



ATRIUM HEALTH

Doctors at Levine Children's Hospital perform about 480 heart catheterizations and 300 open-heart surgeries a year.

Heart healthy

Advances in technology give cardiac patients better outcomes.

The tiniest heart-surgery patient weighed 2 pounds.

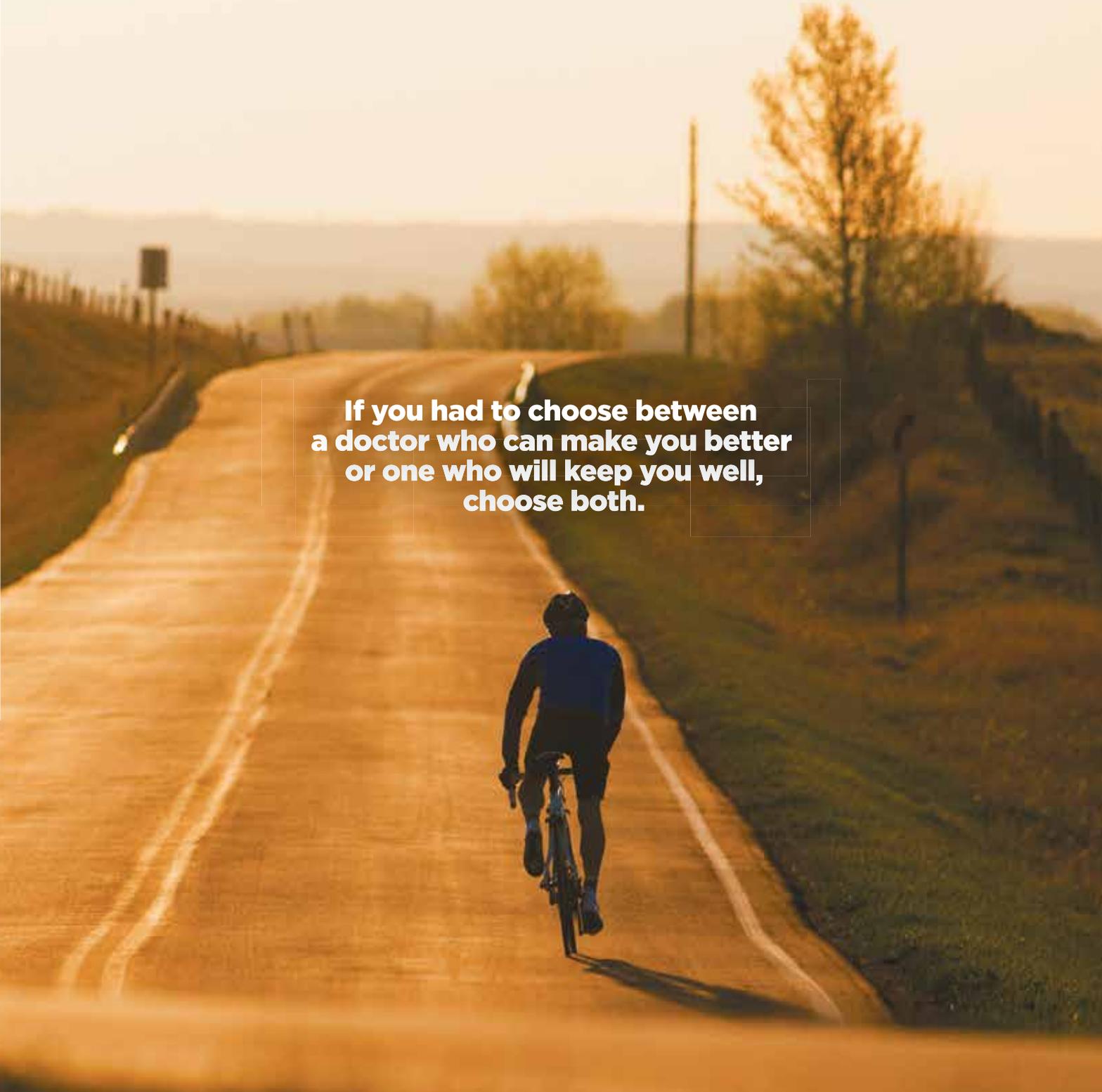
At Levine Children's Hospital in Charlotte, little ones with congenital defects — conditions their hearts were born with — are cared for by a team of nurses, child-life specialists, surgeons, anesthesiologists and intensivists who handle about 480 heart catheterizations and 300 open-heart surgeries a year.

