# CT Head

**CPT: 70450, 70460, 70470**

# 1 Major Symptom or Complaint presented as primary indication

## 1.1 Altered level of consciousness, cognitive ability or personality

### 1.1.1 Headache

### 1.1.2 Known or suspected infectious process, or abscess

#### 1.1.2.1 Elevated WBC

#### 1.1.2.2 Fever

### 1.1.3 Multiple Sclerosis (MS)

### 1.1.4 Stroke

### 1.1.5 Suspected Pseudotumor Cerebri

### 1.1.6 Trauma, recent history of

### 1.1.7 Vasculitis

References:


1. Practice parameter: the utility of neuroimaging in the evaluation of headache in patients with normal neurological examinations (summary statement). Report of the Quality Standards Subcommittee of the American Academy of Neurology. Neurology 1994; 44:1353-1354.
2. F. K. Alehan; Value of Neuroimaging in the Evaluation of Neurologically Normal Children With Recurrent Headache; J Child Neurol, January 1, 2002; 17(11): 807 – 809.
3. Maytal, Joseph, Bienkowski, Robert S., Patel, Mahendra, Eviatar, Lydia; The Value of Brain Imaging in Children With Headaches; Pediatrics 1995 96: 413-416
4. Yoshito Tsushima, and Keigo Endo; MR Imaging in the Evaluation of Chronic or Recurrent Headache; Radiology 2005 235: 575-579
5. Dodick, David W.; Chronic Daily Headache;N Engl J Med 2006 354: 158-165
6. Michael E. Detsky, BSc; Devon R. McDonald, BSc; Mark O. Baerlocher, MD; George A. Tomlinson, PhD; Douglas C. McCrory, MD, MHSc; Christopher M. Booth, MD, FRCPC; Does This Patient With Headache Have a Migraine or Need Neuroimaging?; JAMA. 2006;296:1274-1283.
7. Zahid H Bajwa, MD, R Joshua Wootton, MDiv, PhD; Evaluation of headache in adults; UpToDate Online 15.2 accessed 7/18/07
8. Malm, Jan, Eklund, Anders Idiopathic normal pressure hydrocephalus PRACTICAL NEUROLOGY 2006 6: 14-27
9. Marvin A Fishman, MD Hydrocephalus UpToDate 15.2 accessed 7/18/07
10. TE Gammal, MB Allen, Jr, BS Brooks, and EK Mark MR evaluation of hydrocephalus Am. J. Roentgenol., Oct 1987; 149: 807 – 813.
11. C. M. Fisher Hydrocephalus as a cause of disturbances of gait in the elderly Neurology, Dec 1982; 32: 1358.


## 1.2 Amaurosis Fugax def – temporary loss of vision

## 1.3 Amnesia

### 1.3.1 Suspect Stroke or TIA

### 1.3.2 Trauma, recent history of

References:


1. Aminoff MJ, Greenberg DA, Simon RP, “Chapter 1. Disorders of Cognitive Function” (Chapter). Aminoff MJ, Greenberg DA, Simon RP: Clinical Neurology, 6th Edition: http://www.accessmedicine.com/content.aspx?aID=2079000.
2. Ropper AH, Brown RH, “Chapter 35. Craniocerebral Trauma” (Chapter). Ropper AH, Brown RH: Adams and Victor’s Principles of Neurology, 8th Edition: http://www.accessmedicine.com/content.aspx?aID=974711.
3. .Peggy Quinette , Bérengère Guillery-Girard , Jacques Dayan , Vincent de la Sayette , Sophie Marquis , Fausto Viader , Béatrice Desgranges , and Francis Eustache What does transient global amnesia really mean? Review of the literature and thorough study of 142 cases Brain Advance Access published on July 1, 2006, DOI 10.1093/brain/awl105. Brain 129: 1640-1658.


## 1.4 Aphasia Def: Loss or impairment of the power to use or comprehend words

### 1.4.1 Known or suspected infectious process, or abscess

### 1.4.2 Suspected Stroke or TIA

Reference:


- Aminoff Michael J, “Chapter 24. Nervous System Disorders” (Chapter). McPhee SJ, Papadakis MA, Tierney LM, Jr.: CURRENT Medical Diagnosis & Treatment 2009: http://www.accessmedicine.com/content.aspx?aID=12507.


## 1.5 Apraxia loss or impairment of the ability to execute complex coordinated movements

### 1.5.1 Alzheimer’s Dis

### 1.5.2 Normal Pressure Hydrocephalus (NPH)

### 1.5.3 Parkinson’s Dis

### 1.5.4 Progressive Supranuclear Palsy

References


1. Cindy Zadikoff , and Anthony E. Lang Apraxia in movement disorders Brain 128: 1480-1497.”Apraxia can be found in diseases of the basal ganglia, including Parkinson’s disease, progressive supranuclear palsy (PSP) and Huntington’s disease, and reportedly in isolated lesions of the basal ganglia.”

## 1.6 Ataxia an inability to coordinate voluntary muscular movements

### 1.6.1 Hydrocephalus, Suspected obstructive

### 1.6.2 Known or suspected infectious process, or abscess

### 1.6.3 Suspected Stroke or TIA

References:


1. Aminoff Michael J, “Chapter 24. Nervous System Disorders” (Chapter). McPhee SJ, Papadakis MA, Tierney LM, Jr.: CURRENT Medical Diagnosis & Treatment 2009: http://www.accessmedicine.com/content.aspx?aID=12507


## 1.7 Cognitive dysfunction

### 1.7.1 Headache

### 1.7.2 Known or suspected infectious process, or abscess

### 1.7.3 Normal Pressure Hydrocephalus (NPH), Suspected

### 1.7.4 Trauma, recent history of

References:


1. Practice parameter: the utility of neuroimaging in the evaluation of headache in patients with normal neurological examinations (summary statement). Report of the Quality Standards Subcommittee of the American Academy of Neurology. Neurology 1994; 44:1353-1354.
2. F. K. Alehan; Value of Neuroimaging in the Evaluation of Neurologically Normal Children With Recurrent Headache; J Child Neurol, January 1, 2002; 17(11): 807 – 809.
3. Maytal, Joseph, Bienkowski, Robert S., Patel, Mahendra, Eviatar, Lydia; The Value of Brain Imaging in Children With Headaches; Pediatrics 1995 96: 413-416
4. Yoshito Tsushima, and Keigo Endo; MR Imaging in the Evaluation of Chronic or Recurrent Headache; Radiology 2005 235: 575-579
5. Dodick, David W.; Chronic Daily Headache;N Engl J Med 2006 354: 158-165
6. Michael E. Detsky, BSc; Devon R. McDonald, BSc; Mark O. Baerlocher, MD; George A. Tomlinson, PhD; Douglas C. McCrory, MD, MHSc; Christopher M. Booth, MD, FRCPC; Does This Patient With Headache Have a Migraine or Need Neuroimaging?; JAMA. 2006;296:1274-1283.
7. Zahid H Bajwa, MD, R Joshua Wootton, MDiv, PhD; Evaluation of headache in adults; UpToDate Online 15.2 accessed 7/18/07

### 1.8 Decreased sensation

1.8.1 Note: Testing for reversible causes that are readily treated should be completed prior to imaging. The tests should include TSH, ELectrolytes, B12

1.8.2 Known or suspected infectious process, or abscess

1.8.2.1 Elevated WBC

1.8.2.2 Fever

1.8.3 Suspected Stroke or TIA

### 1.9 Dementia

1.9.1 Agnosia

1.9.2 Aphasia

1.9.3 Apraxia

1.9.4 Confusion

1.9.5 Disorientation

1.9.6 Fluctuating cognition

1.9.7 Memory loss

1.9.8 Mini Mental State score of 24 or less on two occasions

1.9.9 Recurrent visual hallucinations

1.9.10 Spontaneous motor features of Parkinsonism

1.9.11 Trauma, recent history of

References

1. Knopman DS; DeKosky ST; Cummings JL; Chui H; Corey-Bloom J; Relkin N; Small GW; Miller B; Stevens JC Practice parameter: diagnosis of dementia (an evidence-based review). Report of the Quality Standards Subcommittee of the American Academy of Neurology. Neurology 2001 May 8;56(9):1143-53.

## 1.10 Diplopia

### 1.10.1 Hydrocephalus, Suspected obstructive

### 1.10.2 Suspected multiple sclerosis

### 1.10.3 Suspected Stroke or TIA

References:


1. Hauser Stephen L, Goodin Douglas S, “Chapter 375. Multiple Sclerosis and Other Demyelinating Diseases” (Chapter). Fauci AS, Braunwald E, Kasper DL, Hauser SL, Longo DL, Jameson JL, Loscalzo J: Harrison’s Principles of Internal Medicine, 17th Edition: http://www.accessmedicine.com/content.aspx?aID=2906445.
2. Aminoff Michael J, “Chapter 24. Nervous System Disorders” (Chapter). McPhee SJ, Papadakis MA, Tierney LM, Jr.: CURRENT Medical Diagnosis & Treatment 2009: http://www.accessmedicine.com/content.aspx?aID=12507.
3. Simon, J.E., Morgan, S.C., Pexman, J.H.W., Hill, M.D., Buchan, A.M. CT assessment of conjugate eye deviation in acute stroke Neurology 2003 60: 135-137

## 1.11 Dizziness

> **NOTE**
>
> "The life-time prevalence of dizziness in general population is estimated from 5.5% to 25-30% in the United States depending on the criteria adopted (Kroenke and Mangelsdorff, 1989; Colledge et al., 1994; Yardley et al., 1998b)."
>
> NOTE: While vertigo is more than dizziness, lightheadedness or imbalance, vertigo requires the patient to experience a sense of spinning, of either the patient, or the surroundings, for the purposes of prior authorization the terms are interchangeable and **approval should be issued if any of the following are present**

### 1.11.1 Altered mental state

### 1.11.2 Cranial neuropathies

### 1.11.3 Diabetes mellitus, by history

### 1.11.4 Hearing Loss

### 1.11.5 Loss of vision

### 1.11.6 Nausea or Vomiting

### 1.11.7 Nystagmus

### 1.11.8 Stroke, prior history of

### 1.11.9 Tinnitus

### 1.11.10 Weakness or paralysis

References:


1. Kevin Barraclough, Adolfo Bronstein Vertigo BMJ 2009;339:b3493, doi: 10.1136/bmj.b3493 (Published 22 September 2009) http://www.bmj.com/content/vol339/issuesep22_1/images/large/bark673889.f1_default.jpeg
2. David E. Newman-Toker, et al; Spectrum of Dizziness Visits to US Emergency Departments: Cross-Sectional Analysis From a Nationally Representative Sample; Mayo Clin Proc. July 2008 83(7):765-775; doi:10.4065/83.7.765
3. C S K Cheung, P S K Mak, K V Manley, J M Y Lam, A Y L Tsang, H M S Chan, T H Rainer, C A Graham Predictors of important neurological causes of dizziness among patients presenting to the emergency department Emerg Med J 2010;27:517-521 doi:10.1136/emj.2009.078014
4. Ropper AH, Brown RH, “Chapter 15. Deafness, Dizziness, and Disorders of Equilibrium” (Chapter). Ropper AH, Brown RH: Adams and Victor’s Principles of Neurology, 8th Edition
5. Daroff Robert B, “Chapter 22. Dizziness and Vertigo” (Chapter). Fauci AS, Braunwald E, Kasper DL, Hauser SL, Longo DL, Jameson JL, Loscalzo J: Harrison’s Principles of Internal Medicine, 17th Edition: http://www.accessmedicine.com/content.aspx?aID=2886671
6. Jeffrey P. Staab; Michael J. Ruckenstein Expanding the Differential Diagnosis of Chronic Dizziness Arch Otolaryngol Head Neck Surg. 2007;133(2):170-176.
7. Irwin Nazareth , Lucy Yardley , Natalie Owen , and Linda Luxon Outcome of symptoms of dizziness in a general practice community sample Fam. Pract. 16: 616-618.
8. M Wasay, N Dubey, and R Bakshi Emerg Dizziness and yield of emergency head CT scan: Is it cost effective? Med J. 2005 April; 22(4): 312. doi: 10.1136/emj.2003.012765. PMCID: PMC1726733
9. Ramos, R Antidepressants and Dizziness Journal of Psychopharmacology 20:5 (sept 2003) p 708


