

Risk-Based Lung Cancer Screening Is More Cost-Effective

Models based on personal risk may be more useful than those based on age and smoking history alone.

May 31, 2023 By [Sukanya Charuchandra](#)

Lung cancer screening models that select people for screening on the basis of their individual risk are more cost-effective than categorical recommendations based solely on age and smoking history, according to study findings published in [Annals of Internal Medicine](#).

“Our model shows that personal risk-based screening for lung cancer is cost-effective under a wide range of risk thresholds, offering flexibility for implementing risk model-based approaches in a variety of settings that have different health care resources available,” Iakovos Toumazis, PhD, of the University of Texas MD Anderson Cancer Center, said in a [press release](#).

People with early-stage [lung cancer](#) often do not have symptoms, so the malignancy is frequently diagnosed late, when it is more difficult to treat.

Regular screening using low-dose computed tomography (CT) scans can help detect tumors sooner. In 2021, updated guidelines from the U.S. Preventive Services Task Force (USPSTF) [recommended annual lung cancer screening](#) for people ages 50 to 80 who have at least a 20 pack-year smoking history (equivalent to one pack of cigarettes a day for 20 years) and who currently still smoke or have quit within the past 15 years. The new criteria lower the starting age from 55 and the smoking history from 30 pack-years.

In the same update, the USPSTF suggested that more research should be carried out to explore the benefits of using risk-based strategies to identify eligible individuals. Whatever the screening strategy, the benefits of catching more lung cancer cases early must be weighed against the harms of overdiagnosis, unnecessary invasive procedures and radiation exposure from repeated CT scans.

Toumazis and colleagues with the [Cancer Intervention and Surveillance Modeling Network](#) Lung Working Group assessed the cost-effectiveness of risk-based strategies for lung cancer screening compared with the current USPSTF criteria.

The researchers used two different models to calculate the cost-effectiveness of the strategies.

The first, known as the Prostate, Lung, Colorectal and Ovarian modified 2012 (PLCOm2012) model assesses an individual's chances of developing lung cancer over six years, while the second, the Lung Cancer Death Risk Assessment Tool (LCDRAT), estimates the likelihood of a person dying of lung cancer over the same period. For this study, they used simplified versions of both models that consider only age, sex and smoking-related risk predictors. For the PLCOm2012 model, they used risk thresholds ranging from 0.5% to 2.2%.

Using data from the National Lung Screening Trial, the researchers simulated lung cancer events for 1 million men and women using the smoking patterns of people born in 1960. This population is representative of those targeted for lung cancer screening. The simulated individuals entered the study at age 45 with follow-up continuing until age 90 or death, whichever was earlier.

Screening was considered cost-effective if the incremental cost-effectiveness ratio was less than \$100,000. The researchers found that risk model-based screening strategies were more cost-effective than the USPSTF criteria, but results varied according to the chosen risk threshold.

A risk-based strategy using the PLCOm2012 model that began screening at age 50 with six-year risk thresholds of 1.2% or higher was more cost-effective. A 1.2% six-year risk threshold resulted in an incremental cost-effectiveness ratio of \$94,659 per quality-adjusted life-year gained. It also led to a larger decrease in lung cancer mortality compared with the USPSTF guidelines (a 12.4% versus 11.7% decline, respectively). Using the LCDRAT model with a 1.1% six-year risk threshold, the incremental cost-effectiveness ratio was similar, at \$97,284 per quality-adjusted life-year gained.

Both risk-model strategies and the USPSTF screening recommendations were more cost-effective for women than for men.

"Findings from this study could be considered as a potential guide for the development of cost-effective risk model-based lung cancer screening under various settings and availability of health care resources," Toumazis said. "While the current recommendations are cost-effective, our findings suggest that we can improve on these guidelines and provide more flexibility to include those most likely to benefit from lung cancer screening."

However, failure to meet screening criteria is not the main barrier to early lung cancer detection, as most people who are eligible are never screened.

"Selection criteria aside, the biggest crisis facing lung cancer screening implementation is the slow uptake in practice, with only 10% to 20% of lung cancer screening-eligible Americans screened to date," Renda Soylemez Wiener, MD, MPH, of the VA Boston Healthcare System, and Michael Gould, MD, MS, of the Kaiser Permanente Bernard J. Tyson School of Medicine, wrote in an [accompanying editorial](#).

"[S]hared decision-making involves more than information provision; it entails helping patients understand the information and weigh the trade-offs of lung cancer screening in the context of

their own values, preferences and goals,” they continued. “It is not yet clear how to make risk model output comprehensible to patients, particularly those with low health literacy.”

Click here to read the study abstract in the [Annals of Internal Medicine](#).

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