AmeriHealth Caritas Louisiana

National Imaging Associates, Inc.*	
Clinical guidelines **THORACIC SPINE MRI**	**Original Date: September 1997**
CPT Codes: 72146, 72147, 72157	**Last Revised Date: May 2020**
Guideline Number: NIA_CG_042	**Implementation Date: ~~January 2021~~TBD**

GENERAL INFORMATION:

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. All prior relevant imaging results, and the reason that alternative imaging (gold standard, protocol, contrast, etc.) cannot be performed must be included in the documentation submitted.

INDICATIONS FOR THORACIC SPINE MRI:

For evaluation of back pain with any of the following (Allegri, 2016; ANSCNS, 2014; Jarvik, 2015)

- **With new or worsening objective neurologic deficits on exam**
- **Failure of conservative treatment* for at least six (6) weeks within the last six (6) months.**
- **With progression or worsening of symptoms during the course of conservative treatment*.**
- **With an abnormal electromyography (EMG) or nerve conduction study (if performed) indicating a thoracic radiculopathy. (EMG is not recommended to determine the cause of axial lumbar, thoracic, or cervical spine pain (NASS, 2013)).**

~~For evaluation of known or suspected multiple sclerosis (MS)~~

- ~~Suspected MS with new or changing symptoms consistent with thoracic spinal cord disease (ie, transverse myelitis, progressive myelopathy)~~
- ~~Follow up of known Multiple Sclerosis with known thoracic involvement (CMSC, 2018)~~
- ~~Follow up to the initiation or change in medication for patient with known Multiple Sclerosis with thoracic involvement (CMSC, 2018)~~
- ~~Cervical and/or Thoracic MRI for evaluation of suspected multiple sclerosis (MS) when Brain MRI does not fulfill diagnostic criteria (Filippi, 2016)~~

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- ~~Cervical and/or Thoracic MRI for evaluation of neuromyelitis optica spectrum disorders (recurrent or bilateral optic neuritis; recurrent transverse myelitis) (Wingerchuk, 2015)~~

For evaluation of neurologic deficits

- With any of the following new neurological deficits: extremity ~~myotomal~~**muscular** weakness **(Acharya, 2019)**; pathologic (e.g., Babinski) or abnormal reflexes**;** or abnormal sensory changes along a particular dermatome (nerve distribution) as documented on physical exam; evidence of Cauda Equina Syndrome; bowel or bladder dysfunction; spasticity, sensory or motor level (Stolper, 2017).

For evaluation of suspected myelopathy

(ACR, 2015; Behrbalk, 2013; Hou, 2016)

- **Does not require conservative care**
- **Concurrent cervical/thoracic imaging not recommended**
- **Progressive symptoms including hand clumsiness, worsening handwriting, difficulty with**
- **With any of the following new neurological deficits: extremity muscular weakness; pathologic (e.g. Babinski, Hoffman's) or abnormal reflexes; or abnormal sensory changes along a particular dermatome (nerve distribution) as documented on physical exam; bowel or bladder dysfunction; spasticity, sensory, or motor level.**
- ~~grasping and holding objects, diffuse numbness in the hands, pins and needles sensation, increasing difficulty with balance and ambulation~~
- ~~Signs: unsteadiness, broad-based gait, increased muscle tone, weakness and wasting of the upper and lower limbs; diminished sensation to light touch, temperature, proprioception, vibration; limb hyperreflexia and pathologic reflexes (upper or lower extremity); bowel and bladder dysfunction in more severe cases.~~
- ~~Progressive symptoms including lower extremity weakness, numbness in the legs, increasing difficulty with balance and ambulation (Signs: unsteadiness, broad-based gait, increased muscle tone, pins and needles sensation, weakness and wasting of the lower limbs, and diminished sensation to light touch, temperature, proprioception, and vibration; limb hyperreflexia and pathologic reflexes; bowel and bladder dysfunction in more severe cases).~~

For evaluation of known or suspected multiple sclerosis (MS)

