AmeriHealth Caritas Louisiana

National Imaging Associates, Inc.*	
Clinical guidelines **LUMBAR SPINE MRI**	**Original Date: September 1997**
CPT Codes: 72148, 72149, 72158, +0698T	**Last Revised Date: ~~April~~ March 2021~~1~~**
Guideline Number: NIA_CG_044	**Implementation Date: January 2023~~2~~**

INDICATIONS FOR LUMBAR SPINE MRI

[+]If there is a combination request* for an overlapping body part, either requested at the same time or sequentially (within the past 3 months) the results of the prior study should be:

- **Inconclusive or show a need for additional or follow up imaging evaluation OR**
- **The office notes should clearly document an indication why overlapping imaging is needed and how it will change management for the patient.**

(*Unless approvable in the combination section as noted in the guidelines)

~~**(Combination requests at end of the document)**~~

For evaluation of neurologic deficits[1-4]

~~(Acharya, 2019; ACR, 2013; NASS, 2010; Stolper, 2017)~~

- With any of the following new neurological deficits documented on physical exam
  - Extremity muscular weakness **(and not likely caused by plexopathy, or peripheral neuropathy)**[5, 6]
  - Pathologic or abnormal reflexes
  - Absent/decreased sensory changes along a particular lumbar dermatome (nerve distribution): pin prick, touch, vibration, proprioception or temperature
  - Lower extremity increased muscle tone/spasticity
  - New onset bowel or bladder dysfunction (e.g., retention or incontinence)**- not related to an inherent bowel or bladder process**
  - Gait abnormalities (see Table 1 for more details)
  - New onset foot drop **(Not related to a peripheral nerve injury, e.g., peroneal nerve)**
- Cauda Equina Syndrome as evidence by severe back pain/sciatica along with one of the defined symptoms (see ~~Background~~**Overview** section)
- ~~

For evaluation of back pain with any of the following[7-16]

* National Imaging Associates, Inc. (NIA) is a subsidiary of Magellan Healthcare, Inc.

~~(AAFP, 2012; ACEP, 2014; ACR, 2015; Allegri, 2016; Ammendolia, 2015; Jarvik, 2015; Last, 2009; NASS, 2013; Quaseem, 2017; Schneider, 2019)~~

- With new or worsening objective ~~neurologic deficits~~**neurologic deficits** on exam, as above
- Failure of conservative treatment* for at least six (6) weeks within the last six (6) months[16]
- 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 lumbar radiculopathy. (EMG is not recommended to determine the cause of axial lumbar, thoracic, or cervical spine pain. ~~(NASS, 2013)~~)[15]~~.~~
- Isolated back pain in pediatric population[17] ~~(ACR, 2016)~~ – conservative care not required if red flags present ~~(see combination request below cervical and thoracic spine may also be indicated)~~
    - Red flags that prompt imaging should include the presence of: age 5 or younger, constant pain, pain lasting >4 weeks, abnormal neurologic examination, early morning stiffness and/or gelling; night pain that prevents or disrupts sleep; radicular pain; fever; weight loss; malaise; postural changes (e.g., kyphosis or scoliosis); and limp (or refusal to walk in a younger child <5yo) AND initial radiographs have been performed[18, 19] ~~(Bernstein, 2007; Feldman, 2006)~~
    - ~~Back pain associated with suspected inflammation, infection, or malignancy~~

As part of initial pre-operative / post-operative / procedural evaluation ("CT best examination to assess for hardware complication, extent of fusion"[16, 20] ~~(ACR, 2015; Rao, 2018)~~ and MRI for cord, nerve root compression, disc pathology or post-op infection)

