



HEAD IMAGING GUIDELINES

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MedSolutions, Inc. Clinical Decision Support Tool for Advanced Diagnostic Imaging

Common symptoms and symptom complexes are addressed by this tool. Imaging requests for patients with atypical symptoms or clinical presentations that are not specifically addressed will require physician review. Consultation with the referring physician may provide additional insight.

This version incorporates MSI accepted revisions prior to 12/31/14

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HEAD IMAGING GUIDELINES

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ABBREVIATIONS for HEAD IMAGING GUIDELINES

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

HEAD IMAGING GUIDELINES

HD-1~GENERAL GUIDELINES

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HD-1~GENERAL GUIDELINES

- ✓ A current clinical evaluation (within 60 days) is required before advanced imaging can be considered.
 - The clinical evaluation may include a relevant history and physical examination, including a neurological examination, appropriate laboratory studies, and non-advanced imaging modalities.
 - Other meaningful contact (telephone call, electronic mail or messaging) by 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 area 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 brain MRI [CPT[®]70553] or MRI Orbit, Face, Neck [CPT[®]70543]) is adequate to report the imaging of the pituitary.
 - **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 brain 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, except:
 - 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-1.3 General Guidelines – Brain MRI

- ✓ 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 – Brain CT

- ✓ Head CT without contrast (CPT[®]70450) in nearly all cases, to show:
 - mass effect
 - blood/blood products
 - abnormal tissue
 - MRI without and with contrast may be performed to follow-up abnormalities seen on CT without contrast when a mass, lesion, or infection is found
 - MRI without contrast may be performed to follow-up abnormalities seen on CT without contrast when there is suspected Multiple Sclerosis or other demyelinating disease

HD-1.5 General Guidelines - CT and MR Angiography: (CTA and MRA)

- ✓ Head MRA (CPT[®]70544) is generally done without contrast.
- ✓ **Head and Neck MRA 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
 - arterial dissection suspicion
 - sickle cell anemia
 - suspicion of vasculitis
 - **NOTE:** Evaluation of posterior circulation disease requires both neck and head MRA/CTA to visualize the entire vertebral- basilar system.

- ✓ **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 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 brain MRI 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 brain MRI 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

1. Yousem DM, Grossman RI. *Neuroradiology, the requisites*. 3rd Ed. Philadelphia, Mosby, 2010
2. Latchaw RE, Kucharczyk J, Moseley ME. *Imaging of the Nervous System*. Philadelphia, Elsevier, 2005
3. Rowland LP (Ed.). *Merritt's Neurology*. 12th Ed. Philadelphia, Lippincott, 2010
4. Menkes JH, Sarnat HB, Maria BL. *Child Neurology*. 7th Ed. Philadelphia, Lippincott, 2006
5. <http://www.acr.org/~media/ACR/Documents/AppCriteria/Diagnostic/CerebrovascularDisease.pdf>. Accessed October 10, 2013.

HD-2~TASTE and SMELL DISORDERS

HD-2.1 Taste and Smell Disorders

- ✓ Brain MRI 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}.
- ✓ Sinus or facial bone disorders is suspected, then consider initially Maxillofacial CT without contrast (CPT[®]70486)²

References

1. Wippold FJ II, Cornelius RS, Aiken AH, Angtuaco EJ, et al. ACR Appropriateness Criteria[®] cranial neuropathy. American College of Radiology (ACR); 2012. 18 p
2. UpToDate, Evaluation and treatment of taste and smell disorders, Literature review current through: Feb 2014.

HD-3~ATAXIA

HD-3.1 Ataxia – Imaging

- ✓ MRI brain without and with contrast (CPT®70553) or MRI brain without contrast (CPT®70551) is considered in all with ataxia¹:
 - If 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)
 - If acute and suspect stroke see **HD-21~ Stroke – TIA**
 - **If MS is suspect, see HD-16-Multiple Sclerosis (MS) & Related Conditions**
 - If acute following head trauma can ADD CT head without contrast (CPT®70450) and/or CT temporal bone without contrast¹ (CPT®70480)

Reference

1. Broderick DF, Wippold FJ II, Cornelius RS, Aiken AH, et al. Expert Panel on Neurologic Imaging. ACR Appropriateness Criteria® ataxia. *American College of Radiology (ACR)*; 2012.

HD-4~BEHAVIORAL DISORDERS

Autism: See **PACHD-4~Autism and Autism Spectrum Disorders**

HD-4.1 Behavioral Disorders – Imaging

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
 - Brain MRI without contrast (CPT[®]70551), or
 - Head CT without contrast (CPT[®]70450)

References

1. Ropper AH and Brown RH. *Adams and Victor's Principles of Neurology*. 8th Ed. New York, McGraw-Hill, 2005, pp.1285-1332
2. Rowland LP (Ed.). *Merritt's Neurology*. 12th Ed. Philadelphia, Lippincott, 2010, pp.1053-1075

HD-5~CHIARI and SKULL-BASE MALFORMATION

HD-5.1 Chiari Malformation

- ✓ For Chiari malformation, Brain MRI without contrast (CPT[®]70551) is appropriate
- ✓ Once Chiari malformation has been identified, need to:
 - Exclude syrinx
 - Cervical and Thoracic Spine MRI without contrast (CPT[®]72141)
 - Conduct follow-up hydro/syringomyelia
 - Spine MRI without contrast (is superior to spine CT)
 - See: **SP-13~Spinal Cord Disorders (e.g. Syringomyelia)** in the Spine Imaging Guidelines.
 - Head or neck MRA and CTA are not needed in the evaluation of syringomyelia unless ordered by the operating surgeon for preoperative planning.
 - Evaluate for hydrocephalus with CSF flow studies. There is no unique CPT[®] code to report a CSF flow study; it is performed as a sequence a brain MRI without contrast (CPT[®]70551). No separate code should be assigned.
See: **HD-24.3 CSF Flow Imaging**
 - Repeat Brain MRI without contrast is not needed unless there are increasing symptoms or signs, or as a preoperative study
- ✓ Chiari malformation is not itself familial and family screening is not appropriate.

