CLINICAL APPROPRIATENESS GUIDELINES

ADVANCED IMAGING

Appropriate Use Criteria: Imaging of the Chest

EFFECTIVE MARCH 12, 2020
Proprietary

Approval and implementation dates for specific health plans may vary. Please consult the applicable health plan for more details.

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Description and Application of the Guidelines

The AIM Clinical Appropriateness Guidelines (hereinafter “the AIM Clinical Appropriateness Guidelines” or the “Guidelines”) are designed to assist providers in making the most appropriate treatment decision for a specific clinical condition for an individual. As used by AIM, the Guidelines establish objective and evidence-based criteria for medical necessity determinations where possible. In the process, multiple functions are accomplished:

- To establish criteria for when services are medically necessary
- To assist the practitioner as an educational tool
- To encourage standardization of medical practice patterns
- To curtail the performance of inappropriate and/or duplicate services
- To advocate for patient safety concerns
- To enhance the quality of health care
- To promote the most efficient and cost-effective use of services

The AIM guideline development process complies with applicable accreditation standards, including the requirement that the Guidelines be developed with involvement from appropriate providers with current clinical expertise relevant to the Guidelines under review and be based on the most up-to-date clinical principles and best practices. Relevant citations are included in the References section attached to each Guideline. AIM reviews all of its Guidelines at least annually.

AIM makes its Guidelines publicly available on its website twenty-four hours a day, seven days a week. Copies of the AIM Clinical Appropriateness Guidelines are also available upon oral or written request. Although the Guidelines are publicly-available, AIM considers the Guidelines to be important, proprietary information of AIM, which cannot be sold, assigned, leased, licensed, reproduced or distributed without the written consent of AIM.

AIM applies objective and evidence-based criteria, and takes individual circumstances and the local delivery system into account when determining the medical appropriateness of health care services. The AIM Guidelines are just guidelines for the provision of specialty health services. These criteria are designed to guide both providers and reviewers to the most appropriate services based on a patient’s unique circumstances. In all cases, clinical judgment consistent with the standards of good medical practice should be used when applying the Guidelines. Guideline determinations are made based on the information provided at the time of the request. It is expected that medical necessity decisions may change as new information is provided or based on unique aspects of the patient’s condition. The treating clinician has final authority and responsibility for treatment decisions regarding the care of the patient and for justifying and demonstrating the existence of medical necessity for the requested service. The Guidelines are not a substitute for the experience and judgment of a physician or other health care professionals. Any clinician seeking to apply or consult the Guidelines is expected to use independent medical judgment in the context of individual clinical circumstances to determine any patient’s care or treatment.

The Guidelines do not address coverage, benefit or other plan specific issues. Applicable federal and state coverage mandates take precedence over these clinical guidelines. If requested by a health plan, AIM will review requests based on health plan medical policy/guidelines in lieu of the AIM Guidelines.

The Guidelines may also be used by the health plan or by AIM for purposes of provider education, or to review the medical necessity of services by any provider who has been notified of the need for medical necessity review, due to billing practices or claims that are not consistent with other providers in terms of frequency or some other manner.

General Clinical Guideline

Clinical Appropriateness Framework

Critical to any finding of clinical appropriateness under the guidelines for a specific diagnostic or therapeutic intervention are the following elements:

- Prior to any intervention, it is essential that the clinician confirm the diagnosis or establish its pretest likelihood based on a complete evaluation of the patient. This includes a history and physical examination and, where applicable, a review of relevant laboratory studies, diagnostic testing, and response to prior therapeutic intervention.
- The anticipated benefit of the recommended intervention should outweigh any potential harms that may result (net benefit).
- Current literature and/or standards of medical practice should support that the recommended intervention offers the greatest net benefit among competing alternatives.
- Based on the clinical evaluation, current literature, and standards of medical practice, there exists a reasonable likelihood that the intervention will change management and/or lead to an improved outcome for the patient.

If these elements are not established with respect to a given request, the determination of appropriateness will most likely require a peer-to-peer conversation to understand the individual and unique facts that would supersede the requirements set forth above. During the peer-to-peer conversation, factors such as patient acuity and setting of service may also be taken into account.

Simultaneous Ordering of Multiple Diagnostic or Therapeutic Interventions

Requests for multiple diagnostic or therapeutic interventions at the same time will often require a peer-to-peer conversation to understand the individual circumstances that support the medical necessity of performing all interventions simultaneously. This is based on the fact that appropriateness of additional intervention is often dependent on the outcome of the initial intervention.

Additionally, either of the following may apply:

- Current literature and/or standards of medical practice support that one of the requested diagnostic or therapeutic interventions is more appropriate in the clinical situation presented; or
- One of the diagnostic or therapeutic interventions requested is more likely to improve patient outcomes based on current literature and/or standards of medical practice.

Repeat Diagnostic Intervention

In general, repeated testing of the same anatomic location for the same indication should be limited to evaluation following an intervention, or when there is a change in clinical status such that additional testing is required to determine next steps in management. At times, it may be necessary to repeat a test using different techniques or protocols to clarify a finding or result of the original study.

