AmeriHealth Caritas Louisiana

*National Imaging Associates, Inc. *	
Clinical guidelines **ABDOMEN CT**	**Original Date: September 1997**
CPT Codes: 74150, 74160, 74170	**Last Revised Date: ~~March 2022~~May 2023**
Guideline Number: NIA_CG_030	**Implementation Date: January 202~~3~~4**

GENERAL INFORMATION

- *It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.*
- ***Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.***

Note: For syndromes for which imaging starts in the pediatric age group, MRI preferred

NOTE: ABDOMEN CT **ALONE** SHOULD ONLY BE APPROVED WHEN DISEASE PROCESS IS SUSPECTED TO BE LIMITED TO THE ABDOMEN. ~~CT~~ Abdomen/Pelvis ~~Combo~~**CT** (CPT Codes: 74176, 74177, 74178) is the correct study when the indication(s) include both the abdomen AND pelvis, such as CTU (CT Urography), CTE (CT Enterography), acute abdominal pain, widespread inflammatory disease, or neoplasm.
When separate requests for CT abdomen and CT Pelvis are encountered for processes involving both the abdomen and pelvis, they need to be resubmitted as a single Abdomen/Pelvis CT (to avoid unbundling; CPT codes 74176, 74177, 74178). Otherwise, the exam should be limited to the appropriate area (i.e., Abdomen **OR** Pelvis) which includes the specific organ, area of known disease/abnormality, or the area of concern.

INDICATIONS FOR ABDOMEN CT

Abdominal Pain for Unknown Etiology

- CT allowed after initial workup is inconclusive and must include results of the following:

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- ~~Initial imaging, such as ultrasound (although ultrasound does have limitations, it is a common misconception that ultrasound is not a good tool in ALL obese patients, such that it is often useful even in obese patients and quite reasonable to attempt as a first line imaging modality particularly given the benefit of no radiation), scope study, or x-ray AND~~
- ~~Appropriate~~ laboratory testing (chemistry profile, complete blood count, and**/or** urinalysis)
  - ~~Amylase/ lipase if~~ **for the patient's presentation (e.g.,** suspected pancreatitis **– amylase/lipase etc.) AND**
    - ~~Liver function tests if suspicion of hepatic disease~~
  - **Initial imaging (such as ultrasound, barium study, nuclear medicine, or scope study) appropriate to the symptoms**
  - **Not all of the above tests need to be performed, but both labs and initial imaging need to be performed**
    - **E.g., for GI bleeding, CBC and a scope study would be appropriate initial testing (however, a UA and ultrasound would not be)**

- For acute abdominal pain in a patient over the age of 65[1, 2]
- **Initial evaluation of abnormal findings seen on other imaging, such as ultrasound (US) or x-ray and limited to the abdomen, and CT is the most reasonable next step for that diagnosis**

Evaluation of suspicious known mass/tumors (unconfirmed diagnosis of cancer) for further evaluation of indeterminate or questionable findings

- ~~Initial evaluation of suspicious masses/tumors found by physical exam or imaging study, such as ultrasound (US), and only the abdomen is affected[3, 4]~~

- ~~Surveillance:~~ **Initial evaluation of suspicious masses/tumors found by physical exam or imaging study, such as ultrasound (US), and only the abdomen is affected[3, 4]**
- One follow-up exam to ensure no suspicious change has occurred in a tumor ~~in the abdomen and pelvis.~~ No further surveillance ~~CT~~**imaging** unless tumor(s) **is/**are specified as highly suspicious**,** or ~~a~~ change was found on ~~the~~**exam or** last follow-up ~~CT, new/changing sign/symptoms, or abnormal lab values~~**imaging.**
- For abnormal incidental abdominal lymph nodes when follow-up is recommended based on prior imaging (initial 3-month follow-up)[5]

Follow-up of known cancer[6, 7]

- In **a** patient undergoing active treatment within the past year or **as** per surveillance imaging ~~tip sheet~~**guidance for** that ~~summarizes NCCN recommendations~~**cancer**
- Known cancer with suspected abdominal metastasis based on a sign, symptom (e.g., anorexia, early satiety, intestinal obstruction, night sweats, pelvic pain, weight loss, vaginal bleeding) or an abnormal lab value (alpha-fetoprotein, CEA, CA 19-9, p53 mutation)

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For evaluation of suspected infection or inflammatory disease based on exam or discovered on previous imaging~~[8-10]~~[8-10]

- Right upper quadrant pain for suspected biliary disease with negative or equivocal ultrasound
- For epigastric or left upper quadrant pain if labs or other imaging are inconclusive[11]

For evaluation of suspected infection or for follow-up known infection limited to the abdomen

- Any known infection that is clinically suspected to have created an abscess limited to the abdomen. (If location unclear or unknown, CT Abdomen/Pelvis)
- Any history of fistula limited to the abdomen that requires re-evaluation or is suspected to have recurred
- Abnormal fluid collection limited to the abdomen seen on prior imaging that needs follow-up evaluation

For evaluation of Inflammatory Bowel Disease (IBD) such as Crohn's or Ulcerative Colitis (MRE should be considered for age < 35 to reduce radiation exposure). If only Abdomen CT is requested for IBD, the request should be resubmitted as CT Abdomen and Pelvis (see Guideline for criteria) unless it is known that the disease ~~or follow-up~~is limited to the abdomen.

