West Midlands Regional Spine Network

Spine disorders MRI policy
(Emergency and elective)

December 2018

Category	**Operational Delivery Network policy document** **West Midlands Regional Spine Network (WMRSN)**
Purpose	**To provide a summary of MRI requirements for spine surgical referral in the network**
Version	**1.0**
Previous versions	**Nil**
Supporting documents	**WMRSN Emergency spine disorders policy** **RSN mandatory items** **SBNS and BASS position statements on CES**
Responsible working group	**WMRSN Board**
Sign off	**WMRSN board**
Related networks	**Major trauma network**
Distribution	**All WMRSN hospital COO and medical director** **Clinical leads ED / oncology / acute medicine / spine surgery / radiology** **Chair STPs** **Betsi Cadwaladr health board**
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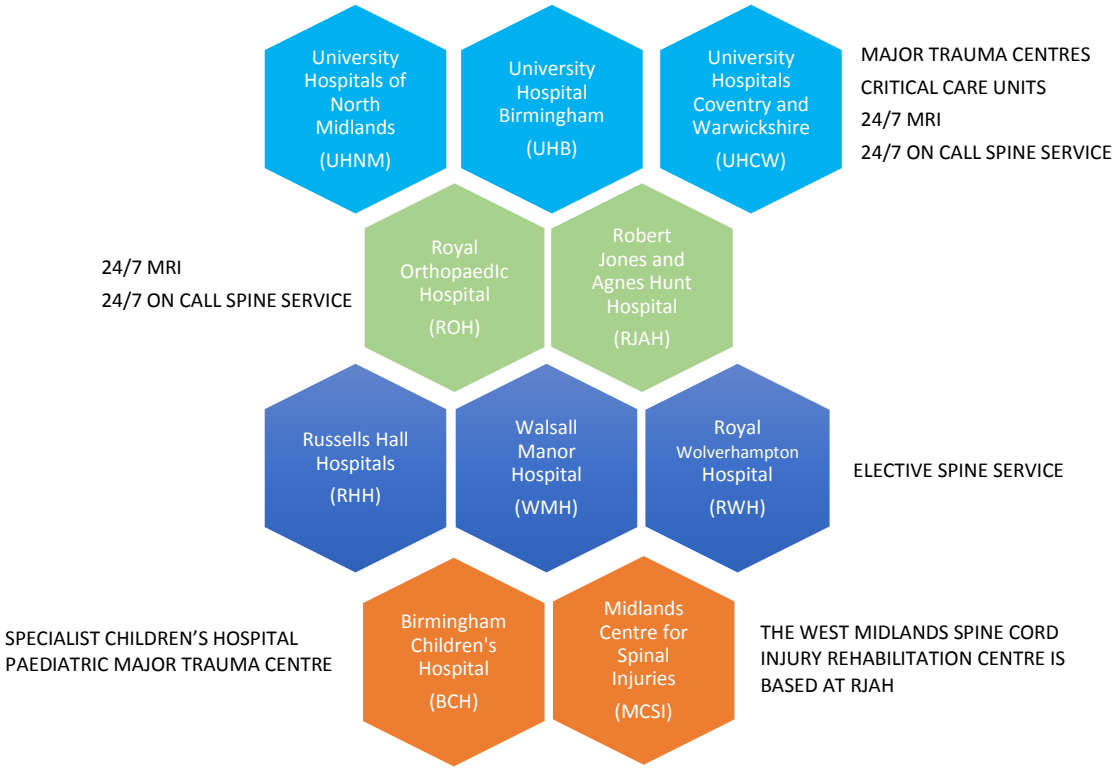
INTRODUCTION

The West Midlands Regional Spine Network (WM RSN) includes 3 major trauma centres, 2 specialist orthopaedic hospitals, 3 neuroscience centres and 3 spine partner hospitals. There is also a specialist children's hospital which provides elective and emergency spine care. There is a regional specialist spinal cord injury rehabilitation centre. Spine cord injury rehabilitation also takes place at the neurorehabilitation centres associated with the major trauma centres.

UHNM, UHB, UHCW, ROH and RJAH are known as spine hubs as they provide 24 hours spine on call cover. RWH, Walsall Manor and RHH are spine partners as they provide a spine service but without 24 hours on call cover.

WM RSN SPINE SURGICAL SERVICE OUTLINE



All hospitals accept adult patients for outpatient and inpatient management.
BCH, UHNM, ROH and RJAH accept 16 – 18 year olds for outpatient and inpatient management.
BCH and UHNM accept <16 year olds for outpatient and inpatient management. RJAH manages patients <14 years old as inpatients through Alder Hey Hospital, Liverpool.

In addition to the above hospitals are the triage services, pain management and rehabilitation services.