### 1.12 Dysarthria. impaired ability to speak due to CNS disorder

#### 1.12.1 Known or suspected infectious process, or abscess

##### 1.12.1.1 Elevated WBC

##### 1.12.1.2 Fever

#### 1.12.2 Suspected multiple sclerosis

#### 1.12.3 Suspected Stroke or TIA

References:


1. Blanco, Y, Compta, Y, Graus, F, Saiz, A Midbrain lesions and paroxysmal dysarthria in multiple sclerosis Multiple Sclerosis 2008 14: 694-697
2. Malm, Jan, Eklund, Anders Idiopathic normal pressure hydrocephalus PRACTICAL NEUROLOGY 2006 6: 14-27
3. Marvin A Fishman, MD Hydrocephalus UpToDate 15.2 accessed 7/18/07
4. TE Gammal, MB Allen, Jr, BS Brooks, and EK Mark MR evaluation of hydrocephalus Am. J. Roentgenol., Oct 1987; 149: 807 – 813.


### 1.13 Dysequilibrium See Dizziness

## 1.14 Dysphagia

### 1.14.1 Suspected multiple sclerosis

### 1.14.2 Suspected Stroke or TIA.

## 1.15 Gait Disturbance

### 1.15.1 Hydrocephalus, Suspected obstructive

### 1.15.2 Known or suspected infectious process, or abscess

### 1.15.3 Suspected Stroke or TIA

References:


1. Malm, Jan, Eklund, Anders Idiopathic normal pressure hydrocephalus PRACTICAL NEUROLOGY 2006 6: 14-27
2. Marvin A Fishman, MD Hydrocephalus UpToDate 15.2 accessed 7/18/07
3. TE Gammal, MB Allen, Jr, BS Brooks, and EK Mark MR evaluation of hydrocephalus Am. J. Roentgenol., Oct 1987; 149: 807 – 813.
4. C. M. Fisher Hydrocephalus as a cause of disturbances of gait in the elderly Neurology, Dec 1982; 32: 1358.

## 1.16 Headache ANY ONE

- 1.16.1 Altered level of consciousness, cognitive ability or personality
- 1.16.2 Cancer, known elsewhere in body
- 1.16.3 Carotid dissection, suspected
- 1.16.4 Central Venous Thrombosis
- 1.16.5 Changed of established headache pattern
- 1.16.6 Elevated WBC
- 1.16.7 Exercise or exertion lead to headache
- 1.16.8 Fever
- 1.16.9 Horner’s Syndrome
- 1.16.10 Hydrocephalus, Suspected obstructive
- 1.16.11 Immunosuppressed
- 1.16.12 Infection elsewhere in body
- 1.16.13 New headaches in persons below age 5 or over 50
- 1.16.14 Pain in neck or shoulder
- 1.16.15 Papilledema
- 1.16.16 Sudden onset after recent trauma, straining or manipulation
- 1.16.17 Sudden onset of “worst headache”
- 1.16.18 Suspected Pseudotumor Cerebri
- 1.16.19 Suspected subarachnoid hemorrhage (SAH)
- 1.16.20 Syncope
- 1.16.21 Thunderclap (sudden onset and severe)
- 1.16.22 Trauma, recent history of
- 1.16.23 Valsalva or straining worsens headache
- 1.16.24 Vertigo
- 1.16.25 Vomiting
- 1.16.26 Wakens from sleep

References:


1. C. M. Fisher Hydrocephalus as a cause of disturbances of gait in the elderly Neurology, Dec 1982; 32: 1358.
2. F. K. Alehan; Value of Neuroimaging in the Evaluation of Neurologically Normal Children With Recurrent Headache; J Child Neurol, January 1, 2002; 17(11): 807 – 809.
3. Adams and Victor's Principles of Neurology, 8th Edition Allan H. Ropper, Robert H. Brown Eds. p157
4. Beithon F, Detlie E, Hult C, et al, Health care guideline: diagnosis and treatment of headache, Eighth edition, January 2007, Institute for Clinical Systems Improvement http://www.icsi.org/headache/headache__diagnosis_and_treatment_of_2609.html accessed July 10, 2007.
5. British Association for the Study of Headache Concise Headache Management Guidelines accessed at http://72.14.205.104/search?q=cache:lQ_ULNd6r00J:64.227.208.149/NS_BASH/Concise%2520BASH%2520Guidelines.pdf+concise+headache+management+guidelines&hl=en&ct=clnk&cd=1&gl=us&client=firefox-a accessed 7/3/07
6. Dodick, David W.; Chronic Daily Headache; N Engl J Med 2006 354: 158-165
7. D W Dodick Thunderclap headache J. Neurol. Neurosurg. Psychiatry, Jan 2002; 72: 6.
8. Evidence Based Guidelines in the Primary Care Setting: Neuroimaging in Patients with Nonacute Headache, p14, accessed at www.aan.com/professionals/practice/pdfs/gl0088.pdf 6/24/07
9. Frishberg BM, Rosenberg JH, Matchar DB, et al, Evidence-based guidelines in the primary care setting: neuroimaging in patients with nonacute headache, accessed at http://www.aan.com/professionals/practice/pdfs/gl0088.pdf September 20, 2007.
10. http://www.acr.org/SecondaryMainMenuCategories/quality_safety/app_criteria/pdf/ExpertPanelonPediatricimaging/headacheChildDoc3.aspx
11. Jordan, JE, Seidenwurm DJ, Davis PC, et al, Expert panel on neurologic imaging, ACR Appropriateness Criteria, Headache accessed at www.acr.org/SecondaryMainMenuCategories/quality_safety/app_criteria/pdf/ExpertPanelonNeurologicimaging/headacheDoc6.aspx
12. Malm, Jan, Eklund, Anders Idiopathic normal pressure hydrocephalus PRACTICAL NEUROLOGY 2006 6: 14-27
13. Marvin A Fishman, MD Hydrocephalus UpToDate 15.2 accessed 7/18/07
14. Maytal, Joseph, Bienkowski, Robert S., Patel, Mahendra, Eviatar, Lydia; The Value of Brain Imaging in Children With Headaches; Pediatrics 1995 96: 413-416
15. Michael E. Detsky, BSc; Devon R. McDonald, BSc; Mark O. Baerlocher, MD; George A. Tomlinson, PhD; Douglas C. McCrory, MD, MHSc; Christopher M. Booth, MD, FRCPC; Does This Patient With Headache Have a Migraine or Need Neuroimaging?; JAMA. 2006;296:1274-1283.
16. Practice parameter: the utility of neuroimaging in the evaluation of headache in patients with normal neurological examinations (summary statement). Report of the Quality Standards Subcommittee of the American Academy of Neurology. Neurology 1994; 44:1353-1354.
17. Sandrin G, Friberg L, Janig W, et al, Neurophysiological tests and neuroimaging procedures in non-acute headache: guidelines and recommendations, Eur J Neurology,2004; 11:217-224.
18. Strain JD, Cohen HL, Fordham L, et al, Expert panel on neurologic imaging, ACR Appropriateness Criteria, Headache-

