Cohere Medical Policy - Computed Tomography (CT), Chest

Clinical Guidelines for Medical Necessity Review

Version: 3
Effective Date: October 30, 2024

Important Notices

Notices & Disclaimers:

GUIDELINES ARE SOLELY FOR COHERE'S USE IN PERFORMING MEDICAL NECESSITY REVIEWS AND ARE NOT INTENDED TO INFORM OR ALTER CLINICAL DECISION-MAKING OF END USERS.

Cohere Health, Inc. ("**Cohere**") has published these clinical guidelines to determine the medical necessity of services (the "**Guidelines**") for informational purposes only, and solely for use by Cohere's authorized "**End Users**". These Guidelines (and any attachments or linked third-party content) are not intended to be a substitute for medical advice, diagnosis, or treatment directed by an appropriately licensed healthcare professional. These Guidelines are not in any way intended to support clinical decision-making of any kind; their sole purpose and intended use is to summarize certain criteria Cohere may use when reviewing the medical necessity of any service requests submitted to Cohere by End Users. Always seek the advice of a qualified healthcare professional regarding any medical questions, treatment decisions, or other clinical guidance. The Guidelines, including any attachments or linked content, are subject to change at any time without notice.

Other Notices:

Guideline Information:

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

Date of last literature review: 8/16/2024
Document last updated: 10/30/2024
Type: [**X**] Adult (18+ yo) | [**X**] Pediatric (0-17 yo)

Table of Contents

Medical Necessity Criteria

Service: Computed Tomography (CT), Chest

Recommended Clinical Approach

Computed tomography (CT) of the chest can be performed as a screening examination in high-risk patients and to diagnose and evaluate a myriad of thoracic processes involving the lungs, mediastinum/hilum, pleura, and chest wall. Contrast usage is guided by the clinical scenario being investigated.[1]

Fleischner Society 2017 Guidelines for Management of Incidentally Detected Pulmonary Nodules in Adults[2]				
Solid Nodules*				
	Size			
Nodule Type	**<6mm (<100 mm^3)**	**6–8 mm (100–250 mm^3)**	**>8 mm (>250 mm^3)**	**Comments**
Single				
Low Risk**	No routine follow-up	CT at 6–12 months, then consider CT at 18–24 months	Consider CT at 3 months, PET/CT, or tissue sampling	Nodules <6 mm do not require routine follow-up in low-risk patients (recommendation 1A).
High Risk**	Optional CT at 12 months	CT at 6–12 months, then CT at 18–24 months	Consider CT at 3 months, PET/CT, or tissue sampling	Certain patients at high-risk with suspicious nodule morphology, upper lobe location, or both may warrant a 12-month follow-up (recommendation 1A).

Multiple				
Low Risk**	No routine follow-up	CT at 3–6 months, then consider CT at 18–24 months	CT at 3–6 months, then consider CT at 18–24 months	Use most suspicious nodule as guide to management. Follow-up intervals may vary according to size and risk (recommendation 2A).
High Risk**	Optional CT at 12 months	CT at 3–6 months, then at 18–24 months	CT at 3–6 months, then at 18–24 months	Use most suspicious nodule as guide to management. Follow-up intervals may vary according to size and risk (recommendation 2A).
Subsolid Nodules*				
	Size			
Nodule Type	**<6mm (<100 mm^3)**	**≥ 6 mm (>100 mm3)**	**Comments**	
Single				
Ground Glass	No routine follow-up	CT at 6–12 months to confirm persistence, then CT every 2 years until 5 years	In certain suspicious nodules <6 mm, consider follow-up at 2 and 4 years. If solid component(s)or growth develops, consider resection. (Recommendations 3A and 4A).	
Part Solid	No routine follow-up	CT at 3–6 months to confirm persistence. If unchanged and solid component	In practice, part-solid nodules cannot be defined as such until ≥6 mm, and nodules <6 mm do not usually require follow-up. Persistent part-solid nodules with solid components 6mm should be considered highly suspicious (recommendations 4A-4C).	

		remain <6 mm, annual CT should be performed for 5 years.	
Multiple	CT at 3–6 months. If stable, consider CT at 2 and 4 years	CT at 3–6 months. Subsequent management based on the most suspicious nodule(s)	Multiple <6 mm pure ground-glass nodules are usually benign, but consider follow-up in selected patients at high risk at 2 and 4 years(recommendation 5A).