There are a number of private hospitals providing elective care for spine disorder patients through the region which are also part of the RSN.

TYPES OF EMERGENCY SPINE DISORDERS ACCEPTED FOR MANAGEMENT BY HOSPITAL

Hospital	Major Trauma	Isolated spine trauma (ISS < 9)	Osteoporotic and elderly trauma (no neurology)	Cauda Equina Syndrome	MSCC	Intradural pathology	Primary sarcoma	Spinal cord injury (acute)	Spinal cord injury specialist rehabilitation
UHNM	✓	✓	✓	✓	✓	✓		✓	
UHB	✓	✓	✓	✓	✓	✓		✓	
UHCW	✓	✓	✓	✓	✓	✓		✓	
ROH		✓	✓	✓	✓		✓		
RJAH		✓	✓	✓	✓		✓		
RHH		✓*	✓*						
WMH		✓*	✓*						
RWH		✓*	✓*						
BCH	✓^	✓^			✓^	✓^			
MCSI									✓

*can manage isolated spine trauma presenting at own ED if no requirement for surgery
^paediatric major trauma centre and specialist children's hospital

TYPES OF ELECTIVE SPINE SURGERY BY HOSPITAL

Hospital	Degenerative lumbar	Degenerative cervical	Adult deformity	Paediatric disorders	MSCC	Intradural pathology
UHNM	✓	✓	✓	✓	✓	✓
UHB	✓	✓	✓		✓	✓
UHCW	✓	✓	✓		✓	✓
ROH	✓	✓	✓	✓*	✓	✓
RJAH	✓	✓	✓	✓*	✓	
RHH	✓					
WMH	✓					
RWH	✓	✓				
BCH				✓		

*16 – 18 year old on site; for ROH < 16 y are managed at BCH; RJAH < 14 y at Alder Hey

EXECUTIVE SUMMARY

- The aim of this document is to outline MRI requirements for the West Midlands Regional Spine Network to ensure appropriate referrals to the spine surgical service.
- All adult elective referrals should be referred to a triage and treat service. The triage service should assess the need for and carry out an MRI scan. MRI scans should be relevant to the presenting symptoms and be within 6-12 months of the current episode.
- Paediatric elective referrals do not require imaging before referral.
- Emergency referrals do usually require imaging studies to identify the presence of a surgically relevant abnormality. This is usually a CT scan and or an MRI scan depending on the clinical scenario and disorder.
- The on call spine service will guide the need for further imaging and patient transfer.
- When the need for transfer to the hub is clear on initial imaging then further diagnostic imaging should take place at the hub and transfer should not be delayed.
- When the surgical diagnosis or need for surgery is not established further imaging should take place at the referring hospital in a timely manner eg possible cauda equina syndrome.
- Referring hospitals in the RSN must make provisions for out of hours MRI by on site imaging or SLA with the spine hub.

Magnetic Resonance Imaging MRI

Magnetic resonance imaging (MRI) is a standard imaging technique for spine disorders. It has become a baseline test for all spine disorders being considered for surgical evaluation.

MRI may be contraindicated if the patient has implanted devices, intracranial clips, devices with motorised mechanics, metallic fragments or metallic cardiac implants that are not MRI safe. These patients should be discussed with your MRI centre and the centre that has implanted the device to establish safety. Some of these devices are MRI safe and they should not be assumed to be MRI unsafe automatically.

The presence of a spine implant such as rods and pedicle screws (except a spinal cord stimulator, sacral stimulator or intrathecal pump) does NOT exclude a patient from an MRI scan at any point in the timeline of the implant.

Some patients may not be suitable for an MRI due to movement disorders, severe deformity, severe pain or claustrophobia.

Alternative imaging modalities are available and should be considered if the patient is not suitable for an MRI scan (CT scan, CT- myelography). If necessary, discuss with your spine centre.

MRI for Elective Referrals

Within the RSN, there are established local policies regarding the suitability of MRI scanning in the primary care setting. Please refer to your local document for this.

Any referral for a specialist spine surgical opinion in an adult should have an MRI before referral. The expectation is that all adults are referred via a single portal to undergo triage and initial assessment and management before referral to a secondary care spine surgical service. This is in line with the NICE document on management of low back pain and sciatica. The principle of referral through a triage service is extended to all elective adult spine disorders (for example cervical radicular pain) on the WM RSN. The triage service should request the MRI before referral to the specialist spine centre. The MRI should be made available for review by the specialist centre as should the radiologist's report. An MRI should be relevant to the presenting symptoms and within 6 -12 months of the current episode. Repeat the scan before referral if symptoms have changed.

Where the patient is being referred to a pain specialist or rheumatologist an MRI may not be mandatory.

Paediatric patients do not need an MRI before referral.

