eviCore healthcare Clinical Decision Support Tool Diagnostic Strategies: 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.

PEDIATRIC ABDOMEN IMAGING GUIDELINES

Version 18.0; Effective 03-18-2016

This version incorporates accepted revisions prior to 12/31/15

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<table>
<thead>
<tr>
<th>Pediatric ABDOMEN Imaging Guidelines</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PEDAB-1~General Guidelines</td>
<td>3</td>
</tr>
<tr>
<td>PEDAB-2~Generalized Abdominal Pain</td>
<td>11</td>
</tr>
<tr>
<td>PEDAB-3~Right Lower Quadrant Pain</td>
<td>13</td>
</tr>
<tr>
<td>PEDAB-4~Flank Pain, Rule Out Renal Stone</td>
<td>14</td>
</tr>
<tr>
<td>PEDAB-5~Urinary Tract Infection</td>
<td>15</td>
</tr>
<tr>
<td>PEDAB-6~Pediatric Acute Gastroenteritis</td>
<td>18</td>
</tr>
<tr>
<td>PEDAB-7~Hematuria</td>
<td>19</td>
</tr>
<tr>
<td>PEDAB-8~Right Upper Quadrant Pain</td>
<td>20</td>
</tr>
<tr>
<td>PEDAB-9~Inflammatory Bowel Disease, Crohn Disease, or Ulcerative Colitis</td>
<td>21</td>
</tr>
<tr>
<td>PEDAB-10~Abdominal Sepsis (Suspected Abdominal Abscess)</td>
<td>22</td>
</tr>
<tr>
<td>PEDAB-11~Postoperative Pain Within 60 Days Following Abdominal Surgery</td>
<td>22</td>
</tr>
<tr>
<td>PEDAB-12~Constipation, Diarrhea, and Irritable Bowel Syndrome</td>
<td>23</td>
</tr>
<tr>
<td>PEDAB-13~Abdominal Mass</td>
<td>24</td>
</tr>
<tr>
<td>PEDAB-14~Renovascular Hypertension</td>
<td>25</td>
</tr>
<tr>
<td>PEDAB-15~Liver Lesion Characterization</td>
<td>27</td>
</tr>
<tr>
<td>PEDAB-16~Pediatric Liver Failure and Cirrhosis</td>
<td>28</td>
</tr>
<tr>
<td>PEDAB-17~Adrenal Lesions</td>
<td>29</td>
</tr>
<tr>
<td>PEDAB-18~Hemochromatosis</td>
<td>31</td>
</tr>
<tr>
<td>PEDAB-19~Indeterminate Renal Lesion</td>
<td>32</td>
</tr>
<tr>
<td>PEDAB-20~Polycystic Kidney Disease</td>
<td>33</td>
</tr>
<tr>
<td>PEDAB-21~Blunt Abdominal Trauma</td>
<td>33</td>
</tr>
<tr>
<td>PEDAB-22~Hernias</td>
<td>33</td>
</tr>
<tr>
<td>PEDAB-23~Abdominal Lymphadenopathy</td>
<td>33</td>
</tr>
<tr>
<td>PEDAB-24~Left Upper Quadrant Pain</td>
<td>34</td>
</tr>
<tr>
<td>PEDAB-25~Spleen</td>
<td>34</td>
</tr>
<tr>
<td>PEDAB-26~Intussusception</td>
<td>35</td>
</tr>
<tr>
<td>PEDAB-27~Bowel Obstruction</td>
<td>35</td>
</tr>
<tr>
<td>PEDAB-28~Left Lower Quadrant Pain</td>
<td>36</td>
</tr>
<tr>
<td>PEDAB-29~Celiac Disease (Sprue)</td>
<td>37</td>
</tr>
<tr>
<td>PEDAB-30~Transplant</td>
<td>37</td>
</tr>
<tr>
<td>PEDAB-31~Gaucher’s Disease</td>
<td>37</td>
</tr>
</tbody>
</table>
# Procedure Codes Associated with Abdomen Imaging

