Wheels Up:

Bringing Lung Cancer Education and Screening to Rural Patients

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Lung cancer has been the center of great challenge and great hope over the past decade. Innovations in lung cancer treatments, including targeted therapies, genetic markers, and immunotherapy, have captured national headlines. These advancements have allowed people to live longer and better with late-stage lung cancer than they ever have before. Less public attention, however, has been given to rapid advancements in lung cancer screenings, which offer the potential to diagnose lung cancer at a stage early enough to cure it. Among those paying close attention was Derek Raghavan, MD, PhD, the president of Levine Cancer Institute, Charlotte, N.C., who recognized new possibilities with each new study.

New Data, Sparks a New Idea

In 2011 lung cancer screenings became more effective. In a large trial with more than 50,000 patients at more than 30 sites, the National Lung Screening Trial compared two methods of detecting lung cancer: a low-dose helical computed tomography (CT) and a standard chest X-ray. The low-dose CT detected lung cancer at earlier stages than the standard X-ray, making lung cancer screening as effective in preventing lung cancer deaths as mammograms are at preventing breast cancer deaths. Patients who had the low-dose CT had a 15 to 20 percent lower risk of dying from lung cancer than those who had the standard chest X-ray.

In 2013 lung cancer screenings became more systematic when the U.S. Preventive Services Task Force issued new lung cancer screening recommendations: annual screenings with low-dose computed tomography (LDCT) for adults between 55 and 80 years old with a 30-pack-per-year smoking history, who have quit within the last 15 years, or who still smoke. By applying these criteria, physicians could systematically screen those who are at the highest risk of lung cancer, increasing opportunities to diagnose at earlier stages, thus creating the opportunity to cure more frequently.

With lung cancer screening now more effective, systematic, and affordable, Dr. Raghavan began to look at ways to improve patient access. Specifically, how could Levine Cancer Institute deliver these critical screenings to their patients, including those in underserved communities?

In 2015 lung cancer screenings became more affordable: Medicare began to cover these scans for eligible patients, aged 65 years and older, with a 30-pack-per-year smoking history, and who have smoked during the past 15 years or continue to smoke.

With lung cancer screening now more effective, systematic, and affordable, Dr. Raghavan began to look at ways to improve patient access. Specifically, how could Levine Cancer Institute deliver these critical screenings to their patients, including those in underserved communities? Access barriers existed. For example,

despite coverage and/or patients who could afford to pay out of pocket for this screening, some rural hospitals lacked the LDCT scanners that make these early diagnoses possible. In search of solutions, Dr. Raghavan contacted the Director of Disparities and Outreach at Levine Cancer Institute (and the author of this article), Mellisa Wheeler. Dr. Raghavan proposed that Levine Cancer Institute send a mobile LDCT lung scanning unit to rural locations, and he contacted me—Mellisa Wheeler, BSW, MHA—to help him make this vision a reality. As the Director of Disparities and Outreach at Levine Cancer Institute, I have long shared Dr. Raghavan's commitment to serving underserved populations. With a mobile unit, Levine Cancer Institute could deliver these critical screenings to underserved communities and patients who otherwise might not be able to access them.

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I shared enthusiasm for the idea. There was just one problem, we learned. A mobile LDCT lung screening unit did not actually exist. Faced with two options—the first being acceptance of the status quo—Dr. Raghavan and I chose option two: acceptance that a mobile lung cancer unit did not exist *yet* and development of an even more ambitious plan.

We needed to think differently about how we were going to reach people. In healthcare, we think, if we build it, patients will come. And that's not the way that it happens. You have to go out and find people where they already are.

A Great Need in the Carolinas

What drove Dr. Raghavan and I was a belief that with the right operational approach, lung cancer deaths could see significant declines. It's a lofty goal. Lung cancer is still the deadliest cancer. Each year, lung cancer kills more Americans than the next three common cancers combined: breast, colorectal, and prostate. Late diagnoses are partly to blame for the high death rate. Typically, when people begin to feel symptoms, the disease has already progressed to an advanced stage when no cure is possible.

A lack of insurance contributes to these late diagnoses. Nearly half of North Carolina residents who make less than 133 percent of the federal poverty level lack health insurance. People with Medicaid, as well as the "working poor" who fall below the Medicaid threshold but are still unable to afford healthcare insurance, are not likely to come into a hospital unless it's an emergency. Too many people associate hospitals with bills they're unable to pay, so they stay away as long as possible. Thus, diagnoses for lung cancer often occur in the emergency department, after the disease has become metastatic.

