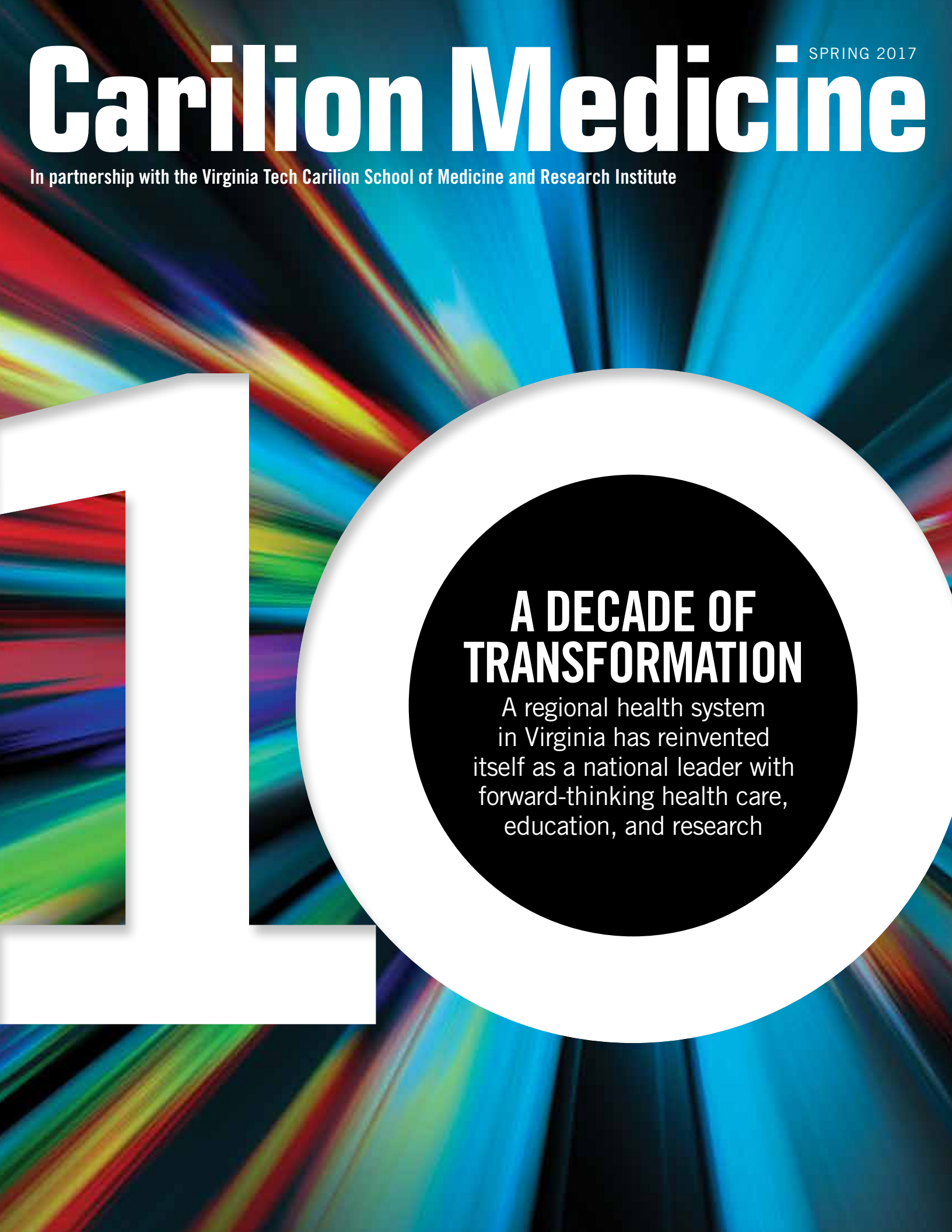
# Carilion Medicine

SPRING 2017

In partnership with the Virginia Tech Carilion School of Medicine and Research Institute



## A DECADE OF TRANSFORMATION

A regional health system in Virginia has reinvented itself as a national leader with forward-thinking health care, education, and research

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CARILION MEDICINE SPRING 2017

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SHUTTERSTOCK (COVER); DAVID HUNGATE (ABOVE)

TEN YEARS AGO, WE BEGAN A TRANSFORMATION at Carilion, turning a collection of hospitals into an integrated care delivery system emphasizing exceptional clinical care, education, and research.

That transformation meant taking risks. We took a risk when we changed the way we organized, becoming a physician-led clinic. We took a risk by partnering with Virginia Tech to start a medical school and research institute. We took a risk when we embraced population health, focusing our work on the community as well as our own patients.

We surrounded ourselves with innovative and tenacious people, and we kept pushing to build the future of health care all around us. We expanded our academic programs, services, and research. Along the way, we received attention for our approach to national problems, such as physician burnout and opioid addiction.

We continue to take risks and to look at problems from new angles. We're finding new ways to bring care to people where they are, realizing they may not always be able to come to us. We're working with community partners to improve our regional economy and the social determinants of health. We're taking a page from colleagues in other industries to use data and process improvement toward clinical advancement.

We keep working to find solutions not for the sake of innovation itself, but for the people. We're working for the mother who hasn't visited the doctor because it's too difficult to coordinate child care and public transportation. We're working for the father who needs mental health services but doesn't know where to find them, or what questions to ask. We're working for the grandmother who needs surgery, to ensure her hospital stay is a safe one and that she doesn't acquire additional infections. We're also working to care for each other, because physician burnout is a serious problem and clinicians who have support are better able to care for others.

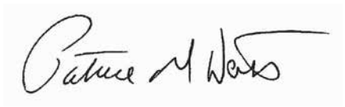
Our patients and our communities continue to face many health problems. So we continue to work, and we will continue to evolve.

This edition of *Carilion Medicine* highlights our past ten years, our present, and our vision for the future.

Muhammad Ali once said: "If your dreams don't scare you, maybe they're not big enough."

Our dreams are big. Medicine is constantly evolving, and each advancement has the potential to save lives and make our patients healthier.

I can't wait to see what the future holds.



**Patrice M. Weiss, M.D.**
Chief Medical Officer and Executive Vice President
Carilion Clinic

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Carilion Clinic is a nationally ranked integrated health care system headquartered in Roanoke, Virginia. Its flagship, Carilion Roanoke Memorial Hospital, is the clinical affiliate of the Virginia Tech Carilion School of Medicine and Jefferson College of Health Sciences.




PHOTO: JARED LADIA

# in brief

*On the pulse of the Carilion Clinic community*

**THE FUTURE IS NOW:** Nancy Howell Agee, president and chief executive officer of Carilion Clinic, speaks at the Virginia Tech Board of Visitors meeting.

## STRONGER TOGETHER

In August, the Virginia Tech Board of Visitors voted to integrate the academic and research missions of the Virginia Tech Carilion School of Medicine fully into Virginia Tech.

The medical school will notify and review milestones with several accrediting and regulatory bodies, including the Liaison Committee on Medical Education, before becoming the university's ninth college in July 2018. The medical school is now an independent institution, affiliated with both Carilion Clinic and Virginia Tech. The school, along with the closely aligned Virginia Tech Carilion Research Institute, will form the core of the expanded Virginia Tech Carilion Health Sciences and Technology Campus in Roanoke.

"The integration will create new opportunities to access external research funding that is available to institutions with medical schools," said Nancy Howell Agee, president and chief executive officer of Carilion Clinic. "That builds on our already strong program and will be good for the students, Virginia Tech, and Carilion because it will lead to increased growth in translational research, connecting the theoretical to our patients' bedside. It will also help us to continue to attract the very best clinical researchers and their teams."

Many of the major connections between Carilion and the medical school will continue after the integration. Students will continue to train at Carilion Roanoke Memorial Hospital and elsewhere within the Carilion system. About 300 clinicians at Carilion Clinic will continue to hold dual appointments as professors at the medical school, and the two entities will work together to attract and hire expert clinicians to fill future appointments.

"For more than a decade, the relationship between Virginia Tech and Carilion has grown stronger as we both focus on supporting our region," said Virginia Tech President Tim Sands. "The integration of the school of medicine into a vibrant, growing, and dynamic research university with world-class expertise in the biomedical sciences is a natural next step for both Virginia Tech and Carilion Clinic."

In 2016, Virginia's General Assembly approved a bond package to build a $66-million facility to expand the Health Sciences and Technology Campus.

PHOTO: LOGAN WALLACE

**conference**

## Precision in Neuroscience

In October, the Virginia Tech Carilion Research Institute became the capital of the precision neuroscience world, as it hosted the Virginia-Nordic Precision Neuroscience Conference, the first international scientific meeting to explore an ultra-personal approach to brain health.

Michael Friedlander, Ph.D., executive director of the institute, pointed out that more than 1,000 disorders of the brain and nervous system result in more hospitalizations than any other disease group, including heart disease and cancer.

"By understanding an individual's genetics, behavior, education, habits, and life experiences, such as physical and psychological trauma—all the things that make people who they are—the neuroscientific community may be able to develop individually tailored plans that allow people to thrive cognitively, socially, and physically," he said.

honors

## Carol Gilbert Wins Prestigious Humanism in Medicine Award

Carol Gilbert, M.D., an associate professor of surgery at the Virginia Tech Carilion School of Medicine, has won the Arnold P. Gold Foundation Humanism in Medicine Award.

The annual Association of American Medical Colleges award "honors a medical school faculty physician who exemplifies the qualities of a caring and compassionate mentor in the teaching and advising of medical students."

Virginia Tech Carilion School of Medicine students nominated Gilbert for the award. All 145 U.S. medical schools that are accredited by the Liaison Committee on Medical Education are allowed to nominate one faculty physician for the award; Gilbert was selected from those nominations.

"This award is a big honor for me. I was so amazed to even have the students working on this," Dr. Gilbert said. "I'm so touched."

Dr. Gilbert knew she wanted to be a doctor at an early age. "When I was about three, our next-door neighbor, a physician, gave me a stethoscope," she said. "I grew up with that like some kids grow up with a teddy bear."

Despite her early drive, she faced challenges to become a doctor. When she attended the University of California Davis School of Medicine, only a quarter of her classmates were women. Dr. Gilbert encountered a larger hurdle when she decided to pursue surgery because she was a woman and left-handed, both rare attributes among surgeons in the 1970s. She was the first woman to undertake her surgical residency in Portland, Oregon.

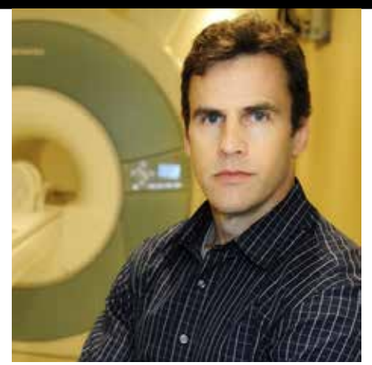
When she left her residency and fellowship, Dr. Gilbert vowed to be a role model to other women and men as well.

"I took the Hippocratic Oath seriously, particularly the part where you agree to pass on the practice of medicine," she said. "I feel it is integral to do that. You should be teaching people and passing it on, providing them with the best possible example of what you want to see in a physician."

Dr. Gilbert has been a physician and trauma surgeon in Roanoke since the early 1980s. Gilbert served as the first medical director for Life-Guard, the first medical helicopter in Virginia.

"I have never witnessed anyone be able to replicate her compassion for teaching as well as medicine," said Robert Ferguson, M.D., a surgical resident in the Carilion Clinic–Virginia Tech Carilion School of Medicine program. "Dr. Gilbert is a true inspiration to all of us here. She is one of those rare surgeons who is not only a master in the operating room, but is also a compassionate healer and advocate for her patients."

