

DIAGNOSTIC ULTRASOUND and NONINVASIVE VASCULAR IMAGING GUIDELINES

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**MedSolutions, Inc. Clinical Decision Support Tool
for Ultrasound Diagnostic Imaging**

Common symptoms and symptom complexes are addressed by this tool. Imaging requests for patients with atypical symptoms or clinical presentations that are not specifically addressed will require physician review. Consultation with the referring physician may provide additional insight.

DIAGNOSTIC ULTRASOUND and NONINVASIVE VASCULAR STUDIES

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ABBREVIATIONS and GLOSSARY

AAA	Abdominal aortic aneurysm
A-Mode Amplitude Mode	One dimensional ultrasonographic measurement procedure
ACOG	American College of Obstetricians and Gynecologists
ACR	American College of Radiology
ABI	Ankle brachial index
AFP	Alpha-fetoprotein
AMA	American Medical Association
BI-RADS™	Breast Imaging Reporting and Data System
CPT®	Current Procedural Terminology (a registered trademark of the American Medical Association)
CST	
B-Mode (brightness mode)	A two-dimensional imaging procedure, B-mode ultrasound is the basis for all static and real-time B-scan images
CT	Computed tomography
CTA	Computed tomography angiography
DOS	Date of Service
Doppler Studies	Doppler involves measuring a change in frequency when the motion of vascular flow is detected.
Duplex Exam	Duplex is an ultrasound technique that combines Doppler and real-time imaging capabilities, either simultaneously or sequentially performed.
DVT	Deep vein thrombosis
FNA	Fine needle aspiration
IDDM	Insulin-dependent diabetes mellitus
LFT	Liver function tests
M-Mode (time motion trace)	An M-mode picture is an ultrasound image in which movement of a structure such as a heart valve or heart wall can be depicted in a wave-like manner. M-mode is primarily used in cardiac and fetal cardiac imaging.
MRA	Magnetic resonance angiography
MRI	Magnetic resonance imaging
PACS	Picture Archiving and Communication System
Real Time Scan	Considered the most common type of ultrasound, this is a two-dimensional scan that reflects structure and motion over time. The scanning and display of ultrasound images are run at a sufficiently rapid rate so that moving structures can be viewed moving at their natural rate. Frame rates ≥ 15 frames per second are considered real time.
TCD	Transcranial Doppler
TV	Transvaginal
US	Ultrasound, ultrasonography

2009 DIAGNOSTIC ULTRASOUND IMAGING GUIDELINES

US-1~GENERAL GUIDELINES

- Ultrasound is the initial imaging tool for the evaluation of the pregnant woman and fetus in many conditions.
- **A Duplex scan describes:**
 1. An ultrasonic scanning procedure for characterizing the pattern and direction of blood flow in arteries and veins with the production of real time images integrating B-mode two dimensional vascular structure, and
 2. Doppler spectral analysis, and
 3. color flow Doppler imaging
- The use of a hand-held or any Doppler device that does not create a hard-copy output is considered part of the physical examination and is not separately billable. This exclusion includes devices that produce a record that does not permit analysis of bi-directional vascular flow.
- The minimal use of color Doppler alone, when performed for anatomical structure identification, during a standard ultrasound procedure, is not separately reimbursable
- The routine use of 3D and 4D rendering, (post-processing), in conjunction with ultrasound is considered investigational.
- **All ultrasound studies require permanently recorded images.**
 - These images may be stored on film or in a Picture Archiving and Communication System (PACS).
 - Obstetric ultrasound services may not be billed without image recording.
 - The use of a hand-held or any Doppler device that does not create a hard-copy output is considered part of the physical examination and is not separately reimbursable.

2009 DIAGNOSTIC ULTRASOUND IMAGING GUIDELINES

US-2~HEAD and NECK ULTRASOUND

• US-2.1 Echoencephalography

76506	Echoencephalography, real time with image documentation (gray scale) (for determination of ventricular size, delineation of cerebral contents and detection of fluid masses or other intracranial abnormalities), including A-mode encephalography as secondary component where indicated
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- An echoencephalogram (CPT 76506) is performed to determine intracranial pathology such as intracranial hemorrhage, fluid collections, masses, or other structural abnormalities. Primarily performed on a child or infant, <12-14 months of age prior to fontanelle closure, and is known as 'neonatal intracranial ultrasound' (ACR Appropriateness Criteria)
- The study can be used to determine intracranial hemorrhage as cause of Neonatal seizure within the first 7 days of life
- Detection of parenchymal abnormalities
- Ventricular dilation-initial evaluation and for the follow up of hydrocephalus and periventricular leukomalacia (PVL)
- Congenital abnormalities
- Vascular abnormalities-includes Doppler evaluation of vascular lesions, ECMO and other cases where decreased blood flow is a concern for infarction
- Possible subdural hematoma
- Separate vascular structures from hematoma
- Follow up evaluation of hydrocephalus and periventricular leukomalacia (PVL) (Diagnostic Ultrasound third edition, pp 1623-1624)
- **CODING NOTES:**
 - Transcranial Doppler, when performed in conjunction with echoencephalography, may be billed separately.
 - Transcranial Doppler should be performed by duplex imaging technique.
 - Report code 93888 if only spectral Doppler is performed or only a limited number of vessels are imaged.
 - CPT 93886 describes a complete bilateral evaluation of the intracranial arteries.
 - 93890 Transcranial Doppler intracranial arteries, vasoresponsive
 - Emboli detection
 - 93892 Transcranial Doppler intracranial arteries, emboli detection without intravenous microbubble injection
 - 93893 Transcranial Doppler intracranial arteries, emboli detection with intravenous microbubble injection
 - 93888 should not be used with 93880, 93890-93893
 - Use this code for the evaluation of vasospasm when only a limited number of vessels are studied
- Parkinson's Disease

- Early evidence indicates that transcranial ultrasound is sensitive in diagnosing early parkinsonian syndromes before the disease can be clearly diagnosed clinically
 - Reference: *Ultrasound Reliably Diagnoses Early-Stage Parkinson's Disease, The Lancet Neurology, April 2008.*
- Transcranial Doppler (Stoke, 2007;38(4):1245-9)
 - 93886 if bilateral study or 93888 if study is limited or unilateral-93888 should not be used with 93886 or multiple times.
 - Occasionally used to complement head CTA for real time flow evaluation.
- Paranasal sinus ultrasound-considered investigational

• US-2.2 Ophthalmic Ultrasound

76510	Ophthalmic ultrasound, diagnostic; B-scan and quantitative A-scan performed during the same patient encounter
76511	Ophthalmic ultrasound, diagnostic; quantitative A-scan only
76512	Ophthalmic ultrasound, diagnostic; B-scan (with or without superimposed non-quantitative A-scan)
76513	Ophthalmic ultrasound, diagnostic; anterior segment ultrasound, immersion (water bath) B-scan or high resolution biomicroscopy immersion
76514	Ophthalmic ultrasound, diagnostic; corneal pachymetry, unilateral or bilateral

- Ophthalmic ultrasound involves placement of an ultrasound probe on the surface of the anesthetized eye to measure the axial length of the eye and precisely identify the size and type of abnormal tissue.
- Repeat imaging for the same condition, high tech or low tech, is not indicated unless previous imaging results are indeterminate or patients symptoms have changed for the same condition.
- Ophtho Optometry specialist is helpful in determining the appropriate imaging pathway.
 - Includes
- Opaque Ocular Media
 - Anterior segment
 - Corneal opacification
 - Hyphema or hypopyon
 - Meiosis
 - Cataract
 - Papillary or retrolenticular membrane
 - Posterior Segment
 - Vitreous hemorrhage or inflammation
- Clear Ocular Media
 - Anterior Segment
 - Tumors
 - Choroidal detachment; serous versus Hemorrhagic
 - Retinal detachment: rhegmatogenous versus exudative
 - Optic disc abnormalities
 - Unexplained retinitis and/or choroditis

- Intraocular Foreign Bodies (76529)
 - Detection
 - Localization
- Von Hippel Lindau Disease
 - For those at risk, abdominal screening by ultrasound should be done during the teenage years (76705 is a limited exam used once per patient exam) (see HD-24.12) (*Ultrasound of the Eye and Orbit second edition, pp13-14*)
- A-scan technology (CPT 76510, when quantitative A-scan is completed with the B-scan, or CPT 76511, A-scan only) is performed:
 - to measure tumor size
 - to differentiate both intraocular and orbital pathology.
- B-scan technology (CPT 76510, 76512, or 76513) is performed:
 - when clouding of the ocular tissues prevents proper visualization of the structure of the eye
 - to evaluate the retina
 - to evaluate intraocular tumors or other intraocular disorders
- A-mode and B-mode scans may be appropriately performed together to diagnose tumors of the eye, diseases of the orbit and/or intraocular disease.
 - If both B-mode (CPT 76510) and A-scan echography (CPT 76511) are completed simultaneously, do not report separately. Rather, it is appropriate to report CPT 76512 in this circumstance.*

**CPT Assistant, Oct 96:9*

• **US-2.3 Ophthalmic Biometry**

76516	Ophthalmic biometry by ultrasound echography, A-scan
76519	Ophthalmic biometry by ultrasound echography, A-scan; with lens power calculation

- A-scan technology (CPT 76516) is performed prior to cataract surgery to determine the axial length of the eye and to identify any abnormalities in globe length.
- If the strength of the intraocular lens (IOL), needed for cataract surgery, is calculated during the same session, report with CPT 76519.
- By CPT definition, any diagnostic ultrasound requires “permanently recorded images”.
 - The exceptions to this rule are those studies whose result is a biometric measurement. Such exceptions include:
 - CPT codes 76514, 76516, and 76519

• **US-2.4 Foreign Body Localization**

76529	Ophthalmic ultrasonic foreign body localization
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- CPT 76529 is performed to localize a foreign body in the eye and to guide its removal.

- **US-2.5 Head/Neck Soft Tissue Ultrasound**

76536	Ultrasound, soft tissues of head and neck (eg, thyroid, parathyroid, parotid), B-scan and/or real time with image documentation
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- This code may be used to report ultrasonic evaluation of the soft tissue of the head and neck (thyroid or parathyroid gland, salivary glands, lymph nodes) and soft tissue masses, such as cysts and/or lipomas.
- **Inflammatory cervical lymphadenopathy**
 - Ultrasound can be helpful in determining whether a distinct mass/abnormality is present.
- **Neck Masses**
 - Neck masses that are located on the anterior neck should have ultrasound performed as the initial imaging study.
 - For possible neck masses or fullness of the neck that is not well described on physical examination, ultrasound or ENT evaluation can be helpful in making decisions regarding the need for advanced imaging.
- **Supraclavicular Region**
 - A complete history and physical examination, including palpation of the supraclavicular region, should be performed initially in the evaluation of a suspected supraclavicular mass or abnormality.
 - The sensitivity of palpation, CT, and ultrasound for detecting supraclavicular metastases were 33%, 83%, and 100%, respectively.¹
 - In one study, lymph nodes had to have a diameter of 22.3 mm or greater to be palpated in 50% of cases.¹

¹ *Radiology* 2004;232:75-80
 - Given the high false positive and false negative results of palpation alone, ultrasound should be performed in order to confirm the presence of enlarged lymph nodes or other mass prior to considering advanced imaging.
 - Ultrasound has the added advantage of allowing ultrasound-guided fine needle aspiration (FNA) for histologic diagnosis of a suspicious lymph node or mass.*

**Radiology* 2004;232:75-80
- **Thyroid and Parathyroid**
 - Ultrasound and nuclear medicine scan are the preferred initial imaging studies for suspected thyroid masses. If ultrasound shows a dominant mass, fine needle aspiration (FNA) should be the next diagnostic study.
 - Patients with a suspected substernal goiter should have a neck ultrasound or radionuclide study first to confirm extension of the thyroid to the sternum.
 - Incidental thyroid nodules, found by US, CT, or MRI, can be followed by ultrasound. FNA is indicated if there is a concern for malignancy.
 - A thyroid study consists of imaging of the right lobe, left lobe, and isthmus in at least two projections.
 - A parathyroid study includes images from the carotid arteries to the midline bilaterally and extending from the hyoid bone superiorly to the thoracic inlet inferiorly.

- Endoscopic evaluation of esophagus lesion-transesophageal ultrasound evaluation (76975) of lesion detected on prior imaging or for the evaluation of dysphagia by GI during endoscopy and for surgery planning (see NECK-4)

US-3~CHEST and BREAST ULTRASOUND

• US-3.1 Chest Ultrasound

76604 | Ultrasound, chest, (includes mediastinum) real time with image documentation

- An ultrasound of the chest includes transverse, longitudinal, and oblique images of the chest wall with measurements of chest wall thickness.
- Chest ultrasound is performed primarily to evaluate for the presence of fluid within the pleural spaces. (*Diagnostic Ultrasound third edition, pp 603-623*)
- Repeat imaging for a condition, high tech or low tech, except for chest x-ray, is not indicated unless previous imaging results are indeterminate or patient's symptoms have changed for the condition.
- A chest x-ray should be performed prior to a chest ultrasound.
- A specialist evaluation is not required to determine the need for a chest ultrasound
- Other indications for chest ultrasound include:
 - To define mediastinal masses
 - Patients with a suspected substernal goiter should have a neck ultrasound (CPT 76536) or radionuclide study first to confirm extension of the thyroid to the sternum.
 - To measure the distance between the anterior surface to chest wall prior to radiation therapy (?Reference)
 - Ultrasonic evaluation of other masses suspected within the chest or chest wall (*Diagnostic Ultrasound third edition, pp 603-623*)
- Acute Respiratory Distress Syndrome (probably not an outpatient issue)
 - See Pediatric Chest
- Adult
 - Ultrasound can replace plain film, Chest CT for the evaluation of adult RDS (*Current Opinion in Critical Care. 14(1): 70-74, Feb. 2008*)

• US-3.2 Breast Ultrasound

76645 | Ultrasound breast(s) (unilateral or bilateral), real time with image documentation

- **Breast Abnormalities**
 - Mammography should be used to screen for breast cancer in the general population. It is inappropriate to use only breast ultrasound for cancer screening instead of mammogram (76645)
 - Breast ultrasound is typically performed to further evaluate abnormalities found on mammography.
 - Routine performance of breast ultrasound with diagnostic mammography is inappropriate.
 - Sagittal, transverse, and oblique images are generally obtained.
 - Ultrasound should be used to differentiate cysts from solid lesions.

