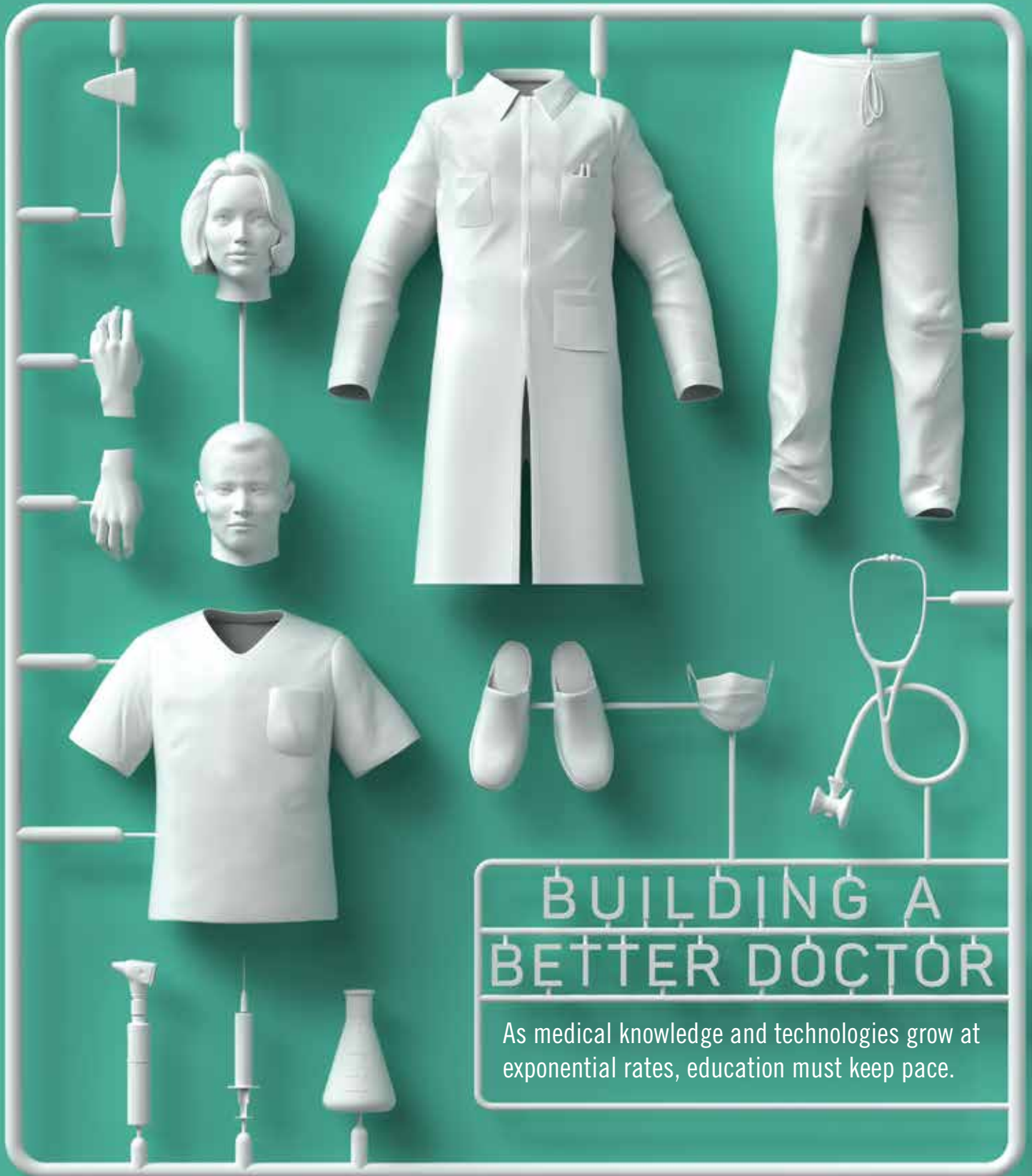


Carilion Medicine

SPRING/SUMMER 2019

In partnership with the Virginia Tech Carilion School of Medicine and Fralin Biomedical Research Institute at VTC



BUILDING A
BETTER DOCTOR

As medical knowledge and technologies grow at exponential rates, education must keep pace.

