HEALTHHELP®

A WNS COMPANY

2024 Magnetic Resonance Imaging (MRI) Cervical Spine

Diagnostic Imaging

MRI-CSpine-HH

Last Review Date: 11/18/2024
Previous Review Date: 10/28/2024
Guideline Initiated: 06/30/2019

HEALTHHELP®

A WNS COMPANY

Table of Contents

Magnetic Resonance Imaging (MRI) Cervical Spine

NCD 220.2
See also, **NCD 220.2**: Magnetic Resonance Imaging at https://www.cms.gov/medicare-coverage-database/search.aspx *if applicable to individual's healthplan membership*.

MRI General Contraindications

MRI may be contraindicated for **ANY** of the following:

- Safety, related to clinical status (body mass index exceeds MRI capability, intravascular stents within recent 6 weeks)
- Safety, related to implanted devices (aneurysm clips, cochlear implant, insulin pump, spinal cord stimulator)[1]

References: [26] [10] [18]

Preamble: Pediatric Diagnostic Imaging

HealthHelp's clinical guidelines for the Diagnostic Imaging program, are intended to apply to both adults and pediatrics (21 years of age or younger), unless otherwise specified within the criteria.

MRI Cervical Spine Guideline

Magnetic resonance imaging (MRI) of the cervical spine is considered medically appropriate when the documentation demonstrates **ANY** of the following:

1. Cervical radiculopathy is demonstrated on electromyography (EMG) or nerve conduction study. (*__NOTE:__ *An EMG is **NOT** recommended to determine the cause of axial lumbar, cervical or thoracic spine pain.*)
   References: [27]
2. Pain in the neck and **ANY** of the following:
   a. Conservative management, active (eg, chiropractic treatments, physical therapy), and **EITHER** of the following:

[1]Some implanted devices that were once absolute contraindications to a MRI may now be accepted, including if the specific MRI is able to accommodate the device or the device itself is deemed safe for MRI.

i. Attempted within the last 6 months, for at least 6 weeks **AND** symptoms persist or worsen.

ii. Symptoms progress or worsen during current course of conservative management

b. Neck pain, in a pediatric individual and **EITHER** of the following: [8]

i. Chronic **AND** inflammation, infection or malignancy is suspected.

ii. Isolated neck pain, X-ray is completed and **ANY** of the following: (**NOTE**: *Conservative management is **NOT** required if any of these "red flags" exist*.)

A. Age is 5 years or younger.

B. Fever

C. Limp or refusal to walk

D. Malaise

E. Pain at night that disrupts sleep.

F. Pain is constant.

G. Pain lasts more than 4 weeks.

H. Postural changes (kyphosis or scoliosis)

I. Radicular pain

J. Stiffness or gelling in the early morning.

K. Weight loss (more than 5% in 2 months or 10% in 6 months)

References: [5] [27]

3. Arnold-Chiari malformation is known.
References: [39] [36] [34]

4. Brachial plexopathy is suspected or known **AND** location of injury includes the cervical spine.

5. Cancer, tumor, recurrence or metastasis evaluation for **ANY** of the following:

a. Prior imaging for metastasis or tumor is abnormal, non-diagnostic or indeterminate.

b. Spinal tumor is known **AND** signs are new or progressing (eg, non-traumatic pain is new or increasing).

c. Surveillance following the **National Comprehensive Cancer Network (NCCN) Guideline's** surveillance recommendations (*see **Surveillance** section*).

References: [7] [24]

6. Cerebrospinal fluid (CSF) leak is suspected (eg, cerebrospinal-venous fistula, CSF rhinorrhea, orthostatic headache, otorrhea, post lumbar puncture headache, post spinal surgery headache, spontaneous idiopathic intracranial hypotension [SIH]).
References: [13]
7. Compression fracture(s) evaluation and **ANY** of the following:
    a. Compression fractures are known and treated **AND** neck pain is new.
    b. New, demonstrated on X-ray, and **EITHER** of the following:
        i. **NO** known malignancy **AND** neck pain is worsening
        ii. Cancer is known, with or **WITHOUT** worsening neck pain, for differentiation of benign osteoporotic fractures from metastatic disease. (*__NOTE__: *a follow-up MRI, 6 to 8 weeks after initial MRI, when imaging is non-diagnostic or indeterminate, is appropriate*.)

    References: [24]
8. Infection (eg, abscess, discitis, osteomyelitis) is suspected or known and **ANY** of the following:
    a. Active treatment, to assess response
    b. Immune system suppression-related (eg, cancer, diabetes, dialysis, human immunodeficiency virus [HIV], intravenous drug use) spinal infection is suspected, from signs (eg, abnormal white blood cell count, erythrocyte sedimentation rate [ESR], back pain).
    c. Prior imaging is abnormal, non-diagnostic or indeterminate.
    d. Signs/symptoms are present (eg, chills, complete blood count [CBC], c-reactive protein [CRP], ESR, fever, pain)

    References: [33] [27]
9. Inflammatory disease or atlantoaxial instability is suspected or known, and **ANY** of the following:
    a. Atlantoaxial articulation disorder (eg, Down syndrome, Marfan syndrome) is known and **ANY** of the following:
        i. Cervical spine X-ray(s) are abnormal, non-diagnostic or indeterminate.
        ii. Neurological physical exam is abnormal (eg, abnormal gait or reflexes, bowel/bladder dysfunction, extremity weakness).
    b. Neuroinflammatory conditions (eg, Behcet's syndrome, sarcoidosis) are suspected with abnormal neurologic physical exam (eg, abnormal gait or reflexes, bowel/

bladder dysfunction, extremity weakness) **AND** rheumatology evaluation (eg, CRP, ESR) is completed.

c. Rheumatoid arthritis with abnormal neurologic physical exam (eg, abnormal gait or reflexes, bowel/bladder dysfunction, extremity weakness) **OR** X-ray demonstrates subluxation. (*__NOTE__: *Initial imaging should be a lateral X-ray in flexion and neutral. MRI is indicated with negative X-rays when neurological deficit is present or symptoms suggest cervical instability.*)

d. Spondyloarthropathies are suspected or known, X-ray(s) are non-diagnostic or indeterminate **AND** rheumatology evaluation (eg, CRP, ESR) is completed.

References: [25] [12] [6] [21] [29] [9] [32] [25] [4]

10. Multiple Sclerosis (MS) is suspected or known with **ANY** of the following: (*__NOTE__: *Any combination of brain/cervical/thoracic/lumbar MRI may be appropriate, see below for the combination study indications.*)

a. Brain MR Iis suspicious for MS, baseline.

b. Cervical spinal cord disease symptoms (eg, focal neurologic deficit, Lhermitte sign [electric shock-like sensation that occurs with flexion of the neck]) are new or worsening.

c. Pediatric demyelinating disease (acute disseminated encephalomyelitis [ADEM] or MS) is suspected or known.

d. Signs/symptoms (eg, fatigue, numbness, tingling) are new **OR** to assess response to treatment.

References: [16] [43]

11. Myelopathy (eg, abnormal gait or reflexes, bowel/bladder dysfunction, extremity weakness) is suspected and **ANY** of the following: (*__NOTE__: *Conservative care is **NOT** required prior to ordering imaging*.)

a. Abnormal neurologic physical exam (eg, abnormal gait or reflexes, bowel/bladder dysfunction, extremity weakness) are demonstrated on physical exam (eg, digital rectal exam, examination of balance and reflexes)

b. Symptoms or neurologic physical exam (eg, balance, difficulty with ambulation, diffuse numbness in the hands, grasping and holding objects, hand clumsiness, pins and needles sensation) are progressing.

