

CLINICAL APPROPRIATENESS GUIDELINES

ADVANCED IMAGING

Appropriate Use Criteria: Vascular Imaging

EFFECTIVE JANUARY 1, 2019

Proprietary



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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. 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.

Administrative Guidelines

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 medical 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

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.

History

Status	Date	Action
Reviewed and revised	07/26/2016	Independent Multispecialty Physician Panel review and revision
Created	03/30/2005	Original effective date

Vascular Imaging

General Information/Overview

Scope

These guidelines address advanced vascular imaging 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

Duplex ultrasound is frequently chosen as the primary modality for screening and diagnosis of vascular disease, particularly arterial stenosis. It is also suitable for analysis in subclinical arterial plaque buildup and as such is useful for evaluating patients with high cardiovascular disease risk. Duplex ultrasound is noninvasive, does not use ionizing radiation, and can be performed with several Doppler modalities. Duplex ultrasound is less accurate in the aortoiliac region, especially in cases of patient obesity or intestinal gas, and also in the presence of multiple sequential vascular lesions. Additional modalities are often required for preoperative arterial mapping.

Computed tomography angiography (CTA) and **magnetic resonance angiography (MRA)** scans both provide high contrast and can yield a 3D map of vasculature, making them useful for imaging prior to intervention. MRA imaging with gadolinium-enhanced contrast detects arterial stenosis more accurately than duplex ultrasound. Specific MR sequences are also available that allow MRA to be performed without contrast or with non-gadolinium contrast agents if exposure to gadolinium is a potential concern. CTA offers faster image acquisition and is less susceptible than MRA to respiration or motion artifact. CTA is reliable for vascular lesion localization and severity, but MRA yields improved soft tissue resolution and, unlike CTA, is not sensitive to calcification. For example, in the case of vasculitis, the vessel wall edema would be better visualized with MRA. However, the surrounding soft tissues are not well evaluated with MRA and would be better visualized with CTA. MRA has become the preferred technique for imaging peripheral vascular disease, as newer imaging sequences are able to overcome issues such as long acquisition times and artifact.

Disadvantages of CTA include exposure to ionizing radiation and risks associated with infusion of iodinated contrast media, including allergic reactions or renal compromise. 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 MRA. Infusion of gadolinium may also confer an unacceptable risk in persons with advanced renal disease.

Ankle brachial index, the ratio of blood pressure at the ankle to blood pressure in the brachial artery, is a noninvasive metric used in the diagnosis of peripheral artery disease, particularly lower extremity arterial disease, and a predictor of cardiovascular disease risk.

Digital subtraction angiography, a type of catheter angiography, has long been the gold standard for vascular imaging. In contrast to the modalities described above, digital subtraction angiography allows for treatment in addition to diagnosis of some vascular pathologies. Due to associated risks it is used much less frequently than CTA or MRA, but may be indicated in imaging of below-the-knee arterial disease, or when noninvasive imaging modalities have yielded conflicting or inconclusive results.

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 terminology¹

- **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 vascular imaging 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.

General Vascular

Congenital or developmental vascular anomalies

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

IMAGING STUDY

- CTA or MRA brain, neck, chest, abdomen and pelvis, or extremities (based on location)
- CT or MRI brain
- CT or MRI chest

Traumatic vascular injury

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

IMAGING STUDY

- CTA or MRA brain, neck, chest, abdomen and pelvis, or extremities (based on location)
- CT chest

Tumor

Advanced imaging is considered medically necessary for evaluation of the following:

- Blood supply to established tumor
- Vascular invasion or compression by tumor

IMAGING STUDY

- CTA or MRA brain, neck, chest, abdomen and pelvis, or extremities (based on location)

Vasculitis

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

IMAGING STUDY

- CTA or MRA brain, neck, chest, abdomen and pelvis, or extremities (based on location)
- MRI brain
- CT chest

Procedure-related Imaging

Procedure-related Imaging

For procedures related to aortic aneurysm or dissection, see Aneurysm and Dissection indications for the appropriate anatomic region.

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

- Vascular anatomic delineation prior to surgical and interventional procedures
- Evaluation of the aorta prior to transcatheter aortic valve implantation/replacement (TAVI/TAVR)
- Evaluation for suspected vascular complications following a procedure

IMAGING STUDY

- CTA or MRA brain, neck, chest, abdomen and pelvis, or extremities (based on specific procedure)
- CTA or MRA chest, abdomen and pelvis prior to TAVI/TAVR*

**Alternative studies for this indication include CT or MRI chest, CT abdomen and pelvis, CTA abdominal aorta with bilateral lower extremity runoff*

Exclusions

Advanced imaging is considered **not medically necessary** in **EITHER** of the following scenarios:

- Screening for carotid disease using CTA or MRA in preparation for coronary artery bypass graft (CABG) surgery is considered not medically necessary.
- MR venography or CT venography in preparation for a neurosurgical or percutaneous procedure to treat multiple sclerosis is considered not medically necessary.

