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Components Necessary for High-Quality Lung Cancer Screening

American College of Chest Physicians and American Thoracic Society Policy Statement

Peter Mazzone, MD, MPH, FCCP; Charles A. Powell, MD; Douglas Arenberg, MD, FCCP; Peter Bach, MD; Frank Detterbeck, MD, FCCP; Michael K. Gould, MD, FCCP; Michael T. Jaklitsch, MD; James Jett, MD, FCCP; David Naidich, MD, FCCP; Anil Vachani, MD; Renda Soylemez Wiener, MD; and Gerard Silvestri, MD, FCCP

PODCAST

Lung cancer screening with a low-dose chest CT scan can result in more benefit than harm when performed in settings committed to developing and maintaining high-quality programs. This project aimed to identify the components of screening that should be a part of all lung cancer screening programs. To do so, committees with expertise in lung cancer screening were assembled by the Thoracic Oncology Network of the American College of Chest Physicians (CHEST) and the Thoracic Oncology Assembly of the American Thoracic Society (ATS). Lung cancer program components were derived from evidence-based reviews of lung cancer screening and supplemented by expert opinion. This statement was developed and modified based on iterative feedback of the committees. Nine essential components of a lung cancer screening program were identified. Within these components 21 Policy Statements were developed and translated into criteria that could be used to assess the qualification of a program as a screening facility. Two additional Policy Statements related to the need for multisociety governance of lung cancer screening were developed. High-quality lung cancer screening programs can be developed within the presented framework of nine essential program components outlined by our committees. The statement was developed, reviewed, and formally approved by the leadership of CHEST and the ATS. It was subsequently endorsed by the American Association of Throacic Surgery, American Cancer Society, and the American Society of Preventive Oncology. CHEST 2015; 147(2):295-303

ABBREVIATIONS: ACR = American College of Radiology; ATS = American Thoracic Society; CHEST = American College of Chest Physicians; LDCT = low-dose CT; NLST = National Lung Screening Trial; STR = Society of Thoracic Radiology; USPSTF = US Preventive Services Task Force

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AFFILIATIONS: From the Respiratory Institute (Dr Mazzone), Cleveland Clinic, Cleveland, OH; the Division of Pulmonary, Critical Care, and Sleep Medicine (Dr Powell), Icahn School of Medicine at Mount Sinai, New York, NY; the Division of Pulmonary and Critical Care Medicine (Dr Arenberg), University of Michigan, Ann Arbor, MI; the Center for Health Policy and Outcomes (Dr Bach), Memorial Sloan-Kettering Cancer Center, New York, NY; the Section of Thoracic Surgery (Dr Detterbeck), Yale, New Haven, CT; Department of Research and Evaluation (Dr Gould), Kaiser Permanente Southern California, Pasadena, CA; the Division of Thoracic Surgery (Dr Jaklitsch), Brigham and Womens Hospital, Boston, MA; the Division of Oncology (Dr Jett), National Jewish Health, Denver, CO; the Department of Radiology (Dr Naidich), NYU Langone Medical Center, New York, NY; the Pulmonary, Allergy, & Critical Care Division (Dr Vachani), University of Pennsylvania, Philadelphia PA; the Center for Healthcare Organization and Implementation Research (Dr Wiener), Edith Nourse Rogers Memorial Veterans Hospital, Bedford, MA; The Pulmonary Center (Dr Wiener), Boston University School of Medicine, Boston, MA; and the Division of Pulmonary and Critical Care (Dr Silvestri), Medical University of South Carolina, Charleston, SC.