- For preoperative evaluation/planning
- CSF leak highly suspected and supported by patient history and/or physical exam findings (leak (known or suspected spontaneous (idiopathic) intracranial hypotension (SIH), post lumbar puncture headache, post spinal surgery headache, orthostatic headache, rhinorrhea or otorrhea, or cerebrospinal-venous fistula))
- 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 (routine surveillance post-op not indicated without symptoms)
- ~~Changing neurologic status post-operatively~~
- Surgical infection as evidenced by signs/symptoms, laboratory, or prior imaging findings
- ~~Residual~~ **N**~~o~~**r** ~~n~~ew **or changing** neurological deficits or symptoms **post-operatively** [20, 21] ~~(Rao, 2018)~~ - see **neurological deficit** section above
- When combo requests **(see above statement[+])** are submitted (i.e., MRI and CT of the spine), the office notes should clearly document the need for both studies to be done simultaneously, i.e., the need for both soft tissue and bony anatomy is required[22] ~~(Fisher, 2013)~~
    - Combination requests where both lumbar spine CT and MRI lumbar spine are both approvable (not an all-inclusive list)
        - Pathologic or complex fractures
        - Malignant process of spine with both bony and soft tissue involvement

- Clearly documented indication for bony and soft tissue abnormality where assessment will change management for the patient

For evaluation of trauma or acute injury[23] ~~(ACR, 2018)~~

- Presents with any of the **neurological deficits** as above~~.~~
- With progression or worsening of symptoms during the course of conservative treatment*
- History of underlying spinal abnormalities (i.e., ankylosing spondylitis or diffuse idiopathic skeletal hyperostosis) **(Both MRI and CT would be approvable)** ~~both MRI and CT are approvable~~[24] ~~(Koivikko, 2008)~~
- When the patient is clinically unevaluable or there are preliminary imaging findings (x-ray or CT) needing further evaluation

("MRI and CT provide complementary information. When indicated it is appropriate to perform both examinations") ~~(ACR, 2018)~~.[23]

Pars defect (spondylolysis) or spondylolisthesis

- Pars defect (spondylolysis) or spondylolisthesis in adults when Flexion/Extension x-rays show instability
- Clinically suspected Pars defect (spondylolysis) which is not seen on plain films in pediatric population (<18 yr) (flexion extension instability not required) and imaging would change treatment[25-27] ~~(Cohen, 2005; Kobayashi, 2013; Rush, 2015)~~

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)~~.[28]

For evaluation of known or new compression fractures with worsening back pain[29]
~~(ACR, 2018)~~

- With history of malignancy
    - To aid in differentiation of benign osteoporotic fractures from metastatic disease
        - A follow up MRI in 6-8 weeks after initial MRI when initial imaging cannot decipher benign osteoporotic fracture from metastatic disease
- With an associated new focal neurologic deficit as above
- Prior to a planned surgery/intervention or if the results of the MRI will change management.

For evaluation of tumor, cancer, or metastasis with any of the following:
(MRI is usually the preferred study, but CT may be needed to further characterize solitary indeterminate lesions seen on MRI)[30-32]
~~(Kim, 2012; McDonald, 2019; Roberts, 2010)~~

- **Primary tumor**
    - Initial staging or re-staging of a known primary spinal tumor[33] ~~(NCCN 2021)~~

- Known primary tumor with new signs or symptoms (e.g., new or increasing nontraumatic pain, physical, laboratory, and/or imaging findings)
- With an associated new focal **neurologic deficit** as above[34] ~~(Alexandru, 2012)~~

- **Metastatic tumor**
  - ~~With evidence of metastasis on bone scan needing further clarification OR inconclusive findings on a prior imaging exam~~
  - ~~Known malignancy with new signs or symptoms (e.g., new or increasing nontraumatic pain, physical, laboratory, and/or imaging findings) in a tumor that tends to metastasize to the spine~~

With an associated new focal neurologic deficit[34] ~~(Alexandru, 2012)~~

  - **Known malignancy with new signs or symptoms (e.g., new or increasing nontraumatic pain, radiculopathy or ~~neck~~back pain that occurs at night and wakes the patient from sleep with known active cancer, physical, laboratory, and/or imaging findings) in a tumor that tends to metastasize to the** ~~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[35, 36] ~~(ACR, 2018; Ziu, 2020)~~