Rationale

The purpose of vascular imaging in multiple sclerosis is for preoperative planning prior to stenting or angioplasty of the venous sinus. Evidence-based guidelines strongly recommend against performing this procedure based on lack of evidence.²

Stenting or angioplasty of the venous sinus ("liberation therapy") is based on an unproven hypothesis that multiple sclerosis is related to chronic cerebrospinal venous insufficiency, which leads to iron buildup in the central nervous system and an immune or inflammatory reaction. The FDA issued a warning in 2012 about liberation therapy, stating there is a lack of evidence to support its use and the criteria used to diagnose chronic cerebrospinal venous insufficiency have not been adequately established. Stenting or angioplasty of the venous sinus has been associated with deaths and serious complications, including migration of stents to the heart or other parts of the body, venous injury, blood clots, cranial nerve damage, and abdominal bleeding in patients who have been treated for chronic cerebrospinal venous insufficiency. The FDA concluded that these procedures put patients at risk without clear evidence that they might benefit.³

Brain, Head and Neck

Aneurysm – intracranial

Screening

- Persons with 2 or more first-degree relatives with intracranial aneurysm or subarachnoid hemorrhage
- Persons with a heritable condition that is associated with intracranial aneurysm (examples include autosomal dominant polycystic kidney disease and Ehlers-Danlos syndrome type IV)

Diagnosis

- Evaluation of neurologic signs or symptoms suggestive of intracranial aneurysm (for isolated headache, see Brain Imaging)

Management

- Evaluation for aneurysm progression based on new or worsening neurologic symptoms
- Preoperative evaluation
- Initial postoperative evaluation

Surveillance

- Initial evaluation at 6 to 12 months following diagnosis, then every 1 to 2 years

IMAGING STUDY

- CTA or MRA brain
- CT or MRI brain

Rationale

SCREENING

The incidence of intracranial aneurysm may be as high as 19% in patients with a significant family history of intracranial aneurysms as compared to 2% to 3.5% in the general population.^{4,5} As a result, the American Heart and Stroke Foundation, American Academy of Neurology, and the American Association of Neurological Surgeons strongly recommend screening in patients with ≥ 2 family members with intracranial aneurysm or subarachnoid hemorrhage by CTA or MRA.^{6,7} Evidence does not support screening in patients with only 1 affected family member and no additional risk factors as incidence is low (1.14%), and early detection was not associated with improved outcomes.⁸ A 2016 prospective trial evaluated screening MRA in first-degree relatives of patients with ruptured intracranial aneurysms. Of the 305 total exams, unruptured intracranial aneurysms were seen in 2.3% of patients (95% CI, 1.02%-4.76%) and less than 1% of the screened population required an endovascular procedure or surgical intervention.⁹

In patients with autosomal dominant polycystic kidney disease, the incidence for intracranial aneurysm may be as high as 10%, and there is general agreement that these patients should be screened. The evidence supporting aneurysm screening in patients with other hereditary syndromes, including Ehlers-Danlos, primordial dwarfism, or glucocorticoid-remediable aldosteronism, is less compelling.

The American Heart Association and American Stroke Association recommend advanced imaging screening for patients with autosomal dominant polycystic kidney disease as well as consideration for screening in patients with microcephalic osteodysplastic primordial dwarfism. Routine screening is not specifically recommended for other hereditary syndromes.⁶ Both CTA and MRA are highly sensitive for aneurysm screening with sensitivities above 95%.^{10,11} As MRA does not require ionizing radiation or contrast, it confers greater potential net benefit and is generally preferred unless contraindicated.

DIAGNOSIS

The use of advanced imaging for diagnosis of clinically suspected aneurysm as well as management (including perioperative evaluation) of known aneurysm is appropriate. Both MRA and CTA can reliably detect intracranial aneurysms $> 5\text{mm}$,^{10,11} so modality selection is often based on factors such as patient preference, radiation sensitivity, contrast risk, and availability. For patients with a suspected subarachnoid hemorrhage, CT head without intravenous contrast is the most appropriate initial imaging modality.⁷

SURVEILLANCE

In the absence of new or worsening symptoms, the American Heart Association and American Stroke Association recommend aneurysm surveillance at 6 to 12 months following diagnosis, then every 1 to 2 years or as follow up after treatment with clips, endovascular coil, or stenting as medically necessary. In patients with unruptured intracranial aneurysm, approximately 12% will have continued growth of their aneurysms and a 24-fold increased risk of rupture.¹² Surveillance is also recommended after surgical intervention by the American Heart Association and American Stroke Association as well as the American College of Radiology. Either MRA or CTA may be used for surveillance of untreated intracranial aneurysm, although follow up using the same imaging modality on which the aneurysm was initially found is preferred. In patients with treated aneurysms, MRA head without intravenous contrast is superior to CTA for the evaluation of coiled aneurysms, while CTA head with intravenous contrast is preferred for evaluation of clipped aneurysms.⁷

Arterial thromboembolic disease

Advanced imaging is considered medically necessary when the results of imaging are essential to establish a diagnosis and/or direct management.

