Key Takeaways:

- After the National Lung Screening Trial proved that LDCT lung cancer screening could reduce mortality rates, a radiologist in Boston led development of a practical screening program.

- Leaders of the screening program meet regularly with primary care physicians throughout the hospital network to build trust and collect input for improving the program.

- Automated patient qualification and enrollment, along with centralized administration and follow-up, reduce the burden of patient management for referring physicians while keeping them in the loop.

Only 16 percent of lung cancers are diagnosed early, when the five-year survival rate can be as high as 90 percent. The rest aren’t detected until the disease reaches the advanced stages. By the time lung cancer spreads and triggers symptoms, the five-year survival rate plummets to just 5 percent — giving it the highest mortality of any cancer and accounting for 25 percent of all cancer deaths in the United States.

Fortunately, advanced screening technologies can improve this prognosis through earlier detection of lung nodules. The National Cancer Institute demonstrated this with the National Lung Screening Trial (NLST), which started in 2002 and revealed that participants screened with low-dose CT (LDCT) were at least 20 percent less likely to die from lung cancer.

The NLST sparked one of the country’s first LDCT lung cancer screening programs at Beth Israel Deaconess Medical Center (BIDMC), a Harvard Medical School Teaching Hospital in Boston. Since launching LungHealth® in March of 2016, radiologists at BIDMC have performed 2,200 LDCT exams to screen 1,390 patients who are at high-risk for lung cancer.

“Through this program, we are catching and detecting lung cancer earlier, at a stage when patients can still undergo treatment and survive,” says Alexander A. Bankier, MD, PhD, medical director of LungHealth at BIDMC. “So far, we’ve caught 25 cases of lung cancer, 24 of which were early stages, and I don’t think it’s overly immodest to say that we saved these patients’ lives. LDCT lung cancer screening shows how imaging can play a proactive role in disease prevention, not just detection.”

Support for LDCT Screening

Years before establishing LungHealth, BIDMC participated in the NLST as one of 33 trial screening sites that conducted exams for the nationwide study. Bankier joined the hospital around 2008 as the trial was ending and became committed to permanently implementing LDCT lung cancer screening at BIDMC.

“When the results of the trial were published in 2011, it gave the idea a new boost,” says Bankier, who is also a professor of radiology at Harvard Medical School and chief of the cardiothoracic imaging section and director of functional respiratory imaging in the radiology department at BIDMC. “But there wasn’t a lot of enthusiasm in the beginning because some members of the hospital administration were concerned that this would never be financially sustainable.”

The idea gained traction at BIDMC between 2012 and 2014 as several professional groups — including the American Cancer Society, the American Thoracic Society, the American Society of Clinical Oncology, the U.S. Preventive Services Task Force, and the ACR — began recommending LDCT lung cancer screening. The final piece of support came in 2015, when CMS issued a national coverage decision to reimburse LDCT lung cancer screening.

“The confirmation of reimbursement from major insurance companies made it possible to implement this idea in practice,” Bankier says. “For the first time, we had reimbursement estimates, which helped us make the case that an LDCT lung cancer screening program made sense economically.”

Bankier worked with the hospital’s strategic planning division to build a business plan that illustrated the...
Program's potential. Together, they estimated the number of high-risk patients within the healthcare system's reach who would qualify for lung cancer screening based on Medicare's eligibility criteria. Then, they calculated potential revenue from regular screenings, as well as downstream revenue from positive findings, incidental findings, and follow-up scans.

"The administration wanted to see numbers to justify whether this program would be economically viable," Bankier says. "But there's also a value aspect that you can't put a dollar amount on, because you're offering preventive care that can improve the health of your patients and potentially save lives."

The First Step
By addressing the program's economic potential and patient value, Bankier secured the approval of the hospital administration, with full support from the radiology department. The hospital provided funds to hire a program manager, which was a critical first step in the program’s development.

"The one thing I learned from witnessing the final phase of the NLST was that the administration and patient management aspects of lung cancer screening are at least as important as the medical aspect," says Bankier, noting that BIDMC added a full-time administrative position for the duration of the NLST. "From the very beginning, I emphasized the need for a dedicated person to run this program."

In late 2015, Lauren M. Taylor, RN, BSN, joined the team as program manager, and together, she and Bankier began planning how to run a screening program. Administratively, Bankier and Taylor had to plan step-by-step how to qualify eligible patients for enrollment, order screening exams, discuss shared decision-making, design a structured reporting template, organize subspecialty reads, handle incidental findings, and coordinate annual follow-ups through ongoing patient management.