**FOLLOWING A CALLING:** Beyond her work in Roanoke, Carol Gilbert, M.D., volunteers for a disaster medical assistance team. She provided care in Louisiana after Hurricane Katrina and in Haiti after the 2010 earthquake.



## ASSIGNING NUMBERS TO FEELINGS

There's a gap in cognitive neuroscience. The psychological understanding of mental disorders addresses clinical symptoms and can offer some relief, but scientists need more to discover the underlying causes and provide definitive diagnoses; they need math.

Scientists at the Virginia Tech Carilion Research Institute are teaming up with neuroscientists the world over to help fill that gap by launching *Computational Psychiatry*, an MIT Press journal that shares its name with a relatively new scientific field.

"*Computational Psychiatry* is an exciting collaboration whose time has come," said Read Montague, Ph.D., director of the Computational Psychiatry Unit at the Virginia Tech Carilion Research Institute. "Clinicians and computational neuroscientists are joining together to develop next-generation solutions to the problems surrounding mental health."

Dr. Montague co-edits the journal with Peter Dayan, Ph.D., director of the Gatsby Computational Neuroscience Unit at University College London. They've recruited more than 60 cognitive neuroscientists to peer review submissions. The journal is open access, with articles published continuously online.

In 2012, Dr. Montague outlined the promise of computational psychiatry in a TEDGlobal talk that has since been viewed nearly 700,000 times. This field, he said, is "redefining with a new lexicon—a mathematical one, actually—the standard ways we think about mental illness."

PHOTOS: DAVID HUNGATE (LEFT); JIM STROUP (TOP)

## A NEW MODEL OF COMMUNITY HEALTH OUTREACH

In partnership with the Bradley Free Clinic, New Horizons Healthcare, and United Way of Roanoke Valley, Carilion has received a $160,000 grant from the Virginia Health Care Foundation to place community health workers in medically underserved areas of Roanoke. The workers will conduct in-home assessments for uninsured patients and help them overcome barriers to good health, with the goal of lowering the cost of care by reducing Emergency Department visits and hospital admissions.

Supporting the community health workers is a Community Hub, an infrastructure that provides tools and strategies to ensure that those at risk are served in a timely, coordinated way by connecting them to meaningful health and social services that produce positive outcomes, avoid duplication of effort, and keep people from falling through the cracks. The Hub includes a network of nonprofit agencies that provide services such as basic health care and safe housing.

biology

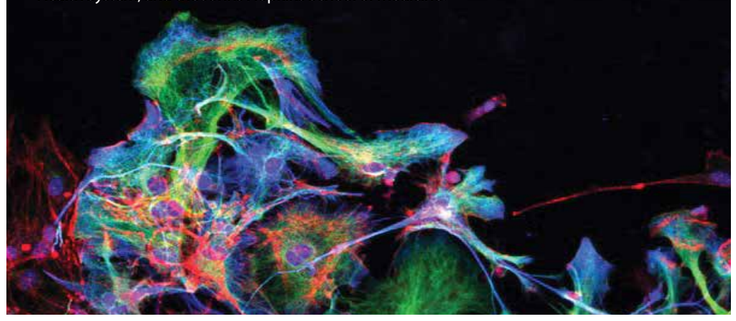
## Strategies for Preserving Brain Health

Neurons may be the marquee cells of the brain, but glial cells are every bit as essential—and they exist in equal or even greater numbers.

Glial cells play a major role in maintaining the brain's healthy milieu. When they go awry, they can give rise to glioblastomas, highly malignant brain tumors. Preserving the health of these important cells was the focus of scientific and medical experts during the Fifth International Conference of Glial Biology in Medicine, hosted by the Virginia Tech Carilion Research Institute in October.

"This annual conference, which attracts one of the biggest concentrations of leaders in glial biology in the world, has a new home in Roanoke," said organizer Harald Sontheimer, Ph.D., director of the institute's Center for Glial Biology in Health, Disease, and Cancer. "For me, it is all about becoming a national and international research center to better understand brain cancer, glia, and the immune system, and glial cell contributions to nervous system injury and disease."

Dr. Sontheimer, who is also the executive director of Virginia Tech's School of Neuroscience, hopes the gathering of experts will lead to new treatments and diagnostics. More than 120 researchers, clinicians, and students attended the conference, including speakers from other major Virginia universities, Harvard Medical School, Duke University, the Children's National Health System, and the Johns Hopkins School of Medicine.



PHOTOS: COURTESY OF THE SONTHEIMER LABORATORY (ABOVE); DAVID HUNGATE (TOP RIGHT)

# briefings

### Leadership Honor

Tracey Criss, M.D., co-interim chair of psychiatry at Carilion and assistant dean for clinical science years 3 and 4 at the Virginia Tech Carilion School of Medicine, was one of only 15 women nationally to be named to the inaugural class of the Carol Emmott Fellowship for Women Leaders in Health. The Public Health Institute program seeks to support outstanding women leaders in creating constructive change in health care.

### Sphere of Influence

*Modern Healthcare* listed Nancy Howell Agee, president and chief executive officer of Carilion, among its "100 Most Influential People in Healthcare" for 2016. Agee is slated to become the chair of the Board of Trustees of the American Hospital Association in 2018.

### Badges of Honor

*Becker's Hospital Review* has named Carilion to its 2016 list of "100 Accountable Care Organizations to Know." The magazine also listed Patrice M. Weiss, M.D., Carilion's chief medical officer, among its "100 Hospital and Health System CMOs to Know" in 2017. She was recognized for being among the top physician leaders dedicated to establishing high standards and to strengthening patient safety and quality initiatives.

### Next Gen Model

Carilion has been chosen to participate in the Next Generation ACO Model, a Centers for Medicare & Medicaid Services initiative aimed at improving health outcomes and lowering costs.

# grand rounds

*Education at Carilion Clinic and its affiliates*

## PERFECT SCORE

Jefferson College of Health Sciences has received the Annual Merit Award from the National Board of Surgical Technology and Surgical Assisting for achieving a 100-percent pass rate on the Certified Surgical Technologist (CST) examination.

The CST—which many local, state, and national health care organizations require for employment—is widely recognized in the health care community as the foremost credential for surgical technologists in the nation. Graduates obtaining national certification as a CST demonstrate understanding of the basic competencies for safe patient care in the operating room.

"We couldn't be prouder of our students," said Dr. Nathaniel L. Bishop, president of Jefferson College of Health Sciences. "But we're not surprised; they've consistently excelled individually and together."

## GI JEOPARDY

In October, gastrointestinal fellows Vu Nguyen, M.D., and Tamika Jaswani, M.D., represented the Virginia Tech Carilion School of Medicine in a high-profile game of GI Jeopardy at the annual conference of the American College of Gastroenterology. The fellowship team, including the program director, Paul Yeaton, M.D., competed against 126 other programs in the first round online. Their performance landed them in the top five, qualifying them for the main-stage event.

## THE CHEST CHALLENGE

Pulmonary and Critical Care fellows at Carilion were among the top-scoring teams in the CHEST Challenge 2016, an online competition from the American College of Chest Physicians. The fellows who competed—Nathalie Abi Hatem, M.D.; Mary Carter, M.D.; and Santosh Nepal, M.D.—were led by the fellowship director, Mattie Foroozesh, M.D., a physician in the Section of Pulmonary, Critical Care and Sleep Medicine.

**BRIGHT FUTURE:** After graduation from the Virginia Tech Carilion School of Medicine in May, Tarangi Sutaria will embark on a residency in obstetrics and gynecology at George Washington University.

PHOTO: DAVID HUNGATE

## NEW OPPORTUNITIES

Carilion's clinical education programs became even more varied recently. Carilion now offers a rural elective for residents, as well as advanced clinical practitioner fellowships in emergency medicine and family practice. Carilion also received accreditation for its clinical pastoral education program.

## STUDENT AWARDED FULBRIGHT TO STUDY ADDICTION

Andrew Gaddis, a third-year student at the Virginia Tech Carilion School of Medicine, has embarked on a yearlong Fulbright study to investigate the growing problem of opioid addiction.

Gaddis is conducting his research at Insite, a Vancouver, Canada–based treatment facility that uses harm-reduction practices—including clinician-supervised injections and opiate-replacement medications—for opioid-addicted patients. Gaddis is helping to complete the first-ever pragmatic clinical trial focused on efficacy for opioid replacement therapy. He is also analyzing data in an ongoing Canadian study of 1,500 opiate-replacement therapy recipients to help answer questions about user compliance and efficacy.

spotlight

### Record Number

The Virginia Tech Carilion School of Medicine faced a challenge in selecting its most recent class: The number of applicants for only 42 slots topped 4,600, the largest in the school's history.

"Our admissions committee members really had their work cut out for them," said Cynda Johnson, M.D., M.B.A., dean of the school. "Ultimately, we selected the applicants we felt would thrive in our unique, patient-centered, problem-based curriculum, which uses a team approach to learning."

Most class members arrived with considerable research experience already under their belts. The school offers a rigorous research-intensive curriculum in which students spend more than 1,200 hours on individual research projects over the course of four years, culminating in a journal article of publishable quality. By graduation, most students have presented their work nationally and even internationally.

# A DECADE OF TRANSFORMATION

A regional health system in Virginia has reinvented itself as a national leader with forward-thinking health care, education, and research.

**by Charles Slack**

WHEN MEDICAL LEADERS IN VIRGINIA SEARCH FOR ways to describe how they feel about Carilion Clinic's remarkable rise over the past decade, one word emerges repeatedly: "surprised." • Proud? Certainly. Gratified? Of course. Yet the prevailing theme is a sort of quiet astonishment not just at the number of things that have gone right over the past 10 years, but how quickly it's all come together.

"The health care business is incremental and evolutionary," says Nancy Howell Agee, president and chief executive officer of Carilion. "Change can be slow. But we've done an awful lot."

And that's putting it mildly. The past decade has seen the recasting of Carilion Health System into a clinic-based model, with enhanced emphasis on primary care and chronic care, and deep involvement of clinicians at every level of management. The number of clinicians has risen dramatically, with more than 700 doctors and 300 advanced clinical practitioners. Enhanced specialties include such areas as heart and vascular, orthopaedics, gastroenterology, critical care, and children's health.

Notable too has been the partnership with Virginia Tech in forming a new medical school that now draws top students and faculty from around the country, and a research institute whose external funding leapt from zero to nearly $80 million in just a few years.

Any of these developments on their own might have taken a decade or more to accomplish. For all of it to happen simultaneously "is beyond comprehension," says Joseph T. Moskal, M.D., chair of orthopaedics and an integral player in the transition. "The momentum and the synergies we have going forward have been phenomenal."

## Building on Success

Carilion Clinic didn't arise from nowhere, of course. It built on traditions that started more than a century ago, when Roanoke Memorial Hospital opened its doors in 1899. Over the years the hospital evolved with changing times, expanding and acquiring other area hospitals and primary care physician groups into a network that by the early 1990s would be known as Carilion Health System.

But by the early 2000s Carilion, like many other hospitals nationwide—and, indeed the entire U.S. health care system—found itself at a crossroads. Medicare reimbursements were falling, and while Carilion was in no immediate financial jeopardy, its leaders, including Edward Murphy, M.D., then its chief executive officer, saw the writing on the wall.

"We were doing well financially, and we had won a national quality award," recalls Agee, who was Carilion's chief operating officer at the time. "But we looked to the future and didn't feel that good times would continue."

