Cohere Medical Policy- Computed Tomography (CT), Brain

Clinical Guidelines for Medical Necessity Review

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Important Notices

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Guideline Information:

Specialty Area: Diagnostic Imaging
Guideline Name: Cohere Medial Policy - Computed Tomography (CT), Brain

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Table of Contents

Medical Necessity Criteria

Service: Computed Tomography (CT), Brain

Recommended Clinical Approach

Computed tomography (CT) of the brain is often appropriate when MRI is unavailable or contraindicated. The clinical request form for a CT Head should be initiated by the referring physician or any appropriate allied healthcare professional familiar with the patient's clinical problem or question and consistent with the state scope of practice requirements. CT Head will often be the initial screening examination to evaluate for acute, life-threatening conditions but will be commonly supplemented by MRI evaluation subsequently.[1]

Medical Necessity Criteria

Indications

- ➔ **Computed tomography (CT), brain** is considered appropriate if **ANY** of the following is **TRUE**:
  - ◆ For diagnosis, treatment, or staging of neoplastic conditions (including brain masses or mass-like lesions if MRI is contraindicated or cannot be performed)[1]; **OR**
    - Lesion with atypical features on prior imaging for further evaluation or follow-up; **OR**
    - Bone tumor or abnormality of the skull; **OR**
    - Known or suspected pituitary tumors or sella turcica tumor (MRI is contraindicated or cannot be performed); **OR**
    - Skull lesion (e.g., fibrous dysplasia, Paget disease, histiocytosis, osteolytic lesion, skeletal tumors)[1]; **OR**
    - Suspected recurrence with prior history of CNS cancer (either primary or secondary) based on neurological symptoms or examination findings (MRI is contraindicated or cannot be performed); **OR**
    - Suspected elevated intracranial pressure[2-3]; **OR**
    - Histiocytic neoplasms (e.g., Langerhans cell histiocystosis, Erdheim-Chester disease, Rosai-Dorfman disease) to assess treatment response and surveillance of known

brain/skull lesions (MRI is contraindicated or cannot be performed); **OR**

- Infection or an infectious disorder, known or suspected, when MRI is contraindicated or cannot be performed, and **ANY** of the following is **TRUE**[1]:
  - Suspected intracranial abscess or brain infection with altered mental status or abnormal lab findings; **OR**
  - Follow up assessment during or after treatment completed; **OR**
  - Endocarditis with suspected septic emboli; **OR**
  - Suspected primary CNS vasculitis based on neurological signs and symptoms with completed infectious or inflammatory lab work-up; **OR**
- Trauma-related conditions as indicated by **ANY** of the following:
  - Head trauma, acute[1,4-5]; **OR**
  - Non-accidental trauma (e.g., abuse)[1,4-5]; **OR**
  - Known coagulopathy or on anticoagulation; **OR**
  - Repeat scan 24-hour post head trauma for anticoagulated or coagulopathic patients with a suspected diagnosis of delayed subdural hematoma; **OR**
  - Post-concussive syndrome if persistent and disabling symptoms and imaging has not been performed; **OR**
  - Subacute or chronic traumatic brain injury with new cognitive and/or neurologic deficit; **OR**
  - Known or suspected skull fracture by physical exam and/or prior imaging; **OR**
- Vascular conditions, known or suspected, including **ANY** of the following:
  - Intraparenchymal hemorrhage, known or suspected[6]; **OR**
  - Intracranial hemorrhage, known or suspected, including follow-up[1]; **OR**
  - Ischemic infarct, known or suspected[6]; **OR**
  - Stroke or transient ischemic attack (TIA), suspected[6]; **OR**
  - Venous sinus thrombosis, known or suspected (MRV is contraindicated or cannot be performed)[6]; **OR**
- For evaluation of **ANY** of the following miscellaneous pathologies when prior testing has failed:

- Syncope with clinical concern for seizure or associated neurological signs and symptoms (MRI is contraindicated or cannot be performed); **OR**
- For evaluation of cranial nerve and visual abnormalities (MRI is contraindicated or cannot be performed); **OR**
- Congenital skull and brain lesions (e.g., craniosynostosis, macrocephaly, and microcephaly)[1]; **OR**
- Mental status change (including cognitive impairment) (MRI is contraindicated or cannot be performed)[1,7-8]; **OR**
- Toxicity related to drugs (e.g., substance use, prescriptions) (MRI is contraindicated or cannot be performed); **OR**
- Epilepsy (suspected or known seizure disorder and MRI is contraindicated or cannot be performed)[1-3,9]; **OR**
- Headache as indicated by **ANY** of the following[1,10]:
    - Pediatric population with persistent headaches for **ANY** of the following (MRI is contraindicated or cannot be performed):
        - Occipital location; **OR**
        - Age less than 6 years; **OR**
        - Symptoms indicative of increased intracranial pressure, such as recurring headaches after waking with or without associated nausea/vomiting; **OR**
        - Severe headache in a child with an underlying disease that predisposes to intracranial pathology (e.g., immune deficiency, sickle cell disease, neurofibromatosis, hypertension); **OR**
    - Focal problem present, and MRI is contraindicated or cannot be performed[2-3]; **OR**
    - The patient has experienced a significant change in symptoms, and MRI is contraindicated or cannot be performed[2-3]; **OR**
    - Sudden onset of a severe headache and **ANY** of the following are **TRUE**:
        - Aneurysm, suspected with a family history (brother, sister, parent, or child) of a brain aneurysm or arteriovenous malformation (AVM)[2-3]; **OR**

        - Bleeding, suspected (known coagulopathy or on anticoagulation) with a prior history of stroke or intracranial hemorrhage[2-3]; **OR**
        - Headache reaches maximal severity within one hour (e.g., Thunderclap headache) with a duration of more than 5 minutes; **OR**
    - With features of intracranial hypertension (e.g., papilledema, pulsatile tinnitus, visual symptoms worse on Valsalva); **OR**
    - **ANY** of the following "red flags" (MRI is contraindicated or cannot be performed):
        - Fever; **OR**
        - History of cancer or immunocompromised; **OR**
        - Increasing frequency or severity (during a course of physician-directed treatment); **OR**
        - Related to activity or event (e.g., sexual activity, exertion, Valsalva, positional) with new or progressively worsening symptoms; **OR**
        - Neurologic deficit; **OR**
        - Older age (over age 50) at onset; **OR**
        - Post-traumatic onset; **OR**
        - Sudden onset of severe headache ("thunderclap") or worst headache of life; **OR**
- Intractable vomiting; **OR**
- Movement disorders including **ANY** of the following neurodegenerative diseases (MRI is contraindicated or cannot be performed)[11]:
    - Acute onset of a movement disorder with concern for stroke or hemorrhage; **OR**
    - For evaluation of Parkinson's disease with atypical features or other movement disorders (e.g., suspected Huntington's disease, chorea, hemiballismus, atypical dystonia) to exclude an underlying structural lesion; **OR**
- Neurologic deficit, acute (e.g., ataxia, cranial nerve dysfunction) and MRI is contraindicated or cannot be performed[1,6]; **OR**
- Vertigo, acute or recurrent with **ANY** of the following (MRI is contraindicated or cannot be performed)[12-13]:

        - Signs and symptoms suggestive of a CNS lesion; **OR**
        - Progressive unilateral hearing loss; **OR**
        - Risk factors for cerebrovascular disease with concern for stroke; **OR**
        - After a full neurological examination and vestibular testing with concern for central vertigo; **OR**
    - With developmental delay in a child less than 18 years of age when MRI is contraindicated or cannot be performed[1]; **OR**
- Preoperative, postoperative, or pretreatment evaluation for **ANY** of the following[1]:
    - CT guidance, image integration, and 3-D planning for procedure or surgery; **OR**
    - Postoperative evaluation following intracranial surgery; **OR**
- Congenital conditions (e.g., hydrocephalus, including shunt malfunctions or shunt revision), and **ANY** of the following is **TRUE**[1,14-15]:
    - Perioperatively if indicated based on the underlying disease and preoperative radiographic findings; **OR**
    - 6-12 months after placement; **OR**
    - With neurologic symptoms that suggest shunt malfunction; **OR**
    - Annual follow-up if the patient continues to exhibit symptoms (more frequent follow-up may be necessary if symptoms persist); **OR**
- Repeat imaging of a specific area or structure using the same imaging modality (in the absence of an existing follow-up guideline) is considered appropriate when **ALL** of the following is **TRUE**:
    - There is documented clinical necessity; **AND**
    - Prior imaging results of the specific area or structure, obtained using the same imaging modality, must be documented and available for comparison; **AND**
    - **ANY** of the following is **TRUE**:
        - A change in clinical status, such as worsening symptoms or the emergence of new symptoms, that may influence the treatment approach; **OR**
        - The requirement for interval reassessment, which may alter the treatment plan; **OR**