- **Suspected MS with new or changing symptoms consistent with thoracic spinal cord disease (i.e., transverse myelitis, progressive myelopathy)**
- **Follow up of known Multiple Sclerosis with known thoracic involvement (CMSC, 2018)**
- **Follow up to the initiation or change in medication for patient with known Multiple Sclerosis with thoracic involvement (CMSC, 2018)**
- **Cervical and/or Thoracic MRI for evaluation of suspected multiple sclerosis (MS) when Brain MRI does not fulfill diagnostic criteria (Filippi, 2016)**
- **Cervical and/or Thoracic MRI for evaluation of neuromyelitis optica spectrum disorders (recurrent or bilateral optic neuritis; recurrent transverse myelitis) (Wingerchuk, 2015)**

~~For evaluation of chronic back pain with any of the following~~

~~(Allegri, 2016; Jarvik, 2015)~~

- ~~With new or worsening objective neurologic deficits on exam~~
- ~~Failure of conservative treatment* for at least six (6) weeks within the last six (6) months.~~
- ~~With progression or worsening of symptoms during the course of conservative treatment*.~~
- ~~With an abnormal electromyography (EMG) or nerve conduction study (if performed) indicating a thoracic radiculopathy. (EMG is not recommended to determine the cause of axial lumbar, thoracic or cervical spine pain (NASS, 2013)).~~

~~For evaluation of new onset of back pain~~
~~(Allegri, 2016; ANSCNS, 2014)~~

- ~~With new or worsening objective neurologic deficits on exam~~
- ~~Failure of conservative treatment*for at least six (6) weeks within the last six (6) months.~~
- ~~With progression or worsening of symptoms during the course of conservative treatment*.~~
- ~~With an abnormal electromyography (EMG) or nerve conduction study (if performed) indicating a thoracic radiculopathy. (EMG is not recommended to determine the cause of axial lumbar, thoracic or cervical spine pain (NASS, 2013)).~~

For evaluation of trauma or acute injury

- Presents with any of the following neurological deficits: muscle weakness, abnormal reflexes, and/or sensory changes along a particular dermatome (nerve distribution).
- With progression or worsening of symptoms during the course of conservative treatment*.
- **History of underlying spinal abnormalities (i.e., ankylosing spondylitis) (Koivikko, 2008)**

~~Pars defect (spondylolysis) or spondylisthesis~~

- ~~Pars defect (spondylolysis) or spondylisthesis in adults when Flexion/Extension x-rays show instability.~~
- ~~Pars defect (spondylolysis with spondylisthesis) on plain films in pediatric population (<18 yr) (flexion extension instability not required).~~

~~**NOTE**: Initial imaging (x-ray, or planar bone scan without SPECT; Bone scan with SPECT is superior to MRI and CT in the detection of pars intrarticularis pathology including spondylolysis) (Matesan, 2016).~~

Ossification Posterior Longitudinal Ligament (OPLL) (Choi, 2011)

- ~~Most common in cervical spine (rare but more severe in thoracic spine)~~
- **CT to evaluate the calcification and MR for evaluation of cord.**
    - **Both CT and MRI would be approvable if surgery is planned as signal changes in the cord would suggest a poorer prognosis after surgery.**

For evaluation of known or new compression fractures with worsening back pain (ACR, 2018)

- With history of malignancy.
- With an associated new focal neurologic deficit

- Prior to a planned surgery/intervention or if the results of the MRI will change management.
- To aid in differentiation of benign osteoperotic fractures from metastatic disease
  - A follow up MRI in 6-8 weeks after initial MRI when initial imaging cannot decipher benign osteoperotic fracture from metastatic disease (Kumar, 2016)
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For evaluation of known tumor, cancer, or evidence of metastasis with any of the following (MRI is usually the preferred study, but CT may help characterize solitary indeterminate lesions).
(Kim, 2012)

- For staging of known tumor.
- For follow-up evaluation of patient undergoing active cancer treatment.
- Presents with new signs or symptoms (e.g. physical, laboratory and/or imaging findings) of new tumor or change in tumor
- With evidence of metastasis on bone scan or previous imaging study.
- New or increasing non-traumatic thoracic back pain or radiculopathy or back that pain occurs at night, and wakes the patient from sleep with known active cancer and a tumor that tends to metastasize to the spine (ACR, 2018; Ziu, 2019). ~~radiculopathy with known active cancer and a tumor that tends to metastasize to the spine (ACR, 2018; Ziu, 2019).~~
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For evaluation of suspected tumor
(ACR, 2015)

- Prior abnormal or indeterminate imaging that requires further clarification.

