National Imaging Associates, Inc.	
Clinical guideline **ABDOMEN/PELVIS CT COMBO**	**Original Date: September 1997**
CPT Codes: 74176, 74177, 74178	**Last Revised Date: ~~March 2022~~ March~~January~~ 2023**
Guideline Number: _NIA_CG_068	**Implementation Date: January 2024~~3~~**

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: CT Abdomen/Pelvis Combo (CPT Codes: 74176, 74177, 74178) is the better 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) that includes the specific organ, area of known disease/abnormality or the area of concern.~~**
When separate requests for CT A~~a~~bdomen 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). 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/PELVIS COMPUTED TOMOGRAPHY (CT)

Evaluation of Abdominal and Pelvis 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 is 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) for the patient's presentation (e.g., suprapubic pain – UA, suspected pancreatitis – amylase/lipase ~~etc~~etc.) **AND**
-
- Initial imaging (such as ultrasound, barium study, nuclear medicine, or scope study) appropriate to the symptoms
- ~~Amylase/lipase if suspected pancreatitis~~
- ~~Liver function tests if suspicion of hepatic disease~~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, both the abdomen and pelvis are likely affected, and CT is the most reasonable next step for that diagnosis

Evaluation of suspicious or 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 both the abdomen and pelvis are likely affected[3, 4]
-
- One follow-up exam to ensure no suspicious change has occurred in a tumor. No further surveillance imaging unless tumor(s) is/are specified as highly suspicious, or change was found on exam or last follow-up imaging.
- ~~Surveillance: One follow-up exam to ensure no suspicious change has occurred in a tumor in the abdomen and pelvis. No further surveillance CT unless tumor(s) are specified as highly suspicious or a change was found on the last follow-up CT, new/changing sign/symptoms, or abnormal lab values~~
- For abnormal incidental abdominopelvic lymph nodes when follow-up is recommended based on prior imaging (initial 3-month FU)[5]
- For follow-up of mesenteric panniculitis[6-8] or lymphadenitis[9] when another diagnosis is suspected after initial imaging or there is a failure of symptom resolution

Evaluation of known cancer[10, 11] (see exception for prostate cancer*)

- Initial staging of known cancer
- Follow-up of known cancer

- Follow-up of known cancer of patient undergoing active treatment within the past year or as per surveillance imaging guidance for that cancer ~~(Surveillance Imaging for Cancer Patients from NCCN)~~[11]
- New evidence of an unknown primary[12]
- Known cancer with suspected abdominal/pelvic 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)

***~~-~~Initial staging of prostate cancer for the following risk groups:** (MRI Pelvis preferred for pelvic imaging; only consider CT Abdomen and Pelvis approval if PSMA PET not requested)

- Unfavorable intermediate risk, high risk and very ~~high risk~~high-risk disease~~-~~:
  - Gleason 8, 9, 10 disease
  - Gleason 4+3=7 disease (primary pattern 4)
  - Gleason 3+4=7 disease **AND** PSA > 10 or clinical stage ≥T2b
  - Gleason 3+3=6 disease **AND** PSA > 20 or clinical stage ≥T3
  - >50% cores positive for cancer in a random (non-targeted) biopsy[1, 13]

~~*~~Note: In patients who have been on a 5-alpha reductase inhibitor (such as P~~p~~roscar) in the past 12 months, an "adjusted PSA" should be used. To adjust, multiply PSA by a factor of 2 (e.g., PSA 6 on finasteride adjusts to a PSA of 12)

***Known prostate cancer for workup of recurrence and response to treatment (**MRI Pelvis preferred for pelvic imaging; only consider CT Abdomen and Pelvis approval if PSMA PET not requested

- Initial treatment with radical prostatectomy
  - Failure of PSA to fall to undetectable levels or PSA detectable and rising on at least 2 subsequent determinations
- Initial treatment with radiation therapy
  - Post-RT rising PSA on at least 2 subsequent determinations or positive digital exam and is candidate for local therapy
  - Known metastatic disease with progression on therapy does not require CI to MRI or PET if CT is requested

~~**Prostate Cancer** imaging is indicated for the following scenarios (Pelvis CT +/- Abdomen)~~

- ~~**Initial Staging**~~
  - ~~High Risk and above (T3a or higher, PSA >20‡, Gleason 8-10)~~
  - ~~Intermediate Risk (T2b-T2c or PSA 10-20‡ or Gleason 7) when Nomogram predicts >10% probability of lymph node involvement (MSKCC/Kattan is the nomogram recommended by NCCN 2021)~~ [11, 14]

~~‡In patients who have been on a 5-alpha reductase inhibitor (such as Proscar) in the past 12 months, an "adjusted PSA" should be used. To adjust, multiply PSA by a factor of 2 (e.g., PSA 6 on finasteride adjusts to a PSA of 12) (initial imaging with CT is not needed for low risk or very low risk prostate cancer (NCCN 2021))~~[11, 14]

- ~~**Workup of recurrence and/or response to treatment**~~
  - ~~Initial treatment by radical prostatectomy with failure of PSA to fall to undetectable levels or PSA detectable and rising on at least 2 subsequent determinations~~
  - ~~Initial treatment radiation therapy with post-RT rising PSA or positive digital exam and is candidate for local therapy~~

Suspected or known recent peritonitis and at LEAST ONE of the following:

- Rebound, guarding (not voluntary) or rigid abdomen, **OR**
- Severe tenderness to palpation present over entire abdomen

For evaluation of suspected infection or inflammatory disease[14, 15]

- Suspected diverticulitis or acute appendicitis** for initial imaging with at least **ONE** of the following[16]:
  - WBC Elevated
  - Fever
  - Anorexia
  - Nausea and vomiting

  **Use ultrasound or MRI in pregnant women with suspected appendicitis[17]
- Suspected diverticulitis[18] when
  - Pain is present in the LLQ (<3 months duration), medical records note suspicion for diverticulitis, the patient has no prior history of diverticulitis, **AND** LLQ tenderness is present on ~~exam;~~exam; **OR**
  - Patient is ~~immunocompromised;~~immunocompromised; **OR**
  - Patient has a history of diverticulitis, symptoms are similar to prior episodes, **AND** patient has failed treatment currently (treatment could be liquid diet/anti-inflammatories or antibiotic)
- Suspected appendicitis in a child (< age 18)[19-23] when ultrasound is inconclusive or cannot be completed due to body habitus or inability to cooperate **OR** when peritoneal signs are present (guarding, rebound) or other red flags
- For acute non-localized abdominal pain and fever~~, no recent surgery~~[24]
- For suspected retroperitoneal fibrosis after labs and ~~inconclusive~~ ultrasound have been completed and other etiologies for symptoms have been excluded (is a diagnosis of exclusion)[25,26]

For follow-up evaluation of known infection or inflammatory disease involving the abdomen and pelvis[14, 27]

- Complications of diverticulitis (diagnosed either clinically or by imaging) with severe abdominal/pelvic pain or severe tenderness or mass not responding to antibiotic treatment ~~(prior imaging study is not required for diverticulitis diagnosis)~~[14, 15]

- Pancreatitis by history (including pancreatic pseudocyst) with continued abdominal pain, early satiety, nausea, vomiting, or signs of infection greater than 4 weeks from initial presentation[27] when there is reason to suspect extensive disease extending into the pelvis (otherwise CT abdomen)

~~- Known inflammatory bowel disease, (Crohn's or ulcerative colitis) with recurrence or worsening signs/symptoms requiring re-evaluation or for monitoring therapy[27]~~

- Any known infection that is clinically suspected to have created an abscess in the abdomen and pelvis
- Any history of fistula that requires re-evaluation or is suspected to have recurred in the abdomen and pelvis
- Abnormal fluid collection seen on prior imaging that needs follow-up evaluation

~~- Follow-up for known peritonitis (from any cause) if abdominal/pelvic pain and tenderness to palpation is present, and **at LEAST ONE** of the following:~~

~~- Rebound, guarding, or rigid abdomen; **OR**~~

~~- Severe tenderness to palpation present over entire abdomen~~

- For known retroperitoneal fibrosis to determine extent of disease

~~**Suspected peritonitis (from any cause) if abdominal pain and tenderness to palpation is present, and at LEAST ONE of the following:**~~

~~- Rebound, guarding (not voluntary) or rigid abdomen, OR~~

~~- Severe tenderness to palpation present over entire abdomen~~

Suspected or known acute pancreatitis[27] when have reason to suspect extension beyond abdomen, into pelvis

- 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 suspected acute pancreatitis with pain and abnormal amylase and lipase and < 48-72 hours, when ultrasound is inconclusive[27,28]~~

~~- Suspected acute pancreatitis with atypical signs and symptoms, and when a diagnosis other than pancreatitis may be possible~~

~~- Severe acute pancreatitis, 72-96 hours after onset of symptoms[29]~~

- ~~Known necrotizing pancreatitis requiring follow-up~~
- ~~Pancreatitis by history, (including pancreatic pseudocyst) with abdominal pain suspicious for worsening, or re-exacerbation~~
- ~~Known necrotizing pancreatitis requiring follow-up~~

~~Suspected inflammatory bowel disease (includes CT enterography)~~
For evaluation of Inflammatory Bowel Disease (IBD) such as Crohn's or Ulcerative Colitis, (includes CT enterography (CTE), however, MRE should be considered for age < 35 to reduce radiation exposure)[28-33]

- For suspected inflammatory bowel disease after complete work up including physical exam, labs, and recent colonoscopy
- Known inflammatory bowel disease with recurrence or worsening signs/symptoms requiring re-evaluation or for monitoring therapy

- ~~For suspected inflammatory bowel disease (Crohn's disease or ulcerative colitis) with abdominal pain **AND** one of the following[29, 31, 32]:~~
  - ~~Chronic diarrhea~~
  - ~~Bloody diarrhea~~

  ~~Note: For patients under 35 years old, consider MRE due to concern for likelihood of the need for repeat imaging in order to reduce potential radiation dose[36]~~
- ~~High clinical suspicion after complete work up including physical exam, labs, endoscopy with biopsy[32, 34, 35, 37]~~

For evaluation of hematuria when stone is NOT suspected (includes CT urography (CTU))[34-36]

- Documented by ~~greater than~~ 3 or more red blood cells (RBC) per high-power field on urinalysis and not based on a dipstick test[34] **AND ONE** or more of the following:
  - Age > 60; **OR**
  - ~~30+ pack year smoking history; or~~
  - ~~> 25 RBC/hpf (i.e., high risk)~~
- > 25 RBC/hpf and infection has been excluded
- If not high risk (based on age, smoking history or > 25 RBC/hpf as above) ~~risk (as above),~~ need equivocal or abnormal renal ultrasound prior to CT
- Gross hematuria
  - UA must be negative for infection
  - UA can be negative for blood if hematuria is witnessed by patient or provider

NOTE: If a previous "routine" CT abdomen/pelvis has been done (with or with/without contrast), and a CTU is later requested, the previous CT must show a clear reason that additional delayed post-contrast images of the collecting system are needed.