Smoking, of course, is another contributing factor. Smoking is more than habit in our state—it's tradition. Tobacco has grown on this land for centuries, creating the livelihood for many rural families. Twenty percent of people in the rural Carolinas still smoke. And it's not just older people smoking. Younger people—even young kids—are picking up the habit, although the situation has improved in the last 10 to 15 years. Awareness of the impact of lung cancer or the existence of a screening for lung cancer does not reach all communities equally. And until it does, lung cancer will continue to strike in the Carolinas with a disproportionate force.

A Need for Early Diagnosis and Prevention

Dr. Raghavan and I recognized that late-stage lung cancer diagnoses are both deadly and, in some cases, preventable. By stage 3, lung cancer has spread to the lymph nodes. By stage 4, the cancer has spread throughout the body and no cure is possible. Yet nearly 70 percent of Atrium Health patients are diagnosed at stage 3 or higher. Nearly half in Mecklenburg County receive a diagnosis at stage 4. Dr. Raghavan and I believed that we could change those percentages by improving early diagnosis and prevention. Recognizing a need for a free screening to increase the ability to diagnose lung cancer earlier, as well as a need for lung health education to decrease smoking rates our community, we believed that a combination of education, screening, navigation, and intervention would provide continual care for everyone by:

- Teaching the risks
- Giving accurate and early diagnoses
- Guiding people through the healthcare system
- Treating people with a high standard of care.

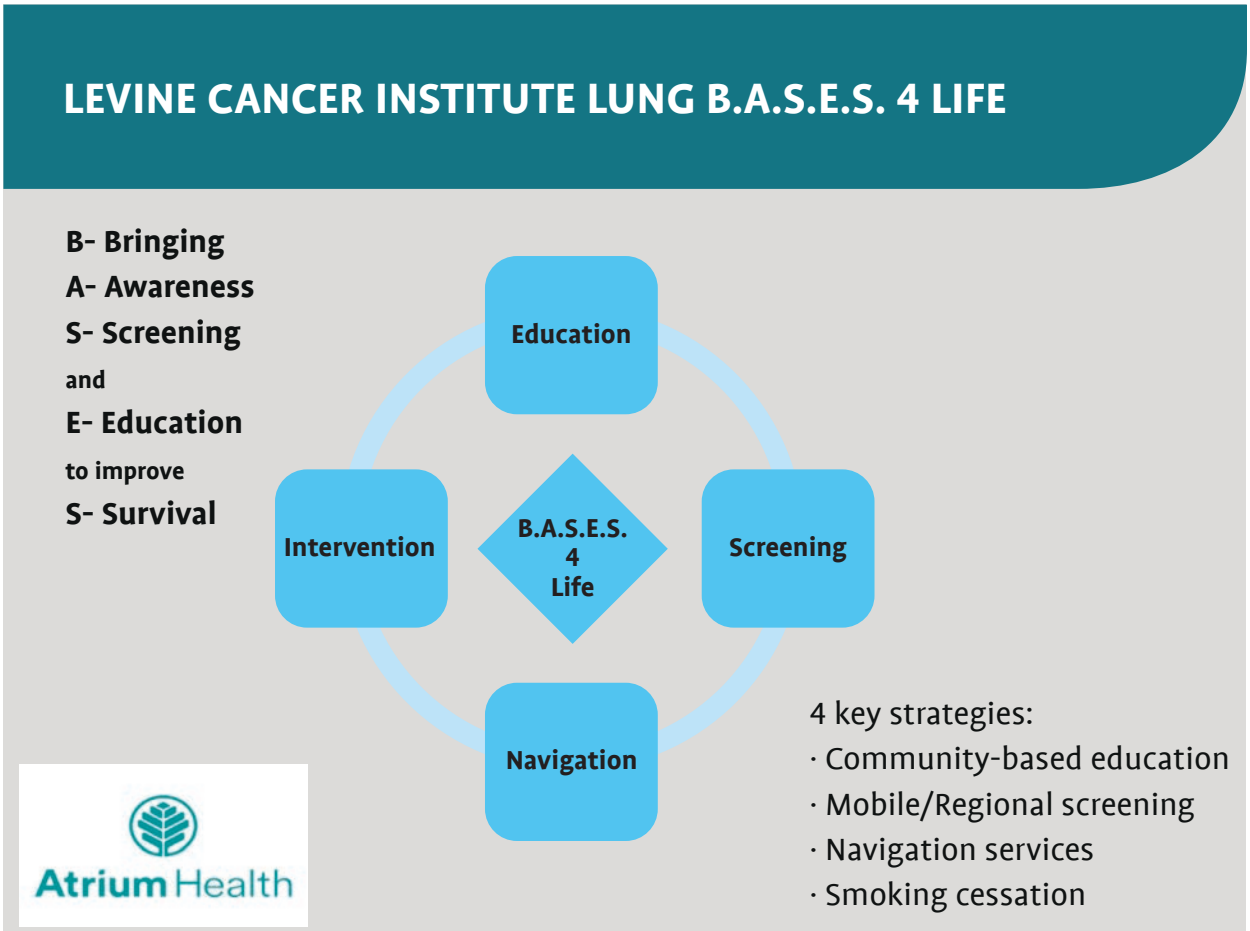
These four priorities—education, screening, navigation, and intervention—became the core components of our Lung B.A.S.E.S. (**Bringing Awareness, Screening & Education to improve Survivorship**) 4 Life program (see Figure 1, right).

