BRINGING SCREENING—AND A BRIGHTER OUTLOOK—TO MORE LUNG CANCER PATIENTS

The landmark National Lung Screening Trial found that in high-risk individuals, low-dose CT (LDCT) screening reduced lung cancer mortality by 20 percent relative to chest X-ray. Nine years after those results were published, lung cancer remains by far the leading cause of cancer-related death. And yet, screening for this dangerous disease is lagging.

"About 95 percent of people nationally who should be screened aren't being screened," said thoracic surgeon Scott James Swanson, MD, of the The Lung Center at Brigham and Women's Hospital. "It's critical that patients understand when they should be screened and that doctors are more aggressive about screening their patients."

To that end, Dr. Swanson and colleagues are setting out to raise awareness among clinicians and patients on the criteria for yearly lung screening with LDCT. They are also working to expand the Brigham's capabilities for lung cancer screening and treatment.

More Resources Devoted to Fighting Lung Cancer

In January, the Brigham added two new CT scanners at its main campus. Previously, the system's only CT scanners used for lung cancer screening were at Brigham and Women's Faulkner Hospital in Boston's Jamaica Plain neighborhood. Plans call for more CT scanners to be introduced to other Brigham and Women's locations in the coming years.

The Brigham is also adding personnel to handle more lung cancer screenings, from staff who field calls from patients and referring physicians to a navigator who assists patients throughout screening and treatment. Suzanne C. Byrne, MD, staff radiologist in the chest radiology service in the Department of Radiology, has also joined The Lung Center's team.

According to Dr. Swanson, the Brigham's Lung Center is the first in the country to bring together a variety of specialists under one roof for lung cancer screening and treatment. The team includes pulmonologists, thoracic surgeons, medical and radiation oncologists, and diagnostic and interventional radiologists.

"Most patients who come here for screening will have no significant findings, meaning they just come back for their annual screening," Dr. Byrne said. "But for patients with more serious findings, we can offer more multidisciplinary collaboration and discussion, ensuring they receive the optimal treatment for whatever is detected on their screening exams."

A Measure of Reassurance

Dr. Swanson stressed that clinicians' message to individuals at high risk for lung cancer should be upbeat:

- For patients who meet the criteria, screening is very effective in detecting lung cancer at an early stage
- The Lung Imaging Reporting and Data System (Lung-RADS®) by the American College of Radiology has standardized reporting of lung cancer screening studies and management recommendations, which helps to lower the incidence of unnecessary surgery for noncancerous conditions
- Chemotherapy and radiation therapy are needed in increasingly fewer cases
- Enhanced surgical techniques have reduced complications and recovery time while improving survival

"At the Brigham, we do 94 percent of our lung cancer surgeries minimally invasively, compared with national rates of around 40 percent," Dr. Swanson said. "By doing less-invasive surgery, you suppress the immune system less. This allows the patient's own immune system to work better at surveilling or taking care of any cancer cells leftover after surgery."

Having expertise in minimally invasive techniques also enables centers like the Brigham to perform lung cancer surgery on a wider span of patients.

"People who are elderly, have a bad heart or can't breathe well generally can't have an open operation because the risks are too high. Therefore, even if you found something upon screening, you wouldn't be able to offer surgery," Dr. Swanson explained. "But very few patients can't handle a minimally invasive operation. So at a center like ours, we can perform surgery on more people who need it. And if they do have the operation, they'll have a better outcome."

Dr. Swanson said that primary care physicians or other clinicians who need assistance interpreting CT scans or determining treatment plans are welcome to contact his team. The Lung Center is also available to manage follow-up appointments with patients who need treatment. Their goal is to help more patients at the Brigham and beyond to enjoy the benefits of earlier detection of and treatment for lung cancer.

For perspective on the importance of lung cancer screening, Dr. Swanson quoted his colleague, Jacob Sands, MD, a medical oncologist at the Dana-Farber Cancer Institute: "It's like Jacob says: If we could completely cure breast cancer, we still wouldn't save as many lives as if all the [high-risk] patients in the U.S. were screened for lung cancer."

NEW ENDOCRINE CLINIC OPTIMIZES TRANSITION FROM PEDIATRIC TO ADULT CARE

Endocrinology patients tend to have chronic illnesses that require lifelong care. Furthermore, many endocrine conditions evolve, so appropriate treatment approaches can change over time as well.

Coordinating the transition from pediatric to adult endocrine care is thus incredibly important, both for maintaining continuity and quality of care as well as reducing complications.

For example, a growing body of literature shows that pediatric type 1 diabetes patients who are lost to follow-up in adulthood tend to have more ER visits, more hospitalizations and worsening complications for their diabetes than those who make successful transitions.

A More Integrated Patient Care Experience

In April 2019, Courtney N. Sandler, MD, MPH, founded the Brigham and Women's Endocrine Transition Care Clinic to provide care to young adults transitioning from pediatric care to adult care. Dr. Sandler described the clinic as a "care coordination network for doctors who are established in our system." Participating Brigham endocrinologists see patients at the main hospital in Boston as well as three other locations.

The Boston Children's Hospital's endocrine program, one of the largest in the nation, is the primary referral source for the Endocrine Transition Care Clinic. The Brigham previously had no organized transition program serving young adults with endocrine disorders.

"Even though our two tertiary health care systems are close by, [the endocrine programs] haven't traditionally been connected through patients or medical records," said Dr. Sandler, who directs the Brigham's clinic. "We're creating an opportunity for the two institutions to come together to facilitate patient care."

Dr. Sandler stressed that the clinic will also accept patients from other hospitals and private practices. "Our aim is to provide a seamless transition to adult endocrinology, no matter where patients are coming from," she said.

