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Carl R. Darnall Army Medical Center  
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# MAGNETIC RESONANCE IMAGING (MRI)

## Guidelines for Non-acute Musculoskeletal Conditions

PROVIDED BY DEPARTMENT  
OF ORTHOPEDICS AND  
REHABILITATION



## Purpose:

To improve quality of patient care through appropriate use of magnetic resonance imaging (MRI) for musculoskeletal conditions.

## Scope:

This policy applies to all clinicians privileged by CRDAMC who order MRIs for musculoskeletal conditions.

## Objectives:

1. Improve outcomes by focusing on treatment rather than technical diagnosis.
2. Improve access to MRI for appropriate patients.
3. Reduce patient confusion caused by incidental findings on MRI.
4. Recapture beneficiaries who receive MRIs off post.

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## 13. Resources & References:

- American College of Radiology: <http://www.acr.org/>.
  - Musculoskeletal Screening and Referral Tools (SRTs). <https://www.qmo.amedd.army.mil/srts/srt.htm>. US Army MEDCOM.
- 1) Richard A. Deyo, MD, MPH, Sohail K. Mirza, MD, MPH, Judith A. Turner, PhD, and Brook I. Martin, MPH. Overtreating Chronic Back Pain: Time to Back Off? J Am Board Fam Med 2009; 22:62– 68.
  - 2) Jensen MC, Brant-Zawadzki MN, Obuchowski N, Modic MT, Malkasian D, Ross JS. Magnetic resonance imaging of the lumbar spine in people without back pain. N Engl J Med 1994;331:69–73
  - 3) Hendee WR, et al “Addressing overutilization in medical imaging” Radiol 2010; DOI: 10.1148/radiol.10100063.

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## 12. Special Cases:

- a. Medical Evaluation Board (MEB) Patients:
  - i. Because of the unique time lines and requirements for Service members in the MEB process, studies may be ordered outside of usual established criteria. However, providers should indicate justification for such studies.
  - ii. Whenever possible the MEB provider should indicate reasons and contact the appropriate on-call radiologist to discuss the indicated examinations.
  - iii. Completing an unnecessary imaging study in these cases may be burdensome and costly, but is likely less so than the extended period of time spent on delayed proceedings.
  - iv. In order to distinguish orders coming from the MEB Clinic the initial line of the radiology request should read “MEB patient – “, before the necessary comments / indications for study.
- b. Warriors-in-Transition: Similar to service members undergoing a medical evaluation board, warriors-in-transition are a challenging population who may require expedited MRIs.
- c. Aviation requirements: Aviators have specific regulatory requirements. Flight Surgeons should identify that a particular study is necessary because of flight requirements.

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## 1. Background:

What is the research telling us...?

The Journal of the American Board of Family medicine reported a 307% increase in number of lumber MRI's among Medicare beneficiaries from 1997 to 2004.<sup>1</sup>

In 1994 Jensen et al performed MRI examinations on 98 asymptomatic people. The scans were read independently by two neuroradiologists who did not know the clinical status of the subjects.

- 36% had normal disks at all levels.
- 52% of the subjects had a bulge at least one level.
- 27% had a protrusion.
- 1% had an extrusion.
- 38% had an abnormality at more than one disk.
- 19% had Schmorl's nodes (herniation of the disk into the vertebral-body end plate).
- 14% had annular defects (disruption of the outer fibrous ring of the disk).
- 8% had facet arthropathy (degenerative disease of the posterior processes of the vertebrae).
- Prevalence of bulges increased with age.
- Findings were similar in men and women. <sup>2</sup>

In August 2009, the American Board of Radiology Foundation hosted a 2-day summit to discuss the causes and effects of the overutilization of imaging. Comments included:

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## 11. Ankle/Foot:

- a. Acute: See General CRDAMC Guidelines or Musculoskeletal Screening and Referral Tools (SRTs) cited in references.
- b. Chronic: At least 6 weeks of conservative treatment to include physical therapy, and any of the following:
  - i. Avascular necrosis of talus after standard x-rays.
  - ii. Tendon rupture.
  - iii. Intra-articular loose body.
  - iv. Ligament and tendon injuries.
  - v. Tarsal tunnel with neuropathy secondary to entrapment.
  - vi. Morton's neuroma, if there is diagnostic uncertainty or if MRI results will affect the treatment plan.
  - vii. Persistent ankle pain with persistent or recurrent swelling or joint tenderness.
  - viii. Not medically necessary: Ankle, talus and foot fractures.