Repeated testing for the same indication using the same or similar technology may be subject to additional review or require peer-to-peer conversation in the following scenarios:

Repeated diagnostic testing at the same facility due to technical issues

- Repeated diagnostic testing requested at a different facility due to provider preference or quality concerns
- Repeated diagnostic testing of the same anatomic area based on persistent symptoms with no clinical change, treatment, or intervention since the previous study

- Repeated diagnostic testing of the same anatomic area by different providers for the same member over a short period of time

Repeat Therapeutic Intervention

In general, repeated therapeutic intervention in the same anatomic area is considered appropriate when the prior intervention proved effective or beneficial and the expected duration of relief has lapsed. A repeat intervention requested prior to the expected duration of relief is not appropriate unless it can be confirmed that the prior intervention was never administered.

Imaging of the Chest

General Information/Overview

Scope

These guidelines address advanced imaging of the chest in both adult and pediatric populations. For interpretation of the Guidelines, and where not otherwise noted, “adult” refers to persons age 19 and older, and “pediatric” refers to persons age 18 and younger. Where separate indications exist, they are specified as **Adult** or **Pediatric**. Where not specified, indications and prerequisite information apply to persons of all ages.

See the Coding section for a list of modalities included in these guidelines.

Technology Considerations

Anatomic coverage for thoracic imaging includes the area between the lung apices and the costophrenic sulci—specifically, the lung parenchyma, pleura, mediastinum, and musculoskeletal structures of the thorax. Chest imaging studies are not appropriate for cardiac and coronary artery imaging. For imaging of the heart, see the AIM guidelines for the specific CPT code being requested. Vascular imaging of the thorax is addressed in the Vascular Imaging guidelines.

In the majority of clinical situations, chest radiographs should have been performed within 30 days of the imaging request. When radiographs are not sufficient to guide management, **computed tomography (CT)** is most often the study of choice for imaging the thorax; it is widely available and provides excellent resolution of soft tissue and the bony thorax.[1] **High-resolution CT (HRCT)** uses thin-section acquisition and high spatial frequency reconstruction to optimize visualization of the fine lung parenchyma and airways.[2] It is primarily indicated for characterization of diffuse lung or small airways disease. HRCT is usually performed without contrast and using dynamic (inspiratory and expiratory) breathing, and often produces a lower radiation dose than a standard chest CT.[3] **Low-dose chest CT (LDCT)** also employs a dose reduction strategy and is primarily used in lung cancer screening (please refer to the Oncologic Imaging guidelines).[4, 5] Disadvantages of CT include exposure to ionizing radiation and risks associated with infusion of iodinated contrast media, including allergic reactions or renal compromise.

Magnetic resonance imaging (MRI) is generally less useful for thoracic imaging; speed of image acquisition is slower and motion artifact in this region may interfere with image quality. However, it does provide superior resolution of the lung apices and chest wall (including breast). It may also be used for problem solving following CT, or for situations in which CT is contraindicated. **Breast MRI** requires a dedicated breast coil. For breast imaging related to cancer screening or diagnosis, see Oncologic Imaging guidelines. The presence of implantable devices such as pacemakers or defibrillators, a potential need for sedation in pediatric patients, and claustrophobia are the main limitations of MRI. Infusion of gadolinium may also confer an unacceptable risk in persons with advanced renal disease.

Definitions

Phases of the care continuum are broadly defined as follows:

- **Screening** – testing in the absence of signs or symptoms of disease
- **Diagnosis –** testing based on a reasonable suspicion of a particular condition or disorder, usually due to the presence of signs or symptoms
- **Management –** testing to direct therapy of an established condition, which may include preoperative or postoperative imaging, or imaging performed to evaluate the response to nonsurgical intervention

- **Surveillance –** periodic assessment following completion of therapy, or for monitoring known disease that is stable or asymptomatic

Statistical terminology [6]