Overcoming Initial Obstacles

The first two obstacles we faced were the largest. Literally. We needed a mobile LDCT machine and a bus large enough to hold the piece of equipment. Dr. Raghavan and I brought in a colleague at Levine Cancer Institute known for her innovation, collaboration, and tenacity—three skills this project needed. That colleague, Darcy Doege, BSN, RN, became the program's coordinator.

Our now three-person team faced some daunting practical challenges. For one, CT scanners are big and heavy. They can't be jostled much, presenting a problem about how to not only fit one inside a bus but also how to protect it from literal bumps in the road. And then there was an issue of the bus itself. Did one even exist that could fit a mobile CT scanner? Being first in this effort meant that there was no precedent and, hence, no ready answers.

Figure 1. Levine Cancer Institutes Lung B.A.S.E.S. 4 Life Program



The lack of precedent became one of the biggest assets to our project. Being first offered the opportunity to design a bus and a program specifically for this purpose and for this population. It spurred an innovative, flexible approach that resulted in the mobile unit not just serving our communities but becoming part of our communities. Relationships were formed, education shared, and lives saved.

I have been asked whether there were things I wish my team knew going into it if we had it all to do again, and my answer is "no." Because we went into this situation unencumbered by a long history of other mobile units, we could really design our mobile unit to fit what we needed. Knowing too much sometimes causes a paralysis of sorts by overthinking, but not in this case. We just forged ahead.

Finding Partners

To help brainstorm solutions for the mobile LDCT scanner and the bus, we looked to Samsung Neurologica, the creator of a mobile scanner for early diagnosis of strokes, and Frazer Ltd., a company that customized large vehicles. Bristol Myers Squibb Foundation supported our project with a grant, allowing Levine Cancer Institute to develop one of the first mobile lung cancer screening units in the country. This group of enthusiastic partners was committed to helping Lung B.A.S.E.S. 4 Life succeed.

Samsung Neurologica solved the challenge of creating a CT scanner that could fit on a bus by adapting the BodyTom CT, a portable LDCT scanner. The mobile unit has no restrictions for age or weight, offers wireless connectivity, and can perform axial, helical, and dynamic scanning (see photo on page 50).

Frazer designed a custom bus that was large enough not only to house the scanner but also to create a headquarters for the Lung B.A.S.E.S. 4 Life program (see photo on page 51). The company created a 35-ft. coach that is able to power the 32-slice LDCT scanner. The bus boasts low power consumption, as well as high-speed wireless Internet connection to allow for fast image transfer. The bus is comfortable for patients as well. It's completely handicapped accessible. Inside is a dressing area and features a Samsung tablet that is loaded with information, including a shared decision-making video that educates about risks and benefits of screening and smoking cessation.

A patient enters the BodyTom CT, a scanner developed by Samsung Neurologica specifically for the Lung B.A.S.E.S. 4 Life program.