- ~~For suspected inflammatory bowel disease (Crohn's disease or ulcerative colitis) with abdominal pain **AND** one of the following[12-14]:~~
  - ~~Chronic diarrhea~~
  - ~~Bloody diarrhea~~

~~Note: For patients under 35 years old, consider MRE~~

- ~~**High** clinical suspicion after complete work up including physical exam, labs, endoscopy with biopsy[12-15]~~
- ~~Known inflammatory bowel disease, (Crohn's or ulcerative colitis) with recurrence or worsening signs/symptoms requiring re-evaluation~~

For evaluation of an organ or abnormality seen on previous imaging

ADRENAL

- ~~To locate a pheochromocytoma once there is clear biochemical evidence (may require abdomen and pelvis imaging)~~
- ~~Suspected adrenal secreting tumor after full clinical and biochemical work-up[16, 17]~~
- ~~Suspected adrenal mass ≥ 1 cm incidentally discovered with no history of malignancy (one follow-up in 6-12 months to document stability)~~
  - **Indeterminate adrenal lesion seen on prior imaging**
  - **For further evaluation of suspected adrenal tumors and/or endocrine disorders when there is clinical and laboratory evidence to suggest an adrenal source; see Background for specific laboratory testing that is needed based on suspected diagnosis[12]**

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- **Adrenal mass < 4 cm incidentally discovered with benign characteristics, one follow-up at 6 months then annually x 2 years (no further imaging if stable, see Background for details)**
- If adrenal mass ≥ 4 cm and no diagnosis of cancer, can approve for ~~preoperative~~**either pre-operative** planning ~~(~~**OR if** surgery ~~to rule out adrenal cortical carcinoma)~~**is not done, can repeat imaging in 6-12 months**

- ~~For adrenal mass < 4 cm with history of malignancy (if ≥ 4 cm consider biopsy or PET/CT unless pheochromocytoma is suspected)~~
- ~~Yearly surveillance for patients with Multiple Endocrine Neoplasia type 1 (MEN1) beginning at age 10~~[18]
- ~~For patients with Von Hippel Lindau, surveillance at least every other year starting at age 16 if MRI contraindicated (Abdominal US starting at age 8)~~[19]

LIVER

- ~~Indeterminate liver lesion > 1 cm seen on ultrasound~~[20] ******
- ~~Indeterminate liver lesion < 1cm on initial imaging with known chronic liver disease or a history of extrahepatic malignancy~~
  - ~~Hepatitis/hepatoma~~ **Indeterminate liver lesion seen on prior imaging** [11]
  - **For evaluation of rising AFP (requires a ≥7 ng/mL increased in AFP per month) in patients at high risk for HCC (known cirrhosis and/or chronic hepatitis B, see Background for additional risk categories)**[13]
  - **For** screening ~~after~~**in patients at high risk for HCC (see above) every 6 months when prior** ultrasound is ~~abnormal, equivocal,~~ **insufficient to evaluate the liver due to steatosis/fatty liver** or ~~non-diagnostic (may be limited in patients who are obese,~~**nodular liver**
    - **The finding of steatosis/fatty liver and/or nodular liver alone on an ultrasound report is insufficient for approval; the report must specify that** those ~~with underlying hepatic steatosis, as well as nodular livers).~~[21-24] ~~(No literature supports the use of AFP alone in the screening of HCC).~~**findings prevent adequate visualization of the liver by ultrasound**
  - For jaundice or abnormal liver function tests after equivocal or abnormal ultrasound~~[25]~~[14]
- ~~For surveillance of HCC in patients who have received liver-directed therapy, surgical resection, medical treatment or transplant (MRI or CT) at one-month post treatment and then every 3 months for up to two years~~[25, 26]******
  - **For surveillance of HCC (MRI or CT) in patients who have received liver-directed therapy, surgical resection, medical treatment, or transplant at one-month post treatment and then every 3 months for up to two years, then every 6 months**[14, 15]
  - For follow-up of suspected adenoma every 6-12 months
- ~~To confirm diagnosis of focal nodular hyperplasia seen on other imaging~~
- ~~For follow-up of focal nodular hyperplasia (FNH) annually if US is inconclusive~~[27]
- ~~Pre-procedure for transjugular intrahepatic portosystemic shunt (TIPS)~~[28, 29]

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- ~~In patients with Beckwith-Wiedemann syndrome and abnormal ultrasound or rising AFP and MRI is contraindicated[30]~~
  - **For surveillance of patients with primary sclerosing cholangitis (also CA 19-9), every 6-12 months after the age of 20 (MRI and MRCP preferred over CT) [16]**
  - **For follow-up of focal nodular hyperplasia (FNH), repeat imaging in 6-12 months to ensure stability. Additional imaging beyond that is needed only if atypical features or diagnosis is still in question. [17]**
  - **For annual elastography[18] in chronic liver disease to stage hepatic fibrosis when MRI is contraindicated and transient elastography with ultrasound is insufficient**
  - **In patients with Beckwith-Wiedemann syndrome and abnormal ultrasound or rising AFP and MRI is contraindicated [19]**
  - **Pre-procedure for transjugular intrahepatic portosystemic shunt (TIPS)[20, 21]**
  - **For evaluation and monitoring of Gaucher Disease at initial diagnosis and every 12 to 24 months when MRI is contraindicated [22]**

Evaluation of iron overload in the following settings when MRI is contraindicated

- **Initial evaluation of liver iron in Hemochromatosis diagnosed in lieu of liver biopsy [23]**
- **Annual evaluation for high-risk patients: transfusion-dependent thalassemia major, sickle cell disease, and other congenital anemias [24]when ultrasound is insufficient**

PANCREAS

- Pancreatic cystic lesion found on initial imaging
  - ~~Intraductal papillary mucinous neoplasm (IPMN) and mucinous cystic neoplasm (MCN) require surveillance imaging as follows (if MRI/MRCP is contraindicated) if indeterminate on~~ **, approve for** initial ~~imaging (if there are no high-risk characteristics, see Background section)[31]:~~**characterization of lesion**
  - **For follow-up for pancreatic cyst as below AND MRI is contraindicated [25]:**
    - For incidental and asymptomatic cysts **<1**.5 mm, ~~one follow up at three years[32]~~ **AND:**
      - ~~For cysts 5 mm-1 cm~~ **Age < 65,** image **annually x 5 years, then** every 2 years ~~for 4 years, and~~ if stable~~ can lengthen intervals~~
      - ~~For cysts 1-2 cm image~~ **Age 65-79, imaging** every ~~year for~~ 2 years ~~and~~**x 5, then stop** if stable
    - **For cysts 1.5-1.9 cm with main pancreatic duct communication (MPD), image annually x 5 years, then** every 2 years ~~for 4 years, and~~**x 2, stop** if stable ~~can lengthen intervals~~ **at year 9.**
    - ~~Cysts that are~~ **For cysts** 2~~-3 cm~~**.0-2.5 cm with MPD communication, image** every 6~~-12~~ months ~~for 3~~**x 4, then annually x 2, then every 2** years ~~and~~**x 3, stop** if stable ~~then yearly for 4 years and if stable can lengthen intervals (can also use EUS)~~**at year 10.**

