for any movement between the two surfaces
MHRA	Medicines and Healthcare products Regulatory Agency
Minimally invasive surgery	Surgery performed using special instruments that allow very small incisions to be made in the tissues of the patient
Mixing and matching	Also known 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	A component composed of more than one piece, e.g. a modular acetabular cup shell component
Monobloc	One piece, e.g. a monobloc femoral stem

N

NAO	National Audit Office
NATN	National Association of Theatre Nurses (now incorporated into the AfPP - see above)
NICE	National Institute for Health and Clinical Excellence
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 health care sector to ensure complete recording of national activity in England and Wales
NJR Centre	National co-ordinating centre for the NJR, based at Harwell, southern Oxfordshire
NJR RSC	National Joint Registry Research Sub Committee
NJR StatsOnline	Web facility for viewing and downloading NJR statistics
NOPAG	National Joint Registry Outlier Performance Advisory Group
NSTS	NHS Strategic Tracing Service. Used to source missing NHS numbers and also to determine when patients recorded on the NJR have died
NTHROS	National Total Hip Replacement Outcomes Study

O

ODEP	Orthopaedic Data Evaluation Panel of the NHS Purchasing and Supply Agency
Oxford Hip/Knee Score	Numerical system used to describe the clinical outcome of a hip or knee replacement in terms of the ability of the patient to perform normal daily activities

P	
PASA	NHS Purchasing and Supply Agency
Patella resurfacing	Replacement of the surface of the patella (kneecap) with a prosthesis
Patello-femoral knee replacement	Procedure involving replacement of the femoral condyles and resurfacing of the patella
Patello-femoral prosthesis (knee)	A 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 consent form	Whether a patient gives or withholds their consent should be recorded on an NJR patient consent form, signed and dated by the patient
Patient feedback questionnaires	A tool that is used to capture patient satisfaction and health-related quality of life information
Patient hospital ID	The reference number a hospital assigns to a patient to identify them within their hospital system
Patient physical status	Describes the overall condition of the patient using the American Society of Anaesthesiology (ASA) scoring system grades of 'fit and healthy', 'mild disease, not incapacitating', 'incapacitating systemic disease', and 'life threatening disease'
Patient procedure	Type of procedure carried out on a patient, e.g. primary total prosthetic replacement using cement
PCI	Patient Consent Initiative
PCT	Primary Care Trust
PEDW	Patient Episode Database Wales, the Welsh equivalent to Hospital Episode Statistics in England (see HES)
PKI	Public Key Infrastructure - system to ensure a high level of data security. On the NJR, this allows for secure, on-line user verification, enabling surgeons to retrieve patient identifiable data on-line
PPI Forums (Patient Forums)	Patient and Public Involvement Forums. There is a Patient and Public Involvement (PPI) Forum for every NHS Trust and Primary Care Trust (PCT) in England. They are made up of local people and play an active role in health related decision making within their communities. PPI Forums are a key vehicle for raising awareness of the needs and views of patients and the public, and placing them at the centre of health services
Pre-registration house officer (PRHO)	All newly qualified doctors spend a year training in hospital as a house officer. Usually, six months are spent as a house surgeon gaining experience in different areas of surgery and another six months are spent as a house physician working in general medicine. Each works as a member of a team under the supervision of a consultant. Once they have completed this year of training they are eligible for full registration with the GMC (General Medical Council) [i]
Primary hip/knee replacement	The first total joint replacement performed on any individual patient
Proforma	Data has to be submitted electronically to the NJR database. Where hospitals wish, they can capture data on paper proformas at the time of operation and submit electronically at a convenient time
PROMS	Patient Reported Outcomes Measurement Studies
Prosthesis	Orthopaedic implant used in joint replacement procedures, e.g. a total hip or a unicondylar knee
PSO	Patient Safety Observatory
Pulsatile lavage	A pulsed jet of sterile water used to clean the bony surfaces prior to the implantation of a total joint replacement

[i] Who's Who: a guide to hospital surgical staff. The Royal College of Surgeons of England Patient Liason Group. Reviewed September 2004. First published July 2001

R

RAC	Regional Audit Co-ordinator. RACs provide field-based links between hospitals and the NJR Centre. They work closely with the RCCs and the NJR Centre to identify and resolve issues, disseminate information to individual hospitals, and identify and facilitate sharing of good practice
RCC	Regional Clinical Co-ordinator. RCCs are practising orthopaedic surgeons who act at a strategic level within trusts and hospitals, facilitating feedback to surgeons and their teams and so enabling them to submit NJR data and optimise their clinical practice
RCS	Royal College of Surgeons
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)	A hip procedure where the acetabular prosthesis is cemented and the femoral prosthesis is not cemented
Revision hip/knee replacement	An operation performed to remove and replace one or more components of a total joint prosthesis, for whatever reason

