# Clinical Appropriateness Guidelines: Advanced Imaging

## Appropriate Use Criteria: Imaging of the Chest

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Proprietary

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# Description and Application of the Guidelines

AIM's Clinical Appropriateness Guidelines (hereinafter "AIM's 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, where possible, criteria for medical necessity determinations. 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 healthcare
- To promote the most efficient and cost-effective use of services

AIM's 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 AIM's 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. If requested by a health plan, AIM will review requests based on health plan medical policy/guidelines in lieu of AIM's 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.

# Administrative Guideline: Ordering of Multiple Studies

Requests for multiple imaging studies to evaluate a suspected or identified condition and requests for repeated imaging of the same anatomic area are subject to additional review to avoid unnecessary or inappropriate imaging.

## Simultaneous Ordering of Multiple Studies

In many situations, ordering multiple imaging studies at the same time is not clinically appropriate because:

- Current literature and/or standards of medical practice support that one of the requested imaging studies is more appropriate in the clinical situation presented; or
- One of the imaging studies requested is more likely to improve patient outcomes based on current literature and/or standards of medical practice; or
- Appropriateness of additional imaging is dependent on the results of the lead study.

When multiple imaging studies are ordered, the request will often require a peer-to-peer conversation to understand the individual circumstances that support the medically necessity of performing all imaging studies simultaneously.

Examples of multiple imaging studies that may require a peer-to-peer conversation include:

- CT brain and CT sinus for headache
- MRI brain and MRA brain for headache
- MRI cervical spine and MRI shoulder for pain indications
- MRI lumbar spine and MRI hip for pain indications
- MRI or CT of multiple spine levels for pain or radicular indications
- MRI foot and MRI ankle for pain indications
- Bilateral exams, particularly comparison studies

There are certain clinical scenarios where simultaneous ordering of multiple imaging studies is consistent with current literature and/or standards of medical practice. These include:

- Oncologic imaging – Considerations include the type of malignancy and the point along the care continuum at which imaging is requested
- Conditions which span multiple anatomic regions – Examples include certain gastrointestinal indications or congenital spinal anomalies

## Repeated Imaging

In general, repeated imaging of the same anatomic area should be limited to evaluation following an intervention, or when there is a change in clinical status such that imaging is required to determine next steps in management. At times, repeated imaging done with different techniques or contrast regimens may be necessary to clarify a finding seen on the original study.

Repeated imaging of the same anatomic area (with same or similar technology) may be subject to additional review in the following scenarios:

- Repeated imaging at the same facility due to motion artifact or other technical issues
- Repeated imaging requested at a different facility due to provider preference or quality concerns
- Repeated imaging of the same anatomic area (MRI or CT) based on persistent symptoms with no clinical change, treatment, or intervention since the previous study
- Repeated imaging of the same anatomical area by different providers for the same member over a short period of time

# Administrative Guideline: Pre-Test Requirements

Critical to any finding of clinical appropriateness under the guidelines for specific imaging exams is a determination that the following are true with respect to the imaging request:

- A clinical evaluation has been performed prior to the imaging request (which should include a complete history and physical exam and review of results from relevant laboratory studies, prior imaging and supplementary testing) to identify suspected or established diseases or conditions.
- **For suspected diseases or conditions:**
  - Based on the clinical evaluation, there is a reasonable likelihood of disease prior to imaging; and
  - Current literature and standards of medical practice support that the requested imaging study is the most appropriate method of narrowing the differential diagnosis generated through the clinical evaluation and can be reasonably expected to lead to a change in management of the patient; and
  - The imaging requested is reasonably expected to improve patient outcomes based on current literature and standards of medical practice.
- **For established diseases or conditions:**
  - Advanced imaging is needed to determine whether the extent or nature of the disease or condition has changed; and
  - Current literature and standards of medical practice support that the requested imaging study is the most appropriate method of determining this and can be reasonably expected to lead to a change in management of the patient; and
  - The imaging requested is reasonably expected to improve patient outcomes based on current literature and standards of medical practice.
- 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 pre-test 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.

