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1. The terms of the applicable benefit plan document in effect on the date of service
2. Any applicable laws and regulations
3. Any relevant collateral source materials including coverage policies
4. The specific facts of the particular situation

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# HEAD IMAGING GUIDELINES

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## ABBREVIATIONS for HEAD IMAGING GUIDELINES

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<td>ACTH</td>
<td>adrenocorticotropic hormone</td>
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<tr>
<td>AD</td>
<td>Alzheimer’s Disease</td>
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<tr>
<td>ADH</td>
<td>antidiuretic hormone</td>
</tr>
<tr>
<td>AION</td>
<td>arteritic ischemic optic neuritis</td>
</tr>
<tr>
<td>AVM</td>
<td>arteriovenous malformation</td>
</tr>
<tr>
<td>CBCT</td>
<td>Cone-beam computerized tomography</td>
</tr>
<tr>
<td>CMV</td>
<td>cytomegalovirus</td>
</tr>
<tr>
<td>CSF</td>
<td>cerebrospinal fluid</td>
</tr>
<tr>
<td>CT</td>
<td>computed tomography</td>
</tr>
<tr>
<td>CTA</td>
<td>computed tomography angiography</td>
</tr>
<tr>
<td>DNA</td>
<td>deoxyribonucleic acid</td>
</tr>
<tr>
<td>DWI</td>
<td>diffusion weighted imaging (for MRI)</td>
</tr>
<tr>
<td>EEG</td>
<td>electroencephalogram</td>
</tr>
<tr>
<td>ENT</td>
<td>Ear, Nose, Throat</td>
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<tr>
<td>ESR</td>
<td>erythrocyte sedimentation rate</td>
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<tr>
<td>FDG</td>
<td>fluorodeoxyglucose</td>
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<tr>
<td>FSH</td>
<td>follicle-stimulating hormone</td>
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<tr>
<td>FTD</td>
<td>Frontotemporal Dementia</td>
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<tr>
<td>GCA</td>
<td>giant cell arteritis</td>
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<tr>
<td>GCS</td>
<td>Glasgow Coma Scale</td>
</tr>
<tr>
<td>HIV</td>
<td>human immunodeficiency virus</td>
</tr>
<tr>
<td>LH</td>
<td>luteinizing hormone</td>
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<tr>
<td>MMSE</td>
<td>mini mental status examination</td>
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<tr>
<td>MRA</td>
<td>magnetic resonance angiography</td>
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<tr>
<td>MRI</td>
<td>magnetic resonance imaging</td>
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<tr>
<td>MRN</td>
<td>magnetic resonance neurography</td>
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<tr>
<td>MS</td>
<td>multiple sclerosis</td>
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<tr>
<td>MSI</td>
<td>magnetic source imaging</td>
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<tr>
<td>NAION</td>
<td>non-arteritic ischemic optic neuritis</td>
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<tr>
<td>NPH</td>
<td>normal pressure hydrocephalus</td>
</tr>
<tr>
<td>PET</td>
<td>positron emission tomography</td>
</tr>
<tr>
<td>PML</td>
<td>progressive multifocal leukoencephalopathy</td>
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<tr>
<td>PNET</td>
<td>primitive neuro ectodermal tumor</td>
</tr>
<tr>
<td>PWI</td>
<td>perfusion weighted imaging (for MRI)</td>
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<tr>
<td>SAH</td>
<td>subarachnoid hemorrhage</td>
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<tr>
<td>SIADH</td>
<td>Syndrome of Inappropriate Antidiuretic Hormone Secretion</td>
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<tr>
<td>SLE</td>
<td>systemic lupus erythematosus</td>
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<tr>
<td>TIA</td>
<td>transient ischemic attack</td>
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<td>TMJ</td>
<td>temporomandibular joint disease</td>
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<tr>
<td>TSH</td>
<td>thyroid-stimulating hormone</td>
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<tr>
<td>VBI</td>
<td>vertebrobasilar</td>
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<tr>
<td>VP</td>
<td>ventriculoperitoneal</td>
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HEAD IMAGING GUIDELINES

HD-1~GENERAL GUIDELINES

✓ A current clinical evaluation (within 60 days) is required before advanced imaging can
be considered (exceptions allowed for scheduled surveillance evaluation of known
abnormalities such as follow up for tumors or hydrocephalus).

- The clinical evaluation should include a relevant history and physical examination,
  including a neurological examination, as well as appropriate laboratory studies and
  non-advanced imaging modalities.
- Other meaningful contact (telephone call, electronic mail or messaging) with an
  established patient can substitute for a face-to-face clinical evaluation.

HD-1.1 General Guidelines - Anatomic Issues

✓ If two studies using the same modality both cover the anatomic region of clinical
interest, only one is generally needed, with the exception of the following scenarios:

- Maxillofacial CT (CPT® code set: 70486-70488) or orbital/temporal bone CT
  (CPT® code set: 70480-70482): both cover the structures of the orbits, sinuses,
  and face. Two separate imaging studies are only supported if there is suspicion of
  simultaneous involvement of more posterior lesions, especially of the region
  involving the middle or inner ear.

- Pituitary Gland: one study (either MRI head [CPT®70553] or MRI Orbit, Face,
  Neck [CPT®70543]) is adequate to report the imaging of the pituitary. If a previous
  routine MRI head was reported to show a possible pituitary tumor, a repeat MRI
  with dedicated pituitary protocol may be performed.

- Internal Auditory Canal (IAC) MRI can be reported as a limited study with one
  code from the set (CPT®70540-CPT®70543), but should not be used in conjunction
  with MRI head codes (CPT®70551-70553) if IAC views are performed as part of
  the brain.

- Mandible (jaw): maxillofacial CT (CPT® code set: 70486, 70487, 70488) or neck
  CT (CPT® code set: 70490, 70491, 70492) can be used to report imaging of the
  mandible. Neck CT will also image the submandibular space.
  - If MRI is indicated, MRI of orbit, face, neck (CPT®70540, CPT®70542, or
    CPT®70543) can be used to report imaging of the mandible and submandibular
    space.
  - MRI of the temporomandibular joint(s) (TMJ) is reported as CPT®70336. This
    code is inherently bilateral and should not be reported twice on the same date of
    service.
**HD-1.2 General Guidelines - Modality**

- MRI is preferable to CT for most indications. For exceptions, see **HD 1.4: General Guidelines – CT Head**.
- MRI may be performed for these indications following an initial CT:
  - MRI head without and with contrast (CPT® 70553) may be performed to follow-up abnormalities seen on CT head without contrast (CPT® 70450) when a mass, lesion, or infection is found
  - MRI head without contrast (CPT® 70551) or MRI head without and with contrast (CPT® 70553) may be performed to follow-up abnormalities seen on CT head without contrast (CPT® 70450) when there is suspected Multiple Sclerosis or other demyelinating disease
  - MRI head without (CPT® 70551) or MRI head without and with contrast (CPT® 70553) may be performed to follow up on stroke or TIA when initial CT head was done on emergent basis.
  - MRI head without and with contrast (CPT® 70553) for evaluation of new onset seizures

**HD-1.3 General Guidelines – MRI head**

- MRI, with contrast, (CPT® 70552) should not be ordered except to follow-up on a very recent noncontrast study (within two weeks).