IMAGING STUDY

- CTA or MRA brain for intracranial arterial disease
- CTA or MRA neck for extracranial arterial disease

Arteriovenous malformation or arteriovenous fistula

Advanced imaging is considered medically necessary when the results of imaging are essential to establish a diagnosis and/or direct management.

IMAGING STUDY

- CTA or MRA brain
- CT or MRI brain

Carotid aneurysm or dissection

Advanced imaging is considered medically necessary when the results of imaging are essential to establish a diagnosis and/or direct management.

IMAGING STUDY

- CTA or MRA neck

Carotid stenosis or occlusion

Advanced imaging is considered medically necessary for diagnosis and management of known or suspected steno-occlusive disease following abnormal or equivocal duplex Doppler study, unless the diagnosis is supported by clinical exam findings.

Note: Screening for carotid disease utilizing vascular imaging is not appropriate.

IMAGING STUDY

- CTA or MRA neck

Rationale

In the absence of symptoms, multiple high-quality evidence-based guidelines do not recommend screening for high-grade carotid stenosis in low or average risk patients.¹³⁻¹⁵ However, the recommendations are inconsistent with regard to screening of high-risk patients. The U.S. Preventive Services Task Force does not recommend screening for asymptomatic carotid artery stenosis in the general adult population.¹⁴ While Brott et al.¹⁵ suggested that duplex ultrasound might be considered in patients without symptoms but with 2 or more risk factors, the authors note that it is unclear whether establishing a diagnosis would justify actions that affect clinical outcomes.

Cerebrovascular accident or transient ischemic attack

Also see Brain Imaging guidelines.

Advanced imaging is considered medically necessary for the diagnosis or management of underlying vascular pathology following transient ischemic attack or confirmed cerebrovascular accident.

IMAGING STUDY

- CTA or MRA brain

Dissection – intracranial

Advanced imaging is considered medically necessary when the results of imaging are essential to establish a diagnosis and/or direct management.

IMAGING STUDY

- CTA or MRA brain

Fibromuscular dysplasia

Advanced imaging is considered medically necessary when the results of imaging are essential to establish a diagnosis and/or direct management.

IMAGING STUDY

- CTA or MRA neck

Hematoma

Advanced imaging is considered medically necessary when the results of imaging are essential to establish a diagnosis and/or direct management.

IMAGING STUDY

- CT or MRI brain for parenchymal evaluation
- CTA or MRA brain for vascular evaluation

Hemorrhage – intracranial or subarachnoid

Advanced imaging is considered medically necessary when the results of imaging are essential to establish a diagnosis and/or direct management.

IMAGING STUDY

- CT or MRI brain for parenchymal evaluation
- CTA or MRA brain for vascular evaluation

Horner's syndrome

Also see Brain Imaging guidelines.

Advanced imaging is considered medically necessary when the results of imaging are essential to establish a diagnosis and/or direct management.

IMAGING STUDY

- CTA or MRA neck

Pulsatile tinnitus

Also see Brain Imaging and Head & Neck Imaging guidelines.

Advanced imaging is considered medically necessary when the results of imaging are essential to establish a diagnosis and/or direct management.

IMAGING STUDY

- CTA or MRA brain
- MRI brain
- CT orbit/sella/posterior fossa

Stenosis or occlusion – intracranial arteries

Includes atherosclerotic disease, Moyamoya disease, sickle cell anemia, and idiopathic progressive arteriopathy of childhood.

Advanced imaging is considered medically necessary when the results of imaging are essential to establish a diagnosis and/or direct management.

IMAGING STUDY

- CTA or MRA brain

Trigeminal neuralgia

Advanced imaging is considered medically necessary when the results of imaging are essential to establish a diagnosis and/or direct management.

IMAGING STUDY

- CTA or MRA brain

Venous thrombosis or compression – extracranial

Advanced imaging is considered medically necessary when the results of imaging are essential to establish a diagnosis and/or direct management.

IMAGING STUDY

- CTA or MRA neck

Venous thrombosis or compression – intracranial

Includes dural venous sinus thrombosis, venous sinus thrombosis, and cerebral vein thrombosis

ADULT

Advanced imaging is considered medically necessary for management of known venous thrombosis and for diagnosis based on **ANY** of the following:

- Headache and abnormal neurologic findings
- Headache or abnormal neurologic findings when **ANY** of the following risk factors are present:
 - Behcet's disease
 - Coagulopathy such as protein S, protein C, or antithrombin 3 deficiencies, and antiphospholipid antibody syndrome
 - Iron deficiency anemia
 - Known malignancy

- Medication use associated with thrombosis such as oral contraceptives and all-trans retinoic acid
- Meningitis/intracranial infection
- Pregnancy
- Prior episodes of venous sinus thrombosis
- Trauma

PEDIATRIC

Advanced imaging is considered medically necessary when the results of imaging are essential to establish a diagnosis and/or direct management.