# Computed Tomography (CT) Chest

## CPT Codes

71250..... Chest CT without contrast

71260..... Chest CT with contrast

71270..... Chest CT without contrast, followed by re-imaging with contrast

G0297..... Low dose CT scan (LDCT) for lung cancer screening

## Standard Anatomic Coverage

- Lung apices through costophrenic sulci
- Scan coverage may vary, depending on the specific clinical indication.

## Technology Considerations

- In the majority of clinical situations, chest radiographs should be performed prior to advanced imaging with CT, preferably within 30 days of the chest CT exam request.
- CT chest is not appropriate for cardiac and coronary artery imaging. Please see guidelines for cardiac CT and CCTA.
- When the purpose of the study is imaging of the heart, including the coronary arteries, do not request both a chest CT and a dedicated cardiac/coronary artery CT.

## Common Diagnostic Indications

Indications for chest CT are contained in general chest, pulmonary, mediastinal and hilar, pleural, chest wall and diaphragm.

### General Chest

#### Broncho-pleural fistula

#### Congenital thoracic anomalies

#### Cough persisting three (3) or more weeks with normal chest X-ray

- Unresponsive to medical treatment and/or after evaluation for other causes (e.g., post-nasal drainage, asthma, gastroesophageal reflux disease and medication effects); **OR**
- Cough in immunosuppressed (e.g. HIV, after organ or bone marrow transplant, on infliximab or other tumor necrosis factor antagonists individual (In these individuals, a higher level of suspicion is warranted); **OR**
- Other etiologies for chronic cough which include, but are not limited to:
  - Smoking
  - Chronic bronchitis
  - Cough-inducing medications (e.g., ACE inhibitors)
  - Exposure to an environmental irritant
  - Respiratory infection
  - Neoplasm

#### Fever of unknown origin

- Lasting more than three weeks with exceptions for immunocompromised patients
- Following standard work-up to localize the source

#### Hemoptysis

- Following non-diagnostic chest radiographs

#### Horner's syndrome

# Common Diagnostic Indications

## Infectious and inflammatory processes when not otherwise specified

- For initial evaluation and surveillance

***Note:*** *This indication is for evaluation of infectious and inflammatory processes not specifically referenced elsewhere in this guideline (e.g., pneumonia complications, mediastinitis, sternal infection, lung abscess and empyema).*

## Lung abscess

## Lung cancer screening

- For annual screening of lung cancer **(all of the following)**
  - Patient has no signs or symptoms suggestive of underlying cancer
  - Patient's age is equal to or greater than 55 and less than or equal to 80
  - There is at least a 30 pack-year history of cigarette smoking (and if former smoker, quit date is within previous 15 years)
  - Patient does not have a health problem that substantially limits life expectancy or the ability/willingness to undergo an intervention with curative intent

***Note:*** *One (1) pack-year of smoking equals smoking one pack (20 cigarettes) per day for one year or 7300 cigarettes annually. CT should be performed using a low-dose technique (LDCT).*

## Mediastinitis

- Includes:
  - Mediastinal infection/abscess
  - Fibrosing mediastinitis

## Paraneoplastic syndrome with unknown primary

***Note:*** *This includes Lambert Eaton syndrome, myasthenia gravis, paraneoplastic cerebellar degeneration, opsoclonus-myoclonus ataxia, positive paraneoplastic panel, anti-GAD antibody syndrome (stiff-person's syndrome), voltage-gated K+ channelopathy (epilepsy syndrome), limbic encephalitis (rapidly progressive dementia syndromes with abnormal lumbar puncture), dermatomyositis/polymyositis, and anti-NMDA*

## Persistent pneumonia

- Repeat radiographs show no improvement following at least four (4) weeks of medical treatment
- Recurrent pneumonia in the same location within six months
- Patient is immunosuppressed

## Pneumonia, complications

**(any one of the following)**

- Following non-diagnostic chest radiograph
- Immunosuppressed patient

***Note:*** *Complications of the mediastinum, lung parenchyma, or pleura include abscess, bronchopleural fistula, complicated or loculated parapneumonic effusion, empyema, necrotic pneumonia, and purulent pericarditis*

## Positive sputum cytology for malignancy

## Post-operative or post-procedure evaluation

## Preoperative or pre-procedure evaluation

***Note:*** *This indication is for preoperative evaluation of conditions not specifically referenced elsewhere in this guideline.*