S

Senior house officer (SHO)	Doctors at this level spend between two and four years learning surgery and gaining experience of different surgical procedures. They then sit the MRCS (member of The Royal College of Surgeons) exams needed to enable them to continue their training and which allows them to revert to the title 'Mr', 'Mrs', 'Miss' or 'Ms'. They work under the direct supervision of a consultant [i]
SHA	Strategic Health Authority
Specialist surgical registrar (SpR)	Most surgeons spend six years in this post building up their surgical experience and expertise under the supervision of a consultant. After a few years, they choose an area of surgery in which they wish to specialise. Only after this training is complete and they have passed more exams and become a Fellow of The Royal College of Surgeons (which means they can put the letters FRCS after their name), can they apply for a position as a fully trained consultant. In teaching hospitals an SpR may be called a research registrar [i]
Staff grade surgeon	These surgeons have usually had some experience as a registrar with whom, in many hospitals, they alternate on the emergency surgical rota. They may perform a range of operations and outpatient consultations under the supervision of a consultant [i]
Stem	See *Femoral component (hip)*
Surgical approach	The 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
Thrombo-prophylaxis	A drug or other post-operative regime prescribed to patients with the aim of preventing blood clot formation in the post-operative 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	A type of knee prosthesis that replaces the complete contact area between the femur and tibia of a patient
Treatment Centre	Treatment centres are dedicated units that offer elective and short-stay surgery and diagnostic procedures in specialties such as ophthalmology, orthopaedics and a range of other conditions. These include hip and knee replacements, hernia repair and gallbladder and cataract removal, amongst others. Treatment centres may be NHS-funded or privately funded
Trochanter	A bony protuberance of the femur found just below the femoral head
Trochanteric osteotomy	The temporary incision of the trochanter, used to aid exposure of the hip joint during some types of total hip replacement
Type (of prosthesis)	The type of a prosthesis is the generic description of a prosthesis, e.g modular cemented stem (hip), patello-femoral joint (knee)

U	
Unicompartmental knee	Also known as unicondylar knee. Normally used to define the type of prosthesis used in unicondylar arthroplasty
Unicondylar arthroplasty	Replacement of one tibial condyl 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. on left hip
Unseen Consent	NJR consent is obtained and recorded in the usual manner, for example, the patient is asked to sign the NJR consent form at the pre-operative assessment. Completed consent forms are filed directly in the patient notes and are not passed to the person entering data for consent verification. This means the patient's consent decision (i.e. the signed NJR consent form) is not viewed directly by the person entering NJR data and patient consent is presumed as given unless the data entry person is notified otherwise

[i] Who's Who: a guide to hospital surgical staff. The Royal College of Surgeons of England Patient Liason Group. Reviewed September 2004. First published July 2001

APPENDIX 10A

Alphabetical listing of NHS hospitals and treatment centres (England) and related trusts