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- For ~~lesions > 3~~**cysts 1.5-2.5** cm ~~MRI/CT~~ **with NO MPD communication (**or ~~EUS~~**cannot be determined), image** every 6 ~~months for 3~~**mos. x 4, then annually x 2 then every 2 years x 3, stop if stable at year 10.**
- **For cyst > 2.5 cm on surveillance (i.e., intervention has not been chosen), image every 6 mos. x 4, then annually x 2 years, then every 2** years~~, then imaging alternating with EUS every year for 4 years and~~ **x 3. Stop** if stable ~~can lengthen intervals~~ **at year 10.**
- **Patients > 80 years of age at presentation are imaged less frequently: image every 2 years x 2, stop if stable at year 4 (intervals are the same regardless of size if surveillance chosen)**
- **GROWTH or suspicious change on a surveillance imaging scan may warrant more frequent surveillance**

- **For localization of a functional pancreatic tumor, see Background (endocrine) once diagnosis is confirmed (or highly suspected)**
- Annual surveillance for individuals determined to have an increased lifetime risk of developing pancreatic cancer (if MRI/MRCP and EUS contraindicated), based on genetic predisposition or family history **as below:**
  - **SKT11 variant (including Peutz-Jeghers):** starting at age ~~5~~30 **(**or 10 years younger than the earliest ~~age of~~**pancreatic** cancer ~~affected~~**diagnosis in the family, whichever is earlier)**
  - **CDKN2A variant: starting at age 40 (or 10 years younger than the earliest pancreatic cancer diagnosis in the family, whichever is earlier)**
  - **Other variants and based on family history as detailed below: Starting at age 50 (or 10 years younger than the earliest pancreatic cancer diagnosis in the family, whichever is earlier) for the following:**
    - **≥ 1** first- **or second-**degree relative ~~(except~~ with ~~Peutz Jeghers start at age 30-35)~~ **history of pancreatic cancer from the same side of the family as the identified variant AND known mutation in other pancreatic susceptibility genes (ATM, BRCA1, BRCA2, MLH1 (Lynch), MSH2, MSH6, EPCAM, PALB2, TP53)**
  - ~~Von Hippel Lindau starting at age 16 at least every other year (abdominal US starting at age 8)~~
    - **≥ 2 first-degree relatives with a history of pancreatic cancer from the same side of the family**
    - **≥ 3 first- and/or second-degree relatives with a history of pancreatic cancer from the same side of the family**
  - Hereditary Pancreatitis **(such as PRSS1 variant)** starting ~~at age 40 or~~ 20 years after ~~first attack)~~**onset of pancreatitis, or at age 40 years, whichever is earlier**[~~7, 33, 34~~**1, 26-28** ~~***~~]

- ~~For patients with MEN 1, yearly surveillance for primary neuroectodermal tumors (pNET) starting at age 10 (EUS also considered)~~
- ~~For suspected acute pancreatitis with pain and abnormal amylase and lipase and <48-72 hours if ultrasound is inconclusive~~[~~25, 35~~]

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- ~~Suspected acute pancreatitis with atypical signs and symptoms including equivocal amylase and lipase[36]~~
- ~~Severe acute pancreatitis, 72-96 hours after onset of symptoms[37]~~
    -
    - **Multiple Endocrine Neoplasia type 1 (MEN1) (to screen for PanNET (neuroendocrine tumor) every 1-3 years (chest CT or MRI also approvable for this syndrome at same interval)**
- **Initial imaging for suspected acute pancreatitis due to epigastric pain with elevated amylase and/or lipase:**
    - **For mild presentation when symptom improvement is not seen after 72 hours of treatment and either:**
        - **ultrasound has been performed and did not show an abnormality such as gallstones, dilated bile duct**
        - **ultrasound suggests complications (such as fluid collection)**
    - **For severe presentation (such as fever, elevated WBC)**
    - **For a decline in clinical status and/or suspected complication**
- Pancreatitis by history, (including pancreatic pseudocyst) with abdominal pain suspicious for worsening, or re-exacerbation
- Known necrotizing pancreatitis requiring follow-up
- ~~For localization of an insulinoma once diagnosis is confirmed[38]~~

- **In patients > 40 years of age who have pancreatitis with no identifiable cause (see Background), CT is indicated to exclude neoplasm [29]**

RENAL

- ~~For an indeterminate renal mass on other imaging[39]~~
- **For an indeterminate renal mass on other imaging [30]**

- Active surveillance for indeterminate cystic renal mass, not a simple renal cyst[40] ~~(see Bosniak criteria in the Overview section)~~

~~Active surveillance for patients with tuberous sclerosis~~ (Bosniak IIF (6 mos., 12 mos. then annually), III and ~~known angiomyolipoma (AML) if MRI is contraindicated~~[41]IV lesions - see Background)[31]

- ~~For surveillance of patients with Von Hippel Lindau at least every other year to assess for clear cell renal cell carcinoma to begin at age 16 (screening with ultrasound starting at around age 8)[19]~~
    - Follow-up for solid renal masses under ~~1~~3 cm at 6 and 12 months, then annually[42] [32,33]
- ~~Active surveillance for renal cell carcinoma in patients with Birt-Hogg syndrome every 36 months[43]~~
    - **Surveillance for known angiomyolipoma (AML): annually if known tuberous sclerosis (TSC) or AML size is > 4 cm; every 2 years if AML size is 3-4 cm[34-36] (if AML < 3 cm, CT or MRI not needed unless pt has TSC)**