## Pulmonary embolism

- For moderate or high clinical suspicion of pulmonary embolism or follow-up when recurrent thromboembolism is a concern in patients on adequate medical therapy

# Common Diagnostic Indications

## Sarcoidosis

- Initial evaluation and periodic follow-up

## Sternal infection and dehiscence

***Note:*** *Rare complication of cardiothoracic surgery*

## Structural abnormalities on chest X–ray, which require further clarification with CT

## Trauma

- Injury involving the chest wall, cardiomediastinal structures and/or lungs

## Tumor (primary neoplasm or metastatic disease)

**Management of biopsy-proven malignancy**

- For renal cell carcinoma (where biopsy is contraindicated) when surgical resection is planned, ultrasound or CT findings highly suspicious for cancer may constitute documentation of malignancy

**Exclusions—advanced imaging is not indicated in the following scenarios:**

- Breast cancer
  - Staging of low risk breast cancer (stage 2B or less) in the absence of signs or symptoms suggestive of metastatic disease
  - Surveillance of breast cancer in the absence of signs or symptoms of recurrent disease
- Colon cancer
  - Surveillance imaging of colon cancer in remission, **unless one of the following high risk features is present**:
    - Lymphatic or venous invasion
    - Lymph node involvement
    - Perineural invasion
    - Poorly differentiated tumor
    - T4 tumor
    - Associated with bowel obstruction
    - Close, indeterminate or positive margins
    - Fewer than 12 nodes examined at surgery
    - Localized perforation
- Gynecologic malignancies
  - Surveillance imaging in patients with previously treated gynecologic malignancies including ovarian, endometrial, cervical, vaginal or vulvar cancer *(**Note:** This exclusion does not apply to sarcoma or other rare histologies not typically associated with these structures).*
- Non-Hodgkin's lymphoma
  - Surveillance imaging of non-Hodgkin's lymphoma for a patient in remission and there has been at least two (2) years since the most recent course of chemotherapy
- Prostate cancer
  - Staging of low risk prostate cancer: Gleason score equal to six (6), PSA less than 10 ng/mL, and stage T1 or T2
  - Follow up or surveillance of prostate cancer following completion of therapy in the absence of a rising PSA

***Note:*** *Surveillance applies to patients with no signs or symptoms of recurrent or persistent disease.*

## Unexplained weight loss – significant weight loss exceeding 10% of desirable body weight, over a short time interval (6 months or less), after initial evaluation for other causes

# Common Diagnostic Indications

## Pulmonary

### Asbestos-related benign and malignant lesions, involving the lungs and pleura

- Pleural plaques
- Interstitial lung disease
- Malignant mesothelioma
- Pleural effusion
- Lung cancer

### Bronchiectasis

- Consider high resolution chest CT (HRCT) technique

### Interstitial lung disease / pulmonary fibrosis

- Consider high resolution chest CT (HRCT) technique

### Occupational lung disease (pneumoconioses)

- Diagnosis and management of any one of the following:
  - Silicosis
  - Coal workers pneumoconiosis
  - Progressive massive fibrosis
  - Hard metal pneumoconiosis
  - Talcosis
  - Caplan's syndrome (in patients with Rheumatoid Arthritis)

### Pulmonary mass or suspicious parenchymal abnormality on recent chest X-ray or other imaging exam

# Common Diagnostic Indications

## Pulmonary nodule(s) – without a known primary malignancy

***Note:*** *A nodule by definition is a rounded or regular opacity measuring up to 3 cm in diameter. Nodules can be solid (soft tissue attenuation), subsolid (ground glass attenuation) or part solid (mixed solid and ground glass). Nodules with central calcifications such as granulomas are benign and do not require further imaging.*

**Solid pulmonary nodules**

- For patients less than 35 years of age, a single follow-up exam in 6–12 months may be considered.