<table>
<thead>
<tr>
<th>Procedure Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRI</td>
<td>Abdomen MRI without contrast 74181</td>
</tr>
<tr>
<td>MRI</td>
<td>Abdomen MRI with contrast (rarely used) 74182</td>
</tr>
<tr>
<td>MRI</td>
<td>Abdomen MRI without and with contrast 74183</td>
</tr>
<tr>
<td>MRI</td>
<td>Unlisted MRI procedure (for radiation planning or surgical software) 76498</td>
</tr>
<tr>
<td>MRA</td>
<td>Abdomen MRA 74185</td>
</tr>
<tr>
<td>CT</td>
<td>Abdomen CT without contrast 74150</td>
</tr>
<tr>
<td>CT</td>
<td>Abdomen CT with contrast 74160</td>
</tr>
<tr>
<td>CT</td>
<td>Abdomen CT without and with contrast 74170</td>
</tr>
<tr>
<td>CT</td>
<td>Abdomen/Pelvis CT without contrast 74176</td>
</tr>
<tr>
<td>CT</td>
<td>Abdomen/Pelvis CT with contrast 74177</td>
</tr>
<tr>
<td>CT</td>
<td>Abdomen/Pelvis CT without and with contrast 74178</td>
</tr>
<tr>
<td>CT</td>
<td>CT Guidance for Needle Placement (Biopsy, Aspiration, Injection, etc.) 77012</td>
</tr>
<tr>
<td>CT</td>
<td>CT Guidance for and monitoring of Visceral Tissue Ablation 77013</td>
</tr>
<tr>
<td>CT</td>
<td>CT Guidance for Placement of Radiation Therapy Fields 77014</td>
</tr>
<tr>
<td>CT</td>
<td>Unlisted CT procedure (for radiation planning or surgical software) 76497</td>
</tr>
<tr>
<td>CTA</td>
<td>Abdomen CTA 74175</td>
</tr>
<tr>
<td>CTA</td>
<td>Abdomen/Pelvis CTA 74174</td>
</tr>
<tr>
<td>Nuclear Medicine</td>
<td>PET Imaging: limited area (this code not used in pediatrics) 78811</td>
</tr>
<tr>
<td>Nuclear Medicine</td>
<td>PET Imaging: skull base to mid-thigh (this code not used in pediatrics) 78812</td>
</tr>
<tr>
<td>Nuclear Medicine</td>
<td>PET Imaging: whole body (this code not used in pediatrics) 78813</td>
</tr>
<tr>
<td>Nuclear Medicine</td>
<td>PET with concurrently acquired CT; limited area (this code rarely used in pediatrics) 78814</td>
</tr>
<tr>
<td>Nuclear Medicine</td>
<td>PET with concurrently acquired CT; skull base to mid-thigh 78815</td>
</tr>
<tr>
<td>Nuclear Medicine</td>
<td>PET with concurrently acquired CT; whole body 78816</td>
</tr>
<tr>
<td>Nuclear Medicine</td>
<td>Adrenal Nuclear Imaging Cortex and/or Medulla 78075</td>
</tr>
<tr>
<td>Service Description</td>
<td>Code</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>Spleen Imaging Only with or without Vascular Flow</td>
<td>78185</td>
</tr>
<tr>
<td>Liver Imaging Static</td>
<td>78201</td>
</tr>
<tr>
<td>Liver Imaging with Vascular Flow</td>
<td>78202</td>
</tr>
<tr>
<td>Liver Imaging SPECT</td>
<td>78205</td>
</tr>
<tr>
<td>Liver Imaging SPECT with Vascular Flow</td>
<td>78206</td>
</tr>
<tr>
<td>Liver and Spleen Imaging Static</td>
<td>78215</td>
</tr>
<tr>
<td>Liver and Spleen Imaging with Vascular Flow</td>
<td>78216</td>
</tr>
<tr>
<td>Hepatobiliary System Imaging, Including Gallbladder When Present</td>
<td>78226</td>
</tr>
<tr>
<td>Hepatobiliary System Imaging, Including Gallbladder When Present; with Pharmacologic Intervention, Including Quantitative Measurement(s) When Performed</td>
<td>78227</td>
</tr>
<tr>
<td>Gastric Mucosa Imaging</td>
<td>78261</td>
</tr>
<tr>
<td>Gastroesophageal Reflux Study</td>
<td>78262</td>
</tr>
<tr>
<td>Gastric Emptying Study</td>
<td>78264</td>
</tr>
<tr>
<td>Schilling Test</td>
<td>78270</td>
</tr>
<tr>
<td>B-12 Absorption with Intrinsic Factor</td>
<td>78271</td>
</tr>
<tr>
<td>GI Bleeding Scintigraphy</td>
<td>78278</td>
</tr>
<tr>
<td>Gastrointestinal Protein Loss</td>
<td>78282</td>
</tr>
<tr>
<td>Intestinal Imaging</td>
<td>78290</td>
</tr>
<tr>
<td>Peritoneal-Venous Shunt Patency</td>
<td>78291</td>
</tr>
<tr>
<td>Kidney Imaging (Nuclear) Static</td>
<td>78700</td>
</tr>
<tr>
<td>Kidney Imaging (Nuclear) with Vascular Flow</td>
<td>78701</td>
</tr>
<tr>
<td>Kidney Image with Function Study (Imaging Renogram)</td>
<td>78704</td>
</tr>
<tr>
<td>Kidney Flow and Function, Single Study without Pharmacologic Intervention</td>
<td>78707</td>
</tr>
<tr>
<td>Kidney Imaging with Vascular Flow and Function with Pharmacological Intervention, Single</td>
<td>78708</td>
</tr>
<tr>
<td>Kidney Imaging with Vascular Flow and Function with and without Pharmacological Intervention, Multiple</td>
<td>78709</td>
</tr>
<tr>
<td>Kidney Imaging with SPECT</td>
<td>78710</td>
</tr>
<tr>
<td>Ureteral Reflux Study (Radiopharmaceutical Voiding Cystogram)</td>
<td>78740</td>
</tr>
<tr>
<td>Radiopharmaceutical Imaging of Inflammatory Process Limited Area</td>
<td>78805</td>
</tr>
<tr>
<td>Radiopharmaceutical Imaging of Inflammatory Process Whole Body</td>
<td>78806</td>
</tr>
<tr>
<td>Radiopharmaceutical Imaging of Inflammatory Process SPECT</td>
<td>78807</td>
</tr>
<tr>
<td>Ultrasound</td>
<td>CPT®</td>
</tr>
<tr>
<td>Ultrasound, abdomen; complete</td>
<td>76700</td>
</tr>
<tr>
<td>Procedure</td>
<td>Code</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>Ultrasound, abdomen; limited</td>
<td>76705</td>
</tr>
<tr>
<td>Ultrasound, abdominal wall</td>
<td>76705</td>
</tr>
<tr>
<td>Ultrasound, retroperitoneal; complete</td>
<td>76770</td>
</tr>
<tr>
<td>Ultrasound, retroperitoneal; limited</td>
<td>76775</td>
</tr>
<tr>
<td>Ultrasound, transplanted kidney (with duplex Doppler)</td>
<td>76776</td>
</tr>
<tr>
<td>Duplex scan of arterial inflow and venous outflow of abdominal, pelvic, scrotal contents and/or retroperitoneal organs; complete study</td>
<td>93975</td>
</tr>
<tr>
<td>Duplex scan of arterial inflow and venous outflow of abdominal, pelvic, scrotal contents and/or retroperitoneal organs; limited study</td>
<td>93976</td>
</tr>
<tr>
<td>Duplex scan of aorta, inferior vena cava, iliac vasculature, or bypass grafts; complete</td>
<td>93978</td>
</tr>
<tr>
<td>Duplex scan of aorta, inferior vena cava, iliac vasculature, or bypass grafts; limited</td>
<td>93979</td>
</tr>
</tbody>
</table>
PEDAB-1.1 Pediatric Abdominal Imaging Age Considerations