HD-5.2 Skull-Base Malformations

- ✓ **Platybasia** is a malformation of the skull base: the clivus is too horizontal:
 - Brain MRI without contrast (CPT[®]70551) or Head CT without contrast (CPT[®]70450)
- ✓ **Basilar impression** involves malformation of the occipital bone in relation to C1/2 with the top of the spinal cord is inside the posterior fossa and the foramen magnum is undersized which can lead to brain stem and upper spinal cord and can be associated with the Chiari malformation:
 - Noncontrast Brain MRI without (CPT[®]70551) and cervical spine MRI (CPT[®]72141) in the individual and any first degree relatives
 - If surgery is being considered, noncontrast head and cervical spine CT (CPT[®]70450 and CPT[®]72125) can be performed.

Practice Notes

Chiari I (formerly called Arnold-Chiari) is elongation and displacement of the caudal end of the brainstem into the spinal canal with protrusion of the cerebellar tonsils at least 5 mm below the foramen magnum. Most are without significant symptoms (syringomyelia, hydromyelia or hydrocephalus). Chiari II, III, and IV are very rare and involve much more extensive malformations at all levels of the neural axis which are not further discussed in these guidelines

Reference

1. Menkes JH, Sarnat HB, Maria BL. *Child Neurology*. 7th Ed. Philadelphia, Lippincott, 2006, pp.306-307.

CRANIAL NERVE (CN) PROBLEMS

HD-6~FACIAL PALSY (Bell's Palsy)

HD-6.1 Facial Palsy – Imaging

- ✓ Brain MRI without and with contrast (CPT[®]70553) or MRI brain without contrast (CPT[®]70551) is considered with unexplained facial paresis/paralysis when^{1,2}:
 - Trauma to the temporal bone²
 - History of tumor²
 - No improvement in 8 weeks¹
 - No full recovery in 3 months²
 - Worsening paresis/paralysis²
 - Atypical or Inconsistent features² including:
 - Second paralysis on the same side²
 - Paralysis of isolated branches of the facial nerve²
 - Paralysis associated with other cranial nerves²

References

1. Reginald Baugh et al. Clinical Practice Guidelines Summary: Bell's Palsy. *Otolaryngol Head Neck Surg*, 2013; 149: S1-S27
2. Wippold FJ II, Cornelius RS, Aiken AH, Angtuaco EJ, et al. ACR Appropriateness Criteria[®] cranial neuropathy. ACR Appropriateness Criteria, Cranial Neuropathy 2012.

CRANIAL NERVE (CN) PROBLEMS

HD-7~RECURRENT LARYNGEAL PALSY

HD-7.1 Recurrent Laryngeal Palsy – Imaging

- ✓ MRI brain and neck without and with contrast (CPT[®]70553 and CPT[®]70543) or MRI brain and neck without contrast (CPT[®]70551 and CPT[®]70540) or CT head and neck with contrast (CPT[®]70460 and CPT[®]70491) can be considered with unilateral vocal cord/fold palsy identified by laryngoscopy¹
 - Add Chest CT with contrast (CPT[®]71260) if left vocal cord palsy¹

Reference

1. Wippold FJ II, Cornelius RS, Aiken AH, Angtuaco EJ, Berger KL, Brown DC, Davis PC, Holloway K, McConnell CT Jr, Mechtler LL, Nussenbaum B, Rosenow JM, Roth CJ, Seidenwurm DJ, Slavin K, Waxman AD, Expert Panel on Neurologic Imaging. ACR Appropriateness Criteria[®] cranial neuropathy. American College of Radiology (ACR); 2012

HD-8~DEMENTIA

HD-8.1 Dementia - Diagnosis/Imaging

- ✓ Neuropsychological testing can be performed when history and bedside mental status examination cannot provide a confident diagnosis^{1,2} Brain MRI without contrast (CPT®70551) or Brain MRI without and with contrast (CPT®70553) or Head CT without contrast (CPT®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®78608) imaging are considered experimental and investigational in the diagnosis of Alzheimer's disease and in differentiation between Alzheimer's disease and other neurodegenerative/neurologic disorders.^{3,4,5}

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 informant¹ and “bedside” mental status examinations (such as the Mini Mental Status Exam, Montreal Cognitive Assessment, Memory Impairment Screen^{1,2})

References

1. McKhann GM. The diagnosis of dementia due to Alzheimer's disease: Recommendations from the National Institute on Aging and the Alzheimer's Association workgroup, ePub Alzheimer's & Dementia. *Alzheimer's & Dementia*, 2011; 7: 270-279.
2. AAN Guideline Summary for Clinicians. Detection, diagnosis, and management of dementia. http://tools.aan.com/professionals/practice/pdfs/dementia_guideline.pdf. (accessed March 10, 2014).
3. Decision Memo for Positron Emission Tomography (FDG) for Alzheimer's Disease/Dementia (CAG-00088N).
4. Wippold FJ II, Cornelius RS, Broderick DF, Brown DC, Brunberg JA, Davis PC, De La Paz RL, Frey KA, Garvin CF, Holloway K, McConnell CT Jr, Mukherji SK, Rosenow JM, Seidenwurm DJ, Slavin K, Sloan MA, Smirniotopoulos JG, Expert Panel on Neurologic Imaging. ACR Appropriateness Criteria® dementia and movement disorders. [online publication]. Reston (VA): American College of Radiology (ACR); 2010. 14 p.

5. D. S. Knopman, et. al., Practice parameter: Diagnosis of dementia (an evidence-based review), Report of the Quality Standards Subcommittee of the American Academy of Neurology, *Neurology* May 8, 2001 vol. 56 no. 9 1143-1153.
6. Keith A. Johnson, Appropriate use criteria for amyloid PET: A report of the Amyloid Imaging Task Force, the Society of Nuclear Medicine and Molecular Imaging, and the Alzheimer's Association, *Alzheimer's & Dementia - Alzheimer's & Dementia*, Volume 9, Issue 1 , Pages E1-E16, January 2013.
7. Decision Memo for Positron Emission Tomography (FDG) and Other Neuroimaging Devices for Suspected Dementia (CAG-00088R) September 15, 2004, <http://www.cms.gov/medicare-coverage-database/details/nca-decision-memo.aspx?NCAId=104>, acquired March 10, 2014.
8. NCD for FDG PET for Dementia and Neurodegenerative Diseases (220.6.13), effective 4/3/2009, implemented 10/30/2009, <http://www.cms.gov/medicare-coverage-database/details/ncd-details.aspx?NCDId=288&ncdver=3&bc=BAABAAAAAAAA&>, acquired March 10, 2014.