- One-time follow-up of a prior indeterminate finding to assess for interval change; **OR**
- The need for re-imaging either before or after performing an invasive procedure.

Non-Indications

➔ **Computed tomography (CT), brain with contrast** is not considered appropriate if **ANY** of the following is **TRUE**[16]:

- The patient has undergone advanced imaging of the same body part within 3 months without undergoing treatment or developing new or worsening symptoms; **OR**
- History of anaphylactic allergic reaction to iodinated contrast media.

*NOTE: The referring professional and radiologist should discuss the risks and benefits of contrast media administration, including possible prophylaxis, in patients with chronic or worsening kidney disease or severe renal failure.
**NOTE: CT in pregnant patients should be requested at the discretion of the ordering provider and obstetric care provider.
***NOTE: CT in patients with claustrophobia should be requested at the discretion of the ordering provider.

Disclaimer on Radiation Exposure in Pediatric Population

Due to the heightened sensitivity of pediatric patients to ionizing radiation, minimizing exposure is paramount. At Cohere, we are dedicated to ensuring that every patient, including the pediatric population, has access to appropriate imaging following accepted guidelines. Radiation risk is dependent mainly on the patient's age at exposure, the organs exposed, and the patient's sex, though there are other variables. The following technical guidelines are provided to ensure safe and effective imaging practices:

Radiation Dose Optimization: Adhere to the lowest effective dose principle for pediatric imaging. Ensure that imaging protocols are specifically tailored for pediatric patients to limit radiation exposure.[17-18]

Alternative Modalities: Prioritize non-ionizing imaging options such as ultrasound or MRI when clinically feasible, as they are less likely to expose the patient to ionizing radiation. For instance, MRI or ultrasound should be considered if they are more likely to provide an accurate diagnosis than CT,

fluoroscopy, or radiography.[17-18]

Cumulative Dose Monitoring: Implement systems to track cumulative radiation exposure in pediatric patients, particularly for those requiring multiple imaging studies. Regularly reassess the necessity of repeat imaging based on clinical evaluation.[17-18]

CT Imaging Considerations: When CT is deemed the best method for achieving a correct diagnosis, use the lowest possible radiation dose that still yields reliable diagnostic images.[17-18]

Cohere Imaging Gently Guideline

The purpose of this guideline is to act as a potential override when clinically indicated to adhere to Imaging Gently and Imaging Wisely guidelines and As Low As Reasonably Possible (ALARA) principles.

Level of Care Criteria

Inpatient or Outpatient

Procedure Codes (CPT/HCPCS)

CPT/HCPCS Code	Code Description
70450	Computed tomography (CT), head or brain; without contrast material
70460	Computed tomography (CT), head or brain; with contrast material(s)
70470	Computed tomography (CT), head or brain; without contrast material, followed by contrast material(s) and further sections
76380	Computed tomography, limited or localized follow-up study