Many conditions affecting the abdomen in the pediatric population are different diagnoses than those occurring in the adult population. For those diseases which occur in both pediatric and adult populations, minor differences may exist in management due to patient age, comorbidities, and differences in disease natural history between children and adults.

✓ Patients age <18 years old should be imaged according to the Pediatric Abdomen Imaging Guidelines, and patients age ≥18 years should be imaged according to the Abdomen Imaging Guidelines, except where directed otherwise by a specific guideline section.

PEDAB-1.2 Pediatric Abdomen Imaging Appropriate Clinical Evaluation and Conservative Treatment

✓ A recent (within 60 days) face-to-face evaluation including a detailed history, physical examination, appropriate laboratory studies, and basic imaging such as plain radiography or ultrasound should be performed prior to considering advanced imaging, unless the patient is undergoing guideline-supported scheduled follow-up imaging evaluation.

✓ These guidelines are based upon using advanced imaging to answer specific clinical questions that will affect patient management. Imaging is not indicated if the results will not affect patient management decisions. Standard medical practice would dictate continuing conservative therapy prior to advanced imaging in patients who are improving on current treatment programs.

✓ Unless otherwise stated in a specific guideline section, the use of advanced imaging to screen asymptomatic patients for disorders involving the abdomen is not supported. Advanced imaging should only be approved in patients who have documented active clinical signs or symptoms of disease.

✓ Unless otherwise stated in a specific guideline section, repeat imaging studies of the same body area are not necessary unless there is evidence for progression of disease, new onset of disease, and/or documentation of how repeat imaging will affect patient management or treatment decisions.
**PEDAB-1.3 Pediatric Abdomen Imaging Modality General Considerations**

✓ **Ultrasound**

- Ultrasound should be done prior to advanced imaging in most abdominal conditions to rule out those situations that do not require advanced imaging.
- For those patients who do require advanced imaging, ultrasound can be very beneficial in selecting the proper modality, body area, image sequences, and contrast level that will provide the most definitive information for the patient.
- CPT codes vary by body area and presence or absence of Doppler imaging and are included in the table at the beginning of this guideline.

✓ **MRI**

- MRI of the abdomen is generally performed without and with contrast (CPT® 74183) unless the patient has a documented contraindication to gadolinium or otherwise stated in a specific guideline section.
- Due to the length of time for image acquisition and the need for stillness, anesthesia is required for almost all infants and young children (age <7 years), as well as older children with delays in development or maturity. In this patient population, MRI imaging sessions should be planned with a goal of avoiding a short-interval repeat anesthesia exposure due to insufficient information using the following considerations:
  - MRI should always be performed without and with contrast unless there is a specific contraindication to gadolinium use. since the patient already has intravenous access for anesthesia.
  - If multiple body areas are supported by eviCore guidelines for the clinical condition being evaluated, MRI of all necessary body areas should be obtained concurrently in the same anesthesia session.
- The presence of surgical hardware or implanted devices may preclude MRI.
- The selection of best examination may require coordination between the provider and the imaging service.

✓ **CT**

- CT of the abdomen typically extends from the dome of the diaphragm to the upper margin of the sacroiliac joints, and CT of the abdomen and pelvis extends from the dome of the diaphragm through the ischial tuberosities.
  - In general, CT of the abdomen is appropriate when evaluating solid abdominal organs.
  - In general, CT of the Abdomen and pelvis is appropriate when evaluating inflammatory or infectious processes, hematuria, or conditions which appear to involve both the abdomen and the pelvis.
  - In some cases, especially in follow-up of a known finding, it may be appropriate to limit the exam to the region of concern to reduce radiation exposure.
The contrast level in pediatric CT imaging is specific to the clinical indication, as listed in the specific guideline sections.

CT of the abdomen or abdomen and pelvis may be indicated for further evaluation of abnormalities suggested on prior US or MRI studies.

CT may be indicated without prior MR or US, as indicated in specific sections of these guidelines.

CT should not be used to replace MRI in an attempt to avoid sedation unless listed as a recommended study in a specific guideline section.

The selection of the best examination may require coordination between the provider and the imaging service.