Lung-RADS® (2022)[3]			
Lung-RADS	**Category Descriptor**	**Findings**	**Management**
0	**Incomplete** Estimated Population Prevalence: ~1%	Prior chest CT examination being located for comparison (see note 9)	Comparison to prior chest CT
		Part of all of the lungs cannot be evaluated	Additional lung cancer screening CT imaging needed
		Findings suggestive of an inflammatory or infectious process (see note 10)	1-3 month LDCT
1	**Negative** Estimated Population Prevalence: 39%	**No lung nodules;** OR	12-month screening LDCT
		Nodule with benign features: • Complete, central, popcorn, or concentric ring calcifications; OR • Fat-containing	
2	**Benign** Based on	**Juxtapleural Nodule** • < 10 mm (524 mm^3) mean diameter at baseline or new; AND	

	imaging features or indolent behavior Estimated Population Prevalence: 45%	• Solid; smooth margins; and oval, lentiform, or triangular shape	
		Solid Nodule • < 6 mm (< 113 mm^3) at baseline; OR • New <4 mm (< 34 mm^3)	
		Part Solid Nodule • < 6 mm (< 113 mm^3) total mean diameter at baseline	
		Non-Solid Nodule (GGN) • <30 mm (< 14,137 mm^3) at baseline, new or growing; OR • ≥30 mm (≥ 14,137 mm^3) stable or slowly growing (see note 7)	
		Airway nodule, subsegmental - at baseline, new, or stable (see note 11)	
		• Category 3 lesion that is stable or decreased in size at 6-month follow-up CT; OR • Category 4B lesion proven to be benign in etiology following appropriate diagnostic workup	
3	**Probably Benign** Based on imaging features or behavior Estimated Population Prevalence: 9%	**Solid Nodule** • ≥ 6 mm to < 8 mm (≥ 113 to < 268 mm^3) at baseline; OR • New 4 mm to <6 mm (34 to < 113 mm^3)	6-month LDCT
		Part Solid Nodule • ≥ 6 mm (≥ 113 mm^3) total mean diameter with solid component < 6 mm (< 113 mm^3) at baseline • New < 6 mm (< 113 mm^3) total mean diameter	
		Non-Solid Nodule (GGN) • ≥ 30 mm (≥ 14,137 mm^3) at baseline or new	
		Atypical Pulmonary Cyst (see note 12) • Growing cystic component (mean	

		diameter) of a thick-walled cyst	
		Category 4A lesion that is stable or decreased in size at 3-month follow-up CT (excluding airway nodules)	
4A	**Suspicious** Estimated Population Prevalence: 4%	**Solid Nodule** • ≥ 8 mm to < 15 mm (≥ 268 to < 1767 mm^3) at baseline; OR • Growing < 8 mm (< 268 mm^3) • New 6 to < 8 mm (113 to < 268 mm^3)	3-month LDCT; PET/CT may be considered if there is a ≥ 8 mm (≥ 268 mm^3) solid nodule or solid component
		Part Solid Nodule • ≥ 6 mm (≥ 113 mm^3) total mean diameter with solid component ≥ 6 mm to < 8 mm (≥ 113 to < 268 mm^3) at baseline; OR • New or growing <4 mm (< 34 mm^3) solid component	
		Airway Nodule, segmental or more proximal - at baseline (see note 11)	
		Atypical Pulmonary Cyst (see note 12) • Thick-walled cyst; OR • Multilocular cyst at baseline; OR • Thin- or thick-walled cyst that becomes multilocular	
4B	**Very Suspicious** Estimated Population	**Airway Nodule,** segmental or more proximal - stable or growing (see note 11)	Referral for further clinical evaluation
		Solid Nodule • ≥ 15 mm (≥ 1767 mm^3) at baseline; OR • New or growing ≥ 8 mm (≥ 268 mm^3)	Diagnostic chest CT with or without contrast; PET/CT may be considered if there is a ≥ 8 mm (≥ 268 mm^3) solid nodules or solid component;
		Part Solid Nodule • Solid component ≥ 8 mm (≥ 268 mm^3) at baseline; OR • New or growing ≥ 4 mm (≥ 34 mm^3) solid component	
		Atypical Pulmonary Cyst (see note 12) • Thick-walled cyst with growing wall thickness/nodularity; OR	

