This tool addresses common symptoms and symptom complexes. Imaging requests for patients with atypical symptoms or clinical presentations that are not specifically addressed will require physician review. Consultation with the referring physician, specialist and/or patient’s Primary Care Physician (PCP) may provide additional insight.

MedSolutions, Inc. Clinical Decision Support Tool for Advanced 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.

This version incorporates MSI accepted revisions prior to 7/22/11
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### Pelvic Signs and Symptoms — Female

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### Pelvic Signs and Symptoms — Male

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### Pediatric Pelvis Guideline References

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PACAB-1~GENERAL GUIDELINES

**PACAB-1.1 General Considerations**
- The Abdominal Imaging Guidelines are the same for both the pediatric population and the adult population, unless there are specific guidelines listed here in the Pediatric and Congenital Abdominal Imaging Guidelines.
- Prior to considering advanced imaging, patients should undergo a recent detailed history, physical examination, appropriate laboratory studies, and the use of non advanced imaging modalities such as plain x-ray and ultrasound.
- The need for repeat advanced imaging should be carefully considered and may not be indicated if recent imaging has been performed.
- Abdominal imaging begins at the diaphragm and extends to the umbilicus or iliac crest.
- To avoid radiation exposure, pediatric imaging should consider the use of ultrasound or MRI where it is a clinical option.
- MRI of the abdomen with contrast only is essentially never performed. If contrast is indicated, MRI abdomen without and with contrast (CPT®74183) should be performed.
- **CT imaging:**
  - Abdominal CT is usually performed with contrast (CPT®74160). Exceptions are noted in the individual guidelines.
  - Abdominal CT performed for evaluation of renal stones is performed without intravenous contrast (CPT®74150).
  - Abdominal CT for the evaluation of a pediatric abdominal mass can be performed without and with intravenous contrast (CPT®74170), to detect calcification in the mass.
- Abdominal CT or MRI can be considered to further evaluate abnormalities seen on other imaging modalities such as plain x-ray, ultrasound, etc.
- **Fever of Unknown Origin:** Refer to **ONC-30~Medical Conditions with Cancer in the Differential Diagnosis** in the Adult Oncology Imaging Guidelines.
- **Suspected ascites:** should be initially evaluated by ultrasound (CPT®76700 or CPT®76705). Ultrasound results can then determine the need for peritoneal fluid analysis or further imaging specific to the findings.*

**PACAB-1.2 CODING ISSUES**
- **Abdominal Ultrasound**
  - A complete abdominal ultrasound (CPT®76700) includes:
    - Liver, gallbladder, common bile duct, pancreas, spleen, kidneys, upper abdominal aorta and inferior vena cava
  - 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.

- **Retroperitoneal Ultrasound**
  - A complete retroperitoneal ultrasound (CPT®76770) includes:
    - Kidneys, lymph nodes, abdominal aorta, common iliac artery origins, inferior vena cava
    - For urinary tract indications, a complete study can consist of kidneys and bladder
  - Retroperitoneal ultrasound studies without all of the required elements should be reported with the limited retroperitoneal ultrasound code: CPT®76775
    - A limited retroperitoneal 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.

- **CT Enterography**
  - Combines CT imaging with large volumes of ingested neutral bowel contrast material to allow visualization of the small bowel wall and lumen
  - Report CPT®74177
  - Usually only 2D reformatting is used (coronal reformatted images)
  - If the 3D rendering codes are requested (CPT®76376 or CPT®76377), then the final radiology report should be obtained first to verify that true 3D rendering was performed.
  - Also see [PACAB-19 Inflammatory Bowel Disease Rule Out Crohn’s Disease or Ulcerative Colitis](#).
  - Reference:
    - *RadioGraphics* 2006 May;26:641-657

- **CT Enteroclysis**
  - A tube is placed through the nose or mouth and advanced into the duodenum or jejunum. Bowel contrast material is infused through the tube and CT imaging is performed either with or without intravenous contrast.
  - CT enteroclysis is used to allow visualization of the small bowel wall and lumen. CT enteroclysis may allow better or more consistent distention of the small bowel than CT enterography.
  - Use CPT®74176 or CPT®74177
  - Usually only 2D reformatting is used (coronal reformatted images)
  - If the 3D rendering codes are requested (CPT®76376 or CPT®76377), then the final radiology report should be obtained first to verify that true 3D rendering was performed.
  - Also see [PACAB-19 Inflammatory Bowel Disease Rule Out Crohn’s Disease or Ulcerative Colitis](#).
GENERAL ABDOMINAL SIGNS/SYMPTOMS (ALPHABETICAL ORDER)

PACAB-2~ABDOMINAL PAIN, NONSPECIFIC

- Ultrasound (CPT®76700 or CPT®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 CPT®76856) should be the initial imaging study in females with ovaries or uterus intact who present with generalized abdominal pain, especially if symptoms are located predominately in the lower abdominal area, in order to rule out gynecological pathology.

- Children with generalized abdominal pain and normal physical examination and laboratory studies, including stool for blood (and stool culture if diarrhea), should initially be evaluated by ultrasound (CPT®76700 or CPT®76705) and treated conservatively.
  - Gastroenterology (GI) specialist evaluation is helpful in determining the need for advanced imaging.

- Children with abdominal pain and signs of failure to thrive, anemia, bleeding, and/or abnormal laboratory studies should be initially evaluated with plain abdominal x-rays or ultrasound (CPT®76700 or CPT®76705) to determine the need for further imaging.

*Pediatr Nurs 2007; 33(3):247-259*

- Children presenting with abdominal pain may have an intussusception.
  - Plain x-rays (supine and left lateral decubitus views) should be performed initially to exclude mass or bowel obstruction from other causes.
  - Ultrasound (CPT®76700 or CPT®76705) is appropriate as the initial study if there is a strong suspicion for intussusception, but if negative, plain x-rays of the abdomen should follow.

- CT scans of the abdomen and pelvis with contrast (CPT®74177) can be performed for any of the following:
  - Severe abdominal pain and at least one of the following:
    - WBC greater than 10,000
    - Fever
    - Moderate or severe abdominal tenderness on physical exam
    - Documented rebound tenderness or guarding on physical exam
  - Failure of conservative treatment for 3-4 weeks including clinical re-evaluation
  - Persistent abdominal pain (greater than 4 weeks with no improvement) with unremarkable endoscopy and/or barium enema results
  - Non diagnostic recent endoscopy and/or barium study

- GI specialist evaluation can be helpful in determining the appropriate imaging pathway.
CT scans of the abdomen and pelvis either with or without contrast (CPT®74177 or CPT®74176) can be performed prior to endoscopy if requested by the physician who will be performing the endoscopy, especially if there is suspected inflammatory bowel disease.

- Repeat imaging in patients with unchanged or improving symptoms is not appropriate.
- CT of abdomen and/or pelvis may be performed to evaluate abnormalities detected on plain abdominal x-rays that require further clarification.

### PACAB-3~ABDOMINAL SEPSIS (SUSPECTED ABDOMINAL ABSCESS)

- CT abdomen and/or pelvis with contrast (CPT®74160 or CPT®72193, or CPT®74177) is indicated when the patient has a palpable mass or suspicious abdominal symptoms with fever and/or elevated white blood cell count.*
  *ACR Appropriateness Criteria, Acute abdominal pain and fever or suspected abdominal abscess, 2008
- Ultrasound (CPT®76705) may be useful in follow-up of known fluid collections, especially with catheter drainage, provided the patient is stable or improving. Serial CT scans with contrast (CPT®74160 or CPT®72193, or CPT®74177) are also appropriate.

### PACAB-4~FLANK PAIN, RULE OUT RENAL STONE

- In children, ultrasound (CPT®76770 or CPT®76775) or MR urography (MRI abdomen and pelvis, with or without contrast [CPT®74182/72196 or CPT®74181/72195]) is the best initial study to avoid radiation exposure.*
  *ACR Appropriateness Criteria, Acute onset flank pain, 2011
- CT of the abdomen and pelvis without contrast (renal stone protocol--CPT®74176) is the best imaging study in the non-pregnant patient to evaluate kidney stone.
- Serial CT scans to determine the passage or dissolution (of uric acid stones) of kidney stones are acceptable if they do not exceed three scans in a six week period.
  - If the stone has been seen on the pelvic CT portion of the CT scan, the subsequent CT scan(s) should only include the pelvis.
  - Urology evaluation can be helpful in determining the need for serial CT scans.
- Post-procedure follow-up should be performed with x-rays of the abdomen every 6 to 12 months in asymptomatic patients unless the patient had uric acid stones.*
  - Noncontrast CT abdomen and/or pelvis (CPT®74176, or CPT®74150, or CPT®72192) can be used to follow-up patients with uric acid stones.
  - CT abdomen and pelvis without and with contrast (CPT®74178) can be performed if there were surgical complications or the patient develops unusual symptoms.*

GENERAL ABDOMINAL SIGNS/SYMPTOMS (ALPHABETICAL ORDER)

PACAB-5~ACUTE GASTROENTERITIS (PEDIATRIC)

- Imaging is not indicated in pediatric acute gastroenteritis unless there is a concern for other causes of symptoms.
- Pediatric imaging in suspected gastroenteritis should begin with plain x-rays of the abdomen, including supine and left lateral decubitus views. The left lateral decubitus view is useful for the detection of air-fluid levels and for detection of gas in the rectum—to exclude obstruction.
- Ultrasound (CPT®76700 or CPT®76705) should be performed if there is suspicion for intussusception or organomegaly.
- Ultrasound (CPT®76700 or CPT®76705) may detect findings of gastroenteritis, but is not indicated for the diagnosis of gastroenteritis.
- Gastroenterology (GI) specialist evaluation is helpful, especially in evaluating patients with persistent symptoms or with gross bleeding.