Nuclear Medicine

Nuclear medicine studies are commonly used in evaluation of the pediatric kidney and gallbladder, and other rare indications exist as well:

- Esophageal motility study (CPT® 78258) and/or Gastroesophageal reflux study (CPT® 78262) is indicated in the evaluation of gastroesophageal reflux.
- Gastric mucosa imaging (Meckel’s scan, CPT® 78261) is indicated for the following:
  - Suspected Meckel’s diverticulum
  - Barrett’s esophagus
  - Thoracic masses suspected of containing gastric mucosa
- Gastric emptying study (CPT® 78264) is indicated for evaluation of either suspected delayed or rapid gastric emptying.
- Gastric emptying study with small bowel transit (CPT® 78265) is indicated for evaluation of suspected abnormalities in both total and regional times for gastrointestinal transit in small bowel.
- Gastric emptying study with small bowel and colon transit (CPT® 78266) is indicated for evaluation of suspected abnormalities in both total and regional times for gastrointestinal transit to the colon.
- Gastrointestinal bleeding scintigraphy (CPT® 78278) is indicated for evaluation of brisk active GI bleeding with indeterminate endoscopy.
- Gastrointestinal protein loss study (CPT® 78282) is indicated for decreased serum albumin or globulins and no evidence of GI bleeding.
- Nuclear intestinal imaging (CPT® 78290) is indicated for evaluation of ectopic gastric mucosa.
- Peritoneal-venous shunt patency study (CPT® 78291) is indicated for evaluation of shunt patency and function in a patient with ascites.
- Nuclear renal imaging (CPT® 78701, 78707, 78708, or 78709) is indicated for evaluation of the following:
  - Renal transplant follow-up
  - Kidney salvage vs. nephrectomy surgical decisions.
- Acute renal failure with no evidence of obstruction on recent ultrasound
- Chronic renal failure to estimate prognosis for recovery

✔ 3D Rendering
  - 3D Rendering indications in pediatric abdomen imaging are identical to those for adult patients. See Preface-4.1-3D Rendering for imaging guidelines.

The guidelines listed in this section for certain specific indications are not intended to be all-inclusive; clinical judgment remains paramount and variance from these guidelines may be appropriate and warranted for specific clinical situations.

References

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 that can be localized to a particular area of the abdomen should be imaged according to the relevant guideline section:

- PEDAB-3~Right Lower Quadrant Pain, Rule Out Appendicitis
- PEDAB-4~Flank Pain, Rule Out Renal Stone
- PEDAB-8~Right Upper Quadrant Pain, Rule Out Cholecystitis
- PEDAB-24~Left Upper Quadrant Pain
- PEDAB-28~Left Lower Quadrant Pain

Children with generalized acute abdominal pain AND any of the following red flag signs or symptoms require additional investigation (which may include advanced imaging).

- Pain that wakes the child from sleep
- Unexplained fever (T≥100.4°F)
- Dysphagia
- GI bleeding
- Significant vomiting
- Severe chronic diarrhea or nocturnal diarrhea in a toilet-trained child
- Failure to thrive, involuntary weight loss, or delay in linear growth or pubertal development
- Family history of inflammatory bowel disease, celiac disease, or peptic ulcer disease
- Abdominal mass, hepatomegal, and/or splenomegal on exam
- Jaundice
- Arthritis
- Costovertebral angle tenderness
- Perianal disease
- Spinal tenderness
**References**


PEDAB-3~Right Lower Quadrant Pain

For patients age ≤14 years:
- If local expertise exists, ultrasound (CPT®76700 or CPT®76705) is indicated as the initial examination. If positive or negative, no further diagnostic imaging is necessary.
  - If the appendix is not visualized on ultrasound and the white blood cell count is not elevated, no further imaging is necessary.
- If insufficient local ultrasound expertise exists or the ultrasound findings are inconclusive, any of the following studies are indicated for evaluation of right lower quadrant pain:
  - CT Abdomen/Pelvis with contrast (CPT®74177)
  - CT Abdomen/Pelvis without contrast (CPT®74176)
  - MRI Pelvis without contrast (CPT®72195)
  - MRI Pelvis without and with contrast (CPT®72197)

For patients age ≥15 years:
- Any of the following studies are indicated:
  - CT Abdomen/Pelvis with contrast (CPT®74177)
  - CT Abdomen/Pelvis without contrast (CPT®74176)
  - MRI Pelvis without contrast (CPT®72195)
  - MRI Pelvis without and with contrast (CPT®72197)

If the appendix is absent, follow guidelines in: PEDAB-2~Generalized Abdominal Pain

References
Flank Pain imaging indications in pediatric patients are very similar to those for adult patients. See: **AB-4~Flank Pain, Rule out Renal Stone** for imaging guidelines.

Pediatric-specific imaging considerations include the following:
- In children, ultrasound (CPT® 76770 or CPT® 76775) is the preferred initial study
- If ultrasound is inconclusive, CT Abdomen/Pelvis without contrast (CPT® 74176) is indicated
- If CT is inconclusive or there is significant concern for radiation exposure from frequent CT use for a particular patient, MRI without and with contrast of the abdomen (CPT® 74183) and pelvis (CPT® 72197) is indicated
- If hematuria is present, see **PEDAB-7~Hematuria** for imaging guidelines

Nuclear kidney imaging (CPT® 78707, 78708, or 78709) is indicated for evaluation of recurrent flank pain when CT and ultrasound are non-diagnostic, or for suspected obstructive uropathy

**References**

PEDAB-5.1 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, pyelonephritis, or congenital renal anomaly.
  o If hydronephrosis is present, this should be further evaluated with voiding cystourethrography (VCUG), to evaluate for vesicoureteral reflux.