Hospital	Trust
Addenbrooke's Hospital	Addenbrooke's NHS Trust
Airedale General Hospital	Airedale NHS Trust
Alexandra Hospital, The	Worcestershire Acute Hospitals NHS Trust
Arrowe Park Hospital	Wirral Hospital NHS Trust
Ashford Hospital	Ashford and St Peter's Hospitals NHS Trust
Barnet General Hospital	Barnet and Chase Farm Hospitals NHS Trust
Barnsley District General Hospital	Barnsley District General Hospital NHS Trust
Basildon Hospital	Basildon and Thurrock University Hospitals NHS Trust
Bassetlaw Hospital	Doncaster and Bassetlaw Hospitals NHS Trust
Bedford Hospital South Wing	Bedford Hospitals NHS Trust
Bishop Auckland Treatment Centre	County Durham and Darlington Acute Hospitals NHS Trust
Blackburn Royal Infirmary	East Lancashire Hospitals NHS Trust
Blackpool Victoria Hospital	Blackpool, Fylde and Wyre Hospitals NHS Trust
Bradford Royal Infirmary	Bradford Hospitals NHS Trust
Bristol Royal Infirmary	United Bristol Healthcare NHS Trust
Broadgreen Hospital	Royal Liverpool and Broadgreen University Hospitals NHS Trust
Broomfield Hospital	Mid Essex Hospital Services NHS Trust
Burnley General Hospital	East Lancashire Hospitals NHS Trust
Calderdale Royal Hospital	Calderdale and Huddersfield NHS Trust
Cannock TC	Mid Staffordshire General Hospitals NHS Trust
Castle Hill Hospital	Hull and East Yorkshire Hospitals NHS Trust
Central Middlesex Hospital	North West London Hospitals NHS Trust
Chapel Allerton Hospital	Leeds Teaching Hospitals NHS Trust
Charing Cross Hospital	Hammersmith Hospitals NHS Trust
Chase Farm Hospital	Barnet and Chase Farm Hospitals NHS Trust
Chelsea & Westminster Hospital	Chelsea and Westminster Healthcare NHS Trust
Cheltenham General Hospital	Gloucestershire Hospitals NHS Trust
Chesterfield & North Derbyshire Royal Hospital	Chesterfield and North Derbyshire Royal Hospital NHS Trust
Chorley and South Ribble District General Hospital	Lancashire Teaching Hospitals NHS Trust
City General Hospital	North Staffordshire Hospital NHS Trust
City Hospital	Sandwell and West Birmingham Hospitals NHS Trust
Clatterbridge Hospital	Wirral Hospital NHS Trust
Colchester General Hospital	Essex Rivers Healthcare NHS Trust
Conquest Hospital	East Sussex Hospitals NHS Trust
Corbett Hospital	Dudley Group of Hospitals NHS Trust
Countess of Chester Hospital	Countess of Chester Hospital NHS Trust
Coventry & Warwickshire Hospital	University Hospitals Coventry and Warwickshire NHS Trust
Crawley Hospital	Surrey and Sussex Healthcare NHS Trust
Cumberland Infirmary	North Cumbria Acute Hospitals NHS Trust
Darent Valley Hospital	Dartford and Gravesham NHS Trust
Darlington Memorial Hospital	County Durham and Darlington Acute Hospitals NHS Trust
Derby Royal Infirmary	Southern Derbyshire Acute Hospitals NHS Trust
Derriford Hospital	Plymouth Hospitals NHS Trust
Dewsbury Hospitals	Mid Yorkshire Hospitals NHS Trust
Diana, Princess of Wales Hospital	Northern Lincolnshire and Goole Hospitals NHS Trust
Doncaster Royal Infirmary	Doncaster and Bassetlaw Hospitals NHS Trust
Dorset County Hospital	West Dorset General Hospitals NHS Trust
Ealing Hospital	Ealing Hospital NHS Trust
East Surrey Hospital	Surrey and Sussex Healthcare NHS Trust
Eastbourne District General Hospital	East Sussex Hospitals NHS Trust
Edith Cavell Hospital	Peterborough & Stamford Hospitals NHS Foundation Trust
Epsom General Hospital	Epsom and St Helier NHS Trust
Freeman Hospital	The Newcastle Upon Tyne Hospitals NHS Trust
Friarage Hospital	South Tees Hospitals NHS Trust
Frimley Park Hospital	Frimley Park Hospital NHS Trust
Furness General Hospital	Morecambe Bay Hospitals NHS Trust
George Eliot Hospital - Acute Services	George Eliot Hospital NHS Trust