## Embracing Change

Instead of simply hoping for the best, Carilion's leaders, under Dr. Murphy's guidance, launched a yearlong planning initiative.

"We thought long and hard about what the organization should look like going forward," says Agee. "How would it be sustainable? What models should we look at?"

Carilion's Board of Directors issued three clear mandates: The hospital system needed to remain nonprofit, to maintain as its top priority providing Virginia with quality medical care, and to retain its headquarters in Roanoke. Beyond that, it seemed, almost everything was on the table.

The more they looked, the more Carilion leaders were drawn to the clinic model established by such esteemed institutions as the Mayo Clinic and the Cleveland Clinic. Among the defining characteristics: excellent primary care for local communities, supported by nationally renowned specialists. The best of these systems also emphasized direct physician involvement in management, as well as integrated care—promoting seamless process and communications as patients moved from primary care to specialists, and back again.

## Community Emphasis

Carilion already had a strong core of primary care physicians. Adopting the clinic model was a matter of enhancing community outreach and finding more ways to serve people where they lived and worked. Primary care practices were recast as patient-centered "medical homes" focusing on wellness and prevention, and coordinated care by a team of providers. Patients were encouraged to take greater ownership of their own health. Carilion's online, mobile-friendly MyChart patient portal, for example, allows patients to review their medical history, receive test results, and communicate securely with physicians—in many cases obviating the need for in-person appointments.

The same community-based model extends to specialties such as orthopaedics. In early 2016, Carilion opened its Institute for Orthopaedics and Neurosciences with dozens of specialists and state-of-the-art facilities for treating a range of issues, from pediatric spinal conditions to complex hip disorders. At the same time, a network of community-based services offers everything from onsite coverage of high school and college sporting events to local clinics addressing more routine injuries.

"Shifting away from hospital-based care for all interventions lets us use our resources more efficiently and improve access and quality for those needing more intensive care," says Dr. Moskal. Fewer hospital visits also means lower costs. That's one reason Carilion earnings jumped from 1.4 percent of operating revenue in 2013 to more than 4 percent in 2016—money that, as a nonprofit, the clinic reinvests directly in technology, facilities, and staff.

## A New School

To fulfill the promise of its clinic model, Carilion leaders knew they would need

EXCEEDING EXPECTATIONS: In just a few years, a desolate field bordering railroad tracks was transformed into the vibrant educational and research community of the Virginia Tech Carilion School of Medicine and Research Institute.

## A DECADE OF TRANSFORMATION

When Carilion reinvented itself following a clinic model, it adopted a three-part bell symbol to represent the organization's three pillars: clinical excellence, medical education, and scientific research.

**2006** — Carilion Health System becomes Carilion Clinic, signaling the transition from a hospital system to an integrated health care delivery model

**2007** — Carilion becomes an early adopter of the electronic health records system known as Epic

**2008** — The Virginia Tech Carilion School of Medicine launches, with Cynda Johnson, M.D., M.B.A., named the founding dean

**2009** — Carilion family medicine practices reorganize as patient-centered medical homes, a new care model designed to keep patients healthy

**2010** — The Virginia Tech Carilion School of Medicine welcomes its first class of 42 students, who tackle patient-centered learning in small teams

**2010** — The Virginia Tech Carilion Research Institute opens, with Michael Friedlander, Ph.D., named the founding executive director; he immediately begins to establish its national reputation in neuroscience



PHOTOS: SHUTTERSTOCK (PREVIOUS SPREAD); ALL OTHERS, DAVID HUNGATE

not just expanded primary care, but a rapid influx of national-caliber specialists. Among the challenges: how to lure medical all-stars to southwest Virginia, whose bucolic setting stands in sharp contrast to the major metropolitan areas where many of them trained. Yet Carilion leaders knew that even prospects with low expectations would likely be charmed by the quality of life in a vibrant small city in one of the country's most beautiful natural settings.

A second and more vexing challenge was the lack of a formal medical school. Despite a strong tradition of postgraduate medical education, Carilion could hardly expect to attract the types of physician and science leaders it coveted without offering the research, teaching, and publishing opportunities associated with a medical school affiliation.

Here, Carilion found a crucial ally in neighboring Virginia Tech, which was looking to take its own reputation as a research center to the next level.

"When Charles Steger became president of Virginia Tech in 2000, he set forth an ambitious agenda to increase its funded research," says Raymond Smoot Jr., Ph.D., chief executive officer of the Virginia Tech Foundation and chair of the finance committee of the Carilion Board of Directors at the time. "When you looked at the upper tier of national research universities, nearly all of them had a medical school."

From the institutions' shared vision emerged plans for the public-private partnership that would become the Virginia Tech Carilion School of Medicine and Research Institute, or VTC.

"We've had an unusual confluence of capable, forward-looking people who really seem to like each other," Smoot says. "Conflict and jockeying for position are not unusual in any organization, and I'm sure we've had some of that. But all the folks have played well together."

## Rethinking Education

"Starting a whole new school, you really don't know what to expect," says Cynda Johnson, M.D., M.B.A., tapped to lead the medical school as founding dean. "A couple of decades had passed without the Liaison Committee on Medical Education accrediting any new medical schools, so nobody had experience in how to do this. Somehow, though, it never occurred to me that we had any choice but to succeed."

Where rethinking the curriculum of an older school might be like turning a battleship in a bathtub, VTC's newness allowed for a virtual blank slate. The medical school forged its own curriculum, one based heavily on problem-based learning and research.

"The traditional medical school is two years of basic science and two years of clinical science," Dr. Johnson says. "But, actually, it's not just basic science and clinical science that are important these days. Just as essential are interdisciplinary training, working as teams, and excellent communication skills."

At VTC, students tackle patient cases right from the start, honing their skills in problem-solving, research, and diagnosis. It's an early introduction to "interprofessionalism," a central tenet of the curriculum that requires cooperation across all traditional dividing lines, with groups that may involve nurses, physicians from multiple specialties, and research specialists as well as the patient and the patient's family.

"What we're doing is making a statement to students that we understand that board exams don't capture how effectively you work together as a team or how well you communicate with your patients," says Dr. Johnson, a family medicine physician. "But without skill in those essential aspects of the practice of medicine, you can't be a great clinician."

## Research Minded

Cooperation is just as essential in fostering first-class research. That's the idea behind the Virginia Tech Carilion Research Institute. Michael Friedlander, Ph.D., its founding executive director, knew he had to work quickly to attract the type of people he wanted to establish the new institute as a research hub. "Roanoke, Virginia, didn't really exist as a biomedical research center," he says.

Like Dr. Johnson, Dr. Friedlander—who had held leadership positions at major research centers in Texas and Alabama—was drawn by the rare opportunity to bring an entrepreneurial vision to a new center and to populate it with the best scientists he could find. Two areas he knew he wanted to establish were brain research and heart research.

"We got off to a fast start in brain research," Dr. Friedlander says. "We brought in several internationally renowned, established investigators, such as Dr. Read Montague in human brain imaging, Dr. Warren Bickel in the study of addiction and substance abuse, Dr. Craig Ramey in early childhood brain and behavior development, and Dr. Sharon Ramey in neurorehabilitation research for children with cerebral palsy."

The other major focus area, cardiovascular research, reached an early milestone with the arrival of Robert Gourdie, Ph.D., to direct the institute's new Center for Heart and Regenerative Medicine Research.

"We didn't have a reputation in the area, but everybody in the field knew who

# A Beautiful Friendship

In retrospect, the collaboration between Virginia Tech and Carilion Clinic on an entirely new kind of medical school seems almost preordained. The two venerable institutions were neighbors in southwest Virginia, and their missions—in medical research, education, and support for their communities—made them natural allies. Yet bringing them together required a shared vision, strong financial commitments, and a determination to help communities in the region.

Carilion had already been involved in graduate medical education for more than half a century. In addition, one of its academic affiliates—Jefferson College of Health Sciences, which trains nurses and allied health professionals—had been at the forefront of interprofessional training for decades.

"Over the years we had talked about how it would make sense to have a medical school," says Nancy Howell Agee, president and chief executive officer of Carilion.

Virginia Tech, deeply involved in many aspects of biomedical research—with joint degree programs with Wake Forest University School of Medicine—was looking to extend its "ongoing mission to provide students with meaningful learning experiences," says Timothy Sands, Ph.D., president of Virginia Tech.

### Learning Together

Still, melding a large public university and a private clinic posed many potential challenges.

"We both had smart, caring people doing good work, but these were two different cultures," Agee says. "We weren't used to the processes a state institution has to follow. And the university had no experience with certain issues related to patient care. We learned together."

The partnership publicly launched in January 2007, and in May of the following year, the governor of Virginia signed a law calling for $59 million in capital projects bonds to help finance the new school and an affiliated research institute. The first medical students arrived in 2010.

Nancy Howell Agee and Timothy Sands

"By promoting innovation in research as well as in patient care, we're helping improve the financial stability and integrity of the entire region."

### 'Smart People, Brilliant Ideas'

"Our partnership has connected smart people with brilliant ideas," says Dr. Sands. The Virginia Tech Carilion School of Medicine has quickly become a sought-after destination, attracting more than 4,600 applicants for only 42 spots in a recent class. Every student in the school's four graduating classes has been matched with a postgraduate residency.

And the dramatic success of the Virginia Tech Carilion Research Institute led to a new milestone in 2016, when the Commonwealth of Virginia agreed to join Carilion and the university in providing funding to double the institute's size and number of research teams.

"By promoting innovation in research as well as in patient care," Agee says, "we're helping improve the financial stability and integrity of the entire region."

Says Dr. Sands, "Connecting medical students and Carilion clinicians with researchers studying areas such as brain science, infectious disease, and biomaterials brings great potential for breakthroughs that make a difference in people's lives."

*—Written by David Bumke*

**2010** Carilion becomes one of three U.S. health care systems chosen for a three-year national pilot project to test a new health care payment model known as the accountable care organization

**2010** Carilion introduces MyChart, an online patient portal that gives patients secure, online access to their health information

**2011** Nancy Howell Agee becomes president and chief executive officer of Carilion, succeeding Edward Murphy, M.D., who served in that role for 11 years

**2011** In a critical piece of the clinic model, Carilion forms partnerships with Aetna and, a year later, Anthem; the Aetna contract succeeds in lowering premiums by more than 20 percent in its first year

**2012** The MyChart mobile app launches, giving patients with smartphones and tablets the ability to view their test results, schedule appointments, and email their doctors from anywhere

**2012** Carilion's Graduate Medical Education, which has educated physicians for several decades, grows to 20 accredited fellowship and residency programs

**2013** Third-year VTC medical students achieve a 100-percent pass rate on their first national board exams on the first try—and they far exceed the national average

**2013** Carilion establishes Doctors Connected, a partnership between the organization and Medicare to ensure that patients receive high-quality care

# An Emerging National Voice

A decade ago, Carilion Clinic, seeking to transform its health care model and adapt to an uncertain future, turned to nationally renowned institutions such as the Mayo Clinic to help light the path forward. After a string of high-profile successes, these days it's Carilion that increasingly finds itself in the national spotlight, as an ever-more-prominent example of how to meet the challenges and opportunities of 21st-century health care.

Indeed, Carilion's patient-based, physician-led health care model, combined with the new Virginia Tech Carilion School of Medicine and Research Institute, has caught the eye of leaders such as Darrell Kirch, M.D., president and chief executive officer of the Association of American Medical Colleges.

