

## Case Study: Lung Screening in an Urban Setting



*Radiologists in the Bronx lead a lung cancer screening program targeting an underserved, high-risk urban population.*

By Brooke Bilyj

### Key Takeaways:

- Inspired by the results of the National Lung Screening Trial, physicians at Montefiore Health System collaborated across disciplines to develop a lung cancer screening program to reduce mortality rates in their high-risk population.
- Screening program directors meet regularly with referring physicians throughout the hospital network to raise awareness and build trust.
- With automated enrollment forms and follow-up reminders in the EMR system, the screening program reduces the burden of patient management for referring physicians.

David Feliciano's friend went to the doctor for what he thought was just a cough, but imaging revealed something much more serious: Stage 4 lung cancer. "By the time he finally got his lungs checked, it was too late, and four months later, he was gone," Feliciano says.

Feliciano, himself a former smoker, learned a valuable lesson from his friend's results: Lung cancer typically doesn't present symptoms until the advanced stages, when the disease is more difficult to treat and nearly impossible to cure. "You don't want to wait until you have symptoms to find out you need treatment. You want to catch it right away," says Feliciano, who smoked for 40 years. "That's why I get checked every year."

When it comes to lung cancer, early detection is lifesaving. Three-fourths of lung cancer cases aren't diagnosed until the disease has spread, reducing the five-year survival rate to just 5%.<sup>1</sup> But if lung cancer is detected early, the five-year survival rate can be as high as 90%.<sup>2</sup> Lung cancer screening programs, like the one Feliciano is enrolled in at Montefiore Health System in New York, aim to increase survival by catching lung cancer early.

"We have systems like mammography to detect breast cancer and colonoscopy to detect colon cancer, but lung cancer always lacked a screening pathway until we introduced low-dose CT (LDCT)," says Chirag D. Shah, MD, director of the pulmonary and critical care fellowship at Montefiore. "With a framework for lung cancer screening, we can really impact patient care."

Montefiore is located in the Bronx, which has the second-highest smoking rate of New York City's five boroughs. The hospital's screening program targets an ethnically diverse, underserved urban population at high risk for lung cancer. Since Montefiore's program launched in December of 2012, the system's radiologists have screened more than 2,200 patients and detected 55 cancers — about half of them Stage 1 and 2 lung cancer.



Linda B. Haramati, MD, MS, FACR, director of cardiothoracic imaging, and Andrea C. Furlani, MD, a cardiologist and future radiologist, review a chest scan at Montefiore Health System.

"Early stage disease is the most likely to be cured," says Linda B. Haramati, MD, MS, FACR, director of cardiothoracic imaging at Montefiore, who spearheaded the program's development. "By participating in a screening program, people with a smoking history have an opportunity to get ahead of lung cancer and seek life-saving treatment."

### Support for Screening

In 2011, the National Cancer Institute published the findings of the [National Lung Screening Trial](#) (NLST), which established the evidence to support lung cancer screening. The results revealed that annual LDCT screening could lead to a 20% reduction in lung cancer mortality rates, compared to standard chest X-rays.<sup>3</sup>

Around the same time, the Centers for Medicare and Medicaid Services selected Montefiore as one of 32 [Pioneer Accountable Care Organizations](#) (ACO). Under this model, Montefiore focused on providing enhanced care coordination and illness prevention for Medicare beneficiaries, so its administrators instantly saw the lung cancer screening program as a way to meet these goals and improve patient outcomes related to lung cancer. "Montefiore had just become an ACO, so it was a propitious moment to get everyone on board with

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Linda B. Haramati, MD, MS, FACR, director of cardiothoracic imaging at Montefiore, led implementation of a successful lung cancer screening program at Montefiore Health System.

a program like this," says Haramati, who has a joint appointment in the department of medicine.

With the goal of developing a lung cancer screening program, Montefiore's head of pulmonary medicine initiated the first meeting among physicians from the surgery, oncology, radiology, and radiation oncology departments. Although all of the physicians supported the idea of lung cancer screening, the radiologists took the lead, sharing the NLST data and other screening information with their colleagues.

"The strong body of evidence supporting lung cancer screening generated a lot of enthusiasm among participants," says Haramati, who's also a professor of radiology at Albert Einstein College of Medicine. "But we knew from mammography that image-based screening has to be done right to be effective. We're not doing diagnostic imaging; we're screening healthy people, so we had to find a way to target and track eligible patients. Instead of starting from scratch, we decided to apply the lessons we learned from mammography to make this program successful as a radiology-centered service."

### Initial Resources

In modeling the lung screening program after mammography, Haramati and the multidisciplinary committee identified three key resources they needed to launch the initiative: a special order in the electronic medical record, a system to report results consistently, and a coordinator to manage patients and data.