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- **For surveillance of patients with the following known genetic mutations at the following intervals (MRI preferred due to lifetime radiation risk, CT can be approved if needed for surgical planning or CI to MRI):**
  - **BAP1-TPDS (BAP-1 tumor predisposition syndrome) every 2 years starting at age 30**
  - **BHDS (Birt-Hogg-Dube) every 3 years starting at age 20**
  - **HLRCC (hereditary leiomyomatosis and renal cell cancer) annually starting at age 8**
  - **HPRC (hereditary papillary renal carcinoma) every 1-2 years starting at age 30**
  - **PGL/PCC (hereditary paraganglioma/pheochromocytoma) every 4-6 years starting at age 12**
  - **TSC (tuberous sclerosis complex) without known AML every 3-5 years starting at age 12**
    - **TSC + known AML annually**
  - **VHL (Von Hippel Lindau) every 2 years starting at age 15[37]**
- ~~-~~For evaluation of total kidney volume in polycystic kidney disease when MRI is contraindicated[~~44~~**38**]

SPLEEN

- Incidental findings of the spleen that are indeterminate on other imaging

~~**For evaluation of a suspected or known hernia**~~

- **For evaluation and monitoring of Gaucher Disease at initial diagnosis and every 12 to 24 months when MRI is contraindicated [22]**

For evaluation of a suspected or known hernia [39]

- Abdominal/pelvic pain suspected to be due to an occult, umbilical, Spigelian, or incisional hernia **(including recurrent hernias)** when physical exam and~~/or~~ prior imaging (such as ultrasound) is non-diagnostic or equivocal or if requested as a preoperative study and limited to the abdomen
- Hernia with suspected complications (e.g., bowel obstruction or strangulation, or non-reducible) based on symptoms (e.g., diarrhea, hematochezia, vomiting, severe pain, or guarding), physical exam (guarding, rebound) or prior imaging[~~45~~**40**]

~~- For confirming the diagnosis of a recurrent hernia when ultrasound is negative or non-diagnostic~~

~~- Complex ventral hernia that is ≥ 10 cm for pre-operative planning[45]~~

- **Lower esophageal hernias (such as hiatal, paraesophageal) for pre-operative planning (Abdomen CT preferred, only approve one study, chest CT can be approved instead of abdomen if specific reason given); CT is not a part of the typical workup for diagnosis [41]**
- **Deep intraabdominal hernia is suspected (post-Roux-en-Y, does not require US first; hernia type needs to be specified)**

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For evaluation of known or suspected non-aortic vascular disease (e.g., aneurysms, hematomas)[46, 47][42, 43], CTA/MRA is the preferred study when ultrasound is inconclusive

~~NOTE: CT/MRI should not be approvable without a contraindication to CTAngiography/MRAngiography (such as severe renal dysfunction, contrast allergy, or another specific reason CT/MRI (rather than CTA/MRA) is preferred.~~

- ~~Evidence of vascular abnormality identified on imaging studies and limited~~**If a contraindication to CTA/MRA has been provided, CT can be approved**

Transplants

- **Prior** to **solid organ transplantation**
- **For initial workup prior to Bone Marrow Transplantation (BMT) (along with CT Chest[44], CT Pelvis, CT Sinus and Brain MRI)[45]). Alternatively, PET might be sufficient to evaluate** the abdomen~~.~~ **and pelvis if indicated based on that malignancy (see PET Guideline)**

Pre-operative ~~evaluation~~planning

- For abdominal surgery or procedure

Post-operative/procedural evaluation

- Follow-up of known or suspected post-operative complication involving only the abdomen
- A follow-up study to help evaluate a patient's progress after treatment, procedure, intervention, or surgery. Documentation requires a medical reason that clearly indicates why additional imaging is needed

Other Indications

Further evaluation of indeterminate findings on prior imaging (unless follow up is otherwise specified within the guideline):

- **For initial evaluation of an inconclusive finding on a prior imaging report that requires further clarification**
- **One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam)**

Indication for combination studies for the initial pre-therapy staging of cancer, evaluation before starting treatment OR active monitoring for recurrence as clinically indicated OR evaluation of suspected metastases

- ≤ 5 concurrent studies to include CT or MRI of any of the following areas as appropriate depending on the cancer: Neck, Abdomen, Pelvis, Chest, Brain, Cervical Spine, Thoracic Spine or Lumbar Spine, and MUGA

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BACKGROUND

~~CT provides direct visualization of anatomic structures in the abdomen and pelvis and is a fast imaging tool used to detect and characterize diseases.~~ Abdominal imaging begins at the diaphragm and extends to the umbilicus or iliac crests. CT uses x-rays and multiple detectors to create cross-sectional images of the normal anatomy, as well as demonstrate abnormal soft tissue densities, calcifications or fluid/gas patterns in the viscera or peritoneal space.

~~In general, ionizing radiation from CT should be avoided during pregnancy.~~ Ultrasound is clearly a safe~~r~~ imaging option and is the first imaging test of choice~~; although,~~. CT or MRI **can then be done as needed** after equivocal ultrasound ~~has been validated for diagnosis~~. Clinicians should exercise increased caution with CT imaging in children, pregnant women, and young adults due to the risks of exposure to ionizing radiation. Screening for pregnancy as part of a work-up is suggested to minimize the number of unexpected radiation exposures for women of childbearing age.

~~Cross-sectional imaging (liver ultrasound with Doppler, CT or MRI) should be completed no more than a month prior to the Transjugular Intrahepatic Portosystemic Shunt (TIPS) to assess for vascular patency and look for hepatic masses or other problems that could complicate the procedure. Post procedure, an ultrasound of the liver is performed a day after to assess shunt patency. Hepatic encephalopathy (HE) is the most common complication and usually occurs 2-3 weeks after insertion of TIPS. Unique complications may include intravascular hemolysis and infection of the shunt. Other complications can include capsule puncture, intraperitoneal bleed, hepatic infarction, fistula, hematobilia, thrombosis of stent, occlusion or stent migration and may require cross-sectional imaging.~~

~~Follow up and maintenance imaging if complications suspected include Doppler ultrasound to assess shunt velocity. If asymptomatic sonogram performed at 4 weeks post placement, then every 6 months to a year. The gold standard for shunt patency is portal venography, usually reserved if concern for shunt occlusion.~~