For evaluation of known or suspected kidney or ureteral stone in a patient with acute flank pain

- **CT is indicated if one or more of the following is present:**
  - Atypical presentation (i.e., fever or WBC >15,000)
  - Inadequate analgesia
  - Abnormal or indeterminate ultrasound (with findings needing further evaluation with CT)
  - KUB has been provided and is highly suggestive of kidney or ureteral stone (US is the preferred initial imaging test but if provided, information on KUB can be used to make decision)
- **Ultrasound should be performed PRIOR to CT in the following situations (CT is needed only if US is inconclusive or has findings that need further imaging):**
  - Pediatric and pregnant patients (MRU preferred if further imaging indicated)
  - Typical presentation without signs/symptoms of infection in a patient < 65
- **CT is allowed for acute abdominal pain, in general, for patients >65**

Preoperative urinary stone planning

- CT is indicated when no imaging has been done in the last 30 days, or if passage or movement of stones will change management[37]

Postoperative urinary stone follow-up CT

- Symptomatic patients following:
  - Ureteroscopic extraction of an intact stone[38]
  - Ureteroscopy with lithotripsy/fragmentation of a radiolucent stone[38]
- Further evaluation of hydronephrosis seen on post-operative ultrasound (following ureteroscopy or ESWL)[38]

For evaluation of pyelonephritis in the following situations[39]

- When other imaging such as ultrasound is abnormal
- For a patient who remains febrile after 72 hours of treatment[40] or has deterioration in clinical status[40] ~~or symptoms resolve and then recur within 2 weeks[44]~~
- With the following co-morbid conditions: personal history of stone disease or renal obstruction, recurrent pyelonephritis, vesicoureteral reflux, immune compromise, prior renal transplant with native kidneys in place, advanced age[39] or lack of response to initial therapy (based on culture)~~For a complicated patient with history of diabetes, stone disease, prior urinary tract surgery, or who is immunocompromised and is not responding to treatment[30] !!!!~~

For evaluation of Complicated Urinary tract Infection: (see above section for pyelonephritis)

- **Women:** UTI is considered complicated (and therefore imaging (ultrasound and/or CT) is warranted) in any of the following situations (may be done after resolution of infection),
  - Immunocompromised host
  - Persistence of bacteria or symptoms after culture specific treatment,

- Rapid recurrence with same bacteria after treatment,
- Multidrug resistant bacteria
- When there is suspicion of renal calculi or obstruction[40, 41]

- **Men:** Any UTI is considered complicated due to high likelihood of anatomic abnormalities,[42] therefore imaging (ultrasound and/or CT) is warranted

Suspected small bowel obstruction when there is a strong clinical suspicion

- Crampy pain, vomiting, distention, high pitched or absent bowel sounds, prior history of abdominal surgery, or based on initial ~~radiograph~~[45, 46] x-ray[43, 44]

Suspected colonic or mesenteric ischemia[45] CTA also appropriate[46]

For suspected small bowel bleeding when endoscopy and capsule endoscopy are inconclusive or negative[47]

For known or suspected abdominal aneurysm

~~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.~~

- For known or suspected, **asymptomatic** abdominal aortic aneurysms, ultrasound should be done prior to advanced imaging. Only when the ultrasound is inconclusive, is advanced imaging with CT or MRI needed
  - Aneurysm size 2.5–3 cm, every 10 years
  - Aneurysm size 3.0–3.9 cm, every 3 years
  - Aneurysm size 4.0-4.9 cm, annually
  - Aneurysm size 5.0-5.4 cm, every 6 months
- For **symptomatic** known or suspected AAA (such as recent-onset abdominal pain or back pain, particularly in the presence of a pulsatile or epigastric mass, suspected dissection, or significant risk factors for AAA) CTA/MRA is appropriate and generally preferred over CT/MRI. (If contrast is contraindicated or other clinical indications for abdomen and/or pelvic imaging are present, then CT/MR may be approved rather than CTA/MRA)
- If there is known complex anatomy, CTA/MRA may be needed.
- ~~Known or suspected aneurysm > 2.5 cm **AND** equivocal or indeterminate ultrasound results~~
- Suspected complications of known aneurysm as evidenced by signs/symptoms such as new onset of abdominal or pelvic pain (MRA/CTA preferred)
- ~~Scheduled follow-up evaluation of aorto/iliac endograft or stent (Abd/Pelvic CTA preferred)~~
- Follow-up for post-endovascular repair (EVAR) or open repair of abdominal aortic aneurysm (AAA)[48] or abdominal extent of iliac artery aneurysms (CT preferred unless MRA/CTA is needed for procedural planning or to evaluate complex anatomy)

- Routine, baseline study (post-op/intervention) is warranted within the first month after EVAR:
  - Repeat in 6 months if type II endoleak is seen (continue every 6 months x 24 months, then annually)
  - Repeat in 12 months if no endoleak or sac enlargement is seen
  - If neither endoleak nor AAA enlargement is seen on imaging one year after EVAR, CT is needed only if US is not feasible for annual surveillance (until year 5 as below)

