INTRODUCTION:

Computed tomography (CT) scans provide greater clarity than regular x-rays and are used to further examine abnormalities found on chest x-rays. They may be used for detection and evaluation of various disease and conditions in the chest, e.g., tumor, inflammatory disease, vascular disease, congenital abnormalities, trauma and symptoms such as hemoptysis.

Initial Clinical Reviewers (ICRs) and Physician Clinical Reviewers (PCRs) must be able to apply criteria based on individual needs and based on an assessment of the local delivery system.

INDICATIONS FOR CHEST CT:

For annual lung cancer screening:
The use of low-dose, non-contrast spiral (helical) multi-detector CT imaging as an annual screening technique for lung cancer is considered medically necessary ONLY when used to screen for lung cancer for certain high-risk asymptomatic individuals when ALL of the following criteria are met:

- Individual is between 55-77 years of age: AND
- There is at least a 30 pack-year history of cigarette smoking: AND
- If the individual is a former smoker, that individual had quit smoking within the previous 15 years (Medicare, ACCP).

For evaluation of known tumor, cancer or mass:
- Initial evaluation of diagnosed cancer.
- Evaluation of known tumor or cancer for patient undergoing active treatment to assess impact of treatment.
- Evaluation of known tumor or cancer or history of prior cancer presenting with new signs (i.e., physical, laboratory, or imaging findings) or new symptoms.
- Active monitoring for recurrence as clinically indicated.

Evaluation of suspicious mass/tumor (unconfirmed cancer diagnosis):
- Initial evaluation of suspicious mass/tumor found on an imaging study and needing clarification or found by physical exam and remains non-diagnostic after x-ray or ultrasound is completed.
- Known distant cancer with suspected chest/lung metastasis based on a sign, symptom, imaging study or abnormal lab value.
• For the follow-up evaluation of a nodule with a previous CT (follow-up intervals approximately 3, 6, 12 and 24 months):
  o f/u evaluation of ground glass > 5mm up to 36 months.
  o no further f/u of solid nodules < 6mm if unchanged at 12 month

**Known or suspected interstitial lung disease** (e.g. idiopathic interstitial lung diseases, idiopathic pulmonary fibrosis, hypersensitivity pneumonitis, pneumoconiosis, sarcoidosis, silicosis and asbestosis) and initial x-ray has been performed:
  • With abnormal physical, laboratory, and/or imaging findings requiring further evaluation.

**Known or suspected infection or inflammatory disease** (i.e., complicated pneumonia not responding to treatment, abscess, tuberculosis (TB), empyema or immunosuppression post-organ transplant with new symptoms or findings) and initial x-ray has been performed:
  • With abnormal physical, laboratory, and/or imaging findings requiring further evaluation.
  • For evaluation of known inflammatory disease:
    o Initial evaluation
    o During treatment
    o With new signs and symptoms
  • For evaluation of non-resolving pneumonia documented by at least two imaging studies:
    o Unimproved with 4 weeks of antibiotic treatment OR
    o Not resolved at 8 weeks
  • For evaluation of lung abscess, cavitary lesion, or empyema, demonstrated or suggested on prior imaging.

**Suspected vascular disease, (e.g., aneurysm, dissection):**
  • For evaluation of known or suspected superior vena cava (SVC) syndrome.
  • Suspected thoracic/thoracoabdominal aneurysm or dissection (documentation of clinical history may include hypertension and reported “tearing or ripping type” chest pain) when contrast is contraindicated.

**Known vascular disease:**
  • For follow up of known vascular disease (aneurysm) and contrast is not appropriate for the clinical indication

**Suspected Pulmonary Embolism (PE):**
Patients at intermediate risk for PE and positive D-dimer or at high risk for PE
Patients with intermediate risk for PE with negative D-dimer or low risk for PE should be directed to Chest CTA although this is controversial and Chest CT optimized as to enhancement of the pulmonary vessels may be acceptable in select circumstances
Patients can be excluded from imaging with low risk for PE and negative D-dimer results D-dimer is a blood test that measures fibrin degradation products that are increased when increased clotting and clot degradation is going on in the body.