Launching the Lung B.A.S.E.S. 4 Life Program

In April 2017, operations began. Levine Cancer Institute began to deliver mobile lung cancer screenings to rural communities through its Lung B.A.S.E.S. 4 Life program, focusing on those who fit the U.S. Preventive Services Task Force screening recommendations and who are either uninsured or on Medicaid.

"This type of patient would normally present to the emergency department with metastatic cancer," said Dr. Raghavan. "What we're trying to do is to find the disease when it's not metastatic. If you do the math, to provide palliative care to someone with metastatic lung cancer—particularly with some of these new expensive drugs—can cost a million dollars and eventually these patients die. If we can operate on these patients early, it costs about $40,000 to $50,000, or less, and there's a potential to cure them."

Lung cancer screening is only one part of the Lung B.A.S.E.S. 4 Life program, however. When patients come to the bus, our providers help them with whatever they need. For many patients, a screening on the bus becomes a first step to obtaining other types of care.

"People who haven't had the community wrap around them are suddenly experiencing a truly altruistic approach, which has really no secondary gain other than doing the right thing," says Dr. Raghavan.

Providers screening patients on the mobile unit have helped to diagnose heart disease in several patients and, in one instance, helped to detect a kidney cancer. For patients who discover a health issue while being screened on the mobile unit, Atrium Health will provide treatment for that issue—regardless of the patient's ability to pay. The mobile unit has become much more than a single lung cancer screening. It's become the start of relationships between people in underserved communities and the providers who can help them—and, it is hoped, the start of a journey to better health.

A lot of these interactions are about relationships, and that's one way we approach our screening programs differently. We are not just screening for disease and sending this person on their way. We're really looking at everything that patient is going through, from "Do you have a primary care physician? No? Let us find one for you" to "Do you need transportation resources? Let us get you plugged in." We even had a patient who was homeless and needed a place to shower, and we were able to help point him to a program where he could access the YMCA to take a shower every day. For more, read our patient case study on page 53.

Delivering High-Tech Operations, Human Touch

During the first year of Lung B.A.S.E.S. 4 Life, the mobile unit provided screenings in six counties in the Charlotte-Mecklenburg region: Anson, Lincoln, Mecklenburg, Stanly, Rutherford, and Burke. During the second year, the reach extended into Cabarrus, Cleveland, and Union counties. Soon, Polk and Columbus counties will be included as well. The hope is to expand the reach of the mobile unit into parts of the Carolinas that lack the technology to provide LDCT screening.

The program has created partnerships with community and indigent care clinics across the area, who invite the mobile unit into their towns and refer their patients for screenings.

The Lung B.A.S.E.S. 4 Life truck, custom designed by Frazer, Ltd.

Healthcare can be very siloed. We think, "We're this system and we do x, y, and z," and "You're that system and you do a, b, and c," and we don't communicate or network. Lung B.A.S.E.S. 4 Life has allowed us to reach out to community partners that never otherwise would have collaborated with our health system and bring them together to benefit patients. This outreach has become the vital component to the success of our mobile lung cancer screening unit. The success isn't due to the bus or the screening technology. It's due to empathy. Collaboration. The human elements. Every decision puts the patient at the center: Is this location convenient for the community? Do patients feel at ease on the bus? What other resources does this patient need to become healthy? Our mobile LDCT unit is more than technology; it's a philosophy of care. Our team operates under the mission that until every patient is seen, we can't stop doing what we do.

To do so, our team ensures that our mobile LDCT unit offers a comfortable, approachable experience. We don't make patients feel as though this is a screening that they must do. We teach the community that this is a screening that they deserve to have—that they're important, that their health is important, and that Levine Cancer Institute recognizes that importance and feels a responsibility to give them high-quality care.

"Patients come, and they love seeing the truck," Doege says. "Our team makes people feel welcome. We sit outside of the truck and make everything feel laid-back and approachable. People have been so appreciative." (See photos on pages 52 and 53.)

Our philosophy of care is represented in the repeated phone calls that Doege makes, encouraging patients to come to their upcoming appointments and providing her personal cell phone number to call if any problems arise. It's represented in the team members aboard the bus being able to talk to all types of people about all types of things, in learning to connect with community members as people before serving them as patients. It's represented in the story about Tiffany Williams Crank, a cancer program development specialist in the Lung B.A.S.E.S. 4 Life program, who noticed a long line of cars waiting for a food truck in one rural area. Crank went car window by car window, telling everyone in line about lung cancer screenings and performing interviews to check for their eligibility. That food truck line led two patients to be screened on the mobile LDCT unit.

