

## 2011 Imaging Criteria

Computed Tomography (CT), Abdomen (Pediatric)<sup>(1\*RIN, 2\*RIN)</sup>

ICD-9-CM: 87.71, 88.01

CPT: 74150, 74160, 74170

I/O Setting: Outpatient

## INDICATION(S)

- 100 Suspected complication post cholecystectomy
- 200 Suspected acute pancreatitis
- 300 Suspected pancreatic pseudocyst
- 400 Evaluation of known pancreatic pseudocyst
- 500 Acute pancreatitis with complication
- 600 Continued acute pancreatitis after Rx
- 700 Pancreatic mass by US
- 800 Liver mass by US
- 900 Suspected pheochromocytoma
- 1000 Suspected adrenal hyperplasia/tumor

100 Suspected complication post cholecystectomy [**Both**]<sup>(3)</sup>

110 Abdominal/back pain

120 Findings [**One**]

121 Abdominal distention/ileus

122 Jaundice

123 Temperature &gt; 100.4 F(38.0 C)

124 Direct bilirubin and alkaline phosphatase &gt; normal

200 Suspected acute pancreatitis [**All**]<sup>(4, 5)</sup>

210 Abdominal pain

220 Abdominal tenderness

230 Abnormal lab [**One**]

231 Amylase &gt; normal

232 Lipase &gt; normal

300 Suspected pancreatic pseudocyst [**All**]<sup>(6, 7)</sup>310 Pancreatitis by Hx [**One**]311 Acute pancreatitis with onset  $\geq$  2 wks

312 Chronic pancreatitis

313 Pancreatitis secondary to trauma

320 Abdominal/back pain

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- 330 Findings by PE **[One]**
- 331 Abdominal tenderness
  - 332 Abdominal mass
- 400 Evaluation of known pancreatic pseudocyst **[One]**<sup>(6, 7)</sup>
- 410 Periodic evaluation for change in size<sup>(8)</sup>
  - 420 New/worsening Sx/findings **[One]**
    - 421 Abdominal/back pain
    - 422 Vomiting
    - 423 Weight loss by Hx/PE
    - 424 Temperature > 100.4 F(38.0 C)
    - 425 WBC > 10,000/cu.mm( $10 \times 10^9/L$ )
    - 426 Hemodynamic instability **[One]** ♦<sup>(9)</sup>
      - 1 Systolic BP < normal
      - 2 Decrease in systolic BP  $\geq 20$  mmHg from baseline
      - 3 Shock by PE<sup>(10)</sup>
      - 4 Tachycardia
      - 5 Urine output < 1 cc/kg/hr
    - 427 Abdominal tenderness
    - 428 Direct bilirubin and alkaline phosphatase > normal
- 500 Acute pancreatitis with complication **[All]**<sup>(11, 12)</sup>
- 510 Abdominal pain
  - 520 Lab finding **[One]**
    - 521 Amylase > normal
    - 522 Lipase > normal
  - 530 Associated complication **[One]**<sup>(13)</sup>
    - 531 Findings by PE **[One]** ♦<sup>(9)</sup>
      - 1 Hemodynamic instability **[One]** ♦<sup>(9)</sup>
        - A) Systolic BP < normal
        - B) Decrease in systolic BP  $\geq 20$  mmHg from baseline
        - C) Shock by PE<sup>(10)</sup>
        - D) Tachycardia
        - E) Urine output < 1 cc/kg/hr
      - 2 Temperature > 100.4 F(38.0 C)
      - 3 Rebound tenderness ♦
    - 532 Lab finding **[One]**
      - 1 Hct decrease  $\geq 6\%$  w/in 4 hrs ♦
      - 2  $Po_2 < 60$  mmHg(8.0 kPa) on RA ♦
      - 3 Creatinine elevated **[One]**
        - A) Infant > 0.4 mg/dL( $35 \mu\text{mol/L}$ )