IMAGING STUDY

- CTA or MRA brain
- CT or MRI brain

Vertebrobasilar aneurysm or dissection

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

IMAGING STUDY

- CTA or MRA neck

Vertebrobasilar stenosis or occlusion

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

IMAGING STUDY

- CTA or MRA neck

Chest**Aortic aneurysm or dissection**

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

ADULT

- Suspected aortic aneurysm or dissection
- Evaluation for disease progression based on signs or symptoms
- Preoperative planning for aneurysm or dissection repair
- Following surgical repair of aortic dissection or aneurysm within the preceding year when imaging has not been performed within the prior 6 months
- Stent graft evaluation
- Annual surveillance of stable patients with confirmed aortic dissection
- Ongoing surveillance of stable patients with confirmed thoracic aortic aneurysm who have not undergone imaging of the thoracic aorta within the preceding 6 months

PEDIATRIC

- Periodic screening in high risk patients (those with connective tissue disease or coarctation of the aorta)

- Evaluation when there is concern for complications (such as dissection)
- Further characterization of suspected aneurysm based on prior diagnostic or imaging study
- Patient with confirmed aortic dissection experiencing new or worsening symptoms
- Periodic surveillance in patients with known aneurysm
- Pre- and postoperative evaluation

IMAGING STUDY

- CT, CTA, MRI or MRA chest

Note: Echocardiogram is generally recommended as a first line modality for evaluation of the ascending aorta in pediatric patients.

Rationale

Although it cannot completely evaluate the thoracic aorta, transthoracic echocardiography (TTE) is the most frequently used technique for measuring proximal segments in clinical practice. Given the wide availability and lack of ionizing radiation, TTE is an excellent imaging modality for measurement of the aortic root diameter and for following known thoracic aortic aneurysms to assist in determining the timing of surgery. Since the predominant area of dilation is often in the proximal aorta, TTE may suffice for screening. Transthoracic echocardiography may be limited in patients with abnormal chest wall configurations, pulmonary emphysema, and obesity; transesophageal echocardiography can offer improved visualization in these patients.¹⁶

CT and CTA are important modalities in the diagnosis and management of aortic disease. In several reports, CT was found to have a pooled sensitivity of 100% and a pooled specificity of 98% for the detection of thoracic aortic dissection or intramural hematoma. MRI reliably demonstrates the relevant features of aortic disease, such as aortic diameter and the relationship of aortic branches to an aneurysm or dissection. Advantages of MRI include the lack of ionizing radiation and ability to avoid the use of iodinated contrast. Disadvantages include longer image acquisition times and reduced ability to monitor potentially unstable patients.¹⁶

When planning for endovascular repair of a thoracic aortic aneurysm, CTA is the imaging modality of choice. It allows for accurate measurement of the length of the aneurysmal segment, evaluation of involved branches, and assessment of the healthy aortic segments above and below the graft. When evaluating patients after repair, CT or CTA is the study of choice. MRI may be safely done to evaluate nitinol-based stent grafts, but may not be used for evaluation of stainless steel grafts and is unable to visualize metallic stent struts. Following endovascular repair, imaging is appropriate at 1 month, 6 months, 12 months, and annually thereafter for aneurysm. Annual evaluation is appropriate following endovascular repair of aortic dissection. Following surgical repair, less-frequent imaging may be performed after 1 year of stability has been established.

Atheromatous disease (Adult only)

Advanced imaging is considered medically necessary for evaluation of the thoracic aorta as a source of distal emboli when a cardiac source has not been identified on echocardiography.

IMAGING STUDY

- CTA chest
- MRA when CTA contraindicated

Pulmonary embolism

ADULT

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

- **Pulmonary embolism likely** based on modified Wells criteria¹⁷ (> 4 points)
- **Pulmonary embolism unlikely** based on modified Wells criteria¹⁷ (\leq 4 points) with a positive D-dimer
- Suspected pulmonary embolism in pregnancy

PEDIATRIC

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

- Moderate or high clinical suspicion of pulmonary embolism
- Concern for recurrent embolism in patients on adequate medical therapy

IMAGING STUDY

- CT or CTA chest

Rationale

Clinical signs and symptoms of pulmonary embolism are notoriously nonspecific, and relatively few patients will present with the classic constellation of pleuritic chest pain, dyspnea, and hypoxia. Furthermore, incidence of the condition is rare relative to mimics like pneumonia, pleurisy, pericarditis, and myocardial infarction. Vascular imaging plays an important role in establishing the diagnosis of pulmonary embolism, but there is evidence that vascular imaging is overutilized in select patient populations where diagnostic yield can be less than 3%.¹⁸⁻²³