- **For evaluation of inconclusive/indeterminate finding on prior imaging that requires further clarification:**
  - One follow-up exam to ensure no suspicious change has occurred in prior imaging finding. No further surveillance unless specified as highly suspicious or change was found on last follow-up exam[36] ~~(ACR, 2018)~~

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[37, 38] ~~(ACR, 2015; Lerner, 2018)~~

- **Infection**
  - As evidenced by signs and/or symptoms, laboratory (i.e., abnormal white blood cell count, ESR and/or CRP) or prior imaging findings[39] ~~(Bond, 2016)~~
  - Follow-up imaging of infection
    - With worsening symptoms/laboratory values (i.e., white blood cell count, ESR/CRP) or radiographic findings[40] ~~(Berbari, 2015)~~
- **Spondyloarthropathies**
  - Ankylosing Spondylitis/Spondyloarthropathies with non-diagnostic or indeterminate x-ray and rheumatology workup

For evaluation of spine abnormalities related to immune system suppression, e.g., HIV, chemotherapy, leukemia, or lymphoma[38]
~~(ACR, 2018)~~

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

Other Indications for a Lumbar Spine MRI
(Note: See **combination requests**, below, for initial advanced imaging assessment and pre-operatively)

- Tethered cord, or spinal dysraphism (known or suspected) based on preliminary imaging, neurological exam, and/or high-risk cutaneous stigmata[41-43] ~~(AANS, 2019; Duz, 2008; Milhorat, 2009)~~
- Known anorectal malformations[44, 45] ~~(Kim, 2010a; Morimoto, 2003)~~
- Suspicious sacral dimple (those that are deep, larger than 0.5 cm, located within the superior portion of the gluteal crease or above the gluteal crease, multiple dimples, or associated with other cutaneous markers)[46] ~~(D'Alessandro, 2009)~~ or duplicated or deviated gluteal cleft[47] ~~(Zywicke, 2011)~~
    - in patients ≤3 months should have ultrasound
- Toe walking in a child when associated with upper motor neuron signs, including hyperreflexia, spasticity; or orthopedic deformity with concern for spinal cord pathology (e.g., pes cavus, clawed toes, leg or foot length deformity (excluding tight heel cords))
- Known Chiari II (Arnold-Chiari syndrome), III, or IV malformation.
- For follow-up/repeat evaluation of Arnold-Chiari I with new signs or symptoms suggesting recurrent spinal cord tethering (For initial diagnosis see below)
- **Suspected neuroinflammatory Conditions/Diseases (e.g., sarcoidosis, Behcet's)**
    - **After detailed neurological exam and basic testing completed**

COMBINATION OF STUDIES WITH LUMBAR SPINE MRI

Any combination of Cervical and/or Thoracic and/or Lumbar MRIs
Note: ~~(~~These body regions might be evaluated separately or in combination as documented in the clinical notes by physical examination findings (e.g., localization to a particular segment of the spinal cord), patient history, and other available information, including prior imaging.

Exception- Indications for combination studies[48, 49]: Are approved indications as noted below and being performed in children who will need anesthesia for the procedure ~~)~~

- **Any combination of these studies for:**
    - **Survey/complete initial assessment of infant/child with congenital scoliosis or juvenile idiopathic scoliosis under the age of 10[50-52] (e.g., congenital scoliosis, idiopathic scoliosis, scoliosis with vertebral anomalies)**

- In the presence of neurological deficit, progressive spinal deformity, or for preoperative planning[53]
- Back pain with known vertebral anomalies (hemivertebrae, hypoplasia, agenesis, butterfly, segmentation defect, bars, or congenital wedging) in a child on preliminary imaging
- Scoliosis with any of the following[54]:
  - Progressive spinal deformity;
  - Neurologic deficit (new or unexplained);
  - 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