	Prevalence: 2%	• Growing multilocular cyst (mean diameter); OR • Multilocular cyst with increased loculation or new/increased opacity (nodular, ground glass, or consolidation)	Tissue sampling; and/or referral for further clinical evaluation; Management depends on clinical evaluation, patient preference, and the probability of malignancy (see note 13)
		Slow-growing solid or part-solid nodule that demonstrates growth over multiple screening exams (see note 8)	
4X	Estimated Population Prevalence: <1%	Category 3 or 4 nodules with additional features or imaging findings that increase suspicion for lung cancer (see note 14)	
S	**Significant or Potentially Significant** Estimated Population Prevalence: 10%	Modifier: May add to category 0-4 for clinically significant or potentially clinically significant findings unrelated to lung cancer (see note 15)	As appropriate to the specific finding

Medical Necessity Criteria

Indications

➔ **Computed tomography (CT), chest** is considered appropriate when **ANY** of the following is **TRUE**:

- ◆ Abnormality discovered or partially imaged on other imaging modalities and chest CT evaluation is indicated[4]; **OR**
- ◆ Neoplastic conditions (including masses or mass-like conditions) including **ANY** of the following:
  - Chest wall mass with **ANY** of the following:
    - Palpable chest wall mass with non-diagnostic chest X-ray or ultrasound; **OR**

    - Chest wall mass identified on prior imaging when further information is needed to determine the need for biopsy or surgery; **OR**
    - Preoperative planning following biopsy; **OR**
- Pulmonary nodule or mass and **ANY** of the following is **TRUE**:
    - Incidentally detected pulmonary nodule on prior CT chest and the patient meets criteria specified in Fleischner Society Guidelines[2]; **OR**
    - Pulmonary nodules detected on lung cancer screening CT and the patient meets Lung-RADS® (2022) criteria[3]; **OR**
    - Nodule or mass detected on non-CT chest imaging (e.g., chest X-ray, CT abdomen/pelvis, MRI, etc.) that requires additional workup; **OR**
- Other thoracic mass lesions when suspected on prior imaging or clinical criteria (e.g., myasthenia gravis for thymoma) including **ANY** of the following:
    - Mediastinal mass; **OR**
    - Pancoast tumor; **OR**
    - Pleural mass; **OR**
    - Thymoma; **OR**
    - Tracheal or endobronchial lesion; **OR**
- Cardiothoracic manifestation of known extrathoracic diseases; **OR**
- Detection and evaluation of metastatic disease when primary malignancy is known[4]; **OR**
- Staging and follow-up of lung cancer or other primary thoracic malignancy[4]; **OR**

◆ Infection or an infectious disorder for **ANY** of the following:

- Pneumonia when **ANY** of the following is **TRUE**:

        - Repeat chest X-ray shows no improvement following at least 4-6 weeks of medical treatment[5]; **OR**
        - Recurrence of pneumonia in the same location within 6 months; **OR**
        - Evaluation of known or suspected complications of pneumonia following nondiagnostic chest X-ray; **OR**
        - Immunosuppressed patients with signs or symptoms of pneumonia; **OR**
    - For the diagnosis and management of other infectious or inflammatory conditions, including **ANY** of the following:
        - Lung abscess; **OR**
        - Sternal wound infection or dehiscence; **OR**
        - Mediastinitis; **OR**
        - Infectious and inflammatory conditions not listed elsewhere in this guideline; **OR**
- For the diagnosis and management of blunt or penetrating trauma to the thorax and chest X-ray is non-diagnostic; **OR**
- For the management (including treatment response), suspected or known, of a parenchymal lung disease including **ANY** of the following when chest X-ray is non-diagnostic:
    - Bronchiectasis; **OR**
    - Bronchiolitis obliterans; **OR**
    - Sarcoidosis; **OR**
    - Interstitial lung disease (including idiopathic pulmonary fibrosis [IPF]); **OR**
    - Occupational lung disease; **OR**
- Vascular conditions, known or suspected, including **ANY** of the following (CTA preferred)[4,6-7]:
    - Pulmonary hypertension; **OR**
    - Pulmonary vascular malformations; **OR**
    - Pulmonary venous abnormalities; **OR**