**HD-1.4 General Guidelines – CT Head**

- Scenarios in which MRI is contraindicated (i.e. pacemakers, ICDs, cochlear implants, aneurysm clips, orbital metallic fragments etc…)
- Head CT without contrast (CPT® 70450) in nearly all cases, to show:
  - Mass effect
  - Blood/blood products
  - Urgent/emergent settings due to availability and speed of CT
  - Trauma
  - Recent hemorrhage, whether traumatic or spontaneous
  - Bony structures of the head evaluations
  - Hydrocephalus evaluation and follow-up (some centers use limited fast MRI to minimize radiation exposure in children - these requests may be approved)
  - Prior to lumbar puncture in patients with cranial complaints (without contrast (CPT® 70450)
HD-1.5 General Guidelines - CT and MR Angiography: (CTA and MRA)

- Head MRA (CPT®70544) is generally done without contrast.
- MRA Neck may be done either without or with contrast for most indications, depending on facility preference and protocols, and type of scanner.
- MRA Neck both without and with contrast is reserved for evaluation of possible or known arterial dissection
- **Head** or CTA may be considered with suspected intracranial vascular disease, for example:
  - recurrent stroke or TIA who have failed maximum medical management and are candidates for intervention with invasive procedures
  - trigeminal neuralgia failed medical therapy
  - cerebral sinus thrombosis suspected with increased intracranial pressure (refractory headaches, papilledema, diagnosis of pseudotumor cerebri)
  - aneurysm suspected with acute “thunderclap” headache syndrome and appropriate screening or evaluation of known subarachnoid hemorrhage
  - intra-cranial pre-operative planning if there is concern of possible vascular involvement or risk for vascular complication from procedure
  - sickle cell anemia
  - suspicion of vasculitis based on supporting clinical evidence
- **NOTE**: Evaluation of posterior circulation disease requires both neck and head MRA/CTA to visualize the entire vertebral- basilar system.
- CTA or MRA Head without or without contrast and with contrast for follow up of aneurysm clipping or coiling procedures (**See HD 12.1**)

- **CT** and **MR Venography** (CTV and MRV) are reported with the same codes as the CTA/MRA counterpart:
  - If arterial and venous CT or MR studies are both performed in the same session, only one CPT® code should be used to report both procedures.
  - MRA with and without contrast with venous sinus thrombosis to differentiate total from subtotal occlusion.

HD-1.6 General Guidelines - Coding Notes

- Brain PET should be reported as metabolic brain PET (CPT®78608).

HD-1.7 General Guidelines - Other Imaging Situations

- Nausea and vomiting, persistent, unexplained and a negative GI evaluation: can undergo MRI head without contrast (CPT®70551)
  (See also: **AB-1.9 Special Considerations** in the Abdomen Imaging Guidelines)
- ECT treatment to screen for intracranial disease: can undergo either MRI head without contrast (CPT®70551) or head CT without contrast (CPT®70450).
Screening for metallic fragments before MRI should be done initially with plain x-ray.
  - The use of orbital CT to rule out orbital metallic fragments prior to MRI is rarely necessary.
  - Plain x-rays are generally sufficient; X-ray detects fragments of 0.12 mm or more, and CT detects those of 0.07 mm or more.
Plain x-ray is generally sufficient to screen for aneurysm clips.

References

HD-2~TASTE and SMELL DISORDERS

HD-2.1 Taste and Smell Disorders

MRI head without and with contrast (CPT® 70553) or without contrast (CPT® 70551) is considered with unexplained unilateral or bilateral anosmia (inability to perceive odor) or dysgeusia (loss of taste)\(^1,2\).

If sinus or facial bone disorders is suspected, then consider initially Maxillofacial CT without contrast (CPT® 70486)\(^2\)

References
2. UpToDate, Evaluation and treatment of taste and smell disorders, Literature review current through: Feb 2014.
HD-3~ATAXIA

HD-3.1 Ataxia

✓ MRI head without and with contrast (CPT®70553) or MRI head without contrast (CPT®70551) is considered in all patients with ataxia¹:
  o If it is progressive and/or not acute and suspect spinal disease can ADD MRI cervical, thoracic and/or lumbar spine without contrast¹ (CPT®72141, CPT®72146, CPT®72148)
  o If it is acute and stroke is suspected see HD-21~Stroke – TIA
  o If MS is suspected, see HD-16-Multiple Sclerosis (MS) & Related Conditions
    o If it is acute following head trauma, CT head without contrast (CPT®70450) and/or CT temporal bone without contrast¹ (CPT®70480) can be added

Reference

HD-4~BEHAVIORAL DISORDERS

Autism: See PACHD-17~Autism and Autism Spectrum Disorders

HD-4.1 Behavioral Disorders

Neuroses and psychoses do not need advanced imaging, except:

✓ Bipolar disorder, schizophrenia, and related disorders who fail to respond to treatment in the expected manner and who manifest features suggestive of an organic brain disorder
  o MRI head without contrast (CPT®70551), or
  o Head CT without contrast (CPT®70450)

References
CRANIAL NERVE (CN) PROBLEMS

HD-6~FACIAL PALS Y (Bell’s Palsy)

HD-6.1 Facial Palsy

✓ MRI brain without and with contrast (CPT® 70553) or MRI head without contrast (CPT® 70551) is considered with unexplained facial paresis/paralysis in clinical scenarios with1,2:
  o Trauma to the temporal bone2
  o History of tumor2
  o No improvement in 8 weeks1
  o No full recovery in 3 months2
  o Worsening paresis/paralysis2
  o Atypical or Inconsistent features2 including:
    o Second paralysis on the same side2
    o Paralysis of isolated branches of the facial nerve2
    o Paralysis associated with other cranial nerves2

✓ MRI head without and with contrast (CPT® 70553) may be considered for suspected neurosarcoid/sarcoid

References

HD-7.1 Recurrent Laryngeal Palsy The following can be considered with unilateral vocal cord/fold palsy identified by laryngoscopy:\(^1\)

- MRI head without and with contrast (CPT\(^\circledast\) 70553) and/or MRI neck without and with contrast (CPT\(^\circledast\) 70543); or  
- MRI head without contrast (CPT\(^\circledast\) 70551) and/or MRI neck without contrast (CPT\(^\circledast\) 70540); or  
- If MRI is not available, CT head without and with contrast (CPT\(^\circledast\) 70470) and/or CT neck with contrast (CPT\(^\circledast\) 70491)  
  - Chest CT with contrast (CPT\(^\circledast\) 71260) may be added with left vocal cord palsy\(^1\)

Reference

HD-8~DEMENTIA

HD-8.1 Dementia

✓ Neuropsychological testing can be performed when history and bedside mental status examination cannot provide a confident diagnosis.\(^1,^2\) MRI head without contrast (CPT\(^\circledR\)70551) or MRI head without and with contrast (CPT\(^\circledR\)70553) or Head CT without contrast (CPT\(^\circledR\)70450) is considered after an initial clinical diagnosis of dementia\(^3,^4\)

HD-8.2 Dementia - PET

✓ Send to MD review. FDG and Amyloid Brain PET (CPT\(^\circledR\)78608) imaging are considered experimental and investigational in the diagnosis of Alzheimer’s disease and in differentiating between Alzheimer’s disease and other neurodegenerative/neurologic disorders.\(^3,^4,^5\)

✓ PET brain may be approved to differentiate Alzheimer’s disease from Frontotemporal dementia (either behavioral or primary progressive aphasia sub-types) with appropriate documentation.

See: **ONC-31~Medicare Coverage Policies for PET**

Practice Notes

The clinical diagnosis of dementia can be established by history-taking from the patient and a knowledgeable informant\(^1\) as well as a “bedside” mental status examinations (such as the Mini Mental Status Exam, Montreal Cognitive Assessment, Memory Impairment Screen\(^1,^2\))

References

3. Decision Memo for Positron Emission Tomography (FDG) for Alzheimer's Disease/Dementia (CAG-00088N).
Appropriateness Criteria® dementia and movement disorders. [online publication]. Reston (VA): American College of Radiology (ACR); 2010. 14 p.


HD-9.1 Epilepsy/Seizure

✓ MRI head without and with contrast (CPT® 70553) or MRI head without contrast (CPT® 70551) may be considered
  o For refractory or drug resistant seizures
  o For preoperative planning
    ▪ PET (CPT® 78608) can be considered for planning in patients with seizures who are candidates for surgical treatment
  o If CT head was performed for an initial evaluation, MRI (as described above) may be approved for additional evaluation

✓ MRI head without and with contrast (preferred study) (CPT® 70553) or MRI head without contrast (CPT® 70551) may be considered
  o For new onset seizures unrelated to or related trauma
  o Alcohol or drug related seizures

References

HD-10.1 Facial Pain/Trigeminal Neuralgia

- MRI head without and with contrast (CPT® 70553) (with special attention to the skull base), and facial imaging orbital MRI without and with contrast (CPT® 70543) may be of value in a given case, including:
  - Suspected tic douloureux (or its IX or VII nerve variants)
  - Those under age 40, which raise reasonable concerns about an underlying diagnosis of multiple sclerosis.
  - Trigeminal neuralgia which involve the ophthalmic nerve, (peri-orbital or forehead pain), once herpetic neuralgia (a complication of shingles) has been excluded
  - See Head 1.5: General Guidelines - CT and MR Angiography

Practice Notes

The differential diagnosis of facial pain is extensive, complex, and difficult, and there is considerable case-to-case variation in optimal imaging pathway.