***Note:*** *Primary lung cancer is rare in patients less than 35 years of age. The risks associated with radiation are greater in younger patients; therefore, follow-up imaging for small incidental pulmonary nodules should be avoided.*

- For patients aged 35 years or older, see **Table 1** below.
  - High-risk patients have at least **one of the following:**
    - Smoking history
    - First degree relative with lung cancer
    - Significant exposure to asbestos, uranium and/or radon, typically through high-risk profession (for example, shipyard/construction workers)

**Table 1: Appropriate follow-up of solid, stable nodules in patients 35 years or older**

| Nodule size (mm) | Follow-up intervals (months) | |
|---|---|---|
| | Low-risk patient | High-risk patient |
| Less than or equal to 4 | none | 12 |
| Greater than 4 and less than or equal to 6 | 12 | 6–12 and 18–24 |
| Greater than 6 and less than or equal to 8 | 6–12 and 18–24 | 3–6, 9–12, and 24 |
| Greater than 8 | 3, 9, and 24 unless biopsy or PET CT | |

**Subsolid, groundglass, or part solid pulmonary nodules**

- When nodule size is 5 mm or less, follow up at 2 years and 4 years
- When nodule size is greater than 5 mm, follow up in 3 months, then annually for 3 years unless diagnostic biopsy has been performed

## Pulmonary sequestration

# Mediastinal and Hilar

## Hilar enlargement on recent chest X-ray

## Hoarseness, dysphonia or vocal cord weakness/paralysis

**Initial evaluation when at least one of the following applies:**

- 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

## Known hilar and/or mediastinal lymphadenopathy / mass

- Periodic follow-up

## Mediastinal widening on recent chest X-ray

# Common Diagnostic Indications

## Penetrating atherosclerotic aortic ulcer

## Superior vena cava (SVC) syndrome

## Thoracic aorta evaluation

**Acute aortic syndrome (any <u>one</u> of the following)**

- Diagnosis and management
- Periodic surveillance in patients with established acute aortic syndrome undergoing medical management

***Note:*** *Initial diagnosis of acute aortic syndrome is considered a medical emergency. This indication includes aortic rupture, dissection, pseudoaneurysm, mural hematoma, and penetrating ulcer mediastinal hematoma.*

**Non-acute thoracic aorta (any <u>one</u> of the following)**

- In patients with suspected thoracic aortic aneurysm
- In patients with confirmed thoracic aortic aneurysm with new or worsening signs/symptoms
- For ongoing surveillance of stable patients with confirmed thoracic aortic aneurysm who have not undergone imaging of the thoracic aorta within the preceding six months
- In patients with confirmed aortic dissection in whom surgical repair is anticipated (to assist in preoperative planning)
- For ongoing surveillance of stable patients with confirmed aortic dissection who have not undergone imaging of the thoracic aorta within the preceding year
- In patients with confirmed aortic dissection or thoracic aortic aneurysm who have undergone surgical repair within the preceding year and have not undergone imaging of the thoracic aorta within the preceding six months
- In patients being evaluated for potential transcatheter aortic valve implantation/replacement (TAVI or TAVR) provided that the patient has not undergone CTA or MRA of the chest within the preceding 60 days

***Note:*** *See acute aortic syndrome (section above) for complications of aneurysm including aortic dissection.*

## Thymoma

- Note that approximately 15% of patients with myasthenia gravis will have a thymoma

## Tracheobronchial lesion evaluation

## Traumatic aortic injury

## Vasculitis of the thoracic aorta or branch vessel

# Pleural, Chest Wall and Diaphragm

## Abnormal pleural fluid collection, including effusion, hemothorax, empyema and chylothorax

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

## Chest wall mass

## Diaphragmatic hernia

## Pleural mass

## Pneumothorax – unexplained or recurrent

## Thoracic outlet syndrome

## Unexplained diaphragmatic elevation or immobility

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# CT Angiography (CTA) Chest (Non-Coronary)

## CPT Codes

71275..... CTA of chest (non-coronary), with contrast material(s), including non-contrast images, if performed, and image post-processing

## Standard Anatomic Coverage

- Scan coverage varies depending on the clinical indication. This exam does not include cardiac and coronary artery indications.
- Chest CTA may be used for anatomic depiction from the pulmonary apices through the costophrenic sulci.