- Non-contrast CT of entire aorta (Abdomen and Pelvis) is needed every 5 years after open repair of AAA or EVAR
- If symptomatic or imaging shows increasing, or new findings related to stent graft – more frequent imaging may be needed
- For suspected complication such as: new-onset lower extremity claudication, ischemia, or reduction in ABI after aneurysm repair~~7~~

- Evaluation of endovascular/interventional abdominal vascular procedures for luminal patency versus restenosis due to conditions such as atherosclerosis, thromboembolism, and intimal hyperplasia
- Evaluation of post-operative complications, e.g., pseudoaneurysms, related to surgical bypass grafts, vascular stents, and stent-grafts in the peritoneal cavity
  - ~~Follow-up for post-endovascular repair (EVAR) or open repair of abdominal aortic aneurysm (AAA) or abdominal extent of iliac artery aneurysms. Routine, baseline study (post-op/intervention) is warranted within 1-3 months.~~[50, 51]
  - ~~Asymptomatic at six (6)-month intervals, for one (1) year, then annually~~
  - Symptomatic/complications related to stent graft – more frequent imaging may be needed
- Follow-up study may be needed 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 for the type and area(s) requested.

For evaluation of trauma[49]

- Suspected retroperitoneal hematoma or hemorrhage based on lab or physical findings
- Blunt injury with suspicion of multisystem trauma and hematuria
- Penetrating abdominal injury with suspicion of multisystem trauma with or without hematuria[49]

For evaluation of a suspected or known hernia

- Abdominal/pelvic pain suspected to be due to an occult, umbilical, Spigelian, or incisional hernia when physical exam and prior imaging is non-diagnostic or equivocal or if requested as a preoperative study
  - If inguinal hernia, approve CT Pelvis only (needs reason to include abdomen)

- If umbilical hernia, approve CT Abdomen (needs reason to include pelvis)
- 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[50]
- 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[50]
- Deep intraabdominal/pelvic hernia is suspected (post-Roux-en-Y, obturator, sciatic or perineal) (does not require US first but this type of hernia needs to be specified in notes)[51]

Transplants

- Prior to solid organ transplantation
- For initial workup prior to Bone Marrow Transplantation (BMT) (along with CT Chest[52], CT Sinus and Brain MRI)[53]). Alternatively, PET might be sufficient to evaluate the abdomen and pelvis if indicated based on that malignancy (see PET Guideline)

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)

Other Indications for Abdomen/Pelvic CT Combo

- To locate a pheochromocytoma once there is clear biochemical evidence
- For one or more of the following B symptoms: fevers more than 101° F, drenching night sweats, and/or unexplained weight loss of more than 10% of body weight over 6 months with documented concern for lymphoma/malignancy ~~Concern for lymphoma/malignancy with B symptoms of fevers to more than 101° F, drenching night sweats, and/or unexplained weight loss of more than 10% of body weight over 6 months (can also approve chest CT)~~[54]
- Clinically significant unintentional weight loss ~~i.e.~~i.e., ≥5% of body weight in less than 12 months, with signs or symptoms suggestive of an abdominal cause (see Background)
- Ongoing unexplained clinically significant weight loss ~~i.e.~~i.e., ≥5% of body weight in less than 12 months,[55-57] after initial workup (see Background) has been completed, no cause identified, and second visit documenting further decline in weight [58]
- ~~Unexplained weight loss of 10% of body weight in two months (patient history is acceptable); with a second MD visit documenting some further decline in weight[60] !!!!~~

- ~~Unexplained weight loss of 5% of body weight in six months confirmed by documentation to include the following~~[59, 62]~~:~~
  - ~~Related history and abdominal exam~~
  - ~~Chest x-ray~~
  - ~~Abdominal ultrasound~~
  - ~~Lab tests, must include TSH~~
  - ~~Colonoscopy if patient fifty plus (50+) years old~~
- For suspected ~~In the workup of a~~ paraneoplastic syndrome (including dermatomyositis) ~~after ultrasound, mammography, and appropriate lab tests are completed~~with high suspicion of abdominal malignancy and appropriate workup has been done (see Background for details)
- ~~To screen all adult patients with dermatomyositis to rule out occult malignancy~~[63-65]
- For ~~diffuse, unexplained lower extremity edema with negative or inconclusive ultrasound~~[66]acute unilateral (or asymmetric) lower extremity edema with negative or inconclusive doppler US[53]
- For chronic unilateral (or asymmetric) lower extremity edema and suspicion of malignant cause[59, 60]
- For evaluation of suspected May-Thurner syndrome (CTV/MRV preferred)[61, 62]
- For elevation of carcinoembryonic antigen (CEA) in a patient with no cancer history after completing clinical workup (including organ-specific investigations, such as colonoscopy, gastroscopy, mammography, cystoscopy, ultrasound) that fails to demonstrate a reason and CEA is >10 ng/ml, or fails to drop below 5 ng/ml after 3-6 months intervals (see Background section)
- For fever of unknown origin (temperature of ≥101 degrees for a minimum of 3 weeks) after standard diagnostic tests are negative (see Background section)[63]
- For evaluation of thrombocytosis or thrombocytopenia when one or more of the following are present:
  - Any additional cytopenia (~~i.e.~~i.e., leukopenia, anemia)
  - LDH elevation
  - Splenomegaly on exam or imaging
  - Palpable lymphadenopathy
  - Bone marrow biopsy has been completed and concern for myeloproliferative disorder persists
  - Genetic mutation increasing risk of myeloproliferative disorder (such as JAK-2 mutation) on peripheral smear or bone marrow[64-67] biopsy
- ~~For evaluation of suspected May-Thurner syndrome (CTV/MRV preferred)~~[67, 68]
- For further evaluation of a new onset or non-reducible varicocele[68, 69]
- For suspected gestational trophoblastic disease when chest x-ray suggests distant disease (may include Chest CT)[70]
- For confirmed gestational trophoblastic disease when hcg fails to decline appropriately following surgery (may include Chest CT)[70]
- For patients with MEN-1, surveillance of abdomen and pelvis every 1-3 years (MRI preferred)