Indication for combination studies for the initial pre-therapy staging of cancer, OR active monitoring for recurrence as clinically indicated, OR evaluation of suspected metastases:

- ≤ 5 concurrent studies to include CT or MRI of any of the following areas as appropriate depending on the cancer: Neck, Abdomen, Pelvis, Chest, Brain, Cervical Spine, Thoracic Spine or Lumbar Spine.

For evaluation of known or suspected infection, abscess, or inflammatory disease
(ACR, 2015; Lerner, 2018)

- Infection
  - ~~Infection:~~
  - ~~Most common site is the lumbar spine (58%), followed by the thoracic spine (30%) and the cervical spine (11%)~~
  - As evidenced by signs and/or symptoms, laboratory (~~-~~i.e. abnormal white blood cell count, ESR and/or CRP) or prior imaging findings (Bond, 2016).
  - ~~High risk populations (indwelling hardware, history of endocarditis, IVDA, recent procedures) with appropriate signs/symptoms.~~
  - Follow up imaging of infection

- With worsening symptoms/laboratory values (i.e. white blood cell count, ESR/CRP) or radiographic findings (Berbari, 2015)

- ~~As evidenced by signs/symptoms, laboratory or prior imaging findings.~~

For evaluation of spine abnormalities related to immune system suppression, e.g., HIV, chemotherapy, leukemia, or lymphoma
(ACR, 2015)

- As evidenced by signs/symptoms, laboratory, or prior imaging findings.

As part of initial post-operative / procedural evaluation ("CT best examination to assess for hardware complication, extent of fusion" (ACR, 2015; Rao, 2018) **and MRI for cord, nerve root compression, disc pathology or post-op infection):**

- A follow-up study may be needed to help evaluate a patient's progress after treatment, procedure, intervention, or surgery in the last 6 months. Documentation requires a medical reason that clearly indicates why additional imaging is needed for the type and area(s) requested.
- Changing neurologic status post-operatively.
- Surgical infection as evidenced by signs/symptoms, laboratory, or prior imaging findings.
- Residual or recurrent symptoms with any of the following neurological deficits: Lower extremity weakness, objective sensory loss, or abnormal reflexes (Rao, 2018).

Other Indications for a Thoracic Spine MRI

- For preoperative evaluation (Cohen, 2012)
- Prior to spinal cord stimulator to exclude canal stenosis if no prior MRI imaging of the thoracic spine has been done recently (Carayannopoulos, 2019)~~)~~.
- Suspected cord compression with any of the following neurological deficits: extremity weakness; sensory deficits, abnormal gait; abnormal reflexes; spinal level; bowel or bladder incontinence.
- Tethered cord, or spinal dysraphism (known or suspected) based on preliminary imaging, neurological exam, and/or ~~high risk~~high-risk cutaneous stigmata (AANS, 2019; Milhorat, 2009~~; NIH~~).
- Ankylosing Spondylitis/Spondyloarthropathies with non-diagnostic or indeterminate x-ray and rheumatology workup
- Known Arnold-Chiari syndrome (Milhorat, 2009; Strahle, 2015).
    - Chiari I malformation without syrinx or hydrocephalus, follow-up imaging after initial diagnosis for new or changing signs/symptoms or exam findings (Hitson, 2015)
- Congenital abnormalities (Trenga, 2016):
    - In the presence of neurologic deficit, progressive spinal deformity, or for preoperative planning (Trenga, 2016)
    - Back pain and vertebral anomalies (hemivertebrae, hypoplasia, agenesis, butterfly, segmentation defect, bars, or congenital wedging) in a child on preliminary imaging.
    - Scoliosis with any of the following:

        - Progressive spinal deformity;
        - Neurologic deficit;
        - Early onset;
        - Atypical curve (e.g., short segment, >30' kyphosis, left thoracic curve, associated organ anomalies);
        - Pre-operative planning; OR
        - When office notes clearly document how imaging will change management
- Syrinx or syringomyelia (known or suspected) **(Magge, 2011)**:
    - With neurologic findings and/or predisposing conditions (e.g. Chiari malformation, prior trauma, neoplasm, arachnoiditis, severe spondylosis (Timpone, 2015)),
    - To further characterize a suspicious abnormality seen on prior imaging.
    - Known syrinx with worsening symptoms.
- ~~CSF leak highly suspected and supported by patient history and/or physical exam findings.~~
- For pediatric population (ACR, 2016)
    - Red flags that prompt imaging should ~~include the presence of constant pain, night pain, and~~ **include one or more of the following: presence of constant pain, night pain, and radicular pain lasting for 4 weeks or more and initial radiographs preformed (ACR, 2016).**
    - ~~radicular pain lasting for 4 weeks or more.~~
    - Back pain associated with suspected inflammation, infection, or malignancy

COMBINATION STUDIES WITH THORACIC SPINE MRI:

Cervical/Thoracic/Lumbar MRIs

- Any combination of these for scoliosis survey in infant/child with congenital scoliosis or under the age of 10 (**ACR, 2018;** Strahle, 2015~~; ACR, 2018~~).
- Any combination of these for spinal survey in patient with metastases.
- For evaluation of spinal abnormalities associated with Arnold-Chiari Malformation. (C/T/L spine due to association with tethered cord and syringomyelia) (Milhorat, 2009; Strahle, 2015).
- **Suspected Leptomeningeal carcinomatosis (LC) (Shah, 2011)**
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- Tethered cord, or spinal dysraphism (known or suspected) based on preliminary imaging, neurological exam, and/or cutaneous stigmata (AANS, 2019; Milhorat, 2009~~; NIH~~), when anesthesia required for imaging
- Drop metastasis from brain or spine (imaging also includes brain).
- Tumor evaluation and monitoring in neurocutaneous syndromes - See Background
- **CSF leak highly suspected and supported by patient history and/or physical exam findings.**

- **Cervical and Thoracic Combination MRI**~~Cervical and thoracic spine~~

- Transverse Myelitis- with appropriate clinical symptoms (i.e. bilateral weakness, sensory disturbance, and autonomic dysfunction which typically evolve over hours or days (Goh, 2011); elevated protein on cerebrospinal fluid (CSF) analysis)

BACKGROUND:
Magnetic resonance imaging (MRI) produces high quality multiplanar images of organs and structures within the body without using ionizing radiation. It is used for evaluation, assessment of severity, and follow-up of diseases of the spine and is the preferred modality for imaging intervertebral disc degeneration. High contrast resolution (soft tissue contrast) and multiplanar imaging (sagittal as well as axial planes) are helpful in the evaluation of possible disc herniation and detecting nerve root compression. MRI is one of the most useful techniques to evaluate spine infection and is also used to evaluate tumors, cancer, and immune system suppression.

OVERVIEW:

Ankylosing Spondylitis/Spondyloarthropathies is a cause of back or sacroiliac pain of insidious onset (usually > 3 month), associated with morning stiffness not relieved with rest (usually age at onset < 40). It is associated with any of the following (Akgul, 2011; Bennett, 2010; Ostergaard, 2012; Seiper, 2014):

- Sedimentation rate and/or C-reactive protein (not an essential criteria).
- HLA B27 (not an essential criteria).
- Non-diagnostic or indeterminate x-ray
- Personal or family history of sacroilitis, peripheral inflammatory arthritis, and/or inflammatory bowel disease.