References: [2] [14] [2024 ACR Appropriateness Criteria Thoracic Back Pain]

12. Neurological deficits (eg, abnormal reflexes, loss of sensation, numbness/tingling) are known based on completed neurological exams (eg, Lhermitte's sign, shoulder abduction test, spurling test)

13. Peri-procedural care to guide spinal procedure for pre-procedure, invasive procedure planning or post-procedural follow-up
14. Prior MRI cervical spine imaging is non-diagnostic or indeterminate. (*__NOTE__: *One follow-up is appropriate to evaluate for changes, since preceding imaging finding[s]. Further surveillance is appropriate when lesion is specified as highly suspicious or there is a change since last exam.*)
15. Syrinx or syringomyelia is suspected or known, and **ANY** of the following:
    a. Predisposing conditions are known (eg, Arnold-Chiari malformation, neoplasm, prior trauma, severe spondylosis).
    b. Prior imaging demonstrates an abnormality (eg, deformities, nodules, septations)
16. Tethered cord or spinal dysraphism is suspected or known from preliminary imaging, neurological exam **OR** high risk cutaneous stigmata.
    References: [3]
17. Toe walking, in a pediatric individual, with signs/symptoms of upper motor neuron abnormalities (eg, hyperreflexia, orthopedic deformity with concern for spinal cord pathology, spasticity)
18. Trauma or acute injury evaluation with **ANY** of the following:
    a. National emergency X-Radiography utilization study (NEXUS) or Canadian cervical rules (CCR) criteria for imaging are met for **ANY** of the following: (*__NOTE:__ *CT and MRI provide complementary information. When indicated it is appropriate to perform both*.)
        i. Evaluation with CT for initial imaging
        ii. Spine is unstable, CT or MRI for treatment planning.
        iii. Spinal cord or nerve root injury is suspected **OR** when obtunded and CT is negative.
    b. Nerve root injury is suspected.
    c. Spinal abnormalities (eg, ankylosing spondylitis, diffuse idiopathic skeletal hyperostosis) are known. (*__NOTE__: *Both a MRI and CT are appropriate.*)
    d. Unexaminable condition (eg, distracting injury, Glasgow coma scale is less than 15)

    References: [19] [5] [22] [31] [41]

Combination CT and MRI for Metastases Evaluation Guideline

Combination CT/MRI studies (5 or less concurrent studies, with a CT or MRI appropriate for cancer location: abdomen, brain, cervical spine, chest, lumbar spine, neck, pelvis and/or thoracic spine) for **ANY** of the following situations:

1. Cancer recurrence or metastasis is suspected.
2. Staging evaluation, for baseline pre-therapy
3. Surveillance following the **NCCN Guidelines** recommended schedule (see *Surveillance* section)

Combination CT Cervical Spine and MRI Cervical Spine Guideline

Computed tomography (CT) cervical spine **combined** with magnetic resonance imaging (MRI) cervical spine is considered medically appropriate when the documentation demonstrates the following: (*__NOTE__: ***NOT*** *an all inclusive list*)

1. Bony and soft tissue abnormality is known **AND** imaging may change the treatment plan.
2. Craniocervical junction is unstable.
3. Fractures are complex or pathological.
4. Malignant process of spine is suspected or known, with **BOTH** bony and soft tissue involvement.
5. Ossification of posterior longitudinal ligament (OPLL) is suspected **OR** for re-evaluation of known OPLL.

Combination MRI Brain and MRI Cervical Spine Guideline

Magnetic resonance imaging (MRI) brain **combined** with MRI cervical spine is considered medically appropriate when the documentation demonstrates Arnold Chiari malformation is known, for evaluation.
References: [39] [36]

Combination MRI Brain/MRI Cervical Spine/MRI Thoracic Spine Guideline

A magnetic resonance imaging (MRI) brain **combined** with MRI cervical spine **AND/OR** MRI thoracic spine (any combination) is considered medically appropriate when the documentation demonstrates evaluation is needed for **ANY** of the following:

1. MS is known, prior to initiation or change of disease modification treatment **OR** to establish new baseline.
   References: [43] [16]
2. MS **AND** spine disease are known, for follow-up:
   A. 6 to 12 months after starting or changing a treatment
   B. Every 1 to 2 years while on disease modifying therapy, less frequently when stable for 2 to 3 years
3. Neuromyelitis optica spectrum disorders (eg, recurrent or bilateral optic neuritis, recurrent transverse myelitis)
   References: [11]

Combination MRI Brain/MRI Cervical Spine/MRI Lumbar Spine/MRI Thoracic Spine (any combination) Guideline

A magnetic resonance imaging (MRI) of the brain **combined** with MRI cervical spine, MRI lumbar spine **AND/OR** MRI thoracic spine, in **ANY** combination, is considered medically appropriate when the documentation demonstrates **ANY** of the following:

1. Arnold Chiari malformation is suspected, for initial evaluation.
2. Arnold Chiari is known.
   References: [39] [36] [34]
3. Cerebrospinal fluid (CSF) leak is suspected (eg, cerebrospinal-venous fistula, orthostatic headache, otorrhea, post lumbar puncture headache, post spinal surgery headache, rhinorrhea, spontaneous idiopathic intracranial hypotension [SIH]).
   References: [13]
4. Drop metastasis from the brain or spine
5. Leptomeningial carcinomatosis is suspected.
   References: [35]
6. Neurocutaneous syndrome tumor evaluation and monitoring
   References: [40]

Combination MRI Brain and MRI Spine Studies Guideline

Magnetic resonance imaging (MRI) brain **combined** with MRI cervical spine, lumbar spine **AND** thoracic spine is considered medically appropriate when the documentation demonstrates known Multiple Sclerosis (MS), for follow-up and **ANY** of the following:

1. 6 to 12 months after starting or changing treatment

2. Every 1 to 2 years while on disease modifying treatment to assess for subclinical disease activity; less frequently if stable.
3. Prior to initiation of disease modifying treatment, for baseline

References: [43] [16]

Combination MRI Cervical Spine/MRI Thoracic Spine Guideline

Magnetic resonance imaging (MRI) cervical spine **combined** with MRI thoracic spine is considered medically appropriate when the documentation demonstrates **ANY** of the following:

1. Multiple Sclerosis (MS) is suspected when brain MRI is non-diagnostic or indeterminate **AND/OR** McDonald criteria to diagnose MS is **NOT** met.
   References: [43] [16]
2. Syrinx or syringomyelia is known, for initial evaluation with **ANY** of the following:
   a. Neurologic symptoms (eg, abnormal gait or reflexes, bowel/bladder dysfunction, extremity weakness) are new or progressing.
   b. Predisposing conditions are known (eg, Arnold-Chiari malformation, neoplasm, prior trauma, spondylosis).
   c. Prior imaging demonstrates an abnormality.
   d. Syrinx is known and symptoms are new or worsening.
3. Transverse myelitis is suspected when symptomatic (eg, autonomic dysfunction, bilateral weakness, sensory disturbance).

Combination CT or MRI Cervical, Thoracic, Lumbar Spine, ANY Combination Guideline

Combination imaging with computed tomography (CT) or magnetic resonance imaging (MRI) of **ANY** combination of the cervical, thoracic, and/or lumbar spine is considered medically appropriate when the documentation demonstrates **ALL** of the following:

1. CT only is ordered and MRI is **contraindicated or unavailable OR** MRI is ordered.
2. Condition includes **ANY** of the following:
   a. Age is less than 8 years old **AND** will require anesthesia for procedure, for any of the indications below.
   b. Arnold Chiari syndrome is known.
   c. Cancer is known and **ANY** of the following:

i. Drop metastasis from brain or spine

ii. Leptomeningeal carcinomatosis is suspected.

iii. Neurocutaneous syndrome tumor, for evaluation and monitoring.

iv. Spinal survey with metastases

d. Cerebrospinal fluid (CSF) leak is suspected, based on history or physical exam (eg, cerebrospinal-venous fistula, orthostatic headache, otorrhea, post lumbar puncture headache, post spinal surgery headache, rhinorrhea, spontaneous idiopathic intracranial hypotension [SIH].

e. Neurologic deficits (eg, abnormal gait or reflexes, bowel/bladder dysfunction, extremity weakness) are known.

f. Peri-procedural planning for spinal procedure including **ANY** of the following:

i. CT myelogram, (when myelogram indications are met), for procedural planning and MRI is **contraindicated or unavailable**.

ii. Post-procedure CT discogram

iii. Pre-procedural planning

g. Scoliosis with **ANY** of the following:

i. Age of onset is early (before age 10 years).

ii. Atypical curve (eg, Kyphosis more than 30 degrees, left thoracic curve, short segment)

iii. Congenital scoliosis or juvenile idiopathic scoliosis and age is less than 10, for initial assessment.

iv. Neurological deficit is new or unexplained.

v. Pre-operative planning

vi. Spinal deformity is progressive.

vii. Treatment planning depends on imaging

h. Spinal deformity is progressing and symptomatic.

i. Tethered cord or spinal dysraphism is suspected or known, based on prior imaging, neurological exam findings and/or high risk cutaneous stigmata, **AND** anesthesia is required for imaging.

j. Vertebral anomalies, in a pediatric individual, are known (eg, agenesis, bars, butterfly, congenital wedging, hemivertebrae, hypoplasia, segmentation defect) from prior imaging **AND** back pain is present.