- B) Child > 0.7 mg/dL(62 µmol/L)
- C) Adolescent > 1.0 mg/dL(88 µmol/L)
- 4 Blood culture positive
- 5 WBC > 14,000/cu.mm( $14 \times 10^9/L$ ) or < 5,000/cu.mm( $5 \times 10^9/L$ )
- 6 Ca < 8 mg/dL(2.00 mmol/dL) ♦
- 7 Glucose > 220 mg/dL(12.21 mmol/L)
- 8 Persistently elevated/increasing LFTs  $\geq$  24 hrs

600 Continued acute pancreatitis after Rx **[All]**<sup>(11)</sup>

610 Symptoms **[One]**

- 611 Abdominal pain
- 612 Vomiting with attempted oral intake

620 Lab finding **[One]**

- 621 Amylase > normal
- 622 Lipase > normal

630 Therapy **[All]**

- 631 NPO  $\geq$  5 days
- 632 Analgesic  $\geq$  5 days
- 633 IV fluids  $\geq$  5 days

700 Pancreatic mass by US

800 Liver mass by US<sup>(14)</sup>

900 Suspected pheochromocytoma **[One]**<sup>(15, 16, 17)</sup>

910 24 hr urine **[One]**

- 911 VMA/metanephrine > normal
- 912 Total catecholamines > normal

920 Plasma catecholamine > normal

1000 Suspected adrenal hyperplasia/tumor **[One]**<sup>(18)</sup>

1010 Cortisol secreting tumor **[All]**<sup>(19\*MDR, 20)</sup>

- 1011 24 hr urine free cortisol > normal<sup>(21)</sup>
- 1012 No suppression by low-dose dexamethasone<sup>(22)</sup>
- 1013 No suppression by high-dose dexamethasone<sup>(23)</sup>

1020 Adrenogenital syndrome **[Both]**<sup>(24)</sup>

- 1021 Ambiguous genitalia by PE
- 1022 Lab findings **[Both]**
  - 1 Urinary 17-ketosteroid > normal
  - 2 Plasma DHEA > normal

## Notes

**(1)-RIN:**

These criteria cover indications for CT of the abdomen only. If the pathology extends into the pelvis, a CT of the pelvis should be performed and does not require additional approval.

**(2)-RIN:**

For evaluation of the genitourinary system, (e.g., kidney stones, hematuria, work-up of a genitourinary tract tumor), see the "Computed Tomography (CT), Abdomen and Pelvis" criteria subset.

**(3)**

Possible complications after cholecystectomy include abscess formation, hemorrhage, biliary-enteric fistula, and bile leaks. In addition, the CBD may be obstructed by stones, intraductal blood clots, or extrinsic compression (Fauci, ed. Harrison's principles of internal medicine. 2008). US is sensitive for detecting biliary obstruction, HIDA scan can detect a bile leak, and CT can accurately diagnose hematoma or biloma. Which imaging study to perform is a matter of clinical judgment.

**(4)**

Imaging is performed to assess for biliary malformations that can predispose to the development of pancreatitis (Anupindi and Victoria, Magn Reson Imaging Clin N Am 2008; 16(3): 453-466, v). US is the preferred initial imaging test, as it lacks radiation and the limited fat in a child produces better images than those seen in adult patients. MRCP can give a comprehensive view of the pancreaticobiliary system but is sometimes difficult in small patients (Darge and Anupindi, Pediatr Radiol 2009; 39 Suppl 2: S153-157).

**(5)**

CT is used to assess the inflammation and complications caused by acute pancreatitis.

**(6)**

A pancreatic pseudocyst is associated with either acute or chronic pancreatitis or pancreatic trauma and evolves when fluid leakage from a damaged pancreas becomes encapsulated. Usually 4 to 6 weeks are required after the onset of acute pancreatitis for the pseudocyst to mature; however, a pseudocyst can be diagnosed by imaging prior to this time (Baron et al., Gastrointest Endosc 2002; 56(1): 7-17; Kloppel, Semin Diagn Pathol 2000; 17(1): 7-15). Pancreatic pseudocysts can be classified as simple (fluid-filled and unilocular), complicated (associated with fever, hemorrhage, and necrosis), or as neoplastic. The majority of pseudocysts resolve with prolonged observation and nonsurgical treatment; intervention is required for symptomatic pseudocysts with complications (e.g., hemorrhage, obstruction, infection, perforation) or for large, persistent cysts (Cooperman, Surg Clin North Am 2001; 81(2): 391-397, xii).

