An introduction to the NJR IT system

The NJR’s background and aims

The establishment of the National Joint Registry (NJR) for England and Wales was made in response to the Royal College of Surgeons report (Ref 1) on the 3M Capital hip. The report highlighted the need to compare the performance of the 3M Capital hip against other types of hip replacement. The limited comparisons that were made suggested the 3M Capital hip’s poorer performance would have been more readily apparent had data on implantation and revision been systematically collected and analysed.

Similarly, earlier reports prepared by the British Orthopaedic Association (Ref 2), the National Audit Office (Ref 3) and the National Institute for Clinical Excellence (Ref 4) identified that there was a need to collect data to measure the long-term effectiveness of hip implants for all implant types in use. It is widely recognised that the orthopaedic community and its stakeholders have been working together for several years to turn the NJR from a concept into a reality.

The recommendation for a national hip registry has been extended to include knee joint replacements. Hip and knee joint replacements comprise the largest number of joint replacements used in the UK, and both are subject to similar issues, i.e. there is a high proliferation of different implant types that commonly lack data on their long-term effectiveness.

The Department of Health carried out an extensive consultation on the possibility of establishing a National Joint Replacement Registry from October 2000 to January 2001. A copy of the consultation document and the results from the consultation exercise can be found on the Department of Health’s website at: http://www.doh.gov.uk/joint_registry.

Both the NHS and the independent health care sector are included in the registry to ensure complete recording of national activity in England and Wales.

The rest of this document looks at the IT system that will be used to collect, process and give access to the NJR data.
References

1. Royal College of Surgeons (2001) *3M Capital Hip System, The lessons learned from the investigation*

Data handling and access

The NJR will utilise an electronic system for collection and transfer of data.

Benefits of an electronic system

- Improved security: the data will be suitably encrypted and transmitted over a secure network. This will avoid distribution of hard copy records through the post.
- Reduced administration: electronic data will facilitate the analysis of large datasets and will significantly reduce staff effort on transcribing paper records.
- Data validation: data validation can begin at the client side at the time of submission. This will prevent invalid data being supplied from the outset.
- Feedback on data submission: the data supplier will receive feedback following data receipt and validation. This will assure the supplier that their data has been accepted.

The core data fields recorded (the Minimum Dataset) will be entered at source by each unit.

A paper proforma will be designed to capture data when a PC is not accessible at the time of operation or staff are not available to input data immediately following operations, or in the event of a hospital system failure. Although it will be acceptable for data to be collected on a paper form initially it will be essential for all data to be transferred electronically to the NJR. Postal submission of forms is not an available option.

The NJR Centre will validate the collection of data, and analyse it to provide performance information on hip and knee joint replacements and on outcomes for hospitals and individual surgeons. The analysed data can then be transmitted to stakeholders with due regard for patient and clinician confidentiality.

Who will have access to the NJR data?

- Clinicians will have continuously available online access to their own data. This access will allow them to carry out analyses themselves.
- Personal patient data will only be available to the individual patient and their surgeon. Patients will be able to see their own records off-line in accordance with the Data Protection Act. Clinicians and suppliers will be able to access anonymised patient data.
- The analyses of individual surgeons’ data will only be available to surgeons and their employing orthopaedic hospitals (where the surgeon has given consent).
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- Anonymised performance of trusts and of implants will be freely accessible to all users.
- Anonymised data will be made available for research purposes but the data will be aggregated in such a way that it is not possible to identify an individual surgeon or patient

The IT system

The NJR system is being designed to be simple, transparent and largely intuitive to use and will be suited to a wide range of users, e.g. surgeons, scrub nurses, medical secretaries etc. Each unit/hospital needs to identify the individuals who will be authorised to input the data since they will require training to ensure they are fully informed of the system requirements. Training will be offered via a number of routes. Supporting help will also be available from the NJR Helpline by phone, email or fax (see section 5).

Each orthopaedic hospital will be linked to the NJR database via their existing computer network. There are two options for connecting to the NJR database (i.e. the software used to submit data), and each unit needs to determine which is most suited to their circumstances:

- Option 1: a web browser based forms solution that will work with standard web browsers & technology
- Option 2: an Internet enabled desktop PC solution that will allow users to integrate information from their hospital Patient Administration System.