- For evaluation of **ANY** of the following uncategorized/miscellaneous symptoms when applicable:
    - Shortness of breath, when symptoms are unlikely to be cardiac in origin with non-diagnostic chest X-ray **OR**
    - Chest pain that persists despite treatment and chest X-ray is non-diagnostic or requires further evaluation; **OR**
    - Cough (chronic or persistent lasting more than 6 weeks) that does not respond to appropriate treatment and is unexplained by clinical evaluation (including but not limited to reflux disease, post-nasal drip), chest X-ray, and/or pulmonary function testing or spirometry; **OR**
    - Cough (chronic or persistent) in immunosuppressed individuals unexplained by chest X-ray; **OR**
    - Fever of unknown origin with **ANY** of the following:
        - Duration greater than 3 weeks and unexplained following a standard diagnostic evaluation (including chest X-ray) to identify the source; **OR**
        - Unexplained fever in an immunocompromised patient; **OR**
    - Hemoptysis, following non-diagnostic chest X-rays; **OR**
    - Vocal cord paralysis when ENT evaluation including CT neck and direct laryngoscopy have been performed; **OR**
    - Pleural disease including **ANY** of the following:
        - Pleural effusion when further evaluation is required for etiology and/or is un-resolving on chest X-ray.; **OR**
        - Hemothorax; **OR**
        - Empyema; **OR**
        - Chylothorax; **OR**
        - Bronchopulmonary fistula suspected based on X-rays and clinical parameters; **OR**
        - Recurrent or unexplained pneumothorax; **OR**

- Unintentional weight loss exceeding 5% of the patient's body weight within a 12-month interval and **ANY** of the following is **TRUE**:
    - Persistent weight loss after a period of observation with a negative comprehensive clinical evaluation and **ALL** of the following:
        - History and physical examination; **AND**
        - Age-appropriate cancer screening; **AND**
        - Chest X-ray; **AND**
        - Initial laboratory evaluation; **OR**
    - Abnormal findings suggestive of malignancy on history, physical exam, imaging, or laboratory evaluation; **OR**

- Preoperative, postoperative, or pre-treatment evaluation for **ANY** of the following:
    - Before lung volume reduction (LVR) procedure; **OR**
    - Before lung resection; **OR**
    - Before navigational bronchoscopy; **OR**
    - Identification and location of a device within the lungs and cardiovascular system when chest X-ray are non-diagnostic; **OR**
    - Performance of CT-guided interventional procedures[4]; **OR**
    - Postoperative complications[4]; **OR**
    - Pre-transplant; **OR**
    - Post-transplant if complications or infection are suspected and chest X-ray is non-diagnostic; **OR**
    - Response to therapies including chemotherapy, immunotherapy, and ablative therapies; **OR**
    - Treatment planning and biopsy for surgical or radiation therapy[4]; **OR**

- Follow-up after an established diagnosis of thoracic aortic aneurysm (TAA) for **ANY** of the following reasons (CTA preferred; CT chest may be approved if the patient has renal insufficiency or explicitly states that dye is not wanted)[8-9]:
    - At 6 months after the initial finding of a dilated thoracic aorta to evaluate the rate of change; **OR**:
    - The patient has no associated condition and **ANY** of the following is **TRUE**:
        - Annual surveillance of less than 5.0 cm TAA; **OR**
        - Six-month surveillance of TAA is greater than 5.0 cm or growing more than 0.5 mm a year; **OR**

- Congenital thoracic anomalies including **ANY** of the following:
    - Congenital pulmonary airway malformation (pediatric); **OR**
    - Chest wall deformities including, but not limited to, pectus excavatum (pediatric only); **OR**
    - Evaluation and management of diaphragmatic hernia; **OR**
    - Pulmonary sequestration; **OR**
- Repeat imaging (defined as repeat request following recent imaging of the same anatomic region with the same modality), in the absence of established guidelines, will be considered reasonable and necessary if **ANY** of the following is **TRUE**:
    - New or worsening symptoms, such that repeat imaging would influence treatment; **OR**
    - One-time clarifying follow-up of a prior indeterminate finding; **OR**
    - In the absence of change in symptoms, there is an established need for monitoring which would influence management.