LOW PRE-TEST PROBABILITY OF PULMONARY EMBOLISM

Consensus exists among multiple high-quality evidence-based guidelines that CTA or other forms of vascular imaging are not indicated in patients with a low pretest probability of pulmonary embolism. The American College of Physicians recommends clinicians use validated clinical prediction rules to estimate the pretest probability in patients with suspected pulmonary embolism. Clinicians should not obtain D-dimer measurements or imaging studies in patients with a low pretest probability of pulmonary embolism and who meet all Pulmonary Embolism Rule-out Criteria. Clinicians should obtain a high-sensitivity D-dimer measurement as the initial diagnostic test in patients who have an intermediate pretest probability of pulmonary embolism or in patients with low pretest probability of pulmonary embolism who do not meet all Pulmonary Embolism Rule-out Criteria. Clinicians should not use imaging studies as the initial test in patients who have a low or intermediate pretest probability of pulmonary embolism.²⁴⁻²⁶

In a 2016 meta-analysis, Crawford et al. concluded that a negative D-dimer test is valuable in ruling out pulmonary embolism in patients who present to the emergency setting with a low pretest probability. They noted high levels of false-positive results, especially among those over the age of 65 years with estimates of specificity from 23% to 63%. No empirical evidence was available, however, to support an increase in the diagnostic threshold of interpretation of D-dimer results for those over the age of 65 years.^{19,27}

In a 2016 multicenter prospective cohort management study of 808 consecutive patients with suspected pulmonary embolism, Bates et al. evaluated whether pulmonary embolism can be safely excluded in patients with negative D-dimer testing without incorporating clinical probability assessment. Ninety-nine (12%) were diagnosed with venous thromboembolism at presentation. Four hundred and twenty (52%) had a negative D-dimer level at presentation and were treated without anticoagulation; of these, 1 had venous thromboembolism during follow up. The negative predictive value of D-dimer testing for pulmonary embolism was 99.8% (95% CI, 98.7%-99.9%)^{28,29}

MODERATE TO HIGH PRE-TEST PROBABILITY OF PULMONARY EMBOLISM

Consensus exists among multiple high-quality evidence-based guidelines that CT/CTA is indicated in patients with intermediate or high clinical suspicion for pulmonary embolism. CT should be offered to patients in whom pulmonary embolism is suspected with a likely Wells score or with an unlikely two-level pulmonary embolism Wells score and positive D-dimer.^{25,30-34} Patients with intermediate or high pretest probability of pulmonary embolism require diagnostic imaging studies,³⁵ and additional diagnostic testing should be considered if CT is negative.²¹ In patients with an elevated D-dimer level, imaging should be obtained.^{36,37} The American College of Radiology gives CT pulmonary angiography and optimized CT chest with intravenous contrast a score of 9, in patients with a positive plasma D-dimer test.³⁸

MRI OR MRA FOR EVALUATION OF PULMONARY EMBOLISM

There is no consistent evidence that MRA or MRI have comparable reliability or diagnostic accuracy to either CTA or ventilation-perfusion scintigraphy.

In a 2016 systematic review/meta-analysis, Li et al. concluded that MRA can be used for the diagnosis of acute pulmonary embolism; however, due to limited sensitivity, it cannot be used as a stand-alone test to exclude acute pulmonary embolism. Five studies were included in the meta-analysis. The pooled sensitivity 0.83 (0.78-0.88) and specificity 0.99 (0.98-1.00) demonstrated that MRA had limited sensitivity and high specificity in the detection of acute pulmonary embolism.³⁹ Zhou et al. conducted a meta-analysis of 15 studies for patient accuracy and 9 studies for vessel accuracy on MRI. Authors concluded that MRI exhibits a high diagnostic capability with proximal arteries, but lacks sensitivity for peripheral embolism. The patient-based analysis yielded an overall sensitivity of 0.75 (0.70-0.79) and 0.84 (0.80-0.87) for all patients and patients with technically adequate images, respectively. The overall specificity was 0.80 (0.77-0.83) and 0.97 (0.96-0.98). On average, MRI was technically inadequate in 18.89% of patients (range, 2.10%-27.70%).^{40,41}

Other vascular indications – chest

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

- Hematoma
- Pulmonary arterial hypertension
- Pulmonary arteriovenous malformation
- Pulmonary sequestration
- Subclavian steal syndrome
- Superior vena cava syndrome
- Systemic venous thrombosis or occlusion
- Thoracic outlet syndrome

IMAGING STUDY

- CTA or MRA chest
- CT or MRI chest (alternative modalities for evaluation of superior vena cava syndrome and thoracic outlet syndrome)

Abdomen and Pelvis

Aneurysm of the abdominal aorta

ADULT

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

- Following inconclusive ultrasound in patients with suspected aneurysm/dilation of the abdominal aorta
- Follow-up imaging of patients with an established aneurysm/dilation when most recent ultrasound imaging is inconclusive
- Preoperative assessment or prior to percutaneous endovascular stent graft placement
- Annual post-operative surveillance of stable patients who have undergone open surgical repair when most recent ultrasound imaging is inconclusive
- Post-operative surveillance of stable patients who have been treated with endovascular stent graft
- Suspected complication of an aneurysm/dilation, such as aneurysmal rupture or infection (requiring urgent imaging)
- Stent graft evaluation when endoleak suspected