- A solid lesion found on mammogram/ultrasound can be observed and followed with repeat mammogram/ultrasound in 6 months if the lesion is a low-risk, probably benign lesion (includes the following: <15 mm, three or fewer lobulations, more than 50% of the lesion margin appears well-circumscribed in any view).
 - Lesions not fitting all of the above criteria should be considered indeterminate and the patient should be referred for surgical evaluation for biopsy.*
 - *Institute for Clinical Systems Improvement (ICSI), *Diagnosis of Breast Disease* Nov 2005. <http://www.icsi.org>. Accessed October 13, 2008
- Bilateral total breast ultrasound (CPT 76645) and bilateral axillary ultrasound (CPT 76604) are recommended for patients who have BI-RADS 4 or 5 abnormalities. If additional suspicious breast lesions or more extensive malignant breast disease is detected by ultrasound, the extent of disease can be mapped with ultrasound-guided biopsies.*
 - **J Am Coll Surg* 2005 Oct;201(4):586-597
- If a probably benign lesion is clearly seen on mammogram and/or ultrasound, then repeat mammography and/or ultrasound should be performed at 6 months. Follow-up breast MRI is not indicated.*
 - *Institute for Clinical Systems Improvement (ICSI), *Diagnosis of Breast Disease*. Nov 2005 and *Genetic Screening for Breast Cancer*, <http://www.icsi.org>. Accessed October 13, 2008
- Appropriate for the evaluation of palpable lumps initially (without mammogram) in women < 30 yo (76645). (*ACR Appropriateness Criteria: Palpable Breast Masses, 2006*)
- **Breast Cancer (CH-25)**
 - Suspected: from suspicious mammogram
 - Restaging: even though there is early literature to suggest ultrasound could be used to follow the treatment of breast cancer its use is still experimental.
 - Surveillance: Mammogram and ultrasound appropriate for surveillance in women with history of breast cancer unless density or significant scarring from treatment would not allow adequate imaging then MRI would be appropriate.
- **Nipple Discharge/Galactorrhea**
 - Mammogram should be obtained. Ultrasound (CPT 76645) may be helpful to locate a duct papilloma, an intraductal nodule, or dilated duct.
 - The appearance of the fluid generally correlates with the etiology.
 - Yellow, brown, green, or gray fluid is associated with fibrocystic change in most patients.
 - Purulent discharge can result from duct ectasia or partial duct obstruction.
 - Pathologic discharges are usually bloody, blood-containing, or sometimes watery and usually are unilateral and involve a single duct.
 - ❖ Patients with bloody or unilateral discharge or palpable abnormality should have a mammogram, with or without an ultrasound (CPT 76445) and referral to a surgeon for open biopsy is recommended.*

*Institute for Clinical Systems Improvement (ICSI), *Diagnosis of Breast Disease*. Updated 2007. <http://www.icsi.org>. Accessed October 14, 2008

- **Breast Pain (Mastodynia)**
 - Three classifications:
 - Cyclic mastalgia: occurs in premenopausal women and is clearly related to the menstrual cycle.
 - Non-cyclic mastalgia: intermittent or continuous pain that is not related to the menstrual cycle. Usually occurs in older women.
 - Non-mammary pain: may present with the symptom of breast pain. History and physical exam should help differentiate breast pain from pain radiating from the chest wall or another site.
 - Evaluation of breast pain:
 - Careful history and physical examination
 - Pregnancy test is generally the only laboratory study needed
 - Mammogram or ultrasound (CPT 76445)
- **Coding Notes:**
 - Chest ultrasound (CPT 76604) should not be used to report ultrasonic guidance for thoracentesis.
 - The appropriate code for this procedure is ultrasonic guidance for needle placement (CPT 76942).
 - Breast ultrasound (CPT 76445) describes either a unilateral or bilateral study.
 - It is not appropriate to use modifier 50 (bilateral procedure) for a bilateral study or modifier 52 (reduced service) for a unilateral test.

US-4~ABDOMEN and PERITONEUM ULTRASOUND

• US-4.1 Abdominal Ultrasound Coding Guidance

76700	Ultrasound, abdominal, B-scan and/or real time with image documentation; complete
76705	;limited

- Detailed instructions have been included in CPT® clearly defining what elements must be performed and documented in order to report a complete abdominal ultrasound (CPT 76700):
 - Liver
 - Gallbladder
 - Common bile duct
 - Pancreas
 - Spleen
 - Kidneys
 - Upper abdominal aorta and inferior vena cava
- The reason for a non-visualized structure should be indicated on the final report. (i.e., surgically absent, etc.)
- Abdominal ultrasound studies, without all of the required elements, should be reported with the limited abdominal ultrasound code: CPT 76705.

- A limited abdomen ultrasound (CPT 76705) can refer to a specific study of a single organ, a limited area of the abdomen, or a follow-up study.
- CPT 76705 may be used to report ultrasonic evaluation of diaphragmatic motion.
- CPT 76705 should be reported only once per patient imaging session.
- CPT 76705 should not be reported with CPT 76700 for the same patient for the same imaging session.

• **US-4.2 Retroperitoneum Ultrasound Coding Guidance**

76770	Ultrasound, retroperitoneal (eg, renal, aorta, nodes), B-scan and/or real time with image documentation; complete
76775	Ultrasound, retroperitoneal (eg, renal, aorta, nodes), B-scan and/or real time with image documentation; limited

- Detailed instructions have been included in CPT® clearly defining what elements must be performed and documented in order to report a complete retroperitoneum ultrasound (CPT 76770):
 - Kidneys
 - Lymph nodes
 - Abdominal aorta
 - Common iliac artery origins
 - Inferior vena cava
 - For urinary tract indications, a complete study can consist of:
 - 1) kidneys and
 - 2) bladder
- The reason for a non-visualized structure should be indicated on the final report. (i.e., surgically absent, etc.)
- Retroperitoneum ultrasound studies, without all of the required elements, should be reported with the limited retroperitoneum ultrasound code: CPT 76775.
 - A limited retroperitoneum ultrasound (CPT 76775) can refer to a specific study of a single organ, a limited area, or a follow-up study.
 - CPT 76775 should be reported only once per patient imaging session.
 - CPT 76775 should not be reported with CPT 76770 for the same patient for the same imaging session.

• **US-4.3 Abdominal Pain, Nonspecific**

- Ultrasound (CPT 76700 or 76705) should be the initial imaging study in patients who present with right upper quadrant pain, left upper quadrant pain or epigastric pain, since ultrasound is useful in detecting gallbladder and other hepatobiliary pathology, renal lesions, ascites, splenic pathology, and sometimes adrenal lesions. If an ultrasound is nondiagnostic or an abnormality is found that warrants further imaging, the information provided by ultrasound can help determine the most appropriate advanced imaging modality (CT vs MRI vs MRCP, etc.).*

**ACR Practice Guidelines for the Performance of an
Ultrasound examination of the abdomen or retroperitoneum, revised 2007*
- Ultrasound (CPT 76700 and 76830, 76831, or 76856) should be the initial imaging study in women with ovaries or uterus intact who present with left lower

quadrant abdominal pain, in order to rule out gynecological pathology (ACR Appropriateness Criteria: Left Lower Quadrant Pain, 2008)

- **US-4.4 Abdominal Sepsis (Suspected Abdominal Abscess)**

- Ultrasound (CPT 76705) may be useful in follow-up of known fluid collections, especially with catheter drainage, provided the patient is stable or improving

- **US-4.5 Epigastric Pain**

- Ultrasound (CPT 76700 or 76705) should be the initial imaging study in patients who present with epigastric pain, since ultrasound is useful in detecting gallbladder and other hepatobiliary pathology, renal lesions, ascites, splenic pathology, and sometimes adrenal lesions. If an ultrasound is nondiagnostic or an abnormality is found that warrants further imaging, the information provided by ultrasound can help determine the most appropriate advanced imaging modality (CT vs MRI vs MRCP, etc.)*

**ACR Practice Guidelines for the Performance of an ultrasound examination of the abdomen or retroperitoneum, revised 2007*

- **US-4.6 Flank Pain, Rule Out Renal Stone**

- If renal stone is not at the top of the differential diagnosis, ultrasound (CPT 76770) should be performed as the initial imaging study.
- In pregnant patients and children, ultrasound (CPT 76770) or MR urography (MRI abdomen and pelvis, contrast as requested) is the best initial study to avoid radiation exposure.*

**ACR Appropriateness Criteria, Acute Onset Flank Pain, 2007*

- **US-4.7 Suspected ascites should be initially evaluated by ultrasound**

- Ultrasound (CPT 76700 or 76705) results can then determine the need for peritoneal fluid analysis or further imaging specific to the findings.*

➤ **Shah R and Fields JM. Ascites. eMedicine, updated February 21, 2007. <http://www.emedicine.com/med/topic173.htm>. Accessed November 11, 2008*

- **US-4.8 Left Lower Quadrant Pain, Rule Out Diverticulosis**

- Pelvic ultrasound (CPT 76830, 76831, or 76856) is the initial imaging study of choice for women of child bearing age (<45 years old) who still have ovaries or uterus intact, for detecting gynecologic abnormalities that may cause left lower quadrant pain.

- **ACR Appropriateness Criteria, Left Lower Quadrant Pain, 2008*

- **US-4.9 Left Upper Quadrant Pain**

- Ultrasound (CPT 76700 or 76705) should be the initial imaging study in patients who present with, left upper quadrant pain, since ultrasound is useful in detecting gallbladder and other hepatobiliary pathology, renal lesions, ascites, splenic pathology, and sometimes adrenal lesions. If an ultrasound is nondiagnostic or an abnormality is found that warrants further imaging, the information provided by ultrasound can help determine the most appropriate advanced imaging modality (CT vs MRI vs MRCP, etc.)*.

- *ACR Practice Guidelines for the Performance of an Ultrasound examination of the abdomen or retroperitoneum, revised 2007

- **US-4.10 Right Lower Quadrant Pain, Rule Out Appendicitis**

- Women of childbearing age and pregnant patients may be evaluated first with ultrasound (CPT 76830, 76831, or 76856) if local expertise exists. If positive, no further diagnostic imaging is necessary. If negative or equivocal, CT with contrast (CPT 74160 and 72193) or without contrast (CPT 74150 and 72192) can be performed.).
 - MRI without and with contrast (CPT 74183 and 72197) or without contrast (CPT 74181 and 72195) can be performed for pregnant patients if ultrasound is equivocal
 - **References:**
 - AJR 2004 Sept;183:671-675
 - Radiology 2006 Mar;238(3):891-899
- If appendicitis is strongly suspected, CT of the abdomen and pelvis either with contrast (CPT 74160 and 72193) or without contrast (CPT 74150 and 72192) should be performed in all patients except pregnant patients (see above)*
 - *ACR Appropriateness Criteria, Acute abdominal pain and fever or suspected abdominal abscess, 2006
- If appendicitis is not at the top of the differential diagnosis, then women less than 45 years old who have ovaries or uterus intact and present with right lower quadrant pain should have ultrasound of the pelvis (CPT 76830, 76831, or 76856) performed initially to rule out gynecological pathology. (? Reference)

- **US-4.11 Right Upper Quadrant Pain, Rule Out Cholecystitis**

- Right upper quadrant ultrasound (CPT 76705) is generally the imaging study of choice in the patient with acute right upper quadrant pain, with or without fever, if the gallbladder has not been removed)*
 - *ACR Appropriateness Criteria: Right Upper Quadrant Pain, 2007
 - *Barnes DS. Gallbladder and Biliary Tract Disease. The Cleveland Clinic Disease Management Project. July 9, 2002.
<http://www.clevelandclinicmeded.com/diseasemanagement>
 - Accessed November 20, 2006
- In patients who have had cholecystectomy, or in patients with normal ultrasound, CT of the abdomen with contrast (CPT 74160) can be performed

- **US-4.12 Blunt Abdominal Trauma**

- Significant trauma should be evaluated in the Emergency Department.
- Trauma with low probability of intra-abdominal injury should have ultrasound (CPT 76700 and/or CPT 76856) initially and any positive findings can be further evaluated with CT abdomen and/or pelvis without and with contrast (CPT 74170 and/or 72194).
- For more significant trauma or blunt renal trauma associated with hematuria,^{1,2} CT abdomen and pelvis without and with contrast (CPT 74170 and 72194) may be used initially to determine patients who need hospitalization for observation.³

¹ Geehan DM and Santucci RA. *Renal Trauma*. eMedicine, June 12, 2006. <http://www.emedicine.com>. Accessed September 11, 2007

² Smith J. *Kidney, Trauma*. eMedicine, Feb 21, 2007. <http://www.emedicine.com>. Accessed September 11, 2007

³ *ACR Appropriateness Criteria, Blunt Abdominal Trauma, 2005*

• **US-4.13 Hernias**

- Patients without prior inguinal hernia surgery who present with lower abdominal or groin pain and suspected inguinal hernia may benefit from evaluation by a surgeon. Imaging (ultrasound, CT, MRI) can be helpful when physical exam is inconclusive. Ultrasound has a very high sensitivity and specificity (88%-100%) for evaluating inguinal and femoral hernias.* Ultrasound(CPT 76856) identified the pathology in a groin (either hernia or lipoma) without a palpable bulge at an accuracy of 75%.*
 - **Ann R Coll Surg Eng 2003 May;85(3):174-177*
 - **Ann Ital Chir.2002 Jan-Feb;73(1):65-68*
 - **Surg Endosc 2002 Apr;16(4):659-662*
- Patients with known or suspected Spigelian hernia (anterior abdominal wall hernia through the semilunar line), ventral hernia, or incisional hernia can be evaluated by ultrasound (CPT 76856) initially, but CT of the abdomen (and pelvis if below the umbilicus) with contrast (CPT 74160 ± 72193) or without contrast (CPT 74150 ± CPT 72192) may be necessary for definitive evaluation.
- Patients with suspected recurrent inguinal hernia after inguinal hernia surgery can have CT of the pelvis with contrast (CPT 72193) or without contrast (CPT 72192) (whichever the physician prefers).
- **Sportsman's Hernia**
 - A controversial clinical entity thought to account for up to 5% of all groin injuries, especially among athletes involved in kicking sports.
 - Probably a chronic overuse injury involving posterior inguinal wall weakness, tearing of the transversus abdominis aponeurosis, and neuralgia.
 - Conservative management is performed initially. Some elite athletes require surgical intervention.
 - Ultrasound (CPT 76856) may show posterior inguinal wall bulging, but this is also seen in asymptomatic athletes.
 - Advanced imaging is not indicated.
 - The microtears described at surgery cannot be reliably diagnosed on imaging and therefore, **this condition remains a clinical diagnosis.**
 - **References:**
 - *Robinson P. Imaging of Athletic Pubalgia. Presented at: 33rd Annual Radiology Refresher Course of the International Skeletal Society, September 13-16, 2006; Vancouver, British Columbia, Canada.*
 - *Manthey D and Nicks BA. Hernias. eMedicine, January 3, 2007. <http://www.emedicine.com>. Accessed September 11, 2007*

- **US-4.14 Lipomas**

- **Subcutaneous lipoma** does not require imaging for diagnosis.
 - Evaluation by a dermatologist or surgeon is helpful in determining the need for advanced imaging.
 - If the clinical exam is equivocal, ultrasound should be performed initially.
 - Noncontrast MRI can be performed if surgery is planned.
- Lipomas in other locations (not subcutaneous) should be evaluated by ultrasound or CT without and with contrast.
 - Lesions with Hounsfield units less than -50 HU do not require additional imaging except for surgical planning.*
**Scott-Conner CEH and Radebold K. Lipomas. eMedicine, April 17, 2006, <http://www.emedicine.com>. Accessed September 11, 2007*
- Noncontrast MRI can be considered if ultrasound and/or CT are equivocal, or for preoperative planning.