Medical Evidence

Bedernik et al. (2022) conducted a randomized control trial (RCT) to assess image quality by comparing single-energy computed tomography (SECT) with automated tube voltage adaptation (TVA) to dual-energy CT (DECT) weighted average images. A total of 80 patients underwent SECT or radiation dose-matched DECT. The effective radiation dose (ED) showed no significant difference between the SECT and DECT study groups. Compared to the SECT group, the DECT group exhibited significantly higher contrast-to-noise ratio differences (CNRD) for jugular veins relative to fatty tissue and muscle tissue relative to fatty tissue. However, the CNRD for jugular veins relative to muscle tissue was comparable between groups. Image artifacts were also less pronounced, and overall diagnostic acceptability was higher in the DECT group. Overall, DECT-weighted average images demonstrate superior objective and subjective image quality compared to SECT performed with TVA in head and neck imaging.[19]

Smith-Bindman et al. (2020) performed an RCT to study the efficacy of interventions to lower the amount of radiation patients are exposed to. The RCT included 864,080 adults at 100 facilities who underwent a CT scan, including CT Head (1,156,657 total scans). The study included two primary measures: the percentage of high-dose CT scans and the average effective dose administered at the facility level. The study's secondary measure included the doses received by specific organs. Outcomes were assessed concerning the impact of the interventions and outcomes post-intervention. Data were contrasted with pre-intervention data, utilizing hierarchical generalized linear models that accounted for temporal patterns and patient attributes. In conclusion, data regarding CT radiation dosage and practical recommendations may improve quality, including significant dose reductions, especially for organ-specific doses.[20]

Tranvinh et al. (2019) examined the evidence backing the utilization of neuroimaging in adult patients experiencing a new-onset seizure. In the acute setting, unenhanced CT serves as the primary imaging modality for adults encountering their first unprovoked seizure, prioritizing the exclusion of urgent or emergent conditions. An initial unenhanced head CT scan may rule out treatable intracranial abnormalities promptly. If the CT findings are negative but clinical suspicion persists for a structural cause of the seizure, MRI should be considered, particularly in acute cases. MRI offers supplementary advantages and is helpful for patients with negative initial CT findings in acute scenarios and those experiencing new-onset seizures in nonacute circumstances.[21]

References

1. American College of Radiology (ACR), American Society of Neuroradiology (ASNR), Society for Pediatric Radiology (SPR). ACR–ASNR–SPR practice parameter for the performance of computed tomography (CT) of the head - resolution 44. Updated 2020. Accessed July 31, 2024. https://www.acr.org/-/media/ACR/Files/Practice-Parameters/CT-Brain.pdf.
2. Centers for Medicare and Medicaid Services (CMS). Local coverage determination: MRI and CT scans of the head and neck (L37373). Revision Effective Date October 1, 2019. Accessed July 31, 2024. https://www.cms.gov/medicare-coverage-database/search.aspx.
3. Centers for Medicare and Medicaid Services (CMS). Local coverage determination: MRI and CT scans of the head and neck (L35175). Revision Effective Date October 1, 2019. Accessed July 31, 2024. https://www.cms.gov/medicare-coverage-database/search.aspx.
4. Expert Panel on Neurological Imaging, Shih RY, Burns J, et al. ACR appropriateness criteria - head trauma: 2021 update. J Am Coll Radiol. 2021 May;18(5S):S13-S36. doi: 10.1016/j.jacr.2021.01.006. PMID: 33958108.
5. Expert Panel on Major Trauma Imaging, Shyu JY, Khurana B, et al. ACR appropriateness criteria - major blunt trauma. *J Am Coll Radiol*. 2020 May;17(5S):S160-S174. doi: 10.1016/j.jacr.2020.01.024. PMID: 32370960.
6. Expert Panel on Neurological Imaging, Pannell JS, Corey AS, et al. ACR appropriateness criteria - cerebrovascular diseases (stroke and stroke-related conditions). Published 2023. Accessed July 31, 2024. https://acsearch.acr.org/docs/3149012/Narrative.
7. Expert Panel on Neurological Imaging, Moonis G, Subramaniam RM, et al. ACR appropriateness criteria - dementia. *J Am Coll Radiol*. 2020 May;17(5S):S100-S112. doi: 10.1016/j.jacr.2020.01.040. PMID: 32370954.
8. Expert Panel on Neurological Imaging, Luttrull MD, Boulter DJ, et al. ACR appropriateness criteria - acute mental status change, delirium, and new onset psychosis. *J Am Coll Radiol*. 2019 May;16(5S):S26-S37. doi: 10.1016/j.jacr.2019.02.024. PMID: 31054753.
9. Expert Panel on Neurological Imaging, Lee RK, Burns J, et al. ACR appropriateness criteria - seizures and epilepsy. *J Am Coll Radiol*. 2020 May;17(5S):S293-S304. doi: 10.1016/j.jacr.2020.01.037. PMID: 32370973.
10. Expert Panel on Neurologic Imaging, Utukuri PS, Shih RY, et al. ACR appropriateness criteria - headache. Revised 2022. Accessed July 31, 2024. https://acsearch.acr.org/docs/69482/Narrative/.
11. Expert Panel on Neurological Imaging, Harvey HB, Watson LC, et al. ACR appropriateness criteria - movement disorders and neurodegenerative diseases. *J Am Coll Radiol*. 2020 May;17(5S):S175-S187. doi: 10.1016/j.jacr.2020.01.042. PMID: 32370961.