HD-9~EPILEPSY/SEIZURES

HD-9.1 Epilepsy/Seizure

- ✓ Brain MRI without and with contrast (CPT[®]70553) or without contrast (CPT[®]70551) or more often in the acute setting, Head CT without (CPT[®]70450) or Head CT with contrast (CPT[®]70460) can be considered when^{1,2,3,4}:
 - New onset seizures (with or without related trauma)^{1,2,3,4}
 - Drug resistant epilepsy¹
 - Surgical candidate or planning¹
- ✓ PET (CPT[®]76808) can be considered with seizures when surgical candidate or planning¹

References

1. Smirniotopoulos JG, Wippold FJ II, Cornelius RS, Angtuaco EJ, Broderick DF, Brown DC, Creasy JL, Davis PC, Garvin CF, Holloway K, McConnell CT Jr, Mechtler LL, Rosenow JM, Seidenwurm DJ, Slavin K, Tobben PJ, Waxman AD, Expert Panel on Neurologic Imaging. ACR Appropriateness Criteria[®] seizures and epilepsy. [online publication]. Reston (VA): American College of Radiology (ACR); 2011. 10 p.
2. A. Krumholz, MD, et al., Practice Parameter: Evaluating an apparent unprovoked first seizure in adults (an evidence-based review), Report of the Quality Standards Subcommittee of the American Academy of Neurology and the American Epilepsy Society, *Neurology* November 20, 2007 vol. 69 no. 21 1996-2007
3. C. L. Harden, MD, et. al., Reassessment: Neuroimaging in the emergency patient presenting with seizure (an evidence-based review), Report of the Therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology, *Neurology* October 30, 2007 vol. 69 no. 18 1772-1780
4. D. Hirtz, MD, et. al., Practice parameter: Evaluating a first nonfebrile seizure in children, Report of the Quality Standards Subcommittee of the American Academy of Neurology, the Child Neurology Society, and the American Epilepsy Society, *Neurology* September 12, 2000 vol. 55 no. 5 616-623

HD-10~FACIAL PAIN/TRIGEMINAL NEURALGIA

HD-10.1 Facial Pain/Trigeminal Neuralgia - Imaging

- ✓ Brain MRI 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)
 - Under age 40 raises 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

Practice Notes

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

References

1. Goh BT, Poon CY, Peck RH. The importance of routine magnetic resonance imaging in trigeminal neuralgia diagnosis. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2001;92 :424-429.

HEAD IMAGING GUIDELINES

HD-11~HEADACHE

HD-11.1 Headache, Adult – Imaging

- ✓ Any one of the following: Brain MRI without contrast (CPT®70551), brain MRI without and with contrast (CPT®70553), head CT without contrast (CPT®70450), or head CT without and with contrast (CPT®70470)^{1,2} can be utilized for headache that meet any of the following criteria:

CRITERIA	
1.	Abnormal features or neurological findings on examination ^{1,2,3,4,5,6,7} including: <ul style="list-style-type: none"> • Change in attack pattern^{1,2,7} (For example: rapidly increasing headache intensity or frequency, transformation of established migraine to chronic daily headaches, associated with seizure) • Focal neurological signs or symptoms^{1,2,4,6,7} • Papilledema (see: <u>HD-17~Papilledema/Pseudotumor Cerebri</u>)
2.	Sudden onset of headache ^{1,7} <ul style="list-style-type: none"> • 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 (Can add MRA or CTA Neck and/or Head ¹) <ul style="list-style-type: none"> • See also: <u>HD-12.1 Intracranial Aneurysms – Imaging</u> • See also: <u>HD-21.1 Stroke/TIA</u>
3.	Trigeminal autonomic origin ¹ <ul style="list-style-type: none"> • See also <u>HD-10~Facial Pain/Trigeminal Neuralgia</u>
4.	Skull base, orbit, periorbital or oromaxillary ¹ (Can add MRI/CT Orbits)
5.	Suspected intracranial extension of sinusitis or mastoiditis ¹ <ul style="list-style-type: none"> • NOT cervicogenic • See <u>HD-29~Sinusitis</u>
6.	New onset older than 50 ^{1,2,6} (Can add MRA or CTA Neck and/or Head)
7.	Cancer or immunosuppression ¹
8.	Prothrombotic states ¹ including anticoagulation
9.	Pregnancy ¹
10.	Positional including Valsalva maneuver ^{2,6} , or associated with cough, exertion, or sexual (post-coital) activity ^{1,6}
11.	Post-Traumatic within one year ¹ See also: <u>HD-13~Head Trauma</u>
12.	Acute systemic infections with meningeal neck stiffness ^{1,6}

- ✓ Neuroimaging is not usually warranted in patients with migraine and a normal neurologic examination⁴

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
3. Choose Wisely.org, American Headache Society, acquired February 13, 2014
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
9. Neff MJ, Am Fam Physician. 2005 Mar 15;71(6):1219-1222.
10. Institute for Clinical Systems Improvement. Health Care Guideline Diagnosis and Treatment of Headache, Eleventh Edition January 2013, https://www.icsi.org/_asset/qwrznq/Headache.pdf
11. Callaghan, B, et. al., Headaches and Neuroimaging: High Utilization and Costs Despite Guidelines, JAMA Internal Medicine, Online March 17, 2014

HEAD IMAGING GUIDELINES

HD-12 Aneurysm and AVM

HD-12.1 Intracranial Aneurysms

- ✓ Head CTA (CPT[®]70496) or Head MRA (CPT[®]70544) can be performed if any of the following:

Criteria	Comments
1. Posterior communicating artery aneurysm compressing cranial nerve III exhibiting fixed, dilated pupil and severe ipsilateral headache.	Head CT without contrast (CPT [®] 70450) or Brain MRI without contrast (CPT [®] 70551) can be added.
2. Mycotic Aneurysm (bacterial from IVDA) with thunderclap headache (but not all with endocarditis)	Brain MRI without and with contrast (CPT [®] 70553) can be added
3. Screening or further evaluations if: <ul style="list-style-type: none"> • Two first degree relatives with subarachnoid hemorrhage (SAH) or an intracranial aneurysm, beginning at age 20 and 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 beginning at age 20 to 65, repeat at ten year intervals^{3,5} • History of aneurysmal subarachnoid hemorrhage³ • Anyone in any of these screening categories with headache: head CT without contrast (CPT[®]70450) or Brain MRI without contrast (CPT[®]70551) can be added • Uncertain lesion and aneurysm in the differential, on Brain MRI or Head CT or Head CTA (CPT[®]70496) or head MRA. • Other genetic syndrome** and risk populations have been described to have increased rates of SAH or intracranial aneurysm. Screening for these groups is not supported by national guidelines¹⁻⁸ 	<p>*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).⁹</p> <p>** including single first-degree relative 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.</p>

- ✓ 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 (AVM) may be suspected as cause of hemorrhage.
- ✓ Repeat head CTA (CPT®70496) or head MRA (CPT®70544 or CPT®70546) can depend on the character of the disease and risk factors, and according to the following template:

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

HD-12.2 Arteriovenous Malformations (AVMs) and Related Lesions

- ✓ Brain MRI without and with contrast (CPT®70553) or without contrast (CPT®70551) when:
 - Suspected AVM based on history of SAH.
 - Screening if:
 - Hereditary hemorrhagic telangiectasia syndrome (Osler Weber Rendu).
 - Familial cavernoma
 - **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) when known AVM are being evaluated for embolization or surgery of the AVM
- ✓ Repeat advanced imaging with brain MRI without and with contrast (CPT®70553) or without contrast (CPT®70551), plus head MRA (CPT®70544) or head CTA (CPT®70496) can depend on the character of the disease and risk factors, or if:
 - New hemorrhage episode is likely
 - Onset or change of seizures or focal neurological signs
 - As follow up after treatment (surgery or embolization) as requested by specialists.

Practice Notes

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

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 an initial risk of bleeding of 2% per year

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9. Unruptured Intracranial Aneurysms: Screening and Management. Adam Kelly, M.D. *Continuum*. Volume 20, Number 2. April 2014. P. 387 – 398

HD-13~HEAD TRAUMA

HD-13.1 Head Trauma – Imaging

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:
 - Taking one anticoagulant or two anti-aggregants, (e.g., aspirin and Plavix)
 - Known platelet or clotting disorder
 - Renal failure (creatinine>6)
 - Glasgow coma scale (GCS) score of less than 15 at 2 hours following injury
 - >30 minutes of amnesia
 - 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)
 - Suspected open skull fracture
 - Signs of basilar skull fracture
 - Two or more episodes of vomiting
 - Patient > 64 years old

- ✓ Brain MRI 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.

References

1. Stiell IG, Wells GA, Vandemheen K, et al. The Canadian CT head rule for patients with minor head injury. *Lancet* 2001; 357:1391–6.

HD-14~CNS INFECTION

HD-14.1 CNS Infection – Imaging

- ✓ The following studies may be considered for suspected intracranial infection¹⁻⁴:
 - MRI brain without and with contrast (CPT[®]70553), or
 - MRI brain without contrast (CPT[®]70551), or
 - Head CT without contrast (CPT[®]70450), or
 - Head CT without and with contrast (CPT[®]70470)

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HD-15~Movement Disorders

HD-15.1 Movement Disorders - Imaging

- ✓ The majority of movement disorders are based on a clinical diagnosis and do not require imaging. These include:
 - Typical Parkinson's Disease¹
 - Essential Tremor or Tremors of Anxiety or Weakness
 - Restless Leg Syndrome
 - 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 when:
 - **Atypical Parkinsonism** because of unusual clinical features, incomplete or uncertain medication responsiveness, or clinical diagnostic uncertainty¹.
 - Suspected Huntington Disease¹

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

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2. Suchowersky, O, et. al., Practice Parameter: Diagnosis and prognosis of new onset Parkinson disease (an evidence-based review) Report of the Quality Standards Subcommittee of the American Academy of Neurology, Neurology April 11, 2006 vol. 66 no. 7 968-975

HD-16~Multiple Sclerosis (MS) and Related Conditions

HD-16.1 MS - Diagnosis/Imaging

- ✓ MRI brain without and with contrast (CPT[®]70553) and MRI cervical and thoracic spine without and with (CPT[®]72156 and CPT[®]72157) requires¹ clinical suspicion based on recurrent episodes of variable neurological signs and symptoms or clinically isolated syndromes and² exclusion, at baseline, of appropriate alternative conditions that can mimic MS.¹⁻⁴
 - Add MRI orbital without and with contrast (CPT[®]70543) if optic neuritis, in addition to above, is suspected⁴.
- ✓ MRI lumbar spine usually is not needed since Cervical and Thoracic will visualize the entire spine.
 - 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 if:
 - New episode of neurological deficit⁴
 - Baseline, in 3 – 6 months and then annually when instituting or maintaining immune-modulating agents and when changing therapy⁴
 - Symptoms suggestive of Progressive Multifocal Leukoencephalopathy during Tysabri therapy.⁵
 - Asymptomatic MRI imaging is to be determined on a case by case basis.
 - Repeat imaging requests for MRI without contrast may be approved when requested by a specialist
- ✓ Family members needs not be screened, unless exhibit suspect signs or symptoms of MS

Practice Notes

Multiple Sclerosis (MS) is common and variable with more women affected and at a younger age. 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

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2. Evidence-based guideline: Clinical evaluation and treatment of transverse myelitis: Report of the Therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology, T.F. Scott, MD, E.M. Frohman, MD, PhD, J. De Seze, MD, G.S. Gronseth, MD, FAAN and B.G. Weinshenker, MD, *Neurology* December 13, 2011 vol. 77 no. 24 2128-2134
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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...]
6. National Multiple Sclerosis Society, Genetics, <http://www.nationalmssociety.org/about-multiple-sclerosis/what-we-know-about-ms/who-gets-ms/genetics/index.aspx>, acquired on February 19, 2014.
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.”