- **US-4.15 Cirrhosis and Liver Screening for Hepatocellular Carcinoma (HCC)**

- Hepatitis B carriers with or without cirrhosis, non-hepatitis B patients with cirrhosis, and any patient with high risk for hepatocellular carcinoma (HCC) should undergo liver screening with ultrasound (CPT 76705) every 6 to 12 months.
 - Any liver lesion less than 1 cm should be followed with ultrasound every 3 to 6 months for 2 years and, if stable, ultrasound should be performed every 6 to 12 months. (*Bruix, J. AASLD Practice Guideline. Management of hepatocellular carcinoma. Hepatology 2005 Nov. 42(5): 1208-36*) (76705)
 - Lesions ≥ 1 cm with a negative biopsy can have repeat ultrasound (CPT 76705) or CT abdomen without and with contrast (CPT 74170) every 3 to 6 months until the lesion resolves, displays diagnostic characteristics of HCC, or repeat biopsy is positive.
- A liver lesion that is negative on biopsy should be followed with ultrasound (CPT 76705) or CT abdomen without and with contrast (CPT 74170) every 3 to 6 months until the lesion resolves, displays diagnostic characteristics of HCC, or repeat biopsy is positive for HCC.

- **US-4.16 Jaundice**

- Ultrasound is the preferred initial imaging study in my clinical scenarios for patients with obstructive jaundice (i.e. high direct or conjugated bilirubin level) to visualize the biliary ductal system, confirm its dilation and possibly demonstrate the level and cause of any obstruction. **ACR Appropriateness Criteria, Jaundice, 2008*
 - Normal Values:
 - Bilirubin (total) 0.2-1.0 mg/dl
 - Bilirubin (conjugated) 0-0.2 mg/dl

- **US-4.17 Liver Lesion Characterization**

- Suspected hepatomegaly should be evaluated by ultrasound (CPT 76705) initially.
- A suspected liver lesion should be evaluated by ultrasound (CPT 76705) initially.
- A liver lesion with typical ultrasound and/or contrast enhanced CT features of a simple cyst or hemangioma may be classified as benign and does not require follow-up imaging.*
 - *Radiology 2000 Jan;214(1):167-172
- A liver lesion with typical CT features of a malignant mass does not require additional imaging. Confirmation with biopsy under ultrasound guidance (CPT 76942) or CT guidance (CPT 77012) is indicated.
- **Nonalcoholic Fatty Liver Disease (NAFLD)**
 - Ultrasound is the preferred imaging study to evaluate for biliary disease or isolated liver lesion.
 - Distinguishing between fatty liver and steatohepatitis is made via biopsy rather than advanced imaging. Imaging (US, CT or MRI) is not useful to differentiate benign steatosis from steatohepatitis.*
 - *Gastroenterology 2002 Nov;123(5):1705-1725
 - *Internal Medicine Journal 2004;34:187-191
 - *CMAJ 2005 March;172(7):899-905
 - *Am Fam Physician 2006 June;73(11):1961-1968
- **Liver Lesion <1 cm**
 - Any Liver lesion less than 1 cm should be followed with ultrasound (CPT 76705) every 3 to 6 months for 2 years, if stable; ultrasound should be performed every 6 to 12 months.
- **Liver Lesion ≥1 cm**
 - Lesions ≥1cm with a negative biopsy can have repeat ultrasound or CT abdomen without and with contrast (CPT 74170) every 3 to 6 months until the lesion resolves, displays diagnostic characteristics of HCC, or repeat biopsy is positive.
 - **Reference:**
 - Hepatology 2005 Nov;42(5):1208-1236

- **US-4.18 Elevated Liver Function (LFT) Levels**

- The enzymes included in this category are AST, ALT, alkaline phosphatase, GGT, and bilirubin.
- Patients with elevation of AST and/or ALT less than two times normal should have repeat levels performed in three to four weeks prior to considering advanced imaging.
- Patients on lipid lowering medications (statins) or other medications known to cause elevated LFT's should have those medications stopped for at least 4 weeks and the LFT levels repeated prior to considering advanced imaging.
- Patients with persistently elevated LFT's or LFT's less than three times normal should have ultrasound (CPT 76705) as the initial imaging study.

- **US-4.19 Pancreatitis**

- **Suspected Pancreatitis**

- Symptoms of mild epigastric pain described as uncomfortable without guarding should be evaluated initially by ultrasound (CPT 76705) and serum lipase/amylase.
 - If amylase/lipase are elevated but are less than three times the upper limits of normal, and ultrasound does not demonstrate an abnormality to explain the signs and symptoms (e.g. gallstones, common duct stone, etc.), then CT abdomen with contrast (CPT 74160) can be performed.
 - If ultrasound suggests pancreatitis, then advanced imaging is not necessary.
 - **Reference:**
 - *Am J Gastroenterol* 2006;101:2379-2400

- **Chronic Pancreatitis Suspected**

- If chronic pancreatitis is **suspected** as evidenced by recurrent characteristic pancreatic pain, symptoms of maldigestion/malabsorption that improve with digestive enzymes, and/or abnormal laboratory studies suggesting pancreatic dysfunction, then plain abdominal x-ray (KUB) and ultrasound (CPT 76705) should be performed initially.
 - If x-ray and ultrasound are nondiagnostic for changes consistent with chronic pancreatitis, then CT abdomen without and with contrast (CPT 74170) or MRCP (CPT 74181) can be performed if findings will affect management decisions.
 - Diagnostic findings on ultrasound include pancreatic stones as evidenced by intra-pancreatic hyperreflective echoes with acoustic shadows

- Pancreatic pseudocyst (AB36)

- Endoscopic ultrasound may be helpful to better delineate pancreatic lesions

- **US-4.20 Spleen**

- **Splenomegaly** is usually the result of systemic disease, and diagnostic studies are directed toward identifying the causative disease.

- Complete blood count with differential, LFT's, and peripheral blood smear examination should be performed prior to considering advanced imaging.
 - Suspected splenomegaly should be evaluated by ultrasound initially.*

- * *ACR Practice Guidelines for the Performance of an Ultrasound examination of the abdomen or retroperitoneum, revised 2007*

- If an **incidental splenic lesion** is seen on a non-abdominal imaging study (e.g. chest CT, thoracic MRI, etc.), abdominal ultrasound (CPT 76705) should be performed if the lesion has cystic qualities.

- **US-4.21 Indeterminate Renal Lesion**

- **Newly discovered renal mass > 1cm (indeterminate by the initial test):**

- Ultrasound (CPT 76770) should be performed initially.
 - If the lesion is consistent with a simple cyst on ultrasound (spherical or ovoid shape, absence of internal echoes, presence of a thin smooth

wall, enhancement of the posterior wall) or meet the CT criteria for a Bosniak class I cyst (uniform density or no greater than 20 Hounsfield units, no enhancement of the mass after the administration of contrast medium and round or oval shape with no perceptible wall), no further imaging is indicated.*

**Am Fam Physician 2001;63:288-294 and 299*

- Lesions > 1cm that are not characterized as a simple cyst by ultrasound can be evaluated by CT of the abdomen without and with contrast (CPT 74170). (? Reference)
 - If the patient cannot tolerate IV contrast, then MRI of the abdomen without and with contrast (CPT 74183) is appropriate.

• **US-4.22 Renal Failure**

- Ultrasound is the preferred initial imaging study for patients with acute or chronic renal failure.
 - Patients with evidence of primary generalized renal disease (elevated creatinine or urinalysis showing red cell casts, greater than 2+protein on dipstick, dysmorphic red blood cells, or 24 hour urine protein >500 mg per 24 hrs) should have renal ultrasound (CPT 76770 or 76775) in order to determine renal volume and morphology prior to considering advanced imaging.
- Nephrology or Urology evaluation is helpful in evaluating patients with GFR <30 ml/min/1.73m² to determine the need for advanced imaging.*
 - *ACR Appropriateness Criteria, Renal Failure, 2008*
 - *Am J Kidney Dis 2002;39(2 Suppl 1):S46-S75*

• **US-4.23 Hematuria**

- Ultrasound should be the initial evaluation in both children and pregnant women
- Not appropriate if signs and symptoms are consistent with hemorrhagic cystitis in a young women particularly prior to conservative treatment which may result in complete resolutions. **(ACR Appropriateness Criteria, Hematuria, 2005)*
- The distinction between microhematuria and gross hematuria is no longer used as a criterion for guidelines to determine which patients need imaging evaluation.
- If a dipstick test is positive for blood, a blood creatinine level and complete urinalysis with microscopic exam should be performed prior to imaging studies.
 - The American Urological Association defines microscopic hematuria as 3 or more RBC's per high power field from 2 of 3 urinalysis specimens).

• **US-4.24 Urinary Tract Infection (UTI)**

- Pregnant women should be evaluated initially by ultrasound and if further imaging is necessary, MRI abdomen and pelvis (contrast as requested).
- **Upper Urinary Tract**
 - Uncomplicated acute pyelonephritis does not require imaging prior to antibiotic treatment unless the patient has a history of kidney stones, prior renal surgery, or repeated pyelonephritis.

- No advanced imaging is indicated in patients with uncomplicated pyelonephritis.
- If there is no response to medication after 72 hours, ultrasound (CPT 76770 or 76775) should be performed initially. CT without and with contrast (CPT 74170 and 72194) may be indicated.
- **Lower Urinary Tract**
 - Complicated recurrent UTI can be evaluated with CT abdomen and pelvis without and with contrast (CPT 74170 and 72194). The combination of ultrasound (CPT 76770 or 76775) and plain x-rays can be as accurate as CT, but ultrasound quality is not as consistent and is operator dependent.
 - Suspected **urethral diverticulum** should be evaluated by voiding cystourethrography, retrograde urethrography, or ultrasound (CPT 76770).
- **US-4.25 Patent Urachus**
 - **Patent urachus** which is suspected due to umbilical discharge should initially be evaluated by ultrasound (CPT 76700 or 76705).
 - The urachus is a “tube” connecting the fetal bladder to the umbilical cord. It is usually obliterated during fetal growth, but if it remains patent, there can be a connection between the bladder and the umbilicus.

- **US-4.26 Transplanted Kidney**

76776	Ultrasound, transplanted kidney, real time and duplex Doppler with image documentation
	<ul style="list-style-type: none"> ○ Current ultrasound imaging protocols of the transplanted kidney commonly include a Doppler study. ○ Approve study as requested ○ Coding Notes: <ul style="list-style-type: none"> ➤ Ultrasound of the transplanted kidney performed without duplex Doppler, should be reported as a limited retroperitoneal ultrasound (CPT 76775). ➤ Do not report non-invasive vascular codes 93975 and 93976 in conjunction with CPT 76776.

- **US-4.27 Renal Stone/Renal Colic**

76770	Ultrasound, retroperitoneal (eg, renal, aorta, nodes), B-scan and/or real time with image documentation; complete
76775	Ultrasound, retroperitoneal (eg, renal, aorta, nodes), B-scan and/or real time with image documentation; limited
	<ul style="list-style-type: none"> ○ Can be the initial study and particularly in pregnant women and children. ○ Flank pain or renal colic for the evaluation of the kidney and to rule out hydronephrosis (<i>Ultrasonography, Abdominal, Valley, V. emdicine update Nov. 12, 2007</i>)

- **US-4.28 Hydronephrosis/Hydroureter**

76770	Ultrasound, retroperitoneal (eg, renal, aorta, nodes), B-scan and/or real time with image documentation; complete
76775	Ultrasound, retroperitoneal (eg, renal, aorta, nodes), B-scan and/or real time with image documentation; limited

- Ultrasound is appropriate if suspected
- Ultrasound is appropriate for post obstructive procedure follow up

- **US-4.29 Screening for Polycystic Kidney Disease**

- Individual at risk for autosomal dominant polycystic disease (ADPKD) should be screened by ultrasound (CPT 76775)
 - *Unified Ultrasonographic Diagnostic Criteria for Autosomal Dominant Polycystic Kidney Disease (ADPKD), JASN, January 2009*

- **US-4.30 Inflammatory Bowel Disease/Crohn's Disease/Colitis (see AB-28)**

- The bowel wall can be evaluated with transabdominal, transperineal and rectal endoscopic ultrasound for the evaluation of pathology and may be considered for the initial modality especially in children (CPT 76700 or 76705)
 - **(Diagnostic Ultrasound third edition, pp280-291 and 311-317)*
 - **(ACR Appropriateness Criteria, Crohn's Disease, 2005)*
- Evaluation, diagnosis, and accessing the extent of complications of the bowel wall using an ultrasound color Doppler flow.
 - Endoscopic transrectal or (in women) transvaginal ultrasound can be used to evaluate for peri-rectal involvement.
 - **(Diagnostic Ultrasound third edition, pp280-291 and 311-317)*
- If pseudomembranous colitis is expected, ultrasound is not considered useful to make the diagnosis which is usually accomplished by endoscopy or stool analysis.
 - *(Diagnosis and treatment of Clostridium difficile colitis, JAMA, 0098-7484, 1993)*
- **Ischemic colitis (see AB-9) (CPT code 76705)**
 - Ultrasound is not usually the initial imaging study. Sonographic features have been poorly described.
 - **(Diagnostic Ultrasound third edition, p308)*
 - GI evaluation is helpful
 - Although computed tomography may have suggestive findings, colonoscopy is the procedure of choice for diagnosis.
 - **(Ischemic Colitis: A Clinical Review Evaluation, Southern Medical Journal: February 2005- Volume 98-Issue 2-pp 217-222)*

- **US-4.31 Hyperemesis**

76705	Ultrasound, abdominal, B-scan and/or real time with image documentation; limited
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- Ultrasonography has largely replaced the radiographic upper G.I. series for evaluation of infants with projectile non bilious vomiting suspicious for hypertrophic pyloric stenosis.*
- Ultrasound is also helpful in follow up of pylorospasm and minimal muscular thickening to assure resolution after conservative medical treatment*
 - *(*Diagnostic Ultrasound third edition, pp. 1942-1947*)

US-5~SPINAL CANAL ULTRASOUND

76800	Ultrasound, spinal canal and contents
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- Certain payers consider ultrasound of the spinal canal investigational, and their coverage policies will take precedence over MedSolutions' guidelines. Prior authorization does not guarantee payment of the study.
- Spinal canal ultrasound (CPT 76800) describes the ultrasonic evaluation of the spinal cord (canal and contents).
- The performance of this study is generally limited to infants and young children because of the bone mass surrounding the spinal cord.
- Indications include:
 - lack of complete ossification of the vertebral bodies
 - tethered cord
- Adults who are status post laminectomy may also be evaluated by this procedure.
- **Coding Notes:**
 - CPT 76800 describes evaluation of the entire spine and should not be reported multiple times for imaging of different areas of the spinal canal.
 - Do not use CPT 76800 for intraoperative spinal canal ultrasound. CPT 76998, intraoperative ultrasonic guidance, is the appropriate code in this circumstance.