OVERVIEW

Ultrasound should be considered prior to a request for Abdomen CT for the following evaluations:

- Possible gallstones or abnormal liver function tests
- Evaluation of cholecystitis
- Follow up for aortic aneurysm

~~Note: For known or suspected abdominal aneurysm, CT/MRI should not be approvable without a contraindication to CTAngiography /MRAngiography, such as severe renal dysfunction, contrast allergy, or another specific reason CT/MRI (rather than CTA/MRA) is preferred.~~

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~~**Screening for Hepatocellular carcinoma (HCC)** – AASLD (American Association for the Study of Liver Diseases) recommends screening for HCC with ultrasound every 6 months for patients with hepatitis C and B.[21] The literature differs on the role of AFP (alpha fetoprotein) in the screening of HCC. Some authors argue against its use altogether due to its lack of sensitivity and specificity in detecting HCC~~

Liver

Hepatocellular carcinoma (HCC) Screening for Hepatocellular carcinoma (HCC) – AASLD (American Association for the Study of Liver Diseases) recommends screening for HCC with ultrasound every 6 months for patients with hepatitis C and B.[46] Advanced imaging is recommended when the AFP is rising, regardless of ultrasound results. The main risk factors for HCC are cirrhosis and Hepatitis B. Additional populations for which there is a benefit to surveillance for HCC include: Asian males Hepatitis B carriers ≥ 40 y, Asian female Hepatitis B carriers ≥50 y, Hepatitis B carriers with + family history of HCC and African and/or North American blacks with hepatitis B ~~[21, 23]~~**[13, 47]** ~~and instead recommend ultrasound alone for screening. According to Marquardt, the AASLD and EASLD (European Association for the Study of the Liver) "do not endorse its [AFP] use in clinical routine, neither alone nor in combination with ultrasound". This approach is supported by reports of patients with chronic viral hepatitis and elevated AFP but normal livers on imaging. AFP elevation in these cases is due to hepatic inflammation and viral replication,[48] not neoplasm. Others advocate for combined ultrasound and AFP for screening,[49, 50] citing increased sensitivity compared to ultrasound alone in detecting early-stage HCC particularly in cirrhotic patients. In a meta-analysis by Tzartzeva, et al of thirty-two studies (13,367 patients with cirrhosis), ultrasound with AFP had a 63% sensitivity of detecting early-stage HCC, compared to 45% for ultrasound alone. In the final analysis, no literature supports the use of AFP alone in the screening of HCC.[50]~~

~~Although most international groups recommend US screening and surveillance for HCC, the evidence to support this practice is weak. The recommendation for screening with US every 6 months by the AASLD is based on a prospective Chinese study of hepatitis B patients that showed that patients who had an US survived longer. However, there is no good evidence to show that these results apply to the population in the United States, which has a much higher percentage of obese patients, fewer patients with chronic hepatitis B, and many more patients with alcoholic cirrhosis, often with hepatitis C and NAFLD (and the role of surveillance in NAFLD without cirrhosis is unclear). US is insensitive for detection of HCC in patients with hepatic steatosis, as well as nodular cirrhotic livers who are undergoing surveillance. The regenerative nodules in cirrhotic livers alter the background hepatic echotexture, making HCC difficult to detect. Another inherent limitation of US is its operator dependence.[51]~~

- ~~Incidental liver lesions – "Incidental hepatic lesions that are ≥1 cm and have distinctly benign imaging features do not require follow-up. Such features include sharp margin, homogeneous low attenuation (≤20 HU) on noncontrast or portal venous–phase imaging, or characteristic~~

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~~features of hemangiomas, FNH, or perfusional changes (including focal fatty sparing or deposition)… Incidental hepatic lesions that are ≥1 cm and have suspicious imaging features require further workup with prompt MRI or biopsy, depending on the lesion's size and features and the patient's risk level. Suspicious imaging features include ill-defined margins, heterogeneous density, mural thickening or nodularity, thick septa, and intermediate to high attenuation on portal venous–phase imaging (>20 HU, in the absence of pseudoenhancement)."[51]~~

~~A diagnosis of HCC can be made with CT or MRI if the typical characteristics are present: a solid FLL with enhancement in the arterial phase with washout in the delayed venous phase should be considered to have HCC until otherwise proven (strong recommendation, moderate quality of evidence. If the characteristic features are not seen on imaging, a biopsy may be indicated. "A study by Serst et al, performed CT, MRI, and biopsy for a series of 74 patients with nodules identified by surveillance ultrasound. The authors concluded that sensitivity and specificity of the combination of the two diagnostic tests was 98% and 81%, respectively, and that biopsy could be reserved for those without definitive findings on either CT or MRI."[52]~~

~~A CT or MRI should be performed in cirrhotics with an ultrasound showing a lesion of > 1 cm, an elevated or rising α- fetoprotein in the absence of a liver lesion on US, or when there is a clinical suspicion for the presence of HCC. The choice of MRI versus CT is controversial at this time.~~

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Surveillance for HCC is required for patients who have received liver-directed therapy, surgical resection, medical treatment, or a transplant for HCC. However, because of the higher risk of tumor recurrence, US is not typically used for surveillance for HCC in the first 2 years after treatment. The European Association for the Study of the Liver recommends multiphase CT or MRI to assess response 1 month after resection or locoregional or systemic therapies, followed by one imaging technique every 3 months to complete at least 2 years, and then regular US every 6 months. This schedule is more frequent than some of the other society recommendations and the most common practice among interventional radiologists (every 3 months).

Imaging for pancreatitis – When acute pancreatitis is suspected, ultrasound is typically the first line imaging modality. The purpose of US is to identify other causes such as gallstones and/or biliary dilatation as well as help identify potential complications such as fluid collections. MRCP is preferred over CT for further evaluation of bile duct dilation. When a diagnosis other than pancreatitis is likely (such as when amylase and lipase are equivocal), CT or MRI may be indicated but would generally fall under indications for acute abdominal pain. In general, CT is not indicated in patients with mild pancreatitis who show rapid improvement with appropriate medical management. When a patient has or is at risk for severe pancreatitis, CT may be used after 72 hours to best assess the full extent of disease. CT should be repeated when the clinical picture drastically changes, such as with sudden

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onset of fever, decrease in hematocrit or sepsis. For prolonged symptoms (>4 weeks) with known fluid collection, CT or MRI is indicated. Common causes for pancreatitis include gallstones, alcohol, hypertriglyceridemia, post-ERCP, trauma. In patients over 40 years old, when no cause for pancreatitis can be identified, advanced imaging is indicated to exclude neoplasm.