- **Confidence interval (CI) –** range of values which is likely to contain the cited statistic. For example, 92% sensitivity (95% CI, 89%-95%) means that, while the sensitivity was calculated at 92% on the current study, there is a 95% chance that, if a study were to be repeated, the sensitivity on the repeat study would be in the range of 89%-95%.
- **Diagnostic accuracy –** ability of a test to discriminate between the target condition and health. Diagnostic accuracy is quantified using sensitivity and specificity, predictive values, and likelihood ratios.
- **Hazard ratio –** odds that an individual in the group with the higher hazard reaches the outcome first. Hazard ratio is analogous to odds ratio and is reported most commonly in time-to-event analysis or survival analysis. A hazard ratio of 1 means that the hazard rates of the 2 groups are equivalent. A hazard ratio of greater than 1 or less than 1 means that there are differences in the hazard rates between the 2 groups.
- **Likelihood ratio –** ratio of an expected test result (positive or negative) in patients *with* the disease to an expected test result (positive or negative) in patients *without* the disease. Positive likelihood ratios, especially those greater than 10, help rule in a disease (i.e., they substantially raise the post-test probability of the disease, and hence make it very likely and the test very useful in identifying the disease). Negative likelihood ratios, especially those less than 0.1, help rule out a disease (i.e., they substantially decrease the post-test probability of disease, and hence make it very unlikely and the test very useful in excluding the disease).
- **Odds ratio –** odds that an outcome will occur given a particular exposure, compared to the odds of the outcome occurring in the absence of that exposure. An odds ratio of 1 means that the exposure does not affect the odds of the outcome. An odds ratio greater than 1 means that the exposure is associated with higher odds of the outcome. An odds ratio less than 1 means that the exposure is associated with lower odds of the outcome.
- **Predictive value –** likelihood that a given test result correlates with the presence or absence of disease. Positive predictive value is defined as the number of true positives divided by the number of test positives. Negative predictive value is defined as the number of true negatives divided by the number of test negative patients. Predictive value is dependent on the prevalence of the condition.
- **Pretest probability –** probability that a given patient has a disease prior to testing. May be divided into very low (less than 5%), low (less than 20%), moderate (20%-75%), and high (greater than 75%) although these numbers may vary by condition.
- **Relative risk –** probability of an outcome when an exposure is present relative to the probability of the outcome occurring when the exposure is absent. Relative risk is analogous to odds ratio; however, relative risk is calculated by using percentages instead of odds. A relative risk of 1 means that there is no difference in risk between the 2 groups. A relative risk of greater than 1 means that the outcome is more likely to happen in the exposed group compared to the control group. A relative risk less than 1 means that the outcome is less likely to happen in the exposed group compared to the control group.
- **Sensitivity –** conditional probability that the test is positive, given that the patient has the disease. Defined as the true positive rate (number of true positives divided by the number of patients with disease). Excellent or high sensitivity is usually greater than 90%.

- **Specificity –** conditional probability that the test is negative, given that the patient does not have the disease. Defined as the true negative rate (number of true negatives divided by the number of patients without the disease). Excellent or high specificity is usually greater than 90%.

Clinical Indications

The following section includes indications for which advanced imaging of the chest is considered medically necessary, along with prerequisite information and supporting evidence where available. Indications, diagnoses, or imaging modalities not specifically addressed are considered not medically necessary.

It is recognized that imaging often detects abnormalities unrelated to the condition being evaluated. Such findings must be considered within the context of the clinical situation when determining whether additional imaging is required.

Congenital and Developmental Conditions

Congenital thoracic anomalies

Advanced imaging is considered medically necessary for diagnosis and management when the results of imaging will impact treatment decisions.

IMAGING STUDY

- CT chest

Congenital pulmonary airway malformation (Pediatric only)

Advanced imaging is considered medically necessary for diagnosis and management of the following conditions when the results of imaging will impact treatment decisions.

- Congenital lobar emphysema
- Congenital cystic adenomatoid malformation

IMAGING STUDY

- CT chest

Chest wall deformities including pectus excavatum (Pediatric only)

Advanced imaging is considered medically necessary in **EITHER** of the following scenarios:

- Preoperative evaluation
- Postoperative evaluation for complications or recurrence

IMAGING STUDY

- CT or MRI chest

Pulmonary sequestration

Advanced imaging is considered medically necessary for diagnosis and management when the results of imaging will impact treatment decisions.

IMAGING STUDY

- CT chest

Infectious and Inflammatory Conditions

Pneumonia

Advanced imaging is considered medically necessary in **ANY** of the following scenarios:

- Radiographs show no improvement following at least 4 weeks of medical treatment
- Recurrence of pneumonia in the same location within 6 months
- Evaluation of known or suspected complications of pneumonia following nondiagnostic radiographs
- Immunosuppressed patients with signs or symptoms of pneumonia
- Person under investigation* for Coronavirus Disease 2019 (COVID-19) pneumonia when reverse transcription polymerase chain reaction (RT-PCR) is negative or cannot be performed

** As defined by the Centers for Disease Control (CDC)*

IMAGING STUDY

- CT chest

Rationale

PERSISTENT ABNORMAL RADIOGRAPHS

Clinical signs and symptoms of pneumonia resolve faster than findings on radiography, but may take up to 3 months to resolve.[7, 8] It is common for pneumonia to persist on radiographs after clinical resolution, with the rate of radiographic clearance estimates at 35% within 3 weeks and 84% within 12 weeks.[9, 10] Patients over age 50 are 2 to 4 times more likely to have delayed radiographic resolution of pneumonia. Therefore, it is important to wait at least 4 weeks after clinical resolution before performing advanced imaging, to exclude non-infectious causes of persistent airspace disease.