✓ Diuretic renography using Tc-99m MAG 3 (CPT®78707, 78708, or 78909) is the study of choice for the following indications:
  o Differentiating a dilated non-obstructed urinary system from a true stenosis (e.g., UPJ obstruction; ureteral-vesical junction [UVJ] obstruction), and for
  o Quantifying renal parenchymal function.
  o Ultrasound findings that are compatible with a multicystic dysplastic kidney to evaluate function of the affected kidney or a ureteral-pelvic junction (UPJ) obstruction of the contralateral kidney
  o Diagnostic evaluation of upper tract dilatation when VCUG is negative
  o Renal function evaluation in patients with hydronephrosis

✓ Magnetic resonance urography (MRU) (CPT®74183 and CPT®72197), is appropriate (where available) for investigation of a dilated upper urinary tract
  o **NOTE:** MRU requires sedation in young children
  o MRU can also quantitate renal function
  o MRU is very sensitive for the detection of acute pyelonephritis, and where available can be used in place of CT

✓ Technetium-99m-dimercaptosuccinic acid (Tc-99m DMSA) scintigraphy (CPT® 78700, 78701, or 78710), is indicated in the following:
  o Children aged 5 years or younger with febrile UTI 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.
  o Detection of post-pyelonephritic renal scarring at least 6 months after the documented upper tract UTI

✓ Radiopharmaceutical nuclear medicine imaging (CPT® 78805, 78806, or 78807) is indicated for evaluation of suspected pyelonephritis or diffuse interstitial nephritis
PEDAB-5.2 Lower Urinary Tract

Fluoroscopic Voiding cystourethrogramy (VCUG) is indicated for detection of possible vesico-ureteral reflux (VUR) in neonates or young children when hydrenephrosis is seen on ultrasound.

The American Academy of Pediatrics clinical practice guidelines no longer recommend routine VCUG for infants and young children from 2 to 24 months of age after the first febrile UTI.

- The current recommendation is to postpone the VCUG until the second febrile UTI UNLESS there are:
  - Atypical or complex clinical circumstances
  - Renal/bladder ultrasound reveals hydrenephrosis, scarring, or obstructive uropathy

Vesicoureteral Reflux (VUR)

- Fluoroscopic VCUG is typically performed for diagnosis and grading of VUR, and should be the first modality used for diagnosis.
- Radionuclide cystography (CPT® 78740), because of its lower radiation burden and higher sensitivity for reflux > Grade I, is recommended for follow-up imaging of VUR, and investigation of VUR in siblings of affected patients.

Male patients with first UTI should be evaluated with fluoroscopic VCUG studies rather than radionuclide cystography, to visualize the male urethra for possible posterior urethral valves.

For female patients, radionuclide cystography (CPT® 78740) may replace fluoroscopic VCUG as the initial study, since urethral anatomy is rarely abnormal except in complex malformations.

MR urography is indicated for evaluation of ectopic distal ureteral insertion, or other complex lower urinary tract anatomy.

Siblings of patients with known vesicoureteral reflux can have radiopharmaceutical VUCG (CPT® 78740) if they have renal scarring on ultrasound or history of UTI and no prior evaluation for VUR.

References


Imaging is not indicated in pediatric acute gastroenteritis unless there is a concern for other causes of symptoms.

When necessary, imaging in children with 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 and to exclude obstruction.

Ultrasound (CPT® 76700 or CPT® 76705) should be performed if there is organomegaly, palpable mass, or suspicion for intussusception (See: PEDAB 26 Intussusception)

While ultrasound (CPT® 76700 or CPT® 76705) may detect findings of gastroenteritis, imaging is not necessary to make the diagnosis of uncomplicated gastroenteritis.

CT Abdomen/Pelvis with contrast (CPT® 74177) is indicated if abdominal red flag symptoms are present as listed in PEDAB-2~Generalized Abdominal Pain.

References
Hematuria is a relatively common complaint in pediatric patients, and the imaging considerations are different than those occurring in adult patients.

✔ For patients with asymptomatic gross hematuria or microscopic hematuria present on separate urinalysis evaluations, ultrasound of the kidneys (CPT® 76770 or 76775) and bladder (CPT® 76856 or 76857) are indicated.

✔ For patients with painful hematuria and no recent trauma, any of the following studies can be approved:
  - CT Abdomen/Pelvis without contrast (CPT® 74176)
  - Ultrasound of kidneys (CPT® 76770 or 76775)
  - Ultrasound of bladder (CPT® 76856 or 76857)

✔ For patients with hematuria and recent trauma, the following studies are indicated:
  - CT Abdomen/Pelvis with contrast (CPT® 74177)
  - CT Cystography (CT Pelvis with bladder contrast—CPT® 72193), if gross hematuria is present and pelvic fracture or traumatic bladder injury is suspected

References
✓ Right upper quadrant pain imaging indications in pediatric patients are very similar to those for adult patients. See: AB-2~Abdominal Pain for imaging guidelines.

✓ Pediatric-specific imaging considerations include the following:
  o MRI is preferred over CT when possible to reduce radiation exposure

✓ Nuclear medicine imaging of the hepatobiliary system (HIDA scan, CPT® 78226 or 78227) is indicated in the following:
  o Suspected acute cholecystitis when ultrasound is nondiagnostic (CPT® 78226)
    ▪ CPT® 78227 is supported when gallbladder does not fill on routine HIDA scan (CPT® 78226)
  o Chronic Cholecystitis with one of the following (CPT® 78226):
    ▪ Evidence of gallstones on prior ultrasound
    ▪ Recurrent RUQ pain
    ▪ CPT® 78227 is supported when gallbladder does not fill on routine HIDA scan (CPT® 78226)
  o Chronic acalculous cholecystitis with recurrent RUQ pain and no evidence of gallstones on ultrasound (CPT® 78227)
  o Suspected bile leak after trauma or surgery (CPT® 78226)
  o Preoperative assessment prior to partial hepatectomy (CPT® 78226)
  o Preoperative assessment of post-operative liver remnant or monitoring of liver regeneration (CPT® 78226)
  o Assessment of liver transplant or choledochal cyst (CPT® 78226)
  o Sphincter of Oddi dysfunction with recurrent RUQ pain and no evidence of gallstones on ultrasound (CPT® 78226 or 78227)
  o Calculation of gallbladder ejection fraction or biliary dyskinesia with persistent RUQ pain and no evidence of gallstones on ultrasound (CPT® 78227)

References
PEDAB-9~Inflammatory Bowel Disease, Crohn Disease, or Ulcerative Colitis

Enterography is the most appropriate advanced imaging study for patients with inflammatory bowel disease (IBD).