PEDIATRIC

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

- Annual screening in patients with connective tissue disease
- Follow-up imaging of patients with an established aneurysm/dilation
- Preoperative or post-operative evaluation
- Suspected complication of an aneurysm/dilation

IMAGING STUDY

- CT, CTA, MRI or MRA abdomen
- CTA abdominal aorta with bilateral lower extremity runoff (adults only)

Rationale

Given its wide availability and ability to diagnose or exclude a wide variety of causes of symptoms, ultrasound is generally the initial modality used in the evaluation of abdominal aortic aneurysm (AAA). Several studies have reported high sensitivity and specificity, 94%-100% and 98%-100%, respectively.⁴²

CT is less operator-dependent and allows for more reproducible measurements over serial scans, in addition to providing detail about many aneurysm features relevant to clinical decision making. When endovascular repair of an aneurysm is planned, contrast-enhanced CT or CTA is essential for procedural planning. This modality allows accurate measurements to be taken at the proximal and distal landing sites for the stent graft as well as for evaluation of the relationship between the aneurysm and aortic branches, and for evaluation of the iliac arteries.¹⁶

MRI and MRA are able to reliably depict the anatomic features of aneurysms such that these modalities are well suited to aortic evaluation. Limitations include potential for artifact due to longer image acquisition times, and less accessibility for monitoring of potentially unstable patients. Given the lack of ionizing radiation and absence of a need for iodinated contrast use, these modalities may be considered in cases where serial follow-up studies are needed.¹⁶

A high-quality evidence-based guideline recommends follow up surveillance of AAA at 12-month intervals for AAA of 35 to 44 mm in diameter and at 6-month intervals for AAA 45 to 54 mm in diameter.¹⁶ Following endovascular repair, surveillance is recommended after 1 month, 6 months, 12 months, and annually thereafter. Shorter intervals may be appropriate when there are abnormal findings warranting closer surveillance. If there is no evidence of endoleak or AAA sac enlargement in the first year after endovascular repair, using duplex ultrasound for annual screening supplemented with CT at 5-year intervals may be considered. Following open surgical repair, surveillance may be considered at approximately 5-year intervals and may be performed with duplex ultrasound or CT.¹⁶

Four randomized trials compared the outcomes of population-based studies with or without screening for AAA. The prevalence of AAA was 5.5% in these studies, and AAA screening in men greater than 65 years of age was associated with a statistically significant decline in AAA-related mortality over 10 years. No similar benefit was seen in women, though women were included in only 1 of the trials and comprised a small number of patients (9342 out of a total 127,891 patients). Rescreening of patients has demonstrated few positive results, suggesting that a single ultrasound scan should be sufficient for screening.^{16,42}

CTA abdomen and pelvis with intravenous contrast is the gold standard for preoperative endovascular aneurysm repair planning and for monitoring following endovascular aneurysm repair procedure in patients with AAA.⁴³ MRA abdomen and pelvis without and with intravenous contrast is an appropriate alternative to CTA abdomen and pelvis with intravenous contrast for patients undergoing planning for endovascular aneurysm repair and for monitoring following endovascular aneurysm repair procedure where iodinated contrast is contraindicated.⁴³ Following endovascular aneurysm repair, the most widely used surveillance regimen includes multiphasic contrast-enhanced CT at 1, 6, 12 months, and annually thereafter.⁴³

Aneurysm of the iliac vessels

ADULT

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

- Following inconclusive ultrasound in patients with suspected aneurysm/dilation of the iliac or femoral vessels
- Follow-up imaging of patients with an established aneurysm/dilation when most recent ultrasound imaging is inconclusive
- Preoperative assessment or prior to percutaneous endovascular stent graft placement
- Annual post-operative surveillance of stable patients who have undergone open surgical repair when most recent ultrasound imaging is inconclusive
- Postoperative surveillance of stable patients who have been treated with endovascular stent graft
- Suspected complication of an aneurysm/dilation, such as aneurysmal rupture or infection requiring urgent imaging

PEDIATRIC

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

- Annual screening in patients with connective tissue disease
- Follow-up imaging of patients with an established aneurysm/dilation
- Pre/postoperative evaluation
- Suspected complication of an aneurysm/dilation

IMAGING STUDY

- CTA or MRA pelvis
- CTA abdominal aorta with bilateral lower extremity runoff (adults only)

Arteriovenous malformation or fistula

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

IMAGING STUDY

- CTA or MRA abdomen and/or pelvis

Dissection of the abdominal aorta or branch vessel

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

IMAGING STUDY

- CT, CTA or MRA abdomen and/or pelvis
- CTA abdominal aorta with bilateral lower extremity runoff

Hematoma/hemorrhage – abdominal aorta and/or branch vessel

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

IMAGING STUDY

- CT, CTA or MRA abdomen and/or pelvis
- CTA abdominal aorta with bilateral lower extremity runoff

Mesenteric ischemia

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

IMAGING STUDY

- CTA or MRA abdomen and pelvis

Rationale

In patients with suspected mesenteric ischemia, CTA abdomen with intravenous contrast should be the first-line imaging test.⁴⁴

