AmeriHealth Caritas Louisiana

National Imaging Associates, Inc.*	
Clinical guidelines: **LUMBAR SPINE CT**	**Original Date: September 1997**
CPT Codes: 72131, 72132, 72133	**Last Revised Date: ~~April~~ March 2021~~1~~**
Guideline Number: NIA_CG_045	**Implementation Date: January 2023~~2~~**

INDICATIONS FOR LUMBAR SPINE CT

†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 when Lumbar Spine MRI is contraindicated or inappropriate

- With any of the following new neurological deficits documented on physical exam
  - **Extremity muscular weakness (and not likely caused by plexopathy, or peripheral neuropathy)**[1, 2]
  - ~~Extremity muscular weakness~~
  - 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** below 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~~)

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

For evaluation of back pain with any of the following when Lumbar Spine MRI is contraindicated[3-11]

~~(AAFP, 2012; AANSCNS, 2014; ACA, 2017; ACEP, 2014; ACR, 2015; Chou, 2007; Jarvik, 2015; Last, 2009; NASS, 2013)~~

- With new or worsening objective neurologic deficits* on exam, as above
- 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 lumbar radiculopathy. (EMG is not recommended to determine the cause of axial lumbar, thoracic, or cervical spine pain[12] ~~(NASS, 2013)~~)
- Isolated **low** back pain in pediatric population[13] ~~(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[14, 15] ~~(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"[11, 16] ~~(ACR, 2015; Rao, 2018)~~ and MRI for cord, nerve root compression, disc pathology, or post-op infection)
[Note: If ordered by Neurosurgeon or orthopedic surgeon for purposes of surgical planning, a contraindication to MRI is not required.]

- For preoperative evaluation/planning
- CT discogram
- 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 -preferred exam CT myelogram))[17] ~~(Starling, 2013)~~
- 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
- **New or changing neurological deficits or symptoms post-operatively** ~~Residual or new neurological deficits or symptoms~~[16, 18] ~~(Rao, 2018)~~ see **neurological deficit section** above
- When combo requests are submitted **(see above statement[+])** (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[19] ~~(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[20]
~~(ACR, 2018)~~

- Presents with any of the following **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) ~~b~~ (Both MRI and CT ~~are~~ **would be** approvable)[21] ~~(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")[20] ~~(ACR, 2018)~~

For evaluation of known fracture or known/new compression fractures[22]
~~(ACR, 2018)~~

- To assess union of a fracture when physical examination, plain radiographs, or prior imaging suggest delayed or non-healing
- To determine the position of fracture fragments
- With history of malignancy (if MRI is contraindicated or cannot be performed)
- With an associated new focal **neurologic deficit** as above[23] ~~(Alexandru, 2012)~~
- Prior to a planned surgery/intervention or if the results of the CT will change management

CT myelogram: When MRI cannot be performed/contraindicated-/surgeon preference

- ~~is indicated~~ **W**~~w~~hen signs and symptoms are ~~incongruent~~ **inconsistent or not explained** ~~with~~ **by the** MRI findings ~~or MRI cannot be performed/contraindicated /surgeon preference~~[24-28]

~~(Grams, 2010; Morita, 2011; Naganawa, 2011; NASS, 2012; Ozdoba; 2011)~~

- Demonstration of the site of a CSF 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)
- Surgical planning, especially regarding to the nerve roots or evaluation of dural sac

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[29-31] ~~(Cohen, 2005; Kobayashi, 2013; Rush, 2015)~~ when MRI is contraindicated**/cannot be performed or surgeon preference**~~.~~

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)[32] ~~(Matesan, 2016)~~

For evaluation of tumor, cancer, or metastasis with any of the following:
~~-~~(MRI is usually the preferred study- CT may be needed to further characterize solitary indeterminate lesions seen on MRI)[33, 34]
~~(Kim, 2012; McDonald, 2019)~~

- **Primary tumor**
  - Initial staging or re-staging of a known primary spinal tumor[35] ~~(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[23] ~~(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[23] ~~(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 neck pain or radiculopathy or neck 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[36, 37] ~~(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. When MRI cannot be performed or is contraindicated or CT is preferred to characterize the finding[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 disease when Lumbar Spine MRI is contraindicated[4, 38, 39]
~~(ACR, 2015; Last, 2009; 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[40] ~~(Bond, 2016)~~
    - Follow-up imaging of infection
        - With worsening symptoms/laboratory values (i.e., white blood cell count, ESR/CRP) or radiographic findings[41] ~~(Berbari, 2015)~~

For evaluation of known or suspected inflammatory disease when MRI is contraindicated or cannot be performed[42]
~~(ACR, 2021)~~

- ~~For known or suspected~~ 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, and Lumbar Spine MRI is contraindicated[38]
~~(ACR, 2015)~~