19. TE Gammal, MB Allen, Jr, BS Brooks, and EK Mark MR evaluation of hydrocephalus Am. J. Roentgenol., Oct 1987; 149: 807 – 813.

20. Yoshito T, and Endo K, MR imaging in the evaluation of chronic or recurrent headache, Radiology, 2005; 235:575-579.

21. Yoshito Tsushima, and Keigo Endo; MR Imaging in the Evaluation of Chronic or Recurrent Headache; Radiology 2005 235: 575-579

22. Zahid H Bajwa, MD, R Joshua Wootton, MDiv, PhD; Evaluation of headache in adults; UpToDate Online 15.2 accessed 7/18/07

### 1.17 Hearing loss, Unilateral or asymmetric by audiometry

#### 1.17.1 Suspected acoustic neuroma or CPA tumor

### 1.18 Lightheadedness See Dizziness

### 1.19 Mental status changes

#### 1.19.1 *See Altered Level of Consciousness*

### 1.20 Photophobia

#### 1.20.1 Known or suspected infectious process, or abscess

### 1.21 Seizure MRI PREFERRED

#### 1.21.1 Changed Pattern

#### 1.21.2 Known or suspected infectious process, or abscess

#### 1.21.3 New Onset

#### 1.21.4 Refractory to treatment

#### 1.21.5 Trauma, recent history of

#### 1.21.6 Prior to Surgical management (MRI or PET preferred)

References:

1. ACR Appropriateness Criteria http://www.acr.org/SecondaryMainMenuCategories/quality_safety/app_criteria/pdf/ExpertPanelonNeurologicImaging/EpilepsyDoc3.aspx accessed 11/16/10

## 1.22 Tinnitus (See Tinnitus Algorithm Page)

### 1.22.1 Non pulsatile

#### 1.22.1.1 Suggest MRI with gadolinium

### 1.22.2 Pulsatile

#### 1.22.2.1 Suggest CTA or MRA of the brain, can approve contrast enhanced CT

References:


1. Henry, J. A., et. al., General Review of Tinnitus: Prevalence, Mechanisms, Effects, and Management. Journal of Speech, Language, and Hearing Research v. 48 no. October 2005) p. 1204-35
2. Jane L. Weissman and Barry E. Hirsch Imaging of Tinnitus: A Review Radiology August 2000 216:2 342-349
3. Lockwood, Alan H., Salvi, Richard J., Burkard, Robert F. Tinnitus N Engl J Med 2002 347: 904-910


## 1.23 Urinary incontinence

### 1.23.1 Normal Pressure Hydrocephalus (NPH), Suspected

## 1.24 Vertigo (also Dizziness)

> **NOTE**
>
> "The life-time prevalence of dizziness in general population is estimated from 5.5% to 25-30% in the United States depending on the criteria adopted (Kroenke and Mangelsdorff, 1989; Colledge et al., 1994; Yardley et al., 1998b)."
>
> While vertigo is more than dizziness, lightheadedness or imbalance, vertigo requires the patient to experience a sense of spinning, of either the patient, or the surroundings, for the purposes of prior authorization the terms are interchangeable and **approval should be issued if any of the following are present**:

### 1.24.1 Altered mental state

### 1.24.2 Cranial neuropathies

### 1.24.3 Diabetes mellitus, by history

### 1.24.4 Hearing Loss

### 1.24.5 Loss of vision

### 1.24.6 Nausea or Vomiting

### 1.24.7 Nystagmus

### 1.24.8 Stroke, prior history of

### 1.24.9 Tinnitus

### 1.24.10 Weakness or paralysis

References:


1. Kevin Barraclough, Adolfo Bronstein Vertigo BMJ 2009;339:b3493, doi: 10.1136/bmj.b3493 (Published 22 September 2009) http://www.bmj.com/content/vol339/issuesep22_1/images/large/bark673889.f1_default.jpeg
2. David E. Newman-Toker, et al; Spectrum of Dizziness Visits to US Emergency Departments: Cross-Sectional Analysis From a Nationally Representative Sample; Mayo Clin Proc. July 2008 83(7):765-775; doi:10.4065/83.7.765
3. C S K Cheung, P S K Mak, K V Manley, J M Y Lam, A Y L Tsang, H M S Chan, T H Rainer, C A Graham Predictors of important neurological causes of dizziness among patients presenting to the emergency department Emerg Med J 2010;27:517-521 doi:10.1136/emj.2009.078014
4. Ropper AH, Brown RH, “Chapter 15. Deafness, Dizziness, and Disorders of Equilibrium” (Chapter). Ropper AH, Brown RH: Adams and Victor’s Principles of Neurology, 8th Edition
5. Daroff Robert B, “Chapter 22. Dizziness and Vertigo” (Chapter). Fauci AS, Braunwald E, Kasper DL, Hauser SL, Longo DL, Jameson JL, Loscalzo J: Harrison’s Principles of Internal Medicine, 17th Edition: http://www.accessmedicine.com/content.aspx?aID=2886671
6. Jeffrey P. Staab; Michael J. Ruckenstein Expanding the Differential Diagnosis of Chronic Dizziness Arch Otolaryngol Head Neck Surg. 2007;133(2):170-176.
7. Irwin Nazareth , Lucy Yardley , Natalie Owen , and Linda Luxon Outcome of symptoms of dizziness in a general practice community sample Fam. Pract. 16: 616-618.
8. M Wasay, N Dubey, and R Bakshi Emerg Dizziness and yield of emergency head CT scan: Is it cost effective? Med J. 2005 April; 22(4): 312. doi: 10.1136/emj.2003.012765. PMCID: PMC1726733
9. Ramos, R Antidepressants and Dizziness Journal of Psychopharmacology 20:5 (sept 2003) p 708