PCPs as Partners
Bankier and Taylor quickly learned that implementing a screening program was markedly different than providing diagnostic imaging. "Preventive screening requires a completely different context, because we don't see patients with symptoms," Bankier says. "We see individuals who are at risk for a disease and want to stay healthy."

Since ideal candidates for lung cancer screening typically don't walk into the hospital seeking a diagnosis, Bankier had to reach high-risk participants proactively — through their primary care physicians (PCPs). Early in the planning process, Bankier and Taylor met with PCPs to build buy-in while fine-tuning the details of the program.

The goal of these conversations was twofold: First, to educate referring physicians about the screening program so they could, in turn, inform their patients; and second, to gather PCPs' feedback and concerns. "A few of these physicians were enthusiastic about the idea of LDCT lung cancer screening, but there was also a substantial number of skeptics," Bankier says. "We learned a lot from these conversations, and the input from physicians helped us improve the program."

Most of the early concerns echoed the same risks that were documented in NLST findings and other research — such as overdiagnosis of lung cancer and incidental findings unrelated to lung cancer. Many PCPs worried that the program would add more administrative work and patient management duties to their workloads, and others feared they'd lose control over patients who enrolled.

"By knowing the referring physicians' concerns, we were able to tailor the program on the front end to make them more comfortable enrolling patients," Taylor says. "We realized how important it was to reduce their administrative burden, while keeping them continuously in the communication loop so they didn't lose contact with their patients."

Collaborative Partners
After meeting with referring physicians within the hospital, Bankier and Taylor worked their way outward to reach referrers throughout BIDMC's network, which spans 45 affiliate locations, including primary care practices and community healthcare centers across the

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Greater Boston area.

“The segment of our population that qualifies for LDCT lung cancer screening often includes the same people who receive care at our community healthcare centers,” Bankier says. “A relatively high smoking population exists within these groups, so there’s a proportionately higher number of high-risk patients in these pockets.”

Bankier recognized that the community healthcare centers in BIDMC’s network would be critical partners for the screening program. “Nancy Kasen, the chief of the community healthcare centers, was immediately onboard, because she understood the importance of screening these patients,” Bankier says. “From day one, the community healthcare centers and the patients they represent were a strong pillar on which our program was built.”

Relationship Building

For months before the program began in 2016, Bankier and Taylor met regularly with referring physicians throughout the network. Since then, they’ve continued to check in every few weeks. “In our experience, the most effective way to reach patients has been through regular in-person visits with referring physicians,” Taylor says. “The referring physicians are our closest partners in terms of educating patients about the program and getting them to enroll.”

Bankier emphasizes that these visits can’t be phoned in or delegated, because relationships with referring physicians are critical to a screening program’s success. “The best advice I can give other radiologists is to seek as much personal contact with referring physicians as possible,” Bankier says. “Referring physicians delegate some of their responsibility to us in terms of patient management, so it’s very important that they know to whom they’re entrusting their patients.”

Primary care physicians like Mark D. Aronson, MD, appreciate knowing that the LungHealth team handles patient qualification, education, tracking, and administration centrally, so referring doctors don’t have to spend time on those things.

“The radiologists set up a system to track lung cancer screening candidates and take ownership of patient management,” says Aronson, vice chair for quality in the department of medicine at Harvard Medical School. “Once a patient’s enrolled in the program, I don’t have to worry about reminding them to get their annual scan. That’s valuable, because it’s very difficult for doctors to keep track of each individual when they have so many patients.”

Patient Enrollment

Taylor and Aronson knew they needed to make it easy for referring physicians to enroll patients into the program. To that end, they worked with the hospital’s IT department to develop an in-house tool that allows referring physicians to enroll qualified patients — those between the ages of 55 and 77 with a smoking history of at least 30 pack-years, who either currently smoke or quit within the last 15 years — with just a few clicks.

“They developed a tool within our ordering system that calculates a patient’s smoking history in pack-years,” Aronson says. “So, if a patient smoked half a pack a day for 10 years, then a full pack a day for 15 years, and then five cigarettes a day for the last 10 years — the calculator determines the accumulated pack-years. Once they exceed 30, they fall into the screening protocol, and the system automatically prompts us to recommend the program.”

Referring physicians just click the pop-up notification, and the system automatically issues a screening exam order, auto-populated with the patient’s inclusion criteria. When Aronson sees the smoking history pop-up, he’ll tell the patient: “You fit into our lung cancer screening protocol. I recommend that you get screened, because studies show that if we screen you regularly, we have a much better chance of picking up lung cancer early and treating it. It has saved lives and could save your life someday.”