CORRESPONDENCE TO: Peter J. Mazzone, MD, MPH, FCCP, 9500 Euclid Ave, A90, Cleveland, OH 44195; e-mail: mazzonp@ccf.org

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We believe that, when performed in an appropriate patient population in settings committed to quality, lung cancer screening with low-dose CT (LDCT) scanning will result in more benefit than harm. The benefits and harms of lung cancer screening depend on a complex interplay of multiple factors. Lung cancer screening is not solely an imaging test; it is a process that should take place within an organized program. In the text that follows we outline the components of lung cancer screening programs that can influence the balance of benefit and harms. We briefly review the evidence base and considerations for each program component, list Policy Statements for each component, and provide criteria that could be applied to qualify a program as a lung cancer screening facility. Within each component, reducing harm may impact the potential benefit and vice versa. The purpose of this document is to provide guidance for policy development by relevant stakeholders who will play an important role in lung cancer screening implementation. There remain opportunities for continued study to optimize the outcomes of lung cancer screening.

Materials and Methods

Committees with expertise in lung cancer screening were assembled by the Thoracic Oncology Network of the American College of Chest Physicians (CHEST) and the Thoracic Oncology Assembly of the American Thoracic Society (ATS). Participants included pulmonologists, thoracic surgeons, a chest radiologist, and health services policy experts with expertise in lung cancer CT scan screening as identified by their publications and involvement in professional societies. The committees reviewed evidence-based guidelines related to lung cancer screening, including a combined review from CHEST, ATS, and American Society of Clinical Oncology,[1] a separate review from CHEST,[2] and the statement from the US Preventive Services Task Force (USPSTF).[3] Particular focus was given to the areas of these documents discussing implementation challenges. This review was supplemented by the experience of the committee members to develop a list of components of a lung cancer screening program that are capable of influencing the balance of benefit to harm.

The evidence related to each component was summarized, and Policy Statements were developed based on the evidence. Consensus about the component descriptions and Policy Statements was achieved through incorporation of the iterative written and verbal feedback of the committees. Two quality metrics were developed based on our expert committee's consensus that the metrics are valid, feasible, and relevant. The statement was developed, reviewed, and formally approved by the leadership of CHEST and ATS. It was subsequently endorsed by the American Association of Thoracic Surgery, American Cancer Society, and the American Society of Preventive Oncology. All elements of the final draft were unanimously accepted by all authors and endorsed by all sponsoring Societies.

Results

Component 1: Who Is Offered Lung Cancer Screening

The principal question is how do lung cancer screening programs identify a group at high enough risk of developing lung cancer to benefit more than they are harmed. The balance with this choice is that more lives can be saved by screening at lower thresholds of risk, but the relative harms of screening increase as the threshold is lowered. It is difficult to determine the ideal balance of benefit and harm, as the value of the benefit and harms is not equal and varies with patient preferences.

The only group in which lung cancer screening has direct evidence of a proven benefit is the National Lung Screening Trial (NLST) cohort.[4] Based on the results of computer models of screening performed by the Cancer Intervention and Surveillance Modeling Network for the Agency for Healthcare Research and Quality,[5] the USPSTF extended the age limit for screening from 74 to 80 years in its recommendations.[3] Even within the NLST cohort, there is a wide range of risk for developing lung cancer and, thus, a wide range of the benefit to harm balance that can be expected[6] (Table 1).

Multiple models exist to help estimate the risk of developing lung cancer[7-11] (Table 2). One model, Prostate, Lung, Colorectal, Ovarian Screening Trial (PLCO 2012), was validated in comparison with the NLST criteria, showing marginally improved sensitivity with similar specificity for identifying patients with lung cancer.[9] At

TABLE 1] Variation in Benefit (Number Needed to Screen to Prevent One Death From Lung Cancer) to Harm (FPs per Prevented Lung Cancer Death) Based on the Quintile of Risk Within the NLST[6]

5-y Risk of Lung Cancer Death, %	FP per Prevented Lung Cancer Death	Number Needed to Screen
All	108	302
0.15-0.55	1,648	5,276
0.56-0.84	181	531
0.85-1.23	147	415
1.24-2.00	64	171
>2.00	65	161

FP = false positive (benign nodule detected on screening CT scan); NLST = National Lung Screening Trial.