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

Other Indications for a Lumbar Spine CT, when MRI is contraindicated or cannot be performed
(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[43-45] ~~(AANS, 2019; Duz, 2008; Milhorat, 2009)~~
- Known anorectal malformations[46, 47] ~~(Kim, 2010; 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) (D'Alessandro, 2009) or duplicated or deviated gluteal cleft[48] ~~(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 STUDIES WITH LUMBAR SPINE CT WHEN MRI IS CONTRAINDICATED OR CANNOT BE PERFORMED OR SURGEON PREFERENCE

~~Indications for combination studies[49, 50]: (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 CTs~~S~~

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[49, 50]: 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[51-53] (e.g., congenital scoliosis, idiopathic scoliosis, scoliosis with vertebral anomalies)
    - In the presence of neurological deficit, progressive spinal deformity, or for preoperative planning[54]
    - 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[55]:
        - 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[56, 57]
    - 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[45, 51]
    - 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,[43-45] ~~40-42~~ when anesthesia required for imaging[58]~~54~~ (e.g., meningomyelocele, lipomeningomyelocele, diastematomyelia, fatty/thickened filum terminale, and other spinal cord malformations)
- Oncological Applications (e.g., primary nervous system, metastatic)

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

- ~~Any combination of these studies for:~~
    - ~~Scoliosis survey in infant/child with congenital scoliosis or juvenile idiopathic scoliosis under the age of 10[47-49] (ACR, 2018; SRS, 2019; Strahle, 2015)~~
    - ~~In the presence of neurological deficit, progressive spinal deformity, or for preoperative planning[50] (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[51] (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[52, 53] (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[41, 49] (Milhorat, 2009; Strahle, 2015)~~
- ~~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,[39-41] (AANS, 2019; Duz, 2008; Milhorat, 2009), when anesthesia is required for imaging[54] (Hertzler, 2012)~~
- ~~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[12, 13] (Bernstein, 2007; Feldman, 2006)~~

  - Drop metastasis from brain or spine (imaging also includes brain; CT spine imaging in this scenario is usually CT myelogram)- **See ~~Background~~Overview**
  - Suspected leptomeningeal carcinomatosis (LC)[59]- **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~~
- 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 -preferred exam CT myelogram))[17] ~~(Starling, 2013)~~
- CT myelogram when meets above guidelines and MRI is contraindicated or for surgical planning
- Post-procedure (discogram) CT

BACKGROUND

Computed tomography is used for the evaluation, assessment of severity, and follow-up of diseases of the spine. Its use in the thoracic spine is limited, however, due to the lack of epidural fat in this part of the body. CT myelography improves the contrast severity of CT, but it is also invasive. CT may be used for conditions, e.g., degenerative changes, infection, and immune suppression, when magnetic resonance imaging (MRI) is contraindicated. It may also be used in the evaluation of tumors, cancer, or metastasis in the thoracic spine, and it may be used for preoperative and post-surgical evaluations. CT obtains images from different angles and uses computer processing to show a cross-section of body tissues and organs. CT is fast and is often performed in acute settings. It provides good visualization of cortical bone.

OVERVIEW~~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[60-63] (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 sacroiilitis, peripheral inflammatory arthritis, and/or inflammatory bowel disease~~

~~***Conservative Therapy:** This 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**, regular Osteopathic Manipulative medicine treatments or chiropractic care when considered safe and appropriate.~~

~~****Home Exercise Program - (HEP)/Therapy** – the following elements are required to meet guidelines for completion of conservative therapy[4, 11] (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 1: Gait and spine imaging[60-65‡]

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)~~

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[66-69]:

- **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 – This 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**, regular Osteopathic Manipulative medicine treatments or chiropractic care when considered safe and appropriate.**

****Home Exercise Program - (HEP)/Therapy – the following elements are required to meet guidelines for completion of conservative therapy[4, 11]:**

- **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: CT and Cutaneous Stigmata[70] (Dias, 2015)

Risk Stratification for Various Cutaneous Markers		
High Risk	**Intermediate Risk**	**Low Risk**
• Hypertrichosis • Infantile hemangioma • Artretic meningocele • DST • Subcutaneous lipoma • Caudal appendage • Segmental hemangiomas in association with LUMBAR[‡] syndrome	• 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 • Light hair • 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.		

CT and Fracture of the Lumbar Spine – CT scans of the lumbar spine generate high-resolution spinal images; this and the absence of superimposed structures allow accurate diagnosis of lumbar fractures.