HD-17~Papilledema/Pseudotumor/Cerebri

HD-17.1 Papilledema/Pseudotumor Cerebri

- ✓ Brain MRI without and with contrast (CPT[®]70553) can be considered when there is suspected elevated intracranial pressure, such as with pseudotumor cerebri (benign intracranial hypertension), papilledema, to exclude cerebral mass lesions, obstructive hydrocephalus, or occult meningeal disease
 - Orbital MRI (CPT[®]70543) or Orbit CT without and with (CPT[®]70482) if concern for orbital pseudotumor or a primary bilateral orbital disorder
 - Repeat imaging to evaluate either:
 - Shunt dysfunction in those patients who have had ventriculoperitoneal (VP) or lumboperitoneal (LP) shunts
 - Clinical deterioration
 - MRA/CTA, MRV/CTV can be approved for papilledema, especially in post-partum women to rule out venous sinus thrombosis.

Reference

1. *Headache Currents* 2005;2:1-10

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.^{1,2} Advanced imaging can be considered initially, based on the highest suspicion disorder, according to these guidelines.^{1,2}

References

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HEAD IMAGING GUIDELINES

HD-19~PITUITARY

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 brain MRI without or without and with contrast (CPT[®]70551 or CPT[®]70553):
 - MRI Orbit, Face, Neck (CPT[®]70543) or Head CT without and with contrast (CPT[®]70470) are alternatives
 - Head CT without and with contrast (CPT[®]70470) is occasionally used in addition to MRI to visualize perisellar bony structures in the preoperative evaluation of certain sellar tumors

PITUITARY IMAGING (Continued next page.)

MICROADENOMA (<1cm)		
Indication	Initial Imaging	Repeat Imaging
Microadenoma: Nonfunctioning	Brain MRI without contrast and with contrast (CPT [®] 70553)	Brain MRI without contrast and with contrast (CPT [®] 70553) at: <ul style="list-style-type: none"> • 6 and 12 months, then yearly for 3 years if stable. After 3 years, then every 5 years unless new signs and symptoms.
Microadenoma: Unexplained pituitary asymmetries or small low density regions	Brain MRI without contrast and with contrast (CPT [®] 70553)	MRI without and with contrast (CPT [®] 70553) at <ul style="list-style-type: none"> • 1-2 years; and • 5 years
Prolactinomas*	Brain MRI without and with contrast (CPT [®] 70553) with: <ul style="list-style-type: none"> -Unexplained elevated prolactin or -Galactorrhea (in nonlactating) and normal prolactin levels persisting for ≥ 6 months 	Brain MRI without and with contrast (CPT [®] 70553) only if: <ul style="list-style-type: none"> • Hormonal levels rise or visual or neurological findings appear
TSH, FSH, and LH producing	Brain MRI without and with contrast (CPT [®] 70553) when hormone levels are inappropriately elevated	
Male Hypogonadism	Brain MRI without and with contrast (CPT [®] 70553) if pituitary hormones are borderline to low (LH <i>or</i> FSH) and serum total testosterone of less than 80% of the lower limit of normal (<150 ng/l, most labs)	
Panhypopituitarism	Brain MRI without and with contrast (CPT [®] 70553) if hypothyroidism with low TSH	

ADH ABNORMALITIES		
Indication	Initial Imaging	Repeat Imaging
Diabetes Insipidus (DI)	Brain MRI without and with contrast (CPT®70553) if: <ul style="list-style-type: none"> Laboratory testing consistent with DI and etiology uncertain 	NA
Syndrome of Inappropriate ADH (SIADH)	Brain MRI without and with contrast (CPT®70553) if: <ul style="list-style-type: none"> Etiology remains uncertain or is thought to be in the nervous system, 	NA
Macroadenoma	Brain MRI without and with contrast (CPT®70553)	Brain MRI (CPT®70553) every: <ul style="list-style-type: none"> 6 months for the first year; and then, annually for 5 years (longer if craniopharyngiomas); every 6 months if treatment is deferred
Other Pituitary Region Tumors**	Evaluation may require CT in addition to MRI to evaluate for hyperostosis. Requests will be sent for Medical Director review.	
Enlarged/Empty Sella Turcica***	Head CT without and with contrast (CPT®70470) or, brain MRI without and with contrast (CPT®70553) to <ul style="list-style-type: none"> exclude residual pituitary tumor and to assess the position of the chiasm since herniation into the sella, causes Chiasmatic-type visual loss 	MRI without and with contrast (CPT®70553) 1-5 years after the initial study can be performed.

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 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. Meningiomas - about 10% arise in this area.

*****Enlarged/Empty Sella Turcica Notes:** enlarged sella turcica without evident tumor is incidental finding on brain MRI or head CT 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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2. Kucharczyk W, Montanera WJ, Kucharczyk J. *The sella turcica and parasellar region*. In Latchaw RE, Kucharczyk J, Moseley ME. *Imaging of the Nervous System*. Philadelphia, Elsevier, 2005, pp.1033-1061
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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:
 - Any lesion on physician examination and skull x-ray not clearly benign
 - Langerhans' cell histiocytosis, myeloma, and metastatic cancer, when symptoms suggest bony lesions
 - Brain MRI without contrast (CPT[®]70551) or with and without contrast (CPT[®]70553) if there is concern for intracranial extension

HD-21 STROKE/TIA

HD-21.1 Stroke/TIA

- ✓ *One* from each of the following can be considered for first onset or repeat TIA or stroke¹⁻⁴ or Transient Global Amnesia⁵:
 - CT head without contrast (CPT 70450) or CT head with contrast (CPT®70460) *or* MRI brain without and with contrast (CPT®70553) or MRI brain without contrast (CPT®70551)
 - MRI is preferred if presentation later and can be considered after CT head¹⁻⁴
 - Duplex ultrasound of the carotid arteries **or** MRA neck without and with contrast or MRA neck without contrast (CPT®70548); or Neck CTA (CPT®70498)
- ✓ MRA head without and with contrast (CPT®70546) or MRA head without contrast (CPT®70544) or CTA head with contrast(CPT®70496) to the above if:
 - 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) or head or neck trauma, fibromuscular dysplasia, Ehlers-Danlos syndrome, and chiropractic neck manipulation.
 - Repeat imaging as determined by Specialist
 - Suspected Venous Infacts (as MRV (CPT®70544) or CTV (CPT®70496)) if identified on CT/MRI Brain⁶
 - Recurrent stroke or TIA who have failed maximum medical management (smoking cessation, anti-platelet medication if no contra-indications, BP and lipid treatment) to determine if candidates for elective invasive procedures (such as angioplasty or stents)^{7,8}

HD-21.2 Venous Infarcts

- ✓ MRV (CPT®70544) or CTV (CPT®70496) and brain MRI without and with contrast (CPT®70553) are appropriate if:
 - Intracranial hypertension with headache, vomiting and papilledema from venous sinus thrombosis
 - Venous infarction is identified on Brain MRI or Head CT
 - Women with postpartum stroke or postpartum papilledema
 - Children or young adults who present with a stroke in which headache and seizures are prominent, or who are known to have an intrinsic system clotting disorder.