RECURRENT PNEUMONIA

Recurrent pneumonia is defined as at least 2 episodes of pneumonia in 1 year or 3 lifetime episodes. Evidence is insufficient to inform the optimal timing of imaging in recurrent pneumonia. Bronchoscopy can effectively evaluate the most common causes of recurrent focal airspace disease, including foreign bodies, mucous plugging, and other intraluminal obstructions. However, practice consensus is that CT may be indicated when bronchoscopy is inconclusive. Recurrent pneumonia in the same area is likely due to underlying structural disease—primarily right middle lobe syndrome (airway disease of uncertain pathophysiology) (61%) and congenital lung malformations (21%); diagnostic imaging involving bronchoscopy with or without CT is indicated.[6,11] Recurrent pneumonia in different areas is more likely due to systemic illness (60% related to cystic fibrosis, primary ciliary dyskinesia, or severe gastroesophageal reflux disease) and a more extensive clinical/lab workup is usually performed prior to diagnostic imaging, which is reserved for situations where lab testing (such as immune status assessment, sweat chloride test for cystic fibrosis, tuberculin skin test, pulmonary function tests, and echocardiogram) is inconclusive.[6,11]

Coronavirus disease 2019 (COVID-19) is a highly contagious viral pneumonia. In the absence of a vaccine or other treatment, early and accurate diagnosis is essential to avoid further spread of the disease. While reverse transcription polymerase chain reaction (RT-PCR) testing is accurate and diagnostic in most cases, there is some evidence that chest CT has greater sensitivity, especially in the early stages, making it a potentially important add-on test when RT-PCR is negative or nondiagnostic to reduce contagion.[12]

Other infectious or inflammatory conditions

Advanced imaging is considered medically necessary for diagnosis and management of the following conditions when the results of imaging will impact treatment decisions.

- Lung abscess
- Sternal wound infection or dehiscence
- Mediastinitis
- Infectious and inflammatory conditions not listed elsewhere in this guideline

IMAGING STUDY

- CT chest

Trauma

Blunt or penetrating trauma to the thorax

See Vascular Imaging guidelines.

Advanced imaging is considered medically necessary for diagnosis and management when the results of imaging will impact treatment decisions.

IMAGING STUDY

- CT chest

Tumor or Neoplasm

The following section addresses conditions which may be indicative of underlying neoplasm, as well as benign tumors of the thorax. For cancer screening guidelines and management of documented malignancy, please refer to the Oncologic Imaging guidelines.

Chest wall mass

Advanced imaging is considered medically necessary in **ANY** of the following scenarios**:**

- Palpable chest wall mass with nondiagnostic radiograph or ultrasound
- Chest wall mass identified on prior imaging when further information is needed to determine need for biopsy or surgery
- Preoperative planning following biopsy

  Note: For breast masses (including gynecomastia), see Oncologic Imaging guidelines for breast cancer.

IMAGING STUDY

- CT or MRI chest

Pulmonary nodule

Advanced imaging is considered medically necessary in the following scenarios**:**

Calcified nodules

- Follow up of calcified nodules other than those with benign calcification patterns* is at the discretion of the ordering provider

  **Benign calcification patterns include granulomas and popcorn calcifications, for which routine follow up is not medically necessary*

Noncalcified nodules

- Younger than age 35
  - Nodules ≥ 1 cm or with suspicious morphology (includes nodules with irregular or spiculated margins)
- Age 35 or older
  - Solid nodules: see Table 1
  - Subsolid nodules: see Table 2

Nodules identified on incomplete thoracic CT

- Less than 6 mm: no follow-up imaging required

- 6 mm to 8 mm: 3 to 12 month follow up with complete chest CT; subsequent follow up based on characterization of nodule
- Greater than 8 mm or suspicious morphology*: complete chest CT with subsequent follow up based on characterization of nodule

  **Suspicious morphology includes nodules with irregular or spiculated margins*

IMAGING STUDY

- CT chest (all indications)
- PET, PET-CT when **ALL** of the following are criteria are met:
  - Nodule is well-demarcated, solid or part solid, and lacks a benign calcification pattern.
  - Size is greater than 8 mm but less than 3 cm in greatest diameter
  - Nodule is surrounded by aerated lung parenchyma
  - There is no associated adenopathy, atelectasis or pleural effusion

Table 1. Follow-up recommendations for solid noncalcified pulmonary nodules

Solid nodule size	Risk	Solitary	Multiple
Less than 6 mm	Low	No follow up	
	High*	Optional follow-up exam at 12 months	
6 mm to 8 mm or Lung-RADS 3	N/A	1. 6 to 12 months 2. 18 to 24 months	1. 3 to 6 months 2. 18 to 24 months
More than 8 mm	N/A	1. 3 months 2. 6 months 3. 18 to 24 months unless diagnostic PET-CT or tissue sampling performed	
Any size when prior imaging has documented 24 months of stability	N/A	No follow up	

***High risk** includes the following:

- Smoking history (any)
- First-degree relative with lung cancer
- Significant exposure to asbestos, uranium and/or radon, typically through high risk profession