- **US-5.1 Neonatal Spine**

- Best if patient is <1 year old. However, the persisting acoustic window in children with posterior spinal defects of spinal dysraphism enables ultrasound to be performed at any age
 - Evaluation of suspected occult and non-occult dysraphism commonly seen as sinus tract or dimple of the sacral skin area
 - (*Dick, EA, et al, Ultrasound of the spinal cord in children: its role. Eur Radiol. 2003 Mar, 13(3): 552-62*)
 - Evaluating for spinal cord tumors and vascular malformations and cases of birth-related trauma
 - (*Dick, et al*)

- Non operative spine for back pain
- Asymptomatic patient with normal ultrasound finding require no additional imaging-ultrasound or MRI
- Congenital anomalies for children >2 yo is considered investigational

- **US-5.2 Adult Spine**

- Ultrasound is considered investigational for the following:
 - Facet inflammation, nerve root inflammation, disc herniation and soft-tissue conditions surrounding the adult spine
 - (ACR, American Chiropractic College of Radiology and AIUM)
- Paraspinal ultrasonography is neither accurate nor reproducible in evaluating patients with cervical and lumbar back pain
 - (J Ultrasound Med 1998 Feb; 17(2): 117-22.)
- Currently, no published peer reviewed literature supports the use of diagnostic ultrasound in the evaluation of patients with back pain or radicular symptoms. The procedure cannot be recommended for use in the clinical evaluation of such patients.
 - (Neurology 1998; 51:343-344) This statement was reaffirmed in December 2006

US-6~NON OBSTETRICAL FEMALE PELVIS ULTRASOUND
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76830	Ultrasound, transvaginal
76831	Saline infusion sonohysterography (SIS), including color flow Doppler, when performed
76856	Ultrasound, pelvic (nonobstetric), B-scan and/or real time with image documentation, complete
76857	Ultrasound, pelvic (nonobstetric), B-scan and/or real time with image documentation, limited or follow-up

- Prior to considering advanced imaging of the pelvis (CT, MRI), patients should undergo a recent detailed history, careful gynecological and/or urological exam (including appropriate laboratory studies such as blood count, tumor markers, and gonadotropins if indicated), and the use of non advanced imaging modalities such as plain x-ray and transvaginal ultrasound (CPT 76830).
 - Pelvic ultrasound (CPT 76856 or 76857) and Transvaginal (TV) ultrasound (CPT 76830) are optimal studies to evaluate pelvic pathology
 - Transabdominal ultrasound alone may be satisfactory substitute in pediatric patients or certain non-sexually active adults.
- A sonohysterography (76831) used to evaluate endometrial polyps and fibroids.
 - No specialist evaluation is required for determining the clinical pathway
- If a prior study (MRI, sonohysterography, pelvic ultrasound) has been completed for a condition, a follow-up study for the same condition is not indicated unless there has been a change in the patient's condition or if previous imaging results showed an indeterminate finding.

- **US-6.1 Abnormal Uterine Bleeding**

- Initial evaluation includes pelvic ultrasound (CPT 76856 or 76857), transvaginal ultrasound (CPT 76830), saline infusion sonography (CPT 76831), hysteroscopy and possible biopsy.
 - Premenopausal women should be treated conservatively with hormone therapy. If there is failure to respond to this treatment, evaluation by biopsy and/or hysteroscopy is indicated.
 - Postmenopausal women should be evaluated by biopsy and/or hysteroscopy.
- MRI pelvis without contrast (CPT 72195) is indicated only if pelvic ultrasound (CPT 76856 or 76857) and transvaginal ultrasound (CPT 76830) are unable to differentiate a submucous myoma from a polyp and the MRI results will affect surgical planning as stated by the surgeon.
 - **References:**
 - *Obstet Gynecol* 2003;102:659-662
 - *Management of Abnormal Uterine Bleeding. Slide presentation modified from: APGO Educational Series on Women's Health Issues*

- **US-6.2 Amenorrhea**

- Initial imaging should be by pelvic ultrasound (CPT 76856 or 76857), transvaginal (TV) ultrasound (CPT 76830), hysterosalpingogram and/or hysteroscopy to look for genital and urinary tract abnormalities.
- Suspicion of a hormonally active adrenal tumor should be evaluated using AB-21.2 Adrenal Endocrine Tumors in the Abdomen guidelines.
- Pelvic imaging (CT pelvis with contrast [CPT 72193]) for androgen secreting ovarian tumors may be necessary if needed to plan surgery.
- Amenorrhea with intact uterus and history of normal puberty should be evaluated with pelvic ultrasound (CPT 76856 or 76857), TV ultrasound (CPT 76830) and endocrine work-up.
 - If pregnancy test is negative, then TSH, LH, FSH, and prolactin levels should be measured.
 - If prolactin is elevated refer to HD-28.1 Pituitary Microadenomas in the Head guidelines.
 - If FSH is lower than reference range, MRI brain without and with contrast (CPT 70553) can be performed.
 - If TSH, LH, prolactin, and FSH are within reference range, then a complete hormone evaluation should be performed (e.g. androgen hormones, etc.)
 - If ultrasound identifies the following entities then advanced imaging is not indicated unless requested for surgical planning by the operating surgeon:
 - Asherman's Syndrome (intrauterine scarring and adhesions)
 - ❖ Diagnosis is made using transvaginal ultrasound with/without saline infusion, hysterosalpingography and/or hysteroscopy.
 - Polycystic Ovarian Syndrome (PCO)
 - Androgen secreting ovarian tumor
 - Androgen secreting adrenal tumor
- **Amenorrhea with genital tract abnormalities:**

- Suspected genital and urinary tract abnormalities should be evaluated initially with ultrasound of the abdomen (CPT 76700 or 76705) and pelvis (CPT 76856 or 76857). TV ultrasound (CPT 76830) may also be helpful.
- Patients with absent uterus or foreshortened vagina should have karyotype evaluation.
- Advanced imaging (CT or MRI) is not generally indicated
- **Amenorrhea with delayed puberty:**
 - Initial evaluation includes measurement of thyroid function tests, bone age, LH, FSH and prolactin.
 - If LH and **FSH are low or within the reference range and bone age is normal**, then MRI brain without and with contrast (CPT 70553) can be performed.
 - If prolactin levels are elevated, then MRI brain without and with contrast with attention to the pituitary (CPT 70553) can be performed.
 - Advanced imaging of the abdomen/pelvis (CT or MRI) is not indicated.
- **Reference:**
 - [Bielak KM and Harris GS. Amenorrhea. eMedicine, March 12, 2008.](http://www.emedicine.com/ped/TOPICT2779.HTM)
<http://www.emedicine.com/ped/TOPICT2779.HTM>. Accessed November 14, 2008

- **US- 6.3 Adenomyosis**

- Adenomyosis is a histologic diagnosis and imaging has limitations.
- Adenomyosis is suspected by history and physical examination.
- If hormonal therapy is going to be tried first, then MRI is not indicated in patients with suspected adenomyosis.
- Pelvic ultrasound (CPT 76856 or 76857) and Transvaginal (TV) ultrasound (CPT 76830) are the primary screening modalities for imaging the female pelvis.
 - Pelvic ultrasound (CPT 76856 or 76857) and Transvaginal ultrasonography (along with color Doppler ultrasound) are the diagnostic procedures of choice for the initial evaluation of suspected adenomyosis and is useful to evaluate other potential etiologies of the patient's symptoms.
 - If ultrasound is inconclusive or there has been a failure of several months of hormone suppression and a more definitive diagnosis is necessary for surgical planning only MRI of pelvis without contrast (CPT 72195) can be performed

- **US- 6.4 Suspected Adnexal Mass**

- The adnexa include the ovaries, Fallopian tubes, and ligaments that hold the uterus in place.
- Management of adnexal masses involves either observation or surgical intervention.
- Adnexal masses have a long list of diagnostic possibilities and ultrasound results must be correlated with history, physical exam, and laboratory testing.
 - Tumor markers useful for adnexal mass evaluation include:
 - CA-125 (epithelial cancer, leiomyoma, endometriosis, PID, inflammatory disease such as lupus, and inflammatory bowel disease)

- ❖ Although CA-125 can be elevated with benign entities such as endometriosis, the elevated CA-125 titers generally do not increase over time in these patients.
 - Beta hCG, LDH, and AFP (germ cell tumors)
 - Inhibin A and B (granulosa cell tumor)
 - Transvaginal (TV) ultrasound (CPT 76830) imaging is the initial study of choice. Pelvic ultrasound (CPT 76856 or 76857) may also be done, but does not substitute for TV ultrasound, except as noted above.
 - Color Doppler ultrasound may be helpful in selected situations.
 - MRI of the pelvis (CPT 72197 or 72195 if pregnant) for the evaluation of a pelvic mass is less sensitive and only slightly more specific than transvaginal ultrasound and usually adds little to the plan of care.
 - MRI may be useful in classifying malignant masses if requested by the operating surgeon.
 - **Reference:**
 - ❖ ACOG Practice Bulletin No. 83: Management of adnexal masses. July 2007
 - CT of the pelvis without and with contrast (CPT 72194) is helpful as a preoperative study to evaluate for metastatic disease when cancer is known or suspected.

- **US-6.5 Simple adnexal cysts**

- If TV ultrasound classifies an adnexal mass as a simple or thin walled cystic mass or follicular cyst (ovarian) or tubular cystic mass (fallopian tube):
 - Repeat imaging is recommended whenever there is uncertainty of a diagnosis and when cancer or a benign neoplasm is in the differential diagnosis. Simple cysts up to 10 cm in diameter as measured by ultrasonography are almost universally benign and may safely be followed without intervention, even in postmenopausal patients.
 - Follow up should be with pelvic (CPT 76856 or 76857) and TV ultrasound (CPT 76830) every 6 months for lesions ≤ 10 cm in both premenopausal and postmenopausal women.
 - If elevated tumor markers are present, surgical intervention should be considered.
 - Advanced imaging may be appropriate for preoperative planning if requested by the operating surgeon.
 - Cysts >10 cm with normal tumor markers have not been studied and the current recommendation is to consider surgical intervention.
 - Advanced imaging may be appropriate for preoperative planning if requested by the operating surgeon.
 - ❖ **Reference:**
 - ACOG Practice Bulletin No. 83: Management of adnexal masses. July 2007

- **US- 6.6 Complex adnexal masses**

- Complex adnexal masses are usually ovarian in origin, and in premenopausal women, most commonly represent hemorrhagic cysts or endometriomas.
 - The initial evaluation in this age group is influenced by the presence or absence of abdominal or pelvic symptoms. Symptomatic patients may have conditions that require immediate interventions, such as antibiotics and possibly surgery for tuboovarian abscesses, medical treatment or surgery for ectopic pregnancies, surgery for ovarian torsion, and expectant management for most ruptured ovarian cysts. Appropriate evaluation includes a medical history and physical examination, quantitative b-hCG level, CBC, and transvaginal ultrasonography. Additional studies may be indicated, such as serial hematocrit measurements and appropriate cultures.
- Ultrasound characteristics usually suggest the diagnosis, and in **premenopausal women**, a follow up ultrasound can be done in six weeks or following a menstrual cycle to evaluate for resolution.
 - A pregnancy test is important to narrow the differential diagnosis.
 - Rarely, young women with acute symptoms may have a malignancy. These are often germ cell tumors. Tumor markers specific for many such germ cell tumors, including b-hCG, AFP, and LDH may be helpful. If tumor markers are elevated or the mass is suspicious for primary ovarian cancer by pelvic and TV ultrasound (ultrasound shows solid areas or excrescences and/or free abdominal/pelvic fluid), evaluation for surgical intervention should be considered.
 - Advanced imaging may be appropriate for preoperative planning if requested by the operating surgeon.
 - An ovarian mass suspicious for metastatic disease (e.g. from breast, uterine, colorectal, or gastric cancer) should be evaluated based on the appropriate Oncology Imaging guideline.
 - Advanced imaging such as MRI of the pelvis (CPT 72197 or 72195 if pregnant) should be considered only if classification of the ovarian mass will affect patient management decisions.
 - ❖ **Reference:**
 - ACOG Practice Bulletin No. 83: Management of adnexal masses, July 2007
 - Diagnostic Ultrasound third edition, pp 553-559
 - **Postmenopausal women** (≥ age 47) with a complex adnexal mass by TV (ultrasound shows solid areas or excrescences and/or free abdominal/pelvic fluid) should be evaluated for surgical intervention and have tumor markers measured. Any elevation of CA 125 levels is highly suspicious for malignancy in these women. Most pelvic complex cysts or solid masses in postmenopausal women will require surgical intervention.
 - Advanced imaging may be appropriate for preoperative planning if requested by the operating surgeon, although CT abdomen and

pelvis without and with contrast (CPT 74170 and 72194) should be considered only if abdominal metastatic disease is suspected.