Generating Insights for Quality Improvement

A long-term objective for Dr. Sandler is to establish a registry of transition patients to understand their health care usage patterns and clinical outcomes. She hopes this data will serve as a valuable source of research that informs quality-improvement efforts at the Brigham and in other transition programs.

A more immediate goal is to educate pediatric and adult providers on supporting an appropriate transition for young adults with complex illness. For example, Dr. Sandler has been involved in several review articles and will soon be speaking on transition of care at a conference for pediatric endocrinology providers.

"The literature on the transition of care shows that when it's not planned and done thoughtfully, it isn't successful. Patients either fall through the cracks or aren't prepared when they come to adult care," she said. "We want to educate providers on both sides of the transition so that the process is well-planned. When the time comes, we want patients to feel ready and know specifically where to go to continue receiving quality care."

"If we don't educate providers, they may not be equipped to care for patients and families. And that may prevent patients from continuing to seek care in the future," added Dr. Sandler.

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USING ECMO AS A BRIDGING STRATEGY TO LUNG TRANSPLANT

The Lung Center at Brigham and Women's Hospital hosts the largest, and one of only two, lung transplant programs in New England. Through its use of extracorporeal membrane oxygenation (ECMO), the center is improving the outlook for patients with end-stage lung disease who otherwise would be considered too sick for transplant.

ECMO is a form of experimental mechanical life support in which an external artificial lung device (an "oxygenator") acts to achieve gas exchange to maintain patients with advanced lung disease. Venous blood is withdrawn via large vascular cannula and then passed through the oxygenator by a pump before oxygenated blood is returned to the body to provide support for failing lungs.

"If clinicians have patients with illnesses like interstitial lung disease, chronic obstructive pulmonary disease or cystic fibrosis, they can feel confident making the referral to the Brigham," said Steven P. Keller, MD, PhD, medical director of the ECMO mechanical support service. "Our transplant program has created a leading-edge ECMO program that is enabling us to successfully bridge to transplant many patients previously perceived to be without hope."

Dr. Keller noted that the 2005 introduction of the lung allocation score, which prioritized patients with lower projected transplant-free survival, has increased the need for ECMO. As patients awaiting lung transplantation become sicker, ECMO enables them to remain active and participating in physical therapy to prepare for the rigors of surgery and post-transplant recovery. The device can keep patients with advanced lung failure viable for months during the wait for a donor organ.

"Lung transplant is more and more about sustaining the sickest patients so they can receive these organs," he said. "ECMO has become a powerful tool to successfully bridge these patients to transplant. In fact, roughly a third of our transplant patients at The Lung Center were supported by ECMO prior to transplant."

Creating a Bridge to Candidacy

An emerging application for ECMO at The Lung Center is what Dr. Keller called "bridge to candidacy." Ideally, clinicians would be able to evaluate a prospective transplant patient before their disease has progressed very far. However, this isn't always possible. For example, patients with interstitial lung disease are susceptible to acute exacerbations that can spark an extreme worsening of the condition without warning.

In cases like these, patients are quite sick and may not respond to traditional therapies. "We've expanded our use of ECMO to those patients with acute exacerbations of chronic disease as a means of sustaining them while we work to determine if they're viable lung transplant candidates," Dr. Keller said. "We've successfully bridged many of these patients to active candidacy and then on to successful lung transplantation."

This application for ECMO is ahead of the curve and not without controversy, Dr. Keller acknowledged.

"There is an ethical challenge, as we risk supporting a patient who hasn't yet completed the rigorous lung transplant screening process," he said. "After initiating ECMO support, we may subsequently determine a patient isn't a transplant candidate and then must make the gut-wrenching decision to withdraw support."

However, Dr. Keller offered that this is similar to the decision to discontinue mechanical ventilation for patients with end-stage disease who aren't transplant candidates. "We recognize that this process is very challenging for our patients, their families and the care team. We enter into this thoughtfully and do all we can upfront to determine if someone is a suitable candidate while simultaneously working to advance the technology to provide hope where previously none existed."

Active on the Research Front

As part of the Harvard-MIT Biomedical Engineering Center, Dr. Keller is investigating ECMO as a mechanical support device as well as other mechanical heart and lung support devices. One area of focus is making ECMO and related technologies more accessible throughout the healthcare system. To that end, he has a novel device in development to support patients with hypercapnic respiratory failure.

"It's called an extracorporeal CO2 removal device," he explained. "It removes CO2 at very low blood flows, at about 300 or 400 milliliters per minute of blood flow as opposed to the four or five liters of blood flow that's done with ECMO. That way, we could make available an organ replacement therapy at smaller hospitals that don't have the level of technical expertise needed to operate ECMO."

The CO2 removal device has gone through animal testing, and Dr. Keller hopes to move on to first-in-human studies within two years. He is also looking at ECMO as a mechanical circulatory device, examining the interactions between the heart and the device to optimize how to profuse the body while limiting damage to the heart.

While ECMO was developed in the 1970s, it has not been subject to intensive research. (As noted in a 2014 paper, "the use of ECMO outpaces the data.") Dr. Keller expressed concerns about the rapid growth of ECMO, particularly since the 2009 H1N1 flu epidemic, at centers without the ability to manage it properly.

"It's a complex device that requires active titration, active management and a lot of expertise to understand its physiologic impact. It's not simply inserting it and turning it on," he said. "It requires an enormous amount of knowledge and understanding to use successfully and a lot of experience. There's a real need for basic and bench-top research to enhance our understanding of how ECMO affects patients, and I want to contribute in that capacity."