Hospital	Trust
Glenfield General Hospital	University Hospitals of Leicester NHS Trust
Gloucestershire Royal Hospital	Gloucestershire Hospitals NHS Trust
Good Hope Hospital	Good Hope Hospital NHS Trust
Goole District Hospital (Acute)	Northern Lincolnshire and Goole Hospitals NHS Trust
Goole Hospital TC	Northern Lincolnshire and Goole Hospitals NHS Trust
Grantham & District General Hospital	United Lincolnshire Hospitals NHS Trust
Great Western Hospital, The	Swindon and Marlborough NHS Trust
Guy's Hospital	Guy's and St Thomas' NHS Trust
Harold Wood Hospital	Barking, Havering and Redbridge Hospitals NHS Trust
Harrogate District Hospital	Harrogate Health Care NHS Trust
Heatherwood Hospital	Heatherwood and Wexham Park Hospitals NHS Trust
Hemel Hempstead General Hospital	West Hertfordshire Hospitals NHS Trust
Hereford County Hospital	Hereford Hospitals NHS Trust
Hexham General Hospital	Northumbria Health Care NHS Trust
Hillingdon Hospital	The Hillingdon Hospital NHS Trust
Hinchingbrooke Hospital	Hinchingbrooke Health Care NHS Trust
Homerton University Hospital	Homerton University Hospital NHS Trust
Hope Hospital	Salford Royal Hospitals NHS Trust
Horton General Hospital	Oxford Radcliffe Hospital NHS Trust
Hospital of St Cross	University Hospitals Coventry and Warwickshire NHS Trust
Huddersfield Royal Infirmary	Calderdale and Huddersfield NHS Trust
Ipswich Hospital	Ipswich Hospital NHS Trust
James Cook University Hospital, The	South Tees Hospitals NHS Trust
James Paget Hospital	James Paget Healthcare NHS Trust
Kent & Sussex Hospital	Maidstone and Tunbridge Wells NHS Trust
Kettering General Hospital	Kettering General Hospital NHS Trust
King George Hospital	Barking, Havering and Redbridge Hospitals NHS Trust
King's College Hospital (Denmark Hill)	King's College Hospital NHS Trust
Kings College Hospital TC	King's College Hospital NHS Trust
Kings Mill Hospital	Sherwood Forest Hospitals NHS Trust
Kingston Hospital	Kingston Hospital NHS Trust
Leeds General Infirmary	Leeds Teaching Hospitals NHS Trust
Leicester General Hospital	University Hospitals of Leicester NHS Trust
Leighton Hospital	The Mid Cheshire Hospitals NHS Trust
Lincoln County Hospital	United Lincolnshire Hospitals NHS Trust
Lister Hospital	East and North Hertfordshire NHS Trust
Louth County Hospital	United Lincolnshire Hospitals NHS Trust
Luton & Dunstable Hospital	Luton and Dunstable Hospital NHS Trust
Macclesfield District General Hospital	East Cheshire NHS Trust
Maidstone District General Hospital	Maidstone and Tunbridge Wells NHS Trust
Manchester Royal Infirmary	Central Manchester and Manchester Children's University Hospitals NHS Trust
Manor Hospital	Walsall Hospitals NHS Trust
Mayday University Hospital	Mayday Healthcare NHS Trust
Medway Maritime Hospital	Medway NHS Trust
Middlesex Hospital	University College London Hospitals NHS Foundation Trust
Milton Keynes General Hospital	Milton Keynes General Hospital NHS Trust
Musgrove Park Hospital	Taunton and Somerset NHS Trust
New Cross Hospital	The Royal Wolverhampton Hospitals NHS Trust
Newark Hospital	Sherwood Forest Hospitals NHS Trust
Newcastle General Hospital	The Newcastle Upon Tyne Hospitals NHS Trust
Newham General Hospital	Newham Healthcare NHS Trust
Norfolk & Norwich Hospital	Norfolk and Norwich University Hospital NHS Trust
North Devon District Hospital	Northern Devon Healthcare NHS Trust
North Hampshire Hospital	North Hampshire Hospitals NHS Trust
North Manchester General Hospital	Pennine Acute Hospitals NHS Trust
North Middlesex Hospital	North Middlesex University Hospital NHS Trust
North Tyneside General Hospital	Northumbria Health Care NHS Trust
Northampton General Hospital	Northamptonshire Healthcare NHS Trust
Northern General Hospital	Sheffield Teaching Hospitals NHS Trust
Northwick Park Hospital	North West London Hospitals NHS Trust
Nottingham City Hospital	Nottingham City Hospital NHS Trust
Nuffield Orthopaedic Centre	Nuffield Orthopaedic NHS Trust
Oldchurch Hospital	Barking, Havering and Redbridge Hospitals NHS Trust
Ormskirk & District General Hospital	Southport and Ormskirk Hospital NHS Trust
Pennine Acute (Bury)	Pennine Acute Hospitals NHS Trust

