



Cancer Care for All

Improving Early Detection and Treatment of Cancer in
Underserved Communities with Mobile CT Screening



AtriumHealth
Levine Cancer Institute

Executive Summary

A core strategy of Atrium Health Levine Cancer Institute is addressing social determinants of health that prevent people in its service areas from receiving recommended cancer screenings. As part of that plan, the cancer center developed a mobile lung cancer screening program in 2017 and began bringing CT scanning and other cancer-screening services to underserved communities in North and South Carolina. Data collected during the first four years of the program illustrate its direct impact on improving rates of early detection and ensuring that patients diagnosed with lung cancer are quickly transitioned to treatment. This report describes the development and implementation of the mobile screening program, initial results and plans to expand this and similar offerings aimed at reducing disparities in cancer detection and care.

Introduction

Levine Cancer Institute (LCI) was established in 2010 and immediately launched its Disparities and Outreach program with the goal of reducing cancer care disparities among underserved populations in 23 counties across North and South Carolina. The program's offerings include targeted cancer-prevention education, free screening services and referrals to high-quality cancer care.

Mobile screening is a cornerstone of the Disparities and Outreach program. In 2017, LCI launched Lung B.A.S.E.S. 4 Life, the first mobile lung cancer screening program in the United States. The goal of Lung B.A.S.E.S. 4 Life is contained in its name, which stands for Bringing Awareness Screening and Education to improve Survival. The "Lung Bus" travels through all of the counties LCI serves in the Carolinas, offering free lung cancer screenings, education and tobacco-cessation counseling. This initiative was supported initially by philanthropic grants from the Bristol Myers 501C Foundation and the Leon Levine Foundation.

Lung B.A.S.E.S 4 Life was created in response to a persistent problem: 70% of patients in LCI's service area with lung cancer were diagnosed in stage three or four, at which point their prognosis was poor. The five-year survival rate for the most common lung cancer, non-small cell lung cancer, is 64% if it is diagnosed in earlier stages, according to the American Cancer Society. That figure drops to 37% once the cancer has spread.¹

In speaking with patients, LCI oncologists learned that many faced barriers that prevented them from seeking recommended cancer screening, including a lack of medical insurance and limited access to transportation. These and other obstacles are common among many patients in LCI's service area, prompting the assessment of social determinants of health to be integrated into the cancer center's overall approach to care.

Lung B.A.S.E.S 4 Life was inspired by the success of LCI's mobile mammography program,



While the lens through which we operate is largely around cancer, we really focus on what we consider whole human care.

– Mellisa Wheeler
Director, LCI Disparities and Outreach Program

Project PINK (PP), which was established in 2011 to bring mobile mammography services to underserved communities in Mecklenburg and Union counties. The program was extended in 2016 to include free diagnostic mammograms to anyone with a known breast issue. The project has grown year-by-year, and in 2019, 1,845 women were screened for breast cancer and 29 cancer cases were found.²

LCI's approach to addressing disparities in cancer prevention and treatment is based around four key strategies: Community-based education, mobile screening, community navigators to provide education and care coordination, and navigators to transition patients with positive screens into care.

"While the lens through which we operate is largely around cancer, we really focus on what we consider whole human care," said Mellisa Wheeler, director of LCI's Disparities and Outreach Program. "So when patients come to us for screenings, we assess for all social determinants of health things that might prevent them from accessing quality care."

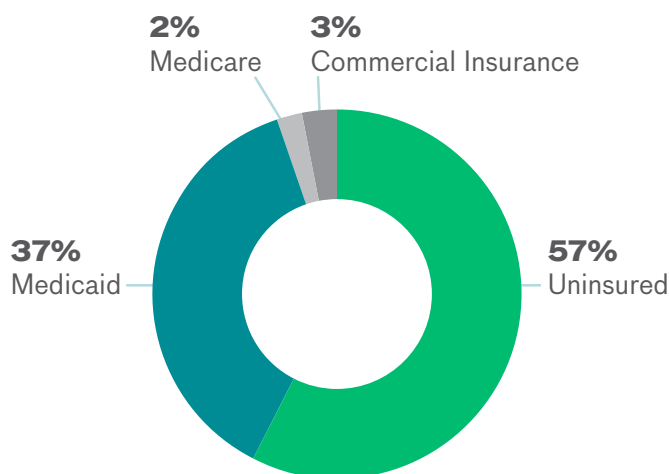
This report provides an overview and results from the first four years of the Lung B.A.S.E.S 4 Life program. LCI recorded significant improvements in screening rates, early diagnosis and treatment outcomes, demonstrating the value of mobile cancer testing in addressing key social determinants of health.