References:
- CDC, Managing Acute Gastroenteritis Among Children, November 21, 2003, Vol.52, No. RR-16

PACAB-6~LEFT LOWER QUADRANT PAIN

- Pelvic ultrasound (CPT®76856) is the initial imaging study of choice for children and for females who still have ovaries or uterus intact, for detecting gynecologic abnormalities that may cause left lower quadrant pain.
- A 5 to 7 day trial of conservative therapy and close observation should be performed prior to considering advanced imaging in patients who present with mild localized abdominal pain, but without significant clinical or laboratory findings.
- CT abdomen and pelvis with contrast (CPT®74177) can be performed if pain persists or if any one of the following significant clinical findings is present:
  - severe abdominal pain
  - palpable mass on examination
  - nausea/vomiting
  - fever
  - significant abdominal tenderness to palpation
  - elevated white blood cell count
- Gastroenterology (GI) specialist evaluation is helpful in determining the appropriate diagnostic pathway in patients with mild pain and heme positive stools or rectal bleeding, since advanced imaging with CT is rarely helpful in the initial evaluation of these patients.

References:
- Am Fam Physician 2005;72:1229-1234 and 1241-1242
- ACR Appropriateness Criteria, Left lower quadrant pain, 2008

**PACAB-7~LEFT UPPER QUADRANT PAIN**

- Ultrasound (CPT®76700 or CPT®76705) should be the initial imaging study in patients who present with 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 and retroperitoneum, revised 2007*

**PACAB-8~POSTOPERATIVE PAIN WITHIN 60 DAYS FOLLOWING ABDOMINAL SURGERY**

- CT abdomen and pelvis with contrast (CPT®74177) can be performed in patients with suspected postoperative complications (e.g. bowel obstruction, abscess, anastomotic leak, etc.).

- Children should be evaluated with ultrasound (CPT®76700 or CPT®76705) initially (especially in small children or in thin older children) or with MRI abdomen and pelvis without and with contrast (CPT®74183 and CPT®72197).
  - Although MRI theoretically would be desirable to reduce radiation exposure, MRI is not practical for the timely evaluation of post-operative abscesses.
  - MRI often requires sedation, is a lengthy study, and may take several days to be performed, thus causing a significant time delay in diagnosis.

- Beyond 60 days postoperatively, see **PACAB-2 Abdominal Pain, Nonspecific**.
  *ACR Appropriateness Criteria, Suspect small bowel obstruction, 2010*
  *ACR Appropriateness Criteria, Acute abdominal pain and fever or suspected abdominal abscess, 2008*

**PACAB-9~RIGHT LOWER QUADRANT PAIN, RULE OUT APPENDICITIS**

- Children, females of childbearing age, and pregnant patients may be evaluated first with ultrasound (CPT®76700 and CPT®76856) if local expertise exists. If positive, no further diagnostic imaging is necessary. If negative or equivocal, CT abdomen and pelvis with contrast (CPT®74177) or without contrast (CPT®74176) can be performed.
  - MRI abdomen and pelvis without and with contrast (CPT®74183 and CPT®72197) or without contrast (CPT®74181 and CPT®72195) can be performed for pregnant patients or if ultrasound or CT is equivocal.

**References:**
- AJR 2004 Sept;183:671-675
- Radiology 2006 March;238(3):891-899
• If appendicitis is strongly suspected (for example, acute onset right lower quadrant pain within past 72 hours that is not improving, tenderness to palpation or guarding in right lower quadrant, rebound tenderness, elevated white blood cell count, fever), CT of the abdomen and pelvis either with contrast (CPT®74177) or without contrast (CPT®74176) should be performed in all patients except pregnant patients (see above).*

  *ACR Appropriateness Criteria, Right lower quadrant pain—suspected appendicitis, 2010

• CT abdomen and pelvis with contrast (CPT®74177) can be used to follow a known appendiceal or other intraperitoneal abscess.

• If appendicitis is not at the top of the differential diagnosis, then females who have ovaries or uterus intact and present with right lower quadrant pain should have ultrasound of the abdomen and pelvis (CPT®76700 and CPT®76856) performed initially to rule out gynecological pathology.

• If the appendix is absent, follow guidelines in: PACAB-2 Abdominal Pain, Nonspecific

### PACAB-10~RIGHT UPPER QUADRANT PAIN, RULE OUT CHOLECYSTITIS

• Right upper quadrant ultrasound (CPT®76705) is generally the initial imaging study of choice in the patient with acute right upper quadrant pain, with or without fever.
  
  o **References:**
    
    ➢ *ACR Appropriateness Criteria, Right upper quadrant pain, 2007*
    
    
    Accessed April 18, 2011

• If ultrasound is negative and/or does not provide an adequate diagnosis, CT of the abdomen with contrast (CPT®74160) can be performed.
  
  o **Reference:**
    
    ➢ *ACR Appropriateness Criteria, Right upper quadrant pain, 2010*
MISCELLANEOUS ABDOMINAL ENTITIES (ALPHABETICAL ORDER)

PACAB-11~ABDOMINAL LYMPHADENOPATHY

- Patients with lymphadenopathy localized to the abdomen and found incidentally on previous imaging without associated fever, weight loss, pain, GI bleeding, or other intraabdominal findings to raise the suspicion of malignancy, can have one follow-up CT abdomen with contrast (CPT®74160) or CT abdomen and pelvis with contrast (CPT®74177) two months following the original imaging study.
  - If enlarged lymph node(s) persist, biopsy should be considered to establish a histological diagnosis.*
  - PET scan is not generally appropriate prior to biopsy.


PACAB-12~BLUNT ABDOMINAL TRAUMA

- Significant trauma should be evaluated in the Emergency Department.
- Hemodynamically stable children who have experienced blunt abdominal trauma can be evaluated with CT abdomen and/or pelvis with contrast (CPT®74160, or CPT®72193, or CPT®74177).

ACR Appropriateness Criteria, Blunt abdominal trauma, 2008

PACAB-13~GAUCHER’S DISEASE

- See also PACPN-3 Gaucher’s Disease in the Pediatric and Congenital Peripheral Nerve Disorders Imaging Guidelines
- Imaging for follow-up:
  - Patients not on enzyme therapy: MRI abdomen without contrast (CPT®74181) and MRI lower extremity without contrast (CPT®73718) every 12 to 24 months
  - Patients on enzyme therapy:
    - Not achieved therapeutic goals: MRI abdomen without contrast (CPT®74181) and MRI lower extremity without contrast (CPT®73718) every 12 months
    - Achieved therapeutic goals: MRI abdomen without contrast (CPT®74181) and MRI lower extremity without contrast (CPT®73718) every 12 to 24 months
    - Change in dose of medication or clinical complication: MRI abdomen without contrast (CPT®74181) and MRI lower extremity without contrast (CPT®73718)
  - Patients with active bone disease may require more frequent monitoring than once a year.
• **References:**
  - [Current Medical Research and Opinion](#) 2006;22(6):1045-1064

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**PACAB-14~HERNIAS**

- Children with suspected inguinal hernia benefit from evaluation by a surgeon to confirm the diagnosis and plan appropriate treatment.
- Ultrasound (CPT®76700 or CPT®76705 and/or CPT®76856) can be helpful when physical exam is inconclusive.
- Patients with suspected inguinal or femoral hernia can be evaluated by CT pelvis with contrast (CPT®72193) or without contrast (CPT®72192) if requested by the referring surgeon to determine management.
- Patients with known or suspected Spigelian hernia (anterior abdominal wall hernia through the semilunar line), ventral hernia, or incisional hernia can be evaluated by CT of the abdomen (and pelvis if below the umbilicus) with contrast (CPT®74160 or CPT®74177) or without contrast (CPT®74150 or CPT®74176) for definitive evaluation.
- Patients with suspected recurrent hernia after hernia surgery can have CT of the abdomen (and pelvis if below the umbilicus) with contrast (CPT®74160 or CPT®74177) or without contrast (CPT®74150 or CPT®74176).

**Hiatal Hernia**
- Generally is asymptomatic and found incidentally on chest x-ray.
- Barium swallow or upper endoscopy is performed to make a definitive diagnosis.
- Ultrasound (CPT®76700 or CPT®76705) is also accurate and should be considered, especially in children, to avoid radiation.
- CT scan of the abdomen with contrast (CPT®74160) may be indicated if needed by the GI specialist or surgeon for treatment planning, especially preoperative planning.
- **Reference:**

**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:**

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**PACAB-15~LIPOMA**

- **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.
  - Imaging studies cannot make a reliable distinction between a lipoma and a liposarcoma.
  - Lesions with Hounsfield units less than -50 HU do not require additional imaging except for surgical planning.*

- Noncontrast MRI can be considered if ultrasound and/or CT are equivocal, or for preoperative planning.
  - MRI shows a discrete, homogeneous fatty mass with few or no thin septa and minimal or no areas of high T2 signal.*
    - *AJR 2004;182:733-739*
PACAB-16 ADRENAL CORTICAL LESIONS

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**PACAB-16~ADRENAL CORTICAL LESIONS**