### 1.25 Vomiting

#### 1.25.1 Known or suspected infectious process, or abscess

#### 1.25.2 Trauma, recent history of

#### 1.25.3 Headache

### 1.26 Weakness

#### 1.26.1 Known or suspected infectious process, or abscess

##### 1.26.1.1 Elevated WBC

##### 1.26.1.2 Fever

#### 1.26.2 Suspected Stroke or TIA

## 2 Working Diagnosis or Rule Out presented as primary indication

### 2.1 Acoustic neuroma or cerebellar pontine angle tumors

#### 2.1.1 Altered sense of taste

#### 2.1.2 Asymmetric or Unilateral hearing loss

#### 2.1.3 Facial paralysis or weakness

#### 2.1.4 Gait disturbance

#### 2.1.5 Tinnitus

References:

1. Johnson Jacob, Lalwani Anil K, “Chapter 61. Vestibular Schwannoma (Acoustic Neuroma)” (Chapter). Lalwani AK: CURRENT Diagnosis & Treatment in Otolaryngology-Head & Neck Surgery, 2nd Edition: http://www.accessmedicine.com/content.aspx?aID=2831739.

## 2.2 Alzheimer's Disease

### 2.2.1 Apraxia

### 2.2.2 Dementia Testing for reversible causes that are readily treated should be completed prior to imaging. The tests should include TSH, ELectrolytes, B12

#### 2.2.2.1 Agnosia

#### 2.2.2.2 Aphasia

#### 2.2.2.3 Apraxia

#### 2.2.2.4 Confusion

#### 2.2.2.5 Disorientation

#### 2.2.2.6 Fluctuating cognition

#### 2.2.2.7 Memory loss

#### 2.2.2.8 Mini Mental State score of 24 or less on two occasions

#### 2.2.2.9 Recurrent visual hallucinations

#### 2.2.2.10 Spontaneous motor features of Parkinsonism

#### 2.2.2.11 Trauma, recent history of

References:

1. Knopman DS; DeKosky ST; Cummings JL; Chui H; Corey-Bloom J; Relkin N; Small GW; Miller B; Stevens JC Practice parameter: diagnosis of dementia (an evidence-based review). Report of the Quality Standards Subcommittee of the American Academy of Neurology. Neurology 2001 May 8;56(9):1143-53.

### 2.2.3 Progressive loss of memory

### 2.2.4 No alteration of consciousness

References:

1. Kato M; Meguro K; Sato M; Shimada Y; Yamazaki H; Saito H; Yamaguchi S; Yamadori A Ideomotor apraxia in patients with Alzheimer disease: why do they use their body parts as objects? Neuropsychiatry Neuropsychol Behav Neurol. 2001 Jan;14(1):45-52.
2. Thomas J Grabowski, Jr, MD Clinical manifestations and diagnosis of Alzheimer disease UpToDate 17.3

## 2.3 Aneurysm Suspected

### 2.3.1 MRA or CTA preferred. If ordered without MRA or CTA send for physician review

References:


1. Kaufmann, Timothy J., Kallmes, David F. Diagnostic Cerebral Angiography: Archaic and Complication-Prone or Here to Stay for Another 80 Years? Am. J. Roentgenol. 2008 190: 1435-1437
2. Philip M. White, Evelyn M. Teasdale, Joanna M. Wardlaw, and Valerie Easton Intracranial Aneurysms: CT Angiography and MR Angiography for Detection—Prospective Blinded Comparison in a Large Patient Cohort Radiology June 2001 219:739-749
3. Mika Okahara, Hiro Kiyosue, Masanori Yamashita, Hirohumi Nagatomi, Hiroyuki Hata, Toshiyuki Saginoya, Yoshiko Sagara, and Hiromu Mori Diagnostic Accuracy of Magnetic Resonance Angiography for Cerebral Aneurysms in Correlation With 3D–Digital Subtraction Angiographic Images: A Study of 133 Aneurysms Stroke 33: 1803-1808,


## 2.4 Metastases, suspected

### 2.4.1 Known malignancy AND new or changed neurologic findings

## 2.5 Brain tumor, mass, structural lesion suspected

### 2.5.1 Motor weakness affecting a limb, face, or body

### 2.5.2 Decreased sensation affecting a limb, face or body

### 2.5.3 Ataxia

### 2.5.4 Confusion, memory loss, or disorientation

### 2.5.5 Visual disturbance

### 2.5.6 Aphasia

### 2.5.7 Dysarthria

### 2.5.8 Dysphagia

### 2.5.9. Vertigo with headache or nystagmus

### 2.5.10 Numbness, tingling, paresthesia

### 2.5.11 Papilledema

### 2.5.12 Stiff neck

### 2.5.13 New onset of severe headache

### 2.5.14 Drowsiness

### 2.5.15 Vomiting

### 2.5.16 Nystagmus

### 2.5.17 Cranial nerve palsy

### 2.5.18 Gait disturbance

### 2.5.19 Personality or behavioral changes

### 2.5.20 New seizures

### 2.5.21 Hearing loss or tinnitus

### 2.5.22 Sudden falls

## 2.7 Osteomyelitis suspected MRI Preferred

### 2.7.1 Pain or Fever AND One

#### 2.7.1.1 C reactive Protein elevated

#### 2.7.1.2 Elevated ESR

#### 2.7.1.3 Fever

#### 2.7.1.4 Leukocytosis

#### 2.7.1.5 Positive Blood Cultures

References:


1. Parsonnet Jeffrey, “Chapter 120. Osteomyelitis” (Chapter). Fauci AS, Braunwald E, Kasper DL, Hauser SL, Longo DL, Jameson JL, Loscalzo J: Harrison’s Principles of Internal Medicine, 17th Edition: http://www.accessmedicine.com/content.aspx?aID=2893649.
2. Alok Kapoor, Stephanie Page, Michael LaValley, Daniel R. Gale, and David T. Felson Magnetic Resonance Imaging for Diagnosing Foot Osteomyelitis: A Meta-analysis Arch Intern Med, Jan 2007; 167: 125 – 132.
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8. Susan A. Connolly, Leonard P. Connolly, Laura A. Drubach, David Zurakowski, and Diego Jaramillo MRI for Detection of Abscess in Acute Osteomyelitis of the Pelvis in Children Am. J. Roentgenol., Oct 2007; 189: 867 – 872.