Addressing Disparities in the Communities Served

The people who live in the counties that the Lung B.A.S.E.S 4 Life mobile screening program serves suffer from disparities that prevent them from seeking out recommended cancer screenings. The biggest hurdles limiting access to recommended cancer screenings in these communities are inadequate insurance coverage, poverty, lack of health education, food insecurity and lack of transportation.

Commercial insurers and Medicare offer coverage for recommended cancer screenings. But in the counties served by the lung buses, 57% of residents are uninsured, 37% are on Medicaid and 2% on Medicare. Only 3% have commercial insurance.³ While health insurance coverage has improved in some counties, cost is still a limiting factor for many residents.

Insurance Coverage in Counties Served by Lung Buses



For example, in Mecklenburg County, N.C., which encompasses Charlotte, 88% of people have health insurance, but 28% of adults report not having a regular source of healthcare. And 19% of adults say they can't afford to see a doctor.⁴

A lack of easy access to transportation is also cited by many patients in LCI's service area as an obstacle to compliance with recommended cancer screenings. This problem manifests in many ways. In Mecklenburg County, there are plenty of public bus lines, but many residents in underserved communities are unable to afford bus passes. In Rutherford County, N.C., there are no public bus lines. The county only offers transportation services to patients on Medicaid and residents over age 60. In Anson County, N.C., 71% of participants in a public survey reported that the lack of public transportation options makes it difficult for them to access basic health services.⁵

Ensuring that patients have adequate access to food, water and housing is vital for driving positive outcomes in cancer detection and treatment. Food insecurity is a significant problem in the community LCI serves. An estimated one in seven residents of North Carolina and one in nine in South Carolina face hunger, according to Feeding America. While this problem may seem to be unrelated to missed cancer screenings, it is a major hurdle, because people facing the burden of hunger cannot focus on non-urgent medical tasks.

"If you're hungry, all you can think about is being hungry," Wheeler said. "So we look at that. We also ask, do they have a safe place to live, do they have the ability to keep the lights on? To succeed in cancer prevention, we have to plug in those pieces."

Mobile Lung Cancer Screening Implementation

LCI launched Lung B.A.S.E.S 4 Life in March 2017 with support from Bristol-Myers Squibb Foundation. A 35-foot custom vehicle was



created for the program and outfitted with a built in portable, 32 slice low-dose CT scanner that had a wireless connection for image transfers to LCI's radiologists. The bus initially traveled to nine counties in rural North Carolina and gradually expanded its service area over time.

The lung bus offers free lung CT scans, as well as screening for head and neck cancer, to people between the ages of 50 and 80 who are uninsured or covered by Medicaid, and who have a history of smoking 20 packs of cigarettes or more per year. All patients who currently smoke or quit smoking within the last 15 years are eligible. Nurse navigators on the bus offer free nicotine-replacement products and on-site counseling on quitting smoking and other healthy lifestyle choices.

By the end of 2019, the program had grown to serve patients in 14 counties in North Carolina. During the first two years of the program, 799 people received screenings, with an average age of 60.2 and history of smoking 44.9 packs of cigarettes per year. Ten patients were diagnosed with lung cancer.

LCI deployed a second mobile unit in 2020, purchased with support from the Leon Levine Foundation, expanding its service area to South Carolina. Lung B.A.S.E.S 4 Life now serves 1,000 patients per year. It is a cornerstone of LCI's cancer-outreach program, which has expanded beyond breast and lung cancer to include free screenings for colorectal, prostate and skin cancer.

Every visitor to the lung bus is assessed by a nurse navigator and referred for recommended



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– Darcy Doege
Clinical Supervisor,
Lung B.A.S.E.S 4 Life

CT scans and counseling. After screening, nurse navigators and cancer specialists work with patients to identify individual barriers to care and provide connections to community resources. While the bus itself is specifically designed to address disparities in transportation access and insurance coverage, the navigators aboard the unit are vital for identifying additional issues patients are facing and helping to provide solutions.

After LCI identified food insecurity as a major disparity in the communities it serves, Lung B.A.S.E.S 4 Life secured additional grant funding so it could provide food staples to people who come to the mobile units for lung CTs and who report difficulties in affording their groceries.

Nurse navigators also provide referrals to local resources such as food pantries and crisis-assistance agencies.

When the outbreak of COVID-19 forced shutdowns in March 2020, LCI paused the Lung B.A.S.E.S 4 Life program to incorporate new pandemic protocols. During that time, LCI continued to meet the needs of community members with food insecurity, deploying dietitians to assemble and deliver healthy meals to their homes.