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CARILION MEDICINE

SPRING/SUMMER 2019

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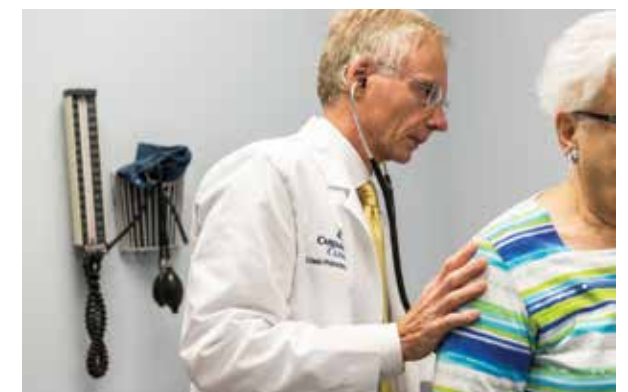
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THERE'S NO PLACE LIKE HOME

Family medicine physician Edwin Polverino thrives in the "medical home" model.

BY LINDA STALEY





WHEN I WAS IN MEDICAL SCHOOL, THE POCKETS of my short white coat bulged with every manual imaginable. Although my neck sometimes ached, carrying around what felt like an extra 20 pounds was worth it, as the quick access to information compensated for my lack of knowledge. Over the years, my coat lightened, but even as a chief resident, my pockets sagged.

Today, students have plenty of information at their fingertips—but it fits into a small, rectangular computer that weighs only a few ounces and can also be used to make phone calls.

Medical students today don't have to worry about learning from CD-ROMs or walking home from the library late at night. They don't have to go to medical records to sign off on carts full of charts or to radiology to review an image. Now, electronic medical records make all the details accessible from anywhere.

Access to information isn't all that's changed about medical education. Four-hour lectures in a large auditorium are a thing of the past. Many lectures are now online, and professors often find themselves addressing sparsely filled halls. And with a more case-based curriculum, students begin learning clinical skills from day one, so the facts they're learning are more immediately applicable.

We didn't start learning clinical skills until the second semester of our second year. Our instructor would give us a patient's name, then we'd pair up with a buddy to take a history, perform a physical, write up our findings, and present the case. Working with actual patients was so exciting that even when I went home on weekends, I'd take my stethoscope and otoscope so I could listen to my parents' hearts and peer into their eyes and ears. My poor parents!

Still, I didn't truly understand the information until I met patients who were suffering from the conditions I'd been studying. Take sickle cell crisis. I'd memorized facts: I knew, for example, to administer oxygen rather than iron. Although I knew the protocols, none of it really made sense to me until I was an OB/GYN resident admitting a pregnant woman in sickle cell crisis.

Much has changed over the past three decades when it comes to medical education. You'll read about some of that evolution in this issue, as we explore the innovative ways the Virginia Tech Carilion School of Medicine is incorporating collaboration, technology, and emotional intelligence into its curriculum.

How do today's medical students differ from those of my generation? They are adept with tools we couldn't have imagined 30 years ago. Many have advanced degrees and extensive research experience. Yet the reasons they decided to become physicians are the same as those of the students of my day: the desire to help others and be part of the healing process.

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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 Radford University Carilion (formerly Jefferson College of Health Sciences).

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On the pulse of the Carilion Clinic community

Carilion Roanoke Memorial Hospital to Expand

Carilion Clinic has announced plans to enlarge the footprint of Carilion Roanoke Memorial Hospital.

"This is an exciting day, not just for Carilion, but for our entire region," said Nancy Howell Agee, president and chief executive officer of Carilion. "After several years of careful planning, we are embarking on a major expansion that will address the growing needs of the one million patients we serve and continue the great momentum happening in the Roanoke Innovation Corridor."

The Roanoke Innovation Corridor is an initiative to build on the partnership between Virginia Tech and Carilion, the merger of Jefferson College of Health Sciences with Radford University, and Carilion's investments to accelerate Roanoke's development as a center for innovation and a multimillion-dollar biomedical and technology hub.