- The ovary is a relatively common site for metastases from some primary malignancies. An ovarian mass suspicious for metastatic disease (e.g. from breast, uterine, colorectal or gastric cancer) should be evaluated based on the appropriate Oncology Imaging guideline.
- ❖ Advanced imaging such as MRI of the pelvis (CPT 72197 or 72195 if pregnant) should be considered only if classification of the ovarian mass will affect patient management decisions.
- ❖ Some women for whom the usual management of a pelvic mass would include surgery are at increased risk for perioperative morbidity and mortality. In such cases, repeat imaging often is safer than immediate surgery, although the frequency of follow-up imaging has not been determined.
 - **Reference:**
 - ACOG Practice Bulletin No. 83: *Management of adnexal masses*, July 2007

- **US- 6.7 Screen for Ovarian Cancer**

- See ONC-20 Ovarian Cancer in the Oncology guidelines
- **Genetic Mutations**
 - Those with BRAC 1 or 2 or family history of the mutation have a higher risk for ovarian, breast, peritoneal and fallopian cancer. They should be screened with pelvic and transvaginal ultrasound with or without Doppler beginning between ages of 30 and 35 or 5-10 years earlier than the earliest age of first diagnosis of ovarian cancer in family. Follow up every 12 months with no mass on exam. CA 125 is less helpful.
- Additional risks that would support screening
 - Women with a personal or multiple family members' history of ovarian, breast cancer, endometrial cancer or Lynch Syndrome mutation (hereditary non polyposis colorectal cancer (HNPCC)).
 - Women with ovarian cancer and a close relative defined as mother, sister, daughter, half sibling, grandmother, granddaughter, aunt with breast cancer, premenopausal breast cancer or both
 - Women of Ashkenazi Jewish descent with breast cancer diagnosed before age 40 or ovarian cancer
 - Women diagnosed with breast cancer at 50 or younger and who have a close relative with ovarian cancer or male breast cancer at any age
- Follow up is every 12 months unless the pelvic exam is suggestive of a mass. Screening is done by Pelvic ultrasound (CPT 76856 or 76857) and TV ultrasound (CPT 76380)
- CA 125 yearly, particularly in post menopausal women. It is less effective for premenopausal women since it fluctuates during the menstrual cycle. In premenopausal women, more than 90% of CA 125 elevations are falsely positive for ovarian cancer.

➤ **Reference**

- *Routine Screening for Hereditary breast and Ovarian Cancer Recommended, ACOG News Release (ACOG Practice Bulletin), March 20, 2009.*
- *ACR Appropriateness Criteria: Ovarian Cancer Screening, 2005*

• **US- 6.8 Endometriosis**

- Endometriosis is a surgical diagnosis and imaging is of little value unless the pelvic clinical exam is abnormal.
- Pelvic ultrasound (CPT 76856 or 76857) and Transvaginal (TV) ultrasound (CPT 76830) are the first line diagnostic exams for suspected endometriosis.*
**Hum Reprod 2007;22(12):3092-3097.*
- In most patients, Pelvic and TV ultrasound followed by medical treatment or laparoscopy should be considered prior to advanced imaging.
 - Laparoscopy remains the definitive test for diagnosis and evaluation of endometriosis in most patients.*
**Eur Radiol 2006 Feb; 16(2): 285-298*
**ACOG Committee Opinion, Number 310, April 2005*
- MRI has shown high accuracy for both anterior and posterior endometriosis and can enable complete lesion mapping prior to surgical excision of known endometriosis that was diagnosed during a previous surgery.*
**Eur Radiol 2006 Feb; 16(2): 285-298*
**Aeby TC, Hiraoka MKY. Endometriosis Updated May 15 2006*
<http://www.emedicine.com>:Accessed November 20, 2006

• **US- 6.9 Pelvic Pain/Dysparunia, Female**

- Complete clinical pelvic examination, Pelvic ultrasound (CPT 76856 or 76857) and Transvaginal (TV) ultrasound (CPT 76830) are indicated for the initial evaluation of pelvic pain.
- Pelvic pain accompanied by fever, elevated WBC, failure of conservative treatment (including the use of hormones or antibiotics when appropriate), or palpable mass should be initially evaluated by Pelvic ultrasound (CPT 76856 or 76857) and TV ultrasound (CPT 76830).
 - If the ultrasound is normal, other causes should be considered such as chronic cystitis or bowel disease. Urological work-up, gastroenterology work-up, and laparoscopy should be performed prior considering advanced imaging.
 - CT pelvis with contrast (CPT 72193) is only appropriate if the ultrasound has equivocal findings.*
 - Pelvic ultrasound (CPT 76856 or 76857) and TV ultrasound (CPT 76830) with color Doppler should be performed if ovarian torsion is a consideration.
**ACOG Practice Bulletin No. 51: Chronic pelvic pain; March 2004 Reaffirmed (2008)*

- **Suprapubic pain:** If pain is recurrent or chronic and is associated with bladder urgency and pressure with negative urine cultures, failure of antibiotic treatment, and normal ultrasound and laboratory studies, then cystoscopy is indicated.
 - Imaging is not indicated in the evaluation of chronic suprapubic pain or chronic cystitis.
- **Pelvic pain/Hip pain- rule out Piriformis Syndrome**
 - See PN-2.4 Sciatic Neuropathy in the Peripheral Nerve Disorders guidelines and MS-24.8 Piriformis Syndrome in the Musculoskeletal guidelines.
- **US- 6.10 Leiomyomata**
 - Transabdominal and transvaginal ultrasound are the preferred screening procedures for leiomyomata.
 - Abnormal uterine bleeding from suspected submucous leiomyoma should be evaluated by saline sonohysterography or panoramic hysteroscopy* initially.
 - If these studies are equivocal, and if imaging for surgical planning is needed, MRI pelvis without contrast (CPT 72195) can be performed.
 - *J Postgrad Med 1992: 38-62
 - Preoperative transabdominal and transvaginal ultrasound should be performed prior to myomectomy.
 - If ultrasound is indeterminate, MRI pelvis without contrast (72195) may be considered if requested by the operating surgeon for surgical planning.
 - MRI pelvis without and with contrast (72197) can be performed if leiomyoma necrosis is suspected.
 - MRI pelvis without and with contrast (CPT 72197) can be performed in those cases in which arterial embolization is being considered. MRI accurately assesses the number, location, and size of leiomyomata for pretreatment planning and post treatment response*
 - *AJR 2003; 181: 851-856
 - For uterine artery embolization, size of the dominant fibroid must be considered. Some studies have reported treatment failure to be more likely with fibroids >8 cm.*
 - *Obstet Gynecol Surv 2002; 57:810-815
 - There is no literature support for the addition of MRA pelvis (CPT 72198) to the preoperative evaluation.
 - There are currently no published guidelines regarding follow up MRI in patients who have undergone uterine artery embolization.
 - Although there are no compelling data to support the need for follow MRI in asymptomatic patients who are status post uterine artery embolization, consensus opinion suggests that one follow up pelvic MRI (CPT 72197) post embolization will be allowed 3 to 6 months after the procedure.
 - MRI results are used for prediction, and for some practitioners, any gadolinium accumulation is followed by another embolization.
 - In patients with persistent or recurrent symptoms, pelvic MRI without and with contrast (CPT 72197) should be performed.

- In patients with fever, pain, or other acute symptoms status post embolization, pelvic MRI without and with (CPT 72197) should be performed.

**JVasc Interv Radiol 2004; 15:115-120*

- **US- 6.11 Periurethral Cysts and Urethral Diverticula**

- Also see AB-43 Urinary Tract Infection
- The etiology of suburethral diverticula is uncertain. The favored theory for the urethral diverticula development is the rupture of an obstructed infected periurethral gland back into the urethra or derivation from a dilated periurethral duct. Symptoms include pain, urinary urgency, frequency of urination, recurrent urinary tract infection, dribbling after urination, or incontinence.
 - MRI pelvis without and with contrast (CPT 72197) is superior to transvaginal ultrasound (CPT 76830) for evaluating these entities but should be reserved for patients in whom ultrasound (CPT 76830 or 76856), voiding cystourethrography, or retrograde urethrography are equivocal.*

**ACR Appropriateness Criteria, Recurrent Lower Urinary Tract Infections in Women, 2008*

- **US-6.12 Cervicitis**

- Is a clinical diagnosis and imaging is not necessary

- **US-6.13 Bladder Dysfunction**

- Before imaging documentation of careful urological exam, urinalysis, failure of conservative treatment, results of urodynamic studies and/or the results of cystoscopy
 - Urology consult would be helpful
 - Ultrasound is not considered a screening tool for bladder dysfunction, preceding a thorough urological evaluation as per above.
- Ultrasound may be used to detect and measure residual urine

US-7~ MALE GENITALIA ULTRASOUND

76870	Ultrasound, scrotum and contents
76872	Ultrasound, transrectal

- **US- 7.1 Penis- Soft Tissue Mass**

- Soft-tissue lesions of the penis should be evaluated initially by high resolution ultrasound with color Doppler.
- If ultrasound is equivocal (not clearly benign, simple cyst or Peyronie's disease) or if primary penile cancer is suspected, MRI of the pelvis without and with contrast (CPT 72197) can be performed.

- **References:**
 - *RadioGraphics* 2001;21:S283-S298
 - *RadioGraphics* 2005;25:1629-1638
 - *Clinical Radiology* 2003;58(7):514-523
- **US- 7.2 Prostatitis/Pudendal Neuralgia/Chronic Pelvic Pain**
 - Suspected prostatitis should be evaluated by physical exam, urinalysis, and digital rectal exam with evaluation of prostate secretions. Initial treatment is 2 to 4 weeks of antibiotics.
 - Failure to improve with initial treatment should be evaluated with transrectal ultrasound (CPT 76872).
 - CT pelvis with contrast (CPT 72193) may be used to differentiate between abscess and tumor if ultrasound is equivocal.*
*Hedayati T and Kwon DS. *Prostatitis*. eMedicine, updated November 5, 2007, <http://www.emedicine.com/emerg/topic488.htm>. Accessed November 13, 2008
 - Chronic prostatitis is a clinical diagnosis and advanced imaging is not indicated.
 - Physical examination, including digital rectal examination, should be performed.
 - Treatment is a 4 week trial of antibiotics
 - Failure to improve should be evaluated by transrectal ultrasound.
 - ❖ CT pelvis with contrast (CPT 72193) may be used to differentiate between abscess and tumor if ultrasound is equivocal.*
*Hedayati T and Kwon DS. *Prostatitis*. eMedicine, updated November 5, 2007, <http://www.emedicine.com/emerg/topic488.htm>. Accessed November 13, 2008
 - Urology consultation is helpful in patients with Pudendal Neuralgia/ Chronic Pelvic Pain, including patients with chronic prostatitis who have failed antibiotics and have a negative ultrasound.
 - Confirmatory tests include Pudendal Nerve Terminal Motor Latency Test and Quantitative Sensory Threshold Test.
 - MRI of the lumbar spine without contrast (CPT 72148) and/or sacral plexus MRI without contrast (CPT 72195) may be requested but are rarely abnormal. *
*Antolak SJ, Jr. *Male Pelvic Pain*. International Pelvic Pain Society, Atlanta, GA, October 2005

US-8~EXTREMITY ULTRASOUND

76880	Ultrasound, extremity, non-vascular, real time with image documentation
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- **US-8.1 Ganglion Cysts**
 - Ganglions are small sacs (cysts) filled with clear, jellylike fluid.
 - A ganglion can usually be diagnosed by its appearance and location.
 - Some of the fluid found in the ganglion may be removed and examined.

- X-ray may be done if osteoarthritis or injury is suspected, but will not demonstrate or diagnose the ganglion cyst.
- In rare cases (usually in suspected occult ganglia), noncontrast MRI or ultrasound (CPT 76880) is used to evaluate unusual ganglions.
- Ganglions usually do not need treatment and often resolve on their own.
- **Reference:**

- *Ganglions-Topic Overview. WebMD, Sept 29, 2006, <http://www.webmd.com>. Accessed December 8, 2007*

- *Ganglions-Topic Overview. WebMD, Sept. 29, 2006 <http://www.webmd.com>. Accessed December 8, 2007.*

- **US-8.2 Mass**

- History and Physical exam--information should include location, size, duration, solid/cystic, fixed/not fixed to bone
- Plain x-rays should be performed initially (see MS-2 Imaging Techniques).
- Most discrete masses warrant imaging (usually MRI without and with contrast).
- **Exceptions-** advanced imaging is generally **not** indicated for these entities:
 - Ganglia
 - Sebaceous cyst
 - Subcutaneous lipoma does not require imaging for diagnosis
 - Evaluation by a dermatologist or surgeon is helpful in determining the need for advanced imaging.
 - If the clinical exam is equivocal, ultrasound (CPT 76880) should be performed initially.
 - Noncontrast MRI can be performed if surgery is planned.
 - Lipomas in other locations (not subcutaneous) should be evaluated by ultrasound (CPT 76880) or CT without and with contrast.
 - Lesions with Hounsfield units less than -50 HU do not require additional imaging except for surgical planning.*
 - *Scott-Conner CEH and Radebold K. *Lipomas. eMedicine, April 17, 2006, <http://www.emedicine.com>. Accessed September 11, 2007*
 - Noncontrast MRI can be considered if ultrasound and/or CT are equivocal, or for preoperative planning.
 - Ill-defined mass/swelling: ultrasound (CPT 76880) should be performed as the initial study
 - Mass that has been present and stable for 1 year
 - Most hematomas can be adequately imaged by ultrasound.*
 - *Krolo I, Babiae N, Marotti M, et. al. *Ultrasound in the Evaluation of Sports Muscular Injury. Jan 7, 2000, <http://www.acta-clinica.kbsm.hr>. Accessed October 16, 2007*
- Soft tissue mass with negative x-ray
 - MRI (contrast as requested) can be performed (Ultrasound (CPT 76880) or CT with contrast if MRI contraindicated)*
 - *ACR Appropriateness Criteria, *Soft tissue masses, 2005*

- Orthopedic or Surgical evaluation is helpful in determining the need for advanced imaging.