Reference

HD-11.1 Headache Non-Indications
Neuroimaging is not usually warranted in patients with migraine and a normal neurologic examination.4

✔ Advanced imaging of the head is NOT indicated for any of the following:
  o Primary headache disorder in the absence of focal neurological deficits
    (headaches that meet criteria for migraine or tension variety)
  o Chronic headaches or intermittent recurring headaches with a normal exam, no
    significant recent changes in pattern or character of headache
  o A new, recent onset headache without “red flags” or findings such as focal
    deficits, papilledema, age over 50, headache that awakens patient from sleep, or
    “thunderclap” headache.

HD-11.2 Abnormal Findings on Examination

✔ Advanced imaging may be considered for patients with headaches and abnormal
features or neurological findings on examination, including:
  o Change in attack pattern7,2,7
    • For example: rapidly increasing headache intensity or frequency, 
      transformation of established migraine to chronic daily headaches, 
      associated with seizure
  o Focal neurological signs or symptoms, which may include lack of coordination, 
    subjective numbness or tingling, papilledema, vomiting, personality changes, 
    drowsiness, dizziness, seizure, confusion, memory loss, gait disturbance, 
    unilateral facial and/or body paralysis or weakness, visual changes, cranial 
    nerve palsy, nystagmus, dysarthria and dysphagia
  o Papilledema

✔ If any of the above abnormal findings are present, the following advanced imaging 
studies may be considered:
  o MRI head without and with contrast (preferred study) (CPT®-70553); or
  o MRI head without contrast (CPT® 70551); or
  o CT head without contrast (CPT®70450)

See also: HD-17~Papilledema/Pseudotumor Cerebri
**HD-11.3 Sudden Onset of Headache**

✓ For sudden onset of headache including:
  - Worst, most severe headache ever experienced or thunderclap-type\(^{1,2,6}\) (example: awakening from sleep\(^{2,4}\))
  - Sudden onset unilateral headache, suspected carotid or vertebral dissection or ipsilateral Horner syndrome\(^{1}\)

✓ If any of these onset of headache features are present, the following advanced imaging studies may be considered:
  - CT head without contrast (preferred study) (CPT® 70450); or
  - CTA head with contrast (CPT® 70496); or
  - MRA head without and with contrast (CPT® 70546); or
  - MRA head without contrast (CPT® 70544); or
  - MRI head without contrast (CPT® 70551);

See also: **HD-12.1 Intracranial Aneurysms** and **HD-21.1 Stroke/TIA**

**HD-11.4 Trigeminal Autonomic Cephalgias**

✓ Trigeminal autonomic cephalgias includes cluster headache short-lasting, unilateral, neuralgiform headache attacks with conjunctival injection and tearing (SUNCT) syndromes; hemicrania continua
  - May also include one-time pituitary screening\(^{1,12}\)

✓ Cluster Headache (may also include pituitary)

✓ The following advanced imaging studies may be considered for trigeminal autonomic cephalgias and cluster headache:
  - MRI head without and with contrast (preferred study) (CPT® 70553); or
  - MRI head without contrast (CPT® 70551)

See also **HD-10~Facial Pain/Trigeminal Neuralgia**
**HD-11.5 Skull Base, Orbit, Periorbital or Oromaxillary**

✓ Skull base, orbital, periorbital or oromaxillary\(^1\) imaging is appropriate for concern of skull base tumors in patients with head and neck cancers, other skull base abnormalities seen on previous imaging, any invasive sinus infections as well as sinus tumors or orbital tumors with intracranial extension. In these clinical scenarios, any one of the following procedures may be considered:
  o MRI head and orbits without and with contrast (preferred study); or
  o MRI head and orbits without contrast; or
  o CT head and orbits without and with contrast; or
  o CT head and orbits with contrast

**HD-11.6 Suspected Intracranial Extension of Sinusitis or Mastoiditis**

✓ For suspected intracranial extension of sinusitis or mastoiditis\(^1\), NOT cervicogenic:
  o MRI head without and with contrast (CPT®70553) may be considered

See **HD-29~Sinusitis**

**HD-11.6 New Headache Onset Older than Age 50**

✓ For new onset older than 50\(^2,6\) and if concern for Giant Cell Arteritis, the following may be considered:
  o MRI head without and with contrast (preferred study) (CPT®70553); or
  o MRI head without contrast (CPT®70551); and
  o MRA head without and with contrast (CPT®70546)

**HD-11.7 Cancer or Immunosuppression**

✓ For new headache in patients with cancer or who are immunocompromised, the following may be considered:
  o MRI head without and with contrast (preferred study) (CPT®70553); or
  o MRI head without contrast (CPT®70551)
**HD-11.8 Prothrombotic States**

✓ For Prothrombotic states\(^1\) including anticoagulation, the following may be considered:
  - MRI head without and with contrast (CPT®70553); or
  - CT head without contrast (CPT®70450)
  - If there is concern for venous sinus thrombosis, MRA (MR venography) or CTA (CT venography may be added

**HD-11.9 Pregnancy**

✓ For new onset headache in pregnancy,\(^1\) the following may be considered:
  - MRI head without contrast (Gadolinium relatively contraindicated in pregnancy) (CPT®70551)
  - MRA/MRV (CPT®70544) may be added if there is concern for venous sinus thrombosis

**HD-11.10 Physical Exertion**

✓ For onset of headache with Valsalva maneuver,\(^2,6\) cough, physical exertion or sexual (post-coital) activity,\(^1,6\) but not a worsening of headache with these activities, the following procedures may be considered:
  - MRI head without and with contrast (preferred study) (CPT®70553); or
  - MRI head without contrast (CPT®70551); or
  - CT head without contrast (CPT®70450)

**HD-11.11 Post-Trauma**

✓ For post-traumatic headaches within one year of the injury’s event, the following may be considered:
  - CT head without contrast (preferred study) (CPT®70450); or
  - MRI head without contrast (CPT®70551); or
  - MRI head without and with contrast (CPT®70546)

See also: **HD-13~Head Trauma**

**HD-11.12 Acute Systemic Infections**

✓ For acute systemic infections with meningeal neck stiffness\(^1,6\) the following may be considered:
  - MRI head without and with contrast (preferred study) (CPT®70553); or
  - MRI head without contrast (CPT®70551)
**HD-11.13 Hydrocephalus Shunts**

✓ For new onset of headache or neurologic deficits in adults with known hydrocephalus and shunts, the following may be considered:
  o MRI head without and with contrast (CPT® 70553); or
  o CT head without contrast (CPT® 70450) or MRI head without contrast (CPT® 70551)

**HD-11.14 Low Pressure Headache and CSF Leak**

✓ Evaluation of suspected low pressure headache and CSF leak may include MRI head without and with contrast and MRI cervical, thoracic and lumbar spine without contrast (usually performed with “heavily-weighted” T1 images).

**References**

1. ACR Appropriateness Criteria Headache, last Review 2013
2. Evidence-Based Guidelines in the Primary Care Setting: Neuroimaging in Patients with Nonacute Headache, 2000
4. Practice parameter: Evidence-based guidelines for migraine headache (an evidence-based review)
5. Report of the Quality Standards Subcommittee of the American Academy of Neurology
6. Stephen D. Silberstein, MD, FACP and for the US Headache Consortium*
7. Neurology September 26, 2000 vol. 55 no. 6 754-762
8. Evidence-Based Guidelines for Neuroimaging in Patients with Nonacute Headache
11. Callaghan, B, et. al., Headaches and Neuroimaging: High Utilization and Costs Despite Guidelines, JAMA Internal Medicine, Online March 17, 2014
**HD-12 Aneurysm and AVM**

**HD-12.1 Intracranial Aneurysms**

✓ Head CTA (CPT® 70496) or Head MRA (CPT® 70544) can be performed in any of the following clinical scenarios:

  - Posterior communicating artery aneurysm compressing cranial nerve III exhibiting fixed, dilated pupil and severe ipsilateral headache.
    - CT head without contrast (CPT® 70450) or MRI head without contrast (CPT® 70551) can be added
  - Mycotic Aneurysm (bacterial from intravenous drug abuse [IVDA]) with thunderclap headache (but not all with endocarditis)
    - MRI head without and with contrast (CPT® 70553) can be added
  - Preoperative planning for cerebral aneurysm management (surgical or interventional)
  - Screening or further evaluations in the following scenarios:
    - Two first degree relatives with subarachnoid hemorrhage (SAH) or an intracranial aneurysm, in which screening begins at age 20 and is repeated at five year intervals\(^1,4\)
    - One first degree relative affected by aneurysm based on a higher risk of unruptured aneurysms in this setting.*
    - Autosomal dominant polycystic kidney disease, in which screening begins at age 20 to 65 and is repeated at ten year intervals\(^3,5\)
    - History of aneurysmal subarachnoid hemorrhage\(^3\)
    - Anyone in any of these screening categories with headache: head CT without contrast (CPT® 70450) or MRI head without contrast (CPT® 70551) can be added
    - MRA head without contrast (CPT® 70544) or CTA head (CPT® 70496) can be performed for uncertain lesion, which has aneurysm in the differential diagnosis, found with a previous MRI head or CT head
    - CTA head (CPT® 70496) can be performed if possible aneurysm is seen on a previous MRA head
    - CTA head (CPT® 70496) may be repeated at some interval for possible aneurysm seen on a previous CTA head. These requests require Medical Director Review
    - Other genetic syndromes** and at risk populations have been described to have increased rates of SAH or intracranial aneurysm. Screening for these groups is not supported by national guidelines\(^1-8\)
✓ Spinal MRI (Cervical, Thoracic, Lumbar (without and with contrast) (CPT®72156, CPT®72157, CPT®72158) is appropriate to evaluate patients with SAH and negative studies for brain aneurysm in whom spinal abnormalities (i.e. AVM) may be suspected as the cause of hemorrhage.

✓ Repeat head CTA (CPT®70496) or head MRA (CPT®70544 or CPT®70546) can be performed, depending on the character of the disease and risk factors, and according to the following template:

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Interval</th>
<th>Follow-Up</th>
<th>Additional Info</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coiling or clipping or no treatment after subarachnoid bleed</td>
<td>3, 6, 12, 18 and 24 months following treatment</td>
<td>If stable and occluded at last imaging, follow-up surveillance imaging may be performed every 5 years</td>
<td>If not stable at 2 years follow-up, then image annually until stable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>These studies may be performed both without and with contrast (Brain MRA CPT®70546)</td>
</tr>
<tr>
<td>Coiling or clipping without subarachnoid bleed</td>
<td>3-6 month intervals for the first year and then every 6-12 months for up to 2 years</td>
<td>Then at decreasing frequency (every 5-10 years) to ensure that the aneurysm is not recanalizing.</td>
<td>These studies may be performed both without and with contrast (Brain MRA CPT®70546)</td>
</tr>
<tr>
<td>Known incidentally discovered aneurysms which have never bled</td>
<td>6 months and then annually until determined to be stable</td>
<td>Every 5 to 10 years after stable</td>
<td></td>
</tr>
</tbody>
</table>

**Practice Notes**

*The potential risks of aneurysm detection (e.g., anxiety, risks of subsequent testing, difficulty obtaining life insurance, occupational concerns) need to be discussed with the patient along with the potential benefits (earlier detection and possible treatment).*

** Including single first-degree relative with bicuspid Aortic Valve, Marfan’s Syndrome, Ehlers-Danlos syndrome, Hereditary Hemorrhagic Telangiectasia (HHT); pseudoxanthoma elasticum, fibromuscular dysplasia, aortic coarctation, type 1 thoracic aortic aneurysm, sickle cell disease, hypertension, hypercholesterolemia, age greater than 50 years, female gender, smoking, heavy alcohol use or sympathomimetic drugs use including cocaine. Cost-effectiveness has not been evaluated in clinical studies, and recommendations regarding screening in these groups are controversial.
HD-12.2 Arteriovenous Malformations (AVMs) and Related Lesions

✅ MRI head without and with contrast (CPT® 70553) or without contrast (CPT® 70551) may be considered in the following clinical scenarios:
  - AVM is suspected based on a history of SAH.
  - Screening for:
    - Hereditary hemorrhagic telangiectasia syndrome (Osler Weber Rendu).
    - Familial cavernoma: Screening should include MRI Head without or without and with contrast (with gradient echo images)
      - **One** head CTA (CPT® 70496) or head MRA (CPT® 70544) can be performed for screening. If negative, no further screening studies are indicated

✅ Head CTA (CPT® 70496) or brain MRA (CPT® 70544 or CPT® 70546) may be considered when known AVM are being evaluated for embolization or surgery

✅ Repeat advanced imaging with MRI head without and with contrast (CPT® 70553) or without contrast (CPT® 70551), plus MRA head (CPT® 70544) or CTA head (CPT® 70496) may be considered depending on the character of the disease and risk factors, or in the following clinical scenarios:
  - New hemorrhage episode is likely
  - Onset or change of seizures
  - Focal neurological signs
  - As follow up after treatment (surgery or embolization) as requested by specialists.

**Practice Notes**

Trauma is the most common reason for subarachnoid hemorrhage. Ruptured berry aneurysm is the most common reason for non-traumatic subarachnoid hemorrhage in adults.

Small aneurysms are present in about 2% of adults, but very few ever reach a size for which bleeding is a risk (>5mm). Small (< 3-4 mm) unruptured aneurysms in those with no personal history of SAH have a 0.1% to 0.5% a year rate of bleeding. The risk of cerebral aneurysm with family history ranges from 2% with one first degree relative to 30-35% for identical twin or two parents. The risks and benefits of screening these populations need to be considered before advanced imaging.

AVM’s most often come to clinical notice either by bleeding or by acting as a seizure focus. They are usually congenital, recognized later in life and have an initial risk of bleeding of 2% per year

**References**


6. Optimal screening strategy for familial intracranial aneurysms, A cost-effectiveness analysis, A. Stijntje E. Bor, MD, Hendrik Koffijberg, PhD, Marieke J.H. Wermer, MD and Gabriel J.E. Rinkel, MD, Neurology May 25, 2010 vol. 74 no. 21 1671-1679


8. J Neurol Neurosurg Psychiatry doi:10.1136/jnnp-2012-303783 , Lifetime risks for aneurysmal subarachnoid haemorrhage: multivariable risk stratification, Monique H M Vlak1,2, Gabriel J E Rinkel1, Paut Greebe1, Jacoba P Grevin, Ale Algra1,


HD-13~HEAD TRAUMA

HD-13.1 Head Trauma

Patients with head trauma are at risk for facial and cervical trauma.
(See: SP-3~Neck (Cervical Spine) Pain with Neurological Features and Trauma)

✓ Head CT without contrast (CPT®70450) is the primary imaging modality in patients with acute head trauma and any of the following modified Canadian Criteria:
  o Taking one anticoagulant or two anti-aggregants, (e.g., aspirin and Plavix)
  o Known platelet or clotting disorder
  o Renal failure (creatinine>6)
  o Glasgow coma scale (GCS) score of less than 15 at 2 hours following injury
  o >30 minutes of amnesia
  o Any “dangerous mechanism of injury” (fall greater than 5 steps down stairs or from height greater than 3 feet; any pedestrian motor vehicle accident or ejection from motor vehicle)
  o Suspected open skull fracture
  o Signs of basilar skull fracture
  o Two or more episodes of vomiting
  o Patient > 64 years old

✓ MRI head without contrast (CPT®70551) is thereafter used when the clinical findings are not explained by the CT results or to evaluate late effect of brain injury.
**HD-14~CNS INFECTION**

**HD-14.1 CNS Infection**

✓ Signs of intracranial infection include 1) headaches, seizures or new focal deficits in a setting of fever or elevated white blood cell count (WBC); 2) known infection elsewhere; 3) or immunosuppression. The following studies may be considered for suspected intracranial infection\(^1\)\(^\text{4}\) if any of these signs of infection are present:

- MRI head without and with contrast (CPT\(^\text{®}70553\)), or
- MRI head without contrast (CPT\(^\text{®}70551\)), or
- CT head without contrast (CPT\(^\text{®}70450\)), or
- CT head without and with contrast (CPT\(^\text{®}70470\))

**References**


HD-15.1 Movement Disorders

✓ The majority of movement disorders are diagnosed based on a clinical diagnosis and do not require imaging. These include:
  o Typical Parkinson’s Disease\(^1\)
  o Essential Tremor or Tremors of Anxiety or Weakness
  o Restless Leg Syndrome
  o Tics or Spasms which can be duplicated at will

✓ MRI of the brain without, or without and with contrast (CPT\(^®\) 70551 or CPT\(^®\) 70553) is considered in the following clinical scenarios:
  o **Atypical Parkinsonism** because of unusual clinical features, incomplete or uncertain medication responsiveness, or clinical diagnostic uncertainty\(^1\).
  o Suspected Huntington Disease\(^1\)

**Practice Notes**

There is little evidence to support the use of MRA/CTA, SPECT scanning and PET in the evaluation of movement disorders.\(^2\)

**References**

HD-16.1 MS

✔ MRI head without and with contrast (CPT®70553) and MRI cervical and thoracic spine without and with (CPT®72156 and CPT®72157) use in these clinical scenarios requires\(^1\) clinical suspicion based on recurrent episodes of variable neurological signs and symptoms or clinically isolated syndromes and\(^2\) the baseline exclusion of appropriate alternative conditions that can mimic MS.\(^{1-4}\)

  o An orbital MRI without and with contrast (CPT®70543) may be considered if optic neuritis is suspected, in addition to the above scenario\(^4\).