## Technology Considerations

### Advantages of CTA:

- Rapidly acquired exam, with excellent anatomic detail afforded by most multidetector CT scanners

### Disadvantages of CTA:

- Potential complications from use of intravascular iodinated contrast administration

### Biosafety Issues:

- Ordering and imaging providers are responsible for considering safety issues prior to the CTA exam. One of the most significant considerations is the requirement for intravascular iodinated contrast material, which may have an adverse effect on patients with a history of documented allergic contrast reactions or atopy, as well as on individuals with renal impairment, who are at greater risk for contrast-induced nephropathy.

### Ordering Issues:

- CTA chest is not appropriate for cardiac and coronary artery imaging. Please review guidelines for cardiac CT and CCTA.
- Pulmonary embolus is rare in the absence of elevated blood D-dimer levels and certain specific risk factors.

## Common Diagnostic Indications

Indications for chest CTA are contained in general chest, thoracic aorta and great vessel, and pulmonary artery and vein.

### General Chest

#### Developmental anomalies of the thoracic vasculature

- Examples of congenital thoracic vascular anomalies include but are not limited to the following:
  - Aortic coarctation
  - Double aortic arch
  - Hypoplastic or atretic pulmonary arteries
  - Inferior vena caval interruption
  - Partial anomalous pulmonary venous return
  - Persistent left-sided superior vena cava
  - Right-sided aortic arch
  - Total anomalous pulmonary venous return
  - Truncus arteriosus

#### Post-traumatic vascular injury

#### Post-operative or post-procedure evaluation

# Common Diagnostic Indications

### Preoperative or pre-procedure evaluation

***Note:*** *This indication is for preoperative evaluation of conditions not specifically referenced elsewhere in this guideline.*

### Systemic venous thrombosis or occlusion, including superior vena cava (SVC) syndrome

### Subclavian steal syndrome

### Thoracic outlet syndrome

### Vascular involvement from neoplasm in the chest

## Thoracic Aorta and Great Vessel

### Atheromatous disease

- Evaluation of the thoracic aorta as a source of distal emboli when transthoracic and/or transesophageal echocardiography are non-diagnostic

### Hematoma

### Post-operative or post-procedure evaluation

### Stent graft evaluation, including detection of an endoleak

- Pre-procedure assessment and post-procedure follow-up

### Thoracic aorta evaluation

**Acute aortic syndrome**

**(any <u>one</u> of the following)**

- Diagnosis and management
- Periodic surveillance in patients with established acute aortic syndrome undergoing medical management

***Note:*** *Initial diagnosis of acute aortic syndrome is considered a medical emergency. This guideline includes aortic rupture, dissection, pseudoaneurysm, mural hematoma, and penetrating ulcer mediastinal hematoma*

**Non-acute thoracic aorta**

**(any <u>one</u> of the following)**

- In patients with suspected thoracic aortic aneurysm
- In patients with confirmed thoracic aortic aneurysm with new or worsening signs/symptoms
- For ongoing surveillance of stable patients with confirmed thoracic aortic aneurysm who have not undergone imaging of the thoracic aorta within the preceding six months
- In patients with confirmed aortic dissection in whom surgical repair is anticipated (to assist in preoperative planning)
- For ongoing surveillance of stable patients with confirmed aortic dissection who have not undergone imaging of the thoracic aorta within the preceding year
- In patients with confirmed aortic dissection or thoracic aortic aneurysm who have undergone surgical repair within the preceding year and have not undergone imaging of the thoracic aorta within the preceding six months
- In patients being evaluated for potential transcatheter aortic valve implantation/replacement (TAVI or TAVR) provided that the patient has not undergone CTA or MRA of the chest within the preceding 60 days

***Note:*** *See acute aortic syndrome section for complications of aneurysm including aortic dissection*

### Vasculitis

# Common Diagnostic Indications

## Pulmonary Artery and Vein

### Pulmonary arterial hypertension

### Pulmonary arteriovenous malformation (AVM)

### Pulmonary embolism

- For moderate or high clinical suspicion of pulmonary embolism or follow-up when recurrent thromboembolism is a concern in patients on adequate medical therapy

### Pulmonary sequestration

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# Magnetic Resonance Imaging (MRI) Chest

## CPT Codes

71550..... MRI chest, without contrast

71551..... MRI chest, with contrast

71552..... MRI chest, without contrast, followed by re-imaging with contrast

## Standard Anatomic Coverage

- Chest MRI studies are often performed as problem-solving exams, following chest CT. In these circumstances, anatomic coverage will depend on the specific indication for the study.
- MRI of the chest should not be performed for imaging of the heart. For cardiac indications, see Cardiac MRI guideline section and corresponding CPT codes 75557–75563, 75565.

