Delivering Quality and Value
Focus on: Magnetic Resonance Imaging (MRI) and Low Back Pain
**Document Purpose**  
Best Practice Guidance

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Focus on: Magnetic Resonance Imaging (MRI) and Low Back Pain

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**Description**  
This document is one of a series of documents produced by the NHS Institute for Innovation and Improvement as part of our High Volume Care programme. Produced by the Delivering Quality and Value Team, the aim of the Focus on series is to help local health communities and organisations improve the quality and value of the care they deliver.

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Recent years have seen diagnostic imaging become increasingly central to clinical processes. The resulting increase in demand has made imaging a frequent bottleneck in patient pathways and has contributed to long waits. This has been particularly true for magnetic resonance imaging (MRI) which has been a scarce and costly resource.

More recently there has been a significant national improvement in waiting times, driven by the 18-week target. The sustainability of this improvement is uncertain. There remains wide variation across the country in practice, efficiency and local funding of MRI services.

The NHS Institute’s Focus on MRI in the context of low back pain is therefore timely and quite rightly focused on optimising processes to achieve a sustainable service.

Although low back pain has been chosen as a high volume clinical condition that frequently requires investigation with MRI, the key characteristics identified in this document are equally applicable to other MRI services and, indeed, the whole of imaging.

The strength of this work is that it builds on many existing improvement ideas and best practice principles already evident in busy MRI units. Added to this, it is frontline staff themselves who have validated the advice and guidance described here.

There is a long way to go before such practices are adopted uniformly. However, there is an exciting opportunity, for local clinical radiology leaders and managers to use this document and its supporting tools to develop local services in a cost effective and sustainable way.

Erika Denton
1. Introduction

The aim of this document is to highlight the ideal pathway and the key characteristics that optimise quality and value for patients requiring MRI.

We have used low back pain - a highly prevalent condition - as an indicator to examine the MRI pathway. Low back pain not only has a significant impact on patients’ lives, but represents a large cost to the healthcare system. It is also a frequent indication for MRI scanning.

Clinicians have tended to focus on clinical excellence rather than service improvement techniques that improve clinical processes. This document therefore concentrates on ways of developing process excellence in order to achieve effective care. It builds on important previous work such as that undertaken by the NHS Radiology Service Improvement Team.

The priority now is to facilitate rapid, high quality and cost effective care through the whole journey; from patient presentation with low back pain, to the point when action is taken based on the scan result. Variation in practice needs to be reduced in order to further improve outcomes.

\[\text{‘The lessons learned as a result of this project have broad relevance to imaging pathways in general’}\]

It is particularly important to look at pathways from the patient’s perspective. Traditional low back pain management involves patients passing through a number of ‘silos’, including clinical assessment, diagnostics and therapeutic interventions, with queues at each stage.

There are a number of factors causing inefficiency and variation in MRI and low back pain pathways. They include:

- previous restricted availability of MRI, high cost and increasing demand contributing to long waits
- varied location and quality of initial clinical assessment in primary and secondary care
- long waits for secondary care outpatient clinics and operating lists
- patients entering separate queues at each step of the pathway
- delays receiving and vetting request cards are becoming an increasing problem as MRI waits are reduced from months to a few weeks
- highly variable booking processes between MRI units with frequent delays, waste and duplication
- booking processes that often do not involve patient choice, causing loss of capacity as a result of DNAs (did not attends)
- restricted local access to enabling technologies, such as electronic requesting, digital dictation and voice recognition, thus limiting progress
- scanning and report turnaround that is often poorly monitored.

However, rapid changes are occurring that are influencing low back pain management. These include:

- reduced waits for clinical assessment as a result of the NHS 18-weeks target\(^3\)
- reduced waits\(^4\) and increased availability of MRI as a result of the 18-weeks diagnostic milestones and contracts with private MRI providers
- earlier patient presentation with low back pain as a result of falling waits
- increasing patient demand and expectation for MRI scanning
- central healthcare policies resulting in the delivery of care in the community, closer to patients’ homes\(^5\)
- new, less invasive therapeutic interventions for low back pain
- increased patient assessment by non-medical specialist practitioners such as extended role physiotherapists specialising in back pain\(^6\).

During 2007-08 the NHS Institute for Innovation and Improvement has been working with NHS organisations involved in low back pain assessment and MRI scanning to identify the key characteristics of high quality and efficient care.

This document is based on this experience and an extensive review of real best practice adopted by clinical teams throughout England. It is intended to help all concerned improve their service and to reduce variation in practice.