✔ MRI lumbar spine usually is not needed since Cervical and Thoracic studies will usually visualize the entire spinal cord.

  o Sagittal MRI of the spinal cord with phased array detector coil (CPT®72156 or CPT®72157) is an alternative spinal imaging

✔ Repeat Brain and/or Spine imaging may be considered in the following scenarios:

  o New episode of neurological deficit\(^4\)
  o Baseline, in 3 – 6 months and then annually when instituting or maintaining immune-modulating agents and when changing therapy\(^4\)
  o Symptoms suggestive of Progressive Multifocal Leukoencephalopathy during Tysabri therapy.\(^5\)
  o Asymptomatic MRI imaging is to be determined on a case by case basis.
  o Repeat imaging requests for MRI without contrast may be approved when requested by a specialist

✔ Family members needs not be screened, unless they exhibit suspicious signs or symptoms suggestive of MS

Practice Notes

Multiple Sclerosis (MS) is common and variable with more women affected and at a younger age than men. MS tends to be relapsing-remitting (improves between episodes), relapsing-progressive (worsens with attacks) and chronic progressive (gradual and steady).

MS is a clinical diagnosis, traditionally recognized by “lesions dispersed in time and space,” which means involvement of different areas of the neuraxis at different times.”

References


5. FDA Drug Safety Communication: Safety update on Progressive Multifocal Leukoencephalopathy (PML) associated with Tysabri (natalizumab), acquired http://www.fda.gov/Drugs/DrugSafety/ucm252045.htm acquired on February 19, 2014. [“…Tell your patients to contact you if they develop any symptoms suggestive of PML. Monitor your patients and withhold Tysabri immediately at the first sign or symptom of PML…”]


7. While there is evidence from studies that this genetic component exists, it appears to be only one factor among several that determine who gets MS.”

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**HD-17~Papilledema/Pseudotumor Cerebri**

**HD-17.1 Papilledema/Pseudotumor Cerebri**

✔ MRI head without and with contrast (CPT®70553) can be considered when there is suspected elevated intracranial pressure, such as with pseudotumor cerebri (benign intracranial hypertension) and papilledema, to exclude cerebral mass lesions, obstructive hydrocephalus, or occult meningeal disease

- Orbital MRI (CPT®70543) or Orbit CT without and with (CPT®70482) may be considered if there is concern for orbital pseudotumor or a primary bilateral orbital disorder

- Repeat imaging may be considered to evaluate either:
  - Shunt dysfunction in those patients who have had ventriculoperitoneal (VP) or lumboperitoneal (LP) shunts
  - Clinical deterioration

- MRA head without contrast or CTA head without and with contrast can be approved for papilledema with suspected venous sinus thrombosis

**Reference**

HD-18~PARESTHESIAS

HD-18.1 Paresthesias

Requests will be sent for Medical Director review. Paresthesia(s) (localized numbness and tingling) are symptoms of a local (nerve entrapment for example), regional (Multiple Sclerosis for example) or central (stroke for example) disorder.\textsuperscript{1,2} Advanced imaging can be considered initially, based on the highest suspicion disorder, according to these guidelines.\textsuperscript{1,2}

References

HD-19.1 Pituitary

✓ Bitemporal hemianopsia is the classic finding.
✓ Endocrine laboratory studies should be performed prior to considering advanced imaging.
✓ Pituitary imaging is primarily performed with MRI head without and with contrast (CPT® 70553):
  o MRI orbit, face, neck (CPT® 70543) or CT head without and with contrast (CPT® 70470) are alternatives
  o CT head without contrast (CPT® 70450) or without and with contrast (CPT® 70470) and/or CT maxillofacial without contrast (CPT® 70486) is occasionally used in addition to MRI to visualize perisellar bony structures in the preoperative evaluation of certain sellar tumors and for preoperative planning for transphenoidal approaches

PITUITARY IMAGING (Continued next page.)

<table>
<thead>
<tr>
<th>Indication</th>
<th>Initial Imaging</th>
<th>Repeat Imaging for Non-Operative Care</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Microadenoma (&lt;1cm)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microadenoma: Nonfunctioning</td>
<td>MRI head without contrast and with contrast (CPT® 70553)</td>
<td>MRI head without contrast and with contrast (CPT® 70553) at:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 6 and 12 months, then yearly for 3 years if stable. After 3 years, then every 5 years unless new signs and symptoms.</td>
</tr>
<tr>
<td>Microadenoma: Unexplained pituitary asymmetries or small low density regions</td>
<td>MRI head without contrast and with contrast (CPT® 70553)</td>
<td>MRI without and with contrast (CPT® 70553) at:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 1-2 years; and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 5 years</td>
</tr>
<tr>
<td><strong>Prolactinomas</strong></td>
<td>MRI head without and with contrast (CPT® 70553) with:</td>
<td>MRI head without and with contrast (CPT® 70553) only if:</td>
</tr>
<tr>
<td></td>
<td>- Unexplained elevated prolactin or - Galactorrhea (in nonlactating) and normal prolactin levels persisting for ≥6 months</td>
<td>• Hormonal levels rise or visual or neurological findings appear</td>
</tr>
<tr>
<td><strong>TSH, FSH, and LH producing</strong></td>
<td>MRI head without and with contrast (CPT® 70553) when hormone levels are inappropriately elevated</td>
<td></td>
</tr>
<tr>
<td><strong>Male Hypogonadism</strong></td>
<td>MRI head without and with contrast (CPT® 70553) if pituitary hormones are borderline to low (LH or FSH) and serum total testosterone of less than 80% of the lower limit of normal (&lt;150 ng/l, most labs)</td>
<td></td>
</tr>
<tr>
<td><strong>Panhypopituitarism</strong></td>
<td>MRI head without and with contrast (CPT® 70553)</td>
<td></td>
</tr>
<tr>
<td>ADH ABNORMALITIES</td>
<td>Indication</td>
<td>Initial Imaging</td>
</tr>
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</tr>
<tr>
<td><strong>Diabetes Insipidus (DI)</strong></td>
<td>MRI head without and with contrast (CPT®70553) if: • Laboratory testing consistent with DI and etiology uncertain</td>
<td>NA</td>
</tr>
<tr>
<td><strong>Syndrome of Inappropriate ADH (SIADH)</strong></td>
<td>MRI head without and with contrast (CPT®70553) if: • Etiology remains uncertain or is thought to be in the nervous system,</td>
<td>MRI head without and with contrast(CPT®70553) every: • 6 months for the first year; and then, • annually for 5 years (longer if craniopharyngiomas); • every 6 months if treatment is deferred</td>
</tr>
<tr>
<td><strong>Macroadenoma</strong></td>
<td>MRI head without and with contrast (CPT®70553)</td>
<td></td>
</tr>
<tr>
<td><strong>Other Pituitary Region Tumors</strong></td>
<td>Evaluation may require CT in addition to MRI to evaluate for hyperostosis. Requests will be sent for Medical Director review.</td>
<td></td>
</tr>
<tr>
<td><strong>Enlarged/Empty Sella Turcica</strong></td>
<td>Head CT without and with contrast (CPT®70470) or, MRI head without and with contrast (CPT®70553) to • exclude residual pituitary tumor and to • assess the position of the chiasm since herniation into the sella, causes Chiasmatic-type visual loss</td>
<td>MRI without and with contrast (CPT®70553) 1-5 years after the initial study can be performed.</td>
</tr>
</tbody>
</table>

✓ Post-operatively, follow-up pituitary imaging is generally done at the discretion of the neurosurgeon, usually at 3 months if stable.