Mobile screenings resumed in the summer of 2020. LCI worked proactively to drive visits to the lung buses by calling patients before their appointments to screen for COVID symptoms and reassure them that the proper precautions were in place to keep them safe. That helped drive a decrease in no-show rates.

LCI has several social programs in place to follow up with patients after their lung cancer screenings. Patients who require additional diagnostics or treatments based on their results are referred to treatment centers and offered

transportation assistance, if needed. LCI also provides financial counseling and referrals to financial-assistance programs, including one that provides no-interest payment plans for all patients regardless of immigration status.

Lung B.A.S.E.S 4 Life's one-on-one interactions and follow-up procedures help to foster close relationships and trust with patients. This minimizes loss-to-follow-up, a common problem in underserved communities, and it increases the probability of finding lung tumors in their earliest stages, when they are easiest to treat.

“In asking questions about barriers to care, we open up a lot of emotional discussions with patients about everything ranging from COVID deaths in their families to job loss,” said Darcy Doege, clinical supervisor of Lung B.A.S.E.S 4 Life. “They know they can call us and say, ‘Hey, my water just got shut off and I don’t know what to do. We can help them, thanks to partnerships we form in the communities we’re serving.”

A Team Approach to Eliminating Hurdles in Cancer Prevention

Sandra, a resident of Gaston County, NC, was referred to the Lung B.A.S.E.S. 4 Life program by her primary care provider, due to her history of smoking and other factors that raised her risk of developing lung cancer. During her first visit to the lung bus, cancer program development specialists talked with her about potential barriers she was facing in seeking out recommended preventative care.

Sandra revealed a laundry list of medical and nonmedical hardships. She was fighting chronic obstructive pulmonary disease (COPD) and was also the primary caregiver for her husband, a kidney disease patient who was on dialysis. What's more, Sandra told the staff of the lung bus, their home lacked safe drinking water, because the well water that supplied their neighborhood was contaminated with arsenic at three times the recommended limit. So Sandra and her family had to buy bottled water to drink and brush their teeth.



In addition to providing Sandra with free low-dose lung CT scanning, and additional screenings for head and neck cancer and colorectal cancer, the LCI team reached out to the Resource Connection Gateway in Gaston County. The Resource Connection Gateway raised funds for the family to receive a discounted water filtration system from Culligan Water, a locally owned and operated company out of Charlotte.

Sandra now has safe drinking water and is on track to receive all of her recommended cancer screenings going forward.

Driving up Early Detection: Four Years of Results

LCI conducted a study in the first four years of the Lung B.A.S.E.S 4 Life program, enrolling 1,200 patients who were uninsured or covered by Medicaid and who faced a high risk of lung cancer. Wheeler and Doege were co-authors of the study, which was led by Dr. Derek Raghavan, president of LCI. The study was accepted by the American Society of Clinical Oncology for the 2022 annual meeting.⁶

All patients were screened at either of the two lung buses, and films were reviewed using the Lung-RADS technique developed by the American College of Radiology to standardize the reporting and treatment of lung nodules.

Study subjects ranged in age from 55 to 64 and had a history of smoking 47.8 packs of cigarettes per year on average. Sixty-one percent of participants were male and 78% lived in rural areas. Eighteen percent were Black and 3% were Hispanic or Latino.

During the study period, 97 patients were diagnosed with high-risk lesions and 30 were found to have lung cancers, including 18 at stage one to three that were treated with curative intent. In addition, five patients were incidentally found to have non-lung cancers. They included two cases of renal cancer, one case of head and neck cancer, and two cases of pancreatic cancer. The CT scans also revealed that more than 50% of patients had cardiovascular disease and COPD.

Among the patients diagnosed with high-risk lung lesions, 51% repeated low-dose CT scans at 12 months and 27% attended a third screening. Only one patient who was treated with curative intent has relapsed to date.

After the initial study period, an additional 288 patients were screened, revealing eight new lung cancers, six of which were in stage one to three. In total, 38 patients were treated with curative intent and 35 who had lesions remain under close surveillance. This combined with the initial high rate of early-stage cancer findings validated LCI's strategy of diagnosing lung cancers at earlier stages by increasing lung screenings in at-risk, underserved communities.

Conclusion

The first four years of LCI's Lung B.A.S.E.S 4 Life mobile cancer screening program improved access to recommended CT scans for patients facing a high risk of lung cancer.

In a study of 1,200 uninsured or underinsured patients who were screened at one of two lung buses, 2.5% of participants were found to have lung cancer, 60% of whom were treated with curative intent. Given that there was a notable shift to diagnoses at early, easier-to-treat stages of cancer, and remissions were sustained beyond four years, LCI's results suggest that a similar approach could be deployed nationwide to improve survival rates in lung cancer.

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