"First, we wanted to make sure that we screened only eligible patients, which at the time were current and former smokers between the ages of 55 and 74 with a smoking history of at least 30 pack-years," Haramati says. "The only real resource we needed from administrators was a special order in our electronic medical record to enroll patients who met the eligibility criteria.

They bought into it because the evidence showed that lung cancer screening would benefit patient care."

With approval for the special order, Haramati developed an intake questionnaire to ensure that patients referred into the program met the screening criteria. She worked with the EMR's tech team to set up the special order so that when referring physicians enrolled patients, the questionnaire popped up automatically to confirm their eligibility.

Next, Haramati turned her attention to developing a consistent method for reporting results. Since standardized guidelines for lung cancer screening did not yet exist, Haramati met with the chief of mammography to develop guidelines based on [BI-RADS](#) — and then switched to [Lung-RADS](#) when the ACR published its first set of guidelines in 2014.

To schedule exams and manage follow-up appointments, the screening program needed a dedicated bilingual coordinator. The radiology department agreed to move a half-time clerk into the role. The coordinator, Aracelis Jimenez, now a pillar of the program, called new patients to confirm that they met eligibility requirements before scheduling exams, and then manually tracked their results and follow-up recommendations with assistance from medical students and residents, including Hannah Milch, Mark Kaminetsky, Abraham Kessler, Robert Peng, and Edward Mardakhaev.

It took the committee about a year to gather these initial resources. Montefiore screened its first patient in December of 2012.

### Patient Enrollment

As the program got underway, the committee's biggest



Anna Shmukler, MD, a radiologist at Montefiore and co-director of the lung screening program, has been integral to the program's outreach.

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Judy Yee, MD, FACR, radiology department chair at Montefiore, is a big advocate for lung cancer screening.

concern was enrolling patients. They worried because Montefiore's patients differ dramatically from the NLST population. "The majority of patients in the trial were more affluent than our patients in the Bronx — most of whom come from low socioeconomic backgrounds and have limited access to healthcare," explains Anna Shmukler, MD, a radiologist at Montefiore and co-director of the lung screening program.

With [CMS' coverage determination](#) still a few years away, Montefiore had to consider the cost of screening for its underserved patient population. "We're the poorest county in New York's 62 counties," Haramati says. "Hospitals in Manhattan were charging between \$400 and \$700 per scan, but if our patients had to pay that much for exams, it would have been a huge burden on them. So, if their insurance company wouldn't cover it, we charged a reduced rate of \$75."

Even with the relatively low cost, the team worried about convincing patients to join the program. "We were concerned that we'd be catching the disease at a later stage because our patients tend to seek medical care only after they're already symptomatic," Shmukler says.

Haramati knew the best way to reach high-risk patients early was through their primary care physicians (PCPs). With this in mind, Montefiore's radiologists began reaching out to referring clinicians about the screening program. When PCPs ordered CT scans for patients with emphysema or a history of smoking, for example, Shmukler would call them back and explain how to enroll these high-risk patients into the new screening program.

"If the screening order makes it simple and practical for referring physicians to ask the right questions to

determine who's a good fit for a CT scan, you'll end up with a more consistent program," Shah says. "Patients are going to be skeptical, so equipping their PCPs to explain the program face-to-face can build trust and confidence."

When his PCP explained that screening could detect lung cancer early enough for treatment, Feliciano agreed that an annual scan was important. He had his first exam in 2016 and hasn't missed his annual visit since. "My doctor is always telling me we've got to nip it in the bud," says Feliciano, 65. "So it's good to have this exam done once a year because of the amount of time I smoked."

Initially, some referring physicians, like Shah, worried about the amount of paperwork and patient management the program added to their already heavy workloads. "I had to keep a list of all my patients who were getting screened, and then try to track them down when it was time for their next screen," Shah explains. To overcome these concerns, the screening program needed more robust resources.

### Added Resources

The first upgrade came in 2015, when Montefiore adopted a new EMR that allowed for a more automated enrollment process to help referring physicians order screening exams and track follow-up recommendations. The second boost came in 2017, when renowned abdominal radiologist, Judy Yee, MD, FACR, became chair of the radiology department.

"Dr. Yee is a big advocate for image-based screening, so even before she joined Montefiore, she met with me to discuss the need for additional resources in the lung cancer screening program," Haramati says. "After Dr. Yee started in her new role, one of the first things she asked for was a nurse practitioner to serve as a clinical coordinator for our program."

Yee coordinated with the chair of radiation oncology and the director of the Montefiore Einstein Center for Cancer Care, who each agreed to fund half of the coordinator's salary. In 2018, Maria Serrano, ANP-BC, AOCN, who had more than 20 years' experience as a nurse practitioner at Montefiore, joined the program as clinical coordinator. "We were lucky to get one of the most experienced nurse practitioners in our institution," Haramati says. "She has experience in thoracic surgery and oncology and knows many of the referring physicians throughout the institution, personal relationships that are extremely beneficial to our program."