## 2.8 Stroke, Suspected Any ONE

### 2.8.1 Altered level of consciousness, cognitive ability or personality

### 2.8.2 Amnesia

### 2.8.3 Aphasia

### 2.8.4 Ataxia

### 2.8.5 Decreased Sensation

### 2.8.6 Dementia (see above)

### 2.8.7 Diplopia

### 2.8.8 Dysarthria

### 2.8.9 Dysphagia

### 2.8.10 Gait Disturbance

### 2.8.11 Paralysis

### 2.8.12 Visual Field Defect

### 2.8.13 Weakness in an extremity

References:


1. Scott Phillip A, Timmerman Caroline A, “Chapter 228. Stroke, Transient Ischemic Attack, and Other Central Focal Conditions” (Chapter). Tintinalli JE, Kelen GD, Stapczynski JS, Ma OJ, Cline DM: Tintinalli’s Emergency Medicine: A Comprehensive Study Guide, 6e: http://www.accessmedicine.com/content.aspx?aID=607610.
2. Pamela W. Schaefer, Elizabeth R. Barak, Shahmir Kamalian, Leila Rezai Gharai, Lee Schwamm, Ramon Gilberto Gonzalez, and Michael H. Lev Quantitative Assessment of Core/Penumbra Mismatch in Acute Stroke: CT and MR Perfusion Imaging Are Strongly Correlated When Sufficient Brain Volume Is Imaged Stroke 39: 2986-2992;
3. Julia Hopyan, Anthony Ciarallo, Dar Dowlatshahi, Peter Howard, Verity John, Robert Yeung, Liying Zhang, Jisung Kim, Genevieve MacFarlane, Ting-Yim Lee, and Richard I. Aviv Certainty of Stroke Diagnosis: Incremental Benefit with CT Perfusion over Noncontrast CT and CT Angiography Radiology April 2010 255:142-153; CT perfusion improves stroke diagnosis by relatively inexperienced readers over that achieved with noncontrast CT alone or a combination of noncontrast CT and CT angiography, with improved inter- and intraobserver agreement..

## 2.9 Transient Ischemic Attack TIA Suspected

### 2.9.1 Altered level of consciousness, cognitive ability or personality

### 2.9.2 Amnesia

### 2.9.3 Aphasia

### 2.9.4 Ataxia

### 2.9.5 Decreased Sensation

### 2.9.6 Dementia

### 2.9.7 Diplopia

### 2.9.8 Dysarthria

### 2.9.9 Dysphagia

### 2.9.10 Gait Disturbance

### 2.9.11 Paralysis

### 2.9.12 Visual Field Defect

### 2.9.13 Weakness in an extremity

References:


1. Scott Phillip A, Timmerman Caroline A, “Chapter 228. Stroke, Transient Ischemic Attack, and Other Central Focal Conditions” (Chapter). Tintinalli JE, Kelen GD, Stapczynski JS, Ma OJ, Cline DM: Tintinalli’s Emergency Medicine: A Comprehensive Study Guide, 6e: http://www.accessmedicine.com/content.aspx?aID=607610.
2. Pamela W. Schaefer, Elizabeth R. Barak, Shahmir Kamalian, Leila Rezai Gharai, Lee Schwamm, Ramon Gilberto Gonzalez, and Michael H. Lev Quantitative Assessment of Core/Penumbra Mismatch in Acute Stroke: CT and MR Perfusion Imaging Are Strongly Correlated When Sufficient Brain Volume Is Imaged Stroke 39: 2986-2992;
3. Julia Hopyan, Anthony Ciarallo, Dar Dowlatshahi, Peter Howard, Verity John, Robert Yeung, Liying Zhang, Jisung Kim, Genevieve MacFarlane, Ting-Yim Lee, and Richard I. Aviv Certainty of Stroke Diagnosis: Incremental Benefit with CT Perfusion over Noncontrast CT and CT Angiography Radiology April 2010 255:142-153; CT perfusion improves stroke diagnosis by relatively inexperienced readers over that achieved with noncontrast CT alone or a combination of noncontrast CT and CT angiography, with improved inter- and intraobserver agreement..