- **PACAB-16.1 Adrenal Cortical Lesions**
  - CT of the abdomen without contrast (CPT®74150) is the imaging study of choice in patients with no history of malignancy, no symptoms, and a lesion less than 3 cm.
    - If the Hounsfield number is less than 10 HU, malignancy is unlikely and no follow-up is required.*
      *J Clin Endocrinol Metab 2005 Feb;90(2):871-877
  - If CT with washout or MRI defines the lesion as a benign lesion-adenoma, myelolipoma, hematoma or cyst, follow-up imaging is not indicated.*
    *AJR 2007;189:1119-1123
    *AJR 2008 May;190:1163-1168
  - Resection or biopsy should be considered for mass lesions larger than 46 cm or hormone-secreting tumors should be resected.*
    *ACR Appropriateness Criteria, Incidentally discovered adrenal mass, 2009
    *AJR 2005;185:684-688
  - If the lesion cannot definitely be characterized as a benign adenoma on noncontrast CT, CT of the abdomen with contrast (CPT®74160) with washout calculated can be performed to help distinguish benign adenoma from other lesions such as metastases.
    - If CT is contraindicated, chemical shift MRI (CPT®74181) can be performed.
    - Noncontrast CT (CPT®74150) and chemical shift MRI (CPT®74181) have comparable performances in the evaluation of lipid content.
    - If prior imaging is available and the lesion has been stable for at least one year, the lesion can be considered benign and no imaging follow up is indicated*
      *ACR Appropriateness Criteria, Incidentally discovered adrenal mass, 2009
  - **INDETERMINATE LESION:** CT of the abdomen with washout (CPT®74160) can be performed. MRI will not add significant information and MRI is not indicated unless there is a history of malignancy of a cell type that would reasonably spread to the adrenals or there is evidence of a hormone-secreting adrenal tumor.
    - If the lesion shows washout features of an adenoma, follow-up noncontrast CT of the abdomen (CPT®74150) can be performed in 12 months.¹
If the lesion does not show washout features of an adenoma, PET (CPT®78812 or CPT®78815) can be performed or biopsy should be considered.\(^1\)

Endocrine re-evaluation should be performed at one year.

\(^1\)J Clin Endocrinol Metab 2005;90(2);871-877

- If CT is contraindicated and MRI is indeterminate, follow-up noncontrast abdominal MRI (CPT®74181) at 3 to 6 months, and at 12 months from the initial finding of the lesion can be performed.
- **In the oncology patient**, CT without and with contrast (CPT®74170) (malignant lesions show slow enhancement with delayed washout after IV contrast) or MRI of the abdomen (contrast as requested; default CPT® code 74183) is appropriate for evaluation of an adrenal lesion.

Biopsy may be considered if pheochromocytoma is excluded.

**PACAB-16.2 Adrenal Endocrine Tumors**

- In patients with signs/symptoms of an adrenal cortical endocrine syndrome (e.g. Cushing’s syndrome, Conn’s syndrome), evaluation may include dexamethasone suppression, serum ACTH level, serum aldosterone/renin, and/or virulizing hormone levels, and 24 hour urine for adrenal hormones.*

  - Normal Values:
    - Aldosterone: 3-10 ng/dl (supine); 5-30 ng/dl (upright)
    - Cortisol: at 8am: 250-850 nmol/L  
      at 4pm: 110-390 nmol/L  
      at 10pm: 50% of 8 am value


- CT with bolus arterial phase (CPT®74160) can be performed if lab studies confirm adrenal cortical endocrine syndrome.*
  
  \(^*\)J Clin Endocrinol Metab 2008 Sept;93(9):3266-3281

- **Pheochromocytoma**

  - Signs/symptoms include flushing spells and/or poorly controlled hypertension.
  - Elevated plasma metanephrines support the diagnosis of pheochromocytoma.
  - If plasma metanephrines are not elevated, a 24-hour urine for catecholamine and metanephrine levels should be obtained prior to considering advanced imaging.
  - If catecholamine and metanephrine levels are not elevated in a 24-hour urine, then no advanced imaging is indicated unless unexplained symptoms suggestive of pheochromocytoma persist.\(^1,2\)
  - If possible, 24-hour urine for catecholamines and metanephrines should be obtained after an episode of signs/symptoms (e.g. following a hypertensive crisis).

    - Sensitivity for diagnosing pheochromocytoma is 99.7% with this approach.\(^1,2\)

Chemical shift MRI (CPT® 74181) is the preferred imaging study for possible pheochromocytoma, since the tumor lights up brightly on T2 weighted images; however MRI abdomen, contrast as requested, can be performed.

In patients with elevated catecholamines/metanephrines, great care should be exercised when considering intravenous contrast administration. These patients are known to have hypertensive crises with the bolus injection of intravenous contrast.
BOWEL (ALPHABETICAL ORDER)

PACAB-17~BOWEL OBSTRUCTION

- Plain x-rays of the abdomen (obstructive series) should be obtained as the initial study in patients with suspected bowel obstruction.
- CT of the abdomen and pelvis with contrast (CPT®74177) may be used to confirm the presence and site of an obstruction if plain x-rays are abnormal or equivocal.
- CT with contrast (CPT®74177) may also be indicated if there is a high index of suspicion for bowel obstruction (abdominal pain, vomiting, constipation, abdominal distention, failure to pass flatus), especially in patients with prior history of abdominal surgery, history of malignancy, or patients with current hernias.*
  *ACR Appropriateness Criteria, Suspected small bowel obstruction, 2010

PACAB-18~DIARRHEA/CONSTIPATION and IRRITABLE BOWEL

- Diarrhea in the absence of fever, weight loss, abnormal physical examination findings, fecal incontinence, gastrointestinal (GI) bleeding, or abnormal labs including stool analysis, should be treated conservatively initially or endoscopy should be performed.
  - Diarrhea associated with any of the above signs/symptoms may require imaging depending on the highest probable concern.
  - GI specialist consultation is helpful in determining the appropriate imaging pathway.
  - If advanced imaging is indicated, CT scan of abdomen and pelvis with contrast (CPT®74177) is appropriate.
  - References:
    - Gastroenterol 1999;116:1461-1463
    - Gastroenterol 2004;127:287-293

- Constipation in the absence of family history of inflammatory bowel disease or cancer, onset of constipation after age 50, acute onset of constipation in the elderly, GI bleeding, fever, substantial pain, vomiting, weight loss, rectal pain, abnormal lab studies, or abnormal physical examination findings should be treated conservatively and advanced imaging is not indicated.
  - Patients who fail to respond to treatment or have any of the above abnormal findings should undergo barium enema or endoscopy.
  - GI specialist consultation is helpful in determining the appropriate imaging pathway.
  - References:
    - Am Fam Physician 2002 June;65(11):2283-2290
    - J Fam Practice 2007 June;56(6 Suppl):S13-S20
  - MRI Defecography for constipation should be considered investigational. It may be appropriate if ordered for preoperative evaluation for the planning of complex pelvic reconstruction.*
    *Obstet & Gynecol 2004;103:41-46
**Constipation in Children** that is not associated with abnormal physical examination including rectal exam, abnormal laboratory studies, GI bleeding, and/or failure to thrive does not require imaging.

- With any of the above mentioned findings, the child should be evaluated with plain x-rays, ultrasound (CPT®76700 and CPT®76856), or barium enema.
- GI specialist consultation is helpful in determining the appropriate imaging pathway.*

**Bloating and/or Irritable Bowel Syndrome**

- Irritable bowel syndrome is frequently a diagnosis of exclusion and is often associated with bloating or abdominal fullness.
  - The criteria for making the clinical diagnosis include the following:
    - Abdominal pain
    - Onset of symptoms associated with a change in frequency of stool (diarrhea, constipation, or both)
    - Onset of symptoms with an associated change in the form of stool.
    - Relief of symptoms with defecation
  - If the above symptoms occur in a patient under age 50 and are associated with alarm symptoms such as fever, anemia, weight loss, GI bleeding, frequent nocturnal symptoms, or failure of a 6-8 week trial of conservative therapy, work-up should include laboratory studies and flexible sigmoidoscopy prior to considering advanced imaging.
    - Children should be evaluated with plain x-rays, ultrasound (CPT®76700 and CPT®76856), or barium enema prior to considering advanced imaging.
- GI specialist consultation is helpful in determining the appropriate imaging pathway, since advanced imaging is often not indicated in these patients.

**References:**
- *Am Fam Physician 2003 May;67(10):2157-2162*
- *Gastroenterol 2000;119:1761-1778*

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**PACAB-19~INFLAMMATORY BOWEL DISEASE, RULE OUT CROHN’S DISEASE or ULCERATIVE COLITIS**

- Colonoscopy or barium studies are the preferred imaging studies for the initial evaluation of suspected early Crohn's disease or ulcerative colitis when pathology is limited to the mucosa.
- CT of the abdomen and pelvis with contrast (CPT®74177) or CT enterography (CPT®74177) can be used to assess mesenteric and extra-intestinal extent of disease.
CT of the abdomen and pelvis with contrast (CPT®74177) or CT enterography (CPT®74177) can be used for evaluation of possible abscess, bowel perforation, fistula formation, or acute inflammation in the patient with known Crohn’s disease or ulcerative colitis and an acute exacerbation (abdominal pain).

- **PET/CT enterography:** There is insufficient data currently to generate appropriateness criteria for the use of PET/CT enterography, and this procedure should be considered investigational at this time.