- Arnold-Chiari malformations[55, 56]
  - Arnold-Chiari I
    - For evaluation of spinal abnormalities associated with initial diagnosis of Arnold-Chiari Malformation. (C/T/L spine due to association with tethered cord and syringomyelia), and initial imaging has not been completed[42, 50]
  - Arnold-Chiari II-IV - For initial evaluation and follow-up as appropriate
    - Usually associated with open and closed spinal dysraphism, particularly meningomyelocele)
- Tethered cord, or spinal dysraphism (known or suspected) based on preliminary imaging, neurological exam, and/or high-risk cutaneous stigmata,[41-43] ~~40-42~~ when anesthesia required for imaging[57]~~54~~ (e.g., meningomyelocele, lipomeningomyelocele, diastematomyelia, fatty/thickened filum terminale, and other spinal cord malformations)
- Oncological Applications (e.g., primary nervous system, metastatic)
  - Drop metastasis from brain or spine (imaging also includes brain)- see **Overview**
  - Suspected leptomeningeal carcinomatosis (LC)[58] ~~Suspected leptomeningeal carcinomatosis (LC)[58]~~ - see ~~background~~**Overview**~~(Shah, 2011)~~
  - Any combination of these for spinal survey in patient with metastases
  - Tumor evaluation and monitoring in neurocutaneous syndromes - See ~~Background~~**Overview**
- CSF leak highly suspected and supported by patient history and/or physical exam findings (leak (known or suspected spontaneous (idiopathic) intracranial hypotension (SIH), post lumbar puncture headache, post spinal surgery headache, orthostatic headache, rhinorrhea or otorrhea, or cerebrospinal-venous fistula))
- ~~Indications for combination studies[43-45]: (ACR, 2017, 2019) - For approved indications as noted below and being performed in a child under 8 years of age who will need anesthesia for the procedure~~

~~Any combination of Cervical and/or Thoracic and/or Lumbar MRIs~~

- Any combination of these studies for:
  - Scoliosis survey in infant/child with congenital scoliosis or juvenile idiopathic scoliosis under the age of 10[46-48] (ACR, 2018; SRS, 2019; Strahle, 2015)
  - In the presence of neurological deficit, progressive spinal deformity, or for preoperative planning[49] (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[50] (Ozturk, 2010):
    - 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
- Arnold Chiari I[51, 52] (Radic, 2018; Strahle, 2011)
  - For evaluation of spinal abnormalities associated with initial diagnosis of Arnold-Chiari Malformation. (C/T/L spine due to association with tethered cord and syringomyelia), and initial imaging has not been completed (Milhorat, 2009; Strahle, 2015).[37, 48]
- Arnold Chiari II-IV
  - For initial evaluation and follow-up as appropriate
- Tethered cord, or spinal dysraphism (known or suspected) based on preliminary imaging, neurological exam, and/or high-risk cutaneous stigmata,[36-38] (AANS, 2019; Duz, 2008; Milhorat, 2009), when anesthesia is required for imaging[53] (Hertzler, 2010)
- Toe walking in a child when associated with upper motor neuron signs, including hyperreflexia, spasticity; or orthopedic deformity with concern for spinal cord pathology (e.g., pes cavus, clawed toes, leg or foot length deformity (excluding tight heel cords))
- Back pain in a child with any of the following red flags (conservative care not required when red flags present):
  - Red flags that prompt imaging should include the presence of: age 5 or younger, constant pain, pain lasting >4 weeks, abnormal neurologic examination, early morning stiffness and/or gelling; night pain that prevents or disrupts sleep; radicular pain; fever; weight loss; malaise; postural changes (e.g., kyphosis or scoliosis); and limp (or refusal to walk in a younger child <5yo) AND initial radiographs have been performed[15, 16] (Bernstein, 2007; Feldman, 2006)
- Drop metastasis from brain or spine (imaging also includes brain)
- Suspected leptomeningeal carcinomatosis (LC)[54] (Shah, 2011)
- Any combination of these for spinal survey in patient with metastases
- Tumor evaluation and monitoring in neurocutaneous syndromes - See Background
- CSF leak highly suspected and supported by patient history and/or physical exam findings (leak (known or suspected spontaneous (idiopathic) intracranial hypotension (SIH), post lumbar puncture headache, post spinal surgery headache, orthostatic headache, rhinorrhea or otorrhea, or cerebrospinal venous fistula))
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BACKGROUND