**Practice Notes**

*Prolactinoma Note:* Most common of the secreting Microadenoma (>50%). Normal prolactin levels range up to 20 µg/l in non-lactating, non-pregnant women and in males. Transient elevation of up to 40 µg/l in females can occur, and requires repeating prior to consideration of advanced imaging.

**Other Pituitary Region Tumor Notes:** Craniopharyngiomas arise in the parasellar area. About 10% of meningiomas arise in this area.

***Enlarged/Empty Sella Turcica Notes:* An enlarged sella turcica without evident tumor is an incidental finding on MRI head or CT head from a defect in the dural diaphragm of the sella (especially if there is elevated intracranial pressure from another
cause), pituitary surgery, or as a result of a pituitary tumor which has expanded the sella and then infarcted (pituitary apoplexy).

**References**


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**HD-20~SCALP and SKULL LESIONS**

**HD-20.1 Scalp and Skull Lesions**

The majority of these are benign soft tissue or bony lesions easily defined by physical examination or with skull x-rays.

- Head CT without or without and with contrast (CPT® 70450 or CPT® 70470) is appropriate for the following scenarios:
  - Any lesion on physician examination and skull x-ray which is not clearly benign
  - Langerhans’ cell histiocytosis, myeloma, and metastatic cancer, when symptoms suggest bony lesions
  - MRI head without contrast (CPT® 70551) or with and without contrast (CPT® 70553) may be considered if there is concern for intracranial extension
HD-21 Stroke/TIA

**HD-21.1 Stroke/TIA**

✓ *One* from each of the following procedures can be considered for the initial occurrence or repeat episodes of TIA, stroke1-4 or Transient Global Amnesia5:

- CT head without contrast (CPT 70450) or CT head without and with contrast (CPT® 70470) or MRI head without and with contrast (CPT® 70553) or MRI head without contrast (CPT® 70551)
  - MRI is preferred with later presentation for evaluation and can be considered after an initial CT head1-4
- Duplex ultrasound of the carotid arteries or MRA neck without contrast (CPT® 70547) or MRA neck with contrast (CPT® 70548) or MRA neck without and with contrast (CPT® 70549); or Neck CTA (CPT® 70498)

✓ MRA head without contrast (CPT® 70544) or CTA head with contrast(CPT® 70496) may be considered in addition to the above in the following clinical scenarios:

- Presentation is within 24 hours of onset1-3
- Vertebrobasilar stroke (vertigo associated with diplopia, dysarthria, bifacial numbness or ataxia)1-4
- Suspected Carotid or Vertebral Artery Dissections2-4. Risks may include premature stroke (under age 50), head or neck trauma, fibromuscular dysplasia, Ehlers-Danlos syndrome, and chiropractic neck manipulation.
  - Repeat imaging as determined by a specialist
- Suspected Venous Infacts (as MRV (CPT® 70544) or CTV (CPT® 70496)) if identified on CT/MRI head6
- Recurrent stroke or TIA who have failed maximum medical management (smoking cessation, anti-platelet medication if no contra-indications, BP and lipid treatment) to assess potential candidates for elective invasive procedures (such as angioplasty or stents)7,8

✓ MRA neck without and with contrast (CPT® 70549) is reserved for evaluation of possible or known arterial dissection.
HD-21.2 Venous Infarcts

✓ MRV (CPT®70544) or CTV (CPT®70496) and MRI head without contrast (CPT®70551) are appropriate in the following scenarios:
  o Intracranial hypertension with headache, vomiting and papilledema from venous sinus thrombosis
  o Venous infarction is identified on MRI head or Head CT
  o Women with postpartum stroke or postpartum papilledema
  o Children or young adults who present with a stroke in which headache and seizures are prominent features, or who are known to have an intrinsic system clotting disorder.

Practice Notes

Transient Global Amnesia is the “…sudden onset of transient inability to retain new information and to recall previous events for a variable period of time, generally occurring in middle-aged or elderly patients formerly in good health and without significant cardiac or cerebrovascular disease…”5

References

1. American College of Radiology, ACR Appropriateness Criteria® Cerebrovascular Disease  Last review date: 2011
2. AHA Scientific Statement, Recommendations for Imaging of Acute Ischemic Stroke, A Scientific Statement From the American Heart Association, Richard E. Latchaw, MD, Chair; Mark J. Alberts, MD, FAHA; Michael H. Lev, MD, FAHA; John J. Connors, MD; Robert E. Harbaugh, MD, FAHA; Randall T. Higashida, MD, FAHA; Robert Hobson, MD, FAHA†; Chelsea S. Kidwell, MD, FAHA; Walter J. Koroshetz, MD; Vincent Mathews, MD; Pablo Villablanca, MD; Steven Warach, MD, PhD; Beverly Walters, MD; Stroke. 2009; 40: 3646-3678
5. Transient Global Amnesia and Transient Ischemic Attack , Natural History, Vascular Risk Factors, and Associated Conditions, Marino Zorzon, MD; Lucia Antonutti, MD; Giovanni Masè, MD; Emanuele Biasutti, MD; Barbara Vitrani, MD; Giuseppe Cazzato, MD,Stroke. 1995; 26: 1536-1542
HD-22~CEREBRAL VASCULITIS

HD-22.1 Cerebral Vasculitis

✓ MRI head without and with contrast (CPT®70553) is considered when any of the following is suspected\(^1,2\):
  - Small to medium vessel Vasculitis\(^1,2\)
  - Large/Giant Cell Arteritis\(^1,3\)
    - MRA Head without and with contrast (CPT 70546) and MRA Neck without or with contrast (CPT 70549); CTA\(^3\) may be considered in addition to MRI in these circumstances

Practice Notes

Classification of vasculitides based on vessel size adapted from Joseph (1). Small and medium vessel vasculitis is generally beyond the resolution for MRA and CTA.

<table>
<thead>
<tr>
<th>Dominant Vessel Involved</th>
<th>Primary</th>
<th>Secondary</th>
</tr>
</thead>
</table>
| Large arteries           | • Giant cell arteritis  
                          | • Takayasu’s arteritis | Aortitis with rheumatoid disease; Infection (e.g. syphilis) |
| Medium Arteries          | • Classical polyarteritis nodosa  
                          | • Kawasaki disease     | Infection (e.g. hepatitis B) |
| Small vessels and medium arteries | • Wegener’s granulomatosis  
                                  | • Churg–Strauss syndrome  
                                  | • Microscopic polyangiitis | Vasculitis with rheumatoid disease, systemic lupus erythematosus, Sjögren’s syndrome, drugs, infection (e.g. HIV) |
| Small vessels            | • Henoch-Schönlein purpura  
                          | • Essential cryoglobulinaemia  
                          | • Cutaneous leukocytoclastic vasculitis | Drugs (e.g. sulphonamides, etc.) Infection (e.g. hepatitis C) |
References
2. Hunder, G, Classification of and approach to the vasculitides in adult, UpToDate, acquired April 2, 2014

HD-23~DIZZINESS, VERTIGO and SYNCOPE

HD-23.1 Dizziness, Vertigo, and Syncope

✓ The initial components in the evaluation of false sensations of balance or motion include obtaining a patient history and performing a physical examination that can assist in diagnosis. These include the elimination of inciting factors.\(^1,2\)

✓ Prior to advanced imaging, the minimum initial evaluation should include at least one of the following:
  - Orthostatic blood pressure\(^1,2\)
  - Dix-Hallpike maneuver or other positional testing\(^1,2\)
  - Nystagmus examination\(^1,2\)
  - Any one Gait examination, including Romberg\(^1,2\)
  - Psychiatric evaluation including for anxiety or panic disorders (if suspected)\(^1,2\)
  - Hearing testing (if associated with hearing loss) to determine if conductive, sensorineural, or mixed\(^5\)
  - Vision examination\(^1\)