## Technology Considerations

### Advantages of chest MRI:

- Chest MRI may be helpful after a CT in the following scenarios:
  - Defining mediastinal and hilar lymphadenopathy (particularly after an unenhanced chest CT exam)
  - Determining direct lung tumor invasion into the mediastinum and hilar structures, without the need for iodinated contrast material in CT
  - Assessing spinal canal extension from a postero-medially located thoracic mass
  - Evaluating a suspected Pancoast tumor (also referred to as apical pleuro-pulmonary groove or superior pulmonary sulcus tumors) for direct chest wall extension, given the multiplanar capability of MRI

### Disadvantages of chest MRI:

- Lung lesions are usually better imaged with CT when compared with MRI, given the superior spatial resolution of CT.
- MRI should not be performed in patients with certain implanted devices that are not MRI compatible, such as pacemakers.

### Ordering issues:

- For initial evaluation of most thoracic lesions, such as pulmonary nodules and masses, chest CT is considered the study of choice.
- Contrast utilization for chest MRI is at the discretion of the ordering and imaging providers.
- For cardiac and coronary artery imaging, see Cardiac MRI guidelines.

## Common Diagnostic Indications

### Developmental anomalies of the thoracic vasculature

- Examples of congenital thoracic vascular anomalies include but are not limited to the following:
  - Aortic coarctation
  - Double aortic arch
  - Hypoplastic or atretic pulmonary arteries
  - Inferior vena caval interruption
  - Partial anomalous pulmonary venous return
  - Persistent left-sided superior vena cava
  - Right-sided aortic arch
  - Total anomalous pulmonary venous return
  - Truncus arteriosus

# Common Diagnostic Indications

## Documented malignancy – primary neoplasm and metastatic disease

- For staging and periodic surveillance
- To evaluate the mediastinum, hila, pericardium, heart, chest wall and paraspinal region

## Horner's syndrome

## Mediastinal and hilar mass lesions – when abnormal findings cannot be thoroughly evaluated with CT

- Particularly in patients who have an allergic history to intravascular iodinated CT contrast material or who have renal insufficiency and thus are at greater risk for contrast-induced nephropathy
- Chest MRI may be helpful in the following circumstances:
  - To differentiate mediastinal and hilar lesions from vascular structures; **OR**
  - To assess vascular invasion by tumor; **OR**
  - To detect spinal extension from a postero-medially located chest mass

## Pancoast tumor

- To evaluate for chest wall extension at the superior pulmonary sulcus

## Superior vena cava syndrome

## Thoracic aorta evaluation

**Acute aortic syndrome (any <u>one</u> of the following)**

- Diagnosis and management
- periodic surveillance in patients with established acute aortic syndrome undergoing medical management

***Note:*** *Initial diagnosis of acute aortic syndrome is considered a medical emergency. This guideline includes aortic rupture, dissection, pseudoaneurysm, mural hematoma, and penetrating ulcer mediastinal hematoma.*

**Non-acute thoracic aorta (any <u>one</u> of the following)**

- In patients with suspected thoracic aortic aneurysm
- In patients with confirmed thoracic aortic aneurysm with new or worsening signs/symptoms
- For ongoing surveillance of stable patients with confirmed thoracic aortic aneurysm who have not undergone imaging of the thoracic aorta within the preceding six months
- In patients with confirmed aortic dissection in whom surgical repair is anticipated (to assist in preoperative planning)
- For ongoing surveillance of stable patients with confirmed aortic dissection who have not undergone imaging of the thoracic aorta within the preceding year
- In patients with confirmed aortic dissection or thoracic aortic aneurysm who have undergone surgical repair within the preceding year and have not undergone imaging of the thoracic aorta within the preceding six months
- In patients being evaluated for potential transcatheter aortic valve implantation/replacement (TAVI or TAVR) provided that the patient has not undergone CTA or MRA of the chest within the preceding 60 days

***Note:*** *See acute aortic syndrome (section above) for complications of aneurysm including aortic dissection.*

## Thoracic outlet syndrome

## Thymoma evaluation or history of myasthenia gravis

***Note:*** *Approximately 15% of patients with myasthenia gravis will have a thymoma.*

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# MR Angiography (MRA) Chest

## CPT Codes

71555..... MRA of chest (excluding the myocardium) without contrast, followed by re-imaging with contrast

## Standard Anatomic Coverage

- Scan coverage varies depending on the clinical indication
- Chest MRA may be used for vascular anatomic depiction, from the pulmonary apices through the costophrenic sulci.