"It's critically important for our nation that, despite our challenges, we move health care, medical research, and medical education forward in an integrated way," Dr. Kirch says. "I can't think of many institutions that are doing it as well as Carilion and Virginia Tech. Their alignment on those three missions is exceptional."

### Shared Purpose

On his visits to Roanoke, Dr. Kirch says, he's been struck by the "sense of shared purpose" among Carilion's leaders. "Leadership is critically important, and their collegial, team-based approach to ensuring the success of the enterprise has been a critical success factor," Dr. Kirch says.

Rated a "Top Performer" for patient treatment and outcomes by The Joint Commission and a "Consumer Choice No. 1" by the National Research Corporation, among other plaudits, Carilion has earned favorable writeups in publications ranging from *The Wall Street Journal* to *U.S. News & World Report* to *The Washington Post*. Last October, *Politico* cited Carilion as a key factor in transforming Roanoke from an aging railroad city into a thriving small metropolis driven by science and innovation.

### Gaining Influence

With that rising prominence has come a greater voice in everything from groundbreaking research to the national debate over health care.

"Our number-one priority is doing what we do best. That's caring for patients, educating the next generation of our workforce, and moving more toward research." —*Nancy Howell Agee*

"Ten years ago, when I would prepare an annual report, I might mention three or four talks that we gave nationally," says Nancy Howell Agee, president and chief executive officer of Carilion. "Now, all the time, we have people giving presentations, writing journal articles, and gaining national and international attention."

As Carilion's leader, Agee, named one of *Modern Healthcare*'s 100 most influential people for 2016, finds herself a bigger part of that national conversation as well. In 2018 she'll take over as chair of the Board of Trustees of the American Hospital Association, grappling with issues such as the future of the Affordable Care Act, or whatever may replace it.

Yet for all that, Agee insists Carilion won't lose its focus on serving Virginia.

"Our number-one priority is doing what we do best," she says. "That's caring for patients, educating the next generation of our workforce, and moving more toward research."

*—Written by Marcia Lerner*

Dr. Gourdie was," Dr. Friedlander says. "When they saw he was in Roanoke, that gave us immediate credibility."

Top scientists from academic medical centers across the country followed, including Steven Poelzing, Ph.D., an expert in sudden cardiac death; James Smyth, Ph.D., a rising star in the field of heart remodeling; and John Chappell, Ph.D., who studies how networks of blood vessels grow.

As the institute's reputation as a destination for researchers grew, so did funding from the National Institutes of Health, amounting to nearly $100 million. And the institute's scientists are increasingly spinning their research into entrepreneurial ventures—with the promise of new jobs and economic activity for the Roanoke area.

"'Virtuous cycle' is a term I use a lot," Dr. Friedlander says.

## Breaking Down Barriers

A key emphasis at both Carilion and the research institute is to encourage collaboration and break down silos—to foster projects involving laboratory scientists and frontline physicians who treat patients day in and day out.

Dr. Friedlander cites one of many collaborations. Damon Kuehl, M.D., director of Carilion's emergency medical residency program, and Stephen LaConte, Ph.D., an associate professor at the Virginia Tech Carilion Research Institute, have teamed up to study emergency department patients with mild head injuries.

By combining Dr. Kuehl's clinical expertise with Dr. LaConte's innovations in functional magnetic resonance imaging, the collaborators are hoping to identify brain activity patterns that are distinctive both for those whose head injuries produce few if any lasting effects, and those who develop serious symptoms. The aim is twofold: to enable clinicians to detect, through a quick brain scan, whether someone with a mild brain injury is likely to develop serious symptoms, and to find new methods of treating and caring for people who have suffered such injuries.

As with other collaborations between the two institutional partners, the ultimate goal is to forge research discoveries that will enable the best clinical care.

## Physician Managers

At Carilion, that spirit of shared mission, collaboration, and cooperation extends to an area of health care often fraught with divisions and competing priorities: hospital management. A key component of adopting the clinic model has been allowing for full participation of clinicians in setting the direction for the clinic and making key management decisions.

That's no accident, says Agee: "We've added meaningful physician leadership, with physicians at the table making the decisions that govern our organization."

Agee, trained as a nurse, understood at a visceral level the value of having clinicians involved in key policy decisions. Still, putting that goal into practice meant overcoming resistance from those accustomed to clear divisions of responsibility.

"Some of our senior managers said, 'Well, we're happy to have input from physicians, but we're the ones managing,'" Agee recalls. "We had to spend a fair amount of time helping people understand the value and the leadership quality that could come with clinicians, physicians, nurses, and managers all working together to lead the organization."

Dr. Moskal acknowledges that physicians, too, were skeptical about just how serious Carilion was about including them in management. Yet those doubts began to melt away with the formal adoption of a "dyad model," in which physicians and administrators pair up to share management of clinical service lines and take joint responsibility for quality of care as well as operations, costs, and efficiency. Dyad partners serve on the Board of Governors, where they have the ear of top executives and discuss everything from long-range strategy to workforce planning.

Dr. Moskal, one such member of the Board of Governors, says that while members sometimes disagree on next steps, "We're fortunate to have leaders who recognize the value of communication."

## Toward a New Decade

After a decade of nonstop growth and activity, the Carilion community might be forgiven for taking a deep breath and some time to pause and reflect. If anything, though, the success of the past decade seems only to have intensified the desire to push forward and expand horizons.

"Time and time again we've proved our resilience," Agee says. "We've gone from a little hospital on a hill caring for migrant workers more than a century ago, to building a system of hospitals, to transforming into an integrated health care delivery system, to becoming the physician-led Carilion Clinic of today. We've always embraced our challenges with energy, passion, and creativity. I'm excited about the next 10 years."

Daunting challenges lie ahead, to be sure. Yet the past decade has infused Agee and others with a remarkable confidence that they can achieve anything. And if recent history is any indication, they just might be right. CM

**2013** The Carilion-affiliated Jefferson College of Health Sciences places at the top in Virginia for first-year earnings by bachelor's degree graduates

**2014** The VTC School of Medicine graduates the first of what will ultimately be four classes in a row—and counting—with a 100-percent residency match

**2014** The Liaison Committee on Medical Education grants the VTC School of Medicine full accreditation, exactly on time

**2015** VTC, Jefferson College of Health Sciences, Carilion, and Virginia Tech host Collaborating Across Borders, the leading North American conference for advancing the field of interprofessionalism

**2016** Nancy Howell Agee is selected as chair-elect of the American Hospital Association's Board of Trustees, an appointment that will start in 2018

**2016** With Virginia Tech, Carilion announces plans to fold the VTC School of Medicine into the university while remaining the school's clinical partner

**2016** Virginia Tech and Carilion announce that VTC will form the hub of the Health Sciences and Technology Campus and Roanoke Innovation Corridor

**2016** The General Assembly of Virginia pledges $45 million to double the size of the Virginia Tech Carilion Research Institute

**PUPPY LOVE:** Ellie, a member of Pet Pals, is one of Carilion's secret weapons in providing care for people seeking to overcome pain without medication.

# the fix

**A team approach helps Carilion lead the charge against Virginia's opioid addiction epidemic.**

BY JESSICA CERRETANI

It's Saturday night and the man is at the emergency department again. This time, he tells the physician on call, he's strained his back doing yardwork. *Feels like I pulled a muscle or something, Doc.* The pain, he says, is unbearable—but a prescription for Oxycontin might help. • It's an increasingly familiar scene at emergency departments throughout Virginia and across the country. The truth is that the patient isn't suffering from back pain—or a twisted ankle, sprained wrist, or other soft-tissue injury. Yet he does have a real health concern: an addiction to opioids. And he isn't alone. According to the U.S. Centers for Disease Control and Prevention, this country is in the midst of an epidemic. In 2015 alone, more than 33,000 Americans died from an overdose of opioids—and nearly half of those deaths involved prescription opioids such as Oxycontin.


The scenario is all too familiar to Virginia clinicians. In 2016, Governor Terry McAuliffe declared the commonwealth's opioid addiction crisis a public health emergency. The statistics are troubling: More people in Virginia now die from opioid overdoses than from car accidents, at an estimated rate of three people a day. Overdoses from heroin—often laced with the powerful opioid fentanyl—are increasingly common in local emergency departments, says John Burton, M.D., chair of emergency medicine at Carilion Clinic. Another common sight: frequent fliers like the man visiting the emergency department.

"In the past decade, we've seen a huge surge of people feigning illness in an attempt to obtain opioids for themselves or to sell," Dr. Burton says. "It's led us to take a hard look at our prescribing practices and make some changes."

Last fall, Carilion leaders met with Virginia's lieutenant governor, Ralph Northam, to brainstorm ways in which they could help solve the state's increasing addiction problem. But the fact is that Carilion has been at the forefront of this battle for much longer than just a few months—and its clinicians are seeing results.

## A PAINFUL TRUTH

To understand the current crisis, it helps to understand the roots of addiction, says Warren Bickel, Ph.D., a professor at the Virginia Tech Carilion Research Institute, where he also directs the Addiction Recovery Research Center. His research has demonstrated that people struggling with addiction radically discount the future in favor of instant gratification. In one study, he and his colleagues found that, when asked to think about their future, healthy non-addicts imagined themselves an average of nearly five years into the future. Opioid-dependent people identified the future as just nine *days*.

This concept, known as delay discounting, suggests that substance abusers are unable to consider the long-term consequences of their addiction because they are focused on an immediate need to procure drugs and quell uncomfortable withdrawal symptoms. That can help explain why drug seekers show up in emergency departments and physicians' offices, desperate to obtain their next fix. Many of these patients may have started taking prescription opioids for legitimate sources of pain, unaware that these substances are highly addictive.

"The medical community used to believe that a few weeks on opioids was safe for people in pain," says Dr. Burton. "Now we know that even that relatively short timeframe can lead to abuse. These medications are much more addictive than was once thought."

Over time, people who become addicted to prescription opioids can progress to stronger drugs such as heroin and fentanyl, which carry a higher risk of overdose.

## CHANGE MAKERS

The key to addressing opioid addiction is a multipronged approach, say experts—and clinicians have a powerful role to play in it.

### Telemedicine for Opioid Addiction

The U.S. Department of Agriculture has awarded Carilion Clinic a $434,182 grant to deliver telemedicine to 12 rural counties in southwest Virginia. The grant is one of five the agency awarded to help provide treatment for the growing opioid epidemic in rural central Appalachia.

"Because addiction treatment is often out of reach for many in rural America," said Tom Vilsack, former U.S. Department of Agriculture secretary, "expanding access to telemedicine is an important step toward making sure rural communities have the tools they need to fight the opioid epidemic."

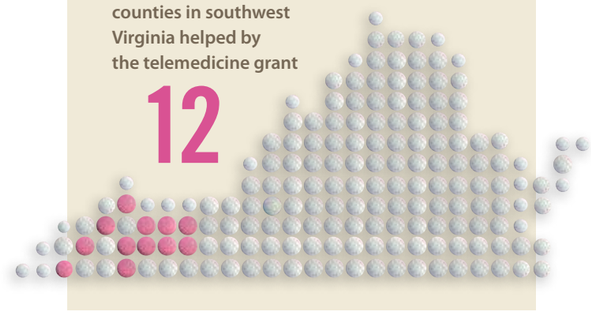
The Carilion program will enable patients struggling with opioid addiction in remote areas to use tablets in their local clinicians' offices to speak with Roanoke psychiatrists. Fifteen of the 18 sites targeted are in high-poverty counties.