Non-Indications

- ➔ **Computed tomography (CT), chest with contrast** is not considered appropriate if **ANY** of the following is **TRUE**[11]:
  - ◆ The patient has undergone advanced imaging of the same body part and for the same indication within 3 months without undergoing treatment or developing new or worsening symptoms[12]; **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.[13-14]

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.[13-14]

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.[13-14]

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.[13-14]

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
71250	Computed tomography (CT), thorax; without contrast material
71260	Computed tomography (CT), thorax; with contrast material(s)
71270	Computed tomography (CT), thorax; without contrast material, followed by contrast material(s) and further sections

76380	Computed tomography, limited or localized follow-up study

Medical Evidence

Hassankhani et al. (2023) conducted a systematic review and meta-analysis of the diagnostic utility of multidetector computed tomography (MDCT) scans in penetrating diaphragmatic injuries. The study investigates the diagnostic efficacy of MDCT in detecting diaphragmatic injuries caused by penetrating trauma, with a focus on the potential risks of missed injuries and complications in cases managed nonoperatively despite the recognized value of CT scans for stable patients. The progression of CT technology, notably with the emergence of MDCT, has significantly improved the capacity to identify and assess diaphragmatic injuries caused by penetrating trauma. Although CT has solidified its role in evaluating blunt abdominal trauma patients who are hemodynamically stable, becoming the preferred imaging method in this regard, utilization in cases of penetrating thoracoabdominal trauma remains an ongoing subject of investigation. The study underscores the efficacy of MDCT in identifying diaphragmatic injury resulting from penetrating trauma with moderate to high diagnostic accuracy.[15]

Cramer et al. (2021) provide a secondary analysis of a randomized control trial (RCT) on the incidence of second primary lung cancer after low-dose CT versus chest X-ray screening in head and neck cancer survivors. A total of 53,452 participants were enrolled in the study; 171 survivors of head and neck cancer were identified (82 had screening via low-dose CT of the chest and 89 via chest X-ray. The average age of participants was 61 years, with 132 being male (77%). The incidence of lung cancer was notably higher among head and neck cancer survivors compared to those without. In head and neck cancer survivors, the incidence of second primary lung cancer was 2610 cases per 100,000 person-years in the low-dose CT group versus 1594 cases per 100,000 person-years in the chest X-ray group. Overall survival in head and neck cancer survivors was 7.07 years with low-dose CT compared to 6.66 years with chest X-ray. The secondary analysis of the RCT indicates that head and neck cancer survivors face a heightened risk of developing second primary lung cancer. Low-dose CT screening is essential for such survivors, particularly individuals with a significant history of cigarette smoking who are deemed suitable for curative treatment.[16]

Oldroyd et al. (2021) performed a systematic review and meta-analysis to determine the clinical factors linked with cancer susceptibility in idiopathic inflammatory myopathies (IIMs) and conduct a comprehensive review of the available evidence concerning cancer screening within this context. The meta-analysis assessed the cancer risk linked with numerous clinical risk factors and myositis-specific autoantibodies (MSAs), providing insights for cancer screening strategies among IIM patients. The authors note that findings can collectively contribute to refining cancer screening guidelines, potentially facilitating earlier cancer detection and enhancing patient outcomes.[17]

References

1. American College of Radiology (ACR), Society of Advanced Body Imaging (SABI), Society for Pediatric Radiology (SPR), Society of Thoracic Radiology (STR). ACR–SABI–SPR–STR practice parameter for the performance of thoracic computed tomography (CT) - resolution 17. Updated 2023. Accessed March 22, 2024. https://www.acr.org/-/media/ACR/Files/Practice-Parameters/CT-Thoracic.pdf.
2. MacMahon H, Naidich DP, Goo JM, et al. Guidelines for management of incidental pulmonary nodules detected on CT images: From the Fleischner Society 2017. *Radiology*. 2017 Jul;284(1):228-243. doi: 10.1148/radiol.2017161659. PMID: 28240562.
3. American College of Radiology (ACR). Lung-RADS v. 2022. Revised November 2022. Accessed June 6, 2024. https://www.acr.org/-/media/ACR/Files/RADS/Lung-RADS/Lung-RADS-2022.pdf.
4. Expert Panel on Cardiac Imaging, Kirsch J, Wu CC, et al. ACR appropriateness criteria - suspected pulmonary embolism: 2022 update. *J Am Coll Radiol*. 2022 Nov;19(11S):S488-S501. doi: 10.1016/j.jacr.2022.09.014. PMID: 36436972.
5. Little BP, Gilman MD, Humphrey KL, et al. Outcome of recommendations for radiographic follow-up of pneumonia on outpatient chest radiography. *AJR Am J Roentgenol*. 2014 Jan;202(1):54-9. doi: 10.2214/AJR.13.10888. PMID: 24370128.
6. Expert Panel on Thoracic Imaging, Morris MF, Henry TS, et al. ACR appropriateness criteria - workup of pleural effusion or pleural disease. Published 2023. Accessed March 22, 2024. https://acsearch.acr.org/docs/3158179/Narrative.
7. Expert Panel on Thoracic Imaging, Sirajuddin A, Mirmomen SM, et al. ACR appropriateness criteria - suspected pulmonary hypertension: 2022 update. *J Am Coll Radiol*. 2022 Nov;19(11S):S502-S512. doi: 10.1016/j.jacr.2022.09.018. PMID: 36436973.
8. Erbel R, Aboyans V, Boileau C, et al. 2014 ESC Guidelines on the diagnosis and treatment of aortic diseases: Document covering acute and