- **Children <age 14 should be evaluated with CT enterography (CPT®74177) or MR enterography (CPT®74183)**

- **Endoscopic ultrasound, rectal ultrasound or pelvic MRI (CPT®72197) may be considered in the setting of rectal pathology (either inflammatory or neoplastic) to evaluate for peri-rectal involvement.**

- **Suspected small bowel Crohn’s should be initially evaluated with small bowel follow through (SBFT), barium study, and/or ileoscopy. If these are inconclusive or if obstructive disease is expected, CT enteroclysis (CPT®74176 or CPT®74177) or CT enterography (CPT®74177) may be considered.***

  *Also see [PACAB-1.2 Coding Issues](#)

- **Capsule Endoscopy (CPT®91110) may be considered if SBFT and/or ileoscopy are inconclusive, and NON-obstructive small bowel Crohn’s is present. Capsule endoscopy is particularly effective for detecting proximal and early mucosal disease.**

  * *Radiology* 2006 Jan;238(1):128-134

- **If advanced imaging is indicated, MRI Enterography (CPT®74183 and CPT®72197) may be performed, especially in young patients to avoid radiation, to monitor response to immunomodulatory agents, and to differentiate acute phase disease from remission.***

  * *Curr Opin Gastroenterol* 2008 March;24(2):135-140

- **SPECT and PET are considered investigational.***

  * *ACR Appropriateness Criteria, Crohn’s Disease, 2008*

### PACAB-20~CELIAC DISEASE (SPRUE)

- **Autoimmune disease in which the villi of the small intestine are damaged from eating gluten (found in wheat, barley, and rye).**

- **Diagnosis is made with blood tests (anti-tissue transglutaminase antibody [anti-tTG], anti-endomysium antibody [EMA], total IgA count, CBC to detect anemia, ESR, C-reactive protein, complete metabolic panel, vitamin D, E, B12 levels)**

  - The tTG and EMA tests are very accurate in the diagnosis of celiac disease. If these tests are positive, endoscopy and biopsy of the small bowel is performed to confirm the diagnosis.

- **Imaging studies:**

  - Imaging studies are generally not indicated for the majority of patients with known or suspected celiac disease.

  - In cases of refractory celiac disease, advanced imaging such as CT or enteroclysis may be indicated in order to rule out other entities such as intestinal lymphoma and other bowel cancers. These patients are usually under the care of GI specialists.
If the patient has been adherent to a gluten free diet but experiences new or continued weight loss, diarrhea, abdominal distention, or anemia, CT abdomen and pelvis with contrast (CPT®74177) can be performed.

- **Reference:**
### LIVER

#### LIVER LESION CHARACTERIZATION

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<td>21.6</td>
<td>Liver Lesion &gt;1 cm</td>
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**PACAB-21~LIVER LESION CHARACTERIZATION**

- Suspected hepatomegaly should be evaluated by ultrasound (CPT®76700 or CPT®76705) initially.
- A suspected liver lesion should be evaluated by ultrasound (CPT®76700 or 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.*
  
- 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.
- PET scan is not indicated to evaluate a liver lesion in a patient with no prior history of confirmed malignancy.
- **PACAB-21.1 Hemangioma**
  
  - If a lesion >1cm is found as an incidental finding on ultrasound or other imaging, triple phase CT (CPT®74170) is preferred to confirm a suspected hepatic hemangioma.*
    
    *Hepatology 2005 Nov;42(5):1208-1236
  
  - Triple phase CT should be avoided in young children, when possible, due to radiation considerations. Ultrasound (CPT®76700 or CPT®76705) is often diagnostic. MRI of the abdomen without and with contrast (CPT®74183) can be performed if ultrasound is not diagnostic.
  
  - Most hemangiomas are easily diagnosed with CT scan.
  
  - MRI of the abdomen without and with contrast (CPT®74183) should be reserved for equivocal lesions.
    
    - In one study, the diagnosis of hemangioma was established by ultrasound in 57% of patients, by CT scan in 73%, and by MRI in 84%.*
      
      *J Am Coll Surg 2003 Sep;197(3):392-402
CT angiography of the abdomen (CPT® 74175) is useful as a preoperative study in patients with large hemangiomas considered for resection. MRA of the abdomen (CPT® 74185) can be performed rather than CTA if requested.

**PACAB-21.2 Hepatic Adenoma or Focal Nodular Hyperplasia**
- MRI of the abdomen without and with contrast (CPT®74183) is the imaging study of choice to evaluate a possible hepatic adenoma or focal nodular hyperplasia (FNH).
- For FNH lesions being followed by serial imaging, MRI of the abdomen without and with contrast (CPT®74183) can be performed annually for 3 years. If no changes occur, imaging is discontinued.
  - Lesions greater than 3 cm should be biopsied for definitive diagnosis.*
  *AJR 2004;182:1227-1231

**PACAB-21.3 Cirrhotic Liver**
- An indeterminate liver lesion in a cirrhotic liver is best evaluated with MRI of the abdomen without and with contrast (CPT®74183).

**PACAB-21.4 Nonalcoholic Fatty Liver Disease (NAFLD)**
- Ultrasound (CPT®76700 or CPT®76705) 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

**PACAB-21.5 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 and, if stable, ultrasound (CPT®76705) should be performed every 6 to 12 months.

**PACAB-21.6 Liver Lesion ≥1 cm**
- Liver lesions ≥1cm may be evaluated by CT abdomen without and with contrast (CPT®74170) or MRI abdomen without and with contrast (CPT®74183).
- If the lesion appearance is typical of hepatocellular carcinoma (HCC), the lesion should be treated as HCC.
- If further characterization of a one centimeter or larger liver lesion found on CT is needed, MRI of the abdomen without and with contrast (CPT®74183) can be performed.
- Lesions that are unable to be characterized as either benign or typical of malignancy on CT or MRI should be biopsied.
- Lesions ≥1cm 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.
- **Reference:**
  - Hepatology 2005 Nov;42(5):1208-1236
PACAB-22~ELEVATED LIVER FUNCTION TEST (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 substances known to cause elevated LFT’s should have those substances stopped for at least 8 to 12 weeks and the LFT levels repeated prior to considering advanced imaging.
  - Examples of hepatotoxins include alcohol, niacin, sulfa, rifampin, tetracycline, estrogen, acetaminophen, etc.
- Patients with persistently elevated LFT’s or LFT’s less than three times normal should have ultrasound (CPT®76705) as the initial imaging study.
  - If a liver or pancreatic mass is seen, CT of the abdomen without and with contrast (CPT®74170) is appropriate.
  - If biliary dilatation or other nonspecific abnormality is seen, CT of the abdomen with contrast (CPT®74160) is appropriate.
- Patients with LFT’s greater than or equal to three times normal can have CT of the abdomen with contrast (CPT®74160).
- If biliary dilatation is seen on ultrasound or CT, MRCP may be appropriate.
  - Specialist evaluation can be helpful in determining the need for MRCP because ERCP is both diagnostic and therapeutic if biliary stone is a high probability.
- Patients with known cancer and suspected liver metastases should have CT of the abdomen without and with contrast (CPT®74170) or CT of the abdomen with contrast (CPT®74160) (whichever the physician prefers). Default CPT® code should be 74170.
- Patients with elevated alpha-fetoprotein (AFP) levels should have MRI of the abdomen without and with contrast (CPT®74183).
- CT of the abdomen with contrast (CPT®74160) is appropriate in patients who present with painless jaundice. MRI/MRCP are accurate but should be reserved for patients with contraindications to CT.* (See AB-32 MR Cholangiopancreatography in the adult Abdomen Imaging Guidelines for coding guidelines for MRCP performed in conjunction with abdominal MRI)
  - Specialist evaluation can be helpful in determining the need for MRCP because ERCP is both diagnostic and therapeutic if biliary stone is a high probability.
- Hemochromatosis:
  - The diagnosis is made by biopsy.
  - Specialist (GI or Hematologist) evaluation is helpful.
  - MRI abdomen without contrast (CPT®74181) is used to confirm liver iron stores and for following treatment.*

  *Hepatology 2001;33(5):1321-1328
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 (CPT®76700 or CPT®76705) initially.*
  * ACR Practice Guidelines for the Performance of an ultrasound examination of the abdomen or retroperitoneum, revised 2007
- If ultrasound is indeterminate or shows an abnormality, CT abdomen without and with contrast (CPT®74170) can be performed.*

  - In children, if ultrasound is indeterminate, MRI abdomen without and with contrast (CPT®74183) can be performed.
- If CT is indeterminate or contraindicated, MRI abdomen without and with contrast (CPT®74183) can be performed.

**Incidental Finding of Splenic Lesion(s)**

- If an incidental splenic lesion is seen on a non-abdominal imaging study (e.g. chest CT, thoracic MRI, etc.), abdominal ultrasound (CPT®76700 or CPT®76705) should be performed if the lesion has cystic qualities.
- CT abdomen (either with contrast [CPT®74160] or without and with contrast [CPT®74170]) can be performed if ultrasound is non-diagnostic or the lesion does not have cystic qualities.
- If CT is indeterminate or contraindicated, MRI abdomen without and with contrast (CPT®74183) can be performed.
- There is no evidence-based data to support performing serial CT or MRI scans to follow patients with incidental splenic lesions.

**Trauma**

- CT scans of the abdomen and pelvis without and with contrast (CPT®74178) are indicated in patients with blunt abdominal trauma with suspected splenic rupture or in patients with penetrating trauma to the left upper quadrant.
RENAL  (FLANK PAIN, RULE OUT RENAL STONE- SEE PACAB-4)

PACAB-24~INDETERMINATE RENAL LESION

- **Newly discovered renal mass >1 cm (indeterminate by the initial test)**
  - Ultrasound (CPT®76770 or CPT®76775) 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 and increased “through transmission”), no further imaging is indicated.*
      *Am Fam Physician 2001;63:288-294 and 299
  - Lesions >1 cm that are not characterized as a simple cyst by ultrasound can be evaluated by CT Abdomen without and with contrast (CPT®74170).
    - If the patient cannot tolerate intravenous contrast, then MRI of the abdomen without and with contrast (CPT®74183) is appropriate
  - If CT or MRI characterizes the lesion as benign (e.g. angiomyolipoma without calcifications) or if a biopsy makes the definitive diagnosis of angiomyolipoma, metanephric adenoma, or focal infection, then no further imaging is necessary.
  - If the initial follow-up CT or MRI is still indeterminate or if biopsy is indeterminate or nonmalignant, follow-up imaging should still be performed in 6 to 12 months (if surgery is not planned), then annually for 5 years in older patients. In younger patients, longer annual follow-up is needed.*
      *N Engl J Med 2010;362:624-634
      *Radiographics 2004;24:5101-5115
  - If a lesion has been characterized as a hyperdense renal cyst, follow-up CT scan should be performed in 3 to 6 months.