Although the focus of this work is on MRI in low back pain it is vital to recognise that the lessons learned as a result of this project have broad relevance to imaging pathways in general.

They are also of considerable value to those involved in commissioning and providing new musculoskeletal assessment services as recommended in the Musculoskeletal Services Framework\(^6\). A publication on Musculoskeletal Interface Services has also been developed by the NHS Institute as part of this programme, see Section 8: Further information and resources.

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3 Delivering the 18 weeks patient pathway, www.18weeks.nhs.uk
4 Monthly and Quarterly/Biannual Diagnostics statistics, Department of Health www.performance.doh.gov.uk/diagnosticsprovider.html
2. The national picture

Approximately 1.26 million MRI scans were performed in England in 2006-07 at an estimated cost of £207 million to the NHS (based on the 2007-08 NHS tariff).

While it is important to acknowledge the progressive increase in MRI activity and provision in the last decade (see Figure 1) the number of MRI scanners and scans per head of population remains low compared to other developed countries. There is strong evidence that MRI usage needs to increase significantly to match care in other countries, and achieve waiting time targets.\(^7\)

There have been marked increases in the number of MRI scans, with a 114% increase respectively between 1999-00 and 2006-07. There were also substantial increases between 1995-96 and 1999-00 (62%).

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\(^7\)‘Evidence for a probable and growing diagnostic deficit in MRI and CT access in the NHS in England’, Joe Rafferty, Paul White, Gerry Marchand, The Diagnostic Futures Programme, April 2006
Recent years have seen a dramatic reduction in waiting times for MRI nationally. There are a number of reasons for this change, including:

- increased funded capacity at local trust level
- additional capacity purchased by the NHS from the private sector, for example the Department of Health’s contract with Alliance Medical
- service redesign as promoted by the NHS Radiology Service Improvement Team
- increased productivity as a result of the national Picture Archiving and Communication Systems (PACS) provision by Connecting for Health
- better understanding and monitoring of waiting list profiles at trust level as a result of the requirement to submit monthly diagnostic data for the 18-week milestones.

Figure 2 shows the reduction in the percentage of patients waiting for six weeks or more out of the total waiting by trust between January 2007 and January 2008. Although there has been clear improvement there remains significant variation between individual trusts.

Figure 2: Percentage of patients waiting for MRI scanned within 6 weeks by NHS Trust in England
Furthermore we have observed wide variation in the time taken to complete the patient pathway, from the date of referral to the clinical review of the MRI scan. Figure 3 shows variation in average times between seven sample MRI units in England.

Figure 3: Average time variations in seven sample MRI pathways from referral to availability of result for clinical review

The figures on the timelines are the cumulative number of days for each stage of the MRI pathway.
As part of this work the NHS Institute sent a questionnaire to every trust in the country to help understand the variation in processes among MRI units. Drawn from the 37% of questionnaires returned (= 67 MRI units), the following data highlights just a few of the variations across the country in the processes currently being applied.

**Figure 4: Opening hours of MRI units per week**

Opening hours range from less than 30 hours per week to up to 90 hours.

**Figure 5: Method of receiving referrals**

The majority of referrals are still being received via paper which delays the patient pathway. Only 7% of referrals are electronic.
Approximately 89% of referrals are vetted according to the survey, although some MRI units visited stated that most referrals do not require vetting and are moving towards limited or no vetting.

Routine time slots for a lumbar spine MRI scan range from 15 to 30 minutes.
Only 2% of scans are reported by radiographers.

Reporting timescales for MRI range from same day to up to a month.
Only 26% of reports are solely distributed electronically. 68% of MRI units still use a combination of paper and electronic methods to distribute reports.
3. Our approach

The NHS Institute is committed to co-producing products with frontline NHS staff. We invite clinicians, managers and patients from inside the NHS to work with us as part of our project teams. We also involve NHS staff in the design of our products.

Site selection phase: During the course of this project we visited a number of organisations in England specifically to look at the MRI and low back pain pathway. We selected eight MRI units and five musculoskeletal interface services from a broad performance range (based on waiting time profiles submitted to the Department of Health). The hospitals spanned large university teaching hospitals and smaller district general hospitals with a reasonable geographical spread and serving both rural and urban communities.