✓ For children with suspected IBD, MR enterography (CPT® 74183 and CPT® 72197) is preferred to avoid radiation exposure
  o CT enterography (CPT® 74177) is indicated if MR enterography is inconclusive or unavailable

✓ For children with established IBD, MR enterography (CPT® 74183 and CPT® 72197) is indicated for the following:
  o Monitoring response to disease-modifying treatment on an annual basis or when treatment change is being considered
  o Patients with new or worsening symptoms or suspected complications including abscess, perforation, fistula, or obstruction
  o CT enterography (CPT® 74177) can be approved if MR enterography is inconclusive or unavailable.

References
**PEDAB-10~Abdominal Sepsis (Suspected Abdominal Abscess)**

Abdominal sepsis imaging indications in pediatric patients are identical to those for adult patients. See **AB-3~Abdominal Sepsis (Suspected Abdominal Abscess)** for imaging guidelines.

**PEDAB-11~Postoperative Pain Within 60 Days Following Abdominal Surgery**

- CT Abdomen/Pelvis with contrast (CPT®74177) is indicated in patients with suspected postoperative complications (e.g. bowel obstruction, abscess, anastomotic leak, etc.)
  - Children can also 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)
  - Because MRI may not be practical for the timely evaluation of post-operative abscesses, MRI should only replace CT when the study can be completed in a similar time frame as CT
- Radiopharmaceutical nuclear medicine imaging (CPT 78805, 78806, or 78807) is indicated for evaluation of any of the following:
  - Peritonitis
  - Postoperative fever without localizing signs or symptoms
- Beyond 60 days postoperatively, see: **PEDAB-2~Abdominal Pain, Generalized**.

**References**

PEDAB-12~Constipation, Diarrhea, and Irritable Bowel Syndrome

Constipation and diarrhea are extremely common complaints in children. The overwhelming majority of patients do not require advanced imaging for evaluation of constipation or diarrhea.

Irritable bowel is rare in young children, but more common in adolescents. The overwhelming majority of patients do not require advanced imaging for evaluation of irritable bowel syndrome.

✓ Constipation that is associated with the following additional red flag signs or symptoms may require advanced imaging:
  o Red flag symptoms for abdominal pain (See PEDAB-2~Generalized Abdominal Pain)
  o Clinical suspicion of tethered cord based on abnormal physical findings over the spine or failure of maximal laxative therapy. See PEDSP-5~Tethered Cord for imaging guidelines.

✓ Diarrhea that is associated with the following additional red flag signs or symptoms may require advanced imaging:
  o Red flag symptoms for abdominal pain (See PEDAB-2~Generalized Abdominal Pain)

✓ Irritable bowel syndrome that is associated with the following additional red flag signs or symptoms may require advanced imaging:
  o Red flag symptoms for abdominal pain (See PEDAB-2~Generalized Abdominal Pain)

References
PEDAB-13~Abdominal Mass

PEDAB-13.1 Abdominal Wall Mass
✓ For initial imaging of a newly discovered abdominal wall mass, any of the following studies are indicated:
  o Ultrasound (CPT®76700)
  o MRI Abdomen without contrast (CPT®74181) or without and with contrast (CPT®74183)
  o If below the umbilicus, MRI Pelvis without contrast (CPT®72195) or without and with contrast (CPT®72197) may be added to MRI Abdomen
✓ If ultrasound and/or MRI are inconclusive or insufficient for preoperative planning, any of the following studies are indicated:
  o CT abdomen with contrast (CPT®74160) or without contrast (CPT®74150)
  o If below the umbilicus, CT Abdomen/Pelvis with contrast (CPT®74177) or without contrast (CPT®74176)

PEDAB-13.2 Intra-Abdominal Mass
✓ Ultrasound (CPT®76700) should be the initial imaging study for children with an intra-abdominal mass.
✓ Additional imaging studies will be determined by the results of the ultrasound, and will depend on the location and organ involvement associated with the mass as well as history, physical exam, and laboratory findings. See the following sections for additional imaging guidelines:
  o PEDONC-1~General Guidelines
  o PEDONC-5~Pediatric Lymphomas
  o PEDONC-6~Neuroblastoma
  o PEDONC-7~Pediatric Renal Tumors
  o PEDONC-10~Pediatric Germ Cell Tumors
  o PEDONC-11~Pediatric Liver Tumors
  o PEDONC-14~Pediatric Adrenocortical Carcinoma
  o PEDAB-15~Liver Lesion Characterization
  o PEDAB-17~Adrenal Lesions
  o PEDAB-19~Indeterminate Renal Lesion
  o PEDAB-25~Spleen

References
Any of the following studies are indicated for initial evaluation of a pediatric patient with repeated systolic BP >95th percentile for age (≥3 measurements):
- Doppler or Duplex Ultrasound (CPT® 93975 or CPT® 93976)
- Complete retroperitoneal ultrasound (CPT® 76770)
- Captopril renography (CPT® 78709)

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>95th percentile SBP Boys</th>
<th>95th percentile SBP Girls</th>
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All follow-up requests for pediatric hypertension will to Medical Directors for review.