Adrenal incidentaloma – Adrenal masses detected on imaging for another reason (i.e., incidental finding) are becoming increasingly common. If there is no prior personal history of malignancy and no features concerning for malignancy on imaging, these patients should undergo hormonal (functional) evaluation and periodic imaging. If the mass is < 4 cm on imaging and has benign characteristic (homogenous, regular borders, HU < 10) a hormonal evaluation should be done. If that evaluation is negative, adrenal protocol/follow-up imaging can be performed at 6 months then annually for 1-2 years[12]. Repeat functional studies are recommended annually (or sooner if symptoms) for 5 years. If the mass exhibits growth or becomes hormonally active, then surgery is recommended [12]. Additional imaging beyond 2 years is reasonable if there has been growth and the mass is not resected; if stable, no further imaging is warranted unless the annual hormonal evaluation is positive. Masses ≥ 4cm generally are resected after hormonal evaluation is completed, additional imaging can be approved when needed for further characterization for surgical planning. If the decision is made not to resect the mass, then FU imaging in 6-12 months is reasonable.

Biochemically active tumors (adrenal and neuroendocrine): Laboratory evaluation prior to imaging - When neuroendocrine and hormonally active tumors are suspected, the required laboratory evaluation prior to advanced imaging is dependent on the tumor type that is suspected. The following list describes suspected syndrome/tumor and typical laboratory evaluation in parenthesis:

GI Carcinoid (24-hour urine or plasma 5-HIAA), Lung/Thymus Carcinoid (24-hour urine or plasma 5-HIAA AND one of the following: overnight dexamethasone suppression test, 2-3 midnight salivary cortisols, 24-hour urinary free cortisol), PPoma (serum pancreatic polypeptide), Insulinoma (serum insulin, pro-insulin and C-peptide all drawn during a period of hypoglycemia (i.e. 72 hour fast)), VIPoma (serum VIP), glucagonoma (serum glucagon), gastrinoma (serum gastrin), somatostatinoma (serum somatostatin), pheochromocytoma/paraganglioma (plasma free or 24-hour urine fractionated metanephrines and normetanephrines +/- serum or urine catecholamines), pituitary tumor (serum IGF-1, prolactin, LH/FSH, alpha subunits, TSH and ONE of the following: overnight dexamethasone suppression test, 2-3 midnight salivary cortisols, 24-hour urinary free cortisol), primary hyperaldosteronism (suppressed renin/renin activity in association with elevated plasma aldosterone (>10 ng/dL) and confirmatory testing if positive), adrenocortical carcinoma (testosterone, DHEA-S AND complete evaluation for hypercortisolemia or primary aldosteronism)[48].

If Cushing's (hypercortisolemia) is suspected, typical labs include a plasma ACTH AND one or more of the following: overnight dexamethasone suppression test, 2-3 midnight salivary cortisols, OR 24-hour urinary free cortisol. The results of the suppression test then indicate whether brain imaging is needed (pituitary source) OR chest and abdominal imaging is needed (CXR + Adrenal CT/MRI). ACTH

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> 20 after suppression > 20 is suggestive of Cushing's Disease and Pituitary MRI is indicated. ACTH after suppression < 5 is suggestive of Cushing's Syndrome and CXR + Adrenal CT/MRI is indicated [49]. If indeterminate, a CRH or desmopressin test is then done. If there is no ACTH suppression with CRH/desmopressin, then adrenal imaging is indicated.

Genetic syndromes and adrenal tumors – Adrenal cortical carcinoma (ACC) diagnosed during childhood is known to be commonly associated with hereditary syndromes, including Beckwith-Wiedemann (BWS) and Li-Fraumeni syndrome (LFS). In adults, ACC may be associated with Multiple Endocrine Neoplasia 1 (MEN1), familial adenomatous polyposis coli and neurofibromatosis type 1 (NF1); however, there are currently no surveillance imaging recommendations.[50]

High

~~"The AASLD (American Association for the Study of Liver Diseases) recommends screening for the following high-risk groups: Asian male hepatitis B carriers over age 40, Asian female hepatitis B carriers over age 50, hepatitis B carriers with a family history of HCC, Africans and African Americans with hepatitis B, cirrhotic hepatitis B carriers, individuals with hepatitis C cirrhosis, individuals with stage 4 primary biliary cholangitis, individuals with genetic hemochromatosis and cirrhosis, individuals with alpha 1-antitypsin deficiency and cirrhosis, individuals with cirrhosis from other etiologies. We scan patients with cirrhosis from any etiology every 6 months with ultrasound. Ultrasonography remains the primary imaging modality of choice for HCC surveillance. It is more cost-effective than CT and MRI, and more widely available. A meta-analysis reported a sensitivity of 94% in detecting lesions and a specificity of >90%, although the figures were less favourable for lesions measuring less than 2 cm. The sensitivity for early HCC is 63%. Although our liver clinic routinely uses alpha-fetoprotein as an adjunct to imaging screening, it is acknowledged that it is neither sensitive nor specific for early diagnosis of HCC."[53]~~