Part of that team is Joseph Paolillo, who serves as Levine's director of pediatric cardiac catheterization, and Paul Kirshbom, chief for the division of pediatric and congenital heart surgery for Levine Children's and Sanger Heart & Vascular Institute. Both Levine and Sanger are affiliated with Atrium Health.

"That was the smallest baby we've done a procedure on here. It's not easy. It's a taxing thing for us, because it's hard

to distance yourself from the families. In pediatric cardiology, you don't just have the one patient — you have the families," Paolillo says. "The majority of heart defects are diagnosed before children are born, so that gives a fair amount of time to meet with the families and let them prepare, tour the facility, meet the people. That kind of approach helps them cope."

"With kids," Kirshbom says, "each one is a custom job. Congenital heart disease has 1,000 different flavors — each a little bit different. It's a huge, emotional thing. Every family comes in with different expectations. There are folks from big families, rural areas, other countries. It's dramatically varied. You're providing hope for their child, a hope they didn't think existed. But most of the children grow up, go to school, get jobs. It's not a death sentence anymore."

A person is riding a bicycle on a winding road that curves into the distance. The scene is captured during the golden hour of sunset, with a warm, orange glow over the landscape. The road has white lane markings. In the background, there are trees and a utility pole. The overall mood is peaceful and active.

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FIRSTHEALTH OF THE CAROLINAS

JOHN GESSNER

Ker Boyce, a board-certified cardiologist at FirstHealth Moore Regional Hospital, performed the hospital's first operation to install the Micra transcatheter pacing system, the world's smallest pacemaker.

The toolbox for petite hearts is different than that for adults. Most equipment is designed for big people. “It’s a lot more art than science sometimes,” Kirshbom says.

Levine Children’s, like other North Carolina hospitals, is acquiring new devices, new technologies for cardiologists and surgeons to intricately navigate fragile arteries, veins, vessels and muscle tissue. It is a continuously evolving profession, in the care of tiny babies as well as older children and adults.

“In general, the procedures we do on babies are usually to open valves or close blood vessels that should have been closed before birth,” Paolillo says. “With older children, there are certain holes in the heart — atrial septal defects, which is a hole between the upper chambers. And we’re very involved here in a new device that has come out.”

Levine Children’s is one of 20 centers testing the W.L. Gore & Associates Inc.’s GORE CARDIOFORM Septal Occluder, for closure of small to medium-size holes. The hospital is now in the second phase of a trial.

Congenital heart defects affect about 1% of the population. Some holes in the heart will fix themselves, Kirshbom says, while some children will have three to five operations early in life. Technology has advanced dramatically, he says. However, Levine Children’s performs about a dozen pediatric heart transplants annually. “Organ donation needs to be stressed in our country,” he says.

Paolillo works mostly in the catheterization laboratory. “Cardiac catheterization is done for a number of reasons. Sometimes it’s to gather information; sometimes it’s to take care of patients between different surgical stages to see how the last operation worked out and what needs to be done,” he says. “A lot of children who come to the lab are pretty sick, and they’re just struggling without an interventional procedure.”

He cites one newborn, from a planned, at-home delivery, whose heart had closed off. “It took a whole team of intensive care doctors to stabilize the baby and bring it to

the lab. We have a machine that allows us to burn a hole in the middle of the valve and make it work: A radio frequency ablation catheter that is designed for that particular procedure. But you can’t think of it as a procedure. They’re people, and I follow them throughout the course of their lives.

“You have to form that trust. The parents are putting their child’s life in your hands, and you can’t ever forget that. You would lose respect for what you do.”