***Conservative Therapy:** (Spine) should include a multimodality approach consisting of a **combination of active and inactive components**. Inactive components, such as rest, ice, heat, modified activities, medical devices, acupuncture and/or stimulators, medications, injections (epidural, facet, bursal, and/or joint, not including trigger point), and diathermy can be utilized. Active modalities may consist of physical therapy, a physician supervised home exercise program**, and/or osteopathic manipulative medicine (OMT) or chiropractic care.

****Home Exercise Program - (HEP)/Therapy** – the following elements are required to meet guidelines for completion of conservative therapy (ACR, 2015; Last, 2009):

- Information provided on exercise prescription/plan AND
- Follow up with member with documentation provided regarding lack of improvement (failed) after completion of HEP (after suitable 6 week period), or inability to complete HEP due to physical reason- i.e. increased pain, inability to physically perform exercises. (Patient inconvenience or noncompliance without explanation does not constitute "inability to complete" HEP).

- Dates and duration of failed PT, physician supervised HEP, or chiropractic treatment should be documented in the original office notes or an addendum to the notes.

Infection, Abscess, or Inflammatory disease

- **Most common site is the lumbar spine (58%), followed by the thoracic spine (30%) and the cervical spine (11%) (Graeber, 2019)**
- **High risk populations (indwelling hardware, history of endocarditis, IVDA, recent procedures) with appropriate signs/symptoms**

MRI and Cutaneous Stigmata (Dias, 2015)

TABLE 1 Risk Stratification for Various Cutaneous Markers

High Risk	Intermediate Risk	Low Risk
Hypertrichosis	Capillary malformations (also referred to as NFS or salmon patch when pink and poorly defined, or PWS when darker red and well defined)	Coccygeal dimple
Infantile hemangioma		Light hair
Atretic meningocele		Isolated café au lait spots
DST		Mongolian spots
Subcutaneous lipoma		Hypo- and hypermelanotic macules or papules
Caudal appendage		Deviated or forked gluteal cleft
Segmental hemangiomas in association with LUMBAR syndrome		Nonmidline lesions

LUMBAR, lower body hemangioma and other cutaneous defects, urogenital abnormalities, ulcerations, myelopathy, bony defects, anorectal malformations, arterial anomalies, and renal anomalies.

Myelopathy: Symptom severity varies and a high index of suspicion is essential for making the proper diagnosis in early cases. Symptoms of pain and radiculopathy may not be present. The natural history of myelopathy is characterized by neurological deterioration. The most frequently encountered symptom is gait abnormality (86%) followed by increased muscular reflexes (79.1%), pathological reflexes (65.1%), paresthesia of upper limb (69.8%), and pain (67.4%) (Vitzthum, 2007).

Ossification Posterior Longitudinal Ligament (OPLL) (Choi, 2011) - Most common in cervical spine (rare but more severe in thoracic spine)

Tethered spinal cord syndrome - a neurological disorder caused by tissue attachments that limit the movement of the spinal cord within the spinal column. Although this condition is rare, it can continue undiagnosed into adulthood. The primary cause is mylelomeningocele and lipomyelomeningocele; the following are other associations that vary in severity of symptoms and treatment.

- Dermal sinus tract (a rare congenital deformity)
- Diastematomyelia (split spinal cord)
- Lipoma
- Tumor
- Thickened/tight filum terminale
- History of spine trauma/surgery
- Arnold Chiari Malformation

Magnetic resonance imaging (MRI) can display the low level of the spinal cord and a thickened filum terminale, the thread-like extension of the spinal cord in the lower back. Treatment depends upon the underlying cause of the tethering. If the only abnormality is a thickened, shortened filum then limited surgical treatment may suffice.

MRI and Spinal Infections – Infection of the spine is not easy to differentiate from other spinal disorders, e.g., degenerative disease, spinal neoplasms, and noninfectious inflammatory lesions. Infections may affect different parts of the spine, e.g., vertebrae, intervertebral discs and paraspinal tissues. Imaging is important to obtain early diagnose and treatment to avoid permanent neurologic deficits. MRI is the preferred imaging technique to evaluate infections of the spine. With its high contrast resolution and direct multiplanar imaging, it has the ability to detect and delineate infective lesions irrespective of their spinal location.