~~**CT for incidental adrenal mass -** In general, masses found < 1 cm do not need to be pursued. If an adrenal mass has diagnostic features of a benign mass, such as a myelolipoma (presence of macroscopic fat), cyst, or hemorrhage (masses without enhancement, defined as change in pre- and postcontrast imaging of <10 HU), no additional workup or follow-up imaging is needed. If the mass has a density of 10 HU on unenhanced CT or signal loss compared with the spleen between in- and opposed-phase images of a chemical-shift MRI (CS-MRI) examination, these features are almost always diagnostic of a lipid-rich adenoma, regardless of size. If no benign imaging features but stable for a year or longer, it is very likely benign and needs no further imaging. The role of adrenal mass biopsy is reserved predominantly to confirm a suspected adrenal metastasis; this procedure has been shown to be safe with a low morbidity. If there are signs or symptoms of pheochromocytoma, plasma-fractionated metanephrine and normetanephrine levels should be obtained prior to biopsy. Otherwise, endocrine workup of an incidental adrenal mass is controversial. Current guidelines from the American Association of Clinical Endocrinologists and the American Association of Endocrine Surgeons recommend an initial biochemical evaluation of all adrenal incidentalomas to exclude pheochromocytoma, subclinical Cushing's syndrome, and hyperaldosteronism.~~

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risk characteristics for mucinous pancreatic cysts include all of the following: Symptoms, Jaundice secondary to the cyst, acute pancreatitis secondary to the cyst, elevated serum CA 19-9 and no benign cause present, an enhancing mural nodule or solid component within the cyst or pancreas, main pancreatic duct of > 5mm, change in duct caliber with upstream atrophy, size over 3 cm, high grade dysplasia or cancer on cytology. These patients should undergo EUS + -FNA or be referred to a multidisciplinary group for further recommendations.[51]

Genetic syndromes and adrenal tumors - Adrenal cortical carcinoma (ACC) diagnosed during childhood is known to be commonly associated with hereditary syndromes including Beckwith-Wiedemann (BWS) and Li-Fraumeni syndrome (LFS). In adults, ACC may be associated with Multiple Endocrine Neoplasia 1 (MEN1), familial adenomatous polyposis coli and neurofibromatosis type 1 (NF1); however, there are currently no surveillance imaging recommendations.~~[54]~~[50]

~~**CT of the kidney** - Recommendations for follow up of a complex cystic renal mass are made using Bosniak criteria[55]:~~

CT of the kidney - Recommendations for follow up of a complex cystic renal mass are made using Bosniak criteria[52]:

- Bosniak I (water density 0-20 HU); no further follow-up
- Bosniak II (one or a few thin septations, small or fine calcifications, hyperdense cysts up to 3 cm); no further follow-up
- Bosniak IIF felt to be benign but too complex to be diagnosed with certainty; image at 6 and 12 months, then annually for 5 years if no progression
- Bosniak III thick-walled cystic lesions with wall or septal enhancement; resection favored vs conservative management and RFA in select cases[40]~~[31]~~
- Bosniak IV malignant cystic renal mass with enhancing soft tissue components; resection favored, malignant until proven otherwise

~~**Screening for pancreatic cancer**~~

~~*** Pancreatic cancer is thought to have a familial or hereditary component in approximately 10% of cases. Surveillance of individuals with genetic predisposition for pancreatic adenocarcinoma should include known mutation carriers from hereditary syndromes such as Peutz-Jeghers (10-30% lifetime risk), hereditary pancreatitis (which is associated with genes *PRSS1* and *SPINK1*), familial atypical multiple melanoma and mole syndrome (10-30% risk) or for members of familial pancreatic cancer with a first-degree family member with pancreatic cancer. In patients who are mutation carriers in *BRCA2* (5-10% lifetime risk), *PALB2* (5-10% lifetime risk), and Lynch syndrome (5-10%) families. Surveillance for patients with *BRCA1* (2% lifetime risk) and *ATM* serine/threonine kinase (1-5% lifetime risk) is limited to those with first- or second-degree relatives with pancreatic cancer. NCCN also recommends screening for individuals with a known pathogenic/likely pathogenic germline variant in a pancreatic susceptibility gene, including *CDKN2A, MLH1, MLH2, MSH6, PMS2, EPCAM* (mismatch repair genes associated with Lynch syndrome), *ATM, PALB2, STK11, TP 53* and a family history (first- or second-degree relative) from the same side of the family; or a family history of exocrine pancreatic cancer in ≥2 first-degree relatives~~

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~~from the same side of the family or ≥3 first- and second-degree relatives from the same side of the family (and at least one is a first-degree relative)[7, 56, 57]. Patients with a family history of pancreatic cancer affecting two first-degree relatives meet criteria for familial pancreatic cancer and are candidates for genetic testing. It should be noted that 90% of families meeting criteria for familial pancreatic cancer will not have a pathogenic mutation.[58]~~

Insulinomas are rare pancreatic tumors. Localization of the tumor by ultrasound and CT are the preferred initial options once a diagnosis has been made, followed by endoscopic ultrasound or arterial stimulation with hepatic venous sampling. Whipple's triad includes symptoms of hypoglycemia, low blood glucose relieved by ingestion of glucose, and benign 90%. Work-up prior to imaging should include: a 72-hour fast with serial glucose and insulin levels over this period until the patient becomes symptomatic. An insulin/glucose ration of greater than 0.3 has been found in virtually all patients with insulinoma or other islet cell disease.[~~38~~53]

~~**Surveillance of Pancreatic Cysts** - Some pancreatic cysts have the potential for malignant transformation to invasive ductal adenocarcinoma; hence the need for intervention vs surveillance. The data, however, is unclear as to the risk of cancer. Cyst surveillance can be offered to patients with asymptomatic cysts presumed to be IPMNs or MCNs. Pancreatic cystic Neoplasms (PCN) make up about 2-45% of the general population.~~

High risk characteristics for mucinous pancreatic cysts include all of the following: Symptoms, Jaundice secondary to the cyst, acute pancreatitis secondary to the cyst, elevated serum CA 19-9 and no benign cause present, an enhancing mural nodule or solid component within the cyst or pancreas, main pancreatic duct of > 5mm, change in duct caliber with upstream atrophy, size over 3 cm, high grade dysplasia or cancer on cytology. These patients should undergo EUS + -FNA or be referred to a multidisciplinary group for further recommendations.[~~31~~54]

CT and elevated Liver Function Tests - For elevated bilirubin, or serum transaminases with or without bilirubin elevation, US is the initial recommended test to assess for duct dilatation which might lead to ERCP or MRCP, vs other causes which might necessitate further lab testing or liver biopsy.[~~59~~55]

Combination request of Abdomen CT/Chest CT - A chest CT will produce images to the level of L3. Documentation for combo is required.