- Multiple Endocrine Neoplasia type 1 (MEN1) every 1-3 years (chest CT or MRI also approvable for this syndrome at same interval) [8, 71]
- Hereditary Paraganglioma syndromes every 2-3 years IF whole body MRI (unlisted MRI CPT 76498) -is not available and CI to MRI exists. (WB MRI is the preferred study; if unable to do whole body MRI may approve abdomen MRI, skull base and neck MRI and chest CT). SDHB mutation may start at age 6, all other SDHx start at age 10
- For patients with FAP (Familial Adenomatous Polyposis, annual screening of abdomen and pelvis with MRI or CT for one or more of the following: personal history of desmoid tumor, family history of desmoid tumor or abdominal symptoms suggestive of desmoid tumor [72]

~~- For further evaluation of an isolated right varicocele with additional signs and symptoms that suggest malignancy or suspicious prior imaging [70]~~

Pre-operative evaluation

- For abdominal/pelvic surgery or procedure

Post-operative/procedural evaluation

- Follow-up of known or suspected post-operative complication
- 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.

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

BACKGROUND

CT provides direct visualization of anatomic structures in the abdomen and pelvis and is a fast-imaging tool used to detect and characterize disease. Abdomen/pelvis imaging begins at the diaphragmatic dome through pubic symphysis. 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 safer imaging option and is the first imaging test of choice; although, CT or MRI 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.

OVERVIEW

CT Imaging for renal colic and hematuria

More than 2 million emergency visits in the US are for suspected renal colic, and CT is performed in over 90% of patients diagnosed with kidney stones.[73] Evidence now supports ultrasound or no further imaging in specific clinical scenarios as renal colic is often self-limited. CT can guide therapy in a subset of patients who require intervention or who have other conditions that mimic renal colic (i.e., appendicitis). CT protocols include: "stone protocol" for detecting urinary tract calculi, "renal mass protocol" for characterizing known renal masses, and CT urography for evaluating hematuria. Non-contrast CT can be used for detecting most ureteral and renal stones but sometimes an intravenous contrast agent is needed to determine the relationship of the calculus to the opacified ureter.

CT imaging for recurrent urinary tract infections

Imaging in patients without risk factors and less than two infections a year on average and who respond promptly to therapy, is of low yield. Risk factors include but are not limited to: Infection with urea-splitting organism, previous pyelonephritis, history of calculi or obstruction, obstructive symptoms, elevated creatinine, severe diabetes, childhood UTI, neurogenic bladder dysfunction, history of GU surgery, suspected bladder diverticula or urethral, urinary incontinence, pelvic floor dysfunction, post void residual.[74]

CT Imaging for abdominal aortic aneurysms

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.

If a pulsatile abdominal mass is found in an asymptomatic patient, **abdominal ultrasonography** is an inexpensive and noninvasive technique for **initial evaluation**. For further examination, CT may be performed to better define the shape and extent of the aneurysm and the local anatomic relationships of the visceral and renal vessels. CT has high level of accuracy in sizing aneurysms; however, CTA and MRA are the gold standards for imaging. The majority of evidence regarding AAA surveillance using CT is based on CTA data and is primarily related to contrast bolus timing. Contrast-enhanced CT is well established in the literature and is capable of identifying aortic aneurysms, with many papers discussing incidental AAA identification.[75, 76] Risk of rupture in 6 years for an AAA < 4 cm is 1%. For a 4-5 cm AAA, the risk of rupture increases to 1-3% per year and becomes 6-11% per year for AAA 5-7 cm in cross sectional diameter. For any AAA >7 cm, the risk of rupture goes to 7% per year.

Initial evaluation of abdominal aortic aneurysm (AAA)

Initial evaluation of AAA is accurately made by ultrasound.