- **Newly discovered renal mass < 1 cm**
  - CT abdomen without and with contrast (CPT®74170) with ultra-thin cuts should be performed
    - If CT demonstrates a simple cyst or other benign lesion (e.g. angiomyolipoma without calcifications) or if a biopsy makes the definitive diagnosis of angiomyolipoma, metanephric adenoma, or focal infection, then no further imaging is necessary
  - If CT is indeterminate, MRI abdomen without and with contrast (CPT®74183) can be performed.
    - If MRI demonstrates a benign lesion (e.g. angiomyolipoma without calcifications) or if a biopsy makes the definitive diagnosis of angiomyolipoma, metanephric adenoma, or focal infection, then no further imaging is necessary
  - If the initial follow-up CT or MRI is still indeterminate or if biopsy is indeterminate or nonmalignant, follow-up imaging should be performed in 6 to 12 months (if surgery is not planned), then annually for 5 years in older patients. In younger patients, longer annual follow-up is needed.*
      *N Engl J Med 2010;362:624-634
      *Radiographics 2004; 24:5101-5115
  - If a lesion has been characterized as a hyperdense renal cyst, follow-up CT scan should be performed in 3 to 6 months.
RENAL

PACAB-25~RENOVASCULAR HYPERTENSION

- Doppler ultrasound (CPT® 93975 or CPT® 93976) is the most cost-effective exam for screening renovascular 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

- Other considerations for imaging evaluation:* Abdominal MRA (CPT® 74185) or CTA (CPT® 74175) may be indicated for the following:
  - Pediatric patients with hypertension, controlled or uncontrolled, to exclude fibromuscular dysplasia of the renal arteries.

PACAB-26~POLYCYSTIC KIDNEY DISEASE

- Ultrasound (CPT® 76770 or CPT® 76775) can be performed for suspected polycystic kidney disease

- Individuals at risk for autosomal dominant polycystic disease (ADPKD) should be screened by ultrasound (CPT® 76770 or CPT® 76775)*

# Renal

## Renal Pacab-27 Urinary Tract Infection

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### Pacab-27~Urinary Tract Infection (UTI)

- Urology evaluation is helpful in determining the need for advanced imaging in patients with recurrent urinary tract infections.
- Thorough diagnostic work-up includes ultrasound (CPT®76770 or CPT®76775), voiding cystourethrography (VCUG), diuretic renography, and MR urography (MRI abdomen and pelvis, contrast as requested).
- Males with first time urinary tract infection may benefit from Urology evaluation and CT urogram (CPT®74178).
- Children should be evaluated initially by ultrasound (CPT®76770 or CPT®76775), and if further imaging is indicated, MRI abdomen and pelvis (contrast as requested) can be performed.

### Pacab-27.1 Upper Urinary Tract

- Males with first time UTI (and females with first or second UTI) should undergo ultrasound evaluation (CPT®76770 or CPT®76775), as the initial imaging modality to diagnose hydronephrosis, pyonephrosis, or congenital renal anomaly.
  - If hydronephrosis is present, this should be further evaluated with voiding cystourethrography (VCUG), to evaluate for vesicoureteral reflux.
  - If the ultrasound findings are compatible with a multicystic dysplastic kidney, diuretic renography should be confirmed to evaluate function of the affected kidney or a ureteral-pelvic junction (UPJ) obstruction of the contralateral kidney.
  - If VCUG is negative, diuretic renography (using Tc-99m MAG 3) should be performed for diagnostic evaluation of upper tract dilatation.
    - Diuretic renography is also appropriate for follow-up of some children with hydronephrosis.
- Diuretic renography is the study of choice for differentiating a dilated non-obstructed urinary system from a true stenosis (e.g., UPJ obstruction; ureteral-vesical junction [UVJ] obstruction), and for quantifying renal parenchymal function.
- Magnetic resonance urography (MRU) is appropriate (where available) for investigation of a dilated upper urinary tract.
  - **Note:** MRU requires sedation in young children
- Where available, MRU can also quantitate renal function.
- Children aged 5 years or younger with febrile UTI may undergo nuclear medicine DMSA imaging (Technetium-99m-dimercaptosuccinic acid [DMSA] scintigraphy) for the diagnosis of acute pyelonephritis.
- Sensitivity of DMSA scintigraphy is much higher than ultrasound and is equivalent to CT, but at a lower radiation dose.
  - Tc-99m DMSA scintigraphy is highly sensitive for detection of acute pyelonephritis and is the reference standard for detection of post-pyelonephritic renal scarring.
  - For detection of renal scarring, DMSA scintigraphy should be performed at least 6 months after the documented upper tract UTI.
  - Power Doppler ultrasound is significantly less accurate than Tc-99m DMSA or CT for the diagnosis of acute pyelonephritis.
  - MRI is very sensitive for the detection of acute pyelonephritis, and where available, should be used in place of CT
    - **NOTE:** MRI requires sedation in young children
- **PACAB-27.2 Lower Urinary Tract**
  - Ultrasound studies in neonates or young children revealing hydronephrosis should undergo voiding cystourethrography (VCUG) for detection of possible vesico-ureteral reflux (VUR).
  - Fluoroscopic VCUG is typically performed for diagnosis and grading of VUR, and should be the first modality used for diagnosis.
  - Radionuclide cystography, because of its lower radiation burden and higher sensitivity for reflux > Grade I, is recommended for follow-up imaging of VU reflux, and investigation of VU reflux in siblings of refluxing children.
  - First time male UTI’s should be evaluated with fluoroscopic VCUG studies rather than radionuclide cystography, to visualize the male urethra for possible posterior urethral valves.
  - Radionuclide cystography may replace fluoroscopic VCUG in girls as the first time study, since urethral anatomy is rarely abnormal except in complex malformations.
  - MR urography may be used for evaluation of ectopic distal ureteral insertion, or other complex lower urinary tract anatomy.
    - **NOTE:** MR urography requires sedation in young children
- **References:**
  - *J Urol* 2003;169:2308-2311
  - *AJR* 1991;157:539-543
PACAB-28~PATENT URACHUS

- Patent urachus which is suspected due to umbilical discharge should initially be evaluated by ultrasound (CPT®76700 or CPT®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.
- CT pelvis with contrast (CPT®72193) can be performed if ultrasound is equivocal or if needed for surgical planning.
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PACAB-29~TRANSPLANT

- PACAB-29.1 Liver Transplant
  - Pre-transplant Imaging Studies
    - Individuals on the liver transplant waiting list can undergo advanced imaging per that institution’s protocol as long as the studies do not exceed the following:
      - See CD-1.2 Transplant Patients in the adult Cardiac Imaging Guidelines for guidelines on cardiac stress testing
      - If no known Hepatocellular Carcinoma:
        - Liver ultrasound (CPT®76705) with Doppler every six months
        - CT or MRI abdomen (CPT®74170 or CPT®74183) every year
        - CT chest (CPT®71260) for initial placement on the transplant list but repeat chest CT scans are not required*
        - MRI Bone Marrow Blood Supply (CPT®77084) or bone scan one time.
      - If known Hepatocellular Carcinoma:
        - Liver ultrasound (CPT®76705) with Doppler every six months
        - CT or MRI abdomen (CPT®74170 or CPT®74183) every three months
        - CT chest (CPT®71260) every six months
        - Bone scan every six months
      - If known Primary Sclerosing Cholangitis (PSC)
        - MRCP (see AB-32 MR Cholangiopancreatography in the adult Abdomen Imaging Guidelines for correct coding)
  - Preoperative studies immediately prior to liver transplant:
    - CT or MRI abdomen (CPT®74170 or CPT®74183)—if CT abdomen was most recently done while on the transplant waiting list, then MRI abdomen should be done immediately prior to transplant and vice versa
    - CT pelvis (CPT®72193)
    - CTA abdomen (CPT®74175) or MRA abdomen (CPT®74185)*
      *RadioGraphics 2004;24:1367-1380
    - CT chest (CPT®71260)
    - MRI Bone Marrow Blood Supply (CPT®77084) or bone scan

- References:
  - United Network for Organ Sharing (UNOS) Policy 3.6 Allocation of Livers.
Barnes-Jewish Hospital transplant protocols, 2010

- **Post-transplant Imaging Studies:**
  - See **CD-1.2 Transplant Patients** in the adult Cardiac Imaging Guidelines for guidelines on stress testing
  - If known **Hepatocellular Carcinoma:**
    - CT or MRI abdomen (CPT®74170 or CPT®74183) at 6 and 12 months post transplant, then every year until 5 years post-transplantation, then as clinically indicated
  - If known **Cholangiocarcinoma**:
    - Liver ultrasound (CPT®76705) every 6 months until 5 years post-transplantation
    - Chest CT (CPT®72160) every 6 months until 5 years post-transplantation
    - MRI abdomen and MRCP (CPT®74183) every 6 months until 5 years post-transplantation
  - **All other post-transplant patients:**
    - CT abdomen and pelvis without and with contrast (CPT®74178) can be performed for the following:
      - Unexplained fever, abdominal pain, anemia, bleeding, weight loss, lymphadenopathy, enlarged spleen or liver, or other suspected postoperative complication

- **Post Transplant Lymphoproliferative Disease (PTLD)**
  - Most cases of PTLD are observed in the first year following transplant
  - Frequency of developing PTLD:
    - Small bowel transplant—20% of patients are at risk of developing PTLD
    - Lung transplant—10% risk
    - Heart transplant—6% risk
    - Liver transplant—1%-3% risk
    - Kidney transplant—1%-3% risk
  - Evaluation of suspected PTLD is same as evaluation for Lymphoma (see **ONC-26 Lymphomas** in the adult Oncology/PET Imaging Guidelines). Chest/abdomen/pelvis CT with contrast (CPT®71260 and CPT®74177) can be performed. Biopsy of the involved organ should be performed if PTLD is suspected
  - **There is insufficient evidence-based data to support the routine use of imaging to screen for PTLD**