Construction, slated to begin later this year, is expected to take five years

in brief



THE FUTURE SERVED UP: A rendering shows the Carilion Roanoke Memorial Hospital expansion at the location of aging tennis courts no longer in use.

and cost more than \$300 million. The project is part of Carilion's long-term capital plan to invest at least \$1 billion in the region.

A new tower, to be built to the south of the hospital, will consist of two or three floors of parking, an expanded Emergency Department, and six or sev-

en floors that will make up Carilion's Cardiovascular Institute, enabling all of Carilion's Roanoke-based heart and vascular services to be consolidated into one location. An additional building will house the Department of Psychiatry and Behavioral Medicine.

The expansion project will add approximately 400,000 square feet to the medical center. Once completed, the hospital will have 2.4 million square feet, making it one of the largest in Virginia.

"We are making real, definitive progress," Agee said. "New buildings are exciting; they are a physical representation of the growth and innovation in our region. What happens inside the buildings—the clinical care, the education, the research—is even more exciting to me. It's the work of talented medical, health sciences, and technology professionals that is carrying our community forward."

CarilionClinic.org/carilionmedicine

Medical School Approved Long Term

The Liaison Committee on Medical Education (LCME) will continue full accreditation for the Virginia Tech Carilion School of Medicine for a period of eight years, the longest term possible.

The LCME, the nationally recognized accrediting authority for medical education programs leading to the M.D., is jointly sponsored by the Association

for American Medical Colleges and the American Medical Association.

LCME visited the school in October 2018 to evaluate the educational program and any changes made because of the medical school's integration into Virginia Tech on July 1, 2018. The LCME granted the Virginia Tech Carilion School of Medicine full accreditation in 2014.

Lee Learman Named Dean of the Medical School



On July 1, Lee Learman, M.D., Ph.D., joined the Virginia Tech Carilion School of Medicine as its second dean. He has also been named professor in the school's Department of Obstetrics and Gynecology.

"We're excited to welcome Dr. Learman to the Virginia Tech Carilion family," said Nancy Howell Agee, president and chief executive officer of Carilion Clinic. "His extensive experience makes him a great match for us, and I'm confident he'll continue the momentum we began with Dean Cynda Johnson."

Dr. Learman has 25 years of leadership experience in medical education and health care, most recently as the senior associate dean for academic affairs and the senior associate dean for graduate medical education at the Florida Atlantic University's Charles E. Schmidt College of Medicine, where he was also a tenured professor of obstetrics and gynecology. Florida Atlantic University is a newer medical school, having opened for its first class in 2011, one year after the Virginia Tech Carilion School of Medicine.

"With his experience as a physician, researcher, and academic leader, Dr. Learman is an ideal choice to lead VTC SOM, and we look forward to welcoming him to Virginia Tech," said Timothy Sands, Ph.D., president of the university. "The medical school is a

critical part of the Virginia Tech Carilion Academic Health Center and the university's overall vision to improve the quality of life in the communities we serve and solve the complex problems of the future."

From 2008 to 2015, Dr. Learman served as the Clarence E. Ehrlich Professor and Chair of the Department of Obstetrics and Gynecology at Indiana University. He joined Indiana after serving 14 years on the faculty at the University of California, San Francisco, where he held a joint appointment in the Department of Epidemiology and Biostatistics.

Dr. Learman has authored more than 75 peer-reviewed publications and serves as a peer reviewer to more than 15 journals. His own research focuses on gynecology, obstetrics, and medical education. In his medical practice, he focuses on diagnosing and treating chronic pelvic pain.

Dr. Learman received his bachelor's degree from the University of California, Los Angeles; his M.D. from Harvard Medical School; and a doctorate in social psychology from Harvard University in a program supported by the MacArthur Foundation. He completed his residency in obstetrics and gynecology at the University of California, Los Angeles.

"I'm honored by the opportunity to serve as dean of the Virginia Tech Carilion School of Medicine," Dr. Learman said. "In its first decade of existence, it has built a solid foundation drawing on the strengths of both an outstanding public research university and an outstanding private health system. This unique public-private partnership makes the Virginia Tech Carilion School of Medicine uniquely positioned to prepare future physicians for the changing health care landscape and to become a national leader in medical education."