Hospital	Trust
Pilgrim Hospital	United Lincolnshire Hospitals NHS Trust
Pinderfields Hospitals	Mid Yorkshire Hospitals NHS Trust
Pontefract General Infirmary	Mid Yorkshire Hospitals NHS Trust
Princess Alexandra Hospital	The Princess Alexandra Hospital NHS Trust
Princess Royal Brighton	Brighton and Sussex University Hospitals NHS Trust
Princess Royal Hospital	The Princess Royal Hospital NHS Trust
Queen Alexandra Hospital	Portsmouth Hospitals NHS Trust
Queen Elizabeth Gateshead	Gateshead Health NHS Trust
Queen Elizabeth Hospital	Queen Elizabeth Hospital NHS Trust
Queen Elizabeth II Hospital	East and North Hertfordshire NHS Trust
Queen Elizabeth Kings Lynn	Kings Lynn and Wisbech Hospitals NHS Trust
Queen Elizabeth The Queen Mother Hospital	East Kent Hospitals NHS Trust
Queen Mary's Hospital	Queen Mary's Sidcup NHS Trust
Queens Hospital	Burton Hospitals NHS Trust
Queens Medical Centre, Nottingham University Hospital	Queen's Medical Centre, Nottingham University Hospital NHS Trust
Ravenscourt Park TC	Hammersmith Hospitals NHS Trust
Robert Jones & Agnes Hunt Orthopaedic Hospital	Robert Jones and Agnes Hunt Orthopaedic and District Hospital NHS Trust
Rochdale Infirmary	Pennine Acute Hospitals NHS Trust
Rotherham District General Hospital	Rotherham General Hospitals NHS Trust
Royal Albert Edward Infirmary	Wrightington, Wigan and Leigh NHS Trust
Royal Berkshire Hospital	Royal Berkshire and Battle Hospitals NHS Trust
Royal Bolton Hospital, The	Bolton Hospitals NHS Trust
Royal Bournemouth General Hospital	Royal Bournemouth and Christchurch Hospitals NHS Trust
Royal Cornwall Hospital (Treliske)	Royal Cornwall Hospitals NHS Trust
Royal Devon & Exeter Hospital (Wonford)	Royal Devon and Exeter Healthcare NHS Trust
Royal Free Hospital	Royal Free Hampstead NHS Trust
Royal Hampshire County Hospital	Winchester and Eastleigh Healthcare NHS Trust
Royal Hospital at Haslar TC	Portsmouth Hospitals NHS Trust
Royal Lancaster Infirmary	Morecambe Bay Hospitals NHS Trust
Royal Liverpool University Hospital, The	Royal Liverpool and Broadgreen University Hospitals NHS Trust
Royal London Hospital, The	Barts and The London NHS Trust
Royal National Orthopaedic Hospital (Stanmore), The	The Royal National Orthopaedic Hospital NHS Trust
Royal Oldham Hospital	Pennine Acute Hospitals NHS Trust
Royal Orthopaedic Hospital	Royal Orthopaedic Hospital NHS Trust
Royal Preston/Sharoe Green Hospitals	Lancashire Teaching Hospitals NHS Trust
Royal Sunderland Hospital	City Hospitals Sunderland NHS Trust
Royal Surrey County Hospital	Royal Surrey County Hospital NHS Trust
Royal Sussex County Hospital	Brighton and Sussex University Hospitals NHS Trust
Royal United Hospital	Royal United Hospital Bath NHS Trust
Russells Hall Hospital	Dudley Group of Hospitals NHS Trust
Salisbury District Hospital	Salisbury Health Care NHS Trust
Sandwell General Hospital	Sandwell and West Birmingham Hospitals NHS Trust
Scarborough General Hospital	Scarborough and North East Yorkshire Health Care NHS Trust
Scunthorpe General Hospital	Northern Lincolnshire and Goole Hospitals NHS Trust
Solihull Hospital	Birmingham Heartlands and Solihull (teaching) NHS Trust
South Shore Hospital	Blackpool, Fylde and Wyre Hospitals NHS Trust
South Tyneside District General Hospital	South Tyneside Health Care NHS Trust
South West London Elective Ortho Centre	Epsom and St Helier NHS Trust
Southampton General Hospital	Southampton University Hospitals NHS Trust
Southend Hospital	Southend Hospital NHS Trust
Southlands Hospital	Worthing and Southlands Hospitals NHS Trust
Southmead Hospital	North Bristol NHS Trust
Southport Formby District General Hospital	Southport and Ormskirk Hospital NHS Trust
St Albans City Hospital	West Hertfordshire Hospitals NHS Trust
St George's Hospital	St George's Healthcare NHS Trust
St Helens Hospital	St Helens and Knowsley Hospitals NHS Trust
St Helier Hospital	Epsom and St Helier NHS Trust
St James's University Hospital	Leeds Teaching Hospitals NHS Trust
St Mary's Hospital	Isle of Wight Healthcare NHS Trust
St Mary's Hospital	St Mary's NHS Trust
St Michael's Hospital	Royal Cornwall Hospitals NHS Trust
St Richard's Hospital	Royal West Sussex NHS Trust
Staffordshire General Hospital	Mid Staffordshire General Hospitals NHS Trust