Magnetic resonance imaging (MRI) is used in the evaluation, diagnosis, and management of spine-related conditions, e.g., degenerative disc disease, cauda equine compression, radiculopathy, infections, or cancer in the lumbar spine. MRI provides high quality multiplanar images of organs and structures within the body without the use of x-rays or radiation. In the lumbar area where gonadal exposure may occur, MRI's lack of radiation is an advantage.

OVERVIEW

Ankylosing Spondylitis/Spondyloarthropathies is a cause of back or sacroiliac pain of insidious onset (usually > 3 months), associated with morning stiffness not relieved with rest (usually age at onset < 40). It is associated with any of the following[59-62] ~~(Akgul, 2011; Bennett, 2010; Ostergaard, 2012; Sieper, 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~~**sacroiliitis**, 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[10, 16]:**

- **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.**

Table 1: Gait and spine imaging[63-68‡]

Gait	Characteristic	Work up/Imaging
Hemiparetic	Spastic unilateral, circumduction	Brain and/or, Cervical spine imaging based on associated symptoms
Diplegic	Spastic bilateral, circumduction	Brain, Cervical and Thoracic Spine imaging
Myelopathic	Wide based, stiff, unsteady	Cervical and/or Thoracic spine MRI based on associated symptoms
Ataxic	Broad based, clumsy, staggering, lack of coordination, usually also with limb ataxia	Brain imaging
Apraxic	Magnetic, shuffling, difficulty initiating	Brain imaging
Parkinsonian	Stooped, small steps, rigid, turning en bloc, decreased arm swing	Brain Imaging
Choreiform	Irregular, jerky, involuntary movements	Medication review, consider brain imaging as per movement disorder Brain MR guidelines
Sensory ataxic	Cautious, stomping, worsening without visual input (ie + Romberg)	EMG, blood work, consider spinal (cervical or thoracic cord imaging) imaging based on EMG
Neurogenic	Steppage, dragging of toes	• EMG initial testing; • BUT if there is a foot drop, lumbar spine MRI is appropriate without EMG • ~~Pelvis MR if there is evidence of plexopathy~~~~EMGà foot drop Lumbar spine MRI~~ • ~~Pelvis MR appropriate evidence of plexopathy~~
Vestibular	Insecure, veer to one side, worse when eyes closed, vertigo	Consider Brain/IAC MRI as per GL

~~(~~[‡]~~References: Chhetri, 2014; Clinch, 2021; Gait, 2021; Haynes, 2018; Marshall, 2012; Pirker, 2017)~~

Infection, Abscess, or Inflammatory disease

- **Most common site is the lumbar spine (58%), followed by the thoracic spine (30%) and the cervical spine (11%)[69]**
- **High risk populations (indwelling hardware, history of endocarditis, IVDA, recent procedures) with appropriate signs/symptoms**

MRI and Back Pain – MRI is the initial imaging modality of choice in the evaluation of complicated low back pain. Contrast administration may be used to evaluate suspected inflammatory disorders, e.g., discitis, and it is useful in evaluating suspected malignancy. Radiculopathy, disease of the nerve roots, is the most common indication for MRI of patients with low back pain. The nerve roots become irritated and inflamed, due to direct pressure from degenerative changes in the lumbar spine, creating pain and numbness. Symptoms of radiculopathy also include muscle weakness. MRI is indicated for this condition if the symptoms do not improve after conservative treatment over six weeks. MRI is also performed to evaluate cauda equina syndrome, severe spinal compression. ~~***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.~~