**(7)**

CT is the most sensitive imaging technique in the evaluation of pancreatic disease and is better than US in evaluating complications of pancreatitis. Although newer US technology and scanning techniques have increased the usefulness of US in pancreatic imaging, CT is recommended as the initial imaging study for suspected pancreatic pseudocyst and is preferred over US in the evaluation of a known pancreatic pseudocyst (Ralls et al., Gastroenterol Clin North Am 2002; 31(3): 801-825, vii).

**(8)**

The interval between imaging studies varies and is a matter of clinical judgment.

**(9)**

These criteria apply to hemodynamic instability at initial presentation or any time during hospitalization. While this may be due simply to volume depletion, it is a matter of clinical judgment whether it represents severe disease with sepsis, volume loss, or retroperitoneal bleeding.

**(10)**

PE findings in shock include clouded sensorium, hypotension, decreased urine output, tachycardia, and cool, mottled extremities with diminished or absent peripheral pulses.

**(11)**

CT is the imaging study of choice for assessing the degree of inflammation and complications associated with acute pancreatitis (Turner, Gastrointest Endosc 2002; 56(6 Suppl): S241-245).

**(12)**

The purpose of CT in acute pancreatitis is to provide the initial staging of the disease and the early detection of complications (Mayerle et al., *Gastroenterol Clin North Am* 2004; 33(4): 855-869, viii). Complications can be lethal in the course of acute pancreatitis. Those occurring early (immediately or within first 2 to 3 days of acute attack) are generally systemic and those described as intermediate complications (2 to 5 weeks post acute attack) are generally local septic complications, often occurring in patients with pancreatic necrosis. In patients with late complications (occurring months to years after an acute attack), vascular or hemorrhagic complications or chronic pancreatic ascites may be present (Balthazar, *Radiol Clin North Am* 2002; 40(6): 1211-1227).

**(13)**

Fifteen to 25% of all episodes of pancreatitis are considered severe and are associated with a mortality rate approaching 10% (Vlodov and Tenner, *Prim Care* 2001; 28(3): 607-628, vii). These criteria address major findings indicative of severe disease and a poor prognosis.

**(14)**

US is the initial diagnostic test of choice for suspected biliary or liver disease (Ros and Morteale, *Clin Liver Dis* 2002; 6(1): 1-16). Liver masses may be incidental findings discovered during US performed for another indication. In general, US or contrast-enhanced CT are adequate for classifying the majority of focal liver lesions, particularly cysts, metastases, and hemangiomas. MRI is also helpful in defining focal nodular hyperplasia, focal fatty infiltration, lesions < 2 cm, or those lesions adjacent to large blood vessels or the heart (Harisinghani and Hahn, *Gastroenterol Clin North Am* 2002; 31(3): 759-776, vi).

**(15)**

A pheochromocytoma is an adrenal tumor that produces, stores, and secretes catecholamine. Approximately 90% of pheochromocytomas are benign, 10% are malignant, and 10% are bilateral (Israel and Krinsky, *Radiol Clin North Am* 2003; 41(1): 145-159). They are a very rare but potentially lethal cause of HTN. Most patients present in mid-adult life with refractory HTN or "spells" of sudden onset headache, sweating, and palpitations. Other symptoms include tremor, anxiety, nervousness, fatigue, unexplained abdominal or chest pain, and weight loss.