"Telemedicine will allow us to remove a critical barrier to care in remote areas, where the need is often greatest," said Thomas Milam, M.D., co-interim chair of Carilion's Department of Psychiatry, which secured the grant. "We can facilitate the psychosocial counseling that patients must undergo to keep their eligibility for medication-assisted treatment. We can also support the providers in rural clinics who are offering that treatment."

The program is one of several innovations the Department of Psychiatry is pursuing in the face of the epidemic. Several physicians are collaborating with the Virginia Department of Health to evaluate outcomes from opiate replacement therapy during pregnancy, for example, while others are working with pregnant women addicted to opiates to secure a better future for mothers and newborns.

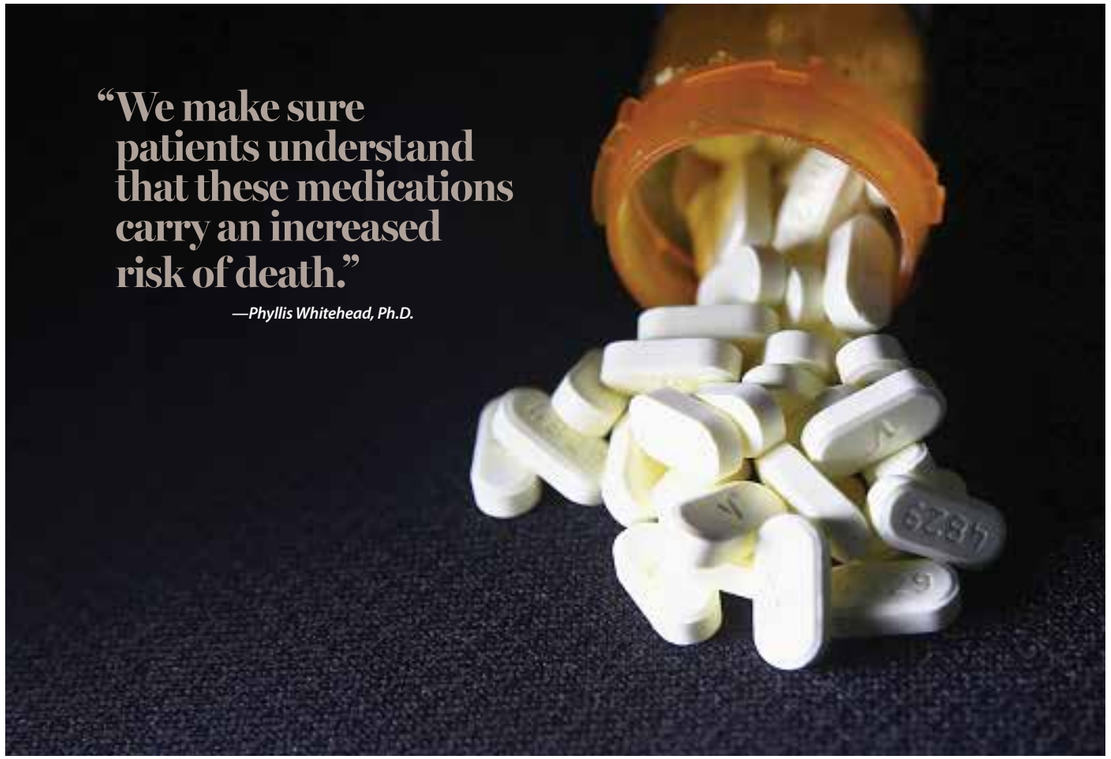
Number of rural counties in southwest Virginia helped by the telemedicine grant

**12**





PHOTOS: JARED LADIA (PREVIOUS SPREAD); DAVID HUNGATE (ABOVE)




“It would be irresponsible for us not to recognize that the availability of prescription narcotics has had a significant effect on opioid abuse and addiction,” says Bruce Long, M.D., interim chair of Carilion’s Department of Surgery. “It’s in our best interests and those of our patients to reduce the amount we prescribe.”

Physician education is a major aspect of this approach. As a member of both local and national taskforces aimed at stemming the opioid epidemic, Carilion clinical nurse specialist Phyllis Whitehead, Ph.D., understands that tackling the crisis is a team effort—and that teaching clinicians about the importance of proper prescribing is critical. She and her colleagues have formed a working group dedicated to creating a pain management curriculum for physicians. They’re also in the process of developing a standardized medication agreement, which educates patients about the risks and responsibilities of taking opioid drugs.

“There are about 20 items for clinicians to walk patients through and have them sign,” Dr. Whitehead explains. “We ask patients to agree not to seek out opioids elsewhere, and we make sure they understand that these medications carry an increased risk of death. This benefits patients and provides an extra layer of protection for clinicians.”

Carilion clinicians are further addressing the crisis by making changes to the way opioid medications are prescribed. Dr. Burton has helped craft statewide guidelines for resetting the process, which provide emergency clinicians with a 14-point checklist for proper prescribing. In the past, patients visiting the Emergency Department might have received a 90-day supply of opioids for the pain of a broken bone—today, the same situation merits just a week’s supply or even less.

Physicians are also rethinking the way they treat chronic pain. “We now know that long-term opioid use doesn’t translate into improved outcomes for people with chronic back pain or joint pain, for example,” Dr. Burton says. “We used to prescribe these medications much more liberally for people with chronic pain, but they don’t actually improve function—and they increase the risk of addiction. Rather than an early go-to strategy, opioids should be for very few patients, and even then as a last resort.”

This approach isn’t limited to the Emergency Department. Surgeons are taking steps to reduce the use of opioids in post-surgical patients as well.

“In recent years, surgeons have worked harder to minimize the levels of narcotics used during elective surgeries,” explains Dr. Long. Instead, they’re relying on different modalities, such as regional anesthesia and lidocaine, to help decrease the amount of opioid medication needed during the procedure itself. As a result, patients emerge from surgery in less pain and with fewer side effects—making them less likely to require postoperative opioids.

PHOTO: SHUTTERSTOCK



“We want patients to get back to their pre-surgery function,” Dr. Long says. “Limiting opioid use helps them achieve that more quickly.”

## MULTIPLE CHOICE

To further reduce reliance on opioid medications, Carilion has launched a comprehensive pain management program that offers a range of services and provides primary care physicians with a referral option.

“Our ability to manage our patients’ pain is absolutely essential to their care,” says Dr. Long. “Yet, historically, pain management doesn’t belong in any one specialty, as it’s a symptom rather than a diagnosis. Caregivers across the continuum have had to treat pain, with varying degrees of success.”

Rather than relying on medications that mask pain, Carilion’s Chronic Pain Management Clinic treats pain at its root. Clinicians draw upon a range of approaches for relieving suffering without relying on prescription drugs.

Under the leadership of Dr. Long, an interdisciplinary team has developed a comprehensive program that addresses pain from a systemwide perspective. The program builds on the work of several departments—including orthopaedics, emergency medicine, and family medicine—and represents an integrated, patient-centered approach. It also introduces complementary and alternative therapies, such as acupuncture, reiki, pet therapy, mindfulness practice, and massage.

## TAKING THE LONG VIEW

For people already struggling with opioid abuse, Dr. Bickel says, clinicians should focus on explaining the value of treatment—and the risks of discontinuing it. “The most important thing,” he says, “is for patients to understand that there are treatments that work—but only as long as the patients remain on them.”

Dr. Bickel notes that Suboxone—a combination of the opioid buprenorphine and the anti-overdose drug naloxone—can serve as a bridge to allow addicts to taper off without getting high. It’s now a standard remedy for opioid addicts undergoing medication-assisted treatment. Yet Suboxone, which satisfies the physical cravings of addiction without the euphoric effects, can in turn be abused. As an imperfect and even controversial solution, the drug needs careful monitoring by specially trained clinicians.

Regardless of treatment, long-term support is key, Dr. Bickel says. “We need to stress the importance of sticking with treatment,” he adds. “The vast majority of overdoses I’ve seen occur when someone stops medication too early and returns to heroin. Addiction affects the whole person, and people need a lot of support to work through those issues and stay clean.”

## A COMMITMENT TO COMMUNITY

Carilion’s clinicians say they aren’t surprised that the hospital has taken the lead in addressing the state’s addiction crisis. “Our clinic model has always promoted collaboration between departments and disciplines,” says Dr. Burton. “This creates an environment that encourages us to communicate across the organization and create cutting-edge solutions for patients. Dealing with opioid addiction is just one example of this approach.”

That attitude carries beyond hospital walls. Carilion is now running a telemedicine initiative that uses video chats to connect rural patients and their physicians with addiction specialists—even though they may be located many miles apart.

Such a commitment to patients remains a major driver of the hospital’s role in transforming the way that clinicians approach both pain and addiction, adds Dr. Whitehead.

“We always put our community first,” she says. “This is just the beginning of what we can do to help.” CM

### Pain Management

Carilion’s Chronic Pain Management Clinic seeks both to alleviate patient pain and to reduce drug abuse. An interdisciplinary team of specialists—including anesthesiologists, physician assistants, and nurse practitioners—offers advanced care. The clinic recently welcomed two new team physicians.

**Yaohua Lu, M.D.**

Dr. Lu joined Carilion in September from the University of Vermont Medical Center, where she undertook an interventional pain fellowship. She earned her medical degree at New York Medical College before completing an anesthesiology residency at the University of Virginia Medical Center. Her principal focus is on the multimodal management of common chronic pain syndromes. She is board certified in anesthesia and interventional pain management.

**Elizabeth Russo-Stringer, M.D.**

Dr. Russo-Stringer joined Carilion in January. She earned her medical degree at Louisiana State University School of Medicine in New Orleans and completed her residency in anesthesia at the University of Alabama, Birmingham, where she also undertook a fellowship in interventional pain management. She specializes in using minimally invasive techniques to manage patient pain without medication. She is board certified in anesthesia and interventional pain management.

PHOTOS: JARED LADIA


CHASERS

# STORM

**Carilion Clinic doctors are mitigating the fear factor with new surgical approaches to epilepsy.**

BY VERONICA MEADE-KELLY

EVERY DAY, CHELSEY MAYHEW BRAVES treacherous conditions: She weathers storms that can come with little warning, erupting into electrical bursts that disrupt her life and leave destruction in their wake.

But these troublesome surges aren't the result of a capricious weather system—they are the defining feature of epilepsy, a neurological condition that affects roughly 1 percent of the population. Patients with epilepsy endure recurrent seizures—short bouts of aberrant electrical activity during which brain cells fire uncontrollably. The convulsive "grand mal" seizure—during which victims collapse to the floor unconscious, shaking, and with teeth clenched—may be the most familiar image of these seizures. In reality, though, seizures range in severity and can also manifest as twitching, blackouts, and hallucinations.

"When I have a seizure, it's different than what people usually imagine," says Mayhew, a 22-year-old occupational therapy assistant who was diagnosed with epilepsy in 2016. "I just blank out. I'm clueless about what's going on around me,

ILLUSTRATION: KEN ORVIDAS

THERE'S OFTEN A CUMULATIVE, COGNITIVE IMPACT FOR THOSE WHO ENDURE THESE ELECTRICAL SURGES OVER TIME: THE EROSION OF OF THEIR SHORT- AND LONG-TERM MEMORY, AS WELL AS LANGUAGE SKILLS.

and if someone tries to talk to me I have no idea what they're saying."

There's also often a cumulative, cognitive impact for those who endure these electrical surges, as their short- and long-term memory and language skills can erode over time. These side effects further hamper patients' independence.