Leveraging her relationships with referring clinicians, Serrano expanded the screening program's outreach

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efforts. She and Shmukler began visiting primary care sites throughout the system to present the lung cancer screening program in weekly meetings and grand rounds, emphasizing that the program adds little work for referring physicians. “Some referring physicians were reluctant because they’re already overwhelmed with paperwork,” Haramati says. “With our clinical coordinator, we have the resources to unburden them of some previous barriers to referring patients.”

### Shared Decision-Making

Serrano and Shmukler also explain that referring physicians can decide how much of the process they want to oversee. When ordering a screening exam, referring physicians can opt to either order a lung cancer screening CT for a patient they’ve already met with to discuss the benefits and potential risks of screening, or they can order a shared decision-making session with the program’s clinical coordinator.

Regardless of which option the referring clinician chooses, the screening staff receive automated pop-up alerts, letting them know that a referrer wants to schedule an exam. From there, they call patients to ensure they meet the screening criteria (which now **aligns with CMS**) before scheduling an appointment for either the exam or a shared decision-making session with Serrano.

During the shared decision-making session, as required by CMS before patients are screened, Serrano explains the risk factors for lung cancer and describes what patients can expect during and after the exam. If the patient decides to proceed with screening, Serrano then orders the LDCT.

### Results Reports

After a patient undergoes a screening exam, one of Montefiore’s six chest radiologists interprets the scan, generally within 24 hours, and the EMR automatically generates a letter to the patient and the referring physician outlining the results. Serrano explains to patients ahead of time that if their results are normal (Lung-RADS-1 or Lung-RADS-2), the letter will simply say, “We are pleased to inform you that the results of your recent lung cancer screening imaging are normal. See you next year,” and they’ll get a reminder to schedule their annual exam 12 months later.

If the results are more suspicious (Lung-RADS-3 or Lung-RADS-4), Serrano follows up with a phone call to both the patient and the referring physician and urges patients to discuss the results with their ordering doctor. For Lung-RADS-3 results, the radiologists typically recommend follow-up scans in six months. They send Lung-RADS-4 results to Montefiore’s weekly multidisciplinary tumor board for discussion.



Maria Serrano, ANP-BC, AOCN, Montefiore’s lung cancer screening program clinical coordinator, leveraged her relationships to expand the program’s outreach.

Since Serrano used to lead the tumor board when she worked in thoracic surgery, she takes the lead presenting abnormal lung screening results every week. “We can escalate cases so other departments can expedite the patient referral,” Serrano says. “It helps facilitate patients getting appointments much sooner, usually within a week.”

### Growth Goals

With robust resources now in place, Montefiore’s lung cancer screening program is poised for steady growth, with two main goals: capture more eligible patients and ensure that enrolled patients return annually. “Ideally, we want 90% compliance with follow-up recommendations, and we’ve been hovering around 50%. Some patients come back late — 18 months or two years later, instead of annually. Some of them drop out of the system because they got one normal result and decided that’s good enough,” Haramati says. “It’s one of our major priorities to improve that compliance.”

The screening team is increasing its outreach and follow-up with physicians to bring more eligible patients into the program and increase compliance. It recently started working with Montefiore’s public relations department to coordinate marketing emails, symposiums, billboards, and press coverage to raise awareness about lung cancer screening, while Serrano and Shmukler continue to meet with local medical groups to promote the program. “Informing physicians about the large body of evidence is important,” Shmukler says. “We emphasize that lung cancer screening saves lives to help them understand how beneficial this program can be for their patients.”

As Montefiore’s program continues to grow, it models how effective lung cancer screening can be — even in the inner-city. “There are many resource-poor areas

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where lung cancer screening can be developed to benefit patients and save lives," Haramati says. "Even with limited resources, screening programs can still improve patient care."

For patients like Feliciano, a quick annual exam is a small price to pay for peace of mind. "Hopefully I never develop lung cancer," he says, "but if they do find something, at least they can find it early enough to start treatment."

### Next Steps:

- Develop a lung cancer screening order in your EMR to automate enrollment for high-risk patients, reducing the administrative burden for referring physicians.
- Dedicate the clinical personnel to take responsibility for patient and data management and outreach to referring physicians.
- Collaborate with a multidisciplinary team of experts to discuss abnormal screening results and expedite patient follow-up.

### Endnotes:

1. Knight SB, Crosbie PA, et al. Progress and prospects of early detection in lung cancer. *Open Biol.* 2017 Sep; 7(9): 170070. doi: 10.1098/rsob.170070. Published online 2017 Sep 6.
2. American Cancer Society. Cancer facts & figures 2018. Atlanta: American Cancer Society; 2018.
3. National Lung Screening Trial Research Team. Reduced lung-cancer mortality with low-dose computed tomographic screening. *N Engl J Med.* 2011 Aug 4; 365(5):395-409. doi: 10.1056/NEJMoa1102873. Published online 2011 Jun 29.

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