*Low risk defined as NO to ALL of the following questions with intermediate and high risk defined based on the number of positive responses:*
1) Evidence of current or prior DVT;
2) HR > 100;
3) Cancer diagnosis;
4) Recent surgery or prolonged immobilization;
5) Hemoptysis;
6) History of PE;
7) Another diagnosis beside PE is less likely.

All patients should have prior Chest x-ray to evaluate other possible causes for the patient symptoms (i.e. CHF) and patients in low and intermediate risk groups for PE should have preceding D-dimer level to better stratify patient into risk categories to decide if test is necessary or proper protocol for Chest CT.

**Known or suspected congenital abnormality:**
- For evaluation of known or suspected congenital abnormality
- Vascular - suggest Chest CTA or Chest MRA depending on age and radiation safety issues.
- Nonvascular - abnormal imaging and/or physical examination finding.

**Hemoptysis:**
- For evaluation of hemoptysis and prior x-ray performed.

**Post-operative/procedural evaluation:**
- Post-surgical follow up when records document medical reason requiring additional imaging

**Other indications for Chest CT:**
- Pre-operative evaluation.
- Re-evaluation after abnormal imaging within past 30 - 60 days and with no improvement on x-ray, (not indicated with known rib fractures).
- Evaluation of persistent unresolved cough of at least four weeks duration, unresponsive to medical treatment and chest x-ray has been performed.
- Evaluation of other chest or thorax adenopathy.
- Evaluation of pneumothorax.
- Evaluation of vocal cord paralysis.
- Suspected thymoma with myasthenia gravis.
- Pre-operative evaluation for Electromagnetic Navigation Bronchoscopy (Khan et al, 2016)

**Combination of studies with Chest CT:**
- Abdomen CT/Pelvis CT/Chest CT/Neck MRI/Neck CT with MUGA – known tumor/cancer for initial staging or evaluation before starting chemotherapy or radiation treatment.

**COMBINATION OF STUDIES WITH CHEST CT/SINUS CT:**
- For poorly controlled asthma associated with upper respiratory tract infection. May be performed without failing 4 consecutive weeks of sinus treatment with medication.
- Granulomatosis with polyangiitis (GPA) (Wegener’s).
ADDITIONAL INFORMATION RELATED TO CHEST CT:

**LDCT for Lung Cancer Screening** - Screening should be discontinued once a person has not smoked for 15 years or develops a health problem that substantially limits life expectancy or the ability or willingness to have curative lung surgery.

**CT for Management of Hemoptysis** – High-resolution CT (HRCT) is useful for estimating the severity of hemoptysis, localizing the bleeding site and determining the cause of the bleeding. Its results can be related to the severity of bleeding. The volume of expectorated blood and the amount of blood that may be retained within the lungs without being coughed up are important. HRCT is a way to evaluate the amount of bleeding and its severity. It may also help in the localization of bleeding sites and help in detecting the cause of bleeding.

**CT and Solitary Pulmonary Nodules** – Solitary Pulmonary nodules are abnormalities that are solid, semisolid and non solid; another term to describe a nodule is focal opacity. CT makes it possible to find smaller nodules and contrast-enhanced CT is used to differentiate benign from malignant pulmonary modules. When a nodule is increasing in size or has spiculated margins or mixed solid and ground-glass attenuation, malignancy should be expected. Patients who have pulmonary nodules and who are immunocompromised may be subject to inflammatory processes.

**CT and Empyema** – Contrast-enhanced CT used in the evaluation of the chest wall may detect pleural effusion and differentiate a peripheral pulmonary abscess from a thoracic empyema. CT may also detect pleural space infections and help in the diagnosis and staging of thoracic empyema.

**CT and Superior Vena Cava (SVC) Syndrome** – SVC is associated with cancer, e.g., lung, breast and mediastinal neoplasms. These malignant diseases cause invasion of the venous intima or an extrinsic mass effect. Adenocarcinoma of the lung is the most common cause of SVC. SVC is a clinical diagnosis with typical symptoms of shortness of breath along with facial and upper extremity edema. Computed tomography (CT), often the most readily available technology, may be used as confirmation and may provide information including possible causes.
REFERENCES


Medicare.gov.