Imaging of hernias - Most hernias are diagnosed clinically with imaging recommended for the diagnosis of occult hernias or in the evaluation of hernia complications, such as bowel obstruction or strangulation. To detect occult hernias, ultrasound is a first-line study with a sensitivity of 86% and specificity of 77%, compared to 80% sensitivity and 65% specificity for CT.[~~60~~56] According to Miller, et al "Magnetic resonance imaging is generally not considered a first- or even second-line evaluation modality for hernias…."[~~61~~57] Based on this analysis, MRI is recommended only when ultrasound and CT have been performed and fail to make a diagnosis.

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POLICY HISTORY

Date	Summary
May 2023	• IBD: eliminated indications for abdomen alone or pelvis imaging alone, resubmission as abdomen and pelvis CT required unless limited indication • Adrenal: additional guidance provided for imaging intervals and background given for functional tumors • Liver: clarified guidance for HCC surveillance imaging, follow up of specific conditions such as hepatic steatosis and focal nodular hyperplasia • Pancreas: updated pancreatic cystic lesion guidance, specified guidance for increased lifetime risk for pancreatic cancer and pancreatitis • Renal: specified guidance for increased lifetime risk of renal cancer • Hernia: Added indications for lower esophageal and deep intraabdominal hernias • Aneurysm: eliminated indications for abdomen alone or pelvis imaging alone, resubmission as abdomen and pelvis CT required unless limited indication • Transplant: added section • Background: deleted some sections, added information to assist with adjudication/application of guideline statement • Aligned sections across body imaging guidelines • General Information moved to beginning of guideline with added statement on clinical indications not addressed in this guideline • Added statement regarding further evaluation of indeterminate findings on prior imaging
March 2022	• In Follow-up of known cancer, added per surveillance imaging of NCCN recommendations • Clarified IPMN and MCN surveillance imaging • Added total kidney volume in polycystic kidney disease when MRI is contraindicated to Renal section • Clarified “and/or” prior imaging (such as US) in abdominal/pelvic pain due to suspected hernia

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April 2021	Added Notes: • For syndromes for which imaging starts in the pediatric age group, MRI preferred • ABDOMEN or Pelvis CT ALONE SHOULD ONLY BE APPROVED WHEN DISEASE PROCESS IS SUSPECTED TO BE LIMITED TO THE ABDOMEN or Pelvis. CT Abdomen/Pelvis Combo (CPT Codes: 74176, 74177, 74178) is the correct study when the indication(s) include both the abdomen AND pelvis, such as CTU (CT Urography), CTE (CT Enterography), acute abdominal pain, widespread inflammatory disease or neoplasm. Otherwise, the exam should be limited to the appropriate area. (i.e., Abdomen OR Pelvis) which includes the specific organ, area of known disease/abnormality or the area of concern.
May 2020	• Added at top of guideline- For syndromes with imaging started in pediatric age group, MRI preferred • Removed Surveillance of cancer. Deleted active monitoring for recurrence as clinically indicated. • Removed suspected cholecystitis or retained gallstones as an indication for CT. Would require an MRCP or ERCP. • Added indication for suspected adrenal secreting tumor • Added surveillance for MEN 1 and Von Hippel Lindau; also Beckwith-Wiedemann syndrome (if abnormal US or rising AFP); Added multiple indications for surveillance for patients with increased lifetime risk of pancreatic cancer; also for surveillance for renal cell cancer in Birt-Hogg syndrome • Added pre procedural imaging prior to transjugular intrahepatic portosystemic shunt (TIPS) • Added imaging for indeterminate liver lesion < 1 cm with known chronic liver disease or a history of extrahepatic malignancy (ACR, 2020) • Added follow up for pancreatic cystic masses under 5mm (possible IPMN) • Added for localization of an insulinoma • Expanded section on hernia imaging • Removed diverticulitis and appendicitis since need CT of the abdomen and pelvis • Expanded background section to include: Genetic syndromes associated with adrenal tumors, improved on Bosniak criteria; Improved indications for screening for pancreatic cancer; Added section on work up for insulinoma; Added section on CT and elevated liver function tests; Removed reduction radiation exposure, consider barium studies for inflammatory bowel disease; work up for distant mets in melanoma, and pre-operative evaluation of primary rectal cancer.

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~~May 2019~~	• ~~For evaluation of suspected infection or inflammatory disease, Added:~~
	  ○ ~~Right upper quadrant pain for suspected biliary disease with negative or equivocal US or HIDA scan~~
	  ○ ~~For epigastric or left upper quadrant pain if labs or other imaging are inconclusive~~
	• ~~For evaluation of an organ or abnormality seen on previous imaging~~
	  ○ ~~Removed: For the evaluation of an organ enlargement such as splenomegaly or hepatomegaly as evidenced by physical exam or confirmed on any previous imaging study"~~
	  ○ ~~Added: To locate a pheochromocytoma once there is clear biochemical evidence~~
	  ○ ~~Changed adrenal indications from mass >4 cm to ≥1 cm with no hx of malignancy; AND adrenal mass ≥4 cm and no diagnosis of cancer, can approve for preoperative planning; AND adrenal mass <4 cm with history of malignancy~~
	• ~~Added indications for: liver lesions, adenoma, hyperplasia; modified hepatitis/hepatoma screening; pancreatic cystic lesions, pancreatitis, pancreatic cancer risk; renal mass; spleen~~
	• ~~Modified hernia indications from suspected spigelian hernia or hernia with suspected complications to occult hernia when physical exam or prior imaging is non diagnostic or equivocal~~
	• ~~Removed follow-up for peritonitis; evaluation of trauma; unexplained weight loss; removed age restrictions for abdominal pain~~
	• ~~Added Background information and updated references~~

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ADDITIONAL RESOURCES

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Reviewed / Approved by NIA Clinical Guideline Committee

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~~**GENERAL INFORMATION**~~

- ~~*It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.*~~

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