- **Reference:**
• **PACAB-29.2 Kidney Transplant**
  o **Pre-transplant Imaging Studies**
    - Individuals on the **kidney transplant waiting list** can undergo advanced imaging per that institution’s protocol as long as the studies do not exceed the following:
      - See [CD-1.2 Transplant Patients](#) in the adult Cardiac Imaging Guidelines for guidelines on cardiac stress testing
      - If stress test is positive for reversible ischemia, or if duration of diabetes is >25 years and patient has additional cardiac risk factors, then diagnostic left heart catheterization can be performed
      - Carotid duplex study (CPT®93880 bilateral study or CPT®93882 unilateral study) if there is history of stroke, TIA, or if carotid bruit is present on exam
      - Abdomen and pelvis CT scan (CPT®74176 or CPT®74177) one time
  - **Reference:**
    - Barnes-Jewish Hospital transplant protocols, 2010
  o **Post-transplant Imaging Studies**
    - Ultrasound of transplanted kidney:
      - Current ultrasound imaging protocols of the transplanted kidney commonly include a Doppler study and are coded as CPT®76776
      - Do not report non-invasive vascular codes CPT®93975 and CPT®93976 in conjunction with CPT®76776
      - Ultrasound of the transplanted kidney performed without duplex Doppler should be reported as a limited retroperitoneal ultrasound (CPT®76775)

• **PACAB-29.3 Heart Transplant**
  o See [CD-1.2 Transplant Patients](#) in the adult Cardiac Imaging Guidelines
PACAB-1~General Guidelines


PACAB-2~Abdominal Pain, Nonspecific

- ACR Practice Guidelines for the performance of an ultrasound examination of the abdomen or retroperitoneum, revised 2007.

PACAB-3~Abdominal Sepsis (Suspected Abdominal Abscess)

- ACR Appropriateness Criteria, Acute abdominal pain and fever or suspected abdominal abscess, 2008.

PACAB-4~Flank Pain, Rule Out Renal Stone


PACAB-5~Acute Gastroenteritis (Pediatric)


PACAB-6~Left Lower Quadrant Pain


PACAB-7~Left Upper Quadrant Pain

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

PACAB-8~Postoperative Pain Within 60 Days Following Abdominal Surgery

- ACR Appropriateness Criteria, Acute abdominal pain and fever or suspected abdominal abscess, 2008.

PACAB-9~Right Lower Quadrant Pain, Rule Out Appendicitis


**PACAB-10~Right Upper Quadrant Pain, Rule Out Cholecystitis**

**PACAB-11~Abdominal Lymphadenopathy**

**PACAB-12~Blunt Abdominal Trauma**

**PACAB-13~Gaucher’s Disease**

**PACAB-14~Hernias**

**PACAB-15~Lipoma**
- Gaskin CM and Helms CA. Lipomas, lipoma variants, and well-differentiated liposarcomas (atypical lipomas): results of MRI evaluations of 126 consecutive fatty masses. AJR 2004;182:733-739.

**PACAB-16~Adrenal Cortical Lesions**
- Song JH, Chaudhry FS, Mayo-Smith WW. The incidental indeterminate adrenal mass on CT (>10H) in patients without cancer: Is further imaging necessary?


**PACAB-17~Bowel Obstruction**


**PACAB-18~Diarrhea/Constipation and Bloating/Irritable Bowel**

PACAB-19~Inflammatory Bowel Disease, Rule Out Crohn’s Disease or Ulcerative Colitis


PACAB-20~Celiac Disease (Sprue)


PACAB-21~Liver Lesion Characterization

- Clouston AD, Powell BE. Nonalcoholic fatty liver disease: is all the fat bad? Internal Medicine Journal 2004;34:187-191.

PACAB-22~Elevated Liver Function Test (LFT) Levels


PACAB-23~Spleen

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

PACAB-24~Indeterminate Renal Lesion


**PACAB-25~Renovascular Hypertension**


**PACAB-26~Polycystic Kidney Disease**


**PACAB-27~Urinary Tract Infection (UTI)**


**PACAB-29~Transplant**

**PACAB-29.1~Liver Transplant**

- Barnes-Jewish Hospital transplant protocols, 2010

**PACAB-29.2~KidneyTransplant**

- Barnes-Jewish Hospital transplant protocols, 2010
The Pelvis Imaging Guidelines are the same for both the pediatric population and the adult population, unless there are specific guidelines listed here in the Pediatric and Congenital Pelvis Imaging Guidelines.

Pelvic imaging begins at the umbilicus and extends to the pubis.

Prior to considering advanced imaging, 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 ultrasound.

Transvaginal ultrasound (TV) (CPT®76830) is the optimal study to evaluate pelvic pathology in the sexually active female. Transabdominal ultrasound (CPT®76856 or CPT®76857) is performed in all other pediatric patients and can also be performed, if requested, as a complimentary study to the TV ultrasound.

- **Ultrasound-guided Procedures:**
  - CPT® 76942 is used to report imaging guidance for needle placement during biopsy, aspiration, and other percutaneous procedures.

- **Coding for ultrasound examination of a soft tissue mass:**
  - Pelvic wall—CPT®76857
  - Buttocks—CPT®76857
  - Penis—CPT®76857
  - Groin—CPT®76882
  - Perineum—CPT®76857
  - Other soft tissue areas- CPT®76999

To avoid radiation exposure, pediatric imaging should consider the use of ultrasound or MRI where it is a clinical option.

- MRI without contrast (CPT®72195) is the usual modality to view the pelvis.
- MRI without and with contrast (CPT®72197) is appropriate for evaluating the ovary or retroperitoneum.
- MRI of the pelvis with contrast only is essentially never performed. If contrast is indicated, MRI pelvis without and with contrast (CPT®72197) should be performed.

- **MR-guided Procedures:**
  - CPT® 77021 is used to report imaging guidance for needle placement during biopsy, aspiration, and other percutaneous procedures.

If CT is performed, CT with contrast (CPT®72193) is the usual modality unless there is a contrast allergy or the study is looking for a renal stone in the lower pelvis.

- **CT-guided Procedures:**
  - CPT® 77012 is used to report imaging guidance for needle placement during biopsy, aspiration, and other percutaneous procedures.

Pelvic CT or MRI may be indicated to further evaluate abnormalities seen on other imaging modalities such as plain x-rays, ultrasound, etc. if the results will affect patient management decisions and/or the results will assist in planning surgery.
• If a prior imaging study has been completed for a condition, a follow-up study for the same condition is generally not indicated unless there has been a change in the patient’s condition or previous imaging results showed an indeterminate finding.

**PELVIC SIGNS AND SYMPTOMS — FEMALE**

### PACPV-2~ABNORMAL UTERINE BLEEDING

- Initial evaluation includes pelvic ultrasound (CPT® 76856 or CPT® 76857 and/or CPT® 76830 [transvaginal]).
  - Teenage girls with normal ultrasound exam and continued abnormal uterine bleeding should be treated conservatively with hormone therapy. If there is failure to respond to this treatment, evaluation by biopsy is indicated.
- MRI pelvis without contrast (CPT® 72195) is indicated only if transvaginal ultrasound is unable to differentiate a submucous myoma from a polyp and the MRI results will affect surgical planning as stated by the surgeon.
- **References:**
  - Management of Abnormal Uterine Bleeding. Slide presentation modified from: APGO Educational Series on Women’s Health Issues

### PACPV-3~AMENORRHEA

- Girls with amenorrhea and delayed puberty who are not sexually active should be evaluated initially with transabdominal ultrasound (CPT® 76856 or CPT® 76857).
  - Otherwise, initial imaging should be by pelvic ultrasound (CPT® 76856 or CPT® 76857 and/or CPT® 76830 [transvaginal]) to look for genital and urinary tract abnormalities.
  - Congenital anomalies of the uterus and urinary system may require advanced imaging with MRI of the abdomen and pelvis (contrast as requested) in order to better define complex anatomy, especially for preoperative planning in girls with hydrocolpos (distension of the vagina by fluid due to congenital vaginal obstruction) or hematocolpos (distention of the vagina by blood due to congenital vaginal obstruction).
- Suspicion of a hormonally active adrenal tumor should be evaluated using PACAB-16.2 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 CPT® 76857 and/or CPT® 76830 [transvaginal]) 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-27.1 Pituitary Microadenomas in the adult Head Imaging 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 (intraperitoneal scarring and adhesions)
  - Diagnosis is made using pelvic ultrasound (CPT®76856 or CPT®76857 and/or CPT®76830 [transvaginal]) with/without saline infusion.
- 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 CPT®76705) and pelvis (CPT®76856 or CPT®76857 and/or CPT®76830 [transvaginal]).
- Patients with absent uterus or foreshortened vagina should have karyotype evaluation.
- Advanced imaging 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 is not indicated.

**Reference:**

**PACPV-4~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 CPT®76857 and/or CPT®76830 [transvaginal]) is the primary screening modality for imaging the female pelvis.
  - Pelvic ultrasound (CPT®76856 or CPT®76857 and/or CPT®76830 [transvaginal]) along with color Doppler ultrasound is the diagnostic procedure of choice for the initial evaluation of suspected adenomyosis and is useful to evaluate other potential etiologies of the 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 pelvis without contrast (CPT®72195) can be performed.