"The social cost of epilepsy is just horrible. That's what drew me to it," says Mark Witcher, M.D., a functional neurosurgery specialist who treats epilepsy patients, including Mayhew, at his Carilion practice. "If the epilepsy can be controlled, patients can often continue to do the great things that make them who they are. But if left untreated, it can prevent them from reaching their full potential."

## A Needed Advancement

Epilepsy is a chronic condition that can affect people of all ages, and the cause isn't always clear. Some cases are thought to be genetic while others can be traced to brain injury or infection. For most patients, medications can quell the electrical bursts that cause the seizures, but for a small percentage of cases—roughly 1 to 2 percent—these treatments simply don't work.

Until recently, a dreaded alternative has been a highly invasive surgical procedure that involved removing a large piece of the skull in order to plant electrodes directly on the brain, first to identify and then treat the lesion at the eye of the electrical storm.

"This type of surgery engenders a lot of fear, and many people decide to go without," Dr. Witcher says. "Some studies have shown that people suffering from epilepsy go 15 to 20 years before being recommended for surgery, let alone pursuing it."

Fortunately, the surgical climate has changed for the better. New approaches that are both more precise and less invasive have emerged as better imaging and surgical technologies have become available. Dr. Witcher is part of a new wave of surgeons who are harnessing these techniques to help patients in ways that weren't possible even a decade ago.

When Dr. Witcher joined Carilion in the summer of 2016, he brought new methods that make it easier to identify the source of patients' seizures and lessen the trauma of epilepsy surgery.

On the diagnostic front, Carilion has started using stereoencephalography, or SEEG, which allows clinicians to monitor brain activity less invasively. Rather than opening the skull, Dr. Witcher and others who specialize in these new surgical techniques treat patients through a simple "stab incision"—a three-millimeter cut through which electrodes can be placed directly on the brain. These electrodes allow the clinicians to monitor both hemispheres and multiple lobes simultaneously, and produce three-dimensional readouts of the brain's electrical activity.

SEEG helps the clinical team more accurately identify the source, or "focus," of the electrical storms that trigger a patient's seizures. The procedure is safer and more easily borne by patients. It is also more accurate, pinpointing foci more easily, even in cases in which more than one lesion in the brain is causing the trouble.

"There were so many cases in the past in which lesions could not be identified from outside of the skull, and practitioners had to say, 'Sorry, there's no way we can help you,'" Dr. Witcher says. "With these new technologies, we can offer more solutions."

To detect these foci, Dr. Witcher's team has acquired a "stereotactic robot," the first in Virginia to aid in intracranial surgery. Dr. Witcher works in tandem with the robot, guiding it through the tiny scalp incisions where it can then safely and accurately place the electrodes. "Using the robot speeds the procedure and reduces the fear factor for patients," he says. "It means much less time in the operating room."

Because the surgical placement of the electrodes is faster and less invasive than in traditional surgery, patients can be moved from the operating room immediately to Carilion's state-of-the-art Epilepsy Monitoring Unit. There, a team of specially trained nurses and staff observes the patients for seizures. Once seizures occur, the team can use SEEG and other imaging technologies to pinpoint the foci in the brain. In comparison, more invasive, traditional surgeries required a recovery time of two or more days in the intensive care unit before monitoring could even begin.

## Game-Changing Treatments

Sometimes, the diagnostic electrodes themselves can be used to treat the focus of the epilepsy. In other cases, surgeons can use new, minimally invasive approaches such as laser interstitial therapy, which Dr. Witcher describes as "a game changer in epilepsy surgery."

During the procedure, a laser fiber is inserted through a three-millimeter incision and directed to the precise part of the brain identified as the source of the seizures. Magnetic resonance imaging is used in real time to observe the procedure, ensuring that the laser fiber is guided to the right spot. The laser fiber is then used to remove, or "ablate," the troublesome tissue.

No hair is shaved; no bone is removed; and patients no longer endure a four- to six-hour surgery requiring days in the intensive care unit. Instead, they wake up shortly after surgery and go home the next day.

Mayhew, who was given a choice between the more traditional, open-resection surgery and laser ablation, says Dr. Witcher explained the pros and cons of both procedures. The laser ablation is less invasive with a reduced recovery time, but its minimalist approach means the lesion can be missed, requiring a repetition of the procedure or, eventually, traditional surgery.

Mayhew chose the less invasive option and had laser ablation in February. While the full success of the procedure will not become clear for several more months, already she has noticed a considerable lessening of symptoms.

A high percentage of patients come out of laser ablation surgery free of seizures, Dr. Witcher says, and the neuropsychological outcomes—the cognitive impact of surgery—seem to be mitigated, likely because of the procedure's less invasive nature. This is particularly true when foci are near the brain stem, toward the center of the skull. In such cases, open-resection surgery would require tissue to be removed or retracted before the surgeon could reach the source. Now, laser fibers can reach those structures directly. The less invasive approach also reduces risk of infection and hemorrhage.

There are still cases in which the source of the seizures cannot be safely reached by surgical means—and there have been advances to address those, too. An approach known as neuromodulation allows Carilion surgeons and their peers to install a sort of pacemaker for the brain that detects a seizure as it happens and stimulates the brain to stave off the electrical storm. This device, which goes by the tradename Neuropace, was approved in 2013 and has helped improve seizure rates by 60 to 70 percent.

## Beyond the Fear Factor

While these advances have turned the tide for epilepsy treatment, enabling surgeons to reduce and control seizures in patients who would have been considered untreatable just a few years ago, the techniques are not being applied as widely as they could be.

"Many people have been biased against surgery for epilepsy in the past because of the severity of the procedures that were available," Dr. Witcher says. "Overcoming these fears is still a challenge. Educating our referral base about the new treatments that are available will help; people are often surprised these options exist."

These advances have completely revolutionized the way epilepsy is treated, Dr. Witcher adds.

"At Carilion, we can now offer the full armamentarium of options that were previously available to only a few academic centers in the country," he says. "This is great news for our patients: These tools are unparalleled in helping people regain control of their lives." CM

**THE PERFECT SPOT:** Mark Witcher, M.D., is a national leader in using real-time magnetic-resonance-imaging-guided visualization for highly accurate laser ablations in people with epilepsy.

PHOTO: JARED LADIA

# *Call of the* Wild

Carilion has launched a wilderness medicine fellowship in response to the region's popularity as an outdoor destination. **BY PAULA BYRON**

**LIVING ON THE EDGE: McAfee Knob, one of the most photographed spots on the Appalachian Trail, offers an almost 270-degree view of the Catawba Valley to the west, Tinker Cliffs to the north, and the Roanoke Valley to the east.**

**McAfee Knob, an iconic bluff on the Appalachian Trail, offers panoramic views of the azure-hued peaks that give the Blue Ridge Mountains their name. The popular overhang also offers health professionals plenty of practice in wilderness medicine.**

At least once a week, emergency medical technicians in Roanoke, Virginia, are called to McAfee and nearby Dragon's Tooth, a rocky spire that juts several dozen feet in the air, to assist in a crisis: a broken bone, dehydration, a calamitous mixing of alcohol and outdoor adventure. On call to accompany those experts is Stephanie Lareau, M.D., director of Carilion Clinic's new Wilderness Medicine Fellowship.

"We've developed a protocol that allows me to go on calls with emergency medical techs, enabling me to offer training in wilderness settings at the same time I'm assisting on the trail," says Dr. Lareau. "I can also introduce other physicians to the principles and practicalities of wilderness medicine."

## HIGH STAKES

In nearly a decade of providing wilderness medicine, Dr. Lareau has seen it all: a Peruvian farmworker with a machete injury, a snakebitten six-year-old who had to be carried several miles along a trail on her mother's back, a teenager stabbed in the chest while twirling daggers rather than batons. But Dr. Lareau's most challenging patient to date may well have been a woman who tumbled in her own backyard.

It was a wintry evening, and in the dark the 64-year-old woman slipped on some icy steps. She lived alone in rural Virginia, and when she was found the next day, still sprawled on the cold ground, she was unconscious, with only a faint pulse. Her core body temperature had dropped to a dangerous 73 degrees.

After the patient was airlifted to the hospital, Dr. Lareau and her Emergency Department colleagues used medical ingenuity to warm her up slowly and safely, and in less than a week the woman was able to leave the hospital neurologically intact.

Since then, Dr. Lareau has worked with the trauma team to refine Carilion's hypothermia protocol and present the lessons learned at a national conference. The hospital now conducts hypothermia training and maintains a specialized cart with all the equipment clinicians would need a treat a hypothermic patient.

Dr. Lareau takes that same mindset of preparedness into the field.

"Whether the environmental conditions you're confronting are in an Everest base camp or a Walmart parking lot, the same principles apply," she says. "Sometimes the wilderness can be your own backyard. It's a matter of being able to adapt clinical skills to challenging environments with limited resources."

## ROUGH AND READY

Not many doctors choose their medical specialty while sheltering in a cave on the side of a mountain. But that's just where Dr. Lareau confirmed her calling.

During medical school, she was attending a wilderness medicine conference in Colorado when she and some friends decided to climb a "fourteener"—one of the state's peaks with an elevation of at least 14,000 feet. Bad weather started rolling in, but the hikers continued. They were overtaken first with summit fever, Dr. Lareau says, then with the storm. In their scramble down the mountain they were forced to take cover in a cave.

"In retrospect, it was a poor choice to keep pushing for the top when we knew the weather was worsening," Dr. Lareau says. "We ended up being unharmed, but the near miss confirmed for me the fascination I had for the intersection of medicine and the outdoors."

That wasn't her first encounter with challenges in the wild. Also while a medical student, Dr. Lareau slipped on a rock and sprained her ankle several miles from a trailhead. So she fashioned a splint using duct tape and hobbled out on a friend's trekking poles.

"As long as you have an improvising mindset," she says, "you have everything you need in your backpack."

## VIEW FROM THE TOP

Before joining Carilion, Dr. Lareau had already amassed impressive credentials. A board member of the Appalachian Center for Wilderness Medicine since 2008, she had also completed a wilderness medicine fellowship from Georgia Health Sciences.

Recruiting Dr. Lareau to Carilion was easy. The Emergency Department chair, John Burton, M.D., took her up on the helipad of Carilion Roanoke Memorial Hospital. Nestled at the base of Mill Mountain, the hospital is minutes from the Blue Ridge Parkway and the Appalachian Trail. To the west, Dr. Lareau could see a river and miles of greenways snaking through the city. In the distance, she could see undulating hills leading to sunlit mountain ranges.

"I immediately fell in love with the area," she says.

In 2013, the same year she joined Carilion as an emergency medicine physician, Dr. Lareau co-founded Blue Ridge Adventure Medicine, for which she serves as lead instructor. Two years later, she was tasked with creating Carilion's Wilderness Medicine Fellowship. The one-year program joins less than a dozen such programs nationally.

## PASSING THE BATON

The first physician to undertake the fellowship, Jessica Gehner, M.D., had her earliest encounter with Carilion as an emergency patient. The year before she started medical school, she started hiking the Appalachian Trail south from Maine. She got as far as Roanoke, and there she tripped. It was an unspectacular stumble, but enough to fracture her leg and land her in Carilion Roanoke Memorial Hospital's Emergency Department. Both the trail and her hospital stay clearly proved agreeable; she later returned to complete the hike and, ultimately, to start the fellowship in 2016.

Dr. Gehner has spent her year conducting research on the impact of pack weights on long-distance hikers. She has also forged a collaboration with emergency medicine physicians in Nepal.