Other considerations for imaging evaluation:
- Abdominal MRA (CPT® 74185) or CTA (CPT® 74175) may be indicated for pediatric patients with hypertension to exclude fibromuscular dysplasia of the renal arteries
- Echocardiography (CPT® 93306) is indicated at initial evaluation to screen for cardiac abnormalities, coarctation of the aorta, and end-organ damage such as left ventricular hypertrophy
Nuclear renal imaging (CPT® 78707, 78708, or 78709 is indicated for evaluation of the following:

- Severe hypertension with progressive renal insufficiency or failure to respond to 3 drug therapy
- Malignant or accelerated hypertension
- Acute worsening of previously stable hypertension
- Diastolic BP >100 in patient <35 years old
- New onset severe hypertension (diastolic BP >110) in patient >50 years old
- Hypertension in presence of asymmetric kidneys or diffuse atherosclerosis
- Hypertension in presence of acute elevation in creatinine either unexplained or after treatment with ACE inhibitor
- Abdominal bruit
- Recurrent acute pulmonary edema and hypertension
- Hypokalemia with normal or elevated plasma renin level in absence of diuretic therapy
- Hypertension with known neurofibromatosis

References

PEDAB-15~Liver Lesion Characterization

✓ Liver lesion characterization imaging indications in pediatric patients are very similar to those for adult patients. See: AB-29~Liver Lesion Characterization for imaging guidelines.

✓ Nuclear medicine liver imaging (ONE of CPT® 78201, 78202, 78205, 78206, 78215, or 78216) if rarely performed, but can be approved for the following when ultrasound, CT, and MRI are unavailable or contraindicated:
  o Evaluation of liver mass, trauma, or suspected focal nodular hyperplasia (FNH)
  o Differentiation of hepatic hemangioma from FNH
  o Diffuse hepatic disease or elevated liver function tests
  o Suspected accessory spleen (CPT® 78215 or 78216 only)

✓ Pediatric-specific imaging considerations include the following:
  o MRI is preferred over CT when possible to reduce radiation exposure.

References

Elevated liver function testing imaging indications in pediatric patients are very similar to those for adult patients. See: AB-30~Elevated Liver Function (LFT) Levels for imaging guidelines.

Causes of liver failure or cirrhosis in pediatric patients are different from adults, and are frequently idiopathic, but commonly due to one of the following:
- Biliary dysfunction (biliary atresia, cystic fibrosis, etc.)
- Metabolic disease
- Post-infectious

Liver ultrasound (CPT® 76700) is indicated as an initial study for patients prior to approving CT or MRI for pediatric patients
- MRI Abdomen without and with contrast (CPT® 74183) is indicated for evaluation of ultrasound findings that are inconclusive or technically limited, and is preferred over CT when possible to reduce radiation exposure

Repeat liver ultrasound (CPT® 76705) is indicated in pediatric patients in the following circumstances:
- Known chronic liver dysfunction or cirrhosis of any cause
- New or worsening findings on history, physical exam, or laboratory results that suggest progression of liver disease
- Doppler ultrasound of the liver (CPT® 93975 or 93976) is indicated when portal venous congestion or portal hypertension is suspected

Nuclear medicine liver imaging (ONE of CPT® 78201, 78202, 78205, 78206, 78215, or 78216) if rarely performed, but can be approved for the following when ultrasound, CT, and MRI are unavailable or contraindicated:
- Diffuse hepatic disease or elevated liver function tests

References
Pediatric-specific imaging considerations include the following:

- Neonatal adrenal hemorrhage may be identified on renal ultrasound. The most concerning potential diagnosis is neuroblastoma. This can often be adequately evaluated with short interval follow-up retroperitoneal ultrasound (CPT® 76770) in 7-10 days.
  - If repeat ultrasound is inconclusive or there is high clinical concern for neuroblastoma, MRI Abdomen without and with contrast (CPT® 74183) or CT Abdomen without and with contrast (CPT® 74170) is indicated. MRI is preferred over CT when possible to reduce radiation exposure.

Pediatric-specific imaging considerations include the following:

- Adrenal Nuclear Imaging of the cortex and/or medulla (CPT® 78075) is indicated for the following:
  - Distinguishing adrenal adenoma from adrenal hyperplasia
  - Evaluation of suspected pheochromocytoma or paraganglioma
    - MIBG preferred (one of CPT® 78800, 78801, 78802, 78803, or 78804)
    - For known pheochromocytoma or paraganglioma, see ONC-15~Neuroendocrine Cancers and Adrenal Tumors for imaging guidelines
  - Evaluation of suspected neuroblastoma, ganglioneuroblastoma, or ganglioneuroma
    - MIBG preferred (one of CPT® 78800, 78801, 78802, 78803, or 78804), see PEDONC-6~NEUROBLASTOMA for imaging guidelines
  - History of multiple endocrine neoplasia: see PEDONC-2.8 Multiple Endocrine Neoplasias (MEN) for imaging guidelines
  - History of neurofibromatosis: see PEDONC-2.3 Neurofibromatosis 1 and 2 (NF1 and NF2) for imaging guidelines
  - History of von Hippel-Lindau disease: see PEDONC-2.10 Von Hippel-Lindau Syndrome (VHL) for imaging guidelines
References


PEDAB-18~Hemochromatosis

PEDAB-18.1 Hereditary (Primary) Hemochromatosis
✓ Hereditary hemochromatosis imaging indications in pediatric patients are identical to those for adult patients. See AB-11.2~Hereditary Hemochromatosis and Other Iron Storage Disorders for imaging guidelines.

PEDAB-18.2 Transfusion-Associated (Secondary) Hemochromatosis
Transfusion-associated hemochromatosis is a common complication of exposure to repeated red blood cell transfusions. This can occur in any patient with exposure to >20 transfusion episodes, but is most common among sickle cell disease, thalassemia, bone marrow failure (aplastic anemia, Fanconi anemia, etc.), oncology patients, and hematopoietic stem cell transplant patients.