MRA may be considered an alternative to CTA for diagnosis of suspected chronic mesenteric ischemia, although there is some evidence that images obtained with MRA are not as accurate or complete as those obtained with CTA.⁴⁵

Portal hypertension

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

IMAGING STUDY

- CTA or MRA abdomen

Pseudoaneurysm – abdominal aorta or branch vessel

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

IMAGING STUDY

- CTA or MRA abdomen and/or pelvis
- CTA abdominal aorta with bilateral lower extremity runoff

Renal artery stenosis

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

- Following an abnormal renal Doppler ultrasound suggestive of renal artery stenosis
- Refractory hypertension, in patients receiving therapeutic doses of 3 or more anti-hypertensive medications with documentation of at least 2 abnormal serial blood pressure measurements
- Hypertension with renal failure or progressive renal insufficiency
- Abrupt onset of hypertension
- Accelerated or malignant hypertension
- Hypertension developing in patients younger than age 30
- Generalized arteriosclerotic occlusive disease with hypertension
- Deteriorating renal function on angiotensin converting enzyme inhibition
- Abdominal bruit, suspected to originate in the renal artery
- Recurrent, unexplained episodes of “flash” pulmonary edema
- Unilateral small renal size (greater than 1.5 cm difference in renal size on ultrasound)

IMAGING STUDY

- CTA or MRA abdomen

Note: Doppler ultrasound of the renal arteries can often detect renal artery stenosis and should be considered for initial evaluation.

Stenosis or occlusion of the abdominal aorta or branch vessels

Advanced imaging is considered medically necessary when the results of imaging are essential to establish a diagnosis and/or direct management.

IMAGING STUDY

- CTA or MRA abdomen and/or pelvis

Unexplained blood loss in the abdomen or pelvis

Advanced imaging is considered medically necessary for diagnostic evaluation.

IMAGING STUDY

- CTA or MRA abdomen and/or pelvis

Venous thrombosis or occlusion

Advanced imaging is considered medically necessary for evaluation of suspected thrombosis or occlusion of major abdominal vessels, including portal and systemic venous systems.

IMAGING STUDY

- Duplex ultrasound required for initial evaluation of hepatic or portal veins, renal, and splenic veins.
- CTA or MRA of the abdomen and/or pelvis for all other venous structures, or following inconclusive ultrasound of the above

Visceral artery aneurysm

Advanced imaging is considered medically necessary for diagnosis, management, and surveillance of aneurysm involving **ANY** of the following abdominal vessels:

- Renal artery
- Celiac artery
- Splenic artery
- Hepatic artery
- Superior/inferior mesenteric arteries and their branches

IMAGING STUDY

- CTA or MRA abdomen and/or pelvis

Upper Extremity

Steno-occlusive disease

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

IMAGING STUDY

- CTA or MRA upper extremity

Other vascular indications in upper extremity

Vascular imaging of the upper extremity is considered medically necessary when the results of imaging are essential to establish a diagnosis and/or direct management of the following vascular conditions:

- Aneurysm or dissection
- Arterial entrapment syndrome
- Arteriovenous malformation or arteriovenous fistula
- Dialysis graft evaluation following duplex Doppler evaluation
- Intramural hematoma

- Raynaud's syndrome
- Thromboembolic disease (arterial or venous)

IMAGING STUDY

- CTA or MRA upper extremity

Lower Extremity

Peripheral arterial disease – lower extremity

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

- Classic presenting symptoms of lower extremity claudication
- Critical ischemia of the lower extremity
- Ankle brachial index < 0.9

IMAGING STUDY

- CTA or MRA of the lower extremities
- CTA abdominal aorta with bilateral lower extremity runoff is indicated in adults following non-invasive evaluation (ankle brachial index, toe-brachial index, segmental pressure examination, or duplex ultrasound) in the following scenarios:
 - Evaluation of claudication or critical limb ischemia in patients with no contraindication to revascularization
 - Follow up of lower extremity revascularization procedures when non-invasive evaluation suggests restenosis or a complication related to the procedure

Rationale

An estimated 8 to 12 million people in the U.S. are affected by peripheral arterial disease (PAD). Symptomatic PAD often presents as intermittent claudication. Presenting signs and symptoms in the lower extremity may also include weak or absent distal pulses, absent distal hair growth, dry skin, and poor skin healing. Though evidence does not support the use of screening studies for PAD in the general population, the primary study for making the diagnosis in symptomatic patients is the ankle-brachial index (ABI). Compared with arteriography, an ABI of 0.90 or less has a high sensitivity and specificity for hemodynamically significant PAD.⁴⁶ Additional imaging should be reserved for patients in whom revascularization treatment is being considered. Advanced imaging is not indicated for patients with asymptomatic PAD or intermittent claudication who are not appropriate candidates for revascularization.⁴⁶