At the conclusion of Dr. Gehner's fellowship in 2017, Joshua Nichols, M.D., a member of the charter class of the Virginia Tech Carilion School of Medicine, will take her place. Dr. Nichols, who is completing an emergency medicine residency at Carilion, has already collaborated with Dr. Lareau on using a low-cost mannequin in wilderness medicine simulations.

## TEACHABLE MOMENTS

A primary focus of the fellowship program is educating the community to stay safe. As part of her work, Dr. Lareau teams up with Roanoke Parks and Recreation to offer the Disrupting Natural Selection Lecture Series, whose facetious title suggests that slipups in nature will lead to an early extinction. The goal: to lessen the need for backcountry rescues.

Topics include trailside safety, cold-weather injuries, and moving-water hazards. Dr. Lareau says she often needs to correct misconceptions. "I have to tell our students, no—running in a zigzag pattern when a copperhead is after you won't break the snake's back."

Teaching extends to other parts of the globe. The Wilderness Medicine Fellowship has partnered with Sacred Valley Health to design a wilderness first-aid course for local health care workers, known as *prometoras,* in the village of Ollyanta, Peru.

"We teach the *prometoras* such skills as splinting, applying tourniquets, and understanding when people need to be transported to town," Dr. Lareau says. "Their skills can make a real difference in the survival of their community members."

## INTO THE WILD

Dr. Lareau notes that a high proportion of Carilion's emergency medicine patients are transfers from remote areas. Wilderness medicine, she says, is often comparable to disaster medicine, in which physicians learn adaptability and resourcefulness.

"It's about knowing how to take care of yourself in a range of settings," she says, "and providing lifesaving care in austere environments." CM

**REWARD AT THE TOP:** The Appalachian Trail (bottom left) is just minutes from Carilion Clinic's flagship hospital in Roanoke. A thousand miles of hiking trails are within an hour's drive of the city.

**WILDERNESS DOCTOR:** Stephanie Lareau, M.D. (bottom right), on top of McAfee Knob with her dogs, Comet and Copper, heads up Carilion's Wilderness Medicine Fellowship.

PHOTO: CHRISTIN HEALEY (PREVIOUS SPREAD)

PHOTOS: KEMPER MILLS FANT PHOTOGRAPHY (LEFT); COURTESY OF STEPHANIE LAREAU

# Back on Track

Medical students joined with clinicians and engineering students to develop a technique to enhance spinal fusion. **BY ALISON MATTHIESSEN**

When Zakkary Walterscheid first arrived at the Virginia Tech Carilion School of Medicine, he was ready to put his focus on becoming a doctor.

"I had a nice diploma to hang on the wall that said 'biomedical engineering,'" says the third-year student. "But I thought my engineering career was behind me."

That is, until a few months into medical school, when he met Pat Artis, Ph.D., a professor of practice in the Department of Biomedical Engineering and Mechanics (BEAM) in Virginia Tech's College of Engineering. After bonding over their engineering backgrounds at a community reception for medical students, Dr. Artis gave Walterscheid his card and encouraged him to consider teaming up with a BEAM senior project team for his research.

As Walterscheid dove into his studies, he found himself drawn to orthopaedics. He began working on his research project—a requirement for all Virginia Tech Carilion medical students—with Jonathan Carmouche, M.D., an assistant professor of orthopaedic surgery and chief of orthopaedic spine at Carilion Clinic's Institute for Orthopaedics and Neurosciences.

Dr. Carmouche directs the Musculoskeletal Education and Research Center, which he founded within Carilion's Department of Orthopaedics. There he was working on a new technique for spine surgery in which surgeons extract bone from a patient's vertebrae and use it to replace a spinal disc.

Dr. Carmouche's research offered opportunities for VTC medical students. While Conor O'Neill began to compare the new technique with the old, Walterscheid took a different angle.

"The question was, if you are taking a chunk of bone out of the vertebrae, are you making it weaker?" Walterscheid says. "I figured the best way to get that answer was to take models, compress them, and see how they compared. It became clear we needed to involve an engineer."

Walterscheid remembered the earlier offer of help. Dr. Artis connected him with Raffaella De Vita, Ph.D., an associate professor of biomedical engineering and mechanics in the College of Engineering, who had the necessary equipment. Dr. Artis also encouraged Walterscheid to pitch his project to undergraduates looking for research for their senior design projects.

"The day I pitched my project, I walked away with five engineers on my team," Walterscheid says.

The undergraduates helped with the compression study—yet didn't stop there.

"I had talked to Dr. Carmouche about a drill that would have a manual stop so you wouldn't go too deep," Walterscheid says. "But the issue was, how do you drill in and bring the bone back out without damaging anything?"

So the students designed a tool that could be used to extract bone during surgery. Essentially, they adapted an Archimedes drill to use water against gravity. The drill spins a screw down while using water to send the material back up for use in the surgery.

"The technique is simple and elegant," Walterscheid says. "It was brilliant that they were able to take a classical engineering principle and apply it to clinical use."

"The volume of data they came up with in a short time was amazing," Dr. Carmouche says. "The tool design was much more sophisticated than I ever would have expected."

The undergraduates were listed as authors on the research paper that Walterscheid presented as a scientific exhibit at an international meeting of the American Academy of Orthopaedic Surgeons. The feedback was positive, especially among surgeons who work with diabetics and smokers, whose bone quality tends to be compromised. Others noted the advantage the drill would represent in resource-scarce settings.

"When people approach problems from orthogonal perspectives, they yield an enormous number of new ideas and ways to approach problems," Dr. Artis says. "The doctors help the engineers pare down ideas to what is reasonable with patients, and the engineers solve problems that the doctors don't necessarily have the time nor the mechanics background to be able to approach."

Dr. Carmouche agrees that time is a hugely limiting factor for the orthopaedists in his practice who want to conduct research. "We have a bunch of ideas," he says. "The students have time to pour into it. Together, we can bring ideas to fruition."

Beyond the win for research, the projects can also shape students' futures.

"When I got to medical school, I knew we were required to do research," Walterscheid says. "It was one of the things that I liked. But I thought after that, research would be behind me. Now it will absolutely be something I continue. I want to practice at a major academic center and still be involved." CM


PHOTO: DAVID HUNGATE

> **"When I got to medical school, I knew we were required to do research. It was one of the things that I liked. But I thought after that, research would be behind me. Now it will absolutely be something I continue."**
>
> *—Zakkary Walterscheid*

# A Day in the Life of Thomas Kerkering

The internationally renowned infectious disease specialist remains ever alert for the next medical mystery. **PHOTO ESSAY BY DAVID HUNGATE**

**MYSTERY MAN:** During four decades of treating patients for infectious diseases both common and rare, Thomas Kerkering, M.D., has learned to interpret even the subtlest of medical clues. With this patient, though, the diagnosis required less detective work: a case of the flu.

"HER NAME WAS MAGILL, SHE CALLED HERSELF LIL, BUT everyone knew her as Nancy."

That lyric from "Rocky Raccoon," a track on the Beatles' famous *White Album,* was the tipoff for Thomas Kerkering, M.D. Listening to music one evening, just a few years into his career as an infectious disease doctor, he had a eureka moment.

He had been stumped that none of the 10 patients he was treating for a rare infectious disease knew one another. Then it hit him: The cast of characters the patients mentioned—"Dicky," "Ducky," "Bubba," "Top Hat," and "Screaming Jesus"—were all the same man. Like "Magill," the index patient was known by a range of names.

That and other insights gained from nearly 40 years in medicine have earned Dr. Kerkering, Carilion Clinic's chief of infectious disease, an international reputation. At the height of the Ebola outbreak, for example, the World Health Organization enlisted his help in Sierra Leone, where he trained health care workers to care for infected patients.

Back home in Roanoke, Dr. Kerkering treats patients for infections ranging from pneumonia to H1N1 to HIV. In 2013, he treated the youngest known patient in a fungal meningitis outbreak that had been caused by tainted steroid shots.

"I find deep satisfaction in learning my patients' stories, which help me understand how to care for them," he says. "Every patient is a novel."

**ON THE MOVE**

For Thomas Kerkering, M.D., a typical day means moving between various clinical sites to treat various sites of infection. Clockwise from right: Dr. Kerkering makes notations on patient charts at Bradley Free Clinic, where he volunteers alongside Carilion neurologist Gary Harpold, M.D.; examines a patient in Carilion's infectious disease department; discusses treatment strategy with a Carilion Roanoke Memorial Hospital patient; tests a patient's hand strength as part of a routine examination at Bradley Free Clinic; and checks on the recovery of a pediatric patient.

**THE VISION THING**

Dr. Kerkering, who also teaches at the Virginia Tech Carilion School of Medicine, examines an eight-year-old who contracted the microscopic parasite *Cryptosporidium* on his family's farm in Franklin County, Virginia. The boy recovered from the infection after a weeklong hospitalization.

# THE COMFORTER

As Caroline Osborne was fighting for her life, her friends found new meaning in their white coats. **BY ALISON MATTHIESSEN**

IT WAS CURIOSITY THAT HAD DRAWN CAROLINE Osborne to medical school, and curiosity that led her to question her own medical diagnosis.

After having a suspicious spot on her right arm removed, she received good news—yet the test results didn't end her quest. "The sample came back benign, but I'm a medical student," she said months later. "I wanted to know more." So she sought additional tests of a larger section and found her instincts were right: It was melanoma. After additional surgery, her prognosis was excellent.

A second-year student at the Virginia Tech Carilion School of Medicine at the time, Osborne barely missed a beat. She passed the first round of her board exams and started her third-year clerkship rotations on schedule. In January 2013, though, about six months into her clerkships, she began to experience visual defects.

"Then we found out she had many lesions in her brain," said her father, Carl Osborne. "The cancer was basically everywhere and very aggressive. Doctors told us she had just months to live."

The news devastated not just Caroline and her family, but her extended medical school family as well. "We were all close," said Matthew Joy, M.D., president of the school's charter class. "We felt like someone in our own families had been given this diagnosis."

When her family decided to seek treatments abroad, her classmates sent cards, flowers and, most memorably, a quilt made from their white coats.

"We know how precious those white coats are," Osborne's mother, Ellen, says. "For Caroline, it brightened the day because she knew what it meant that they did that for her."

Just a few months after the class graduated, Caroline lost her battle. Her life—and death—still resonates for her classmates, who are now medical residents.