To Ref Section:

- Scott-Conner CEH and Radebold K. *Lipomas*. eMedicine, April 17, 2006, <http://www.emedicine.com>. Accessed September 11, 2007.
- Krolo I, Babiae N, Marotti M, et. al. *Ultrasound in the Evaluation of Sports Muscular Injury*. Jan 7, 2000, <http://www.acta-clinica.kbsm.hr>. Accessed October 16, 2007.
- *ACR Appropriateness Criteria, Soft tissue masses*, 2005.

• **US-8.3 Shoulder Pain**

- A thorough history, recent physical exam, and plain x-rays should be performed initially.
- “When imaging studies are indicated during the initial evaluation and treatment of a patient with shoulder pain, appropriate plain x-rays should be obtained. More sophisticated imaging studies (such as shoulder MRI, ultrasound, or arthrography) are **not** indicated.”*
 - **American Academy of Orthopaedic Surgeons-- Universe of Adult Patients with Localized Shoulder Pain Symptoms—Phase I Guideline, 2001.*
<http://www.aaos.org/Research/guidelines>. Accessed September 26, 2007
- Ultrasound may be useful for the evaluation of full or partial thickness rotator cuff and biceps tendon tears.*
- Ultrasound is inappropriate for the evaluation of possible labral tears and fractures.*
 - **Appropriateness Criteria Shoulder Trauma, 2005*

To Ref Section:

- *American Academy of Orthopaedic Surgeons-- Universe of Adult Patients with Localized Shoulder Pain Symptoms—Phase I Guideline, 2001.*
<http://www.aaos.org/Research/guidelines>. Accessed September 26, 2007.
- Bradley M, Tung G, Green A. Overutilization of shoulder magnetic resonance imaging as a diagnostic screening tool in patients with chronic shoulder pain. *J Shoulder Elbow Surgery* 2005 May/June;14(3):233-237.

• **US-8.4 Baker’s Cyst**

- See also PVD-7.3 Lower extremity edema in the Peripheral Vascular Disease guidelines
- **Definition:** Cyst posterior to the knee which is almost always associated, in adults, with intra-articular knee pathology.
- Ultrasound (CPT 76880) is the indicated initial imaging study.¹
- It is generally accepted that Baker’s cysts in adults are not amenable to surgical excision because they will almost always recur.²
- Noncontrast knee MRI (CPT 73721) is only indicated if surgical excision is being considered.

¹ *University of Michigan Health System Knee Pain Guideline- 2005*

² *Baker’s Cyst/Popliteal Cysts. Wheeless’ Textbook of Orthopaedics Presented by Duke Orthopaedics, Duke University Medical Center*
<http://wheelessonline.com>. Accessed November 27, 2006

To Ref Section:

- *University of Michigan Health System Knee Pain Guideline- 2005.*
- Baker's Cyst/Popliteal Cysts. *Wheeless' Textbook of Orthopaedics.* Presented by Duke Orthopaedics, Duke University Medical Center <http://wheelessonline.com>. Accessed November 27, 2006.

• **US-8.5 Leg Pain/Calf Tenderness**

- Causes of leg pain are multiple and can include trauma, vascular disease, overuse syndromes, tumors, infections, peripheral nerve disorders, spine disease, etc.
- A thorough history and physical exam should be performed initially, including information regarding edema, skin changes, specific areas of tenderness, pulses, and full neurological exam.
- Diagnostic studies such as plain x-ray, ultrasound (CPT 76880), venous and/or arterial Doppler (93922/93923, 93925 or 93926, 93965, 93971) ankle/brachial index, compartment pressure, and NCV/EMG should be considered initially and can help determine the need for advanced imaging.
- For most medical causes of leg pain, advanced imaging with CT or MRI is generally not helpful in making a diagnosis.

• **Reference:**

- *Emerg Med 2006;38(6):24-30*
- *Harris GD and Hughes BC. Deciphering your patient's leg pain. Emerg Med 2006;38(6):24-30.*

• **US-8.6 Ultrasound of Infant Hips for Developmental Hip Dysplasia**

76885	Ultrasound, infant hips, real time with image documentation; dynamic (requiring physician manipulation)
76886	Ultrasound, infant hips, real time with image documentation; limited, static (not requiring physician manipulation)

- Ultrasound is not appropriate in children <2 weeks and is less appropriate than bilateral hip x-rays after 4 months of age. By 4 to 6 months of age, radiographs become more reliable. Hip x-rays are also more appropriate if there is clinical suspicion for teratogenic dysplasia. The routine use of ultrasound in screening all neonates and infants cannot be recommended.
- If there is an abnormal hip exam shortly after birth, sonography should be performed after 2 weeks of age since laxity is common after birth and often resolves itself.
 - Screening for at risk infants is usually performed at 4-6 weeks of age
 - At risk include positive family history, breech delivery, foot deformities, and torticollis*
 - Graf hip classification uses an α angle, which measures the osseous acetabular roof angle, and a β angle, which defines the position of the echogenic fibrocartilaginous acetabular labrum.
- Type I hips are normal and require no treatment and no follow-up; the α angle is >60

- Type II hips are further subdivided into subtypes IIa, IIb, IIc, and II d. In subtype IIa, seen in infants aged <3 months of age, the hip is normally located, but the acetabulum is immature (the α angle is between 50° and 59°). These patients require no treatment, but there is a small risk for delayed displacement or acetabular dysplasia in this group, so follow-up is advised, Subtype IIb, IIc, and II d hips all require referral for treatment.
 - Type III hips (low displacement) and type IV hips (high displacement) are usually very apparent clinically, and both require immediate treatment. The α angle should be < 43°.
 - Reference
 - *Diagnostic Ultrasound third edition, pp2035-2050*
 - *ACR Appropriateness Criteria on Developmental Dysplasia of the Hip-Child 2009*
 - *JACR (2009, Vol. 6:8, PP. 551-557)*
- **US-8.7 Metastatic Bone Disease**
 - Inappropriate use of ultrasound
 - **Reference**
 - *ACR Appropriateness Criteria: Metastatic Bone Disease, 2005*
 - **US-8.8 Bone Tumors**
 - Inappropriate use of ultrasound
 - *ACR Appropriateness Criteria: Bone Tumors, 2005*
 - **US-8.9 Elbow**
 - Elbow ultrasound is appropriate for the evaluation of the following after plain x-rays are obtained:
 - Suspected tennis elbow
 - Ultrasound with Doppler is appropriate
 - *Doppler Ultrasound Provides Clear Diagnosis of Tennis Elbow, British Journal of Sports Medicine, Feb, 2008.*
 - **US-8.10 Knee**
 - Inappropriate except for the evaluation of Baker's cyst
 - Inappropriate for the evaluation of knee trauma
 - *ACR Appropriateness Criteria: acute Knee trauma, 2005)*
 - **US-8.11 Foot**
 - Foot ultrasound is appropriate for the evaluation of the following after plain x-rays are obtained:
 - Planter Faciitis
 - Chronic Foot Pain
 - Middle aged women with burning pain and paresthesias along the plantar surface of the foot and toes and clinically, the patient is suspected of having tarsal tunnel syndrome.

- Patient is complaining of pain in the 3-4 web space with radiation to the toes and Morton's neuroma is clinically suspected.
- Young athletes presenting with localized pain at the plantar aspect of the heel. Plantar fasciitis is suspected clinically
- Considered to be appropriate for suspected tendinopathy when radiographs are normal and as the next study for the evaluation
- Inappropriate for other indications not listed in 1-3. (This indication is considered investigational by some health plans)
- *ACR Appropriateness Criteria: Chronic Foot Pain, 2005*

- **US-8.12 Ankle**

- Ankle ultrasound is appropriate for the evaluation of the following after plain x-rays are obtained:
 - Considered to be appropriate only for suspected tendinopathy when ankle radiographs are normal and as the next study for the evaluation
- *ACR Appropriateness Criteria: Chronic ankle pain, 2005*

- **US-8.13 Bone Mineral Density**

76977	Ultrasound bone density measurement and interpretation, peripheral site(s), any method
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- Used as a screening tool but is not considered accurate and is considered investigational
- If a patient has had a DEXA, Q-CT, or US bone density within the past two years for a condition, repeat imaging is not indicated unless the patient's symptoms have changed or prior imaging results are indeterminate.

- **US-8.14 Muscular Disorders**

- Search for occult neoplasm in adults with dermatomyositis and in all patients with polymyositis in women
 - Pelvic ultrasound (CPT 76830, 76856 or 76857)

- **US-8.15 Rheumatoid Arthritis**

- Although ultrasound has been used to monitor anti-TNF therapy it parallels indirect monitoring-clinical data and laboratory parameters of inflammation and does not add to the care*
- Ultrasound is thought to be useful for predictive value in relation to radiologic progression in patient with established RA who are treated with anti-TNF*
 - Naredo, E., Power Doppler Ultrasonographic Monitoring of Response to Anti-Tumor Necrosis Factor therapy in Patients with Rheumatoid Arthritis, Arthritis and Rheumatism, Vol. 58, No. 8, August 2008, pp2248-2256

US-9~3D RENDERING

- Some payers do not reimburse for CPT 76376 or 76377. In addition, these CPT codes are not included in every MSI client's radiology management program.
- **CPT 76376 and CPT 76377:** Both of these codes share the following text in their definitions: “3D rendering with interpretation and reporting of computed tomography, magnetic resonance imaging, ultrasound or other tomographic modality.”
 - These two procedures differ in the need for and use of an independent workstation for post-processing.
 - CPT 76376 is for procedures not requiring image post-processing on an independent workstation and is the code reported with ultrasound imaging.
 - CPT 76377 is for procedures that require image post-processing on an independent workstation and is most often reported with CT and MRI studies.
- In general, MedSolutions maintains that CPT 76376 (3D rendering not requiring image post-processing on an independent workstation) should not be separately reimbursed, since this function is built into the imaging software and generally takes less than 15 minutes to perform.

US-10~CEREBROVASCULAR ARTERIAL STUDIES

93875	Non-invasive physiologic studies of extracranial arteries, complete bilateral study (e.g., periorbital flow direction with arterial compression, ocular pneumoplethysmography, Doppler ultrasound spectral analysis)
93880	Duplex scan of extracranial arteries; complete bilateral study
93882	; unilateral or limited study
93886	Transcranial Doppler study of the intracranial arteries; complete study
93888	; limited study
93890	; vasoreactive study
93892	; emboli detection <u>without</u> intravenous microbubble injection
93893	; emboli detection <u>with</u> intravenous microbubble injection

- Indications for an ultrasound examination of the extracranial carotid and vertebral arteries include, but are not limited to:
 - Evaluation of patients with hemispheric neurologic symptoms, including stroke, transient ischemic attack, and amaurosis fugax.
 - Evaluation of patients with a cervical bruit
 - Evaluation of pulsatile neck masses
 - Preoperative evaluation of patients scheduled for major cardiovascular surgical procedures.
 - Evaluation of nonhemispheric or unexplained neurologic symptoms
 - Follow-up of patients with proven carotid disease
 - Evaluation of postoperative patients following carotid revascularization, including stenting
 - Intraoperative monitoring of vascular surgery
 - Evaluation of suspected subclavian steal syndrome

➤ **Reference**

- *ACR Appropriateness Criteria: Performance of an Ultrasound Examination of the Extracranial Cerebrovascular System, 2007*

- Other Indications for Duplex scans, Doppler Ultrasound with Spectrum Analysis, Ocular Pneumoplethysmography, and Periorbital Doppler (CPT codes 93875, 93880, and 93882) include, but are not limited to:
 - Blunt neck trauma
 - Retinal arterial emboli
 - Evaluation of suspected dissection
 - Vasculitis of the extracranial carotid arteries
 - Cerebral embolization
 - Evaluation and follow-up of asymptomatic bruits
 - Follow-up of carotid stent placement

➤ **Reference**

- *Blunt Carotid Artery Injury After Accidental Neck Compression: report of a Case, Case, Surgery Today, Volume 20, Number 5/April 2000, pp: 477-480*
- *Diagnostic Ultrasound third edition, pp 943-944*
- *Use of imaging studies in the diagnosis of vasculitis, Current Rheumatology Reports, Volume 6, Number 3/June, 2004, pp: 203-211*
- *Armstrong PA; Bandyk DF. Duplex ultrasound Surveillance after Carotid Stent Angioplasty: When to Follow-up and What to look for. Vascular Disease Management: Vol. 4 #3. May 2007.*

- It is expected that a study, reported with code **93880**, would be performed as the initial non-invasive diagnostic test rather than a physiologic study reported by **93875** because the duplex study has a higher accuracy rate.
 - A physiologic study (**93875**) and a duplex scan (**93880 or 93882**) are appropriately performed together on the same day if there is a 50 percent stenosis demonstrated on the duplex scan, or there are significant symptoms documented.
- Indications for Transcranial Doppler (TCD) (CPT codes 93886, 93888, 93890, & 93893) include, but are not limited to:
 - Evaluation of flow and detection of stenosis in the intracranial carotid, vertebrbasilar and circle of Willis arteries
 - Assessment of patterns and extent of collateral circulation in patients with known regions of severe stenosis or occlusion
 - Intraoperative and perioperative monitoring of intracranial flow velocity and hemodynamic patterns during carotid endarterectomy
 - Evaluation and follow-up of patients with vasoconstriction or spasm resulting from an illness, disease or injury, especially after subarachnoid hemorrhage
 - Detection of arteriovenous malformations and study of the supply arteries and flow patterns
 - As an adjunct in the assessment of patients with suspected brain death
 - Monitoring patients during invasive therapeutic interventions for cerebrovascular complications
 - Evaluation of possible intraoperative cerebral embolization

➤ **Reference**

- *Diagnostic Ultrasound third edition, page 977*
 - If a prior study (MRA, CTA, or transcranial Doppler) has been performed for a condition, a follow-up study is not indicated for the same condition unless there has been a change in the patient's condition or if previous imaging results showed an indeterminate finding.
 - Neurologist or Neurosurgeon is helpful in determining the need for imaging.
- **Coding Notes**
 - Post-interventional follow-up studies are typically limited in scope and unilateral in nature.
 - **CPT 93882**, unilateral or limited study, is appropriate in this situation unless the patient has had bilateral intervention.
 - It is expected that a study, reported with code **93880**, would be performed as the initial non-invasive diagnostic test rather than a physiologic study reported by **93875** because the duplex study has a higher accuracy rate.
 - A physiologic study (**93875**) and a duplex scan (**93880 or 93882**) are appropriately performed together on the same day if there is a 50 percent stenosis demonstrated on the duplex scan, or there are significant symptoms documented.
 - Codes **93880** and **93882** should never be billed together for the same imaging session.
 - Doppler echocardiography, **CPT 93325**, should not be billed with duplex scans of the extracranial arteries (**93880** and **93882**).
- **US- 10.1 Screening of carotid arteries**
 - Screening is indicated for high-risk patients in the general population with the following:
 - Undergoing open-heart surgery
 - Undergoing coronary bypass grafting
 - Peripheral vascular disease
 - Abdominal aortic aneurysms
 - Renal artery stenosis
 - Following radiotherapy for Head and Neck malignancies
 - Following carotid endarterectomy or carotid artery stenting
 - Patients with retinal ischemic syndromes
 - Patients with syncope, dizziness, vertigo, neck bruits
 - History of TIA or stroke
 - Tinnitus
 - Family history of vascular disease and hyperhomocysteinemia
 - **Reference:** *American Society of Neuroimaging, J Neuroimaging, 2007;17:19-47*
- **US-10.2 Carotid intima-media thickness (0126T)**
 - Carotid intima-media thickness using duplex ultrasound imaging (0126T) is advocated as a screening test for vascular disease. This does not involve advanced imaging.
 - Outcomes data are currently lacking.