Visit phase: Site visits were conducted over one or two days and activities included a mix of pathway observation and semi-structured interviews. We also considered the use of information to aid clinical and non-clinical decision making. Our discussions involved a range of professions within the pathway, including radiologists, radiographers, operational and business managers, MRI booking staff, information staff, orthopaedic consultants, physiotherapists, general practitioners (GPs) and general practitioners with a special interest (GPwSIs).

Post visit phase: Following the visits we consolidated and validated the knowledge gathered. Working with frontline staff and other stakeholders at a co-production event we were able to review and agree the optimised pathway for MRI services. We also identified the key characteristics that enable units to deliver this pathway. In the course of this development work we consulted stakeholders including professional bodies and voluntary organisations.

The findings have been separated into two documents:

- Focus On: Magnetic Resonance Imaging and Low Back Pain - this document aims to help local health communities and organisations improve the quality and value of care for patients undergoing an MRI scan. It contains the key characteristics for a high performing quality MRI service, along with case studies and suggested measures for improvement.

- Focus On: Musculoskeletal Interface Services - which shares key success factors for the development and implementation of community based assessment services for musculoskeletal conditions.
4. The ideal pathway

The following diagram shows the ideal pathway for low back pain patients requiring an MRI scan. We recognise that there is already a great deal of excellent practice across the service and that not all of the key characteristics are readily applicable to all MRI units. However, we believe that these characteristics should form a valuable basis for units wishing to develop a high quality, efficient and cost-effective service.

**Clinical Assessment**
- Following GP or self referral
- Usually by MSK Interface Service e.g. CATS
- Full patient history, examination and triage by specialist clinician

**Decision to scan**
- Following agreed protocols
- Training and competency for requester

**Referral for scan**
- Electronic referral

**Booking**
- Direct booking with patient choice
- Only if required, vetting/protocolling by radiographer on the same day or after booking
- Robust DNA policy

**Scanning**
- Extended day and weekend scanning
- Standardised scanning protocols
- Minimum radiologist supervision
- Optimise use of capacity

**Reporting**
- Using PACS
- Electronic work lists
- Voice recognition
- Minimise interruptions
- Monitor turnaround

**Transfer of report to referrer**
- Electronic

**Patient review**
- Review date linked to available scan result
- Scan result triggers patient review
- Result explained by a competent clinician

**Clinical decision based on scan result**
5. The key characteristics of a high quality and efficient MRI service

The following characteristics have been identified to be the key features for delivering quality and value for patients undergoing MRI for low back pain. These are followed by suggested measures for improvement and illustrated with case studies from frontline NHS teams.

The key characteristics are broken down into the following pathway steps:
- Referral
- Booking
- Scanning
- Reporting
- Clinical review

Referral:

- The following practitioners can refer, providing there is an appropriate training and competency framework and they are members of the multidisciplinary team:
  - general practitioners
  - extended role physiotherapists
  - chiropractors
  - osteopaths
  - specialist nurses
  - secondary care consultants/supervised junior doctors.

- Clear indications for referral for MRI scans should be agreed between referrers and the MRI department (e.g. referral guidelines in ‘Making the best use of clinical radiology services’ or MBUR6).

- All patients should receive a full clinical examination and assessment for red flags (e.g. age < 20 and > 55, weight loss, night pain etc) prior to requesting an MRI scan. Examples of red flags can be found in the MBUR6 guidelines.

- Referrals should include: full demographic patient details including mobile phone number, clinical information that will enable the reporter of the examination to provide clinical advice and details of relevant previous imaging tests.

- Electronic referral systems should be used for all referrals. In the absence of an electronic referral system, steps should be made to ensure there are no delays in transferring the request card to the MRI unit (ideally within 24 hours).

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### Case study

**Electronic request system making ‘dramatic’ difference**

Traditionally referrals at Norfolk & Norwich University Hospital NHS Trust came from multiple referrers and from a range of locations. Request cards could typically take up to 10 days to arrive in the radiology department and some stayed in the patient’s notes and never arrived.

Occasionally referrals would contain incorrect demographic information and clinical information was scant or illegible. Reporting in a timely manner was also increasingly difficult with the unit performing around 300,000 examinations across all modalities. Request cards were historically a prompt for a report to be made and this presented challenges in terms of keeping them in chronological order and giving them to the correct reporter.

Extensive work has been done at the trust to develop an in-house electronic requesting system which links directly to the radiology information system (RIS). This system allows the requester to keep track of their request without the need to contact the radiology department.

Following a three month pilot in an emergency admissions ward the system was rapidly rolled out to all wards (approximately 30) over several months. This roll-out is continuing now across outpatients and will be a mandatory requirement for all requests from July 2008.