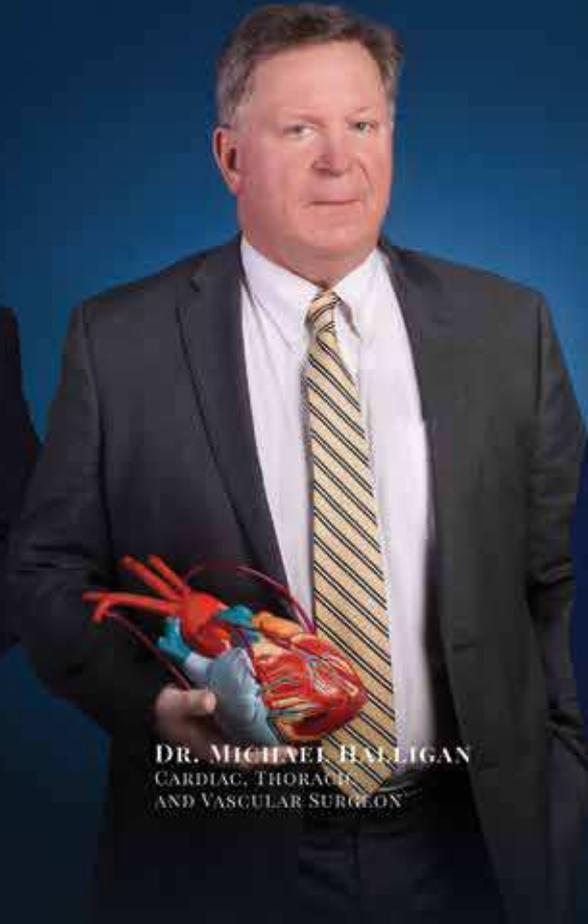
The human heart does not discriminate based on only the very young or very old.

“It’s never been age-specific. Heart attacks are the No. 1 cause of death in this country, and they’re typically smokers or people with a family history of being diabetic,” says Tom Wiley, an electrophysiologist at FryeCare Cardiology Associates in Hickory, which is affiliated with Frye Regional Medical Center. “It’s all over the map. I’ve done an ablation on an 18-year-old and a pacemaker for an octogenarian. But the

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CAPE FEAR VALLEY HEART & VASCULAR CENTER

A doctor works in the control room for the catheterization lab at Cape Fear Valley Heart & Vascular Center in Fayetteville.



CAROLINAEAST HEALTH SYSTEM

Michael Halligan, right, performs cardiac surgery at CarolinaEast Medical Center.

rate of mortality from coronary disease is diminishing, with advances in stents and valve surgery.”

Atrial fibrillation, an irregular, rapid heart rate that can lead to blood clots and heart failure, affects 2.7 million Americans, according to the American Heart Association. “The driver is electric activity in the pulmonary vein, the vein from the lungs back to the heart. You have four of those, two from each lung. Sometimes five. And they connect to the left atrium and develop electric activity,” Wiley says, “which is very rapid and causes [atrial fibrillation].”

Several medications are marketed to treat atrial fibrillation. When they fail, or when additional methods are needed, doctors may turn to radio frequency ablation, which burns scar tissue to seal off activity. A newer method is cryoablation, a minimally invasive procedure that freezes the heart tissue when a balloon catheter is inserted via a wire. The process is on its second generation of balloon, which Frye began using last year.

One of Wiley’s patients is a man in his 60s who was diagnosed with atrial fibrillation when he began to experience signs of rapid heartbeat — fatigue, loss of energy — while working in his landscape business. “A typical hard-working individual who was ignoring his symptoms. He had heart failure and was pretty miserable when he first presented,” Wiley says.

When medications didn’t control the problem, they opted for cryoablation. But cryoablation isn’t a quick fix for everyone.

“Patients with long-standing atrial fibrillation, like for more than a year, may find it doesn’t work because the left atrium is too far gone,” Wiley says. “And it’s an elective procedure, so it may be very expensive.”

His advice: Don’t be in denial. If there are symptoms, get evaluated.

At CarolinaEast Medical Center, whose Cardiovascular Center of Excellence serves the areas around New Bern and Morehead City, cardiac arrhythmias are managed in the hospital’s leading-edge electrophysiology lab. Cardiologists develop diagnostic and treatment options for abnormal rhythms,

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Cone goes 3D

Diagnosing heart problems just got personal.

