

American College of Radiology ACR Appropriateness Criteria®

Clinical Condition: Dyspnea

Variant 1: Any age, positive physical examination.

Radiologic Procedure	Rating	Comments	RRL*
X-ray chest	9		Min
Rating Scale: 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

Variant 2: Older than age 40, negative physical examination.

Radiologic Procedure	Rating	Comments	RRL*
X-ray chest	8		Min
Rating Scale: 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

Variant 3: Younger than age 40, negative physical exam. Positive with other symptom, severe dyspnea, or other risk factors.

Radiologic Procedure	Rating	Comments	RRL*
X-ray chest	8		Min
Rating Scale: 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

Variant 4: Younger than age 40, negative physical examination.

Radiologic Procedure	Rating	Comments	RRL*
X-ray chest	No Consensus	The appropriateness of chest radiography varies and is influenced by several factors including the severity and duration of dyspnea, the presence of other symptoms, and the presence of other risk factors (cardiovascular, pulmonary, and neoplastic diseases).	Min
Rating Scale: 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

Variant 5: Any age, nonrevealing or nondiagnostic clinical, standard radiography, and laboratory studies.

Radiologic Procedure	Rating	Comments	RRL*
CT chest	7	Consider radiation exposure risk from CT in young patients (below the age of 20 years), particularly in women.	Med
Rating Scale: 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level

An ACR Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those exams generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the FDA have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.

DYSPNEA

Expert Panel on Thoracic Imaging: Poonam V. Batra MD¹; Sheila D. Davis, MD²; Suzanne L. Aquino, MD³; Philip C. Goodman, MD⁴; Linda B. Haramati, MD⁵; Arfa Khan, MD⁶; Ann N. Leung, MD⁷; Theresa C. McLoud, MD⁸; Melissa L. Rosado de Christenson, MD⁹; Anna Rozenshtein, MD¹⁰; Charles S. White, MD¹¹; Larry R. Kaiser, MD¹²; Suhail Raoof, MBBS.¹³

Summary of Literature Review

The literature is sparse on whether a chest radiograph is justified in patients with acute or chronic dyspnea. Most studies pertain to dyspnea in combination with other respiratory symptoms rather than as an isolated event. These studies are included under the ACR Appropriateness Criteria[®] [Acute Respiratory Illness](#) topic. This section does not include two of the most serious causes of dyspnea (congestive heart failure [CHF] and pulmonary thromboembolism) because they are dealt with elsewhere (see ACR Appropriateness Criteria[®] cardiac imaging and thoracic imaging sections).

Two studies [1,2] suggest that the chest radiograph adds enough additional useful information to recommend its routine use in patients with chronic and acute dyspnea. Another study [3] found that acute dyspnea was a strong predictor of radiographic abnormality in patients older than age 40 (only 14% had normal chest radiographs). In dyspneic patients younger than age 40, chest radiographs were normal in 68% and revealed acute and chronic findings in 13% and 18%, respectively. Of the patients with acute findings, the vast majority had either a positive physical examination or hemoptysis. The authors concluded that the chest radiograph was not warranted in patients younger than age 40 unless the physical examination was positive or the patient had hemoptysis.

It is recognized that the decision-making process in the individual patient is affected by factors other than just the presence or absence of dyspnea, including the severity of dyspnea and the presence or absence of other symptoms and other risk factors (cardiovascular, pulmonary, and neoplastic diseases). In clinical

practice, chest radiography is usually performed as part of the initial evaluation of dyspnea. A review by Morgan and Hodge [4] stated that the most useful methods for evaluating dyspnea are the electrocardiogram (ECG) and chest radiograph. In another study, the chest radiographs were helpful in making a diagnosis in 66% of the hospitalized patients admitted for other reasons and referred to respiratory physicians for breathlessness [5].

Although computed tomography (CT) is not recommended for the initial evaluation of patients with dyspnea (except for patients with suspected pulmonary embolism), it is frequently appropriate in patients when the results of the clinical, radiographic, and laboratory studies are either nonrevealing or nondiagnostic. Many diseases, including bronchiectasis, sarcoidosis, emphysema, pneumoconiosis, idiopathic pulmonary fibrosis, Langerhans cell histiocytosis, hypersensitivity pneumonitis, bronchiolitis obliterans, and lymphangitic cancer, have features characteristic enough to enable experienced radiologists to make a confident, probable, or limited differential diagnosis in most cases [6-14]. Biopsy and additional diagnostic testing are often unnecessary. CT and high-resolution CT (HRCT) may reveal an abnormality even when the chest radiograph is normal.

Recommendation

Based on a limited number of studies, chest radiography seems indicated when dyspnea is chronic or severe or when there are associated risk factors (older than age 40, cardiovascular, pulmonary, or neoplastic disease), other signs or symptoms, or positive findings on the physical examination. The rationale for performing chest radiography in acutely dyspneic patients younger than age 40 is less compelling, and there does not appear to be strong support in the literature for either performing or not performing chest radiography when there are no other symptoms or risk factors and when the physical examination is normal.