**(16)**

The majority (90%) of pheochromocytomas are intra-adrenal lesions and are usually identified by MRI or CT (Fauci, ed. *Harrison's principles of internal medicine*. 2008). MRI may offer an advantage over CT by providing the anatomic relationship between the tumor and its surrounding structures (Vaughan, *Med Clin North Am* 2004; 88(2): 443-466). MRI is becoming the imaging study of choice for diagnosing pheochromocytomas (Elsayes et al., *AJR Am J Roentgenol* 2005; 184(3): 860-867). The addition of MIBG scintigraphy may improve sensitivity for diagnosing pheochromocytoma when catecholamine levels are normal (Guller et al., *Ann Surg* 2006; 243(1): 102-107).

**(17)**

Pheochromocytomas occur 10% of the time in children, most frequently in those between 6 and 14 years of age. They can present in the adrenal medulla and in extra-adrenal areas (e.g., the urinary bladder, the thoracic cavity, and near the aorta) (Kliegman and Nelson, *Nelson textbook of pediatrics*, 18th ed. 2007, lii, 3147 p.).

**(18)**

Whether to perform CT or MRI in this situation is a matter of clinical judgment.

**(19)-MDR:**

**Some patients with adrenal cortical tumors have Cushingoid findings without lab abnormalities. Requests for imaging in these cases require secondary medical review.**

**(20)**

CT is the primary imaging modality for investigating an adrenal mass and can determine tumor size, tumor relationship to surrounding structures, lymph node involvement, and the presence of distant metastases (Jossart et al., *Endocrinol Metab Clin North Am* 2000; 29(1): 57-68, viii). Measurement of the fat content in Hounsfield units can distinguish benign from malignant lesions; higher values signify more fat and are less likely to be malignant. A value < 10 HU has been established by the NIH as the threshold for determining adrenal malignancy (Gopan et al., *Cleve Clin J Med* 2006; 73(6): 561-568). MRI is helpful in tissue characterization and is indicated when malignancy is suspected. Various MRI techniques can be used to distinguish adrenal adenomas from metastases (Sohaib et al., *Best Pract Res Clin Endocrinol Metab* 2005; 19(2): 293-310; Israel and Krinsky, *Radiol Clin North Am* 2003; 41(1): 145-159).

**(21)**

Cortisol hypersecretion is demonstrated by 24-hour urine tests. Three 24-hour urine samples may be necessary when the initial test is normal and the index of suspicion is high (Vaughan, *Med Clin North Am* 2004; 88(2): 443-466; Arnaldi et al., *J Clin Endocrinol Metab* 2003; 88(12): 5593-5602).

**(22)**

In the overnight low-dose dexamethasone test, dexamethasone is given between 11 PM and 12 AM and a fasting plasma cortisol measurement is taken the next morning between 8 AM and 9 AM. Recently the normal level of suppression has changed from less than 5 µg/dL to less than 1.8 µg/dL, improving the sensitivity of this test in detecting patients with Cushing's syndrome. Patients with cortisol levels below 1.8 µg/dL do not have active Cushing's syndrome. This outpatient screening option is easy to perform and cost-effective. A low-dose dexamethasone suppression test can also be performed over a two day period (Arnaldi et al., J Clin Endocrinol Metab 2003; 88(12): 5593-5602).

**(23)**

Suppression of cortisol excretion with high-dose dexamethasone is useful in distinguishing Cushing's disease (an ACTH-secreting pituitary adenoma) from other forms of Cushing's syndrome. Failure to suppress plasma or urine corticosteroids generally indicates an adrenal cortical or ectopic ACTH-secreting tumor; suppression of corticosteroids supports the diagnosis of a pituitary adenoma instead. Individuals with pituitary disease should demonstrate suppression in cortisol of 50% or more (Vaughan, Med Clin North Am 2004; 88(2): 443-466).

**(24)**

Adrenogenital syndrome is an autosomal recessive error of metabolism which, in 80% to 95% of cases, results in a 21-hydroxylase enzyme deficiency. The altered hormone production causes enlarged and ambiguous genitalia. CT is performed to evaluate the adrenal glands for hyperplasia or tumor.