## Technology Considerations

### Advantages of Chest MRA:

- Use of MR imaging is advantageous over CT in avoiding ionizing radiation and allowing for direct multiplanar imaging.

### Disadvantages of Chest MRA:

- With MRA, artifact due to patient motion may have a particularly significant impact on exam quality.
- MRA cannot be performed in patients with certain implanted devices that are not MRI compatible, such as pacemakers.

## Common Diagnostic Indications

Chest MRA indications are contained in common chest MRA, thoracic aorta and great vessel, and pulmonary artery and vein.

### Common Chest MRA

#### Developmental anomalies of the thoracic vasculature

- Examples of congenital thoracic vascular anomalies include but are not limited to the following:
  - Aortic coarctation
  - Double aortic arch
  - Hypoplastic or atretic pulmonary arteries
  - Inferior vena caval interruption
  - Partial anomalous pulmonary venous return
  - Patent ductus arteriosus
  - Persistent left-sided superior vena cava
  - Right-sided aortic arch
  - Total anomalous pulmonary venous return
  - Transposition of the great vessels
  - Truncus arteriosus

#### Post-traumatic vascular injury

#### Subclavian steal

#### Systemic venous thrombosis or occlusion, including superior vena cava (SVC) syndrome

#### Thoracic outlet syndrome

#### Vascular involvement from neoplasm in the chest

# Common Diagnostic Indications

## Thoracic Aorta and Great Vessel

### Atheromatous disease

**(All of the following)**

- When CT is contraindicated
- Evaluation of the thoracic aorta as a source of distal emboli when transthoracic and/or transesophageal echocardiography are non-diagnostic

### Post-operative or post-procedure evaluation

### Stent graft evaluation, including detection of an endoleak

- Pre-procedure assessment and post-procedure follow-up

### Thoracic aorta evaluation

**Acute aortic syndrome**

**(any one of the following)**

- Diagnosis and management
- periodic surveillance in patients with established acute aortic syndrome undergoing medical management

***Note:*** *Initial diagnosis of acute aortic syndrome is considered a medical emergency. This guideline includes aortic rupture, dissection, pseudoaneurysm, mural hematoma, and penetrating ulcer mediastinal hematoma*

**Non-acute thoracic aorta**

**(any one of the following)**

- In patients with suspected thoracic aortic aneurysm
- In patients with confirmed thoracic aortic aneurysm with new or worsening signs/symptoms
- For ongoing surveillance of stable patients with confirmed thoracic aortic aneurysm who have not undergone imaging of the thoracic aorta within the preceding six months
- In patients with confirmed aortic dissection in whom surgical repair is anticipated (to assist in preoperative planning)
- For ongoing surveillance of stable patients with confirmed aortic dissection who have not undergone imaging of the thoracic aorta within the preceding year
- In patients with confirmed aortic dissection or thoracic aortic aneurysm who have undergone surgical repair within the preceding year and have not undergone imaging of the thoracic aorta within the preceding six months
- In patients being evaluated for potential transcatheter aortic valve implantation/replacement (TAVI or TAVR) provided that the patient has not undergone CTA or MRA of the chest within the preceding 60 days

***Note:*** *See acute aortic syndrome (section above) for complications of aneurysm including aortic dissection.*

### Vasculitis

## Pulmonary Artery and Vein

### Pulmonary arterial hypertension

### Pulmonary arteriovenous malformation (AVM)

### Pulmonary embolism

- Rarely requested and used only in selected cases, for example when intravenous iodinated contrast material for a CTA is contraindicated due to significant iodinated contrast allergy, and a diagnostic ventilation/perfusion (V/Q) study cannot be obtained
- For clinically suspected pulmonary embolism or follow-up when recurrent thromboembolism is a concern in patients on adequate medical therapy

### Pulmonary sequestration

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# Magnetic Resonance Imaging (MRI) Breast Also referred to as MR Mammography (MRM)

## CPT Codes

77058..... MRI of breast, without and/or with contrast material(s); unilateral

77059..... MRI of breast, without and/or with contrast material(s); bilateral

## Technology Considerations

### Technique:

- It is strongly recommended that breast MRI examinations be performed with a dedicated breast coil.