Following on from the hardware health check (see section 4) both these solutions will be built based on the Microsoft .NET platform, the first using ASP.NET web forms and the second using windows forms. The use of one core technology ensures that the development of two clients is efficient as much of the code is common.

Both clients will communicate with a central web service that will validate the data before it is passed to the central database. The central database will be built using Microsoft SQL Server 2000.

To operate either client the units will have to have a minimum specification of computer as follows:

- PC with a Pentium 2 style chip and 64MB of RAM
- Connection to the Internet / NHS Net (connection speed of 56 kilobits per second or greater)
- Internet / NHS Net connection (and any hospital firewalls) must allow both the HTTP (port 80) and HTTPS (port 443) transport protocols

In addition to this the web-based client has the following minimum software requirements:

- Internet Explorer 5.5 or later or Netscape Navigator 6.2 or later
- The authorisation to allow scripting within the browser window

and for the PC client the following requirements apply:

- Hospitals must allow the installation of 3rd party software including the Microsoft .NET framework
Data will be securely transferred to the database from the clients using the industry standard 128-bit SSL protocol. Once on the database strong patient identifiers will be encrypted using asymmetric key pair encryption using keys generated by the RSA 1024 bit asymmetric algorithm. The un-encryption key will be held locally so that this data can only be viewed by the NJR Centre off-line. The dedicated database and web servers will be physically located at the secure INSL data centre in RedBus, London Docklands. Virtual security will be managed both at the application and hosting levels.

**Hardware health check**

As some of you will be aware, the choice of IT solution has been informed by a hardware health check (thank you for your replies). The hardware health check is still on-going as it is helping to establish what level of upgrade of IT infrastructure is needed to allow the NJR to function in all orthopaedic units and hospitals. If your hospital has not filled out a questionnaire please download one from [http://www.njrcentre.org.uk/news/healthcheck.htm](http://www.njrcentre.org.uk/news/healthcheck.htm)

There were two main outcomes of the health check

- **PC related** – a very small number of units do not have the correct hardware to allow them to connect to the NJR database. From the replies gathered this problem applies to about 10% of units who will either need additional memory or a new PC that meets the minimum specification. However, before this is implemented it is suggested that the system is tested on current computers in units to ascertain whether this updating is actually required.

- **Connection related** – 21 NHS units (out of 150 replies) were not able to get past stage 1a on the test web site (the basic home page). This indicates that their connection does not allow the secure transfer of data or they are not allowed to execute server side scripts embedded in web pages. This is potentially a significant problem as these users will not be able to transfer data to the NJR database. The solutions to these problems lie with the individual trusts and their connection policy with regard to NHSNet and / or the Internet. It is suggested that units look at the minimum connection requirements above and consider how they can amend their policy to allow connection to the NJR. This can be done in a very controlled way so that the computers can only access the NJR server. The alternative is for units to provide a stand-alone PC with a modem, although this will provide relatively poor performance.

The NJR Centre wants to identify and address any potential concerns. Please contact the NJR Centre if you are unsure what is involved.

**NJR contact details**

The NJR Centre  
Peoplebuilding 2  
Peoplebuilding Estate  
Maylands Avenue  
Hemel Hempstead, HP2 4NW

Telephone: 0845 345 9991  
Email: enquiries@njrcentre.org.uk
Contact details

To ensure we have your full details for further correspondence please complete and return this form. Fax back to 0845 345 9992 or email health_servicedesk@northgate-is.com

Orthopaedic hospital or unit details

Trust name:
Hospital name:
Unit name:
Address:
Post code:

Details of Unit’s IT manager

Name:
Position:
Tel:
Fax:
Email:

Further information

If you have any colleagues that would like to receive National Joint Registry information directly please supply their full contact details below.

Name:
Position:
Tel:
Fax:
Email:

Please add further contact details on a separate sheet.

If you give your contact details to the NJR they will be stored on the NJR contact database. This database is secure and will be used for NJR purposes only.