Merger Completed

Carilion Clinic and its long-time teaching arm, Jefferson College of Health Sciences, finalized their partnership with Radford University in July, resulting in the successful merger of Jefferson College into Radford University. The college's name is now Radford University Carilion.

"Our partnership with Radford University is not new; it goes back decades, in fact," said Nancy Howell Agee, Carilion's president and chief executive officer. "Having a name, however, is an important symbol of our work together. It's a nod to the future and of more good things to come."

"To mark our growing partnership and enhanced opportunities for current and future students, we chose a strong name that showcases our critical focus



and allows important work to grow in the future," said Radford University President Brian O. Hemphill, Ph.D. "The Radford family looks forward

to officially welcoming Jefferson College of Health Sciences students, faculty, staff, alumni, and friends as Highlanders in preparing to open Radford University Carilion for the upcoming academic year."

It was in January 2018 that Carilion, Jefferson College of Health Sciences, and Radford University jointly announced the intention to merge the college into Radford University. The merging institutions came from positions of strength and believed that by joining forces, they could build something even stronger.

"Even though we are closing a chapter on Jefferson College of Health Sciences," said the college's president, Dr. Nathaniel L. Bishop, "we're ready to open another that will expand opportunities for those seeking a career in the health sciences."

When Jefferson College of Health Sciences hosted its final commencement in May, it was a celebration of both its talented graduates and the school itself, which has prepared thousands of health care providers in the community and beyond.

Translational Health Grant

The integrated Translational Health Research Institute of Virginia (iTHRIV) has received a five-year grant of nearly \$23 million from the National Institutes of Health to advance innovative ideas from the point of discovery to implementation in clinical practice and population health.

iTHRIV includes the University of Virginia, Inova Health System, Virginia Tech, and Carilion Clinic as partners, with the Center for Open Science and the University of Virginia's Licensing & Ventures Group as affiliates. The focus of iTHRIV is to use data to improve health among rural and urban populations and to leverage data science expertise across the state.

The NIH Clinical and Translational Science Awards program, which provided the support, enables research teams—including scientists, patient advocacy organizations, and community members—to tackle significant scientific and operational problems in clinical and translational research that no one team can overcome.

The national Clinical and Translational Science Awards network includes approximately 60 institutions around the coun-

try that are recognized as elite clinical and translational research institutions.

"This grant is an indication of the innovative research happening right here in Virginia," said Nancy Howell Agee, Carilion's president and chief executive officer. "It is an investment that will improve lives across the commonwealth, and we are excited to join our partners and peers in discovery."

As individual institutions, the partners each have established strengths in biomedical and health-related research. Although individual programs have invested in maximizing research success, iTHRIV is the first cross-state effort in Virginia to integrate broad clinical and translational research resources and processes.

"We're delighted to be part of this transformative initiative in translational and clinical research," said Timothy Sands, Ph.D., president of Virginia Tech. "This partnership advances our biomedical health and sciences enterprise, expands our ongoing collaboration with Carilion Clinic, and strengthens our connections with colleagues across the commonwealth at the University of Virginia and Inova in a way that will benefit the health of all Virginians."



FROM DISCOVERY TO IMPLEMENTATION: Members of the iTHRIV team gather for an organizational meeting in Charlottesville, Virginia.

briefings

In Times of Crisis

Carilion Roanoke Memorial Hospital has earned national verification from the American College of Surgeons as a Level 1 Pediatric Trauma Center. The designation reflects the hospital's expanded care for children and the critical nature of traumatic injury, the leading cause of death for children one year and older. The center is one of only three Level 1 programs in the state and the only one in western Virginia. The hospital has been a Virginia-designated adult Level 1 Trauma Center since 1983.

Leadership Recognized

Modern Healthcare has named Nancy Howell Agee, president and chief executive officer of Carilion Clinic, No. 9 on its list of 50 Most Influential Clinical Executives, an honor that recognizes national leaders who are driving innovation and transformation in health care. For the second time, the magazine also named Agee to its list of Top 25 Women Leaders. "Agee had a front row seat in 2018 for some of health care's biggest policy battles," the description for that honor read. "Not only did she serve as chair of the American Hospital Association's board of trustees, but she was a leading voice in her home state of Virginia for expanding Medicaid. Agee has been a long-time mentor of women leaders inside and outside of Carilion, where half the leadership team is female."