Table 2. Follow-up recommendations for subsolid noncalcified pulmonary nodules

Subsolid nodule size	Solitary ground glass	Solitary part solid	Multiple subsolid
Less than 6 mm	No routine follow up	No routine follow up	1. 3 to 6 months 2. 24 months 3. 48 months
Greater than or equal to 6 mm or Lung-RADS 3	1. 6 to 12 months 2. Every 2 years thereafter for a total of 5 years	1. 3 to 6 months 2. Every year for 5 years	1. 3 to 6 months 2. Follow up based on most suspicious nodule (part solid or ground glass)

Abbreviation: Lung-RADS™, American College of Radiology Lung CT Screening Reporting and Data System. Adapted from MacMahon H, Naidich DP, Goo JM, et al. *Radiology*. 2017; 284(1):228-243.[13]

Rationale

AIM Guidelines for pulmonary nodules follow the 2017 recommendations of the Fleischner Society, a high-quality evidence-based guideline directly applicable to American patients.[13] These recommendations apply to asymptomatic patients age 35 or older who are not immunocompromised, who do not have cancer, and who are not enrolled in a lung cancer screening program.

Fleischner endorses the use of Lung-RADS guidelines to determine follow up when pulmonary nodules are detected as part of a lung cancer screening program. Fleischner and Lung-RADS are largely concordant, and differences have been reconciled and aligned in AIM Guidelines.

SOLID PULMONARY NODULE IN ASYMPTOMATIC PATIENTS UNDER AGE 35

Primary lung cancer is rare in persons under age 35 (1% of all cases), and the risks from radiation exposure are greater. In young patients, infectious/inflammatory causes are more likely than cancer, and use of serial CT should be minimized. Exceptions may include nodules greater than 1 cm in size or with suspicious morphology. In such cases, follow-up imaging is at the ordering provider's discretion; a single 12-month follow-up CT may be considered to confirm stability.

Most nodules smaller than 1 cm will not be visible on chest radiographs; however, for larger solid nodules that are clearly visualized and are considered low risk, follow up with radiography rather than CT may be appropriate for lower radiation exposure.

NODULE SMALLER THAN 6 mm SEEN ON PREVIOUS IMAGING

Nodules of this size do not require routine follow up in low-risk patients. Since the average risk of cancer in solid nodules smaller than 6 mm in high-risk patients is less than 1%, and the relative risk of cancer in a nonsmoker is much less (0.15) than in a smoker, the risk of malignancy in low-risk patients is very low.

For high-risk patients, some nodules of this size with suspicious morphology, upper lobe location, or both may warrant follow up at 12 months. These features may increase cancer risk to 1%-5%.

NODULE LARGER THAN 8 mm

High-risk patients should usually proceed directly to PET-CT or biopsy. CT surveillance is recommended for nodules greater than 8 mm when:

- Nodules have a low (less than 5%) risk of malignancy (as a rule of thumb, patients older than age 70, patients 50-70 years of age with no high-risk features, and patients younger than age 50 with only one high-risk feature)
- Nodules with intermediate risk (5%-65%) especially when PET-CT is negative or equivocal, and the lesion is too small to biopsy
- Patients are at high surgical risk

Other thoracic mass lesions

Advanced imaging is considered medically necessary for diagnosis and management of the following findings or conditions when the results of imaging will impact treatment decisions.

- Hilar or mediastinal lymphadenopathy or mass
- Pancoast tumor
- Pleural mass
- Thymoma
- Benign tumors (pediatric only)

IMAGING STUDY

ADULT

- CT chest
- MRI chest for evaluation of mediastinal and hilar masses when CT is insufficient for problem solving or for evaluation of chest wall extension in Pancoast tumor

PEDIATRIC

- CT or MRI chest

Parenchymal Lung Disease – not otherwise specified

Asbestos-related lesions involving the lungs and pleura (Adult only)

Advanced imaging is considered medically necessary for diagnosis and management when the results of imaging will impact treatment decisions.

Note: Asbestos exposure may also manifest in nonmalignant pulmonary conditions including interstitial lung disease, pleural effusion, or pleural plaques.

IMAGING STUDY

- CT chest

Bronchiectasis

Advanced imaging is considered medically necessary for diagnosis and management when the results of imaging will impact treatment decisions.

IMAGING STUDY

- CT chest
- Consider chest HRCT technique

Bronchiolitis obliterans

Advanced imaging is considered medically necessary for diagnosis and management when the results of imaging will impact treatment decisions.

IMAGING STUDY

- CT chest

Interstitial lung disease and pulmonary fibrosis

Advanced imaging is considered medically necessary for diagnosis and management when the results of imaging will impact treatment decisions.

IMAGING STUDY

- CT chest
- Consider chest HRCT technique

Occupational lung disease (Adult only)

Advanced imaging is considered medically necessary for diagnosis and management of the following conditions when the results of imaging will impact treatment decisions.

- Silicosis
- Coal worker's pneumoconiosis
- Progressive massive fibrosis
- Hard metal pneumoconiosis
- Talcosis
- Caplan's syndrome in patients with rheumatoid arthritis

IMAGING STUDY

- CT chest

Pulmonary embolism

See Vascular Imaging guidelines.