CT and Radiculopathy – Lumbar radiculopathy is caused by compression of a nerve root and/or inflammation that has progressed enough to cause neurologic symptoms, e.g., numbness, tingling, and weakness in leg muscles. These are warning signs of a serious medical condition ~~which~~ **that** needs medical attention. Multidetector CT may be performed to rule out or localize lumbar disk herniation before surgical intervention, when MRI is contraindicated. Radiation dose should be kept as low as possible in young individuals undergoing CT of the lumbar spine.

CT and Infection of the spine – ~~-~~ Infection of the spine is not easy to differentiate from other spinal disorders, e.g., degenerative disease, spinal neoplasms, and non-infective inflammatory lesions. Infections may affect different parts of the spine, e.g., vertebrae, intervertebral discs, and paraspinal tissues. Imaging is important to obtain to early diagnose and treat ~~so as to~~**to** avoid permanent neurology deficits. When MRI is contraindicated, CT may be used to evaluate infections of the spine.

CT and Degenerative Disease of the Lumbar Spine – Stenosis of the lumbar canal may result from degenerative changes of the discs, ligaments and facet joints surrounding the lumbar canal. Compression of the microvasculature of the bundle of nerve roots in the lumbosacral

spine may lead to significant effects on the cauda equina. This is a surgical emergency, and CT may be performed to help assess the problem when MRI is contraindicated or inappropriate. CT scans can provide visualization of the vertebral canal and may demonstrate encroachment of the canal by osteophytes, facets, pedicles, or hypertrophied lamina.

Infection, Abscess, or Inflammatory disease

- Most common site is the lumbar spine (58%), followed by the thoracic spine (30%) and the cervical spine (11%)[70] ~~(Graeber, 2019)~~
- High risk populations (indwelling hardware, history of endocarditis, IVDA, recent procedures) with appropriate signs/symptoms

CT and Low Back Pain – Low back pain by itself is a self-limited condition which does not warrant any imaging studies. One of the "red flags" signifying a more complicated status is focal neurologic deficit with progressive or disabling symptoms. When magnetic resonance imaging (MRI) is contraindicated, CT of the lumbar spine with or without contrast is indicated for low back pain accompanied by a "red flag" symptom. Myelography combined with post-myelography CT is accurate in diagnosing disc herniation and may be useful in surgical planning. CT may be indicated when MRI is contraindicated, and chronic back pain unresponsive to conservative treatment; and unsuccessful physical therapy/home exercise program.

Table 2: CT and Cutaneous Stigmata[71]

Risk Stratification for Various Cutaneous Markers		
High Risk	**Intermediate Risk**	**Low Risk**
• Hypertrichosis • Infantile hemangioma • Atretic meningocele • DST • Subcutaneous lipoma • Caudal appendage • Segmental hemangiomas in association with LUMBAR‡ syndrome	• 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 • Light hair • 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.		

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 myelomeningocele and lipomyelomeningocele; the following are other causes 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

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)~~.[72] High-risk cutaneous stigmata in neonates include hemangiomas, upraised lesions (i.e., masses, tails, and hairy patches), and multiple cutaneous stigmata (**Table 2**).

Spina Bifida Occulta[73] ~~(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 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)~~."[22]

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)~~.[37]

CT ~~MYELOGRAM~~Myelogram –

Myelography is the instillation of intrathecal contrast media under fluoroscopy. Patients are then imaged with CT to evaluate for spinal canal pathology. Although this technique has diminished greatly due to the advent of MRI due to its non-invasiveness and superior soft-tissue contrast, myelography is still a useful technique for conventional indications, such as spinal stenosis, when MRI is contraindicated or nondiagnostic, brachial plexus injury in neonates, radiation therapy treatment planning, and cerebrospinal fluid (CSF) leak.

~~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
- This is a "Red Flag" situation and Lumbar Spine MRI is approvable.

Drop Metastases[74] –

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[75] –

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 no related to plexopathy or peripheral neuropathy**

	• Clarified bowel and bladder dysfunction – not related to an inherent bowel or bladder problem • Descriptions for tethered cord • Clarified CT myelogram section • 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 •
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 and surgeon preference for exam type ○ 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 ○ Added anorectal malformations
May 2020	• For evaluation of neurologic deficits added new deficits • Added ankylosing spondylitis for evaluation of trauma/acute injury • Added Osteopathic Manipulative medicine to conservative care therapy • 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

	• Combined the acute and chronic back pain sections • Added spina bifida occulta to background section
June 2019	• Added CT myelogram • Added new or worsening objective neuro deficits for chronic and acute back pain • Added last 6 months for allowable post op follow up period and removed EMG comment • Added section on pars defect • Added section on compression fractures • In other indications removed myelogram since covered previously • Added congenital anomalies • Added sacral dimple and scoliosis • Added red flags specifically for peds back pain and pain related to malignancy, infection, inflammation • Added CSF leak indication • For combination studies C/T/L added drop metastasis, tethered cord, Arnold Chiari

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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

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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.