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## 2. Responsibilities:

- a. Deputy Commander for Clinical Services: Overall responsible for implementation.
- b. Department Chiefs: Responsible for monitoring MRI usage within their departments and identifying and correcting providers who practice out of expected practice patterns. It is expected that department chiefs will delegate this task to a senior clinician (civil service or military) who practices at least halftime in the clinic.
- c. Department of Radiology: Reviews all requests for musculoskeletal MRI imaging for appropriateness:
  - Refers all inappropriate or incomplete requests back to the provider for clarification.
  - Refers 2nd inappropriate request (for the same patient) to ordering provider's Clinic Chief for clarification and/or provider retraining.
  - Refers 3rd inappropriate request (for the same patient) to ordering provider's Department Chief for clarification and/or provider retraining.
- d. Department of Orthopedics and Rehabilitation: Provide initial and sustainment training on CRDAMC musculoskeletal MRI training to all providers privileged to order musculoskeletal MRIs.
- e. Business Operations Division: Provide quarterly by name reports to Department Chiefs on provider MRI utilization to include total MRIs ordered, number of new patients seen, and cost of imaging.

- b. Chronic: At least 6 weeks of conservative treatment to include occupational or physical therapy, and any of the following:
  - i. Elbow instability.
  - ii. Impingement signs.
  - iii. Loss of elbow flexion or extension.
  - iv. Persistent pain with activity.
  - v. Prior surgery with the following:
    1. Progressive changes in objective neurological or physiological findings.
    2. At least one year since last MRI.
    3. No retained hardware from previous surgery.
  - vi. Not medically necessary: Epicondylitis, Cubital tunnel syndrome.

## 8. Wrist/Hand:

- a. Acute: See General CRDAMC Guidelines or Musculoskeletal Screening and Referral Tools (SRTs) cited in references.
- b. Chronic: At least 6 weeks conservative treatment, to include occupational or physical therapy, and any of the following:
  - i. Suspicion of carpal instability.
  - ii. Evaluation of Triangular Fibrocartilage Complex ligament tears (in conjunction with arthrogram).
  - iii. Objective worsening of neurological status by physical exam or electrodiagnostic testing.
  - iv. Not medically necessary:
    1. Carpal tunnel syndrome.
    2. Carpal nonunions.

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## 9. Hip:

- a. Acute: See General CRDAMC Guidelines or Musculoskeletal Screening and Referral Tools (SRTs) cited in references.
- b. Chronic: At least 6 weeks of conservative treatment to include physical therapy, and any of the following:
  - i. Suspected osteonecrosis of the femoral head.
  - ii. Suspected intra- or extra-articular abnormality (e.g., loose body, synovial osteochondromatosis).

## 10. Knee:

- a. Acute: See General CRDAMC Guidelines or Musculoskeletal Screening and Referral Tools (SRTs) cited in references.
- b. Chronic: At least 6 weeks of conservative treatment to include physical therapy, and any of the following:
  - i. Suspected meniscal tear, cruciate, collateral or multiligament injury with pain and instability evidenced by Pivot shift test, positive McMurray's sign (meniscus injury), positive Lachman's test (ACL injury) or locking.
  - ii. Avascular necrosis, after standard x-rays.
  - iii. Intra-articular loose body.
  - iv. Osteochondritis Dissecans with surgical indication.
  - v. Persistent knee pain with persistent or recurrent swelling or joint tenderness.
  - vi. Post-operative evaluation following repair of a ligamentous or tendinous tear, with new symptoms.

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- "In most cases, an imaging procedure enhances the accuracy of a diagnosis or guides a medical treatment and is fully justified, because it benefits the patient."
- "But some imaging procedures are not justified, because they are unnecessary for the patient's care. These are the uses of imaging that we... are trying to identify and eliminate." <sup>3</sup>

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2010 Data Musculoskeletal MRI	Total images	Cost per image	Total cost
MRI CRDAMC	12766	\$149.62	\$1.9 million
MRI off post	3169	\$580.36	\$1.8 million
Total	15935	---	\$3.7 million

The policies that follow in this booklet are guided by the imaging policies set forth by the American College of Radiology and have undergone review by a group of CRDAMC providers and administrators from family medicine, radiology, orthopedics, occupational therapy, physical therapy, emergency medicine, and the business operations division. The policies have been approved by the Deputy Commander for Clinical Services.

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## 6. Shoulder:

- a. Acute: See General CRDAMC Guidelines or Musculoskeletal Screening and Referral Tools (SRTs) cited in references.
- b. Chronic: At least 6 weeks of conservative treatment to include physical therapy, and any of the following:
  - i. Anterior or posterior shoulder instability.  
\*MRI with arthrogram.
  - ii. External rotation pain or weakness.
  - iii. Impingement signs.
  - iv. Loss of abduction.
  - v. Persistent pain with activity.
  - vi. Persistent adhesive capsulitis following physical therapy.
    - 1. Progressive changes in objective neurological or physiological findings.
    - 2. At least one year since last MRI.
    - 3. No retained hardware from previous surgery.
  - viii. Not medically necessary:
    - 1. Advanced imaging of fracture of the clavicle.
    - 2. Non radicular arm pain.
    - 3. Acromioclavicular arthrosis.

- f. Clinicians: Abide by CRDAMC policy and use good clinical judgment and sound evidence based practice when ordering MRIs. Recognize the risk of unnecessary procedures that result from incidental findings on images. Recognize the cost to patients in time and energy caused by unnecessary imaging. Recognize the access and financial costs of unnecessary imaging.