Lasting Tribute

Within just five months of the retirement of Cynda Johnson, M.D., M.B.A., a Virginia Tech Carilion School of Medicine fund in her name reached the \$1 million mark in gift commitments. The milestone was met in part with a finishing gift from Carilion Clinic, in addition to nearly 150 gifts from individuals. The school created the fund as a permanent tribute to Dr. Johnson's legacy as founding dean.



Making It Count

Carilion Clinic will participate in a statewide pilot to reduce the provision of low-value health care in Virginia. The initiative will be led by the Virginia Center for Health Innovation, which received a \$2.2-million grant from Arnold Ventures to launch the pilot.

Low-value health care includes medical tests and procedures that research has proved add no value in particular clinical circumstances and can lead to potential patient harm and a higher total cost of care.

A national dialogue around low-value care has been growing since 2012, when the American Board for Internal Medicine identified more than 550 tests and procedures that should be questioned by providers and patients.

Carilion is one of six Virginia health systems and three clinically integrated networks participating. Together, these groups represent more than 900 practice sites that will join to form a large-scale health system learning community targeting the reduction of seven low-value care measures.

“Making sensible reforms to our health system that reduce costs and improve patient care has been a long-time priority for me,” said U.S. Senator Mark R. Warner of Virginia. “All eyes are now on Virginia because, if successful, we could serve as a national model for improved value in health care spending.”

IAMSE Conference Held in Roanoke

In June, the Virginia Tech Carilion School of Medicine hosted the 23rd Annual Meeting of the International Association of Medical Science Educators (IAMSE), which drew nearly 700 basic science and clinical educators from across the globe to Roanoke.

IAMSE, a nonprofit professional development society for health professions education, seeks to promote “excellence and innovation in teaching, student assessment, program evaluation, instructional technology, human simulation, and learner-centered education.”

The IAMSE president for 2018 and 2019—Richard Vari, Ph.D.—also serves as senior dean for academic affairs at the Virginia Tech Carilion School of Medicine. The school had put in a bid to host the conference in 2020, but IAMSE asked whether a year earlier might work for the school instead.

“The event organizers saw that we successfully hosted a large conference a few years ago, the 2015 Collaborat-

ing Across Borders conference, which attracted nearly 700 health-care professionals from across North America to Roanoke, and felt confident we could accommodate this annual meeting,” Dr. Vari said. “I enjoyed bringing my peers to the place I’ve called home for the last decade and giving them greater exposure to the Virginia Tech Carilion School of Medicine and our key partners.”

IAMSE represents more than 1,000 medical scientist educators, both basic scientists and physicians, in almost 50 countries. The organization offers programming to advance health sciences education as well as an online peer-reviewed journal.