chronic aortic diseases of the thoracic and abdominal aorta of the adult. The Task Force for the Diagnosis and Treatment of Aortic Diseases of the European Society of Cardiology (ESC). *Eur Heart J*. 2014 Nov 1;35(41):2873-926. doi: 10.1093/eurheartj/ehu281. PMID: 25173340.

9. Hiratzka LF, Bakris GL, Beckman JA, et al. 2010 ACCF/AHA/AATS/ACR/ASA/SCA/SCAI/SIR/STS/SVM guidelines for the diagnosis and management of patients with Thoracic Aortic Disease: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines, American Association for Thoracic Surgery, American College of Radiology, American Stroke Association, Society of Cardiovascular Anesthesiologists, Society for Cardiovascular Angiography and Interventions, Society of Interventional Radiology, Society of Thoracic Surgeons, and Society for Vascular Medicine. *Circulation*. 2010 Apr 6;121(13):e266-369. doi: 10.1161/CIR.0b013e3181d4739e. PMID: 20233780. Erratum in: *Circulation*. 2010 Jul 27;122(4):e410.
10. Borger MA, Fedak PWM, Stephens EH, et al. The American Association for Thoracic Surgery consensus guidelines on bicuspid aortic valve-related aortopathy. *J Thorac Cardiovasc Surg*. 2018 Aug;156(2):e41-e74. doi: 10.1016/j.jtcvs.2018.02.115. PMID: 30011777; PMCID: PMC6413866.
11. 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.
12. Wasser EJ, Prevedello LM, Sodickson A, Mar W, Khorasani R. Impact of a real-time computerized duplicate alert system on the utilization of computed tomography. *JAMA Intern Med*. 2013;173(11):1024-1026. doi: 10.1001/jamainternmed.2013.543. PMID: 23609029.
13. The Image Gently Alliance. Procedures - image gentle and CT scans. Updated 2014. Accessed June 26, 2024. https://www.imagegently.org/Procedures/Computed-Tomography.
14. National Cancer Institute. Radiation risks and pediatric computed tomography (CT): A guide for health care. Updated September 4, 2018. Accessed June 26, 2024.

https://www.cancer.gov/about-cancer/causes-prevention/risk/radiation/pediatric-ct-scans.
15. Hassankhani A, Amoukhteh M, Valizadeh P, et al. Diagnostic utility of multidetector CT scan in penetrating diaphragmatic injuries: A systematic review and meta-analysis. *Emerg Radiol*. 2023 Dec;30(6):765-776. doi: 10.1007/s10140-023-02174-1. PMID: 37792116; PMCID: PMC10695863.
16. Cramer JD, Grauer J, Sukari A, et al. Incidence of second primary lung cancer after low-dose computed tomography vs chest radiography screening in survivors of head and neck cancer: A secondary analysis of a randomized clinical trial. *JAMA Otolaryngol Head Neck Surg*. 2021 Dec 1;147(12):1071-1078. doi: 10.1001/jamaoto.2021.2776. PMID: 34709369; PMCID: PMC8554690.
17. Oldroyd AGS, Allard AB, Callen JP, et al. A systematic review and meta-analysis to inform cancer screening guidelines in idiopathic inflammatory myopathies. *Rheumatology (Oxford)*. 2021 Jun 18;60(6):2615-2628. doi: 10.1093/rheumatology/keab166. PMID: 33599244; PMCID: PMC8213426.

Clinical Guideline Revision History/Information

Original Date: April 15, 2022		
Review History		
Version 2	8/20/2024	Annual review and policy restructure.
Version 3	10/30/2024	Edited repeat imaging criteria language.