Table 2: MRI and Cutaneous Stigmata[70] ~~(Dias, 2015)~~

Risk Stratification for Various Cutaneous Markers		
High Risk	Intermediate Risk	Low Risk
• Hypertrichosis • Infantile hemangioma	• Capillary malformations (also referred to as NFS or	• Coccygeal dimple • Light hair

• A~~r~~tretic meningocele • DST • Subcutaneous lipoma • Caudal appendage • Segmental hemangiomas in association with LUMBAR‡ syndrome	salmon patch when pink and poorly defined or PWS when darker red and well-defined)	• Isolated café au lait spots • Mongolian spots • Hypo- and hypermelanotic macules or papules • Deviated or forked gluteal cleft • Nonmidline lesions
‡LUMBAR, lower body hemangioma and other cutaneous defects, urogenital abnormalities, ulcerations, myelopathy, bony defects, anorectal malformations, arterial anomalies, and renal anomalies.		

~~**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 Back Pain –** MRI is the initial imaging modality of choice in the evaluation of complicated low back pain. Contrast administration may be used to evaluate suspected inflammatory disorders, e.g., discitis, and it is useful in evaluating suspected malignancy. Radiculopathy, disease of the nerve roots, is the most common indication for MRI of patients with low back pain. The nerve roots become irritated and inflamed, due to direct pressure from degenerative changes in the lumbar spine, creating pain and numbness. Symptoms of radiculopathy also include muscle weakness. MRI is indicated for this condition if the symptoms do not improve after conservative treatment over six weeks. MRI is also performed to evaluate Cauda equina syndrome, severe spinal compression.~~

Sacral Dimples ~~–~~ Simple midline dimples are the most commonly encountered dorsal cutaneous stigmata in neonates and indicate low risk for spinal dysraphism. Only atypical dimples are associated with a high risk for spinal dysraphism, particularly those that are large (>5 mm), high on the back (>2.5 cm from the anus) or appear in combination with other lesions ~~(D'Alessandro, 2009)~~.[46] High-risk cutaneous stigmata in neonates include hemangiomas, upraised lesions (i.e., masses, tails, and hairy patches), and multiple cutaneous stigmata (**Table 2**).

Tethered spinal cord syndrome – This is 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 myelomeningocele 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 m~~M~~alformation

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.

Spina Bifida Occulta[71] ~~(AANS, 2020)~~

- Called the hidden spina bifida, as the spinal cord and the nerves are usually normal and there is no opening on the skin on the back~~.~~
- This subtype occurs in about 12% of the population, and the majority of people are not aware that they have spina bifida occulta unless it is discovered on an x-ray performed for an unrelated reason.
- Approximately 1 in 1,000 individuals can have an occult structural finding that leads to neurological deficits or disabilities as bowel or bladder dysfunction, back pain, leg weakness or scoliosis.

Back Pain with Cancer~~–~~ History – Radiographic (x-ray) examination should be performed in cases of back pain when a patient has a cancer history. This can make a diagnosis in many cases. This may occasionally allow for selection of bone scan in lieu of MRI. 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)~~."[29]

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 tumors can seed to the spine, the cancers mentioned above metastasize to the spinal column early in the disease process ~~(Ziu, 2019)~~.[35]