- Ultrasound is used to evaluate intima-media thickness of carotid as a surrogate predictor of future cardiovascular events
 - Considered investigational for general population; however, may be considered for those who have the following:
 - Are clinically determined to be “intermediate” risk for a heart attack or cardiac death in the next 10 years.
 - Have a family history of premature cardiovascular disease in a close relative
 - Have a significant abnormalities in one or more known cardiovascular risk factors, such as young patients with genetic cholesterol disorders or heavy smoking
 - Female and under 60 with at least two cardiovascular risk factors
 - ❖ **Reference** (*Use of Carotid Ultrasound to Identify Subclinical Vascular Disease and Evaluate Cardiovascular Disease Risk: A Consensus Statement from the American society of Echocardiography Carotid Intima-Media Thickness Task Force Endorsed by the Society for Vascular Medicine, American Society of Echocardiography guidelines for carotid ultrasound, Journal of the American Society of Echocardiography, Vol. 21, No 2, Feb. 2008*)
- Texas Heart Attack Prevention Bill (Act HB1290) effective September 1, 2010
 - Health-benefit providers should cover the cost of CT coronary-artery calcium (CAC) scans and carotid ultrasonography in men between the ages of 45 and 76 and women between the ages of 55 and 76, as well as anyone (at any age) who has diabetes or is deemed to be at intermediate risk or higher for developing CAD, as determined by the Framingham risk score.

- **US-10.3 Carotid Artery Disease**

- Duplex Ultrasound should be performed initially to evaluate possible carotid artery disease, including carotid bruit, prior to considering advanced imaging.
- If the bruit originates from the external carotid artery, further imaging is not necessary.
- If ultrasound shows > 50% occlusion/stenosis of the internal carotid artery, then neck MRA with contrast (CPT 70548) or CTA (CPT 70498) can be performed.
- The presence or absence of a carotid bruit is not particularly useful in estimating the presence or severity of carotid occlusive disease.

- **US-10.4 Patients with typical symptoms of TIA/stroke or carotid dissection**

- Ultrasound is not appropriate for routine evaluation of the vertebrobasilar system (see transcranial Doppler)
 - Diagnostic Ultrasound third edition, pp 978.*
- Carotid imaging with MRA (CPT 70548 for TIA/Stroke, or CPT 70549 for carotid dissection) or CTA (CPT 70498) can be performed initially.

- Also see HD-30 General Stroke/TIA and HD-31 Special Stroke/TIA in the Head guidelines.
- **US-10.5 Patients with suspected vertebrobasilar pathology**
 - Ultrasound is not appropriate for routine evaluation of the vertebrobasilar system (see transcranial Doppler)
 - Diagnostic Ultrasound third edition, pp 978.*
 - Brain MRI (CPT 70553) and brain MRA (CPT 70544) are generally appropriate.
 - Also see HD-31 Special Stroke/TIA and HD-31 Evidence Based Clinical Support section in the Head guidelines.
 - Evaluation by a neurologist is helpful in determining the appropriate imaging pathway.
 - **Surveillance of individuals who are asymptomatic or have unchanged symptoms and known vertebrobasilar disease:**
 - There is no evidence of-based data supporting serial follow-up advanced imaging in these patients.
 - **Surveillance of individuals who are asymptomatic or have unchanged symptoms who are status post vertebrobasilar stenting:**
 - Follow-up imaging studies should be at the discretion of the specialist who performed the stenting or the vascular specialist who is following the patient.
- **US-10.6 Subclavian Steal Syndrome**
 - Carotid and vertebral artery duplex study should be the initial imaging study in patients with suspected Subclavian Steal Syndrome
 - Duplex study will show reversal of flow in the ipsilateral vertebral artery
 - Neck and chest MRA (CPT 70548 and 71555) or CTA (CPT 70498 and 71275) can be performed for diagnosis if the clinical exam and duplex study are indeterminate or as preoperative studies if they will substitute for invasive angiography.
 - Upper extremity MRA (CPT 73225) or CTA (CPT 73206) can be performed if needed to exclude pathology distal to the subclavian artery and if they will substitute for invasive angiography
 - **Reference:** Whittemore AD and Mannick JA. *Subclavian Steal Syndrome*. In Sabiston DC and Lyerly HK. *Textbook of Surgery*. 15th Ed. Philadelphia, WB Saunders, 1997, pp.1685-1688
 - *Diagnostic Ultrasound third edition, pp 978.*
- **US 10.7 Surveillance after intracranial hemorrhage**
 - The preference of the neurosurgeon or neurologist following the patient should be honored. There is no precise schedule for follow-up imaging in these patients.
- **US 10.8 Surveillance of individuals with known carotid disease who are asymptomatic or have unchanged symptoms and who have not undergone carotid endarterectomy or carotid angioplasty/stenting**
 - **In non-diabetics**, follow-up of a known cervical internal carotid stenosis of >50% by ultrasound, neck MRA (CPT 70548), or neck CTA (CPT 70498) can be performed every year for two years.

- If there is no change in stenosis category after two years, the imaging interval should be increased to every other year.
 - There is no evidence-based data to support continued yearly imaging in these individuals in the absence of disease progression.
- If there is a change in stenosis category, imaging can remain on a yearly basis until there is no change in stenosis category for two years.
- Example of a stenosis categories:
 - Mild stenosis (<30%)
 - Moderate stenosis (30-68%)
 - Severe stenosis (70-99%)
- **In diabetics**, follow-up of a known cervical internal carotid stenosis of >50% by ultrasound, neck MRA (CPT 70548), or neck CTA (CPT 70498) can be performed every year for three years.
 - If there is no change in stenosis category after three years, the imaging interval should be increased to every other year.
 - There is no evidence-based data to support continued yearly imaging in these individuals in the absence of disease progression.
 - If there is a change in stenosis category, imaging can remain on a yearly basis until there is no change in stenosis category for three years.
(? References from Current MSI Guidelines)
- **US 10.9 Surveillance of individuals who are asymptomatic or have unchanged symptoms who are status post carotid angioplasty or endarterectomy**
 - Surveillance imaging of asymptomatic patients who have undergone prior endarterectomy has not been proven to reduce neurologic events.*
**J Vasc Surg* 1997 Jan;25(1):55-63
 - There is insufficient evidence-based data to support serial follow-up MRA, CTA, or other advanced imaging in patients who have undergone prior endarterectomy who are asymptomatic or have unchanged symptoms.
(? References from current MSI Guidelines)
- **US 10.10 Surveillance of individuals who are asymptomatic or have unchanged symptoms who are status post carotid stenting**
 - There are currently no published recommendations regarding the type or frequency of imaging studies for patients who have undergone carotid stenting.
 - Ultrasound should be the initial study unless the vascular specialist has a documented reason why advanced imaging is needed.
 - The preference of the vascular specialist should be honored in terms of frequency of follow-up imaging studies.
(? References from current MSI Guidelines)

- **US 10.11 New signs and symptoms**

- New signs and symptoms consistent with progressive carotid artery disease are an indication to re-image the neck vessels using ultrasound, neck MRA (CPT 70548) or neck CTA (CPT 70498).

US-11~ABDOMINAL ARTERIAL STUDIES

- **US 11.1 Abdominal Aortic Aneurysm (AAA)**

- Also see PVD-6 Aortic Disorders, Renal Vascular Disorders, and Visceral Artery Aneurysms in the Peripheral Vascular Disease guidelines.
- Ultrasound is the preferred initial imaging study in the non-obese patient to screen for AAA or to evaluate a pulsatile abdominal mass.
- The Society for Vascular Surgery and the Society for Vascular Medicine and Biology recommend yearly ultrasound studies for aneurysms between 3 to 4 cm, ultrasound studies every 6 months if aortic diameter is between 4 to 4.5 cm, and referral to a vascular specialist if aortic diameter is greater than 4.5 cm.*
 - * *J Vasc Surg* 2004;39:267-269
 - * *The Internet Journal of Thoracic and Cardiovascular Surgery* 2006;7(2)
- Patients with AAA's smaller than 4 cm in diameter should be followed by ultrasound every 2 to 3 years.*
 - * *Cardiosource Review Journal* November 2006, pp.73-77
 - * *Circulation* 2006;113:463-654
- CT of the abdomen with contrast (CPT 74160) is indicated to follow asymptomatic obese patients using the same imaging timeline used for ultrasound in non-obese patients.
- There is insufficient evidence-based data to support using advanced imaging to screen for thoracic aortic aneurysm in patients with known abdominal aortic aneurysm.
- **Preoperative imaging if endovascular or open repair of AAA is being considered:** CT of the abdomen and pelvis without and with contrast (CPT 74170 and 72194) or CTA (CPT 74175 and 72191). The without contrast portion can help evaluate thrombus and calcification in the aneurysm.

- **US-11.2 Iliac Artery Aneurysm (IAA)**

- Iliac artery aneurysms are most commonly associated with aortic aneurysms.
- Isolated IAA's are rare.
 - The incidence is estimated to be 6.58/100,000 for men and 0.26/100,000 for women in the U.S.¹
- Isolated IAA's are frequently bilateral at time of presentation.
- The majority of patients are male and between 50 and 70 years old.²
- The normal size of the iliac artery is <1cm. IAA's rarely rupture when <2cm.²
- The average size of an IAA is 4 to 5 cm, and the average size of a ruptured aneurysm is estimated at 6 cm.¹
- Surgical intervention should be considered when an IAA exceeds 3 to 4 cm.²
- Evaluation of a suspected IAA should begin with ultrasound.

- If ultrasound is equivocal, CT pelvis with contrast (CPT 72193) can be performed.
- If IAA is found, referral to a Vascular surgeon is appropriate.
 - Follow-up imaging studies can be performed at the discretion of the vascular specialist.
 - ¹Turk J Med Sci 2002;32:267-269
 - ²J Endovascular Surgery 1997;4(4):370-375
- **Preoperative imaging:** at the discretion of the operating surgeon

- **US-11.3 Abdominal Aortic Aneurysm (AAA) and Iliac Artery Aneurysm (IAA) – Post Endovascular or Open Aortic Repair**

- See AB-23. In general ultrasound is not the preferred imaging of patients who have undergone vascular repair of the aortic or iliac arteries.

- **US-11.4 Renovascular Hypertension**

- Doppler ultrasound (CPT 76770 or 76775 with CPT 93975 or 93976) is the most cost-effective exam for screening reno-vascular hypertension and can be used as the initial screening tool for medically controlled patients with clinical suspicion of renovascular disease. However, ultrasound results are highly dependent on the expertise of the local facility/radiologist.*

*AJR 2005;184:931-937

US-12~EXTREMITY ARTERIAL and VENOUS STUDIES
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93930	Duplex scan of upper extremity arteries or arterial bypass grafts; complete bilateral
93931	;unilateral or limited study
93932	Non-invasive physiologic studies of upper or lower extremity arteries, single level, bilateral (eg, ankle/brachial indices, Doppler waveform analysis, volume plethysmography, transcutaneous oxygen tension measurement)

CODING NOTES:

- **US-12.1 Upper Extremity Peripheral Vascular Disease**

- **See MSI PVD 4 Upper Extremity Peripheral Vascular Disease**
- MRA (or MRV) of the chest (CPT 71555) and/or upper extremities (CPT 73225) may be required when clinical evidence points to arterial or venous insufficiency.
 - Symptoms can include muscular limb pain, particularly with exertion, or otherwise unexplained swelling of the upper extremities.
- Superior vena cava syndrome: Chest MRV (CPT 71555) may be indicated when this syndrome is suspected. This syndrome is frequently associated with aggressive thoracic cancers or metastases.*
 - Also see CH-29 Superior Vena Cava Syndrome in the Chest guidelines.
 - *Applied Radiology. February 2004, pp. 26-33
- If a prior study (MRA, CTA, catheter angiogram, duplex scan) has been completed for a condition, a follow-up study for the same condition is not indicated unless there has been a change in the patient's condition or if previous imaging results showed an indeterminate finding.