Practice Notes

Transient Global Amnesia is “...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
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HD-22~CEREBRAL VASCULITIS

HD-22.1 Cerebral Vasculitis

- ✓ Brain MRI 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 Arteritis¹⁻³
 - Head and Neck MRA or CTA³

Practice Notes

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

Dominant Vessel Involved	Primary	Secondary
Large arteries	<ul style="list-style-type: none"> ● Giant cell arteritis ● Takayasu’s arteritis 	Aortitis with rheumatoid disease; Infection (e.g. syphilis)
Medium Arteries	<ul style="list-style-type: none"> ● Classical polyarteritis nodosa ● Kawasaki disease 	Infection (e.g. hepatitis B)
Small vessels and medium arteries	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● Henoch-Schönlein purpura ● Essential cryoglobulinaemia ● Cutaneous leukocytoclastic vasculitis 	Drugs (e.g. sulphonamides, etc.) Infection (e.g. hepatitis C)

References

1. Joseph, F. and Scolding, N, Cerebral vasculitis a practical approach, *Practical Neurology* 2002;2:80-93
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HD-23~DIZZINESS, VERTIGO, and SYNCOPE

HD-23.1 Dizziness, Vertigo, and Syncope

- ✓ Initial components in the evaluation of false sensations of balance or motion include patient history and examinations that can direct diagnosis, including the elimination of inciting factors.^{1,2}
- ✓ Prior to advanced imaging, the minimum initial evaluation should include each of the following:
 - Orthostatic blood pressure,^{1,2} *and*
 - Dix-Hallpike maneuver or other positional testing,^{1,2} *and*
 - Nystagmus examination,^{1,2} *and*
 - Any one Gait examination, including Romberg,^{1,2} *and*
 - Psychiatric evaluation including for anxiety or panic disorders (if suspected),^{1,2} *and*
 - Hearing testing (if associated with hearing loss) to determine if conductive, sensorineural, or mixed,⁵ *and*
 - Vision examination¹
- ✓ Brain MRI and internal auditory canal without and with contrast (CPT[®]70553) or without contrast (CPT[®]70551; limited study CPT[®]70540 or CPT[®]70543)^{3,5} can be considered when the initial evaluation reveals:
 - Any associated neurological signs or symptoms²
 - Cerebrovascular symptoms of TIA or CVA²
 - 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 sign²
 - Short duration (minutes) recurrent attacks²
 - Can add CT temporal bone without contrast (CPT[®]70480)⁵
 - Hearing loss associated with
 - Progressive unilateral hearing loss³
 - Sensorineural⁵
 - Conductive⁵: can add CT temporal bone without contrast (CPT[®]70480)
 - Congenital or total hearing loss⁵: can add CT temporal bone without contrast (CPT[®]70480)
 - Pre-surgical planning or cochlear implant candidate⁵: can add CT temporal bone without contrast (CPT[®]70480)

- Features atypical for benign positional vertigo, which may include abnormal cranial nerve findings, visual disturbances, and severe headache⁴
- Central vertigo
- Also see: **HD-21 Stroke/TIA**

Practice Notes

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

References

1. American Family Physician, Dizziness: A Diagnostic Approach, *Am Fam Physician*. 2010 Aug 15;82(4):361-368. ROBERT E. POST, LORI M. DICKERSON
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
3. American Family Physician, Initial Evaluation of Vertigo RONALD H. LABUGUEN, M.D *Am Fam Physician*. 2006 Jan 15;73(2):244-251
4. Clinical practice guideline: Benign paroxysmal positional vertigo, Neil Bhattacharyya, MD, et al., *Otolaryngology–Head and Neck Surgery* (2008) 139, S47-S81
5. American College of Radiology ACR Appropriateness Criteria[®], 2013, Hearing Loss and/or Vertigo

HD-24~OTHER IMAGING STUDIES

Some payers may consider these techniques investigational, and their coverage policies may take precedence over MedSolutions' 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:
 - **CPT[®]70554** MRI Brain, functional MRI, including test selection and administration of repetitive body part movement and/or visual stimulation, not requiring physician or psychologist administration
 - **CPT[®]70555** MRI Brain, 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:
 - Distinguish recurrent brain tumor from radiation necrosis as an alternative to PET (CPT[®]78608)
 - 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 Brain MRI 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”

HD-24.5 Magnetic Resonance Neurography (MRN)

- ✓ MRN is currently considered investigational by most payors.

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

1. Latchaw RE, Kucharczyk J, Moseley ME. *Imaging of the Nervous System*. Philadelphia, Elsevier, 2005, pp.1089-1100, 101-120 and 1225-1239
2. CMS, *Decision memo for magnetic resonance spectroscopy for brain tumors (CAG-00141N)* <http://www.cms.gov/hhs.gov/mcd/viewdecisionmemo.asp?id=52> Accessed December 18, 2009
3. *Neurology* 2005;64:2085-2089
4. *Neuroimaging Clin N Am* 2006;16:87-116. *An encyclopedic review of current knowledge regarding use of MRS in inborn errors, disease by disease.*
5. *Neurology* 2005;64:434-441
6. *Neurology* 2005;64:406-407
7. *Ann Neurol* 2006;60:508-517
8. *Neurology* 2007;68:694-697
9. *Stroke* 2001;32:2021-36
10. *Neurology* 2007;68:730-736
11. Haughton VM, et al. *Mapping brain function with functional magnetic resonance imaging*. In Latchaw RE, Kucharczyk J, Moseley ME. *Imaging of the Nervous System*. Philadelphia, Elsevier, 2005, pp.89-100
12. *Neurosurgery* 2004;54:902-915.
13. *Radiology* 2005;236:247-253
14. *Neuroimag Clin N Amer* 2006;16:285-297
15. *Radiology* 2006;240:793-802
16. Stippich C (Ed.). *Clinical Functional MRI*. Springer, Berlin Heidelberg, 2007
17. *Nature Clin Pract Neurol* 2005;1:45-53
18. *Neurology* 2002;58:1597-1602
19. *Radiology* 2006;241:213-222
20. *Neurosurgery* 2006;59:493-511
21. *International Journal of Oral & Maxillofacial Surgery* 2009 June;38(6):609-625