## 2.10 Intracranial hemorrhage suspected

### 2.10.1 Head trauma

#### 2.10.1.1 Amnesia

#### 2.10.1.2 Altered level of consciousness

#### 2.10.1.3 Vomiting

#### 2.10.1.4 Seizure

#### 2.10.1.5 Coagulopathy or current treatment with heparin or Coumadin

#### 2.10.1.6 Skull fracture

#### 2.10.1.7 Ataxia

#### 2.10.1.8 Aphasia

#### 2.10.1.9 Decreased sensation in a limb

#### 2.10.1.10 Visual field loss

#### 2.10.1.11 Double vision

#### 2.10.1.12 Memory loss

### 2.10.2 Subarachnoid hemorrhage

#### 2.10.2.1. Vomiting

#### 2.10.2.2 Sudden severe hypertension

#### 2.10.2.3. Decreased level of consciousness

#### 2.10.2.4 Thunderclap headache

#### 2.10.2.5. Worst headache of life

#### 2.10.2.6 Known aneurysm

#### 2.10.7 Treated aneurysm and/or AVM with new headache or neurologic findings

#### 2.10.2.8 Stiff neck

#### 2.10.2.9 Seizures

#### 2.10.2.10 Third nerve palsy

### 2.10.3 Intracerebral hemorrhage

#### 2.10.3.1 Hypertension with new onset headache

#### 2.10.3.2 Known brain tumor with new neurologic findings

#### 2.10.3.4 New onset of neurologic symptoms

## 2.11 Hydrocephalus

### 2.11.1 Suspected obstructive hydrocephalus

#### 2.11.1.1 Ataxia

#### 2.11.1.2 Diplopia

#### 2.11.1.3 Gait disturbance

#### 2.11.1.4 Headache

#### 2.11.1.5 Mental status changes

#### 2.11.1.6 Papilledema

### 2.11.2 Normal pressure hydrocephalus (NPH) [One of the following]

#### 2.11.2.1 Gait distrurbance

#### 2.11.2.2 Tremors

#### 2.11.2.3 Urinary incontinence, urgency, or frequency

#### 2.11.2.4 Dementia

#### 2.11.2.5 Known NPH with worsening symptoms

### 2.11.3 Suspicion of VP (ventriculoperitoneal) shunt malfunction

### 2.11.4 Known hydrocephalus in a child

#### 2.11.4.1 Age 0-5 yrs annually

#### 2.11.4.2 Age 5 or older every 2 years

References


1. Diagnostic evaluation for nontraumatic intracerebral hemorrhage.
2. Domingues R, Rossi C, Cordonnier C.
3. Neurol Clin. 2015 May;33(2):315-28. doi: 10.1016/j.ncl.2014.12.001.
4. Patients with disease of brain, cerebral vasculature, and spine.
5. Sappenfield JW, Martz DG Jr.
6. Med Clin North Am. 2013 Nov;97(6):993-1013
7. Modern brain tumor imaging.
8. Mabray MC, Barajas RF Jr, Cha S.
9. Brain Tumor Res Treat. 2015 Apr;3(1):8-23. doi: 10.14791/btrt.2015.3.1.8. Epub 2015 Apr 29.
10. History and evolution of brain tumor imaging: insights through radiology.
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17. Ghosh S, Lippa C.
18. Am J Alzheimers Dis Other Demen. 2014 Nov;29(7):583-9.

# 3 Abnormal Physical Exam Finding presented as primary indication

## 3.1 Altered level of consciousness, cognitive ability or personality

### 3.1.1 Headache

### 3.1.2 Known or suspected infectious process, or abscess

#### 3.1.2.1 Elevated WBC

#### 3.1.2.2 Fever

### 3.1.3 Multiple Sclerosis (MS)

### 3.1.4 Stroke

### 3.1.5 Suspected Pseudotumor Cerebri

### 3.1.6 Trauma, recent history of

### 3.1.7 Vasculitis

References:


1. Practice parameter: the utility of neuroimaging in the evaluation of headache in patients with normal neurological examinations (summary statement). Report of the Quality Standards Subcommittee of the American Academy of Neurology. Neurology 1994; 44:1353-1354.
2. F. K. Alehan; Value of Neuroimaging in the Evaluation of Neurologically Normal Children With Recurrent Headache; J Child Neurol, January 1, 2002; 17(11): 807 – 809.
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10. TE Gammal, MB Allen, Jr, BS Brooks, and EK Mark MR evaluation of hydrocephalus Am. J. Roentgenol., Oct 1987; 149: 807 – 813.
11. C. M. Fisher Hydrocephalus as a cause of disturbances of gait in the elderly Neurology, Dec 1982; 32: 1358.

### 3.2 Aphasia Def: Loss or impairment of the power to use or comprehend words

#### 3.2.1 Known or suspected infectious process, or abscess

#### 3.2.2 Suspected Stroke or TIA

References

1. Aminoff Michael J, “Chapter 24. Nervous System Disorders” (Chapter). McPhee SJ, Papadakis MA, Tierney LM, Jr.: CURRENT Medical Diagnosis & Treatment 2009: http://www.accessmedicine.com/content.aspx?aID=12507.

### 3.3 Apraxia loss or impairment of the ability to execute complex coordinated movements

#### 3.3.1 Alzheimer’s Dis.

#### 3.3.2 Normal Pressure Hydrocephalus (NPH)

#### 3.3.3 Parkinson’s Dis.

#### 3.3.4 Progressive Supranuclear Palsy

References

1. Cindy Zadikoff , and Anthony E. Lang Apraxia in movement disorders Brain 128: 1480-1497. “Apraxia can be found in diseases of the basal ganglia, including Parkinson’s disease, progressive supranuclear palsy (PSP) and Huntington’s disease, and reportedly in isolated lesions of the basal ganglia.”

### 3.4 Ataxia an inability to coordinate voluntary muscular movements

#### 3.4.1 Hydrocephalus, Suspected obstructive

#### 3.4.2 Known or suspected infectious process, or abscess

#### 3.4.3 Suspected Stroke or TIA

References:

1. Aminoff Michael J, “Chapter 24. Nervous System Disorders” (Chapter). McPhee SJ, Papadakis MA, Tierney LM, Jr.: CURRENT Medical Diagnosis & Treatment 2009: http://www.accessmedicine.com/content.aspx?aID=12507.

### 3.5 Dysarthria. impaired ability to speak due to CNS disorder

#### 3.5.1 Known or suspected infectious process, or abscess

##### 3.5.1.1 Elevated WBC

##### 3.5.1.2 Fever

#### 3.5.2 Suspected multiple sclerosis

#### 3.5.3 Suspected Stroke or TIA

References:


1. Blanco, Y, Compta, Y, Graus, F, Saiz, A Midbrain lesions and paroxysmal dysarthria in multiple sclerosis Multiple Sclerosis 2008 14: 694-697
2. Malm, Jan, Eklund, Anders Idiopathic normal pressure hydrocephalus PRACTICAL NEUROLOGY 2006 6: 14-27
3. Marvin A Fishman, MD Hydrocephalus UpToDate 15.2 accessed 7/18/07
4. TE Gammal, MB Allen, Jr, BS Brooks, and EK Mark MR evaluation of hydrocephalus Am. J. Roentgenol., Oct 1987; 149: 807 – 813.