## 7. Elbow:

- a. Acute: See General CRDAMC Guidelines or Musculoskeletal Screening and Referral Tools (SRTs) cited in references.

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### 3. CRDAMC musculoskeletal MRI guidelines:

- a. General: Always order appropriate radiographs/ plain films before ordering an MRI. In rare cases these can be done concurrently. In many cases a simple radiograph provides the necessary information to guide clinical interventions. Radiologists use radiographic images to assist in reading MRIs.
- b. Conservative management: Prior to ordering an MRI for a chronic musculoskeletal condition, clinicians should consult physical or occupational therapy. Physical therapists (PTs) and occupational therapists (OTs) are musculoskeletal experts who are the providers of choice for identifying patients who need expedited orthopedic surgical intervention and for rehabilitating patients who may not require surgical intervention. Additionally, the PT and OT clinics have specific programs for expediting good surgical candidates to see an orthopedic surgeon.
- c. General Indications: The following categories apply to all musculoskeletal conditions where an MRI is indicated whether the condition is acute or chronic:
  - i. Progressive neurological deficit such as Cauda Equina Syndrome.
  - ii. Suspected femoral neck stress fracture with high clinical suspicion and negative or inconclusive radiographs.

- viii. Indication not listed: provide clinical justification. Indications here should be well documented. For example, while the vast majority true radiculopathy cases would meet the criteria above, specific syndromes (lateral stenosis, L1-L3 syndromes) may only meet some of these criteria.
- ix. Not medically necessary: Uncomplicated acute low back pain with or without suspected radiculopathy (no red flags) does not warrant the use of MRI.

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## Regional Indications for MRI:

### 4. Cervical and thoracic spine:

- a. Acute: See General CRDAMC guidelines or Musculoskeletal Screening and Referral Tools (SRTs) cited in references.
- b. Chronic: At least 6 weeks of conservative treatment to include physical therapy, and any of the following:
  - i. Neck, shoulder, or upper extremity pain with or without prior surgery, and documented focal neurologic deficit or abnormal findings on neurologic exam (i.e., motor weakness, dermatomal sensory loss, or significant reflex abnormality).
  - ii. Pain/radiculopathy in adults not improving despite 6 weeks of conservative care which includes PT and appropriate pharmacologic intervention.
  - iii. Clinical suspicion of primary cervical spine metastatic process with symptoms and/or signs suggesting involvement of the spine, spinal cord, meninges or positive bone scan in systemic processes.
  - iv. Known diagnosis of a tumor with suspicion of metastases to the cervical spine, meninges, or spinal cord.
  - v. Further investigation of spinal abnormality of unknown or uncertain cause seen on plain film.
  - vi. Clinical suspicion of cervical or thoracic myelopathy or cervical or thoracic nerve root compression with new onset of extremity weakness, bladder/bowel symptoms, ataxia, spasticity, spinal level sensory loss, etc.
  - vii. Signs/symptoms suggestive of spinal stenosis and the patient would like to consider surgical intervention (signs/symptoms include weakness, spasticity, clonus, muscle wasting, generalized sensory loss, nerve root compression, hyperactive reflexes, or suggestive radiographic findings).
  - viii. Suspected spinal cord infarct or spinal cord tumor.
  - ix. In children suspicion of congenital or acquired abnormalities of spine and/or spinal cord.
  - x. To delineate the presence or absence of demyelinating disease.

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## 5. Lumbar Spine:

- a. Acute: See General CRDAMC Guidelines or Musculoskeletal Screening and Referral Tools (SRTs) cited in references.
  - b. Chronic: At least 6 weeks of conservative treatment to include physical therapy, and any of the following:
    - i. Suspected radiculopathy with:
      - 1. Leg pain greater than back pain.
      - 2. Motor weakness or sensory loss in a radicular distribution.
    - ii. EMG/NCS consistent with radiculopathy and the patient would like to consider surgical intervention.
    - iii. Suspicion of substantial spinal stenosis on another imaging procedure and the patient would like to consider surgical intervention.
    - iv. Objective worsening of neurological status by physical exam or electrodiagnostic testing.
    - v. Patient is considered a candidate for spine surgery and one of the following:
      - 1. Progressive changes in objective neurological findings.
      - 2. At least 1 year since last lumbar MRI (without objective change in neurological signs).
    - vi. Prior lumbar surgery and one of the following:
      - 1. Progressive changes in objective neurological or physiological findings.
      - 2. At least one year since last MRI.
      - 3. No retained hardware from previous surgery.
    - vii. Three months of continued pain after a compression fracture.
  - iii. Suspected primary malignant or metastatic bone or soft tissue tumor by preliminary imaging or significant abnormality on physical examination. \*Contact orthopedics immediately.
  - iv. Suspected infection such as osteomyelitis, septic arthritis, or abscess.
  - v. Indication not listed: provide clinical justification.
- d. MRI Not Medically Necessary:
- i. Patient is not interested in surgical intervention.
  - ii. Routine evaluation of scoliosis.
  - iii. Acute fracture.

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