

Lung Cancer Screening: Translating Research Into Practice

According to the National Lung Screening Trial (NLST), use of low-dose computed tomography (LDCT) reduced lung cancer deaths by 20%. That finding led the U.S. Preventive Services Task Force (USPSTF) to recommend screening for high-risk individuals (current and former heavy smokers). And that, in turn, led to hospitals nationwide setting up lung cancer screening programs—a number that rose “dramatically,” according to the National Cancer Institute (NCI), after the Centers for Medicare and Medicaid Services decided to cover LDCT screening for high-risk Medicare beneficiaries.

But how does the screening recommendation pan out in real life? Primary care physicians and pulmonologists alike were concerned about the workability of putting LDCT into real-life practice. And not without basis: Published experience with implementation of lung cancer screening (LCS) is limited, say VHA researchers. Their 3-year demonstration project bears out the concerns, they add.

When they designed the study, the researchers wanted to see how feasible LCS would be in terms of resources and effort, whether patients would take part, what their clinical experience might be, and what type of findings the screenings might produce. The researchers found that establishing and sustaining a screening program requires “significant clinical effort for as-yet uncertain patient benefit.” They also found “wide variation” in both processes and patient experiences among the 8 VA hospitals in the study. Moreover, they found that, although most patients had findings that required follow-up, few had early-stage lung cancers.

Of the 2,106 screened patients in a *JAMA Internal Medicine* study, 1,257 had nodules. More than half of those required tracking, and 2% required further evaluation, but the findings were not cancer. Just 1.5% had lung cancer. Scans of 857 patients (40.7%) also revealed a variety of incidental findings, such as emphysema, other pulmonary abnormalities, and coronary artery calcification.

The researchers say that implementing a comprehensive program that followed recommendations was “challenging and complex,” requiring new tools and processes for staff as well as for

dedicated patient coordination. As an example, they say creating electronic tools to capture the necessary clinical data in real time that met the needs of the screening coordinators proved to be difficult, “even with the VHA’s highly regarded electronic medical record.”

Also, finding out who actually had a smoking history of > 30 pack-years of smoking per the USPSTF recommendation was not easy. Lead investigator Linda Kinsinger, MD, MPH, points out, “People who smoke don’t track that sort of thing as closely as you think they would, and they don’t smoke at the same level for years and years.”

The researchers estimate that nearly 900,000 veterans meet the initial screening criteria for age, smoking history, and medical history, but they caution that accurately identifying the patients and discussing risks and benefits will take “significant effort” for primary care teams. Even if that number were reduced by 16% to account for longer medical contraindications, the number of veterans who might be candidates for annual LCS would be “substantial.” And based on the researchers’ experience, a bit more than half the candidates will agree to be screened.

Although screening programs are a complex endeavor, the researchers say, the results of their study can help the VHA plan for broader implementation of comprehensive screening programs.

“What [the VHA] is reporting is the initial experience for almost everybody,” said Lynn Tanoue, MD, director of the Lung Screening and Nodule Program at Yale Cancer Center in New Haven, Connecticut, in an interview with the NCI. “Until people really started doing lung cancer screening and began to understand the challenges of doing it properly, you couldn’t have known what it was going to be like.” But she adds, “The data from NLST were very clear. We should accept that there is benefit and choose the right population to screen.”

However, although the LDCT screening can find signs of early lung cancer, a biopsy is often necessary. Researchers from Boston University suggest an effective, much less invasive approach: analyzing gene expression in nasal cell samples.

The researchers collected and analyzed nasal cell samples from 505 current and former smokers for gene expression. They found 535 genes that were expressed differently between patients who were diagnosed with lung cancer and those whose lesions were benign.

Comparing those data with data from bronchial airway samples from the same patients, the researchers found changes that were similar between the nose and lung samples of patients with lung cancer, suggesting that smoking might cause similar genetic changes throughout the entire airway.

The researchers used the 30 most prominent changes to create a biomarker panel and tested it in 130 other patients. Compared with a clinical risk factor model that considered age, smoking status, and other factors, the biomarker panel was better at predicting lung cancer. Combining the 2 models further improved detection. "We find that nasal gene expression contains information about the presence of cancer that is independent of standard clinical risk factors," said one of the co-lead investigators.

Lung cancer screening is still experiencing "growing pains," the NCI says. And the need for screening is both acute and chronic: A 2015 study found that only 4% of people who meet the criteria for screening actually undergo screening.

These studies not only open avenues for better screening and diagnosis, but also highlight the need for better patient education.

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Related Reading

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