### 3.6 Motor perseveration

#### 3.6.1 Normal Pressure Hydrocephalus (NPH), Suspected

### 3.7 New neurologic signs or symptoms

#### 3.7.1 Any known malignancy

#### 3.7.2 HIV

#### 3.7.3 Systemic Lupus Erythematsus

### 3.8 Papilledema

### 3.9 Photophobia

#### 3.9.1 Known or suspected infectious process, or abscess

### 3.10 Visual field loss

### 3.11 Weakness

#### 3.11.1 Known or suspected infectious process, or abscess

##### 3.11.1.1 Elevated WBC

##### 3.11.1.2 Fever

#### 3.11.2 Suspected Stroke or TIA

## 4 Abnormal Lab or Imaging presented as primary indication

### 4.1 Skull abnormalities

#### 4.1.1 detected by physical exam or x-ray

# 5 Significant Prior Medical History presented as primary indication

## 5.1 Follow up

### 5.1.1 After medical treatment for tumor or infection

#### 5.1.1.1 Intracrainial tumors may be reexamined every 3 to 6 months or when clinical findings change.

### 5.1.2 After surgical treatment for any problem

#### 5.1.2.1 Change in clinical status

### 5.1.3 Repeat exam prior to surgery or intervention

#### 5.1.3.1 prior exam at least ten days old

5.2 Head Injury, recent history of ONE

5.2.1 Age over 50

5.2.2 Alcohol abuse

5.2.3 Amnesia

5.2.4 Anticoagulant drugs or known coagulopathy

5.2.5 Fracture

5.2.6 Headache

5.2.7 Neurologic symptoms, new onset

5.2.7.1 Altered consciousness

5.2.7.2 Amaurosis fugax

5.2.7.3 Amnesia

5.2.7.4 Aphasia

5.2.7.5 Ataxia

5.2.7.6 Cognitive dysfunction

5.2.7.7 Coma

5.2.7.8 Decreased sensation

5.2.7.9 Diplopia

5.2.7.10 Dysarthria

5.2.7.11 Dysphagia with no GI cause

5.2.7.12 Headache

5.2.7.13 Seizures, new onset

5.2.7.14 Visual Field loss

5.2.7.15 Vomitting

5.2.8 Seizure

5.2.9 Short term memoy loss

5.2.10 Vomiting

5.3 Hydrocephalus, known with worsening symptoms

5.4 Intracranial metastases, Known

5.4.1 New signs or symptoms

5.5 Melanomas for staging,

5.5.1 Part of initial work up, no symptoms required

### 5.6 Metastases, known intracranial

#### 5.6.1 New or worsening symptoms

### 5.7 Multiple sclerosis, known MRI PREFERRED

### 5.8 Osteomyelitis Known MRI PREFERRED

#### 5.8.1 Interval follow up during and after treatment

#### 5.8.2 Preoperative

#### 5.8.3 Worsening clinical situation

References:


1. Parsonnet Jeffrey, “Chapter 120. Osteomyelitis” (Chapter). Fauci AS, Braunwald E, Kasper DL, Hauser SL, Longo DL, Jameson JL, Loscalzo J: Harrison’s Principles of Internal Medicine, 17th Edition: http://www.accessmedicine.com/content.aspx?aID=2893649.
2. Alok Kapoor, Stephanie Page, Michael LaValley, Daniel R. Gale, and David T. Felson Magnetic Resonance Imaging for Diagnosing Foot Osteomyelitis: A Meta-analysis Arch Intern Med, Jan 2007; 167: 125 – 132.
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4. Kuo-Chen Lee, Yi-Ting Tsai, Chih-Yuan Lin, and Chien-Sung Tsai Vertebral osteomyelitis combined streptococcal viridans endocarditis Eur. J. Cardiothorac. Surg., Jan 2003; 23: 125.
5. D Allen, S Ng, K Beaton, and D Taussig Sternal osteomyelitis caused by Aspergillus fumigatus in a patient with previously treated Hodgkin’s disease J. Clin. Pathol., Aug 2002; 55: 616 – 618.
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8. Susan A. Connolly, Leonard P. Connolly, Laura A. Drubach, David Zurakowski, and Diego Jaramillo MRI for Detection of Abscess in Acute Osteomyelitis of the Pelvis in Children Am. J. Roentgenol., Oct 2007; 189: 867 – 872.


### 5.9 Sarcoma, known, for staging,

#### 5.9.1 Part of initial work up, no symptoms required

### 5.10 Skull fracture Known

### 5.11 Small cell lung cancer for staging,

#### 5.11.1 Part of initial work up, no symptoms required

### 5.12 Trauma, recent history of ONE

#### 5.12.1 Age over 50

#### 5.12.2 Alcohol abuse

#### 5.12.3 Amnesia

#### 5.12.4 Anticoagulant drugs or known coagulopathy

#### 5.12.5 Fracture

#### 5.12.6 Headache

#### 5.12.7 Neurologic symptoms, new onset

##### 5.12.7.1 Altered consciousness

##### 5.12.7.2 Amaurosis fugax

##### 5.12.7.3 Amnesia

##### 5.12.7.4 Aphasia

##### 5.12.7.5 Ataxia

##### 5.12.7.6 Cognitive dysfunction

##### 5.12.7.7 Coma

##### 5.12.7.8 Decreased sensation

##### 5.12.7.9 Diplopia

##### 5.12.7.10 Dysarthria

##### 5.12.7.11 Dysphagia with no GI cause

##### 5.12.7.12 Headache

##### 5.12.7.13 Seizures, new onset

##### 5.12.7.14 Visual Field loss

#### 5.12.8 Seizure

#### 5.12.9 Short term memoy loss

#### 5.12.10 Vomiting

References

1. Kirsch Thomas D, Lipinski Christopher A, “Chapter 255. Head Injury” (Chapter). Tintinalli JE, Kelen GD, Stapczynski JS, Ma OJ, Cline DM: Tintinalli’s Emergency Medicine: A Comprehensive Study Guide, 6e: http://www.accessmedicine.com/content.aspx?aID=610258.

### 5.13 Tumor. Known primary intracranial

#### 5.13.1 New signs or symptoms

#### 5.13.2 Interval follow up at 3 to 6 month