At Moses H. Cone Memorial Hospital in Greensboro, patients who undergo a computed tomography (CT) scan to identify potential coronary artery blockages and blood-flow issues no longer automatically follow up with an invasive catheterization to determine treatment.

A new technology called HeartFlow Analysis, which Cone physicians acquired this spring, uses CT scan data to upload a 3D model of the patient's heart labeled with a color-coded vessel-by-vessel assessment.

"It will tell us functional information about an anatomical lesion, so if we see a blockage that is borderline that doesn't need any intervention or stent, the physician can look at the numbers and come to the conclusion of whether the lesion needs to be treated," says Katarina Nelson, Cone's director of non-invasive cardiovascular imaging. "We have had really good results, and we've had good correlations with other studies, so we are very pleased with that. Previously, borderline lesions would send patients for catheterization. Now, we get the data the same day.

"Not every patient needs HeartFlow Analysis. Some are clearly normal, and some are clearly abnormal, but the ones in between where we don't know, they can get the results right away," Nelson says. "The patient doesn't have to do any more testing."

That saves money, she says. Data shows a 26% accumulated savings after accounting for the \$1,500 cost of HeartFlow Analysis.



CONE HEALTH

Katarina Nelson, Moses H. Cone Memorial Hospital's director of non-invasive cardiovascular imaging, administers a CT scan for the hospital's HeartFlow Analysis.

including the latest advances in ablation therapy and implants, which can include heart failure devices.

Pacemakers, available since the late 1950s, generate electrical impulses to contract heart muscles and maintain an adequate heart rate.

This March, Ker Boyce, a cardiologist and electrophysiologist at FirstHealth Cardiology Pinehurst Medical Clinic, performed FirstHealth Moore Regional Hospital's first operation to install the Micra transcatheter pacing system, the world's smallest pacemaker. About the size of a large vitamin, the Micra TPS treats bradycardia, a too-slow heart rate caused by an inability to pump enough oxygen-rich blood. Unlike other pacemakers that are implanted in a pocket in the skin, the Micra TPS is placed directly into the heart and is cosmetically invisible.

"Approximately 15,000 Micras have been implanted worldwide in the last two and half years, initially under a clinical trial," Boyce says. "After FDA approval [in April 2016], they were rolled out to primarily academic centers. The procedure is different from a standard pacemaker and requires specialized training. The roll-out to non-academic centers started in about December 2017 nationwide. It is a niche device, only for persons who require a single-chamber ventricular pacemaker, not a dual chamber, biventricular pacemaker or defibrillator."

Should a patient need more than one Micra during his lifetime, the first can be turned off and a second one installed and activated without risk of electrical interaction.

FirstHealth's doctors attempt to treat slow heartbeats through medication before relying on pacemakers.

"In an emergency, meds are first used. However, there are no long-term meds for slow heartbeats," Boyce says. "We correct any underlying problems first and then if it's still slow, they get a pacemaker."

For pacemaker and defibrillator after-care, Cape Fear Valley Heart & Vascular Center offers what it calls a "pacemaker surveillance program." It's a monitoring

program to be certain that the devices are working. Pacemaker and defibrillator patients are given a transmitter that sends electrocardiogram data to the heart center three times a year. Pacemaker patients come into the clinic once a year for an in-depth pacemaker performance evaluation. Defibrillator patients come into the clinic every three months for an in-depth defibrillator performance evaluation.

Last December, doctors at Sanger Heart & Vascular Institute in Charlotte became the first in the world to treat a patient in an investigational device exemption study for a venous self-expanding stent system, to aid in vein-to-heart blood flow.

Erin Murphy, director of Sanger's venous and lymphatic program, and vascular surgery fellowship director Gregory Stanley performed the operation at Carolinas Medical Center on a patient with nonthrombotic iliac vein lesions. Murphy is the United States' principal investigator for the 35-site international clinical trial.