References: [36] [39] [34] [35] [40] [13] [1] [42] [30] [20] [3]

LCD 35175
See also, **LCD 35175**: MRI and CT Scans of the Head and Neck at https://www.cms.gov/medicare-coverage-database/search.aspx *if applicable to individual's healthplan membership*.

LCD 35391
See also, **LCD 35391**: Multiple Imaging in Oncology at https://www.cms.gov/medicare-coverage-database/search.aspx *if applicable to individual's healthplan membership*.

LCD 37373
See also, **LCD 37373**: MRI and CT Scans of Head and Neck at https://www.cms.gov/medicare-coverage-database/search.aspx *if applicable to individual's healthplan membership*.

Central Nervous System Surveillance section

Surveillance imaging (after cancer treatment) of the central nervous system is considered medically appropriate when the documentation demonstrates **ANY** of the following:

Central Nervous System (CNS) Cancer Surveillance

NCCN Central Nervous System Cancer Version 3.2024

Central nervous system (CNS) cancer surveillance includes **ANY** of the following:

1. Brain metastasis, limited **OR** extensive, image with brain magnetic resonance imaging (MRI) every 2 to 3 months for 1-2 years, then every 4 to 6 months indefinitely
2. Glioma and **ANY** of the following:
    a. Low-grade glioma, image with brain MRI every 3 to 6 months for years 3 through 5, then at least annually as clinically indicated
    b. High grade glioma, image with brain MRI 2 to 8 weeks after radiation therapy, then every 2 to 4 months for 3 years, then every 3 to 6 months indefinitely

3. Medulloblastoma, image with brain MRI every 3 months for 2 years, then every 6 to 12 months for years 5 through 10, then every 1 to 2 years as clinically indicated. (*__NOTE__: *For patients with previous spine disease, concurrent spine imaging as clinically indicated.*)
4. Meningiomas, WHO Grade 1 or 2 **OR** unresectable, image with brain MRI at months 3, 6 and 12, then every 6 to 12 months for 5 years, then every 1 to 3 years as clinically indicated. WHO grade 3 meningiomas: Brain MRI, every 2–4 months for 3 years, then every 3–6 months.
5. Primary CNS lymphoma, image with brain MRI every 3 months for 2 years, then every 6 months until year 5, then annually indefinitely (*__NOTE__: *for individuals with previous spine disease, concurrent spine imaging and cerebrospinal fluid (CSF) sampling as clinically indicated*)
6. Primary spinal cord tumors and **ANY** of the following:
    a. Low-grade tumors, image with spine MRI every 3 to 6 months until year 5, then at least annually indefinitely
    b. High-grade tumors, image with spine MRI every 2 to 6 weeks after treatment, then every 2 to 4 months until year 2-3, then every 3 to 6 months until year 5, then every 6 to 12 months indefinitely
7. Spine metastasis, image with spine MRI or computed tomography (CT) 1 to 3 months after treatment, then every 3 to 4 months for 1 year, then clinically as indicated

Neuroendocrine and Adrenal Tumors Surveillance

NCCN Neuroendocrine and Adrenal Tumors Version 2.2024

Neuroendocrine and adrenal cancer surveillance includes **ANY** of the following:[2]

1. Adrenal gland tumors surveillance imaging includes **ANY** of the following:
    a. Localized disease: chest computed tomography (CT) (± contrast) and abdominal CT or magnetic resonance imaging (MRI) (+ contrast) every 12 weeks to 12 months up to 5 years, then clinically as indicated
    b. Locoregional unresectable or metastatic disease; chest CT (± contrast) and abdominal/pelvic CT or MRI (+ contrast) or FDG positron emission tomography (PET)/CT every 12 weeks to 12 months up to 5 years, then clinically as indicated
2. Carcinoid syndrome surveillance imaging includes **BOTH** of the following:
    a. Abdominal/pelvic multiphasic CT or MRI every 12 weeks to 12 months and chest CT (± contrast) as clinically indicated

[2]No surveillance is indicated for appendiceal tumors 2 cm or smaller without aggressive features.

b. Echocardiogram every 1 to 3 years or as clinically indicated **without** known carcinoid heart disease (CHD) and at least annually for patients with established CHD.

3. Gastrointestinal (GI) tract (jejunum/ileum/colon, duodenum, rectum), lung and/or thymus neuroendocrine tumor (NET) surveillance includes imaging post-resection with **ANY** of the following:

   a. Jejunum/ilium/colon, duodenum, rectum and thymus, surveillance imaging with abdominal ± pelvic multiphasic CT or MRI according to **ONE** of the following levels of frequency:[3]

      i. Within 12 weeks to 12 months post-operatively

      ii. After 12 months, image every 12 to 24 months for 10 years

      iii. After 10 years as clinically indicated

   b. Lung/thymus tumors surveillance chest CT (± contrast) for primary tumors, (as clinically indicated for primary GI tumors) according to **ONE** of the following levels of frequency:

      i. Within 12 weeks to 12 months post-operatively

      ii. After 12 months, image every 12 to 24 months for 10 years

      iii. After 10 years as clinically indicated

4. Grade 3, well-differentiated neuroendocrine surveillance includes chest CT (± contrast) as clinically indicated for **ANY** of the following:

   a. Locally advanced/metastatic disease with favorable biology (low Ki-67 [eg, less than 55%], positive somastatin receptor [SSTR] based PET imaging) includes abdominal/pelvic MRI (+ contrast) or abdominal/pelvic multiphasic CT for surveillance with **ANY** of the following:

      i. Resectable disease surveillance every 12 weeks to 24 weeks for 2 years, then every 6 to 12 months for up to 10 years and chest CT as clinically indicated

      ii. Unresectable disease surveillance every 12 weeks to 24 weeks (depending on tumor biology) **AND** chest CT (± contrast); as clinically indicated.

   b. Locally advanced/metastatic disease with unfavorable biology (high Ki-67 [eg 55% or higher], rapid growth rate, FDG avid tumors, negative SSTR-based PET imaging), includes surveillance imaging, every 8 weeks to 12 weeks (depending on tumor biology) with **ALL** of the following:

[3]High-grade tumors may be appropriate for more frequent monitoring.

i. Abdominal/pelvic MRI (+ contrast) or abdominal/pelvic multiphasic CT and FDG PET/CT as clinically indicated

ii. Chest CT (± contrast) as clinically indicated

iii. FDG-PET/CT as clinically indicated

c. Locoregional disease (resectable) abdominal/pelvic MRI (+ contrast) or abdominal/pelvic multiphasic CT with frequency of **ONE** of the following:

i. Every 12 weeks to 24 weeks for 2 years (depending on tumor biology, Ki-67) and chest CT as clinically indicated

ii. Every 6 months to 12 months for up to 10 years (depending on tumor biology, Ki-67) and chest CT as clinically indicated

d. Multiple endocrine neoplasia, type 1 (MEN1) screening surveillance for **ANY** of the following tumor types: (*__NOTE__: *For prolonged surveillance, imaging studies without radiation are preferred.*)

i. Lung/thymic NETs: chest CT or MRI (+ contrast) every 1 to 3 years

ii. PanNET: abdominal/pelvic CT or MRI (+ contrast) every 1 to 3 years and consider serial endoscopic ultrasound (EUS)

iii. Parathyroid: if calcium rises, re-image with neck ultrasound and/or parathyroid sestamibi with single-photon emission computed tomography (SPECT) scan (SPECT-CT preferred) or 4D-CT

iv. Pituitary: pituitary or sella MRI (+ contrast) of the pituitary every 3 to 5 years

e. Poorly differentiated large or small cell carcinoma and/or mixed neuroendocrine/non-neuroendocrine neoplasm or unknown primary, imaging surveillance includes **ALL** of the following:

i. Locoregional unresectable or metastatic disease surveillance imaging includes **EITHER** chest CT (± contrast) with abdominal/pelvic MRI (+ contrast) **OR** chest/abdominal/pelvic multiphasic CT; every 6 weeks to 16 weeks

ii. Resectable surveillance imaging includes **EITHER** chest CT (± contrast) with abdominal/pelvic MRI (+ contrast) **OR** chest/abdominal/pelvic multiphasic CT; every 12 weeks for the 1st year, and every 6 months thereafter

f. Post-operative from potentially curative surgery surveillance for at least 10 years (longer if high-risk)