#### Results:

- Dramatic improvements in workflow and turnaround times
- Electronic requests arrive on the RIS in approximately two to three minutes from the request being made
- The RIS allows an electronic work list so there is no need for request cards to act as a prompt for reporting
- Consultant radiologists now report about 80 films per session because they are using electronic work lists.

### Case study

**‘Show & Go’ walk-in referrals**

The radiology department at the Royal Berkshire NHS Foundation Trust offers a ‘Show & Go’ appointment system in several of the sub-specialty areas: MRI, x-ray, ultrasound and CT.

The system is helping eliminate waits for outpatient referrals in straightforward cases. This reduces the possibility of delays between the referral card being written and received in the department – which could take up to two weeks.

After being seen in clinic, the patient brings their referral card directly to the radiology department to either have a ‘Show & Go’ scan or, if it is a complex case, arrange an appointment.

Flexible slots which are available for inpatients are used for ‘Show & Go’ patients when they are not needed.

#### Results:

- Significant reduction in wasted days in the pathway
- One patient visit to the radiology department instead of two
- Less stress for patients
- Reduction in the total number of appointments that need to be made, freeing up staff to deal with other tasks.
Booking:

- Patient is given instructions about the booking process at initial consultation with referrer.
- For the majority of referrals booking should occur on the same day as receipt of the request.
- Vetting* and protocolling* must not cause delay, and if required, can be performed after the appointment has been scheduled.
- Vetting should not be required in the context of short waits and a clinical indication that complies with agreed referral protocols. These cases can be booked directly.
- If vetting is required it should be done on the same day as the receipt of the request. It should be performed by a senior radiographer in conjunction with protocolling. The radiographer should follow agreed procedures, and be acting under the guidance of a radiologist.
- Protocolling should be standardised locally and benchmarked nationally.
- Booking should be undertaken by clerical staff trained to cover multiple modalities in order to cover for annual leave and sickness.
- Booking should be performed exclusively on an electronic schedule.
- Each scan should be assigned a standard, locally agreed time slot within the booking schedule. The number of time slots should be limited, ideally to three or less. The length of the time slots should allow flexibility within the schedule to enable some additional inpatients and emergencies to be scanned.
- After booking, a confirmation letter should be sent to the patient with the agreed date and time.
- If a patient wishes to rearrange their appointment, it should be agreed directly with the patient at the time of contact.
- The DNA policy should be explained to the patient at the time of booking. If a patient does not attend, no further appointment should be offered. However, vulnerable patient groups may be exempt from this policy according to local agreement.
- The booking schedule should not be dependant on individual radiologist's annual leave. If specialists scanning slots are used, then these should be covered by a pool of specialist reporters.
- The majority of patients can be booked from a single queue into the next available appointment. However, for high volume cases (e.g. Internal Auditory Meati scans) dedicated lists can be allocated to reduce the amount of time needed for coil changes.
- If an orbital x-ray is required this should be arranged in advance of the scan appointment and should be requested by radiographers.

* Vetting: assessing appropriateness of referral and degree of urgency.
* Protocolling: assigning an appropriate scanning technique and sequences to a request.
Case study
Eliminating vetting reduces delays

Walsgrave Hospital had a time delay in appointments being processed for MRI scans. This was mainly due to the time spent by radiologists vetting requests. Radiologists agreed that vetting was unnecessary as it rarely resulted in any changes and impacted on their reporting time. It was agreed that if referrers use correct referral criteria in all modalities (except body MRI scans) that vetting was not required.

Radiologists and radiographers agreed with referring clinicians recognised standards for urgent and routine requests and were clearly stated on the referral card. As a result, radiographers can identify referrers who misuse the system and have been empowered to raise issues with the clinician responsible and educate accordingly. The protocol is assigned on the day of the scan and defined by the request.

Results:
• Any issues as a result of the removal of vetting are picked up during scanning and dealt with immediately
• Immediate booking makes it easier to fill available appointment spaces
• Radiographers making appropriate clinical decisions whilst scanning prevents unnecessary delays searching for radiologists
• Good working relationships between department and referrers
• Increased recall rate to 5%.

Case study
Call centre maximises booking efficiency

At the Royal Berkshire NHS Foundation Trust, each modality planned and scheduled their own appointments. When designated schedulers were on holiday, appointment requests stacked up in boxes until their return. In short, the system had developed around individuals rather than around an efficient, patient focused process.