✓ T2* MRI has been well established in the determination of organ iron burden in transfusion-associated hemochromatosis. Contrast use is not necessary for evaluation of iron burden. The following studies are indicated for evaluation of transfusion-associated hemochromatosis:
  o MRI Abdomen without contrast (CPT® 74181) for liver iron evaluation
  o MRI Cardiac without contrast (CPT® 75557) for cardiac iron evaluation
  o MRI Chest without contrast (CPT® 71550) can be approved as a single study to evaluate both heart and liver iron burden
  o CPT® 74181 and 75557 can be approved alone, or both together
  o If requested, CPT® 71550 will evaluate both heart and liver and should not be approved with any other codes

✓ Screening MRI is indicated every 12 months for chronically transfused patients at risk of hemochromatosis

✓ Imaging is indicated every 3 months for treatment response in patients receiving active treatment (chelation and/or phlebotomy)

References
Indeterminate renal lesion imaging indications in pediatric patients are very similar to those for adult patients. See **AB-35~Indeterminate Renal Lesion** for imaging guidelines.

Nuclear medicine studies of the kidney are indicated for evaluation of the following anatomic renal anomalies:
- Suspected horseshoe kidney (CPT® 78700 or 78701)
- Suspected solitary or ectopic kidney (CPT® 78700 or 78701)
- Radiopharmaceutical voiding cystogram (CPT® 78740) is indicated for evaluation of antenatally-detected hydroureter.

Pediatric-specific imaging considerations include the following:
- Pediatric renal cysts have a lower risk of malignant progression than renal cysts in adults.
- For patients who have simple cysts but are symptomatic and surgical intervention is being considered, CT Abdomen with contrast (CPT® 74160) is indicated.
- For pediatric patients with complex renal cyst identified on ultrasound, CT Abdomen without and with contrast (CPT® 74170) is indicated.
- Patients with solid renal masses should be imaged according to guidelines in section **PEDONC-7~Pediatric Renal Tumors**.

**References**

PEDAB-20~Polycystic Kidney Disease

✓ Abdominal ultrasound (CPT® 76700) or retroperitoneal ultrasound (CPT® 76770) are indicated for clinical concern for polycystic kidney disease, or for screening individuals at risk for autosomal dominant polycystic kidney disease (ADPCKD)

References

PEDAB-21~Blunt Abdominal Trauma

✓ Blunt abdominal trauma imaging indications in pediatric patients are identical to those for adult patients. See AB-10.1 Blunt Abdominal Trauma for imaging guidelines.

PEDAB-22~Hernias

✓ Hernia imaging indications in pediatric patients are identical to those for adult patients. See AB-12~Hernias for imaging guidelines.

PEDAB-23~Abdominal Lymphadenopathy

✓ Abdominal lymphadenopathy imaging indications in pediatric patients are identical to those for adult patients. See AB-8~Abdominal Lymphadenopathy for imaging guidelines.
**PEDAB-24~Left Upper Quadrant Pain**

- Left upper quadrant pain imaging indications in pediatric patients are identical to those for adult patients. See **AB-2~Abdominal Pain** for imaging guidelines.

- Nuclear medicine spleen imaging (CPT® 78185) is rarely performed, but can be approved for left upper quadrant pain when neither ultrasound or CT is available.

**Reference**


**PEDAB-25~Spleen**

- Spleen imaging indications in pediatric patients are very similar to those for adult patients. See: **AB-34~Spleen** for imaging guidelines.

- Nuclear medicine spleen imaging (CPT® 78185) is rarely performed, but can be approved for the following indications when CT is unavailable:
  - Splenic trauma
  - Evaluation of splenic function
  - Suspected splenic mass, cyst, abscess, infarct, or metastasis
  - Radiation treatment planning
  - Asplenia
  - Suspected functional accessory spleen
    - Can approve CPT® 78215 or 78216 instead of 78185 if requested

- Pediatric-specific imaging considerations include the following:
  - MRI is preferred over CT when possible to reduce radiation exposure

**References**

PEDAB-26~Intussusception

✓ Intussusception, telescoping of one bowel loop into another, is a frequent cause of abdominal pain in young children. It may be associated with bloody stool. 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 indicated as an initial study if there is a strong suspicion for intussusception, but if negative, plain x-rays of the abdomen should follow.

Reference

PEDAB-27~Bowel Obstruction

✓ Bowel obstruction imaging indications in pediatric patients are identical to those for adult patients. See AB-20~Bowel Obstruction for imaging guidelines.
Diverticulitis is the most common cause of left lower quadrant pain in adults but is extremely rare in children.

Gastroenterologist evaluation is helpful in determining the appropriate diagnostic pathway in patients with left lower quadrant pain with or without heme-positive stools or rectal bleeding, since advanced imaging is rarely helpful in the initial evaluation of these patients.

✓ 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.

References

PEDAB-29~Celiac Disease (Sprue)

✓ Celiac disease imaging indications in pediatric patients are identical to those for adult patients. See AB-24~Celiac Disease (Sprue) for imaging guidelines.

PEDAB-30~Transplant

✓ Liver and kidney transplant imaging indications in pediatric patients are identical to those for adult patients. See AB-42~Transplant for imaging guidelines.

✓ For post-transplant lymphoproliferative disorder in pediatric patients, see PEDONC-5.3~Pediatric Non-Hodgkin Lymphoma, Aggressive Mature B-Cell NHL for imaging guidelines.

PEDAB-31~Gaucher’s Disease

See: PEDPN-4 Gaucher’s Disease for imaging guidelines.