The 2016 American Heart Association/American College of Cardiology Guideline on the Management of Patients with Lower Extremity Peripheral Arterial Disease recommends against performing angiography, either invasive or noninvasive, to evaluate for peripheral artery disease in the absence of lower extremity symptoms, indicating that there are several potential risks and that management will not be altered on the basis of the angiographic findings.⁴⁷

The Society for Vascular Surgery commissioned a systematic review which suggested that there was no clear benefit to screening for PAD in asymptomatic patients. The U.S. Preventive Services Task Force concluded in 2013 that there is insufficient evidence to support screening for PAD with the ABI.⁴⁸

Other vascular indications in lower extremity

Vascular imaging of the lower extremity is considered medically necessary when the results of imaging are essential to establish a diagnosis and/or direct management of the following vascular conditions:

- Arterial entrapment syndrome
- Aneurysm/dilation
- Arteriovenous malformation or arteriovenous fistula
- Dissection
- Intramural hematoma

- Thromboembolic disease – arterial or venous
- Venous compression
- Venous thrombosis

IMAGING STUDY

- CTA or MRA lower extremity
- CTA abdominal aorta with bilateral lower extremity runoff indicated for arterial evaluation when there is evidence of disease originating in the abdominal aorta or branch vessels

MR Angiography of the Spinal Canal

MR Angiography of the Spinal Canal

MR angiography of the spinal canal is an evolving technology under clinical development, and its impact on health outcomes will continue to undergo review as new evidence-based studies are published. Medically necessary applications are currently limited to the following:

- Preoperative or postoperative imaging
- Follow up of prior imaging findings suggestive of a vascular lesion

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Codes

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The following codes may be applicable to the vascular imaging and may not be all inclusive.

CPT

70450	CT head, without contrast
70460	CT head, with contrast
70470	CT head, without contrast, followed by re-imaging with contrast
70496	CT angiography head, with contrast material(s), including noncontrast images, if performed, and image post-processing
70498	CT angiography neck, with contrast material(s), including noncontrast images, if performed, and image post-processing
70544	MR angiography head, without contrast
70545	MR angiography head, with contrast
70546	MR angiography head, without contrast, followed by re-imaging with contrast
70547	MR angiography neck, without contrast
70548	MR angiography neck, with contrast
70549	MR angiography neck, without contrast, followed by re-imaging with contrast
70551	MRI head, without contrast
70552	MRI head, with contrast
70553	MRI head, without contrast, followed by re-imaging with contrast
71250	CT chest, without contrast
71260	CT chest, with contrast
71270	CT chest without contrast, followed by re-imaging with contrast
71275	CT angiography of chest (non-coronary), with contrast material(s), including non-contrast images, if performed, and image post-processing
71550	MRI chest, without contrast
71551	MRI chest, with contrast
71552	MRI chest, without contrast, followed by re-imaging with contrast
71555	MR angiography chest (excluding the myocardium) without contrast, followed by re-imaging with contrast
72159	MR angiography spinal canal
72191	CT angiography pelvis, with contrast material(s), including non-contrast images, if performed, and image post-processing
72192	CT pelvis, without contrast
72193	CT pelvis, with contrast
72194	CT pelvis without contrast, followed by re-imaging with contrast
72195	MRI pelvis, without contrast
72196	MRI pelvis, with contrast
72197	MRI pelvis, without contrast, followed by re-imaging with contrast
72198	MR angiography pelvis; without contrast, followed by re-imaging with contrast
73206	CT angiography upper extremity, with contrast material(s), including non-contrast images, if performed, and image post-processing

- 73225 MR angiography upper extremity, without and with contrast
- 73706 CT angiography lower extremity, with contrast material(s), including noncontrast images, if performed, and image post-processing
- 73725 MR angiography lower extremity, without and with contrast
- 74150 CT abdomen, without contrast
- 74160 CT abdomen, with contrast
- 74170 CT abdomen, without contrast, followed by re-imaging with contrast
- 74174 CT angiography abdomen and pelvis, with contrast material(s), including noncontrast images, if performed, and image post-processing
- 74175 CT angiography abdomen, with contrast material(s), including non-contrast images, if performed, and image post-processing
- 74176 CT abdomen and pelvis, without contrast
- 74177 CT abdomen and pelvis, with contrast
- 74178 CT abdomen and pelvis, without contrast, followed by re-imaging with contrast
- 74181 MRI abdomen, without contrast
- 74182 MRI abdomen, with contrast
- 74183 MRI abdomen, without contrast, followed by re-imaging with contrast
- 74185 MR angiography abdomen; without or with contrast
- 75635 CT angiography abdominal aorta and bilateral iliofemoral lower extremity runoff, with contrast material(s), including non-contrast images, if performed, and image post-processing

HCPCS

None

ICD-10 Diagnosis

Refer to the ICD-10 CM manual

History

Status	Date	Action
Restructured	01/01/2019	Advanced Imaging guidelines redesigned and reorganized to a condition-based structure
Reviewed and revised	03/01/2018	Last Independent Multispecialty Physician Panel review and revision
Created	03/30/2005	Original effective date