In response, booking staff and managers worked together to redesign the booking process. Staff are now reorganised and based in one designated area, resulting in a better overall skill mix. A telephone booking centre has been created to offer patients choice and personal contact with the department. Booking staff have been involved in the change process by identifying problems and devising solutions.

The radiology call centre operates between 8am and 5pm, and to 8pm on some evenings, depending on staff availability. While the changes have meant some expenditure (e.g. providing partitions between schedulers so sound levels are reduced and introducing a roaming phone system with a number of telephones on one extension number), the cost of radiology calls has not increased significantly.

Results:
• Within three months MRI waiting times were reduced from 16 to six weeks. The maximum waiting time is currently at three weeks, with the call centre contributing to the drop
• Improved job satisfaction with staff enjoying making appointments this way. Staff also rotate between modality booking, enhancing job interest
• The increase in skill mix among booking staff has resulted in a more flexible workforce
• Processes are now more efficient and present better value for money for the organisation.
Case study
Booking letter highlights patient responsibility

The DNA (‘did not attend’) rate at North Bristol NHS Trust was higher than average. As a result, booking staff at the trust developed a patient information sheet detailing the number of lost appointments due to patients failing to attend and the consequences:

The ‘Your responsibility as a patient’ sheet informs patients:

‘Outpatient services at North Bristol NHS Trust are in great demand. Even so, every week **600 patients fail to keep their appointments. All of these appointments are wasted. As an outpatient you can help us tackle this problem.’

The booking sheet is sent out with the information pack for patients. It clearly states what a patient needs to do if they need to change their appointment and states that they will not be offered another appointment if they fail to attend.

**Results:**
- Patients are made aware of their responsibility to keep appointments
- The DNA rate has decreased.

Case study
Fixed appointments improve patient flow

Originally, North Bristol NHS Trust used a partial booking system for MRI appointments. However, with reduced waiting times, patients were taking too long to respond with this system.

As a result, the trust moved to a fixed appointments system, booking patients into a specific time slot. All patients are given the opportunity to change the date and time at the point of confirmation, although only approximately 1% of patients choose to alter their allocated appointment.

**Results:**
- Better use of scanner capacity
- More patient throughput each hour by booking whole sessions for one anatomical area
- No increase in patient DNA or cancellation rates.
Case study
Set calling times better for patients and staff

Lancashire Teaching Hospitals NHS Foundation Trust deals with approximately 2000 appointments a month for MRI and CT patients. The central booking office books appointments for two CT scanners, two static MRI scanners (working 12 hour days and weekends) and approximately 16 days’ usage of a mobile MRI scanner.

The office typically received a high volume of calls from patients wishing to book their appointments. This resulted in complaints from patients unable to get through to the booking department as well as low staff morale due to the constant pressure of calls and the inability to spend time on other tasks such as waiting list validation.

The trust introduced a new system to improve the booking process. Patients are now sent a partial booking letter on receipt of their referral asking them to ring the appointments office to book a mutually convenient time.

Patients referred for a routine MRI scan are asked to call on a specified date during a two hour time slot. For urgent referrals, patients are asked to ring a specific number as soon as possible.

If a patient does not call the booking team will keep their referral for two weeks before sending the referral back and trying to contact the patients by phone during this period.

The new process, which delivers 100% choice for all bookings, is fully explained to the patient in the original booking letter.

Results:
- All patients are given a choice of scan date
- Positive patient feedback on the new system, resulting in a dramatic decrease in patient complaints
- Better control over allocation of routine appointments in line with the trust four week waiting time targets – patients are batched in date order according to their referral date
- Booking staff feel more ‘in control’ of telephone calls as they dictate the numbers of patients calling – this also helps during periods of reduced staff levels as the number of patients calling in can be reduced as well
- Booking staff are able to plan their daily tasks better as they know when they will be taking calls
- The new system has not increased patient DNA or cancellation rates.

Case study
20 minute scan times increases throughput

Coventry and Warwickshire NHS Trust policy required a reduction in waiting times from three years to five weeks. Previously scans were scheduled to 30 or 45 minute slot times depending on the examination required.

Scanning times were reduced by agreeing standardised protocols with the radiologists and the radiology team. The department also applied ‘lean’ principles looking at their existing processes. As a result of this, waste was eliminated and new ways of processing patients were adopted. Patient preparation is now undertaken by radiography assistants thus freeing up radiographer time and improving patient throughput. The result of this work has resulted in a shortened scan time of 20 minutes.