**Abdominal aneurysms and general guidelines for follow-up

The normal diameter of the suprarenal abdominal aorta is 3.0 cm and that of the infrarenal is 2.0 cm. Aneurysmal dilatation of the infrarenal aorta is defined as diameter ≥ 3.0 cm or dilatation of the aorta ≥ 1.5x the normal diameter. Ultrasound can detect and size AAA, with the advantage of being relatively inexpensive, noninvasive, and not require iodinate contrast. The limitations are that overlying bowel gas can obscure findings and the technique is ~~operator dependent~~operator dependent. Ultrasound is used to screen for and to monitor aneurysms*. CT is used when US is inconclusive or insufficient. When there are suspected complications, complex anatomy and/or surgery is planned, CTA/MRA is preferred. Risk factors for AAA ~~include:~~include smoking history, age, male gender, family history of AAA (first degree relative) and personal history of vascular disease. Risk factors for rupture ~~include:~~include female gender, large initial aneurysm diameter, low FEV, current smoking history, elevated mean blood pressure and patients on immunosuppression after major organ transplantation. The Society of Vascular Surgery recommends elective repair of AAA ≥ 5.5 cm in patients at low or acceptable surgical risk. [1]

Ultrasound screening intervals*:

- Aneurysm size 2.5–3 cm, every 10 years
- Aneurysm size 3.0–3.9 cm, every 3 years
- Aneurysm size 4.0-4.9 cm, annually[77]
- Aneurysm size 5.0-5.4 cm, every 6 months

~~**Recommended intervals for initial follow-up imaging (any modality) of ectatic aortas and abdominal aortas (follow-up intervals may vary depending on comorbidities and the growth rate of the aneurysm)**~~

~~2.5-2.9 cm: .....5 yr~~
~~3.0-3.4 cm: ..... 3 yr~~
~~3.5-3.9 cm: .....2 yr~~
~~4.0-4.4 cm: .....1 yr~~
~~4.5-4.9 cm: .....6 mo~~
~~5.0-5.5 cm: .....3-6 mo~~

~~The Society of Vascular Surgery has different follow-up intervals for AAA[50]:~~
~~>2.5 cm - <3 cm.....10 yr~~
~~3.0 - 3.9 cm.....3 yr~~
~~4.0 - 4.9 cm.....12 mo~~
~~5.0 - 5.4 cm.....6 mo~~

~~The Society of Vascular Surgery recommends elective repair of AAA ≥ 5.5 cm in patients at low or acceptable surgical risk.~~ [50]

CT for Mesenteric Ischemia

CT of the abdomen and pelvis with intravenous (IV) contrast performed during the venous phase has been less well-studied compared with CTA in diagnosing mesenteric ischemia. CT with IV contrast can assess nonvascular findings, major arterial lesions, and mesenteric veins; however, the lack of arterial phase may lead to suboptimal evaluation of the mesenteric arteries compared to CTA.[46]

CT for elevation of CEA with no history of a previous CEA-producing tumor

CEA is not normally elevated after birth, but elevated CEA levels increases the chance of finding colon cancer from 1.3% to 4.6%. It is also a predictor of other diseases, including other cancers (e.g., mucinous adenocarcinomas of the endocervix and ovary, as well as keratinising squamous cell carcinoma of the cervix), diabetes, chronic lung, and liver disease.

Evaluation should begin with a thorough history, including smoking history, and clinical exam. Investigation would include repeat CEA, full blood count, iron, liver function and renal function tests, CA 125 levels, and ~~calcitoinin~~calcitonin. If CEA <10ng/ml and clinical review is negative, repeat the clinical evaluation in 3 months and CEA for changes. If level falls, repeat at 6-month intervals until normal or 2 consecutive decreases. If CEA level remains above 5 ng/ml after 3-6-month intervals or exceeds 10ng/ml at any stage, consider CT imaging.[78]

CT and Fever of Unknown Origin

Initial work up prior to CT would include a comprehensive history, repeated physical exam, complete blood count with differential, three sets of blood cultures, chest x-ray, complete metabolic panel, urinalysis, ESR, ANA, RA, CMV IgM antibodies, virus detection in blood, heterophile antibody test, tuberculin test, and HIV antibody test.[63] Lastly, with a negative CXR, only when initial workup and abdomen/pelvis CT/MR fail to identify the cause for fever can Chest CT be approved. If CXR suggests a malignancy and/or source of fever, then Chest CT would be approved.

~~**CT and screening for occult malignancy**~~

~~In patients with a dermatomyositis, an initial screen with CT chest and abdomen is recommended because large population-based cohort studies report a frequency of 20-25% of malignancy. For the first incidence of unprovoked DVT, there is no indication for screening for occult malignancy (history, blood testing including blood count, calcium, UA, liver function tests, CXR, and age- and gender-specific screening indicated).[76] In the case of recurrent DVT, recently a risk score including age >70, chronic lung disease, anemia, elevated platelet count, prior venous thrombosis and recent surgery was designed but still needs external validation before clinical use.[77, 78] Paraneoplastic neurologic syndromes fall into this category. They are rare, often sub-acutely manifesting conditions associated with malignant neoplasms, and they are hypothesized to be immune-mediated. When classic clinical symptoms are present and a high concentration of characteristic anti-neuronal antibodies, there is associated a high probability of malignancy. Small cell lung cancer, thymoma, breast cancer, ovarian cancer and teratoma, and testicular tumors are most common. In paraneoplastic syndrome, screen first for breast cancer with mammography then MRI breast, ovarian teratoma and ovarian cancer with pelvic ultrasound (also CA-125), and for a testicular tumor with ultrasound (also B-HCG and AFP), and if~~

~~inconclusive follow by CT. Note that tumors may manifest as late as 5 years after the onset of PNS symptoms and further follow-up imaging may be warranted.~~ ~~79~~

Suspected paraneoplastic syndromes with no established cancer diagnosis: laboratory evaluation and imaging

The laboratory evaluation for paraneoplastic syndrome is complex. If the appropriate lab test results are suspicious for malignancy, imaging is indicated.