Hospital	Trust
Standish Hospital	Gloucestershire Hospitals NHS Trust
Stepping Hill Hospital	Stockport NHS Trust
Stoke Mandeville Hospital	Buckinghamshire Hospitals NHS Trust
Tameside General Hospital	Tameside and Glossop Acute Services NHS Trust
Torbay TC	South Devon Health Care NHS Trust
Trafford General Hospital	Trafford Healthcare NHS Trust
University College London Hospital TC	University College London Hospitals NHS Foundation Trust
University Hospital Aintree	Aintree Hospitals NHS Trust
University Hospital Lewisham	The Lewisham Hospital NHS Trust
University Hospital of Hartlepool	North Tees and Hartlepool NHS Trust
University Hospital of North Durham	County Durham and Darlington Acute Hospitals NHS Trust
University Hospital of North Tees	North Tees and Hartlepool NHS Trust
Wansbeck Hospital	Northumbria Health Care NHS Trust
Warrington Hospital	North Cheshire Hospitals NHS Trust
Warwick Hospital	South Warwickshire General Hospitals NHS Trust
Watford General Hospital	West Hertfordshire Hospitals NHS Trust
West Cumberland Hospital	North Cumbria Acute Hospitals NHS Trust
West Suffolk Hospital	West Suffolk Hospitals NHS Trust
Westmorland General Hospital	Morecambe Bay Hospitals NHS Trust
Weston General Hospital	Weston Area Health NHS Trust
Weston TC	Weston Area Health NHS Trust
Wexham Park Hospital	Heatherwood and Wexham Park Hospitals NHS Trust
Wharfedale Hospital	Leeds Teaching Hospitals NHS Trust
Whipps Cross University Hospital	Whipps Cross University Hospital NHS Trust
Whiston Hospital	St Helens and Knowsley Hospitals NHS Trust
Whittington Hospital, The	The Whittington Hospital NHS Trust
William Harvey Hospital (Ashford)	East Kent Hospitals NHS Trust
Worcestershire Royal Hospital	Worcestershire Acute Hospitals NHS Trust
Worthing Hospital	Worthing and Southlands Hospitals NHS Trust
Wrightington Hospital	Wrightington, Wigan and Leigh NHS Trust
Wycombe General Hospital	Buckinghamshire Hospitals NHS Trust
Wythenshawe Hospital	South Manchester University Hospitals NHS Trust
Yeovil District Hospital	East Somerset NHS Trust
York District General Hospital	York Health Services NHS Trust

APPENDIX 10B

Alphabetical listing of NHS hospitals (Wales) and related trusts

Hospital	Trust
Abergele Hospital	Conwy and Denbighshire NHS Trust
Bronglais General Hospital	Ceredigion and Mid Wales NHS Trust
Glan Clwyd General Hospital	Conwy and Denbighshire NHS Trust
Llandough Hospital	Cardiff and Vale NHS Trust
Morriston Hospital	Swansea NHS Trust
Neath Port Talbot Hospital	Bro Morgannwg NHS Trust
Nevill Hall Hospital	Gwent Healthcare NHS Trust
Prince Charles Hospital	North Glamorgan NHS Trust
Prince Philip Hospital	Carmarthenshire NHS Trust
Princess of Wales Hospital	Bro Morgannwg NHS Trust
Royal Glamorgan Hospital, The	Pontypridd and Rhondda NHS Trust
Royal Gwent Hospital	Gwent Healthcare NHS Trust
West Wales General Hospital	Carmarthenshire NHS Trust
Withybush General Hospital	Pembroke and Derwen NHS Trust
Wrexham Maelor Hospital	North East Wales NHS Trust
Ysbyty Gwynedd	North West Wales NHS Trust