12. Expert Panel on Neurologic Imaging, Wang LL, Thompson TA, et al. ACR appropriateness criteria - dizziness and ataxia. Published 2023. Accessed July 31, 2024. https://acsearch.acr.org/docs/69477/Narrative/.
13. Expert Panel on Neurologic Imaging, Sharma A, Kirsch CFE, et al. ACR appropriateness criteria - hearing loss and/or vertigo. Published 2018. Accessed January 17, 2024. https://acsearch.acr.org/docs/69488/Narrative/.
14. Farb R, Rovira A, Hodler J, et al. Hydrocephalus and CSF disorders. In: Diseases of the brain, head and neck, spine 2020–2023: Diagnostic imaging [Internet]. Cham (CH): Springer; 2020. Chapter 2. DKD Springer Series. 2020 Feb 15. PMID: 32119247; Bookshelf ID: NBK554339.
15. Harper JR, Cherukuri V, O'Reilly T, et al. Assessing the utility of low-resolution brain imaging: Treatment of infant hydrocephalus. *Neuroimage Clin*. 2021:32:102896. doi: 10.1016/j.nicl.2021.102896. PMID: 34911199; PMCID: PMC8646178.
16. Davenport MS, Perazella MA, Yee J, et al. Use of intravenous iodinated contrast media in patients with kidney disease: Consensus statements from the American College of Radiology and the National Kidney Foundation. *Radiology*. 2020;294(3):660-668. doi: 10.1148/radiol.2019192094. PMID: 33015613; PMCID: PMC7525144.
17. The Image Gently Alliance. Procedures - image gentle and CT scans. Updated 2014. Accessed July 31, 2024. https://www.imagegently.org/Procedures/Computed-Tomography.
18. National Cancer Institute. Radiation risks and pediatric computed tomography (CT): A guide for health care. Updated September 4, 2018. Accessed July 31, 2024. https://www.cancer.gov/about-cancer/causes-prevention/risk/radiation/pediatric-ct-scans.
19. Bedernik A, Wuest W, May MS, et al. Image quality comparison of single-energy and dual-energy computed tomography for head and neck patients: A prospective randomized study. *Eur Radiol*. 2022 Nov;32(11):7700-7709. doi: 10.1007/s00330-022-08689-4. PMID: 35441839; PMCID: PMC9668949.
20. Smith-Bindman R, Chu P, Wang Y, et al. Comparison of the effectiveness of single-component and multicomponent interventions for reducing radiation doses in patients undergoing computed tomography: A randomized clinical trial. *JAMA Intern Med*. 2020 May 1;180(5):666-675. doi: 10.1001/jamainternmed.2020.0064. PMID: 32227142; PMCID: PMC7105953.
21. Tranvinh E, Lanzman B, Provenzale J, et al. Imaging evaluation of the adult presenting with new-onset seizure. *AJR Am J Roentgenol*. 2019 Jan;212(1):15-25. doi: 10.2214/AJR.18.20202. PMID: 30299997.

Clinical Guideline Revision History/Information

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