Lown Right Care

Reducing Overuse and Underuse

Lung Cancer Screening: Pros and Cons

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Case Scenario

A 70-year-old man had been a heavy smoker until 10 years ago, when he quit after a myocardial infarction. He has hypertension, mild chronic obstructive pulmonary disease, and stable coronary artery disease. He walks half a mile daily without shortness of breath. At his wellness visit, he asks you about lung cancer screening with low-dose chest computed tomography (CT), because he has been told by a friend that having this test performed annually will reduce his risk of dying from lung cancer by 20%. You inform him that lung cancer screening also has risks, but the patient elects to proceed with the test anyway. His first scan shows an indeterminate lung nodule that will require additional testing, as well as calcifications in his liver and aorta.

Clinical Commentary

Lung cancer is the leading cause of cancer death in the United States, accounting for 28% of all cancer deaths.[1] The overall five-year survival rate of lung cancer is 17%; however, it rises to 52% if the disease is localized.[2] Although screening for lung cancer using chest radiography or sputum cytology is ineffective,[3] the 2011 National Lung Screening Trial demonstrated that among people 55 to 74 years of age who actively smoke or have quit smoking within the past 15 years, those who are screened with low-dose CT are less likely to die from lung cancer than those screened with chest radiography. Participants in the trial received three rounds of CT screening and were followed for at least five years.[4]

The 20% reduction in lung cancer mortality that the patient in the scenario mentioned is based on relative risk; there were 247 lung cancer deaths per 100,000 person-years in the low-dose CT study arm, and 309 lung cancer deaths per 100,000 person-years in the chest radiography arm.[4] This relative risk reduction was later recalculated to be 16%.[5] A more clinically meaningful number is the absolute risk reduction of approximately three in 1,000 (number needed to screen is 320 to prevent one lung cancer death over five years).[4]

The U.S. Preventive Services Task Force recommends annual low-dose CT to screen for lung cancer in otherwise healthy adults 55 to 80 years of age who have a 30-pack-year smoking history and currently smoke or have quit within the past 15 years.[6] The Centers for Medicare and Medicaid Services pays for annual testing for patients up to age 77, which is the age of the oldest participants in the National Lung Screening Trial.[7]

The Centers for Medicare and Medicaid Services requires that physicians discuss the risks and benefits of screening during a shared decision-making visit using one or more decision aids such as those from the Agency for Healthcare Research and Quality (https://effectivehealthcare.ahrq.gov/decision-aids/lung-cancer-screening/home.html). This visit should include a discussion of the potential harms of screening (e.g., radiation exposure, overdiagnosis), follow-up diagnostic testing, false-positive rate, and the importance of adherence to annual lung cancer screening and smoking cessation.[7]

TAKE-HOME MESSAGES FOR RIGHT CARE

- The National Lung Screening Trial showed that one in 320 high-risk patients screened with low-dose CT over five years will avoid death from lung cancer. However, no other study has shown a benefit from this screening.
- Low-dose CT scans have a high false-positive rate. Of 1,000 high-risk patients who do not have cancer, 250 will have an abnormal low-dose CT result and will require further testing to rule out cancer; 2.5% of patients without cancer will undergo invasive procedures (e.g., lung biopsy, bronchoscopy) with a small risk of complication and death.
- Of the cancers found by low-dose CT, at least 20% are overdiagnosed (i.e., the cancer would not have harmed the patient if left alone). Patients with overdiagnosed lung cancers will be exposed to potentially dangerous and lethal interventions with no benefit.

CT = computed tomography.

Lown Institute Right Care Alliance is a grassroots coalition of clinicians, patients, and community members organizing to make health care institutions accountable to communities and to put patients, not profits, at the heart of health care.

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Although the American Cancer Society and the American College of Radiology endorse lung cancer screening,[8,9] the American Academy of Family Physicians concludes that because the National Lung Screening Trial results have not been reproduced in a community setting, the evidence is insufficient to make a recommendation.[10] Only 2% to 3% of the 8 million Americans who are eligible receive lung cancer screening, reflecting a reluctance of physicians to recommend it.[5] Data indicate that most physicians who discuss lung cancer screening with patients do not accurately convey the benefits and harms of testing. In a small study of physicians who counseled patients on low-dose CT screening, none were able to accurately convey information about screening to their patients, and all of these physicians minimized the risks.[11]

COSTS OF LUNG SCANS AND PROCEDURES

Test	Representative fair price*
Low-dose CT	$300†
Chest CT with contrast	$500‡
Lung biopsy	$900‡
PET	$3,000‡
Lung surgery	$13,000‡

CT = computed tomography; PET = positron emission tomography.

*—The fair price represents reasonable out-of-pocket costs based on price comparisons. Actual cost will vary with insurance and by region.
†—Source: Choosing Wisely. http://www.choosingwisely.org/patient-resources/ct-scans-to-find-lung-cancer-in-smokers/ (accessed March 28, 2019).
‡—Source: HealthCare Bluebook, https://www.healthcarebluebook.com/ui/consumerfront (accessed March 28, 2019).

BENEFITS

In the National Lung Screening Trial, three out of 1,000 high-risk people screened annually for three years and followed for five years avoided death from lung cancer.[4] It is unclear how long this benefit lasts. Patients most likely to benefit have more risk factors and more pack-years of smoking, but also tend to die of other causes sooner than healthier former smokers.[12] It is also important to note that three smaller studies of low-dose CT screening showed no benefit of screening, and when those studies were pooled with National Lung Screening Trial data, there was collectively no decrease in lung cancer mortality.[13] Finally, in real-world experience, low-dose CT detects cancers less often than in the National Lung Screening Trial,[5] meaning that even fewer people may benefit than the National Lung Screening Trial results predict.

HARMS

False Positives. According to the National Lung Screening Trial, approximately 250 out of 1,000 high-risk patients screened who do not have cancer will be told their low-dose CT scans show an abnormality that may be cancer.[14] Early data from community use of low-dose CT suggest that the false-positive rate may be even higher.[15] False-positive results can lead to unnecessary further testing, cause patient anxiety and harm, and increase health care costs. A total of 95% of abnormal low-dose CT results are false-positives. Often, a questionable nodule will be followed by serial high-dose CT or positron emission tomography, exposing the patient to radiation. Approximately one in 40 people with positive low-dose CT results will need invasive procedures such as a lung biopsy or bronchoscopy,[5] putting them at risk of complications (e.g., pneumothorax, infection, death). In addition, low-dose CT scans show incidental abnormalities in other organs that can lead to overtesting and overtreatment.

Overdiagnosis. Many cancers are indolent and will not lead to death if left alone. Other cancers grow slowly, and patients die of something unrelated to the cancer. Screening tests such as low-dose CT will detect these cancers, often exposing patients to surgery, radiation, and chemotherapy, all of which can lead to death and injury, for cancers that would have been harmless if not detected. An estimated 18% to 67% of lung cancers detected with low-dose CT screening may be overdiagnosed,[16,17] exposing many patients to unnecessary risk.

Resolution of Case

After six months, repeat CT of the lungs and abdomen was performed, the results of which were unremarkable. The radiologist advised continuing to check CT results periodically to assure stability of the benign-appearing nodules. The patient decided to forgo further screening for lung cancer.

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