[Evidence-Based Medicine]

CHEST

Screening for Lung Cancer

CHEST Guideline and Expert Panel Report

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BACKGROUND: Low-dose chest CT screening for lung cancer has become a standard of care in the United States in the past few years, in large part due to the results of the National Lung Screening Trial. The benefit and harms of low-dose chest CT screening differ in both frequency and magnitude. The translation of a favorable balance of benefit and harms into practice can be difficult. Here, we update the evidence base for the benefit, harms, and implementation of low radiation dose chest CT screening. We use the updated evidence base to provide recommendations where the evidence allows, and statements based on experience and expert consensus where it does not.

METHODS: Approved panelists developed key questions using the PICO (population, intervention, comparator, and outcome) format to address the benefit and harms of low-dose CT screening, as well as key areas of program implementation. A systematic literature review was conducted by using MEDLINE via PubMed, Embase, and the Cochrane Library. Reference lists from relevant retrievals were searched, and additional papers were added. The quality of the evidence was assessed for each critical or important outcome of interest using the GRADE (Grading of Recommendations, Assessment, Development, and Evaluation) approach. Important clinical questions were addressed based on the evidence developed from the systematic literature review. Graded recommendations and ungraded statements were drafted, voted on, and revised until consensus was reached.

RESULTS: The systematic literature review identified 59 studies that informed the response to the 12 PICO questions that were developed. Key clinical questions were addressed resulting in six graded recommendations and nine ungraded consensus based statements.

CONCLUSIONS: Evidence suggests that low-dose CT screening for lung cancer results in a favorable but tenuous balance of benefit and harms. The selection of screen-eligible patients, the quality of imaging and image interpretation, the management of screen-detected findings, and the effectiveness of smoking cessation interventions can affect this balance. Additional research is needed to optimize the approach to low-dose CT screening.

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ABBREVIATIONS: ACR = American College of Radiology; CHEST = American College of Chest Physicians; CISNET = Cancer Intervention and Surveillance Modeling Network; CMS = Centers for Medicare & Medicaid Services; COI = conflict of interest; CXR = chest radiograph; GRADE = Grading of Recommendations, Assessment, Development, and Evaluation; HR = hazard ratio; LDCT = low-dose CT; PICO = population, intervention, comparator, outcome; SES = socioeconomic status; RR = risk ratio; SEER = Surveillance, Epidemiology, and End Results; STR = Society of Thoracic Radiology; USPSTF = United States Preventative Services Task Force

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Summary of Recommendations

1. For asymptomatic smokers and former smokers age 55 to 77 who have smoked 30 pack years or more and either continue to smoke or have quit within the past 15 years, we suggest that annual screening with low-dose CT should be offered. (Weak recommendation, moderate-quality evidence)

Remark: Age 77 represents the oldest age of participants in the NLST at the end of the screening period. Age 77 also matches the oldest age of CMS coverage for low-dose CT screening. Age 80 has been recommended by the USPSTF based on modeling studies. Recommendation #2 can be applied to individuals age 78 to 80.

Remark: Asymptomatic refers to the absence of symptoms suggesting the presence of lung cancer.

2. For asymptomatic smokers and former smokers who do not meet the smoking and age criteria in Recommendation #1 but are deemed to be at high risk of having/developing lung cancer based on clinical risk prediction calculators, we suggest that low-dose CT screening should not be routinely performed. (Weak recommendation, low-quality evidence)

Remark: It is recognized that clinical risk prediction calculators may be slightly more efficient at identifying individuals who have or will develop lung cancer than the eligibility criteria listed in Recommendation #1. It is also recognized that the variables included in the clinical risk prediction calculators are risk factors for morbidity from the evaluation and treatment of screen detected findings, and death from any cause. Thus, a cohort at high risk for lung cancer based on a clinical risk prediction calculator may be less likely to benefit and more likely to be harmed by lung cancer screening than the cohort identified by the eligibility criteria listed in Recommendation #1. Thus, we do not believe the evidence supports a policy to screen this group.

Remark: It is also recognized that there will be individuals within the cohort deemed to be at high risk for lung cancer from a clinical risk prediction calculator who are healthy enough to benefit from lung cancer screening, and that low-dose CT screening could be considered in these individuals.

Remark: A risk threshold of 1.51% over 6 years on the PLCOm2012 calculator is an example of high risk.

Remark: In the United States, health insurance providers may not pay for low-dose CT screening for those who do not meet the eligibility criteria listed in Recommendation #1.

Remark: Additional lung cancer screening trials that include patients who do not meet the eligibility criteria listed in Recommendation #1 but have a high risk of having/developing lung cancer based on clinical risk prediction calculators are needed.

3. For individuals who have accumulated fewer than 30 pack years of smoking or are younger than age 55 or older than 77, or have quit smoking more than 15 years ago, and do not have a high risk of having/developing lung cancer based on clinical risk prediction calculators, we recommend that low-dose CT screening should not be performed. (Strong recommendation, moderate-quality evidence)

4. For individuals with comorbidities that adversely influence their ability to tolerate the evaluation of screen-detected findings, or tolerate treatment of an early-stage screen-detected lung cancer, or that substantially limit their life expectancy, we recommend that low-dose CT screening should not be performed. (Strong recommendation, low-quality evidence)

Remark: At very severe stages of a comorbid condition it can be clear that low-dose CT screening is not indicated (eg, advanced liver disease, COPD with hypoventilation and hypoxia, NYHA class IV heart failure) because competing mortality limits the potential benefit, and harms are magnified. At less severe stages it can be difficult to determine if an individual's comorbidities are significant enough that they should not receive low-dose CT screening. Further research is required to assist clinicians with this decision.

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