The unit identified that scanner design was a constraint because of the time taken to choose coils in between patients. Scanning time could only therefore be reduced to 30 minutes on one scanner.

Results:
- Standard 20 minute scan time
- Significantly increased patient throughput
- Flexibility to scan inpatients - increased throughput of inpatients from approximately 100 per month to 30-50 per week.
## Case study
Waiting list validation system reduces waiting times

During 2007 the Radiology Care Group at Southampton University Hospitals NHS Trust developed and implemented a waiting list monitoring and reporting system to help reduce waiting times.

Accurate and timely information was needed to:
- Monitor and report the waiting list position at trust and care group level
- Assist radiology departments with the management of their individual waiting lists.

In particular, there was a requirement to:
- Provide individual target dates against each request
- Identify breaches and possible breaches quickly
- Identify the cause of the breaches
- Implement actions to resolve any issues identified.

A new weekly process has now been implemented as follows:

During Monday morning a radiology Patient Tracking List (PTL) file is produced to provide:
- An overview of the number of requests waiting using a traffic light system*

* The traffic light system works as follows:

<table>
<thead>
<tr>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GREEN</td>
<td>Appointment within target</td>
</tr>
<tr>
<td>AMBER</td>
<td>No appointment but over two weeks to target</td>
</tr>
<tr>
<td>RED</td>
<td>No appointment within target and less than two weeks to target</td>
</tr>
<tr>
<td>WHITE</td>
<td>Already breached</td>
</tr>
</tbody>
</table>

This PTL was adapted from the trust’s cancer referral PTL.

- The PTL enables departments to filter their requests by site, modality, room, exam and ‘booked by’ criteria.

On Monday afternoon and Tuesday departments review their data including reasons for exclusions (e.g. data entry error, planned therapeutic).

Early Wednesday morning, reports are produced summarising the categories in the WHITE and RED lists.

Late Wednesday morning representatives from all departments attend a Radiology Delivery Group chaired by the radiology care group manager to review the week’s data, discuss relevant issues and agree actions.

**Results:**
- Patients’ waiting times for radiology examinations are continually monitored
- Information regarding total waiting times and relevant contributory factors is produced in a timely manner
- There is full understanding of the data and confidence in it
- Staff discuss contributory factors with the care group manager and agree actions at the earliest opportunity
- The waiting list management system has helped teams achieve the trust’s target to have no patients waiting six weeks or more by 31 March, 2008.

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**Case study**
Waiting list validation system reduces waiting times

* The traffic light system works as follows:

- GREEN = appointment within target
- AMBER = no appointment but over two weeks to target
- RED = no appointment within target and less than two weeks to target
- WHITE = already breached

This PTL was adapted from the trust’s cancer referral PTL.
Scanning:

- Orbital x-rays are reported immediately by trained radiographers
- Cannulation should be performed by an appropriately trained helper outside the scanning room
- The majority of scans do not require radiologist supervision with the exception of a small number of sub-specialist scans
- The majority of scans should be performed according to standard, locally agreed protocols
- Inpatient demand should be measured continuously and used to determine the number of inpatient dedicated slots on the schedule
- A seven day scanning schedule with extended day should be in place (not waiting list initiative funded).

Reporting:

- Allocation of reporting by electronic work lists only
- Allocation of reports using pool of specialty reporters rather than individual reporters
- Reporting performed by both radiologists and appropriately trained radiographers who are part of the multidisciplinary clinical team
- Reports should be structured for the individual referrer and provide clinical details, scan findings, conclusions in the clinical context, and clear clinical advice if appropriate
- Reporting should be performed in an appropriate reporting room which should have a comfortable environment with steps taken to minimise disturbance (e.g. redirection of ad-hoc queries to a designated duty radiologist)
- Dictation of report by voice recognition with validation at the time of reporting
- Reporting using PACS
- Electronic distribution of reports via PACS or RIS. There should be mechanisms in place to ensure urgent or unexpected report findings are flagged to the referrer, and that a record is made when each report is read by the referrer
- Report turnaround time targets should be in place and monitored.

Case study
Voice activated reporting shortens pathway

The reduction in secretarial staff and difficulties in recruitment at Norfolk & Norwich University Hospital NHS Trust meant that transcription turnaround times were often poor (an average of nine days) especially during peak holiday times. In addition MRI reports were usually sent back to radiologists for authorisation which added an extra delay to the pathway.

Voice recognition software was introduced. This involved an hour’s training but required up to six months usage to be fully effective.