✓ MRI head with attention to internal auditory canal without and with contrast (CPT\(^\text{®}^70553\)) or without contrast (CPT\(^\text{®}^70551\); limited study CPT\(^\text{®}^70540\) or CPT\(^\text{®}^70543\))\(^3,5\) can be considered when the initial evaluation reveals:
  - Any associated neurological signs or symptoms\(^2\)
    - Cerebrovascular symptoms of TIA or CVA\(^2\)
    - Examples include drop attacks, seizures, coincident headache, ataxia, aura or focal neurological findings
  - Equivocal or unusual nystagmus findings, including direction changing or persistent downbeat nystagmus\(^2,4\)
  - Absent head thrust sign\(^2\)
  - Short duration (minutes) recurrent attacks\(^2\)
    - CT temporal bone without contrast (CPT\(^\text{®}^70480\)) may be considered in addition to the MRI evaluation\(^5\)
  - Hearing loss associated with
    - Progressive unilateral hearing loss\(^3\)
- Sensorineural
- Conductive: CT temporal bone without contrast (CPT® 70480) may be considered in addition to the MRI evaluation
- Congenital or total hearing loss: CT temporal bone without contrast (CPT® 70480) may be considered in addition to the MRI evaluation
- Pre-surgical planning or cochlear implant candidate: CT temporal bone without contrast (CPT® 70480) may be considered in addition to the MRI evaluation
  - Features atypical for benign positional vertigo, which may include abnormal cranial nerve findings, visual disturbances, and severe headache
  - Central vertigo
  - Also see: **HD-21 Stroke/TIA**

### Practice Notes

<table>
<thead>
<tr>
<th>Categories of Dizziness</th>
<th>Description</th>
<th>Most Common Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertigo</td>
<td>False sense of motion, possibly spinning sensation</td>
<td>Benign paroxysmal positional vertigo, Meniere disease, vestibular neuritis, and labyrinthitis</td>
</tr>
<tr>
<td>Disequilibrium</td>
<td>Off-Balance, wobbly</td>
<td>Parkinson disease and diabetic neuropathy</td>
</tr>
<tr>
<td>Presyncope</td>
<td>Feeling of losing consciousness or “blacking out”</td>
<td>Medications</td>
</tr>
<tr>
<td>Lightheadedness</td>
<td>Vague symptoms, possibly feeling disconnected with the environment</td>
<td>Psychiatric disorders, such as depression, anxiety, and hyperventilation syndrome</td>
</tr>
</tbody>
</table>

### References

2. *Neurol Clin Pract* December 2011 vol. 1 no. 1 24-33 The evaluation of a patient with dizziness, Kevin A. Kerber, MD and Robert W. Baloh, MD
5. American College of Radiology ACR Appropriateness Criteria®, 2013, Hearing Loss and/or Vertigo
Some payers may consider these techniques investigational, and their coverage policies may take precedence over eviCore’s guidelines.

HD-24.1 Functional MRI (f-MRI)

✓ f-MRI is useful in pre-operative scenarios to define the “eloquent” areas of brain.

✓ The ordering physician must be a neurosurgeon or radiation oncologist. All other requests should be sent for MD review. It must be evident that brain surgery is planned, and that f-MRI is being performed to avoid the language centers, or other processing centers, of the brain.

✓ f-MRI can be approved with PET brain in epilepsy surgery planning.

✓ Procedure codes for functional MRI:
  o CPT® 70554 MRI head, functional MRI, including test selection and administration of repetitive body part movement and/or visual stimulation, not requiring physician or psychologist administration
  o CPT® 70555 MRI head, functional MRI; requiring physician or psychologist administration of entire neurofunctional testing

HD-24.2 Magnetic Resonance Spectroscopy (MRS)

✓ MRS involves analysis of the levels of certain chemicals in a pre-selected voxels (small regions) on an MRI scan done at the same time.

✓ MRS is evaluated on a case-by-case basis, and may be considered:
  o Distinguish recurrent brain tumor from radiation necrosis as an alternative to PET (CPT® 78608)
  o Diagnosis of certain rare inborn errors of metabolism affecting the CNS (primarily pediatric patients)

HD-24.3 CSF Flow Imaging

✓ This is generally imaged as a part of a head MRI study. It is not coded separately for preoperative evaluation of hydrocephalus and Chiari syndrome, with either features of hydrocephalus or syrinx.

✓ There is no specific or unique procedure code for this study; it is done as a special sequence of a routine MRI head without contrast (CPT® 70551).
HD-24.4 CT or MRI Perfusion

✓ Performed as part of a head CT or MRI examination in the evaluation of patients with very new strokes or brain tumors

✓ Category III 0042T - “cerebral perfusion analysis using CT”

✓ There is no specific CPT code for MRI Perfusion. Perfusion weighted images are obtained with contrast and are not coded separately from a contrasted MRI Head examination. If MRI head without and with contrast is approved, no additional CPT codes are necessary or appropriate to perform MRI perfusion.

HD-24.5 Magnetic Resonance Neurography (MRN)

MRN is currently considered investigational

HD-24.6 Positional MRI

May be considered when performed as the definitive MRI study

HD-24.7 Cone Beam Computed Tomography (CBCT)

CPT® Codes: 70486, 70487, 70488, 70480, 70482 (NO separate 3-D rendering codes should be reported)

See: HD-30~Temporomandibular Joint Disease (TMJ)

References

5. Neurology 2005;64:434-441
7. Ann Neurol 2006;60:508-517
15. Radiology 2006;240:793-802
HD-25~EPISTAXIS

HD-25.1 Epistaxis
✓ Maxillofacial CT without or with contrast (CPT®70486 or CPT®70488) is appropriate based on endoscopic findings during ENT examination.

References
1. Practical Neurology 2001;1:42-49

HD-26~MASTOID DISEASE

HD-26.1 Mastoid Disease
✓ See Pediatric Head Guidelines, PEDHD 16.2 Ear Pain
HD-27.1 Hearing Loss

✓ MRI head with attention to internal auditory canal without and with contrast (CPT® 70553), or MRI head with attention to internal auditory canal without contrast or CT temporal bone without contrast (CPT® 70480) can be considered for hearing loss. Clinical information provided should include evaluation of hearing either by bedside testing or by formal audiology.

✓ Limited Study MRI with attention to internal auditory canal (CPT® 70540 - 70543) can be approved in place of MRI head with attention to internal auditory canal when requested by the provider in the following scenarios:
  o Any sensorineural (cochlea or auditory nerve)
  o Any conductive (including Cholesteatoma)
  o Cochlear implants candidate
  o Fluctuating hearing loss

Practice Note
An initial evaluation generally determines whether a patient’s hearing loss is conductive (external or middle ear structures) or sensorineural (inner ear structures, such as cochlea or auditory nerve) hearing loss.

References
HD-28.1 Ear Pain (Otalgia)

✓ CT temporal bone without and with contrast (CPT®70482) or without contrast (CPT®70480) and/or MRI head without contrast (CPT®70551) or without and with contrast (CPT®70553) can be considered for:

- Common causes of ear pain include ear infections, dental problems, sinus infection, neck problems, tonsillitis, and pharyngitis, as well as otitis media or externa or no obvious cause, which do not improve over a reasonable time
- Cerebellopontine angle or other intracranial tumor is suspected
- Nervus intermedius neuralgia in order to exclude a structural lesion

See also: **HD-27~Hearing Loss**

**References**

HD-29.1 Sinus Imaging in Adults and Children

CT Maxillofacial without contrast (CPT®70486) or limited sinus CT without contrast (CPT®76380) is considered for any of the following:

- Acute (< 4 weeks) and sub-acute (4-12 weeks) rhinosinusitis in immune-deficient (i.e., fungal sinusitis)¹
  - There is no evidence to support advanced imaging of Acute (<4 weeks) and subacute (4–12 weeks) uncomplicated rhinosinusitis.¹,³
  - There is no evidence to support routine follow-up advanced imaging after treatment with clinical improvement of sinusitis.¹
- Recurrent (< 30 days episodes separated by at least 10 asymptomatic days) acute/subacute/chronic rhinosinusitis in a patient who is possible surgical candidate¹,²,³
- Sinonasal polyposis¹
- Chronic ( > 12 weeks) sinusitis³
- Worsening or failure to improve within 72 hours of initial management⁴
- CT Orbits without contrast (CPT®70480) or with contrast (CPT®70481) or MRI head without contrast (CPT®70551) or without and with contrast (CPT®70553) or CT head without and with contrast (CPT®70470) may be added to the standard sinus CT procedure in the following scenarios
  - Orbital and/or Intracranial complications with ocular and/or neurological deficit¹,³,⁴
    - Any new obstructing sinus mass, including retention cysts and nasal polyps, that the obscures the physician’s view on endoscopy (MRI orbit/face/neck without and with contrast, CPT® 70543,) may be added to the standard sinus CT procedure
  - Fungal Sinusitis¹