5. Pancreatic neuroendocrine tumor surveillance imaging, post-resection, includes chest CT (± contrast) as clinically indicated and abdominal multiphasic CT or MRI with imaging frequency of **ONE** of the following:[3]
    a. Within 3 to 12 months post-operatively
    b. After 12 months, image every 6 to 12 months for 10 years
    c. After 10 years as clinically indicated
6. Pheochromocytoma/Paranganglioma surveillance imaging and **ANY** of the following:
    a. Locally unresectable disease or distant metastases includes **ANY** of the following:
        i. Chest/abdominal/pelvic CT with contrast
        ii. Chest CT (± contrast) and abdominal/pelvic MRI without contrast (if risk for hypertensive episode)
        iii. FDG-PET/CT for bone dominant disease
        iv. Meta-iodobenzylguanidine (MIBG) with single-photon emission computerized tomography/CT (SPECT) (if previous MIBG-positive or concern for disease progression) prior to considering radionuclide therapy
        v. SSTR-PET/CT or SSTR-PET/MRI (if previous SSTR-positive or concern for disease progression) prior to considering radionuclide therapy
    b. Resectable disease, post-resection includes chest CT (± contrast) and abdominal/ pelvic CT or MRI (+contrast), if clinically indicated with imaging frequency of **ONE** of the following:
        i. 12 weeks to 12 months after resection
        ii. Every 6 to 12 months for the 1st 3 years
        iii. Annually from year 4 up to 10.
        iv. Annually up to 10 years, then as clinically indicated

TIP

NCCN recommends following the surveillance protocols from designated guidelines for the following hereditary endocrine neoplasia syndromes :

- Thyroid cancer guideline, use for: Multiple endocrine neoplasia, type 2 (MEN2) with genetic evaluation of inherited syndromes
- Kidney cancer, use for:
  - Hereditary paraganglioma/pheochromocytoma syndrome
  - Tuberous sclerosis complex (TSC1 and TSC2)
  - von Hippel Lindau syndrome (VHL)
- Genetic/Familial High-Risk Assessment: Breast, Ovarian, and Pancreatic, use for:
  - Neurofibromatosis type 1 (NF1)
  - Li-Fraumeni syndrome (TP53)
  - Lynch syndrome (MLH1, EPCAM/MSH2, MSH6, PMS2)
- Genetic/Familial High-Risk Assessment: Colorectal, use for:
  - Lynch syndrome (MLH1, EPCAM/MSH2, MSH6, PMS2)
  - Familial adenomatous polyposis (APC)

Central Nervous System (CNS) Cancer Surveillance

NCCN Central Nervous System Cancer Version 3.2024

Central nervous system (CNS) cancer surveillance includes **ANY** of the following:

1. Brain metastasis, limited **OR** extensive, image with brain magnetic resonance imaging (MRI) every 2 to 3 months for 1-2 years, then every 4 to 6 months indefinitely
2. Glioma and **ANY** of the following:
   a. Low-grade glioma, image with brain MRI every 3 to 6 months for years 3 through 5, then at least annually as clinically indicated
   b. High grade glioma, image with brain MRI 2 to 8 weeks after radiation therapy, then every 2 to 4 months for 3 years, then every 3 to 6 months indefinitely
3. Medulloblastoma, image with brain MRI every 3 months for 2 years, then every 6 to 12 months for years 5 through 10, then every 1 to 2 years as clinically indicated. (*__NOTE__: *For patients with previous spine disease, concurrent spine imaging as clinically indicated.*)

4. Meningiomas, WHO Grade 1 or 2 **OR** unresectable, image with brain MRI at months 3, 6 and 12, then every 6 to 12 months for 5 years, then every 1 to 3 years as clinically indicated. WHO grade 3 meningiomas: Brain MRI, every 2–4 months for 3 years, then every 3–6 months.
5. Primary CNS lymphoma, image with brain MRI every 3 months for 2 years, then every 6 months until year 5, then annually indefinitely (*__NOTE__: *for individuals with previous spine disease, concurrent spine imaging and cerebrospinal fluid (CSF) sampling as clinically indicated*)
6. Primary spinal cord tumors and **ANY** of the following:
    a. Low-grade tumors, image with spine MRI every 3 to 6 months until year 5, then at least annually indefinitely
    b. High-grade tumors, image with spine MRI every 2 to 6 weeks after treatment, then every 2 to 4 months until year 2-3, then every 3 to 6 months until year 5, then every 6 to 12 months indefinitely
7. Spine metastasis, image with spine MRI or computed tomography (CT) 1 to 3 months after treatment, then every 3 to 4 months for 1 year, then clinically as indicated

Neuroendocrine and Adrenal Tumors Surveillance

NCCN Neuroendocrine and Adrenal Tumors Version 2.2024

Neuroendocrine and adrenal cancer surveillance includes **ANY** of the following:[4]

1. Adrenal gland tumors surveillance imaging includes **ANY** of the following:
    a. Localized disease: chest computed tomography (CT) (± contrast) and abdominal CT or magnetic resonance imaging (MRI) (+ contrast) every 12 weeks to 12 months up to 5 years, then clinically as indicated
    b. Locoregional unresectable or metastatic disease; chest CT (± contrast) and abdominal/pelvic CT or MRI (+ contrast) or FDG positron emission tomography (PET)/CT every 12 weeks to 12 months up to 5 years, then clinically as indicated
2. Carcinoid syndrome surveillance imaging includes **BOTH** of the following:
    a. Abdominal/pelvic multiphasic CT or MRI every 12 weeks to 12 months and chest CT (± contrast) as clinically indicated
    b. Echocardiogram every 1 to 3 years or as clinically indicated **without** known carcinoid heart disease (CHD) and at least annually for patients with established CHD.

[4]No surveillance is indicated for appendiceal tumors 2 cm or smaller without aggressive features.

3. Gastrointestinal (GI) tract (jejunum/ileum/colon, duodenum, rectum), lung and/or thymus neuroendocrine tumor (NET) surveillance includes imaging post-resection with **ANY** of the following:
    a. Jejunum/ilium/colon, duodenum, rectum and thymus, surveillance imaging with abdominal ± pelvic multiphasic CT or MRI according to **ONE** of the following levels of frequency:[5]
        i. Within 12 weeks to 12 months post-operatively
        ii. After 12 months, image every 12 to 24 months for 10 years
        iii. After 10 years as clinically indicated
    b. Lung/thymus tumors surveillance chest CT (± contrast) for primary tumors, (as clinically indicated for primary GI tumors) according to **ONE** of the following levels of frequency:
        i. Within 12 weeks to 12 months post-operatively
        ii. After 12 months, image every 12 to 24 months for 10 years
        iii. After 10 years as clinically indicated
4. Grade 3, well-differentiated neuroendocrine surveillance includes chest CT (± contrast) as clinically indicated for **ANY** of the following:
    a. Locally advanced/metastatic disease with favorable biology (low Ki-67 [eg, less than 55%], positive somastatin receptor [SSTR] based PET imaging) includes abdominal/pelvic MRI (+ contrast) or abdominal/pelvic multiphasic CT for surveillance with **ANY** of the following:
        i. Resectable disease surveillance every 12 weeks to 24 weeks for 2 years, then every 6 to 12 months for up to 10 years and chest CT as clinically indicated
        ii. Unresectable disease surveillance every 12 weeks to 24 weeks (depending on tumor biology) **AND** chest CT (± contrast); as clinically indicated.
    b. Locally advanced/metastatic disease with unfavorable biology (high Ki-67 [eg 55% or higher], rapid growth rate, FDG avid tumors, negative SSTR-based PET imaging), includes surveillance imaging, every 8 weeks to 12 weeks (depending on tumor biology) with **ALL** of the following:
        i. Abdominal/pelvic MRI (+ contrast) or abdominal/pelvic multiphasic CT and FDG PET/CT as clinically indicated