APPENDIX 10C

Alphabetical listing of independent sector hospitals and treatment centres

Hospital	Group name (where relevant)
Abbey Caldew Hospital	Abbey Group
Abbey Gisburne Hospital	Abbey Group
Abbey Sefton Hospital	Abbey Group
Acland Nuffield Hospital, The/Manor Hospital, The	Nuffield Hospitals
All hospitals	Capio Group
Ashtead Hospital	Capio Healthcare
Berkshire Independent Hospital	Capio Healthcare
Birkdale Clinic	Birkdale Clinic
Birmingham Nuffield Hospital, The	Nuffield Hospitals
BMI Alexandra Hospital	BMI Healthcare
BMI Bath Clinic	BMI Healthcare
BMI Beardwood Private Hospital	BMI Healthcare
BMI Bishops Wood Hospital	BMI Healthcare
BMI Blackheath Hospital	BMI Healthcare
BMI Chatsworth Suite	BMI Healthcare
BMI Chaucer Hospital	BMI Healthcare
BMI Chelsfield Park Hospital	BMI Healthcare
BMI Clementine Churchill Hospital	BMI Healthcare
BMI Esperance	BMI Healthcare
BMI Fawkham Manor Hospital	BMI Healthcare
BMI Garden Hospital	BMI Healthcare
BMI Goring Hall Hospital	BMI Healthcare
BMI Hampshire Clinic	BMI Healthcare
BMI Highfield Hospital	BMI Healthcare
BMI Kings Oak Hospital	BMI Healthcare
BMI Manor Hospital	BMI Healthcare
BMI Nuneaton Private Hospital	BMI Healthcare
BMI Park Hospital, The	BMI Healthcare
BMI Princess Margaret	BMI Healthcare
BMI Priory Hospital	BMI Healthcare
BMI Ridgeway Hospital	BMI Healthcare
BMI Runnymede Hospital	BMI Healthcare
BMI Sandringham Hospital	BMI Healthcare
BMI Sarum Road Hospital	BMI Healthcare
BMI Saxon Clinic	BMI Healthcare
BMI Shelburne Hospital	BMI Healthcare
BMI Shirley Oaks Hospital	BMI Healthcare
BMI Sloane Hospital	BMI Healthcare
BMI South Cheshire Hospital	BMI Healthcare
BMI The Alexandra Hospital Victoria Park	BMI Healthcare
BMI The Beaumont Hospital	BMI Healthcare
BMI The Chiltern	BMI Healthcare
BMI The Droitwich Spa Hospital	BMI Healthcare
BMI The Harbour Hospital	BMI Healthcare
BMI The Paddocks	BMI Healthcare
BMI The Somerfield Hospital	BMI Healthcare
BMI Thornbury Hospital	BMI Healthcare
BMI Three Shires Hospital	BMI Healthcare
BMI Werndale Hospital	BMI Healthcare
BMI Winterbourne Hospital	BMI Healthcare
Bournemouth Nuffield Hospital, The	Nuffield Hospitals
Bristol Nuffield Hospital, The	Nuffield Hospitals
BUPA Alexandra Hospital	BUPA
BUPA Cambridge Lea Hospital	BUPA

Hospital	Group name (where relevant)
BUPA Clare Park Hospital	BUPA
BUPA Dunedin Hospital	BUPA
BUPA Fylde Coast Hospital	BUPA
BUPA Gatwick Park Hospital	BUPA
BUPA Hartswood Hospital	BUPA
BUPA Hospital Bristol	BUPA
BUPA Hospital Bushey	BUPA
BUPA Hospital Cardiff	BUPA
BUPA Hospital Elland	BUPA
BUPA Hospital Harpenden	BUPA
BUPA Hospital Hastings	BUPA
BUPA Hospital Hull, East Riding	BUPA
BUPA Hospital Leeds	BUPA
BUPA Hospital Leicester	BUPA
BUPA Hospital Little Aston	BUPA
BUPA Hospital Manchester	BUPA
BUPA Hospital Norwich	BUPA
BUPA Hospital Portsmouth	BUPA
BUPA Hospital Southampton	BUPA
BUPA Hospital Washington	BUPA
BUPA Methley Park Hospital	BUPA
BUPA Murrayfield Hospital - Wirral	BUPA
BUPA North Cheshire Hospital	BUPA
BUPA Parkway Hospital	BUPA
BUPA Regency Hospital	BUPA
BUPA Roding Hospital	BUPA
BUPA South Bank Hospital	BUPA
BUPA St Saviours Hospital	BUPA
BUPA Tunbridge Wells Hospital	BUPA
BUPA Wellesley Hospital	BUPA
BUPA Yale Hospital	BUPA
Bury St Edmunds Nuffield Hospital, The	Nuffield Hospitals
Capio Fulwood Hall Hospital	Capio Healthcare
Cheltenham, Gloucester Nuffield Hospital, The	Nuffield Hospitals
Chichester Nuffield Hospital, The	Nuffield Hospitals
Claremont Hospital	Hospital Management Trust
Cleveland Nuffield Hospital, The	Nuffield Hospitals
Cromwell Clinic	Cromwell Clinic
Cromwell Hospital	Cromwell Hospital
Duchy Hospital, The	Capio Healthcare
Essex Nuffield Hospital, The	Nuffield Hospitals
Euxton Hall Hospital	Capio Healthcare
Exeter Nuffield Hospital, The	Nuffield Hospitals
Fairfield Independent Hospital	Fairfield Independent Hospital
Fitzwilliam Hospital	Capio Healthcare
Foscote Hospital, The	BMI Healthcare
Greater Manchester Surgical Centre	Netcare UK Treatment Centres
Grosvenor Nuffield Hospital, The	Nuffield Hospitals
Guildford Nuffield Hospital, The	Nuffield Hospitals
Holly House Hospital	Aspen Healthcare Limited
Horder Centre for Arthritis, The	The Horder Centre for Arthritis
Hospital of St John and St Elizabeth	Hospital of St John and St Elizabeth
HRH Princess Christian Nuffield Hospital, The	Nuffield Hospitals
Huddersfield Nuffield Hospital, The	Nuffield Hospitals
Hull Nuffield Hospital, The	Nuffield Hospitals
King Edward VII Hospital Sister Agnes	King Edward VII Hospital Sister Agnes
King Edward VII Hospital, Midhurst	King Edward VII Hospital, Midhurst
Lancaster, Lakeland Nuffield Hospital, The	Nuffield Hospitals
Leeds Nuffield Hospital, The	Nuffield Hospitals
Leicester Nuffield Hospital, The	Nuffield Hospitals
Lincoln Nuffield Hospital, The	Nuffield Hospitals
Lister Hospital, The	HCA International Ltd