"Deep venous obstruction impacts more than 27 million people worldwide and can result in limited mobility and poor quality of life," Murphy says. "By investigating a new form of iliac vein stenting, we are committed to exploring the latest treatment options for patients."

When it comes to complex valve disease, Mission Heart in Asheville is one of the country's leading practitioners. Mission Heart cardiothoracic surgeons perform more than 400 cardiac valve procedures each year. Doctors use advanced valve repair and replacement technologies with outstanding patient outcomes, the hospital says.

Mission Heart's valve procedure volumes are in the top 2% of U.S. hospitals, and studies show that high-volume centers produce better results for patients.

Mission Heart has been recognized for the 12th time by Truven Health Analytics as a national Top 50 Cardiovascular Hospital.

At the East Carolina Heart Institute at Vidant Medical Center in Greenville, cardiovascular surgeons at times use the robotic daVinci Surgical System, which

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NEW HANOVER REGIONAL MEDICAL CENTER

Jeff Soukup, right, manager of New Hanover Regional Medical Center's intensive cardiac rehab program, assists heart attack survivor Ashley Garner.



MISSION HEALTH

Mission Heart cardiothoracic surgeons use advanced valve repair and replacement technologies to perform more than 400 cardiac valve procedures annually.

means there are small incisions in the chest. With the robotic devices and tiny instruments, heart surgeons perform a number of procedures that are much less invasive than traditional surgeries.

Using the daVinci robot can minimize risks related to major heart surgery. It's not necessary to cut through the breastbone to open the patient's chest, which eliminates many complications related to major surgery.

Robotic surgeries have been used for a number of different heart-related procedures, including valve surgery, coronary artery bypass, cardiac tissue ablation, heart defect repair and tumor removal.

Aftercare is important with heart procedures, and patients are routinely informed about healthy lifestyle changes, proper nutrition and exercise. New Hanover Regional Medical Center in Wilmington emphasizes that cardiac rehab begins immediately after a heart attack or any surgery or stent procedure. The hospital offers inpatient and outpatient care that has been certified by the American Association of Cardiovascular and Pulmonary Rehabilitation.

NHRMC's intensive cardiac rehabilitation program is based on data presented by Dean Ornish, a physician who founded the nonprofit Preventive Medicine Research Institute in California, and others who showed that a more rigorous approach to nutrition, stress management and group support along with exercise could halt the progression and even reverse the amount of blockage within the coronary arteries.

NHRMC began its intensive cardiac rehab program — the Ornish Reversal Program — in September 2017 and was the second program in North Carolina to do so, following Mission Hospital in Asheville, which began its program a year earlier. Patients attend 18 four-hour sessions at NHRMC Heart Center – Outpatient Services, which has space and equipment for the Ornish program and other cardiac and pulmonary rehab classes. More than 70 people have enrolled.

“This program requires commitment from the patient. They are investing in the future for themselves and their families,” says Jeff Soukup, manager of NHRMC’s cardiac rehab program. “It has been extremely rewarding to watch as participants undergo a transformation in which they begin to understand and demonstrate how to take control of their heart disease through a new lifestyle that includes plant-based, low-fat, low-cholesterol nutrition, regular exercise, stress management and being a part of a group with a common interest.”

Investing in the future is what propels Paolillo at Levine Children’s.

“A lot of our patients need surgery, and they’re our patients for a lifetime,” Paolillo says. “When I walk in here, I don’t see the physical structure of a lobby. I see a culture of people who are here for our patients and their families.” ■

— *Kathy Blake is a freelance writer who lives in eastern North Carolina.*



FRYE REGIONAL MEDICAL CENTER

Thomas Wiley, center, is an electrophysiologist at FryeCare Cardiology in Hickory.



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Cape Fear Valley Medical Center was recognized as a Watson Health Top 50 Cardiovascular Hospital for 2018. Top 50 Cardiovascular Hospitals are recognized as the nation’s best providers of cardiovascular care. These hospitals had significantly higher inpatient survival, fewer patients with complications, and lower readmission rates for heart attack, heart failure and open heart surgery. Where can you find this level of quality? Right here in Fayetteville. At Cape Fear Valley Health.


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