CT and HRCT should be considered when the initial evaluation of the dyspneic patient is nonrevealing or when it reveals abnormality but no definitive diagnosis.

Relative Radiation Level Information

Potential adverse health effects associated with radiation exposure are an important factor to consider when selecting the appropriate imaging procedure. Because there is a wide range of radiation exposures associated with different diagnostic procedures, a relative radiation level (RRL) indication has been included for each imaging examination. The RRLs are

¹Review Author, David Geffen School of Medicine, Los Angeles, Calif; ²Panel Chair, Westchester Medical Imaging Services, Hawthorne, NY; ³Massachusetts General Hospital, Boston, Mass; ⁴Duke University Medical Center, Durham, NC; ⁵Albert Einstein College of Medicine, Montefiore Medical Center, Bronx, NY; ⁶Long Island Jewish Medical Center, New Hyde Park, NY; ⁷Stanford University Medical Center, Stanford, Calif; ⁸Massachusetts General Hospital, Boston, Mass; ⁹Ohio State University Medical Center, Columbus, Ohio; ¹⁰Columbia Presbyterian Medical Center, New York, NY; ¹¹University of Maryland Hospital, Baltimore, Md; ¹²University of Pennsylvania Medical Center, Philadelphia, Pa, The Society of Thoracic Surgeons; ¹³New York Methodist Hospital, Brooklyn, NY, The American College of Chest Physicians.

Reprint requests to: Department of Quality & Safety, American College of Radiology, 1891 Preston White Drive, Reston, VA 20191-4397.

An ACR Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those exams generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the FDA have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.

based on effective dose, which is a radiation dose quantity that is used to estimate population total radiation risk associated with an imaging procedure. Additional information regarding radiation dose assessment for imaging examinations can be found in the ACR Appropriateness Criteria® [Radiation Dose Assessment Introduction](#) document.

Relative Radiation Level Designations	
Relative Radiation Level	Effective Dose Estimate Range
None	0
Minimal	< 0.1 mSv
Low	0.1-1 mSv
Medium	1-10 mSv
High	10-100 mSv

References

- Butcher BL, Nichol KL, Parenti CM. High yield of chest radiography in walk-in clinic patients with chest symptoms. *J Gen Intern Med* 1993; 8(3):115-119.
- Pratter MR, Curley FJ, Dubois J, Irwin RS. Cause and evaluation of chronic dyspnea in a pulmonary disease clinic. *Arch Intern Med* 1989; 149(10):2277-2282.
- Benacerraf BR, McLoud TC, Rhea JT, Tritschler V, Libby P. An assessment of the contribution of chest radiography in outpatients with acute chest complaints: a prospective study. *Radiology* 1981; 138(2):293-299.
- Morgan WC, Hodge HL. Diagnostic evaluation of dyspnea. *Am Fam Physician* 1998; 57(4):711-716.
- Mukhopadhyay A, Lim TK. A prospective audit of referrals for breathlessness in patients hospitalised for other reasons. *Singapore Med J* 2005; 46(1):21-24.
- Desai SR, Hansell DM. Small airways disease: expiratory computed tomography comes of age. *Clin Radiol* 1997; 52(5):332-337.
- Grenier P, Chevret S, Beigelman C, Brauner MW, Chastang C, Valeyre D. Chronic diffuse infiltrative lung disease: determination of the diagnostic value of clinical data, chest radiography, and CT and Bayesian analysis. *Radiology* 1994; 191(2):383-390.
- Kang EY, Miller RR, Muller NL. Bronchiectasis: comparison of preoperative thin-section CT and pathologic findings in resected specimens. *Radiology* 1995; 195(3):649-654.
- Koyama M, Johkoh T, Honda O, et al. Chronic cystic lung disease: diagnostic accuracy of high-resolution CT in 92 patients. *AJR Am J Roentgenol* 2003; 180(3):827-835.
- Lynch DA, Travis WD, Muller NL, et al. Idiopathic interstitial pneumonias: CT features. *Radiology* 2005; 236(1):10-21.
- Roberts HR, Wells AU, Milne DG, et al. Airflow obstruction in bronchiectasis: correlation between computed tomography features and pulmonary function tests. *Thorax* 2000; 55(3):198-204.
- Swensen SJ, Aughenbaugh GL, Myers JL. Diffuse lung disease: diagnostic accuracy of CT in patients undergoing surgical biopsy of the lung. *Radiology* 1997; 205(1):229-234.
- Waitches GM, Stern EJ. High-resolution CT of peripheral airways diseases. *Radiol Clin North Am* 2002; 40(1):21-29.
- Zompatori M, Sverzellati N, Poletti V, et al. High-resolution CT in diagnosis of diffuse infiltrative lung disease. *Semin Ultrasound CT MR* 2005; 26(5):332-347.

An ACR Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those exams generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the FDA have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.