EAR and NOSE GUIDELINES

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
2. *Imaging of the Temporal Bone*, 4th ed. *J.D. Swartz and L.A. Loevner, eds. Thieme Medical Publishers; 2009.*

HD-26~MASTOID DISEASE

HD-26.1 Mastoid Disease

- ✓ Temporal bone CT without contrast (CPT[®]70480) is the usual imaging for disease of the mastoid region, including mastoiditis.
 - Head CT without contrast (CPT[®]70450) is acceptable if thin sections of a temporal bone CT study are not needed.
 - Minor degrees of mastoid cell mucosal thickening are often seen on brain MRI or other cranial imaging studies, and do not, in general, require further imaging.

EAR and NOSE GUIDELINES

HD-27~HEARING LOSS

HD-27.1 Hearing Loss

- ✓ MRI brain with attention to internal auditory canal without and with contrast (CPT[®]70553), or MRI brain with attention to internal auditory canal without contrast or CT temporal bone without contrast (CPT[®]70480) can be considered for hearing loss¹
- ✓ Limited Study MRI with attention to internal auditory canal (CPT[®]70540 - 70543) can be approved in place of MRI Brain with attention to internal auditory canal when requested by the provider :
 - Any sensorineural (cochlea or auditory nerve)¹
 - Any conductive¹(including Cholesteatoma²)
 - Cochlear implants candidate¹
 - Fluctuating hearing loss¹

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.^{1,2}

References

1. Turski PA, Wippold FJ II, Cornelius RS, Brunberg JA, Davis PC, De La Paz RL, Dormont D, Gray L, Jordan JE, Mukherji SK, Nussenbaum B, Seidenwurm DJ, Sloan MA, Zimmerman RD, Expert Panel on Neurologic Imaging. ACR Appropriateness Criteria[®] vertigo and hearing loss. [online publication]. Reston (VA): American College of Radiology (ACR); 2008
2. Isaacson J, Vora N. Differential Diagnosis and Treatment of Hearing Loss, *Am Fam Physician*. 2003 Sep 15;68(6):1125-1132

HD-28~EAR PAIN (OTALGIA)

HD-28.1 Ear Pain (Otalgia)

- ✓ Temporal Bone CT without and with contrast (CPT[®]70482) or without contrast (CPT[®]70480) and/or Brain MRI 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

1. Li JC and Brunk J. *Otalgia*. eMedicine. March 16, 2010, <http://emedicine.medscape.com/article/845173-overview>. Accessed June 13, 2011
2. Imaging of the Temporal Bone, 4th ed. *J.D. Swartz and L.A. Loevner, eds. Thieme Medical Publishers; 2009.*

HD-29~SINUSITIS

HD-29.1 Sinus Imaging in Adults and Children

- ✓ Maxillofacial CT 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) rhino sinusitis 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 after sinusitis.¹
 - Recurrent (< 30 days episodes separated by at least 10 asymptomatic days) acute/subacute/chronic rhinosinusitis who is possible surgical candidate^{1,2,3}
 - Sinonasal polyposis¹
 - Persistent acute (≥ 4 weeks) sinusitis not responding to treatment³
 - Chronic (> 12 weeks) sinusitis³
 - Worsening or failure to improve within 72 hours of initial management⁴
 - Add CT Orbits without contrast (CPT®70480) or with contrast (CPT®70481) or MRI brain without contrast (CPT®70551) or without and with contrast (CPT®70553) or CT head without and with contrast (CPT®70470) if
 - Orbital and/or Intracranial complications with ocular and/or neurological deficit^{1,3,4}
 - Suspected sinonasal obstructing mass¹
 - Fungal Sinusitis¹

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

1. Cornelius RS, Martin J, Wippold FJ II, Aiken AH, et al. ACR Appropriateness Criteria® sinonasal disease. American College of Radiology (ACR); 2012
2. Huntzinger A. Guidelines for the Diagnosis and Management of Rhinosinusitis in Adults, *Am Fam Physician*. 2007;76:1718-1724
3. Karmazyn B, Coley BD, Dempsey-Robertson ME, Dillman JR, Dory CE, Garber M, Hadley JA, Hayes LL, Keller MS, Meyer JS, Milla SS, Paidas C, Raske ME, Rigsby CK, Strouse PJ, Wootton-Gorges SL, Expert Panel on Pediatric Imaging. ACR Appropriateness Criteria® sinusitis - child. American College of Radiology (ACR); 2012
4. Wald E, et. el., Sinusitis in Children Aged 1 to 18 Years Clinical Practice Guideline for the Diagnosis and Management of Acute Bacterial, *Pediatrics* 2013;132:e262.