Results:

- Reports are authorised at the time of dictation and electronically distributed to the referrer on the same day and often in the same hour
- No requirement for reporters to authorise work the next day or after transcription
- Improved secretarial efficiency providing better support for radiologists for other tasks
- All reporters (consultants, registrars, radiographers and vascular sonographers) have been trained and have licenses to use voice activated reporting.
Case study

Radiographer reporting reduces waiting times

Medway NHS Foundation Trust introduced radiographer reporting to reduce the 40 plus week wait and comply with the 18-weeks target. A shortage of radiologists necessitated this but the unit also required a solution that allowed increased throughput without overloading radiologists. Due to the 18-weeks target scanning and reporting had to be done within a maximum of two weeks.

As well as introducing 12 hour days and a seven day working week radiographer protocolling and reporting was introduced to reduce delays in the pathway.

Reporting radiographers in MRI joined the first fully accredited M level course at Canterbury Christ Church University College in 2004. Training was given by radiologists on specific areas (initially thoraco lumbar spine, IAM’s and knees) with a current addition of brain and cervical spine. Each course consists of three modules and lasts one year. Final assessment is by objective structured examination where the student is required to achieve 90% sensitivity, specificity and accuracy, 85% agreement with an original, agreeing report from three general radiologists. Radiographer reports are self generated and signed by the author but a continual random audit of their work is performed by radiologists both internally and externally.

Results:

- Patient waiting times have reduced to less than two weeks and the trust is now working towards a ‘walk in service’
- Radiographers produce around 20-30% of the reporting workload but this can be as high as 50% in busy times
- Radiologists are now able to perform tasks equal to their enhanced level of expertise rather than being slowed by routine examinations
- Some clinicians are strongly in favour of radiographer reporting whilst others are not. Regular contact with the requesting clinicians, e.g. multidisciplinary team meetings has improved clinician attitudes.

Clinical review:

- A prompt clinical assessment of the patient with an appropriately trained and competent clinician should be arranged as soon as possible after the scan result is available. This can be achieved in a number of ways including:
  - booking the scan and the follow-up appointment all within the original consultation visit
  - booking the follow-up appointment at the average expected time of the scan and report becoming available
  - arrival of the electronic report triggering a patient episode such as a telephone consultation or outpatient appointment booking.
6. Measures for improvement

Through our observations we identified a need from teams to understand current performance in their MRI services and compare their performance to local and national benchmarks.

Well performing organisations had a good understanding of their own performance. They routinely used data to drive quality and safety in their local services and assess the impact of any changes they made.

The measures offered here are not prescriptive. They are intended to stimulate thinking and help local organisations consider their own position in terms of specific MRI processes. Local agreement will need to be reached on the frequency and level of detail at which this information is collected and reviewed. The aim of using these metrics is to improve the quality and effectiveness of care as well as the patient experience and to minimise variation in the MRI pathway.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Aim</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time from request to receipt of referral</td>
<td>100% same day</td>
</tr>
<tr>
<td>Electronic referrals</td>
<td>100%</td>
</tr>
<tr>
<td>Appropriate referrals for MRI</td>
<td>100%</td>
</tr>
<tr>
<td>Concise, relevant clinical information and accurate demographic information on all referrals</td>
<td>100%</td>
</tr>
<tr>
<td>Time from receipt to allocation of appointment</td>
<td>100% within 5 working days</td>
</tr>
<tr>
<td>DNA rate</td>
<td>&lt; 3%</td>
</tr>
<tr>
<td>Patients given choice of date when booking appointments</td>
<td>100% of outpatients</td>
</tr>
<tr>
<td>Waiting list profile data collection and validation</td>
<td>Completed weekly</td>
</tr>
<tr>
<td>Vetting / Protocolling of requests if required</td>
<td>100% same day</td>
</tr>
<tr>
<td>Vetting / Protocolling undertaken by radiographer</td>
<td>&gt; 95%</td>
</tr>
<tr>
<td>Time from allocation of appointment to scan</td>
<td>100% within 14 days</td>
</tr>
<tr>
<td>Reporting of orbital x-rays</td>
<td>100% by radiographers</td>
</tr>
<tr>
<td>Time from scan to completion of report available to referrer</td>
<td>100% same day</td>
</tr>
<tr>
<td>Radiologist needed to review scan images before completion</td>
<td>&lt; 5%</td>
</tr>
<tr>
<td>Voice recognition reporting</td>
<td>&gt; 90%</td>
</tr>
</tbody>
</table>
7. Next steps

Further products will be produced to support units in implementing the improvement ideas and good practice shared in this guidance. In particular the Delivering Quality and Value team will be producing the following resources to support the MRI and low back pain pathway:

- Focus On: Musculoskeletal Interface Services
- Focus On: Booking Processes in Radiology

These will be available in Summer 2008.