[5]High-grade tumors may be appropriate for more frequent monitoring.

ii. Chest CT (± contrast) as clinically indicated

iii. FDG-PET/CT as clinically indicated

c. Locoregional disease (resectable) abdominal/pelvic MRI (+ contrast) or abdominal/pelvic multiphasic CT with frequency of **ONE** of the following:

i. Every 12 weeks to 24 weeks for 2 years (depending on tumor biology, Ki-67) and chest CT as clinically indicated

ii. Every 6 months to 12 months for up to 10 years (depending on tumor biology, Ki-67) and chest CT as clinically indicated

d. Multiple endocrine neoplasia, type 1 (MEN1) screening surveillance for **ANY** of the following tumor types: (*__NOTE__: *For prolonged surveillance, imaging studies without radiation are preferred.*)

i. Lung/thymic NETs: chest CT or MRI (+ contrast) every 1 to 3 years

ii. PanNET: abdominal/pelvic CT or MRI (+ contrast) every 1 to 3 years and consider serial endoscopic ultrasound (EUS)

iii. Parathyroid: if calcium rises, re-image with neck ultrasound and/or parathyroid sestamibi with single-photon emission computed tomography (SPECT) scan (SPECT-CT preferred) or 4D-CT

iv. Pituitary: pituitary or sella MRI (+ contrast) of the pituitary every 3 to 5 years

e. Poorly differentiated large or small cell carcinoma and/or mixed neuroendocrine/non-neuroendocrine neoplasm or unknown primary, imaging surveillance includes **ALL** of the following:

i. Locoregional unresectable or metastatic disease surveillance imaging includes **EITHER** chest CT (± contrast) with abdominal/pelvic MRI (+ contrast) **OR** chest/abdominal/pelvic multiphasic CT; every 6 weeks to 16 weeks

ii. Resectable surveillance imaging includes **EITHER** chest CT (± contrast) with abdominal/pelvic MRI (+ contrast) **OR** chest/abdominal/pelvic multiphasic CT; every 12 weeks for the 1st year, and every 6 months thereafter

f. Post-operative from potentially curative surgery surveillance for at least 10 years (longer if high-risk)

5. Pancreatic neuroendocrine tumor surveillance imaging, post-resection, includes chest CT (± contrast) as clinically indicated and abdominal multiphasic CT or MRI with imaging frequency of **ONE** of the following:[5]

a. Within 3 to 12 months post-operatively

b. After 12 months, image every 6 to 12 months for 10 years

c. After 10 years as clinically indicated

6. Pheochromocytoma/Paraganglioma surveillance imaging and **ANY** of the following:

a. Locally unresectable disease or distant metastases includes **ANY** of the following:

i. Chest/abdominal/pelvic CT with contrast

ii. Chest CT (± contrast) and abdominal/pelvic MRI without contrast (if risk for hypertensive episode)

iii. FDG-PET/CT for bone dominant disease

iv. Meta-iodobenzylguanidine (MIBG) with single-photon emission computerized tomography/CT (SPECT) (if previous MIBG-positive or concern for disease progression) prior to considering radionuclide therapy

v. SSTR-PET/CT or SSTR-PET/MRI (if previous SSTR-positive or concern for disease progression) prior to considering radionuclide therapy

b. Resectable disease, post-resection includes chest CT (± contrast) and abdominal/ pelvic CT or MRI (+contrast), if clinically indicated with imaging frequency of **ONE** of the following:

i. 12 weeks to 12 months after resection

ii. Every 6 to 12 months for the 1st 3 years

iii. Annually from year 4 up to 10.

iv. Annually up to 10 years, then as clinically indicated

TIP

NCCN recommends following the surveillance protocols from designated guidelines for the following hereditary endocrine neoplasia syndromes :

- Thyroid cancer guideline, use for: Multiple endocrine neoplasia, type 2 (MEN2) with genetic evaluation of inherited syndromes
- Kidney cancer, use for:
  - Hereditary paraganglioma/pheochromocytoma syndrome
  - Tuberous sclerosis complex (TSC1 and TSC2)
  - von Hippel Lindau syndrome (VHL)
- Genetic/Familial High-Risk Assessment: Breast, Ovarian, and Pancreatic, use for:
  - Neurofibromatosis type 1 (NF1)
  - Li-Fraumeni syndrome (TP53)
  - Lynch syndrome (MLH1, EPCAM/MSH2, MSH6, PMS2)
- Genetic/Familial High-Risk Assessment: Colorectal, use for:
  - Lynch syndrome (MLH1, EPCAM/MSH2, MSH6, PMS2)
  - Familial adenomatous polyposis (APC)

MRI Cervical Spine Procedure Codes

Table 1. MRI Cervical Spine Associated Procedure Codes

CODE	DESCRIPTION
72141	Magnetic resonance (eg, proton) imaging, spinal canal and contents, cervical; without contrast material
72142	Magnetic resonance (eg, proton) imaging, spinal canal and contents, cervical; with contrast material(s)
72156	Magnetic resonance (eg, proton) imaging, spinal canal and contents, without contrast material, followed by contrast material(s) and further sequences; cervical
0649T	Quantitative magnetic resonance for analysis of tissue composition (eg, fat, iron, water content), including multiparametric data acquisition, data preparation and transmission, interpretation and report, obtained with diagnostic MRI examination of the same anatomy (eg, organ, gland, tissue, target structure); single organ

MRI Cervical Spine Summary of Changes

MRI Cervical Spine guideline had the following version changes from 2023 to 2024:

- Added the following to keep in line with current research:
  - "Cervical radiculopathy" indications under "Pain in the neck"
  - Indications under "Neurological deficits"
  - Indications under "Primary tumor"
  - "Pediatric abuse" indication
  - "Pediatric population" under "Pain in the neck"
  - "Pediatric demyelinating disease" under "Multiple Sclerosis"
  - "Toe walking" under "Myelopathy"
  - "Trigeminal neuralgia" indication
- Citations updated per the evidence.
- Mid-cycle update: added Pediatric Preamble and pediatric indications
- Mid-cycle code-driven update:
  - Added the following to keep in line with current research:
    - "Neurological deficits" indication
    - "Signs/symptoms" under "Multiple sclerosis"
  - Changed the indications under "Compression fracture" to keep in line with current evidence
  - "Immune system indication" moved under "Infection"
  - Removed the following, as current evidence does not support the indication:
    - "Cancer is known" indication under "Cancer" indication
    - "Conservative management" indication under "Trauma"
    - "Neurological symptoms" from under "Syrinx" and "Trauma" as it was redundant
    - "Prior imaging" indication under "Trauma"

MRI Cervical Spine Definitions

Abscess is a swollen area within body tissue, containing an accumulation of pus.
Achondroplasia is a bone growth disorder that results in dwarfism due to a genetic mutation in the arms and legs. Achondroplasia is the most common form of short stature (adults less than 4-ft. 10-in. in height).