If the patient has implants that are not MRI compatible then there should be a discussion with the spine centre as to the most appropriate next steps. CT – myelography is an invasive test and is best carried out in a spine centre after discussion.

- All adult patients require an MRI of the appropriate region within 6-12 months of the current episode if they are being referred for a specialist spine surgical opinion.
- The MRI should be carried out by the triage service before referral
- The MRI and radiologist's report should be made available to the specialist centre on referral
- Paediatric patients do not need an MRI before referral
- Specialised studies (including specialised MRI sequences) are best carried out by the spine centre. Examples include CSF flow studies or myelography.

MRI for Emergency Referrals

As patients with emergency spine disorders may attend any of the hospitals covered by the WM RSN, this policy document outlines the best practice expected in the event of an emergency referral to a spine centre.
There is an expectation and agreement within the WM RSN catchment that:

1. When a patient requires transfer as the diagnosis is clear and further evaluation will not influence the decision to transfer, the patient should be transferred without delay and MRI and other imaging should be carried out at the spine centre (for example CT scan confirmed spine trauma with neurology). The on call teams at the spine service should not automatically request an MRI to be carried out by the referring hospital for every referral.

2. When a working diagnosis can only be confirmed with an MRI then the referring hospital should carry out the MRI using the agreed MRI protocol (see below) as an urgent investigation to prevent undue delay (for example possible cauda equina syndrome, possible spine infection).
    a. During working hours the expectation is that a planned MRI list should be interrupted for the emergency scan.
    b. During extra MRI lists to clear elective backlogs the expectation is that the MRI list should be interrupted for the emergency scan.
    c. Out of hours the expectation is that an out of hours MRI service should be available at the referring hospital either in house or via a service level agreement with the spine centre. The referring hospital should repatriate the patient immediately after scan if the patient does not require treatment at the specialist spine centre.

3. When a diagnosis has been established but the patient's suitability for non-surgical management can only be clarified by an MRI, this should be undertaken at the referring hospital within a time frame agreed with the spine centre giving advice (for example spine trauma without neurology and no clear instability on CT scan).

4. Any imaging carried out at the referring hospital should be digitally transferred urgently so that the spine centre can access them immediately to provide advice. The local image transfer protocol should be followed.

5. Specialised imaging studies (including specialised MRI sequences) are best carried out by the spine centre

Specific conditions

The conditions described are the commonest ones referred to an on call spine service. This is not an exhaustive list and the spine centres will accept referrals for other conditions and requests for advice.

The suggested imaging is a guideline and your spine centre may individualise imaging according to the clinical scenario.

Spine Trauma Imaging

Once the patient is assessed and stabilised, initial imaging is required for all spine trauma patients being referred to a spine centre. See WM RSN document on emergency disorders for further advice.

Initial imaging
Any suspected spine trauma or injury identified on plain radiographs must have a computerised tomogram (CT) of the area of concern, with raw axial data and 2D reformats in the sagittal and coronal planes, as an emergency.
Reformats of pan scans when completed are acceptable.

MRI scan is not mandatory on referral but when requested should be of the whole spine with sagittal STIR of the whole spine and T1 and T2 sagittals of the injured section with T1 and T2 TSE (and optional T2 gradient echo) axials of the injured section.

Isolated low energy osteoporotic fractures without neurology
Isolated C2 odontoid peg fractures with minimal displacement and no neurology

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Cauda Equina Syndrome (CES)

This is a clinical syndrome of sphincter disturbance due to compression of the lumbosacral nerve roots which, when supported with MRI evidence of pathology compressing the appropriate nerve roots, constitutes a surgical emergency. Delaying treatment can lead to irreversible incontinence and or numbness and weakness in the legs.
Unfortunately there is no good clinical discriminator for this disorder and 70-80% of apparent CES is found not to have compressive pathology on MRI scan, meaning no surgical referral is required.
Note that CES does NOT have to be end stage with painless urinary retention and or incontinence (CES-R). The presence of loss of bladder sensation, difficulty initiating micturition, urinary dribbling, saddle anaesthesia with or without bilateral leg pain is sufficient to warrant emergency MRI scan to assess for CES incomplete (so called CES-I). Appropriate compression on MRI warrants emergency referral even in CES-I.

If a patient presents with acute onset or progressive CES symptoms (72 hours or less) scans should be requested emergently (and ideally within 2 hours of presentation). If a patient presents with recent onset non-progressive symptoms (more than 72 hours and less than 2 weeks), next day urgent scanning is reasonable. If symptoms are chronic and non-progressive (months) then an emergent scan is not required and within 48 - 72 hours is reasonable.

Please note that litigation for delay in scanning and or delay in surgery is a real risk for patients that present with acute or progressive CES symptoms.