Future work

This project has identified a number of areas where further work is needed to provide a better understanding of the pathway and facilitate further improvements:

- **MRI sequence standardisation**
  There is wide variation in standard MRI sequence protocols for musculoskeletal conditions. As a consequence, scanning times are variable, impacting on patient throughput and use of capacity. Work is needed to agree the minimum protocols required to achieve a diagnosis in common musculoskeletal conditions and provide national guidance. This has already been achieved for cancer (Recommendations for Cross-Sectional Imaging in Cancer Management, Issue 2, The Royal College of Radiologists, 2006).

- **MRI scanner design**
  We have found that patient throughput is dependant on individual scanner design. The type of table and coils used have a significant impact on efficiency. Some units address this problem by batching similar scan types but this does not allow optimum use of capacity. MRI manufacturers need to design equipment which gives priority to user friendliness and high patient throughput.

- **The clinical efficacy of MRI in low back pain**
  The role of the ‘reassurance scan’, which is an increasingly common indication for low back pain, is poorly understood. Indeed, the impact on patient outcomes of performing more scans at an earlier stage is under researched. Since considerable resource is being diverted into MRI scanning, more research is needed in these areas.

- **Information Technology (IT) barriers**
  We have observed significant benefits that can be gained from IT systems. For instance an efficient electronic booking diary, effective electronic ordering and voice recognition dictation software all help to reduce delays in the pathway. There are many barriers preventing trusts from benefiting from these systems. The success of the Connecting for Health PACS roll out could be followed by a similar standardisation and provision of effective systems to support MRI processes.

We want to hear from you...

As part of this work we would genuinely welcome and value your contributions and ideas. If you have any comments or would like to be involved please contact the Delivering Quality and Value team at: mri@institute.nhs.uk
8. Further information and resources

This is just a small selection of some of the best links and resources:

Team working within clinical imaging. A contemporary view of skills mix. Joint guidance from the Royal College of Radiologists and the Society and College of Radiographers, January 2007


Going lean in the NHS, NHS Institute for Innovation and Improvement, 2007

18 week information including 18 weeks spinal pathway www.18weeks.nhs.uk


Back Care Charity: www.backpain.org

Focus On: Musculoskeletal Interface Services, NHS Institute for Innovation and Improvement, 2008

9. Acknowledgements

We wish to offer our sincere thanks to everyone who has contributed to this project. In particular we would like to thank the patients and staff who gave us an invaluable insight into their work.

The MRI units we visited included:

- Lancashire Teaching Hospitals NHS Foundation Trust
- Leeds Teaching Hospitals NHS Trust
- Medway NHS Foundation Trust
- Norfolk & Norwich Healthcare NHS Trust
- North Bristol NHS Trust
- Royal Berkshire NHS Trust
- Southampton University Hospitals NHS Trust
- University Hospitals of Coventry and Warwickshire NHS Trust

Musculoskeletal Interface Services included:

- Multidisciplinary Back Pain Service, Birmingham East and North Primary Care Trust
- MUST Service (Musculoskeletal Triage Service), Kingston Hospital NHS Trust
- Orthopaedic CATS, Bolton Primary Care Trust
- Orthopaedic Choice, Hampshire Primary Care Trust
- Collaborative Back Pain Service Organisation, Somerset PCT and Musgrove Park Hospital Foundation Trust

We would also like to thank the following organisations for their contribution:

- 18-weeks Orthopaedic Team
- BackCare
- British Chiropractic Society
- British Orthopaedic Association
- British Osteopathic Society
- British Pain Society
- British Society for Rheumatology
- Chartered Society of Physiotherapists
- Department of Health (Chief Professions Officers)
- MRI Fastrack Diagnostic Scheme, Department of Health
- National Imaging Board, Department of Health
- National Radiology Service Improvement Programme
- Primary Care Rheumatology Society
- Royal College of Radiologists
- Society and College of Radiographers
This document aims to help local health communities and organisations improve the quality and value of care.

It is one of a series of documents produced by the Delivering Quality and Value team at the NHS Institute for Innovation & Improvement.

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