Ankylosing spondylosis (spondylitis) is a chronic inflammatory disease that affects the spine, sacroiliac joints and often other joints (such as the shoulder), and is marked by pain and stiffness.
Atlantoaxial are the anatomical structures that connect the atlas and the axis.
Babinski reflex, also known as the Babinski reflex, is a neuro-pathological response in the foot that occurs when the sole of the foot is firmly stroked and the big toe moves upward or toward the top of the foot. The other toes may also fan out.
Behcet's disease a rare disease of unknown cause that is marked by chronic inflammation of blood vessels with symptoms including ulcerative sores especially of the mouth and genitals, inflammation of the eye, and joint swelling and pain.
Bone scan is a nuclear imaging procedure that examines the bones in the skeleton. It can help diagnose and track bone diseases, and can also be used to monitor the progress of certain treatments.
Canadian Cervical Rules (CCR) are a set of guidelines that help clinicians decide if cervical spine imaging is needed for trauma patients in the emergency department. The CCR are used to rule out cervical spine injuries in low-risk patients. An example can be found at: https://www.physio-pedia.com/Canadian_C-Spine_Rule
Cerebrospinal fluid (CSF) is a colorless liquid that is comparable to serum, is secreted from the blood into the lateral ventricles of the brain, and serves chiefly to maintain uniform pressure within the brain and spinal cord.
Cerebrospinal fluid (CSF) leak is a leak of cerebrospinal fluid that results from a hole or tear in the dura (the outermost layer of the meninges).
Cerebrospinal fluid (CSF) rhinorrhea is a condition where the fluid that surrounds the brain leaks into the nose and sinuses.
Chaddock reflex is a diagnostic reflex similar to the Babinski reflex. Chaddock's sign is present when stroking of the lateral malleolus causes extension of the great toe, indicating damage to the corticospinal tract.
Chiari malformation (Arnold-Chiari syndrome) is a congenital abnormality in which the lower surface of the cerebellum and the lower brain stem protrude into the spinal canal through the foramen magnum.
Compression fracture is a break in the vertebrae and can cause the vertebrae to collapse, making them shorter.
Computed tomography (CT) refers to a computerized X-ray imaging procedure in which a three-dimensional image of a body structure is revealed through a series of cross-sectional images or "slices."
Conservative management is an approach to treating pain utilizing non-surgical treatments that are both passive **AND** active, for a designated time (usually 4 to 6 weeks). Passive conservative management includes acupuncture, braces, ice/heat, injections, medications (NSAIDS, Tylenol). Active conservative management includes physical therapy (PT) program,

supervised by a licensed physical therapist and/or osteopathic manipulative medicine (OMT) or chiropractic care.

C-reactive protein (CRP) is a pentameric protein synthesized by the liver, whose level rises in response to inflammation.

Demyelination is any condition that causes damage to the protective covering (myelin sheath) that surrounds nerve fibers.

Dermatome is a skin area that receives sensory innervation from a single spinal nerve dorsal root.

Diffuse idiopathic skeletal hyperostosis (DISH) is a condition that causes ligaments to become calcified and hard. It usually affects the ligament around the spine, but it can also affect other areas of the body where ligaments join to bone.

Diplegia is a type of paralysis that affects similar body parts on both sides of the body, such as both arms or both legs. It's the most common cause of paralysis in children, but can affect people of any age. Unlike other forms of paralysis, diplegia is unpredictable and may improve, worsen, or change over time.

Discitis is an infection of the discs between the vertebra of the spine.

Down syndrome is a congenital condition characterized especially by developmental delays, usually mild to moderate impairment in cognitive functioning, short stature, upward slanting eyes, a flattened nasal bridge, broad hands with short fingers and decreased muscle tone caused by trisomy of the human chromosome numbered 21.

Drop metastases are intradural extramedullary spinal metastases that arise from intracranial lesions.

Electromyogram (EMG) is a test that converts the electrical activity associated with functioning skeletal muscle into a visual record or into sound used to diagnose neuromuscular disorders and in biofeedback training.

Erythrocyte sedimentation rate (ESR) is a commonly performed hematology test that may indicate and monitor an increase in inflammatory activity within the body caused by one or more conditions such as autoimmune disease, infections or tumors.

Fistula is an abnormal connection that leads from an abscess, hollow organ or part to the body surface, or from one hollow organ or part to another, and may be surgically created to permit passage of fluids or secretions.

Glasgow Coma Scale (GCS) is a scale used to assess the severity of a brain injury. It consists of values from 3 to 15, obtained by summing the ratings that depend on whether and how the patient responds to certain standard stimuli.

Hemiparesis is muscular weakness or partial paralysis restricted to one side of the body.

Hoffmann's sign, also known as Hoffmann's reflex, is a neurological exam that involves flicking a patient's middle fingernail to see if their thumb or index finger flexes involuntarily. A positive result, also known as hyperreflexia, indicates that the nervous system is overreacting to the flick and upper motor neuron lesion or corticospinal pathway dysfunction may be present.

Human Immunodeficiency Virus (HIV) damages the immune system and interferes with the body's ability to fight infection and disease.
Immunosuppression refers to stopping the bodily response to an antigen that occurs when lymphocytes identify the antigenic molecule as foreign, then induce the formation of antibodies and lymphocytes capable of reacting, rendering it harmless.
Indeterminate findings are inconclusive or insufficient for treatment planning.
Kyphosis is the exaggerated outward curvature of the thoracic region of the spine resulting in a rounded upper back.
Leptomeningeal carcinomatosis is cancer involving the pia mater and arachnoid mater. It occurs when cancer cells spread to the leptomeninges, which are the thin tissue layers that cover the brain and spinal cord.
Lhermitte's sign describes an electric shock-like sensation that occurs on flexion of the neck. This sensation radiates down the spine, often into the legs, arms, and sometimes to the trunk.
Magnetic resonance imaging (MRI) is a non-invasive diagnostic technique that produces computerized images of internal body tissues and is based on nuclear magnetic resonance of atoms within the body induced by the application of radio waves.
Marfan syndrome is a disorder of connective tissue inherited as a dominant trait, characterized by abnormal elongation of the long bones and often with ocular and circulatory defects.
McDonald criteria is a tool that incorporates clinical criteria with features of the magnetic resonance imaging (MRI), spinal fluid, and evoked potentials to confirm a definite diagnosis of Multiple Sclerosis.
Metastases is the spread of a disease-producing agency (such as cancer cells) from the initial or primary site of disease to another part of the body.
Multiple sclerosis (MS) is a demyelinating disease marked by patches of hardened tissue in the brain or the spinal cord and associated especially with partial or complete paralysis and jerking muscle tremor.
Myelopathy is a disease or disorder of the spinal cord or bone marrow.
National Emergency X-ray Utilization Study (NEXUS) is a very large, federally supported, multi-center, prospective study designed to define the sensitivity, for detecting significant cervical spine injury, of criteria previously shown to have high negative predictive value. Trauma patients who **DO NOT** require cervical spine imaging require **ALL** of the following:

- Alert and stable
- **NO** altered level of consciousness
- **NO** distracting injury
- **NO** focal neruological deficit
- **NOT** intoxicated

- **NO** midline spinal tenderness

Website for more information: https://www.mdcalc.com/calc/703/nexus-criteria-c-spine-imaging#:~:text=The%20NEXUS%20Criteria%20were%20developed,safely%20avoided%20in%20appropriate%20patients.

Nerve conduction study (NCS) is a test that measures how fast an electrical impulse moves through the nerve and can identify nerve damage.

Neurocutaneous disorders are disorders that affect the brain, spinal cord, organs, skin, and bones. The diseases are lifelong conditions that can cause tumors to grow in these areas.

Neuromyelitis optica spectrum disorder (NMOSD) is an inflammatory disorder of the central nervous system characterized by severe, immune-mediated demyelination and axonal damage predominantly targeting optic nerves and the spinal cord.

Non-diagnostic is a result that does not lead to a confirmed diagnosis.

Obtunded is mild to moderate alertness reduction (altered level of consciousness) with decreased interest in the environment and slower than normal reactivity to stimulation.

Optic neuritis is inflammation of the optic nerve.

Orthostatic headache is a headache while upright, that is relieved by lying down.

Ossification of the Posterior Longitudinal Ligament (OPLL) is a condition where the ligament, that runs along the back of the bone (vertebral body) and disc, hardens into bone.

Osteomyelitis is an infectious, inflammatory disease of bone. It is often painful, bacterial in origin and may result in the death of bone tissue.

Otorrhea is drainage of liquid from the ear.

Pediatric approximate ages are defined by the US Department of Health (USDH), the Food and Drug Administration (FDA), and the American Academy of Pediatrics (AAP) as the following:

- Infancy, between birth and 2 years of age
- Childhood, from 2 to 12 years of age
- Adolescence, from 12 to 21 years of age, further defined by the AAP into:
    1. Early (ages 11–14 years)
    2. Middle (ages 15–17 years),
    3. Late (ages 18–21 years)
    4. Older ages may be appropriate for children with special healthcare needs.

Radiculopathy is an irritation of or injury to a spinal nerve root (as from being compressed) that typically causes pain, numbness, or muscle weakness in the part of the body which is supplied with nerves from that root.

Recurrence is a new occurrence of something that happened or appeared before.