Sarcoidosis

Advanced imaging is considered medically necessary for diagnosis and management when the results of imaging will impact treatment decisions.

IMAGING STUDY

- CT chest

Pleural Conditions

Bronchopleural fistula (Adult only)

Advanced imaging is considered medically necessary for diagnosis and management when the results of imaging will impact treatment decisions.

IMAGING STUDY

- CT chest

Pleural fluid collection

Advanced imaging is considered medically necessary for diagnosis and management of the following conditions when the results of imaging will impact treatment decisions:

- Pleural effusion
- Hemothorax
- Empyema
- Chylothorax

IMAGING STUDY

- CT chest

  Note: Ultrasound should be considered as the initial imaging modality and prior to a diagnostic or therapeutic pleural tap.

Pneumothorax, unexplained or recurrent

Advanced imaging is considered medically necessary for diagnosis and management when the results of imaging will impact treatment decisions.

IMAGING STUDY

- CT chest

Chest Wall and Diaphragmatic Conditions

Breast implant rupture

Advanced imaging is considered medically necessary in **EITHER** of the following scenarios:

- Detection of implant rupture in symptomatic patients
- Screening for rupture of a silicone breast implant (in asymptomatic patients) beginning 3 years after implantation, and every other year thereafter

IMAGING STUDY

- MRI breast

Diaphragmatic hernia

Advanced imaging is considered medically necessary for diagnosis and management when the results of imaging will impact treatment decisions.

IMAGING STUDY

- CT chest

Pectoralis muscle tear

Advanced imaging is considered medically necessary for preoperative planning in patients with suspected full thickness tear of the tendon or myotendinous junction.

IMAGING STUDY

- MRI chest

Thoracic outlet syndrome

Also see Vascular Imaging guidelines.

Advanced imaging is considered medically necessary for diagnosis and management when the results of imaging will impact treatment decisions.

IMAGING STUDY

- CT or MRI chest for neurogenic thoracic outlet syndrome
- CTA or MRA chest for vascular thoracic outlet syndromes

Signs and Symptoms

Cough (chronic or persistent)

Advanced imaging is considered medically necessary for evaluation of cough present for at least 8 weeks in the following scenarios:

- Cough not responding to appropriate treatment and unexplained by clinical evaluation, chest radiography, and pulmonary function testing or spirometry
- Cough in immunosuppressed individuals

Note: Chronic cough, in the context of other signs and symptoms, should be evaluated based on the most likely disease or diseases responsible (see indication for bronchiectasis or interstitial lung disease).

IMAGING STUDY

- CT chest

Rationale

CHRONIC COUGH IN ADULTS

Advanced imaging cannot diagnose the most common causes of chronic cough and the most common causes of cough should first be evaluated prior to advanced imaging.[14,15]

Likely causes of chronic cough without conclusive chest X-ray and lung function include upper airway cough syndrome, cough-variant asthma, gastroesophageal reflux[14], primary and secondary smoking, environmental and occupational irritants, and ACE inhibitors.[15]

Stepwise workup of chronic cough without conclusive chest X-ray is recommended. Before performing HRCT or bronchoscopy, consider asthma, COPD, upper airway cough syndrome, and gastroesophageal reflux.[14]

CHRONIC COUGH IN PEDIATRIC PATIENTS

The majority of pediatric patients with chronic wet cough will respond to antibiotic treatment with a number needed to treat of 3.[16,17]

Fever of unknown origin

Advanced imaging is considered medically necessary in **EITHER** of the following scenarios:

- Fever of duration greater than 3 weeks, which is unexplained following a standard diagnostic evaluation to identify the source
- Unexplained fever in immunocompromised patient

IMAGING STUDY

- CT chest

Hemoptysis

Advanced imaging is considered medically necessary for evaluation following nondiagnostic chest radiographs.

IMAGING STUDY

- CT chest
- MRI chest for suspected vascular anomaly in pediatric patients

Note: Bronchoscopy is a complementary modality to assess hemoptysis.

Rationale

Hemoptysis is defined as the expectoration of blood that originates from the tracheobronchial tree or pulmonary parenchyma and is usually categorized based on the volume and rate of bleeding with massive hemoptysis defined as 300-400 cc of expectorated blood in a 24-hour period.[18]

The most common causes of hemoptysis are bronchiectasis, tuberculosis, pneumonia, and cancer. Radiographs can identify the cause of hemoptysis between 35% and 50% of the time.[19] Guidelines recommend radiography as the preferred initial imaging modality in patients with non-massive hemoptysis.[20,21] CT is indicated in patients with a negative radiograph and persistent unexplained hemoptysis as it is significantly more sensitive (overall 64%-100%) than any other imaging modality.[19]

Hemoptysis is rare in children and very rarely due to malignant etiologies. The ALARA (as low as reasonably achievable) principle dictates that radiography and bronchoscopy should both be considered prior to CT in children. As in adults, however, CT is more sensitive than both radiography and bronchoscopy and could be considered in pediatric cases where the initial workup is nondiagnostic.[22]

Massive hemoptysis is a rare (less than 5% of cases) medical emergency typically evaluated and treated with bronchoscopy.[19] CT performed before or after a nondiagnostic bronchoscopy is complementary and more sensitive for

the diagnosis as it can visualize the lung parenchyma and mediastinum in addition to the tracheobronchial tree.[21] CT frequently changes management in these patients.[21, 23]

Hoarseness, dysphonia, or vocal cord weakness

Also see Head and Neck Imaging guidelines.