"Caroline made us think about what's really important," said Dr. Joy, a plastic surgery resident at Carilion. "It goes beyond just medicine to how you want to spend your life, make it worthwhile, and take advantage of every opportunity you have." CM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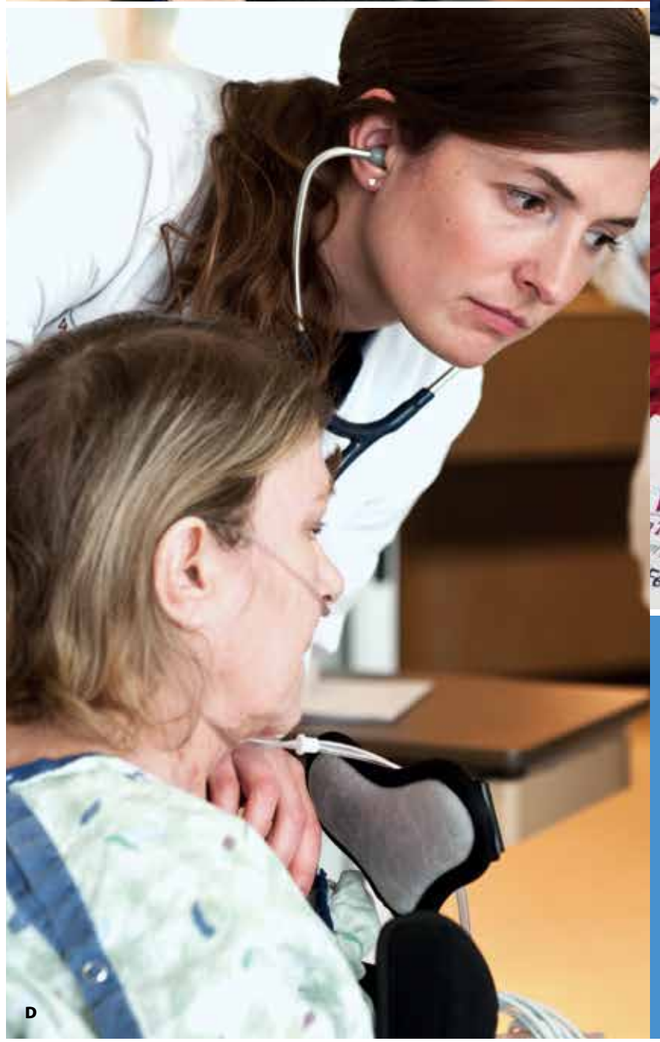
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**AFFECTION IN EVERY STITCH**

**A.** From the very beginning of medical school, Caroline Osborne demonstrated both an easy friendliness and natural leadership skills. **B.** Her classmates all contributed pieces of their white coats for a commemorative quilt, which they sent to Osborne while she was undergoing experimental treatments. **C.** Osborne (second row up, second from the right) was one of 42 members of the Virginia Tech Carilion School of Medicine's charter class. **D.** On the first day of her clinical clerkship, Osborne showed grace under pressure, demonstrating clinical skill, answering her attending's questions impeccably, and treating patients with professionalism and compassion.

PHOTOS: JIM STROUP (A); DAVID HUNGATE (B AND C); LOGAN WALLACE (D)

# cheers for peers

## Family Medicine

**MARK GREENAWALD, M.D.,** vice chair of academic affairs and professional development, was named Family Physician of the Year by the Virginia Academy of Family Physicians. The award recognizes physicians who provide the community with compassionate, comprehensive, and caring medical service on a continuing basis; are directly and effectively involved in community affairs and activities that enhance the quality of life in the community; and serve as a role model in the community and within the profession.

**HETZAL HARTLEY, M.D.,** medical director for Occupational Medicine, was appointed by Governor Terry McAuliffe to the medical advisory board for the Virginia Department of Motor Vehicles.

**ROGER HOFFORD, M.D.,** served on the Virginia Academy of Family Physicians' Legislative Committee.

**MICHAEL JEREMIAH, M.D.,** chair of Family and Community Medicine, was selected to serve as chair of the Healthcare Delivery Transformation Committee of the Association of Departments of Family Medicine. Dr. Jeremiah has also served as a member of the association's Board of Directors.


## Internal Medicine

A quartet of Carilion doctors—**SAMEH AZIZ, M.D.,** a physician with Pulmonary Medicine; **BRIJESH PATEL, M.D.,** a resident with Pulmonary Critical Care; and **SUSANTI IE, M.D.,** and **EDMUNDO RUBIO, M.D.,** both physicians with Critical Care—authored "The Lung Point Sign, not Pathognomonic of a Pneumothorax," which was published in *Ultrasound Quarterly* in September 2016.

**THOMAS KERKERING, M.D.,** chief of Infectious Disease, was recognized by the Medical Society of Virginia Foundation with a Salute to Service Award, which acknowledges his long-term service and commitment to caring for patients in the international community.

## Neurosurgery

**GARY SIMONDS, M.D.,** chief of Neurosurgery, received the Self-Assessment in Neurological Surgery (SANS) Service Award from the Congress of Neurological Surgeons for his service and contributions to resident education.

## Obstetrics and Gynecology

**EDUARDO LARA-TORRE, M.D.,** chief of Obstetrics and Gynecology, and **FIDEL VALEA, M.D.,** chair of Obstetrics and Gynecology, coauthored a chapter on pediatric and adolescent gynecology for the seventh edition of *Comprehensive Gynecology,* a textbook published by Elsevier in August. Dr. Valea also served as an editor on the book.

Dr. Valea gave the A. Cullen Richardson Memorial Lecture at the District IV and VII annual meeting of the American Congress of Obstetricians and Gynecologists in October. His lecture was titled "Surgery on the Morbidly Obese and Other Challenging Cases."

*Office Care of Women,* a textbook published by Cambridge University Press, featured four chapters authored or coauthored by physicians with Obstetrics and Gynecology, including **MELANIE ALTIZER, M.D.; CHRISTINNE CANELA, M.D.; DR. LARA-TORRE; AMANDA MURCHISON, M.D.; MANJUSHA SAHNI, M.D.; ERIC SWISHER, M.D.;** and **PATRICE M. WEISS, M.D.**

Drs. Lara-Torre, Murchison, and Weiss coauthored a chapter on mastalgia for the most recent edition of *The 5-Minute Clinical Consult,* a medical reference published by Wolters Kluwer Health.

## Orthopaedics

**CALEB BEHREND, M.D.,** is part of a Clemson University team that received a $1.57-million grant from the National Institutes of Health to develop a novel imaging technique and dye-based sensor to detect and monitor bacterial infections on implanted medical devices.

## Psychiatry

**ANITA KABLINGER, M.D.,** coauthored "From Industry to Generativity: The First 12 Years of the Association for Academic Psychiatry Master Educator Program," which was published in the April 2016 issue of *Academic Psychiatry.*

The Carilion Department of Psychiatry, led by co-interim chairs **TRACEY CRISS, M.D.,** and **THOMAS MILAM, M.D.,** received a grant from the U.S. Department of Agriculture to provide telemedicine in 12 rural counties in southwest Virginia to help treat the opioid addiction epidemic.

## Radiology

**BIRAJ PATEL, M.D.,** a physician with Interventional Radiology, was selected to participate in the POSITIVE (PerfusiOn imaging Selection of Ischemic STroke Patients for EndoVascular ThErapy) multicenter trial. The principal goal of the trial is to identify, beyond current guidelines, patient populations who may benefit from endovascular stroke interventions.

## Provider Excellence

The Carilion Clinic Provider Excellence Awards recognize providers who demonstrate dedication and exceptional care to patients, families, staff, and fellow providers. Recipients are nominated by their colleagues. **DONALD STEINWEG, M.D.,** a physician with Internal Medicine, received the Provider Excellence Award for Physicians.

**TOMER PELLEG, D.O.,** a fellow with Pulmonary/Critical Care, received the Provider Excellence Award for Residents and Fellows. **ASHLEY AMOS,** a physician assistant with Emergency Medicine, and **AMY OSTERMANN,** a physician assistant with Neurosurgery, received the Provider Excellence Award for Advanced Clinical Practitioners.

## spotlight on Fidel Valea, M.D.

In October, **FIDEL VALEA, M.D.,** a nationally recognized expert in gynecologic oncology, joined Carilion Clinic as chair of its Department of Obstetrics and Gynecology. At the same time, he assumed a professorship in the Virginia Tech Carilion School of Medicine, where he also serves as chair of its Department of Obstetrics and Gynecology.

Most recently, Dr. Valea served as a professor in the Department of Obstetrics and Gynecology at Duke University Medical Center. He held several additional positions at Duke, including professor in the Division of Gynecologic Oncology, vice chair of education in the Department of Obstetrics and Gynecology, residency program director in the Department of Obstetrics and Gynecology, and fellowship program director in the Division of Gynecologic Oncology.

Dr. Valea brings an extensive background in research and education. He has authored or coauthored 71 articles in peer-reviewed journals as well as numerous abstracts, online chapters, and educational tapes. He has served as a reviewer and editor for numerous journals and as a visiting professor at universities around the globe. He has received dozens of teaching awards.

His current research interests are in the areas of pre-invasive diseases of the cervix and lower female genital tract, the use of infrared technology to evaluate dysplasia of the uterine cervix, perioperative care of the gynecologic patient, minimally invasive surgery and robotics, cervical cancer prevention, and education of residents and fellows.

Dr. Valea received his undergraduate degree in biomedical engineering from Columbia University and his medical degree from the State University of New York at Stony Brook School of Medicine.

He completed an internship and residency in the Department of General Surgery at the University of North Carolina, followed by a residency in the Department of Obstetrics and Gynecology at the University of North Carolina. He then served as a fellow and clinical instructor in the Division of Gynecologic Oncology at the University of North Carolina.

Dr. Valea also held several academic roles at the State University of New York at Stony Brook prior to joining Duke.

PHOTOS: DARRYLE ARNOLD, LEFT; DAVID HUNGATE, RIGHT

# PHYSICIAN, LEAD THYSELF

Increasingly, physicians are expected to lead, govern, and manage.

**HUGH J. HAGAN III, M.D.**

THOUGHTFUL, COMPETENT, AND RESPECTFUL leadership by physicians has never been more important than today.

We are moving into a new era of health care delivery. The practice of medicine is rapidly changing and physicians will be held more and more accountable, not only for patient care and treatment outcomes, but also the "value" of services. If physicians do not take a leadership role in shaping the future of the delivery of medical care, that job will be assumed by others who have a less clear vision of what is good for patients and the practice of medicine.

Doctors have always been bright, motivated, and generally altruistic. They have also been independent minded, entrepreneurial, and often resistant to change. These somewhat conflicting traits can make it difficult to move an organization forward without good leadership.

Being physician leaders requires the vision to see where we as a medical community need to go and the ability to motivate others to reach those goals. As President Dwight Eisenhower once pointed out, "You don't lead by hitting people over the head—that's assault, not leadership."

Certainly good physician leaders need knowledge of the organization within which they work. This requires a certain level of formal education; an understanding of business, finance, and politics; and an unusual degree of energy and perseverance. It also requires assuming the qualities required of a good leader.

To be effective, physician leaders require four main foundational elements: desire and stamina, competence in one's professional field, the ability to be a team player and, perhaps most important, that particular collection of traits that fall under the heading of "good manners."

First, desire and stamina go hand in hand. Assuming a leadership role in a medical community is emotionally and physically demanding. It takes a great deal of time and effort on top of the demands of practice to be a leader with all of its daily interruptions and surprises.

Second, to assume a leadership role in one's professional community, the physician needs to be credible. An internist should be a compassionate and experienced clinician and diagnostician. In addition to these traits, a surgeon should be viewed as technically excellent.

Third, good leaders recognize that they cannot effectively reach meaningful goals all alone. They must do so as part of a team. Andrew Carnegie said, "No man will make a great leader who wants to do it all himself, or to get all the credit for doing it."

Finally, physician leaders must have "good manners." A person with good manners demonstrates conduct that conforms to a higher standard of propriety or correct behavior. Their characteristics include kindness, respect for others regardless of station in life, the ability to listen thoughtfully, and a reputation for honesty and fair treatment of others.

The old image of the autocratic, tyrannical physician leader has been replaced with a new image, one of an intelligent, organized, and respectful team member who motivates, guides, and works toward a shared goal cooperatively and without being heavy handed.

As we move forward, we must consider our roles as members of a growing medical community dedicated to excellent and responsible patient care and consider how we can individually exercise our abilities as leaders within this community to the benefit of all. CM

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*Hugh J. Hagan III, M.D., is chief of the hand and upper extremity section at the Carilion Clinic Institute for Orthopaedics and Neurosciences. He holds faculty appointments at the Virginia Tech Carilion School of Medicine and the University of Virginia.*



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