Aronson says he’s never had a high-risk patient decline his screening recommendation. He has enrolled about 20 patients in the program since it launched.
When Marsha DiCesare’s primary care physician told her about the screening program during her annual physical, it seemed like a “no-brainer.” “If you're a former smoker, it’s always in the back of your mind, because we all know how bad smoking is for your health,” says DiCesare, 59. “Lung cancer doesn’t usually present symptoms until it’s pretty advanced, so after smoking for many years, screening gives me peace of mind.”

Workflow Design

With the goal of making the program convenient for both referring physicians and patients, Bankier and Taylor designed a workflow focused on proactive patient management and thorough follow-up. “Once enrolled in the screening program, every patient gets a shared decision-making phone call from me that explains the benefits, risks, what to expect when they arrive for their exam, what to expect on their report, and what happens if there’s a positive finding,” Taylor says. “We talk through all the steps, and I introduce myself as the central contact person who will help them through all of it.”

BIDMC offers screening exams at three (soon to be four) locations throughout the hospital network, and scans are read centrally by a small group of subspecialty-trained radiologists. Technically, any CT equipment can be programmed with the low-dose protocol, allowing for future expansion.

When patients arrive for their initial LDCT screening, they first meet privately with a radiologist to discuss the program. “Having the conversation with the radiologist really put my mind at ease and made me feel comfortable and well-informed,” says DiCesare, who had her first screening in the spring of 2017.

Coordinated Care Decisions

Screening results are sent to patients and their referring physicians within a week. Most screening results come back negative, Bankier says, so the typical recommendation is for patients to return in a year for annual screening. Some findings may require patients to return in three to six months for a re-scan. More suspect findings, however, require a collaborative multidisciplinary discussion.

Every suspicious case (with nodules classified as 4B or 4X according to ACR’s standardized Lung-RADS™ assessment categories) is discussed at a weekly thoracic oncology conference. During each conference, multiple disciplines related to thoracic disease come together, including radiology, thoracic surgery, thoracic pathology, interventional pulmonology, respiratory medicine, nuclear medicine, oncology, and radiation therapy. Bankier also invites referring physicians whose patients are being discussed.

At the conference, the reading radiologist takes the lead — sharing the clinical findings of each case and then moderating the discussion as various subspecialties chime in about the upsides and downsides of potential next steps, including biopsy, surgery, or simply waiting three to six months for a follow-up scan.

“The advantage of this setting is that we can make a multidisciplinary management decision based on our discussion, and then immediately organize the next steps,” Bankier says. “We can refer the patient to the thoracic surgeon, the referring physician, or the specialist, all of whom are usually at the conference and already know the patient’s history. That’s a huge advantage for patient management.”

If primary care physicians are unable to attend these conferences, Taylor takes notes and reports back to them. She also schedules any follow-up exams or appointments — whether it’s surgery, a routine screening, or a re-scan in several months — while maintaining constant contact with referring physicians. “We try to be cognizant of the referring physician’s time, but also keep them totally apprised of their patients,” she says. “Sometimes I’ll just send an email, and then if it’s acute, I also call them, but we track it and order it all centrally so we’re taking that administrative burden off of the referring physicians.”

Growth Opportunity

In addition to detecting lung cancer as early as possible, the screening program is catching other abnormalities, including cardiac disease and abdominal issues. (Read this “Standardized Findings” case study to learn how Bankier and Taylor developed a standardized system to handle incidental findings.)

Perhaps more importantly, patients enrolled in the program are more likely to reduce their smoking habits or stop altogether. Smoking cessation information and support are offered through the program, and Taylor even became a certified smoking cessation counselor to help patients stop smoking. “If we’re telling you that you’re at high-risk for lung cancer because of smoking, it’s a big incentive to quit smoking,” says Aronson, who’s noticed that all of his patients have stopped smoking since enrolling.

To build on these positive results, Bankier has a vision to continue growing the screening program: expanding into new affiliate healthcare sites, increasing patient enrollment, and ultimately broadening the program’s overall reach. “The program is named...”
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LungHealth – not specific to cancer but really about overall lung health,” Bankier says. “In the future, we might be able to use the information we acquire, not only for preventing cancer but also to look at other respiratory diseases where early detection may benefit the patient. We want to be as comprehensive as we can to save as many lives as possible.”

**Next Steps:**

- Meet personally with referring physicians to share ideas about implementing a lung cancer screening program that makes practical sense for everyone involved.

- Encourage radiologists to take a more proactive role in patient care by meeting with participants before screening exams to discuss the process and alleviate concerns.

- Build a multidisciplinary team to regularly discuss complex cases and improve patient care through collaboration.

**ENDNOTES:**


**Share Your Story**

Have a case study idea you’d like to share with the radiology community? To submit your idea please click here.

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