Rheumatoid arthritis (RA) is an autoimmune disease (usually chronic) that is characterized by pain, stiffness, inflammation, swelling and sometimes destruction of the joints.

Rhinorrhea is excessive mucous drainage from the nose.
Sarcoidosis is a chronic disease of unknown cause, that is characterized by the formation of nodules, especially in the lymph nodes, lungs, bones and skin.
Scoliosis is a sideways curvature of the spine that most often is diagnosed in adolescents.
Short segment is a curve in the spinal column that is less than 6 segments.
Spinal dysraphism is a congenital abnormality that results in an abnormal structure in the spine, including the bony structure, the spinal cord, and the nerve roots.
Spondylarthropathy is an inflammatory arthritis affecting the spine.
Spontaneous intracranial hypotension (SIH) is a condition in which the fluid pressure inside the skull is lower than normal.
Staging in cancer is the process of determining how much cancer is within the body (tumor size) and if it has metastasized (spread).
Stenosis is a narrowing or constriction of the diameter of a bodily passage or orifice.
Stigmata is a mental or physical mark that indicates a disease or defect. It can also refer to a specific diagnostic sign of a disease.
Subluxation is an incomplete or partial dislocation of a joint or organ.
Surveillance is ongoing systematic collection and analysis of data and the provision of information which leads to action being taken to prevent and control a disease.
Syringomyelia is a chronic progressive disease of the spinal cord associated with sensory disturbances, muscle atrophy and spasticity.
Syrinx is a cerebrospinal fluid-filled cyst which collects inside of the spinal cord or brain stem. A syrinx in the spinal cord is called syringomyelia, and a syrinx in the brain stem is called syringobulbia.
Tethered spinal cord syndrome (TSCS) is a disorder of the nervous system caused by tissue that attaches itself to the spinal cord and limits the movement of the spinal cord.
Transverse myelitis is a neurological disorder that causes inflammation on both sides of a section of the spinal cord. It can damage the myelin, the insulating material that covers nerve cell fibers. This prevents the spinal cord nerves from sending messages throughout the body.
Trigeminal neuralgia is an intense paroxysmal neuralgia (pain radiating along the course of one or more nerves usually without demonstrable changes in the nerve structure) involving one or more branches of the trigeminal nerve.

MRI Cervical Spine References

[1] (2019). ACR-ASNR-SPR Practice Parameter for the Performance of Myelography and Cisternography. *Practice Parameter*, 1-14.
[2] Agarwal, V., Shah, L.M., . . . Corey, A.S. (2021). ACR Appropriateness Criteria Myelopathy: 2021 Update. *Journal of the American College of Radiology, 18*(5S), S73-S82.

[3] Balani, A., Sidpra, J., . . . Mankad, K. (2024). *International Consensus Statement on the Radiological Evaluation of Dysraphic Malformations of the Spine and Spinal Cord*. *American Journal of Neuroradiology*, 1-20.

[4] Basra, M., Patel, H., . . . Posey, A. (2024). Use of Multimodality Imaging in the Evaluation of Patients With Spondyloarthropathies and Sacroiliitis. *Cureus, 16*(3), e57185.

[5] Beckmann, N.M., West, O.C., . . . Bykowski, J. (2019). ACR Appropriateness Criteria Suspected Spine Trauma. *Journal of the American College of Radiology, 16*(5S), S264-S285.

[6] Bernard, S.A., Kransdorf, M.J., . . . Weissman, B.N. (2017). ACR Appropriateness Criteria Chronic Back Pain Suspected Sacroiliitis-Spondyloarthropathy. *Journal of the American College of Radiology, 14*(5S), S62-S70.

[7] Bestic, J.M., Wessell, D.E., . . . Kransdorf, M.J. (2020). ACR Appropriateness Criteria Primary Bone Tumors. *Journal of the American College of Radiology, 17*(5S), S226-S238.

[8] Booth, T.N., Iyer, R.S., . . . Palasis, S. (2017). ACR Appropriateness Criteria Back Pain—Child. *Journal of the American College of Radiology, 14*(5), S13-S24.

[9] Borhani-Haghighi, A., Kardeh, B., . . . Shapiro, L. (2020). Neuro-Behcet's disease: An update on diagnosis, differential diagnoses, and treatment. *Multiple Sclerosis and Related Disorders, 39*, 101906.

[10] Carpenter, J.P., Litt, H. & Gowda, M. (2023). Magnetic Resonance Imaging and Arteriography. A.N. Sidawy (Eds.). *Rutherford's Vascular Surgery and Endovascular Therapy* (30). (pp. 336-394.e4). Philadelphia, PA: Elsevier.

[11] Clarke, L., Arnett, S., . . . Braodley, S.A. (2021). Magnetic resonance imaging in neuromyelitis optica spectrum disorder. *Clinical and Experimental Immunology, 206*(3), 251-265.

[12] Czuczman, G.J., Mandell, J.C., . . . Beaman, F.D. (2021). ACR Appropriateness Criteria Inflammatory Back Pain: Known or Suspected Axial Spondyloarthritis: 2021 Update. *Journal of the American College of Radiology, 18*(11S), S340-S360.

[13] Dobrocky, T., Nicholson, P., . . . Piechowiak, E.I. (2022). Spontaneous intracranial hypotension: searching for the CSF leak. *The Lancet Neurology, 21*(4), 269-380.

[14] Douglas, A.G., Xu, D.J., & Shah, M.P. (2022). Approach to Myelopathy and Myelitis. *Neurologic Clinics, 40*(1), 133-156.

[15] Elder, J.B., Laufer, I., . . . Bilsky, M. (2022). Staging, Classification, and Oncological Approaches for Metastatic Tumors Involving the Spine. M. P. Steinmetz & S. H. Berven (Eds.). *Benzel's Spine Surgery* (5), (pp. 1325-1342). Philadelphia: Elsevier.

[16] Fabian, M.T., Krieger, S.C., . . . Lublin, F.D. (2022). Multiple Sclerosis and Other Inflammatory Demyelinating Diseases of the Central Nervous System. J. Jankovic & J.C. Mazziotta (Eds.). *Bradley and Daroff's Neurology in Clinical Practice* (8), (pp. 1226-1254). Philadelphia, PA: Elsevier.

[17] Goncalves, F. G., Viaene, A. N., Vossough, A. (2021). Advanced Magnetic Resonance Imaging in Pediatric Glioblastomas. *Frontiers in Neurology, 12*, Article 733323.

[18] Gupta, S.K., Ya'qoub, L., . . . Saeed, I.M. (2020). Safety and Clinical Impact of MRI in Patients with Non–MRI-conditional Cardiac Devices. *Radiology: Cardiothoracic Imaging, 2*(5), e200086.

[19] Hawe, L.V.D., Sundgren, P.C. & Flanders, A.E. (2020) Spinal trauma and spinal cord injury. J. Hodler, R. A. Kubik-Huch & G. K. von Schulthess (Eds.). *Diseases of the Brain, Head and Neck, Spine 2020-2023* (pp. 231-240). Cham: Springer.

[20] Jones, J.Y., Saigal, G., . . . Karmazyn, B. (2019). ACR Appropriateness Criteria Scoliosis-Child. *Journal of the American College of Radiology, 16*(5), S244-S251.

[21] Junior, C., Champs, S., . . . Ferrari, A. (2021). Reliability of Evaluation of the Craniocervical Junction by XR, CT and MRI in Patients with Genetic Skeletal Diseases. *Austin Journal of Radiology, 8*(1), 1118.

[22] Kadom, N., Palasis, S., . . . Karmazyn, B. (2019). ACR Appropriateness Criteria Suspected Spine Trauma-Child. *Journal of the American College of Radiology, 16*(5), S286-S299.

[23] Kane, S.F., Abadie, K.V. & Wilson, A. (2020). Degenerative cervical myelopathy: recognition and management. *American Family Physician, 102*(12), 740-750.

[24] Khan, M.A., Jennings, J.W., . . . Burns, J. (2023). ACR Appropriateness Criteria Management of Vertebral Compression Fractures: 2022 Update. *Journal of the American College of Radiology, 20*(5), S102-S124.

[25] Kotecki, M., Gasik, R., . . . Sudol-Szopinska, I. (2021). Radiological evaluation of cervical spine involvement in rheumatoid arthritis: a cross-sectional retrospective study. *Journal of Clinical Medicine, 10*(19), 4587.