Initial imaging
As a minimum MRI scan of the lumbar spine with sagittal T2 and T1 sequences and T1 and T2 TSE axials through areas of abnormality as an emergency. MRI is required before referral to a spine surgical service as an emergency as the clinical features are not discriminatory.

Metastatic Spinal Cord Compression (MSCC)

MSCC has been written about extensively with NICE guidelines already published and updated.

MSCC refers to impending or actual neurological deficit due to metastatic spread to vertebra and consequent cord compression.
To prevent irreversible neurological deficit, the assessment, investigation and treatment of MSCC should be performed expediently.
Due to the nature of the disease, patients will require senior radiological, oncological and spinal surgical input. Surgery should be considered where prognosis is more than 3 months and reconstruction is possible.

Initial imaging
An MRI scan of the whole spine with sagittal STIR and T1 sequences of the whole spine and sagittal T2, T1 and T2 TSE axials of areas of abnormality should be done within 24 hours of onset of neurological symptoms or spinal pain affecting ambulation. For ambulatory spinal pain only, the scan should be within 1 week.

Consider a CT scan of an abnormal area to assess stability and to plan interventions including vertebral body augmentation.
CT chest / abdomen and pelvis should be done to assist staging.

Spondylodiscitis (Spinal infection)

This refers to infection (not related to a surgical site infection). Spondylodiscitis usually occurs in the immuno-compromised patient (diabetic, renal failure, steroid usage) but not inevitably. There is usually a source of sepsis (skin infection, urinary tract infection, dental infection, septicaemia). It is not unusual for the only presentation to be severe back pain with malaise and pyrexia.
Back pain with raised inflammatory markers should raise the suspicion of spondylodiscitis.
The possible clinical syndromes are:

- Sepsis
- Neurological spontaneous compromise (due to instability or epidural abscess)
- Back pain only
- Kyphosis or other deformity

Initial imaging
Although plain radiographs may show abnormalities they are not always diagnostic.

MRI scans should be done before referral to confirm diagnosis. A whole spine sagittal STIR and T1/T2 sagittals of the region involved with T1 and T2 TSE axials of involved areas. Contrast studies may be helpful to establish the diagnosis.

CT scan may be helpful to confirm the diagnosis and assess the degree of bony destruction.

FINALLY

This document outlines the expected initial imaging for common spine conditions. It is not exhaustive and all the spine centres in the WM RSN are happy to accept calls for advice for conditions not described in this document.

The document is a guideline and reflects the collective view of the spine centres and partner hospitals in the WM RSN at the time of writing.

Recommended MRI protocols*

Degenerative disease (eg lumbar stenosis)	Region affected only T1 and T2 sagittal sequences T2 TSE axial sequences of abnormal levels (additional T2 gradient echo axial sequence for cord assessment may be used)
Trauma	Whole spine sagittal STIR with sagittal T1 and T2 Axial T1 and T2 TSE of affected levels (additional T2 gradient echo axial sequence for cord assessment may be used)
Cauda equina syndrome	Lumbar spine sagittal T1 and T2 Axial T1 and T2 TSE of affected levels (whole spine sagittal T2 to assess cord may be added)
MSCC	Whole spine sagittal STIR and T1 Sagittal T2, axial T1 and T2 TSE of affected levels (additional T2 gradient echo axial sequence for cord assessment may be used)
Spondylodiscitis	Whole spine sagittal STIR T1 and T2 sagittals of the region involved with T1 and T2 TSE axials of involved areas (additional T2 gradient echo axial sequence for cord assessment may be used)

*It is accepted that individual institutions may have additional sequences for specific disorders. The listed sequences are the minimal recommended to establish a diagnosis, aid surgical planning and where appropriate to exclude lesions in the rest of the spine.

Emergency image transfer protocols

University Hospital of North Midlands	Please ensure that you have sent any images via the Image Exchange Portal (IEP) to UHNM – Royal Stoke. For all urgent / trauma or out of hours referrals images please select “Tertiary PACS” and “blue light” priority to ensure clinician see the images immediately.
University Hospital Birmingham	Contact on call team
University Hospitals of Coventry and Warwickshire	Contact on call team
Royal Orthopaedic Hospital	Contact on call team
Robert Jones Agnes Hunt Hospital	Please ensure that you have sent any images via the Image Exchange Portal (IEP) to RJAH. In office hours a phone call is required to the PACS team in RJAH in order to allocate the images to the correct patients. Out of hour they can be sent as blue light transfers.
Russells Hall Hospitals	Contact hospital directly
Walsall Manor Hospital	Contact hospital directly
Royal Wolverhampton Hospital	Contact hospital directly
Birmingham Children’s Hospital	Contact hospital directly

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