### Limitations:

- Breast MRI is not recommended as a screening technique in patients with average-risk for breast cancer.
- Breast MRI is not recommended to assess suspicious breast lesions in order to avoid a biopsy.
- Breast MRI should not be used to differentiate cysts from solid lesions, which is well evaluated with ultrasound.

### Additional Comments:

- A bilateral MRI study of the breast is correctly coded to CPT 77059. Requesting two unilateral studies (77058) to perform a bilateral exam is inappropriate. Billing 77058 two times for the same date of service or separately over subsequent days in order to describe a bilateral procedure fragments the service into its component parts and is not allowed.

## Common Diagnostic Indications

Breast MRI indications are contained in diagnostic evaluation and annual screening with breast carcinoma diagnosis and breast implant rupture not requiring a breast carcinoma diagnosis.

### For Breast Carcinoma: Diagnostic Evaluation

#### BI-RADS category 3 findings

- A single follow-up MRI may be performed at 6 months following a breast MRI with BI-RADS category 3 findings

#### Differentiation of palpable mass(es) from surgical scar tissue

- Following breast surgery, breast reconstruction or radiation therapy

#### Invasion of breast cancer deep to fascia

- MRI evaluation of breast prior to surgical treatment may be useful in both mastectomy and breast conservation candidates to define the relationship of the tumor to the fascia and its extension into the pectoralis major, serratus anterior, and/or intercostal muscles

#### Invasive carcinoma and ductal carcinoma in situ (DCIS)

- To determine the extent of disease and the presence of multifocality and multicentricity

#### Lesion characterization

- When other imaging examinations, such as ultrasound and mammography, and physical examination are inconclusive for the presence of breast cancer, and biopsy could not be performed (e.g., possible distortion on only one mammographic view without a sonographic correlate)

# Common Diagnostic Indications

### Metastatic cancer

- Primary is unknown and suspected to be of breast origin.
- In patients presenting with metastatic disease and/or axillary adenopathy and no mammographic or physical findings of primary breast carcinoma.

### Neoadjuvant chemotherapy

- MR mammography may be performed before, during and after chemotherapy to assess response to treatment and extent of residual disease, prior to surgery.

### Post-lumpectomy with positive margins

- To evaluate for residual disease in patients whose pathology specimens demonstrate close or positive margins for residual disease

### Post-operative tissue reconstruction

- To evaluate suspected cancer recurrence in patients with tissue transfer flaps (rectus, latissimus, dorsi, and gluteal)

### Recurrence of breast cancer

- In women with a prior history of breast cancer and suspicion of recurrence when clinical, mammographic, and/or sonographic findings are inconclusive

## For Breast Carcinoma: Annual Screening

### Individuals who received radiation to the chest between ages 10 and 30 years

### Individuals with a genetic predisposition to breast cancer, in either themselves or a first degree relative, which may include any of the following:

- Bannayan-Riley-Ruvalcaba syndrome
- BRCA1 and BRCA2
- Cowden syndrome
- Li-Fraumeni syndrome

### Individuals known to have any of the following genetic mutations:

- ATM
- CDH1
- CHEK2
- PALB2

### History of lobular carcinoma in situ (LCIS), atypical ductal hyperplasia (ADH) or atypical lobular hyperplasia (ALH) on biopsy

### Lifetime risk ~ 20% or greater

- As defined by BRCAPRO or other models that are largely dependent on family history

## For Breast Implant Rupture: Not Requiring Breast Carcinoma Diagnosis

### Breast MRI is indicated to screen for asymptomatic rupture of a silicone breast implant beginning 3 years after implantation and every other year thereafter

### Evaluation of symptomatic patients with breast implants, for detection of implant rupture

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