Back Pain with Cancer History - Radiographic (x-ray) examination should be performed in cases of back pain when a patient has a cancer history, but without known active cancer or a tumor that tends to metastasize to the spine. This can make a diagnosis in many cases. This may occasionally allow for selection of bone scan in lieu of MRI in some cases. When radiographs do not answer the clinical question, then MRI may be appropriate after a consideration of conservative care.

Neoplasms causing VCF (vertebral compression fractures) include: primary bone neoplasms, such as hemangioma or giant cell tumors, and tumor-like conditions causing bony and cellular remodeling, such as aneurysmal bone cysts, or Paget's disease (osteitis deformans); infiltrative neoplasms including and not limited to multiple myeloma and lymphoma, and metastatic neoplasms (ACR, 2018).

Most common spine metastasis involving primary metastasis originate from the following tumors in descending order: breast (21%), lung (19%), prostate (7.5%), renal (5%), gastrointestinal (4.5%), and thyroid (2.5%). While all tumor can seed to the spine, the cancers mentioned above metastasize to the spinal column early in the disease process (Ziu, 2019).

CAUDA EQUINA SYNDROME:

- Symptoms include severe back pain or sciatica along with one or more of the following:
    - Saddle anesthesia - loss of sensation restricted to the area of the buttocks, perineum, and inner surfaces of the thighs (areas that would sit on a saddle).

- Recent bladder/bowel dysfunction (as listed above)
- Achilles reflex absent on both sides
- Sexual dysfunction that can come on suddenly
- Absent anal reflex and bulbocavernosus reflex

Spinal MRI and Neuromyelitis optica spectrum disorders (NMOSD) - NMOSD are inflammatory disorders of the central nervous system characterized by severe, immune-mediated demyelination and axonal damage predominantly affecting the optic nerves and spinal cord, but also the brain and brainstem. NMOSD can be distinguished from multiple sclerosis and other inflammatory disorders by the presence of the aquaporin-4 (AQP4) antibody. Features of NMOSD include attacks of bilateral or sequential optic neuritis acute transverse myelitis and the area postrema syndrome (with intractable hiccups or nausea and vomiting). The evaluation of suspected NMOSD entails brain and spinal cord neuroimaging. In contrast to MS (in which spinal cord involvement tends to be incomplete and asymmetric), NMOSD have a longer extent of spinal cord demyelination generally involving three or more vertebral segments.

POLICY HISTORY:
Review Date: June 2019
Review Summary:
Added:

- new or worsening objective neuro deficits for chronic and acute back pain
- CSF leak
- last 6 months for allowable post op f/u period and removed EMG comment
- red flags specifically for peds back pain and pain related to malignancy, infection, inflammation
- new sections: pars defect; compression fractures; congenital abnormalities including section on scoliosis and vertebral anomalies in children w/back pain;
- For combination studies cervical/thoracic/lumbar added drop metastasis, tumor evaluation for neurocutaneous syndromes, and abnormalities associated w/Arnold Chiari, as well as separate indication for tethered cord or spinal dysraphism
- Myelopathy
- Pre op for spinal cord stimulator
- Evaluation of MS including NMO disorders and recurrent transverse myelitis
- Back pain in cancer patients with known active cancer in tumors that tend to metastasize
-
- Expanded on tethered cord in Other Indications for Imaging and added content on sacral dimple

Review Date: May 2020
Review Summary:

- Added

- **For evaluation of neurologic deficits when new deficits are present**
- **Removed pars defect section**
- **Added ankylosing spondylitis for evaluation of trauma/acute injury**
- **Added follow up of osteoporotic fracture from metastatic disease**
- **Added transverse myelitis**
- **Modified Initial imaging of new or increasing non-traumatic back pain or radiculopathy or back pain that occurs at night and wakes the patient from sleep with known active cancer and a tumor that tends to metastasize to the spine**
- **Added Imaging of Ossification of the Posterior Longitudinal Ligament (OPPL)**
- **Added Osteopathic Manipulative medicine to conservative care therapy**

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