> For patients who discover a health issue while being screened on the mobile unit, Atrium Health will provide treatment for that issue—regardless of the patient's ability to pay.

Our philosophy of care is based on the knowledge that vulnerable populations face barriers to care that often go overlooked by the medical community. In one case, a woman was going to miss her appointment for her lung screening. When the team called to check in on her, she told them that the bus ride she needed to get to her appointment would cost a dollar, and she

The Lung B.A.S.E.S. 4 Life truck provided screenings in six counties during its first year. Now, almost two years later, it will soon reach 11 counties across the Carolinas.

didn't have an extra dollar to spare. A member of Lung B.A.S.E.S. 4 Life team drove to her home to give the woman that dollar, and she made her appointment.

In another system, that patient would be labeled as non-compliant. There are so many barriers, and as healthcare providers, we must do everything in our power to break down these barriers for these underserved and at-risk patients. It's our moral obligation.

What's Next

Measuring the success of Lung B.A.S.E.S. 4 Life comes down to three main indicators:

1. How many people was our team able to cure?
2. Has our team improved the overall survival rate of our patients? In other words, has our team helped keep people alive longer and enjoying a better quality of life?
3. How many people has our team helped to stop smoking?

But our Lung B.A.S.E.S. 4 Life has its eyes set on an even loftier goal. This isn't a model that can change lung health only in the Carolinas. As our team grows and learns, we want to create a model that can be replicated across the country, connecting underserved communities with free lung cancer screenings that create a big impact—both on an individual and national level.

"My aim for this program is that it will be a game changer. That 10 years from now we're reducing the lung cancer death rate nationally," Dr. Raghavan says. "North Carolina has one of the higher death and incident rates for cancer, so if this program is successful, five years from now, the numbers of people dying from lung cancer will change disproportionately to the number of new cases."

As more people stop smoking, lung cancer rates are expected to decline. But even for current and previous smokers at risk, the team behind Lung B.A.S.E.S. 4 Life hopes that diagnoses will come earlier, cures will come more often, and the death rate for lung cancer will decrease. The goal of Lung B.A.S.E.S. 4 Life is, quite simply, for lung cancer to lose its position as the number one cancer killer. OI

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The Lung B.A.S.E.S. 4 Life truck, custom designed by Frazer, Ltd.

A Patient Case Study

The Lung B.A.S.E.S. 4 Life project began as a way to diagnose lung cancer earlier in underserved populations. But soon, it became its own philosophy of care.

Breathing problems brought Herbert Buff to the Good Samaritan Clinic in Morganton, N.C., a town about 90 miles west of Charlotte in the foothills of the Appalachian Mountains. It was spring of 2018, and Herbert thought that his asthma was flaring up. During his exam, the physician told Herbert that he was eligible for a free lung cancer screening. Even better, the physician told Herbert that he did not have to travel to a hospital for the screening—he could have it done aboard a bus outfitted as a mobile medical unit that would soon roll into to town. Herbert, who did not know that lung cancer had a screening, agreed. The screening would be free, and it wouldn't be a hassle, so he made an appointment.

The screening was no big deal, Herbert said. The people on the bus were friendly, and it was over and done quickly.

It soon became a big deal. Within 2 months of Herbert's free screening aboard the mobile medial unit, Herbert was in surgery for stage 1 lung cancer. The surgery was successful, the cancer is now gone, and Herbert reflects on how a seemingly minor decision changed his life.

"I learned that you can have lung cancer and not even know it," Herbert said. "The early screening might've saved my life. It might've given me quite a few years."

The end of Herbert's lung cancer did not mean the end of his relationship with the providers on the LDCT mobile unit. He's remained in contact with staff regarding his smoking habits. He hasn't quit smoking entirely, but he's cut down significantly, and he's working to do more, progress that he credits to the staff calling him after his surgery to check in on him.

"I'm working very, very hard on not smoking," Herbert says. "I went from a couple packs each day to just a couple cigarettes a day. One of the ladies from the bus called me the other day and said she was going to send me some more nicotine patches. Everyone from there is great. I couldn't be happier with the doctors and everything."