~~CAUDA EQUINA SYNDROME~~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

MRI and Neurocutaneous Syndromes

- In NF-1, clinical evaluation appears to be more useful to detect complications than is screening imaging in asymptomatic patients. Imaging is indicated in evaluation of suspected tumors based on clinical evaluation and for follow-up of known intracranial tumors ~~(Borofsky, 2013)~~.[72]
- Conversely in NF-2, routine MR imaging screening is always indicated, given the high prevalence of CNS tumors, especially vestibular schwannomas. In patients with NF-2, routine screening brain/IAC imaging is indicated annually starting from age 10, if asymptomatic, or earlier with clinical signs/symptoms. Most individuals with NF2 eventually develop a spinal tumor, mostly commonly schwannomas, but meningioma and ependymomas are also seen. Spinal imaging at baseline and every 2 to 3 years is also advised with more frequent imaging, if warranted, based on sites of tumor involvement ~~(Evans, 2017)~~.[73]
- In patients with t~~T~~uberous s~~S~~clerosis, b~~B~~rain MRI should be obtained every 1-3 years up until age 25 for surveillance for CNS abnormalities ~~(Krueger, 2013)~~.[74]
- In Von Hippel Lindau s~~S~~yndrome, imaging of the brain and spinal cord for hemangioblastomas is recommended every 2 years ~~(Varshney, 2017)~~.[75]
- In Sturge Weber Syndrome, b~~B~~rain MRI can rule out intracranial involvement only after age 1 and is recommended in patients <1 year only if symptomatic ~~(Comi, 2011)~~.[76]

Drop Metastases[77] –
Drop metastases are intradural extramedullary spinal metastases that arise from intracranial lesions. Common examples of intracranial neoplasms that result in drop metastases include pineal tumors, ependymomas, medulloblastomas, germinomas, primitive neuroectodermal tumors (PNET), glioblastomas multiform, anaplastic astrocytomas, oligodendrogliomas and less commonly choroid plexus neoplasms and teratomas.

Leptomeningeal Carcinomatosis[78] –
Leptomeningeal carcinomatosis is a complication of cancer in which cancerous cells spread to the membranes (meninges) that covers the brain and spinal cord. The most common solid tumors that involve the leptomeninges are breast, lung, ~~and~~ melanoma, gastrointestinal, and primary central nervous system tumors.

POLICY HISTORY

Date	Summary
March 2022	**Added** • **Combination request for overlapping body part statement**

	• Clarified muscle weakness not related to plexopathy or peripheral neuropathy • Clarified bowel and bladder dysfunction – not related to an inherent bowel or bladder problem • Descriptions for tethered cord • Background section of Drop Metastases • Background section of Leptomeningeal Carcinomatosis • Clarified toe walking in pediatric patient • Added section on neuroinflammatory conditions Removed • Removed from combination section syrinx and syringomyelia and added subsection for cervical and thoracic spine section Removed pediatric back pain from the total spine combination section •
November 2021	• Added +0698T
April 2021	• Added/modified ○ Modified section on neurological deficits ○ Back pain in a child added/modified red flags ○ Gait table in background ○ Post-surgical modified/clarified surgical criteria for combination exams ○ Removed myelopathy combination studies ○ Updated/added MS Criteria ▪ Combination section for initial imaging and follow up ▪ Added pediatric MS ○ Modified known tumor imaging into primary and metastatic disease ○ Added toe walking for pediatric patients ○ Modified Combination exam wording
May 2020	• Added: ○ For evaluation of neurologic deficits added new deficits ○ Added ankylosing spondylitis for evaluation of trauma/acute injury ○ Added follow up of osteoperotic fracture from metastatic disease ○ Added Osteopathic Manipulative medicine to conservative care therapy ○ Added suspected leptomeningeal carcinomatosis to combination spine imaging

	○ 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 ○ Modified Pars fracture to not seen on radiograph and imaging would change management ○ Added spina bifida occulta to background section
June 2019	• 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 • Expanded on tethered cord in Other Indications for imaging and added section on sacral dimple

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Reviewed / Approved by NIA Clinical Guideline Committee

~~**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. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.~~

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ADDITIONAL RESOURCES:

1. American Association of Neurological Surgeons, Congress of Neurological Surgeons. Five things physicians and patients should question: Don't obtain imaging (plain radiographs, magnetic resonance imaging, computed tomography [CT], or other advanced imaging) of the spine in patients with non-specific acute low back pain and without red flags. Choosing Wisely Initiative ABIM Foundation. Updated 2020. Accessed November 9, 2021. https://www.choosingwisely.org/clinician-lists/american-association-neurological-surgeons-imaging-for-nonspecific-acute-low-back-pain/
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Reviewed / Approved by NIA Clinical Guideline Committee

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. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.