One time repeat imaging may be approved in the following scenarios:

- An ENT specialist requests the imaging AND:
- There is no improvement after an additional 4 weeks of conservative treatment after initial imaging was completed; AND
- There has been a follow-up visit since the previous imaging; OR
- If there is a new abnormality on exam such as obstructing mass

Practice Notes

Rhinosinusitis is defined as inflammation of the nasal cavity and adjacent paranasal sinuses. Acute sinusitis refers to symptom duration <4 weeks, subacute 4 to 12 weeks, and chronic >12 weeks. Complicated sinusitis refers to symptoms suggesting spread of disease into adjacent structures, including orbital or intracranial complications.¹,²,³
References


HD-30~Temporomandibular Joint Disease (TMJ) and Dental/Periodontal/Maxillofacial Imaging

HD-30.1 Temporomandibular Joint Disease (TMJ)

✓ TMJ MRI (CPT® 70336) should be reserved for those who fail a minimum of 6 weeks of non-surgical treatment and who are actively being considered for TMJ surgery.

✓ TMJ Imaging in children with Juvenile Rheumatoid Arthritis
  See: PACHD-27 Temporomandibular Joint Imaging in Children

HD-30.2 Dental/Periodontal/Maxillofacial Imaging

✓ All requests will be forwarded to Medical Director for review.

✓ Indications for cone beam CT if requested by an oral or maxillofacial surgeon:
  o Impacted teeth
  o Supernumerary teeth
  o Dentoalveolar trauma
  o Root resorption
  o Foreign body
  o Odontogenic cysts, tumors, or other jaw pathology
  o Cleft pathology
  o Orthognathic surgery for dentofacial anomalies
  o Osteomyelitis and odontogenic infections
  o Bisphosphonate-related osteonecrosis of the jaw
  o Salivary gland stones
  o Maxillofacial bone graft planning
  o Dental implants related to tooth loss from injury, trauma, or jaw pathology such as cysts, tumors, or cancer

✓ Currently, there are no published guidelines from any specialty society such as the American Association of Oral and Maxillofacial Surgeons regarding the appropriate use of cone beam CT for dentoalveolar conditions, maxillofacial conditions, orthodontics, endodontics, or dental implants.

✓ Most payors do not include orthodontic clinical conditions, replacement of teeth lost due to caries or periodontal disease, non-trauma related dental implantology, or endodontic treatment not related to trauma to the natural tooth in their coverage policies.
  o Thus, cone beam CT scans in these patients would also not be included in the coverage policy.
  o These coverage policies will take precedence over eviCore’s guidelines.

✓ Cone Beam CT: Report with CPT® Codes: 70486, 70487, 70488, 70480, 70482.
3-D rendering (CPT®76376 or CPT®76377) should NOT be reported separately.

Also called i-CAT scanner or mini-CAT scanner

References

HD-31~TINNITUS

HD-31.1 Tinnitus
Advanced imaging is not usually indicated in the evaluation of Tinnitus, unless one or more of the following signs and symptoms are present,

- Tinnitus localized to a single ear
- Pulsatile Tinnitus
- Focal neurological abnormalities
- Asymmetric hearing loss

If one or more of these signs and symptoms are present, the following advanced imaging studies can be considered:

✓ MRI head without and with contrast\(^1,2,3\) (CPT®70553), or
✓ Head CT\(^1,2\) with and/or CT temporal bone\(^3\) without contrast, or
✓ MRI head with attention to internal auditory canal\(^3\) without and with contrast (CPT®70553), or MRI head and internal auditory canal\(^3\) without contrast (CPT®70551), or
✓ Limited Study MRI with attention to internal auditory canal (CPT®70540 - 70543) can be approved in place of MRI head with attention to internal auditory canal when requested by the provider

✓ MRA head without contrast (CPT 70544) and/or MRA neck without contrast (CPT 70547) or MRA neck with contrast (CPT 70548) can be added if there is suspicion of vascular lesions

Practice Notes
The history in patients with tinnitus should include a description of the tinnitus (episodic or constant, pulsatile or non-pulsatile, rhythmicity, pitch, quality of the sound), as well as inciting or alleviating factors. Continuous and pulsatile tinnitus are more concerning for an underlying and significant disorder.\(^2\) Audiometric assessment can be used as initial
diagnostic testing\textsuperscript{1,2,3} particularly in patients with tinnitus that is unilateral, persistent (> 6 months) or associated with hearing difficulties.

**References**

2. Turski PA, et. al Expert Panel on Neurologic Imaging. ACR Appropriateness Criteria\textsuperscript{®} vertigo and hearing loss. American College of Radiology (ACR); 2013.
**HD-32.1 Eye Disorders**

- MRI head without and with contrast (CPT® 70553) and/or MRI orbit without and with contrast (CPT® 70543) or MRI head without contrast (CPT® 70551) and/or MRI orbit without contrast (CPT® 70540).  
  1, 2, 3 may be considered in the following scenarios*:
  - Anisocoria which is of new onset (e.g. not present in previous photographs) and >= 1mm  
  3, 4
  - Acute or progressive vision loss due to any cause, including suspected optic neuritis  
  1, 2, 5
  - Ophthalmoplegia  
  1
  - Binocular Diplopia  
  6, 7
  - Horner’s Syndrome, for which CT Neck with contrast and/or CT Chest with contrast may be considered in addition to the head or orbital imaging  
  8
  - CT head without contrast may be substituted for the MRI imaging if there has been a head injury  
  1

- Evaluation of a third nerve palsy may be accomplished with an MRI head without and with contrast (CPT® 70553) and/or MRA brain without contrast
  - CT head without and with contrast (CPT® 70470) and/or CT orbit with contrast (CPT® 70481) can be approved if there is a clinical question of blood in the subarachnoid space.

- If MRI contraindicated or cannot be performed, CT head without and with contrast (CPT® 70470), CT orbit with contrast (CPT® 70482) or CT orbit without and with contrast may be considered as substitutes.

- Also see **HD-16–Multiple Sclerosis (MS) and Related Conditions**

**Practice Notes**

*Advanced imaging of the brain and orbit are not routinely paired. Medical necessity for each region is needed to image both regions, based on suspicion of these disorders.

**References**


4. UpToDate, Approach to the patient with anisocoria, Literature review current through: Feb 2014. | This topic last updated: Jan 9, 2014. (normal pupil difference is \( \leq 4\,\text{mm} \)).


6. UpToDate, Optic Neuritis, Pathophysiology, clinical features and diagnosis, Literature review current through: Feb 2014. | This topic last updated: Jan 5, 2014.


### HD-33~ACOUSTIC NEUROMA & OTHER CEREBELLOPONTINE ANGLE TUMORS

**HD-33.1 Acoustic Neuroma & Other Cerebellopontine Angle Tumors**

- Initial diagnosis can be accomplished with MRI head without and with contrast (CPT\textsuperscript{®} 70553) which should be done with attention to the internal auditory canals. Clinical information provided should include evaluation of hearing either by bedside testing or by formal audiology.

- Temporal bone MRI without and with contrast (CPT\textsuperscript{®} 70543) may be considered with audiologic or clinical features of retrocochlear hearing loss and a negative head MRI and in the rare patient in whom a detailed search is indicated for both a lesion of the cerebellopontine angle and lesions of the cerebral hemispheres.

- After resection, MRI head without and with contrast with attention to the internal auditory canals (CPT\textsuperscript{®} 70553) at 1 and 5 years is sufficient.

- Observation with MRI head without and with contrast with attention to the internal auditory canals (CPT\textsuperscript{®} 70553) at 6 months after diagnosis and then once a year.

### HD-34~PINEAL CYSTS

**HD-34.1 Pineal Cysts**

See Pediatric Head Guidelines, [PEDHD 13.2 Pineal Cysts](http://www.aao.org/).
HD-35.1 Arachnoid Cysts

See Pediatric Head Guidelines, **PEDHD 13.1 Arachnoid Cysts**