For SIADH (hyponatremia + increased urine osmolality), there is a high association with small cell lung cancer, therefore imaging typically starts with chest CT. If other symptoms suggest a different diagnosis other than small cell lung cancer, different imaging studies may be reasonable.
For hypercalcemia (high serum calcium, low-normal PTH, high PTHrP) it is reasonable to start with bone imaging followed by a more directed evaluation such as mammogram, chest, abdomen, and pelvis imaging as appropriate.

For Cushing syndrome (hypokalemia, normal-high midnight serum ACTH **NOT** suppressed with dexamethasone) abdominal and chest imaging is reasonable. If dexamethasone suppression test **DOES** suppress ACTH, pituitary MRI is reasonable.

For hypoglycemia, labs drawn during a period of hypoglycemia (glucose < 55, typically a 72 hour fast) (insulin level, C-~~peptide~~peptide, and IGF-2:IGF-1 ratio) should be done to evaluate for an insulinoma. An elevated insulin level, elevated C-peptide and/or normal IGF-2:IGF-1 ratio warrant CT or MRI abdomen to look for insulinoma. A low insulin, low C-peptide and/or elevated IGF-2:IGF-1 ratio warrant chest and abdominal imaging.

When a paraneoplastic neurologic syndrome is suspected, nuclear and cytoplasmic antibody panels are often ordered to further identify specific tumor types. Results are needed prior to imaging. Because these tests are highly specific, if an antibody highly associated with a specific cancer is positive, then further imaging for that cancer is reasonable. For example, anti-Hu has a high association with SCLC and chest CT would be reasonable. Anti-MA2 has a high association with testicular cancer and testicular ultrasound would be a reasonable next step.

Weight loss definitions and initial evaluation

Unintentional weight loss is considered clinically significant[55, 79] if the amount of weight lost over 12 months is ≥ 5%. Older age and higher percentage of weight loss correlates with higher likelihood of malignancy. A targeted evaluation is recommended when there are signs or symptoms suggestive of a specific source. For example, when there is clinically significant weight loss with abdominal pain that prompts an evaluation for an abdominal source of the weight loss; CXR and labs such as TSH would not be needed prior to abdominal imaging. Conversely a smoker with a cough and weight loss would not start with abdominal imaging, a chest x-ray (CXR) would be the first test to start with. When there is no suspected diagnosis, initial evaluation includes CXR, age-appropriate cancer screening (such as colonoscopy and mammography) and labs (including CBC, CMP, HbA1C, TSH, stool hemoccult, ESR/CRP, HIV, Hepatitis C). If this initial evaluation fails to identify a cause of weight loss, then the patient is monitored and if progressive weight loss is seen on subsequent visits/weights, then CT

Abdomen/Pelvis is reasonable (MRI if there is a contraindication to CT such as contrast allergy or impaired renal function)[80]. Lastly, with a negative CXR, only when initial workup and abdomen/pelvis CT/MR fail to identify the cause for weight loss can Chest CT be approved. If CXR suggests a malignancy and/or source of weight loss, then Chest CT would be approved.

Combination request of Abdomen CT/Chest CT

A Chest CT will produce images to the level of L3. Documentation for combo is required.

Evaluation for appendicitis following clinical and laboratory evaluation

Sonography of the right upper quadrant and pelvis followed by graded compression and color Doppler sonography of the right lower quadrant was used by Gaitini and colleagues as the initial imaging study in 420 consecutive patients referred for emergency evaluation of acute appendicitis. This method correctly diagnosed acute appendicitis in 66 of 75 patients (88%) and excluded it correctly in 312 of 326 patients (96%). It was inconclusive in 19 patients (<5%). Sensitivity, specificity, positive predictive value, negative predictive value and accuracy were 74.2%, 97%, 88%, 93%, and 92%, respectively and comparable to CT.[81]

Appropriate and timely diagnosis of acute appendicitis is needed. Negative laparotomy rates can range from 16% to 47% when based on clinical and laboratory data alone, while perforation rate can reach 35% when surgery is delayed. Appropriate initial imaging can lower the negative laparotomy rate to 6-10%. Ultrasound has a higher non-diagnostic rate (4%) vs. 0.8% for MDCT. In a prospective study operator experience and patient BMI did not affect diagnostic accuracy.[81, 82]

Consider alternatives to CT imaging in patients with Crohn disease

In facilities where the technical and clinical expertise exists, MR enterography is emerging as the study of choice (replacing CT) for patients requiring frequent follow-up examinations to determine disease extent or progression. The technique also allows evaluation of extramucosal and extraluminal disease.

Consider the role of capsule endoscopy

Small bowel capsule endoscopy allows for direct visualization of the mucosa of the small intestine and has been found to be superior to barium studies, CTE and ileocolonscopy. However, the specificity has been questioned. There is a high negative predictive value of 96%. Also, it may identify a site for selected biopsy to establish a diagnosis.

Lab tests used in diagnosing IBD

Anti-glycan antibodies are more prevalent in CD than UC, but this test has a low sensitivity. Fecal calprotectin is a helpful test that can help differentiate IBD from irritable bowel syndrome as well as in assessment of disease activity, including response to therapy. Data supports the use of fecal calprotectin to predict relapse in CD. Those who relapsed in one year had significantly higher levels at

baseline. Fecal lactoferrin and fecal PMN-elastase are also used for monitoring disease activity in Crohn's.[83]

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.[84] According to Miller, et al "Magnetic resonance imaging is generally not considered a first- or even second-line evaluation modality for hernias…."[85] Based on this analysis, MRI is recommended only when ultrasound and CT have been performed and fail to make a diagnosis.