ADULT

Advanced imaging is considered medically necessary for initial evaluation in **ANY** of the following scenarios in adults only:

- Following laryngoscopy, when findings suggest recurrent laryngeal nerve dysfunction or identify a suspicious lesion
- Symptoms persisting longer than one month which are unexplained by laryngoscopy
- Presence of at least **ONE** of the following high-risk features:
  - Tobacco use
  - Alcohol abuse
  - Hemoptysis
  - History of radiation therapy
  - Known head and neck malignancy

PEDIATRIC

Advanced imaging is considered medically necessary in **EITHER** of the following scenarios in pediatric patients only:

- Hoarseness persisting for longer than 4 weeks
- Following laryngoscopy, when findings are nondiagnostic or reveal vocal cord paralysis

IMAGING STUDY

- CT chest

Rationale

Most hoarseness is self-limited or caused by a pathology that can be identified by laryngoscopy.

Clinicians should visualize the patient's larynx, or refer the patient to a clinician who can visualize the larynx, when hoarseness fails to resolve by a maximum of 3 months after onset, or irrespective of duration if a serious underlying cause is suspected.[24, 25]

Benign lesions of the vocal cords such as cysts, nodules, polyps, and gastroesophageal reflux are frequently diagnosed and managed with laryngoscopy alone. Accuracy of history and physical exam in hoarseness is low (~5%), laryngoscopy increases the accuracy of diagnosis by ~68%.[26]

Hoarseness is common in young children (15%-24%) and usually due to benign lesions seen on laryngoscopy such as vocal cord nodules, which account for approximately 77% of cases.[24]

The American Academy of Otolaryngology-Head and Neck Surgery recommends not obtaining CT or MRI in patients with a primary complaint of hoarseness prior to examining the larynx.[27]

Horner's syndrome

Also see Brain Imaging and Head and Neck Imaging guidelines.

Advanced imaging is considered medically necessary for evaluation when the results of imaging will impact treatment decisions.

IMAGING STUDY

- CT or MRI chest

Paraneoplastic syndrome

Advanced imaging is considered medically necessary for evaluation when the results of imaging will impact treatment decisions.

IMAGING STUDY

- CT chest

Rationale

Paraneoplastic syndromes occur when a tumor secretes bioactive substances that result in signs and/or symptoms distant from its site of origin and unrelated to organ invasion.[28] They occur in about 8% of all cancers and are caused by a variety of neoplasms, especially neuroendocrine tumors like small cell lung cancer. Examples of paraneoplastic syndromes include, but are not limited to, hypercalcemia, syndrome of inappropriate diuretic hormone secretion (SIADH), opsoclonus-myoclonus, stiff person (anti-GAD antibodies), myasthenia gravis (Lambert-Eaton), and encephalitis (NMDA receptor antibody).[28]

Advanced imaging (CT or PET-CT) is used to identify the primary neoplasm in patients who present with paraneoplastic syndromes of unknown etiology. Chest CT has been shown to have a sensitivity of 89% and a specificity of 93% for the detection of the most common primary associated with paraneoplastic syndrome: lung cancer.[28]

A 2016 systematic review and meta-analysis of 21 studies and 1293 patients examined the comparative diagnostic accuracy of whole body PET or PET-CT in patients presenting with paraneoplastic syndrome. Pooled sensitivity, specificity, and diagnostic odds ratio of ^{18}F-FDG PET or ^{18}F-FDG PET/CT for the detection of underlying malignancy were 0.81 (95% CI, 0.76–0.86), 0.88 (95% CI, 0.86–0.90), and 34.03 (95% CI, 18.76–61.72), respectively. The pooled global diagnostic accuracy (area under the curve) was 0.916 (SE, 0.018). Five studies examined the performance of conventional screening modalities for paraneoplastic syndrome including CT and found variable sensitivity ranging from 30%-82% and 71%-100%. The authors comment that there is yet "no consensus on the value of whole-body ^{18}F-FDG PET or ^{18}F-FDG PET/CT in patients suspected of harboring a paraneoplastic syndrome… Further studies are needed to investigate the additional value of ^{18}F-FDG PET/CT and its cost effectiveness over conventional screening modalities." However, they conclude that "^{18}F-FDG PET and ^{18}F-FDG PET/CT have excellent diagnostic accuracy and moderate to high sensitivity and specificity for the detection of underlying malignancy in patients suspected of having a paraneoplastic syndrome. The systematic review is significantly limited by unexplained heterogeneity in the data, publication, and selection bias along with differential verification using an inconsistent reference standard.[29]

Weight loss

Also see Abdomen and Pelvis Imaging guidelines.