Hospital	Group name (where relevant)
London Bridge Hospital	HCA International Ltd
London Clinic, The	The London Clinic
London Independent	BMI Healthcare
Lourdes Hospital	Lourdes Hospital
Mount Alvernia Hospital	Mount Alvernia Hospital
Mount Stuart House	Capio Healthcare
New Hall Hospital	Capio Healthcare
New Victoria Hospital, The	The New Victoria Hospital
Newcastle Nuffield Hospital, The	Nuffield Hospitals
North Downs Hospital	Capio Healthcare
North London Nuffield Hospital, The	Nuffield Hospitals
North Staffordshire Nuffield Hospital, The	Nuffield Hospitals
North Wales Medical Centre, The	Bettercare Group Ltd
Nottingham Nuffield Hospital, The	Nuffield Hospitals
Nuffield Hospital Cambridge	Nuffield Hospitals
Nuffield Hospital Derby	Nuffield Hospitals
Nuffield Hospital Harrogate	Nuffield Hospitals
Nuffield Hospital Haywards Heath	Nuffield Hospitals
Nuffield Hospital Ipswich	Nuffield Hospitals
Nuffield Hospital York	Nuffield Hospitals
Oaklands Hospital	Capio Healthcare
Oaks Hospital	Capio Healthcare
Orchard Hospital, The	The Orchard Hospital
Park Hill Hospital	Capio Healthcare
Parkside Hospital	Aspen Healthcare Limited
PHG Bassetlaw Treatment Centre	Partnership Health Group Ltd Treatment Centres
PHG Ilkeston Treatment Centre	Partnership Health Group Ltd Treatment Centres
PHG Ilkeston Treatment Centre & PHG Bassetlaw Treatment Centre	Partnership Health Group Ltd Treatment Centres
Pinehill Hospital	Capio Healthcare
Plymouth Nuffield Hospital, The	Nuffield Hospitals
Princess Grace Hospital, The	HCA International Ltd
Purey Cust Nuffield Hospital, The	Nuffield Hospitals
Redwood Diagnosis and Treatment Centre	BUPA Treatment Centres
Renacres Hall Hospital	Capio Healthcare
Rivers Hospital	Capio Healthcare
Rowley Hall Hospital	Capio Healthcare
Sancta Maria Hospital	Hospital Management Trust
Shropshire Nuffield Hospital, The	Nuffield Hospitals
Somerset Nuffield Hospital, The	Nuffield Hospitals
Springfield Hospital	Capio Healthcare
St Anthonys	St Anthonys
St Hugh's Hospital	Hospital Management Trust
St Josephs Hospital	St Josephs Hospital
Sussex Nuffield Hospital, The	Nuffield Hospitals
Thames Valley Nuffield Hospital, The	Nuffield Hospitals
Tunbridge Wells Nuffield Hospital, The	Nuffield Hospitals
Warwickshire Nuffield Hospital, The	Nuffield Hospitals
Wellington Hospital, The	HCA International Ltd
Wessex Nuffield Hospital, The	Nuffield Hospitals
West Midlands Hospital	Capio Healthcare
Winfield Hospital	Capio Healthcare
Woking Nuffield Hospital, The	Nuffield Hospitals
Wolverhampton Nuffield Hospital, The	Nuffield Hospitals
Woodland Hospital	Capio Healthcare
Woodlands Hospital Darlington	Woodlands Hospital Darlington
Wye Valley Nuffield Hospital, The	Nuffield Hospitals
Yorkshire Clinic, The	Capio Healthcare

National Joint Registry
www.njrcentre.org.uk

The National Joint Registry (NJR) Centre
Building 329
Harwell
Didcot
Oxfordshire OX11 0QJ
England

Website: www.njrcentre.org.uk
Helpline: 0845 345 9991
Fax: 0845 345 9992
Email: enquiries@njrcentre.org.uk