~~(CXR) () Lastly, with a negative CXR, only when initial workup and abdomen/pelvis CT/MR fail to identify the cause for weight loss can Chest CT be approved. If CXR suggests a malignancy and/or source of weight loss, then Chest CT would be approved.~~

~~**POLICY HISTORY**~~

~~Date~~	~~Summary~~
	~~—~~
~~March 2022~~	~~• Moved "New evidence of an unknown primary" from Evaluation of suspicious or known mass section to Initial staging of known cancer.~~ ~~• Clarified suspected diverticulitis~~ ~~• Added immunocompromised patients to suspected diverticulitis~~ ~~• Added "OR when peritoneal signs are present (guarding, rebound) or other red flags" to suspected appendicitis in a child~~ ~~• Clarified note regarding MRE for patients under 35 years of age~~ ~~• Removed "For CT Enterography (CTE) if a CT scan is inconclusive" from section on Suspected IBD~~ ~~• Clarified evaluation of hematuria~~ ~~• Clarified concern for lymphoma/malignancy with B symptoms and removed if CXR, labs, and Abd/Pelvis US have been completed~~
~~April 2021~~	~~• Updated prostate cancer imaging section to reflect current NCCN 2021 changes and adjusted PSA~~ ~~• Revised and clarified hematuria when stone is not suspected~~ ~~• Updated known or suspected stone with acute flank pain section to more clearly reflect criteria for when CT imaging is needed~~

	• ~~Renamed "recurrent UTI" as "Complicated UTI" and specified definitions and criteria for when imaging is needed for women and when for men~~
~~May 2020~~	• ~~Added indication for imaging of new evidence of an unknown primary~~ • ~~FU for abnormal lymph nodes at 3 months~~ • ~~FU mesenteric panniculitis if symptoms fail to improve~~ • ~~Renal colic added no imaging if under 35 and adequate pain relief; if <55 and inadequate relief or abnormal US can image, >55 if no hx of stones or abnormal ultrasound~~ • ~~Pre op for renal surgery or procedure~~ • ~~Post op for symptomatic patients or asymptomatic and abnormal ultrasound~~ • ~~Added imaging for pyelonephritis with complex med hx such as diabetes or prior urinary tract surgery or immunocompromised~~ • ~~Added GL for men with UTI based on age <or>60~~ • ~~Improved criteria for WU of IBD, added CTE information and imaging for monitoring therapy~~ • ~~Other indications added—for diffuse LE edema with neg or inconclusinve US; elevated CEA with no cancer hx, FUO; May-Thurner; isolated right varicocele; Paraneoplastic syndrome; dermatomyositis; acute pain in patient over 65~~ • ~~Added to comment section on renal colic, recurrent UTI, CEA; Occult malignancy~~
~~May 2019~~	• ~~For hematuria, clarified that testing should not be done by dipstick; for infectious hematuria, removed restriction of 6 week completion of antibiotic therapy~~ • ~~Modified indication for prostate cancer imaging when PSA levels ≥10 ng/mL per NCCN update~~ • ~~Removed indication for evaluation of organ enlargement; suspected cholecystitis or retained gallstones; hepatitis screening; adrenal mass; ischemic bowel; suspected partial small bowel obstruction~~ • ~~Added indications for known necrotizing pancreatitis; acute flank pain with or without hematuria; pregnant women with suspected appendicitis consider US or MRI; blunt injury or penetrating abdominal injury; evaluation of endovascular/interventional abdominal vascular procedures; follow up for post endovascular repair or open repair of abdominal aortic aneurysm; symptoms of fevers, night sweats, unexplained weight loss over 6 months if CXR, labs, and US have been performed~~

	• ~~Added time frame to Pancreatitis history to include >4 weeks of symptoms~~

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ADDITIONAL RESOURCES

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Reviewed / Approved by NIA Clinical Guideline Committee

POLICY HISTORY

Date	Summary
March 2023	• Prostate cancer: updated guidance based on new NCCN criteria • IBD: clarified indications • Pancreas: specified guidance on pancreatitis • Pyelonephritis: clarified risk factors and indications • Aneurysm: specified guidance on initial imaging and screening intervals with emphasis on requiring ultrasound on initial imaging and indications for advanced imaging, specified guidance on post-repair imaging • Hernia: clarified hernia types and indicated studies • Transplant: added section • Other: specified guidance for weight loss, paraneoplastic syndrome, edema; added indications for thrombocytopenia, gestational trophoblastic disease, cancer predisposition syndromes

	• 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 • Aligned sections across body imaging guidelines
March 2022	• Moved "New evidence of an unknown primary" from Evaluation of suspicious or known mass section to Initial staging of known cancer. • Clarified suspected diverticulitis • Added immunocompromised patients to suspected diverticulitis • Added "OR when peritoneal signs are present (guarding, rebound) or other red flags" to suspected appendicitis in a child • Clarified note regarding MRE for patients under 35 years of age • Removed "For CT Enterography (CTE) if a CT scan is inconclusive" from section on Suspected IBD • Clarified evaluation of hematuria • Clarified concern for lymphoma/malignancy with B symptoms and removed if CXR, labs, and Abd/Pelvis US have been completed

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.~~