[26] Maralani, P.J., Schieda, N., . . . Weinreb, J. (2020). MRI safety and devices: An update and expert consensus. *Journal of Magnetic Resonance Imaging, 51*(3), 657-674.

[27] McDonald, M.A., Kirsch, C.F.E., . . . Bykowski, J. (2019). ACR Appropriateness Criteria Cervical Neck Pain or Cervical Radiculopathy. *Journal of the American College of Radiology, 16*(5S), S57-S76.

[28] Merali, Z., Wang, J.Z., . . . Fehlings, M.G. (2021). A deep learning model for detection of cervical spinal cord compression in MRI scans. *Scientific Reports, 11*(1), Article: 10473.

[29] Michel, C., Dijanic, C., . . . Yalamanchili, P. (2022). Upper cervical spine instability systematic review: a bibliometric analysis of the 100 most influential publications. *Journal of Spinal Surgery, 8*(2), 266-275.

[30] Mohanty, S.P., Kanhangd, M.P., . . . Saiffudeen, S. (2020). Vertebral, intraspinal and other organ anomalies in congenital scoliosis. *European Spine Journal, 29*, 2449-2456.

[31] Naik, A., Kotecha, H., . . . Issrani, M. (2021). Canadian C-spine rule (CCR) versus national emergency X- radiography utilization study (NEXUS) for screening cervical spine injury. *International Journal of Orthopaedics Sciences, 7*(1), 787-789.

[32] Olah, C., Kardos, Z., . . . Szekanecz, Z. (2020). Assessment of cervical spine involvement in rheumatoid arthritis patients in the era of biologics: a real-life, cross-sectional MRI study. *Rheumatology International, 40*, 915-921.

[33] Ortiz, A.O., Levitt, A., . . . Corey, A.S. (2021). ACR Appropriateness Criteria Suspected Spine Infection. *Journal of the American College of Radiology, 18*(11S), S488-S501.

[34] Pindrik, J., McAllister, A.S. & Jones, J.Y. (2022). Imaging in Chiari I Malfomation. *Neurosurgery Clinics of North America, 34*(1), 67-79.

[35] Rinhardt, H., Kassem, M., . . . Noonan, A.M. (2021). Assessment of Leptomeningeal Carcinomatosis Diagnosis, Management and Outcomes in Patients with Solid Tumors Over a Decade of Experience. *European Journal of Breast Health, 17*(4), 371-377.

[36] Rosenblum, J.S., Pomeraniec, I.J. & Heiss, J.D. (2022). Chiari malformation (update on diagnosis and treatment). *Neurologic Clinics, 40*(2), 297-307.

[37] Savarirayan, R., Ireland, P., . . . Fredwall, S.O. (2021). International Consensus Statement on the diagnosis, multidisciplinary management and lifelong care of individuals with achondroplasia. *Nature Reviews Endocrinology, 18*(3), 173-189.

[38] Smith, S.S., Stewart, M.E., . . . Kotter, M.R.N. (2021). The Prevalence of Asymptomatic and Symptomatic Spinal Cord Compression on Magnetic Resonance Imaging: A Systematic Review and Meta-analysis. *Global Spine Journal, 11*(4), 597-607.

[39] Tam, S.K.P., Chia, J.M., . . . Foroughi, M. (2022). Assessment of patients with a Chiari malformation type I. *Brain and Spine*, *2*, 100850.

[40] Varghese, R., Nandolia, K., . . . Sharma, P. (2021). Neurocutaneous syndromes: Imaging of systemic manifestations. *Journal of Medical Evidence, 2*(2), 147-154.

[41] Vazirizadeh-Mahabadi, M., Yarahmadi, M. (2023). Canadian C-spine Rule versus NEXUS in Screening of Clinically Important Traumatic Cervical Spine Injuries; a systematic review and meta-analysis. *Archives of Academic Emergency Medicine, 11*(1), e5.

[42] Wang, X., Yu, Y., . . . Xia, L. (2020. Incidence of intraspinal abnormalities in congenital scoliosis: a systematic review and meta-analysis. *Journal of Orthopaedic Surgery and Research, 15*(1), 1-7.

[43] Wattjes, M.P., Ciccarelli. O., . . . Rovira, A. (2021). 2021 MAGNIMS–CMSC–NAIMS consensus recommendations on the use of MRI in patients with multiple sclerosis. *The Lancet Neurology, 20*(8), 653-670.

[44] Weiss, P.F. & Chauvin, N.A. (2020). Imaging in the diagnosis and management of axial spondyloarthritis in children. *Best Practice & Research: Clinical Rheumatology, 34*(6, 101596.

[45] Witte, D.H. (2021). Advanced Imaging in Orthopaedics. F.M. Azar & J.H. Beaty (Eds.). *Campbell's Operative Orthopaedics* (14), (pp. 141-176). Philadelphia, PA: Elsevier.

[46] Wootton-Gorges, S.L., Soares, B.P., . . . Palasis, S. (2017). ACR Appropriateness Criteria Suspected Physical Abuse—Child. *Journal of the American College of Radiology, 14*(5), S338-S349.

Disclaimer section

Purpose

The purpose of the HealthHelp's clinical guidelines is to assist healthcare professionals in selecting the medical service that may be appropriate and supported by evidence to safely improve outcomes. Medical information is constantly evolving, and HealthHelp reserves the right to review and update these clinical guidelines periodically. HealthHelp reserves the right to include in these guidelines the clinical indications as appropriate for the organization's program objectives. Therefore the guidelines are not a list of all the clinical indications for a stated procedure, and associated Procedure Code Tables may not represent all codes available for that state procedure or that are managed by a specific client-organization.

Clinician Review

These clinical guidelines neither preempt clinical judgment of trained professionals nor advise anyone on how to practice medicine. Healthcare professionals using these clinical guidelines are responsible for all clinical decisions based on their assessment. All Clinical Reviewers are instructed to apply clinical indications based on individual patient assessment and documentation, within the scope of their clinical license.

Payment

The use of these clinical guidelines does not provide authorization, certification, explanation of benefits, or guarantee of payment; nor do the guidelines substitute for, or constitute, medical advice. Federal and State law, as well as member benefit contract language (including definitions and specific contract provisions/exclusions) take precedence over clinical guidelines and must be considered first when determining eligibility for coverage. All final determinations on coverage and payment are the responsibility of the health plan. Nothing contained within this document can be interpreted to mean otherwise.

Registered Trademarks (®/™) and Copyright (©)

National and Local Coverage Determination (NCD and LCD)

NOTICE
To ensure appropriate review occurs to the most current NCD and/or LCD, always defer to https://www.cms.gov/medicare-coverage-database/search.aspx.

Background

National Coverage Determinations (NCD) and Local Coverage Determinations (LCD) are payment policy documents outlined by the Centers for Medicare and Medicaid Services (CMS) and the government's delegated Medicare Audit Contractors (MACs) that operate regionally in jurisdictions.
CMS introduced variation between different jurisdictions/Medicare Audit Contractors (MACs) and their associated covered code lists with the transition to ICD 10. The variation resulted in jurisdictions independently defining how codes are applied for exclusions, limitations, groupings, ranges, etc. for the medical necessity indications outlined in the NCD and LCD. Due to this variation, there is an inconsistent use/application of codes and coverage determinations across the United States between the different MACs.
In addition, **WITHOUT** notice, CMS can change the codes that indicate medical necessity and the format of the coverage determinations/associated documents (eg, Articles). This is an additional challenge for organizations to keep up with ongoing, unplanned changes in covered codes and medical necessity indications.

Medical Necessity Codes

Due to the variation in code application between jurisdictions/MACs and that updates can happen without notification, HealthHelp is not able to guarantee full accuracy of the codes listed for any Coverage Determination, and advises that prior to use, the associated Coverage Determination Articles are reviewed to ensure applicability to HealthHelp's programs and any associated NCDs and LCDs.

For Internal Use Only:

11248 11249 11253 11282 11325 11328 11333 11349 11350 11351 11352 11354 11355 11356 11358 11359 11360 11361 11362 11365 11366 11367 11368 11369 11370 11374 11375 11394 11395 11396 11565