### PACPV-5~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) is the initial imaging study of choice in the sexually active female. Transabdominal ultrasound (CPT®76856 or CPT®76857) can be performed in all other pediatric patients, and if requested as a complimentary study to the TV ultrasound.
  - Color Doppler ultrasound may be helpful in selected situations.
- **MRI of the pelvis (CPT®72197 or CPT®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:**
- **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.**

### PV-5.1 Simple Adnexal Cysts

- If ultrasound classifies an adnexal mass as a simple or thin walled cystic mass or follicular cyst (ovarian) or tubular cystic mass (fallopian tube):
  - Repeat pelvic ultrasound (CPT®76856 or CPT®76857 and/or CPT®76830 [transvaginal]) is recommended whenever there is uncertainty in the diagnosis. Simple cysts up to 10 cm in diameter
as measured by ultrasound are almost universally benign and may safely be followed without intervention.

- **Follow-up** should be with pelvic ultrasound (CPT®76856 or CPT®76857 and/or CPT®76830 [transvaginal]) every year for lesions ≤ 7 cm and every 6 months for lesions greater than 7 cm but ≤10 cm.
- 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.

**References:**
- *Radiology* 2010;256(3):943-954

**PV-5.2 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 girls 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 possible surgery for tubo ovarian abscess, medical treatment or surgery for ectopic pregnancy, surgery for ovarian torsion, and expectant management for most ruptured ovarian cysts.
    - Appropriate evaluation includes a history and physical examination, quantitative beta hCG, CBC, and pelvic ultrasound (CPT®76856 or CPT®76857 and/or CPT®76830 [transvaginal]). Additional studies such as serial hematocrit measurements and appropriate cultures may also be indicated.
  - Ultrasound characteristics usually suggest the diagnosis, and in girls, a follow up ultrasound (CPT®76856 or CPT®76857 and/or CPT®76830 [transvaginal]) can be done in six to twelve weeks or following a menstrual cycle to evaluate for resolution.
  - A pregnancy test is important to narrow the differential diagnosis.
  - If follow-up imaging confirms a hemorrhagic cyst that has not completely resolved, a repeat ultrasound (CPT®76856 or CPT®76857 and/or CPT®76830 [transvaginal]) can be performed in 6 months (sooner if new symptoms occur).
Rarely, young women with acute symptoms may have a malignancy. These are often germ cell tumors.

- Evaluation for tumor markers specific for many germ cell tumors, including beta hCG, AFP, and LDH, should be performed.
- If tumor markers are elevated or the mass is suspicious for primary ovarian cancer by ultrasound (ultrasound shows solid areas or excrescences, greater than 3 mm irregular septations, nodule with Doppler-detected blood flow, 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/PET Imaging guideline.

- Advanced imaging such as MRI of the pelvis (CPT®72197 or CPT®72195 if pregnant) should be considered only if classification of the ovarian mass will affect patient management decisions.

**References:**

- Radiology 2010;256(3):943-954

**Other Adnexal Masses:**

- **Endometrioma**
  - Initial follow-up ultrasound (CPT®76856 or CPT®76857 and/or CPT®76830 [transvaginal]) can be performed at 6 to 12 weeks and then every 6 months if not surgically resected.

- **Dermoids**
  - Once the diagnosis is confirmed by ultrasound (CPT®76856 or CPT®76857 and/or CPT®76830 [transvaginal]), or CT (CPT®72194) or MRI (CPT®72195 or CPT®72197), if surgical resection is not performed, then follow-up ultrasound (CPT®76856 or CPT®76857 and/or CPT®76830 [transvaginal]) can be obtained once a year.

- **Hydrosalpinxes or peritoneal cysts**
  - Individualized follow-up as clinically indicated

**Reference:**

- Radiology 2010;256(3):943-954

**PV-5.3 Screening for Ovarian Cancer**

- See **ONC-20 Ovarian Cancer** in the adult Oncology and PET Imaging Guidelines
- Screening is done by TV ultrasound.
PACPV-6~ENDOMETRIOSIS

- Endometriosis is a surgical diagnosis and imaging is of little value unless the pelvic clinical exam is abnormal.
- Pelvic ultrasound (CPT®76856 or CPT®76857 and/or CPT®76830 [transvaginal]) is the first line diagnostic exam for suspected endometriosis*.
  
  *Hum Reprod 2007;22(12):3092-3097
- In most patients, 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 is helpful in detecting rectal involvement and has been shown to accurately detect rectovaginal endometriosis and cul-de-sac obliteration in the more than 90% of cases when sonographic gel was inserted in the vagina and rectum. MRI can also 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
  *Hum Reprod 1999 April;14(4):1080-1086
  *Fertil Steril 2005;83:442-447

PACPV-7~PELVIC INFLAMMATORY DISEASE (PID)

- Ultrasound (CPT®76856 or CPT®76857 and/or CPT®76830 [transvaginal]) is the initial study for imaging of pelvic inflammatory disease (PID) that does not respond well to antibiotic therapy, or for complicated PID.
- In rare cases where there is extensive abscess formation as determined by ultrasound, CT of the abdomen and pelvis with contrast (CPT®74177) may be helpful.
- If a CT-guided percutaneous drainage procedure is planned, then CPT®77012 (CT guidance for needle placement) should be used rather than the CPT® code for diagnostic CT scan of the abdomen and pelvis.

PACPV-8~POLYCYSTIC OVARY SYNDROME

- The most common hormonal disorder among women of reproductive age
- One of the leading causes of infertility
- Ovaries are often enlarged and contain numerous small cysts located along the outer edge of each ovary
- Signs and symptoms may include:
• anovulation resulting in infrequent or prolonged menstrual periods
• excessive amounts or effects of androgenic (masculinizing) hormones (e.g. excess hair growth)
• acne
• obesity

• Diagnostic work up:
  o History, specifically menstrual pattern, obesity, hirsutism, and absence of breast discharge
  o Pelvic ultrasound (CPT®76856 or CPT®76857 and/or CPT®76830 [transvaginal])
    ➢ Diagnosis is confirmed if ultrasound shows 12 or more small follicles measuring 2 to 9 mm in diameter in at least one ovary or a total ovarian volume of >10 cm³*
  o Serum levels of androgens. Free testosterone level is thought to be the best measure.

• Advanced imaging is not indicated for the diagnosis or follow up of Polycystic Ovary Syndrome unless elevated serum levels of androgens are found and an adrenal etiology is suspected. In that circumstance, CT with bolus arterial phase (CPT®74160) can be performed.
  o Also see AB-21.2 Adrenal Endocrine Tumors in the Abdomen Imaging Guidelines

PACPV-9~PELVIC PAIN/DYSpareunia, Female

• Complete clinical pelvic examination and pelvic ultrasound (CPT®76856 or CPT®76857 and/or CPT®76830 [transvaginal]) are indicated for the initial evaluation of pelvic pain/dyspareunia.

• Pelvic pain/dyspareunia 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 CPT®76857 and/or CPT®76830 [transvaginal]).
  o If pelvic 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 to considering advanced imaging.
  o CT pelvis with contrast (CPT®72193) is only appropriate if TV ultrasound has equivocal findings.*
  o Pelvic ultrasound (CPT®76856 or CPT®76857 and/or CPT®76830 [transvaginal]) with color Doppler (CPT®93975 or CPT®93976) should be performed if ovarian torsion is a consideration.
  *ACOG Practice Bulletin No. 51: Chronic pelvic pain; March 2004 (Reaffirmed 2010)

• Chronic Pelvic Pain
  o Evaluation should include, but is not limited to, urine culture and cultures for sexually transmitted diseases.
Diagnostic studies should include pelvic ultrasound (CPT®76856 or CPT®76857 and/or CPT®76830 [transvaginal]) with color Doppler, laparoscopy, and/or diagnostic bladder studies.

Treatment should include, but is not limited to, antibiotics, pain management, ovarian suppression.

If pelvic congestion is suspected or for further evaluation of unexplained chronic pelvic pain, an interventional radiologist may request the following imaging studies for pre-procedure planning for pelvic vessel embolization:
- Pelvic MRI (CPT®72195) and/or pelvic MRV (CPT®72198), or
- Pelvic CT (CPT®72193) and/or pelvic CTV (CPT®72191)

References:
- Stein B. Diagnosis and management of pelvic congestion syndrome and varicoceles. pp. 1-11
- Prostate Cancer and Prostatic Dis 2009;12(2):177-183

Interstitial Cystitis/Bladder Pain Syndrome (IC/BPS)

Definition: An unpleasant sensation (pain, pressure, discomfort) perceived to be related to the urinary bladder, associated with lower urinary tract symptoms of more than six weeks duration, in the absence of infection or other identifiable causes*

*Neurourology and Urodynamics 2009;28:274

Work-up should include history, physical exam, laboratory exam (urinalysis and urine culture), and measurement of post void residual urine by bladder catheterization or by ultrasound (CPT®76856 or CPT®76857 or CPT®76830 [female])
- A trial of antibiotics is appropriate when infection is suspected
- Cystoscopy and/or urodynamics should be considered when the diagnosis is in doubt, but are not necessary for making the diagnosis in uncomplicated presentations.

Advanced Imaging:
- CT abdomen and/or pelvis, contrast as requested, may be indicated for the following:
  - nondiagnostic ultrasound or abnormality on ultrasound that requires further evaluation
  - evaluation of complicated IC/BPS (when ordered by the urologist, surgeon, urogynecologist, or other specialist)
- MRI abdomen and/or pelvis, contrast as requested, may be indicated for the following:
  - evaluation of equivocal results on CT

Reference:
Pelvic ultrasound (CPT®76856 or CPT®76857 and/or CPT®76830 [transvaginal]) is the preferred screening procedure for leiomyomata.

Abnormal uterine bleeding from suspected submucous leiomyoma can be evaluated by MRI pelvis without contrast (CPT®72195) if imaging is needed for surgical planning.  