- **US-12.2 Upper extremity DVT**

- Evaluation should begin with chest x-ray (especially if prior intravenous catheter was placed) and duplex ultrasound (with or without previous catheter placement).
- Request for advanced imaging should be sent for Medical Director review.
 - MRI of the upper extremity (CPT 73219) and chest (CPT 71551) and/or MRV (CPT 73225 and 71555) are useful for evaluating suspected or known central venous obstruction.
 - CT of the upper extremity (CPT 73201) and chest (CPT 71260) with contrast and/or CTA (CPT 73206 and 71275) can occasionally be helpful.
- **Reference:**
 - ACR Appropriateness Criteria, Suspected upper extremity deep vein thrombosis, 2005
- **Fibromuscular Dysplasia Brachial Artery**
 - Usually affects renal and carotid arteries
 - Appears as “string of beads” abnormality on angiography but ultrasound exam with advanced dynamic flow mode may be superior
- **Reference:**
 - Circulation 2008;117:2542-2543

- **US- 12.3 Non-Invasive Physiologic Studies Upper or Lower Extremities**

93922	Non-invasive physiologic studies of upper or lower extremity arteries, single level, bilateral (eg, ankle/brachial indices, Doppler waveform analysis, volume plethysmography, transcutaneous oxygen tension measurement)
93923	Non-invasive physiologic studies of upper or lower extremity arteries, multiple levels or with provocative functional maneuvers, complete bilateral study (eg, segmental blood pressure measurements, segmental Doppler waveform analysis, segmental volume plethysmography, segmental transcutaneous oxygen tension measurements, measurements with postural provocative tests, measurements with reactive hyperemia)
93924	Non-invasive physiologic studies of lower extremity arteries, at rest and following treadmill stress testing, complete bilateral study

- Non-Invasive physiologic studies of the extremity arteries can be used to diagnose Peripheral Artery Disease (PAD)
 - Commonly referred to as ABI (ankle/brachial index)
 - Considered to be a non-imaging technique to evaluate extremity arteries
 - Blood pressure measurements are taken in the arms and legs. A ratio is calculated by the machine that indicates presence and severity of arterial disease.
- If a prior study (MRA, CTA, catheter angiogram, duplex, or plethysmography) has been completed for a condition, a follow-up study for the same condition is not indicated unless there has been a change in the patient’s condition or if previous imaging results showed an indeterminate finding.
- A vascular surgeon or surgeon is helpful in determining the appropriate imaging pathway

- **US-12.4 Lower extremity DVT**

- See PVD 7 Lower Extremity Peripheral Vascular Disease
- Patients presenting with lower extremity edema should have venous duplex study as the initial imaging study to rule out deep venous thrombosis (DVT)
 - Follow up an initial negative Doppler with repeat in 5-7 days to rule propagation of clot from calf veins.
Reference (ACR Appropriateness Criteria: Suspected LE DVT, 2005)
 - In patients with negative venous duplex study and unilateral calf edema, a dedicated ultrasound of the popliteal fossa to rule out popliteal (Baker's) cyst should be performed initially.
 - In patients with negative venous duplex study and persistent unexplained unilateral or bilateral lower extremity edema, abdominal and pelvic ultrasound should be performed.
 - If the above ultrasound studies are negative, CT of the abdomen and pelvis with contrast (CPT 74160 and 72193) or CT scan of the pelvis (CPT 72193) alone can be performed.
 - CT or MRI of the lower extremity without contrast (CPT 73700 or 73718) can be performed in patients with persistent unilateral calf edema and negative ultrasound studies.
- Although uncommon, diabetic muscle necrosis can present with acute painful swelling in the lower extremity. MRI of the extremity (contrast as requested) is the diagnostic method of choice.
- The documented presence of chronic lower extremity edema due to chronic venous insufficiency generally will not respond to intervention, and advanced imaging is not routinely indicated.
 - If there is documented need to exclude other more treatable causes such as thigh or abdominal/pelvic clot(s) or masses, MRV (or CTV) can be helpful (CPT 74185 and 72198 or 74175 and 72191). These cases should be sent for Medical Director review.
 - CT venography of the abdomen and pelvis (CPT 74175 and 72191) or MRV (CPT 74185 and 72198) may be appropriate if venous thrombosis is suggested but is indeterminate on other imaging tests, or if the extent of thrombosis needs more detailed assessment.
 - Phlegmasia cerulea dolens can be evaluated by MRV, CTV or CTA with run off to assess the arterial system. MRA (CPT 74185, 73725, and 73725) may also be required for this problem, which can reflect both arterial and venous compromise and produce substantial lower extremity edema.
(?? Reference from current MSI Guidelines)

- **US-12.5 Claudication**

- ABI is the preferred initial test*
 - If ankle brachial index (ABI) and post-exercise ABI are normal, no advanced imaging is indicated.
 - Normal ABI range is 0.9 to 1.3.
 - If ABI is greater than 1.3, this suggests severe peripheral vascular disease and arteries that are inelastic or "stiff."

- A toe-brachial index may be used as further screening in patients with ABI's greater than 1.3
- Advanced imaging may be indicated in these patients, including CTA with run off (CPT 75635) or MRA of the aortoiliofemoral system (CPT 74185, 73725, and 73725).
 - * ACR Appropriateness Criteria, Claudication, 2005
 - * J Am Coll Cardiol 2008;51:1292-1298
- ABI may not be needed if a vascular specialist documents classic signs and symptoms of extremity vascular insufficiency and worsening symptoms and indicates why ABI documentation is not necessary (since it may prove useful for comparison to post procedure evaluation)
- ABI is the preferred initial test, but lower extremity duplex ultrasound and Doppler studies are adjuncts.* and should be performed prior to considering advanced imaging.
 - * Postgrad Med 2006;119(2):21-27
 - * Radiology 2005;236:1083-1093 and 1094-1103
- Duplex ultrasound with Doppler is useful for identifying location and extent of disease.
- Evaluation by a vascular surgeon or other vascular specialist is helpful in determining the need for advanced imaging.
- Advanced imaging is not medically indicated in patients who have claudication symptoms that are improving with medical therapy (walking exercise, rehabilitation and medications).
- Advanced imaging is indicated for the following:
 - After vascular disease is confirmed to be significant by noninvasive testing and an invasive procedure is being considered
 - When conservative medical therapy has failed and an invasive procedure is being considered
 - When there is evidence of potentially limb-threatening vascular disease, such as skin breakdown, nonhealing ischemic ulcers, resting leg pain, or gangrene
 - Preoperative planning for an invasive procedure (endovascular or open surgery)
- If advanced imaging is indicated, MRA of the aorta, pelvic vessels, and lower extremities (CPT 74185, 73725 and 73725) or CTA (CPT 75635) can be performed to further evaluate the lower extremity arteries.
 - Although MRA may be preferred for infrapopliteal and foot vessels either MRA or CTA may be chosen to visualize these vessels*
 - * J Am Coll Cardiol 2006;47:1-192
- **Pseudoclaudication**
 - See SP-4 Lumbar Spinal Stenosis in the Spine guidelines.
 - Post-exercise ABI is often one of the first tests ordered for suspected pseudoclaudication in order to delineate vascular vs nonvascular causes.
- **Popliteal Artery Entrapment Syndrome:**
 - Popliteal artery stenosis or occlusion due to compression by adjacent muscle and tendons.
 - Usually seen in young men (ages 20-40)
 - Diagnosis can be made by ultrasound, lower extremity CTA (CPT 73706), or lower extremity MRA (CPT 73725)

- CT or MRI of the lower extremity (contrast as requested) can be performed to evaluate the structures impinging on the popliteal artery if requested by the operating surgeon.
- **Surveillance of vein graft patency**
 - Duplex US is the standard technique for post-revascularization surveillance of vein graft
 - Can lead to improved long-term graft patency
 - Duplex US surveillance of synthetic grafts is of questionable value*
 - *ACR Appropriateness Criteria, Claudication, 2007
 - **References:**
 - *Diagn Intervent Radiol* 2005;11:222-224
 - *AJR* 2003;181:1259-1265
- **US-12.6 Lower extremity artery aneurysms**
 - **Iliac artery aneurysm:**
 - AB-22 Abdominal Aortic Aneurysm and Iliac Artery Aneurysm—Follow-up of Known Aneurysms and Pre-op Evaluation in the Abdomen guidelines.
 - **Femoral artery aneurysm**
 - Patients present with local pressure symptoms, thrombosis, or distal embolization.
 - A pulsatile mass can be felt in the groin.
 - Ultrasound should be performed initially.
 - Vascular specialist consultation is helpful in determining the need for advanced imaging and the time-line to intervention.
 - Advanced imaging (CTA [CPT 73706] or MRA [CPT 73725]) is generally reserved as a preoperative study for patients with no plans for invasive angiography and/or who have technically limited or abnormal ultrasound results.
 - **Popliteal artery aneurysm:**
 - Account for 80% of all peripheral aneurysms.
 - Patients with this aneurysm are at risk for other types of aneurysm (e.g. aortic aneurysm).
 - Ultrasound should be the initial imaging study to assess for other aneurysms (especially aortic aneurysm).
 - Vascular specialist consultation is helpful in determining the need for advanced imaging and the time-line to intervention.
 - Advanced imaging (CTA—CPT 73706 or MRA—CPT 73725) is generally reserved as a preoperative study for patients with no plans for invasive angiography and/or who have technically limited or abnormal ultrasound results.
 - Post procedure surveillance imaging is unnecessary and has not been shown to alter patient management. Post interventional functional testing (ABI) may be useful as establishing a new baseline for the patient.
 - **Reference:**
 - *Aneurysms and Dissection of Arteries. PatientPlus, <http://www.patient.co.uk>. Accessed December 5, 2007*

- **US- 12.7 Post Lower Extremity Angioplasty**

- **Coding notes**
 - 93925/93926 or 93930/93931
- Useful to screen as well as define location and extent of lesion in claudication
- Not considered best study if limb threatened.
- **Reference:**
 - *ACR Appropriateness Criteria: Recurrent symptoms following Lower extremity angioplasty, 2005*

- **US -12.8 Post Arterial Bypass Surgery**

- **Coding notes**
 - 93925/93926 or 93930/93931
- Color Doppler with waveform evaluation of the entire graft in the setting of claudication either with supra or infra-inguinal grafts.
- Appropriate for threaten limb post graft
- Appropriate for evaluation of asymptomatic post graft
- Reference
 - ACR Appropriateness Criteria: Follow-up of Lower extremity arterial Bypass surgery, 2005.

- **US- 12.9 –Pre and Post Dialysis Access**

- **Coding notes**
 - 93990
 - May add 93990 for color Doppler
- Indications for dialysis access ultrasound include but are not limited to:
 - Patients with decreased flow rates during hemodialysis
 - Patients with development of arm swelling or discomfort after access placement surgery or a hemodialysis session
 - Patients with prolonged immaturity of a surgically created AVF
 - Patient suspected of having a pseudoaneurysm, AVF or graft stenosis, or adjacent fluid collection
 - **Reference:** ACR Appropriateness Criteria: Performance of Vascular Ultrasound for Postoperative Assessment of Dialysis Access, 2007
- Vessel mapping of vessels for hemodialysis (HCPCS code G0365) is indicated for the preoperative examination of vessels prior to hemodialysis access site surgery in patients with end stage renal disease (ESRD). *
 - *Highmark Medicare Services (?? Can we use?)

- **US-12.10 Venous**

- **Coding notes**
- Venous duplex can be used to evaluate for venous insufficiency
- Venous duplex can be used for patients who are candidates for anticoagulation or invasive therapeutic procedures for the following procedures:
 - Post-Thrombotic (Post Phlebitic) Syndrome-
 - Recurrent DT

- Patients with ulceration, thickening and discoloration suspected to be secondary to venous insufficiency in order to confirm this diagnosis, by documenting venous valvular incompetence, prior to treatment
- Venous mapping prior to autologous graft and subfascial endoscopic performing vein ligation (93971)
 - **Reference:**
 - *Chronic Venous Insufficiency and Postphlebotic Syndrome, Merck Manuals, March 2008*
 - *Prandoni P, Cogo, Bernardi E, Villalta S, Polistena P, Simioni P, et al. A simple ultrasound approach for detection of recurrent proximal-vein thrombosis. Circulation 1993; 88:1730-5.*
 - *Postoperative Subfascial Endoscopic Perforator Surgery Duplex Evaluation: Techniques and Ultrasound Characteristics, Journal of Vascular Technology, Volume 25, Number 4, 1 December 2001, pp 213-216(4)*
 - *Diagnostic Ultrasound third edition, pp1027-1030*

US-13~VISCERAL and PENILE VASCULAR STUDIES

- **US- 13.1 Impotence /Erectile dysfunction**
 - Duplex US can be used to assess penile vasculature in Peyronie's disease*
 - Penile Doppler ultrasound can be performed for the evaluation of erectile dysfunction
 - **Reference:**
 - *Penile Vascular Assessment Using Color Duplex Sonography in Men with Peyronie's Disease
Laurence A. Levine, Christopher L. Coogan
The Journal of Urology
April 1996 (Vol. 155, Issue 4, Pages 1270-1273)
 - **Coding notes**
 - Duplex ultrasound
 - 93975 complete exam
 - 93976 used for follow up exam
 - Not to be used together
- **US- 13.2 Scrotal Pain**
 - **Coding notes**
 - 76870 and may be combined with 93975 or 93976
 - Acute onset of Scrotal pain
 - Pain without trauma, without antecedent mass
 - Color Doppler ultrasound is a valuable exam for evaluating testicular perfusion
 - Male infertility
 - Ultrasound use for male infertility is not a covered benefit of the health plan
 - Testicular microlithiasis may be associated with subfertility and testicular tumors. This should have follow up every 6-12 months

- Occult testicular mass for the evaluation of possible testicular primary with clinical evidence of metastatic disease elsewhere.
- Undescended testes
 - Adult male or child
 - Palpable inguinal mass in child
- **Reference**
 - *ACR Appropriateness Criteria: Acute onset of Scrotal Pain, 2005*

- **US- 13.3 Scrotal Pathology**

- Ultrasound is the most commonly used imaging technique to supplement the physical examination for possible scrotal diseases.

Diagnostic Ultrasound third edition, pp 849
- Testicular microlithiasis has been with co-existing testicular tumors in 5-10% of patients. It is not known if there is an increased risk for tumor development in patients with pre-existing microcalcifications, nor is there a consensus on appropriate follow-up. Most commonly annual sonography is recommended

Diagnostic Ultrasound third edition, pp 866.
- Acute scrotal pain, masses, trauma, inguinal hernia, varicocele, or inflammation should be evaluated by ultrasound. MRI in these patients is not supported by evidence-based data.*

**ACR Appropriateness Criteria, Acute Onset of Scrotal Pain, 2007*

- **US-13.4 Undescended Testis**

- Boys with a history of cryptorchid (undescended) testes have a several fold risk increase of testicular cancer.
 - It is important to diagnose and treat this condition either by bringing the undescended testis into the scrotum, or resecting the testis.
 - MRI abdomen and pelvis without and with contrast (CPT 74183 and 72197) can be performed.
 - MRI pelvis without and with contrast (CPT 72197) can be used to evaluate abnormalities of the scrotum if ultrasound is inconclusive.
- The pediatric population should be evaluated initially with ultrasound, and if inconclusive, MRI pelvis (CPT 72197) can be performed.* CT and MRI have a high false negative rate and in general are not reliable as diagnostic tools.
 - Urology evaluation is helpful in determining the most appropriate imaging pathway.

**Undescended Testicle or Cryptorchidism. Cornell University Dept. of Urology, 2006. <http://www.cornellurology.com/pediatrics>. Accessed November 21, 2006*