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. Requests must come from a maxillofacial surgeon.
- ✓ 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 review.
- ✓ Indications for cone beam CT if requested by an oral or maxillofacial surgeon:
 - Impacted teeth
 - Supernumerary teeth
 - Dentoalveolar trauma
 - Root resorption
 - Foreign body
 - Odontogenic cysts, tumors, or other jaw pathology
 - Cleft pathology
 - Orthognathic surgery for dentofacial anomalies
 - Osteomyelitis and odontogenic infections
 - Bisphosphonate-related osteonecrosis of the jaw
 - Salivary gland stones
 - Maxillofacial bone graft planning
 - 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.
 - Thus, cone beam CT scans in these patients would also not be included in the coverage policy.
 - These coverage policies will take precedence over MedSolutions' 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

1. *International Journal of Oral & Maxillofacial Surgery* 2009 June;38(6):609-625
2. *N Engl J Med* 2008;359:2693-2705

HD-31~TINNITUS

HD-31.1 Tinnitus

- ✓ Brain MRI without and with contrast^{1,2,3} (CPT[®]70553), *or*
- ✓ Head CT^{1,2} with and/or CT temporal bone³ without contrast, *or*
- ✓ MRI brain with attention to internal auditory canal³ without and with contrast (CPT[®]70553), *or* MRI head and internal auditory canal³ without contrast if any of the following are present(CPT[®]70551), *or*
- ✓ Limited Study MRI with attention to internal auditory canal (CPT[®]70540 - 70543) can be approved in place of MRI Brain with attention to internal auditory canal when requested by the provider :
 - Pulsatile, objective or subjective^{1,2,4}
 - Continuous without interruption²
 - Hearing loss^{3,4}
 - Vertigo^{3,4}
 - Facial trauma, ear drainage or facial palsy⁴
 - Movement of the head or neck⁴
 - Add Head and/or Neck MRA or Head and/or Neck CTA if suspect vascular lesion(s)²
 - Add Neck MRA without contrast (CPT[®]70540) or CTA (CPT[®]70496) if suspect dissection² or glomus tumor²

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 are more concerning for an underlying and significant disorder.² Audiometric assessment can be used as initial diagnostic testing.^{1,2,3}

References

1. Crummer RW, Hassan GA. Diagnostic Approach to Tinnitus. *Am Fam Physician*. 2004 Jan 1;69(1):120-126.
2. UpToDate, Etiology and Diagnosis of Tinnitus, Literature review current through: Feb 2014. This topic last updated: Dec 28, 2012, acquired March 18, 2014
3. Turski PA, et al Expert Panel on Neurologic Imaging. ACR Appropriateness Criteria[®] vertigo and hearing loss. American College of Radiology (ACR); 2013.
4. American Speech-Language-Hearing Association, Tinnitus Triage Guidelines, <http://www.asha.org/aud/Articles/Tinnitus-Triage-Guidelines/>, acquired March 18, 2014.

HD-32~EYE DISORDERS

HD-32.1 Eye Disorders

- ✓ MRI brain and orbit without and with contrast (CPT[®]70553 and CPT[®]70543) or MRI brain and orbit without contrast (CPT[®]70551 and CPT[®]70540) or Head CT without contrast (CPT[®]70450) and Orbit CT without contrast (CPT[®]70480) ^{1, 2, 3} if*:
 - Anisocoria not known from previous photographs and $\geq 1\text{mm}$ ^{3, 4}
 - Acute or progressive vision loss by any cause, including suspected optic neuritis ^{1, 2, 5}
 - Ophthalmoplegia¹
 - Binocular Diplopia^{6, 7}
 - Horner's Syndrome – can add CT Neck with contrast and/or CT Chest with contrast⁸
 - Substitute with CT head without contrast if head injury¹

*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.

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

References

1. Wippold FJ II, Cornelius RS, Berger KL, Broderick DF, Davis PC, Douglas AC, Germano IM, Hadley JA, McDermott MW, Mechtler LL, Smirniotopoulos JG, Waxman AD, Expert Panel on Neurologic Imaging. ACR Appropriateness Criteria® orbits, vision and visual loss: American College of Radiology (ACR); 2012.
2. UpToDate, Third cranial nerve (oculomotor nerve) palsy in adults, Literature review current through: Feb 2014. | This topic last updated: Aug 2, 2012.
3. UpToDate, Approach to the patient with anisocoria, Literature review current through: Feb 2014. | This topic last updated: Jan 9, 2014. (normal pupil difference is $\leq 4\text{mm}$.)
4. Physiologic anisocoria, American Academy of Ophthalmology, <http://one.aaopt.org>, acquired March 19, 2014.
5. UpToDate, Optic Neuritis, Pathophysiology, clinical features and diagnosis, Literature review current through: Feb 2014. | This topic last updated: Jan 5, 2014.
6. American College of Radiology (ACR), American Society of Neuroradiology (ASNR). ACR-ASNR practice guideline for the performance of computed tomography (CT) of the brain. American College of Radiology (ACR); 2010. 6 p.
7. Deciphering Diplopia, American Academy of Ophthalmology, <http://one.aaopt.org>, acquired March 19, 2014.
8. Lee, JH, et. al., Neuroimaging Strategies for Three Types of Horner Syndrome with Emphasis on Anatomic Location, *American Journal of Roentgenology*. 2007;188: W74-W81.

HD-33~ACOUSTIC NEUROMA & OTHER CEREBELLOPONTINE ANGLE TUMORS

HD-33.1 Acoustic Neuroma & Other Cerebellopontine Angle Tumors

- ✓ Initial diagnosis with Brain MRI (CPT[®]70553) to be done with attention to the internal auditory canals
 - Temporal bone MRI without and with contrast (CPT[®]70543) may be considered with audiologic or clinical features of retrocochlear hearing loss and 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, brain MRI without and with contrast with attention to the internal auditory canals (CPT[®]70553) at 1 and 5 years is sufficient.
- ✓ Observation with brain MRI without and with contrast with attention to the internal auditory canals (CPT[®]70553) at 6 months after diagnosis and then once a year.

HD-34~PINEAL CYSTS

HD-34.1 Pineal Cysts

- ✓ Benign pineal cysts may be re-imaged:
 - A repeat study in 1 to 2 years to assure stability (MRI Brain without and with contrast (CPT[®]70553) or without contrast (CPT[®]70551))
 - If mass effect, yearly imaging to identify either increase in size or the appearance of hydrocephalus
- ✓ For pineal region tumors other than cysts, imaging contrast and modality will depend on the nature and clinical effects of the tumor. Requests will be forwarded for Medical Director review.

HD-35~ARACHNOID CYSTS

HD-35.1 Arachnoid Cysts

Reflect an underlying anomaly of brain development, and once identified require no further imaging. If there is mass effect, yearly imaging, with the study type used for diagnosis, to identify growth or the appearance of hydrocephalus is appropriate.

- **Pituitary Tumors**: See: **HD-19~Pituitary**