*J Postgrad Med 1992;38:62*

Preoperative ultrasound (CPT®76856 or CPT®76857 and/or CPT®76830 [transvaginal]) should be performed prior to myomectomy.

- If ultrasound is indeterminate, MRI pelvis without contrast (CPT®72195) may be considered if requested by the operating surgeon for surgical planning.
- MRI pelvis without and with contrast (CPT®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.*

*Mathet Gynecol Surv 2002;57:810-815*

MRA pelvis (CPT®72198) can be considered if it is necessary for preprocedural planning and is requested by the interventional radiologist planning the arterial embolization.

There are currently no published guidelines regarding follow up MRI in patients who have undergone uterine artery embolization.

- There are no compelling evidence-based data to support the need for follow up MRI in asymptomatic patients who are status post uterine artery embolization.
- In patients with persistent or recurrent symptoms such as continued abnormal bleeding, pain, or pelvic pressure, pelvic ultrasound (CPT®76856 or CPT®76857 and/or CPT®76830 [transvaginal]) should be performed as the initial imaging study.
  - If ultrasound is equivocal, pelvic MRI without and with contrast (CPT®72197) can be performed.
- In patients with fever, pain, or other acute symptoms status post embolization, pelvic MRI without and with contrast (CPT®72197) can be performed.

*J Vasc Interv Radiol 2004;15:115-120*
PACPV-11~PERIURETHRAL CYSTS and URETHRAL DIVERTICULA

- Symptomatic infection of congenital periurethral glands can result in urethral diverticula. 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®76856 or CPT®76857 and/or CPT®76830 [transvaginal]), voiding cytourethrography, or retrograde urethography are equivocal.*

*ACR Appropriateness Criteria, Recurrent lower urinary tract infections in women, 2011

PACPV-12~FETAL MRI

- Ultrasound (ideally performed at a tertiary care center) remains the predominate modality for evaluating disorders related to the fetus and pregnancy overall. MRI is used as an adjunct to ultrasound in evaluating fetal abnormalities.
  - Also see MedSolutions Obstetrical Ultrasound Imaging Guidelines 2011

- Fetal MRI is appropriately reported as an MRI of the pelvis (CPT®72195).

- **Central Nervous System Evaluation:** MRI is used if ultrasound is equivocal and additional information is needed for counseling purposes.¹

- **Non-Central Nervous System Anomalies:** MRI may be used if needed for surgical planning.

- The use of MRI for evaluating fetal size (estimating weight), growth restriction, dystocia, or amniotic fluid volume as compared to ultrasound has not been established.¹

- The use of MRI to evaluate placenta accreta or any placenta implantation has not been established to be superior to ultrasound.¹

- Functional MRI in pregnancy has not been established.¹

- MRI is helpful in the antenatal evaluation of conjoined twins in whom postnatal separation is being anticipated.

- **Reference:**
  - ¹Obstetrics & Gynecology 2008;112:145-157
PELVIC SIGNS AND SYMPTOMS — MALE

PACPV-13~PENIS—SOFT TISSUE MASS

- Soft-tissue lesions of the penis should be evaluated initially by high resolution Doppler ultrasound (CPT®76857).
- 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:

PACPV-14~SCROTAL PATHOLOGY

- Acute scrotal pain, masses, trauma, inguinal hernia, varicocele, or inflammation should be evaluated by Doppler ultrasound (CPT®76870 and/or CPT®93975 or CPT®93976) of the scrotum. MRI of the pelvis (CPT®72197) can be considered if ultrasound is inconclusive, but must be performed within a short time frame.*
  *ACR Appropriateness Criteria, Acute onset of scrotal pain—without trauma, without antecedent mass, 2011

- Testicular microlithiasis
  - Co-exists with testicular tumors in 5%-10% of patients.
  - Unknown whether there is an increased risk of tumor development in patients with pre-existing microcalcifications
  - There is no consensus on appropriate follow-up imaging if testicular microlithiasis is found. Most commonly, annual ultrasound (CPT®76870) is recommended.

- Ultrasound Coding
  - CPT®76870 Ultrasound of scrotum and contents
  - CPT®93975 Duplex scan of arterial inflow and venous outflow of abdominal, pelvic, scrotal contents and/or retroperitoneal organs; complete study
  - CPT®93976 Duplex scan of arterial inflow and venous outflow of abdominal, pelvic, scrotal contents and/or retroperitoneal organs; limited study
    - CPT®93975 and CPT®93976 should not be reported together during the same session

PACPV-15~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 CPT® 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.


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**PACPV-16 INCONTINENCE**

### PACPV-16.1 Urinary Incontinence

- **Types of incontinence**
  - **Stress incontinence**: associated with impaired sphincter function. Results in inability to retain urine when pressure is raised, as in coughing or sneezing.
  - **Urgency incontinence**: associated with detrusor muscle in the wall of the bladder. Involuntary loss of urine associated with the sensation of a sudden compelling urge to void.
  - **Mixed stress and urgency incontinence**
  - **Neurogenic urinary incontinence**

- **Initial work-up of non-neurogenic incontinence**:  
  - History, physical examination, urine cultures
  - Measurement of post void residual urine by bladder catheterization or by ultrasound (CPT® 76856 or CPT® 76857 or CPT® 76830 [female])
  - Video-urodynamic study may be indicated

- **Complicated incontinence**:  
  - Defined as recurrent or total incontinence, incontinence that has failed conservative treatment, or incontinence associated with any of the following:
    - pain
    - hematuria
    - recurrent infection
    - significant voiding symptoms such as pain or dysuria
    - radical pelvic surgery
    - suspected fistula
    - suspected mass
    - pelvic or prostate irradiation
  - Complicated incontinence requires specialist evaluation (urologist, surgeon, urogynecologist) to determine the appropriate work-up, including the need for imaging studies.

- **Initial work-up of neurogenic urinary incontinence**: 

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- History, physical examination
- Ultrasound of the urinary tract (CPT®76770 or CPT®76775)
- Urodynamic studies
  - **Possible etiology of neurogenic urinary incontinence:**
    - Suprapontine cerebral lesion (e.g. Parkinson’s disease, stroke, multiple sclerosis)
    - Suprasacral infrapontine spinal cord lesion (e.g. trauma, multiple sclerosis)
    - Peripheral nerve lesion (e.g. radical pelvic surgery, conus/cauda equine lesion such as lumbar disc prolapse)
  - **Advanced imaging for evaluation of incontinence:**
    - CT abdomen and/or pelvis, contrast as requested, may be indicated for the following:
      - nondiagnostic ultrasound or abnormality on ultrasound that requires further evaluation
      - evaluation of complicated incontinence (when ordered by the urologist, surgeon, urogynecologist, or other specialist)
      - suspected fistulae
      - detecting ectopic ureters if ultrasound is nondiagnostic
      - pre-operative planning when ordered by the operating physician
    - MRI abdomen and/or pelvis, contrast as requested, may be indicated for the following:
      - evaluation of equivocal results on CT
      - evaluation of pelvic floor anatomy and pelvic organ prolapse
      - pre-operative planning when ordered by the operating physician
    - MRI may be indicated for evaluation of the brain, spine, or other regions of the nervous system in neurogenic urinary incontinence
    - Dynamic MRI or abdomen and/or pelvis may be indicated for the following:
      - pre-operative planning when ordered by the operating physician
      - persistent incontinence following surgery
  - **References:**
    - *BJU Int* 2005;95(5):699-703
    - *AJR* 2003;180:1037-1044

**PACPV-16.2 Fecal Incontinence**
- Evaluation for individuals without CNS or spinal cord pathology:
  - History, physical examination
  - Transanal, endoanal or transrectal ultrasound (CPT®76872) to evaluate the anal sphincter.
  - Anal manometry
- Pudendal nerve terminal motor latency
- EMG
- Defecography is an x-ray imaging study using barium. It can be used for the planning of rectocele and enterocele repair.
- **MR defecography**—there are currently insufficient evidence-based data to generate appropriateness criteria for MR defecography.
- MRI pelvis without and with contrast (CPT®72197) or MRI colpocystography may be useful for surgical planning prior to anal sphincter surgery when external sphincter atrophy is suspected due to negative or equivocal Pudendal Nerve Terminal Latency. The need for MRI should be determined by the operating surgeon.*
  *Am J Gastroenterol 2004;99(8):1585-1604

**References:**

**Evaluation for individuals with suspected or known CNS or spinal cord pathology:**
- Specialist consultation is helpful in determining the need for advanced imaging.
PEDIATRIC AND CONGENITAL PELVIS IMAGING GUIDELINE REFERENCES

PACPV-2~Abnormal Uterine Bleeding

PACPV-3~Amenorrhea

PACPV-5~Suspected Adnexal Mass

PACPV-6~Endometriosis

PACPV-8~Polycystic Ovary Syndrome

PACPV-9~Pelvic Pain/Dyspareunia, Female
- ACOG Practice Bulletin No. 51:Chronic pelvic pain March 2004 (Reaffirmed 2010).
- Stein B. Diagnosis and management of pelvic congestion syndrome and varicoceles. pp. 1-11.
- Shoskes DA, Nickel JC, Rackley RR, and Pontari MA. Clinical phenotyping in chronic prostatitis/chronic pelvic pain syndrome and interstitial cystitis: A management


**PACPV-10~Leiomyomata**

**PACPV-11~Periurethral Cysts and Urethral Diverticula**

**PACPV-12~Fetal MRI**

**PACPV-13~Penis—Soft Tissue Mass**

**PACPV-14~Scrotal Pathology**

**PACPV-15~Undescended Testis**

**PACPV-16~Incontinence**

**PACPV-16.1 Urinary Incontinence**

**PACPV-16.2 Fecal Incontinence**