Advanced imaging is considered medically necessary for evaluation of unintentional weight loss exceeding 5% of body weight within a 12-month interval in **EITHER** of the following scenarios:

- Persistence following a negative comprehensive clinical evaluation (including a history and physical examination, age appropriate cancer screening, chest radiography, and initial laboratory evaluation) after a period of observation
- Abnormal findings suggestive of malignancy on history, physical exam, imaging or laboratory evaluation

IMAGING STUDY

- CT chest

Rationale

Persistent unintentional weight loss is defined as a substantive weight loss over a period of 6-12 months.[30] Weight loss is not uncommon in elderly patients and is typically related to one of the 7 Ds: dementia, dentition, depression, diarrhea, drugs, functional dysfunction, or dysphagia. When unintentional weight loss remains unexplained, it may be due to the 8th D: acute or chronic disease.[30]

The primary purpose of advanced imaging in the evaluation of unexplained unintentional weight loss is to exclude an occult malignancy not detected by initial clinical evaluation and testing, usually in patients with abnormalities on baseline testing. Screening with CT is of limited value. Instead, diagnostic testing should be directed toward areas of concern based on the history and physical examination.[31] Age appropriate screening for malignancy (mammogram, pap smear) should also be encouraged.[32]

The most common cause of malignancy in patients with unintentional weight loss is gastrointestinal primary (47%), and gastrointestinal causes account for 45% of nonmalignant organic etiologies.[33] Therefore, endoscopy and/or colonoscopy should be considered for initial evaluation when there is evidence of a GI source.

CT with contrast is sensitive for the detection of lymphoma, lung and genitourinary cancers, which are the next most common causes of malignancy in patients with unintentional weight loss.

Abnormal Test Findings

Imaging abnormalities

Advanced imaging is considered medically necessary for follow up of **ANY** of the following abnormalities identified on chest X-ray or other thoracic imaging study:

- Pulmonary mass, structural or parenchymal abnormality
- Hilar enlargement or mediastinal widening
- Hyperlucent lung in pediatric patients
- Unexplained diaphragmatic elevation or immobility

IMAGING STUDY

- CT chest

Positive sputum cytology

Advanced imaging is considered medically necessary for follow up.

IMAGING STUDY

- CT chest

Tracheal or bronchial lesion or other findings on bronchoscopy

Advanced imaging is considered medically necessary for follow up.

IMAGING STUDY

- CT chest

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Codes

The following codes may be applicable to chest imaging and may not be all-inclusive.

CPT

71250 Chest CT without contrast
71260 Chest CT with contrast
71270 Chest CT without contrast, followed by re-imaging with contrast
71550 MRI chest, without contrast
71551 MRI chest, with contrast
71552 MRI chest, without contrast, followed by re-imaging with contrast
77046 MRI breast without contrast material(s); unilateral
77047 MRI breast without contrast material(s); bilateral
77048 MRI breast without and with contrast with CAD; unilateral
77049 MRI breast without and with contrast with CAD; bilateral
78811 PET imaging, limited area
78812 PET imaging, skull to mid-thigh
78813 PET imaging, whole body
78814 PET imaging, with concurrently acquired CT for attenuation correction and anatomic localization; limited area
78815 PET imaging, with concurrently acquired CT for attenuation correction and anatomic localization; skull base to mid-thigh
78816 PET imaging, with concurrently acquired CT for attenuation correction and anatomic localization; whole body

HCPCS

None

ICD-10 Diagnosis

Refer to the ICD-10 CM manual

History

Status	Review Date	Effective Date	Action
Revised	03/11/2020	03/12/2020	Revised Pneumonia indication to allow CT for diagnosis of COVID-19 pneumonia.
Restructured	09/12/2018	01/01/2019	IMPP review. Advanced Imaging guidelines redesigned and reorganized to a condition-based structure. Incorporated AIM guidelines for pediatric imaging.
Revised	07/11/2018	03/09/2019	IMPP review. Renamed the Administrative Guidelines to “General Clinical Guideline.” Retitled Pretest Requirements to “Clinical Appropriateness Framework” to summarize the components of a decision to pursue diagnostic testing. Revised to expand applicability beyond diagnostic imaging, retitled Ordering of Multiple Studies to “Ordering of Multiple Diagnostic or Therapeutic Interventions” and replaced imaging-specific terms with “diagnostic or therapeutic intervention.” Repeated Imaging split into two subsections, “repeat diagnostic testing” and “repeat therapeutic intervention.”
Reviewed and revised	-	03/12/2018	IMPP review and revision.

Status	Review Date	Effective Date	Action
Created	-	03/30/2005	Original effective date.