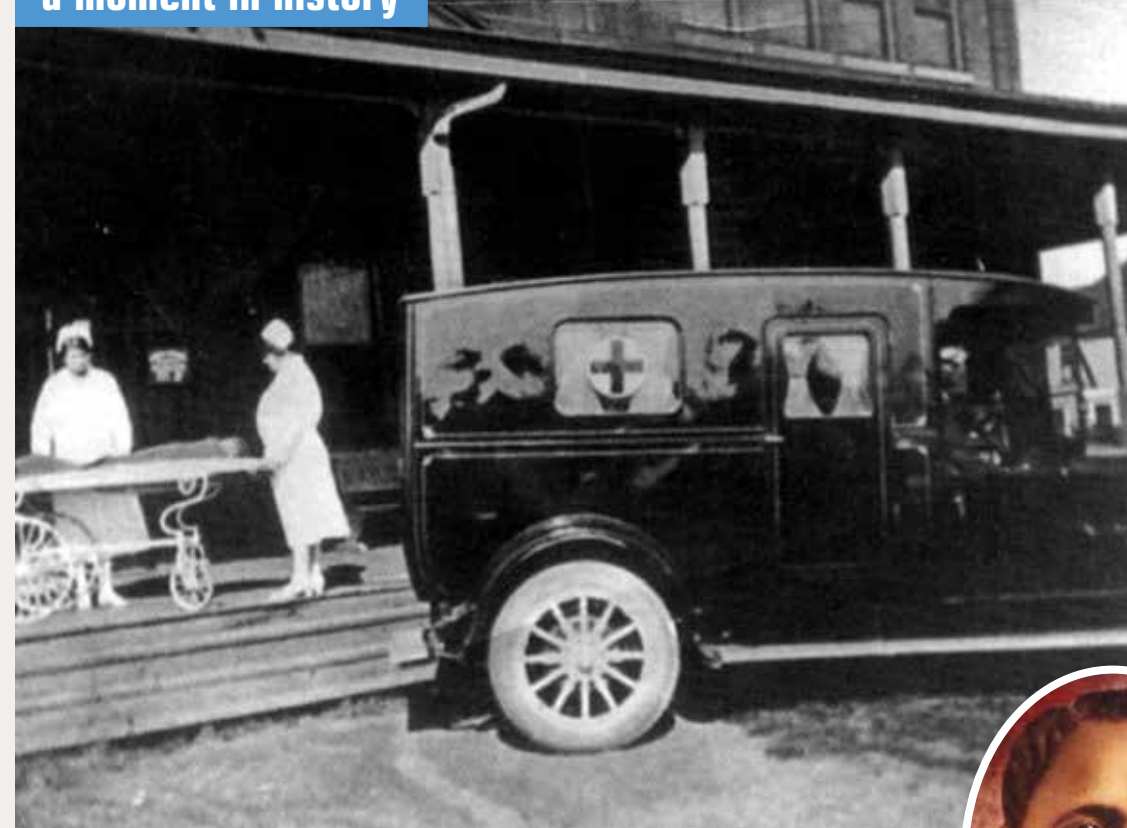
“The IAMSE conference was a resounding success, thanks in part to our partners, sponsors, and volunteers who put in countless hours to make it happen,” Dr. Vari said. “We broke the IAMSE record for number of participants, and the event was another feather in the cap for Roanoke as a conference destination.”



WELCOME TO ROANOKE: Dr. Richard Vari, president of the International Association of Medical Science Educators, addresses conference participants.

PHOTO: ALISON MATTHIESSEN

a moment in history



ACCENT ON HEALING: An ambulance delivers a young patient to Burrell Memorial Hospital in the 1930s; Dr. Isaac David Burrell (below).



The Legacy of Isaac David Burrell

A doctor helps create a new hospital for African Americans, but not in time to survive his own medical emergency.

In the early 20th century, African American doctors in Roanoke struggled to find suitable facilities to care for their patients. Talented physicians like Isaac David Burrell would often practice in cramped rooms in houses, with limited access to surgical tools, sterilization equipment, and adequate lighting. African American patients needing hospital care would be shuttled to Charlottesville, Virginia, or Washington, D.C., on lengthy and uncomfortable train rides.

Dr. Burrell and a group of other African American physicians recognized the need to provide a higher level of medical care for the 11,000 African Americans living in Roanoke at that time. Together, they set out to create a hospital.

Tragically, Dr. Burrell would never see the hospital's completion. One frigid day in the winter of 1914, on the eve of his 49th birthday, this tal-

ented, well-respected physician needed medical help. But he knew he wouldn't find it in Roanoke. Instead, he was loaded onto a cot in the back of an unheated boxcar to make the jolting, 240-mile journey to the Freedman's Hospital in Washington, D.C., where he underwent surgery for gallstones. Shortly thereafter, he died.

Dr. Burrell's preventable death served as a catalyst for the opening of a hospital in Roanoke for African Americans. In March 1915—a year, almost to the day, after his death—Burrell Memorial Hospital opened in a two-story building that had served as a preparatory school for boys. The hospital, which grew from an initial ten beds and two operating rooms, provided care and comfort to many through the 1970s.

In a tribute to Dr. Burrell this past spring, Nancy Howell Agee, president and chief exec-

utive officer of Carilion Clinic, recalled a story about a critically injured woman who was being transferred from Lexington to Roanoke.

“The trip was long, and her health was failing fast,” Agee noted in a *Roanoke Times* op-ed following the city's declaration of Dr. Isaac D. Burrell Day more than a century after his death. “Fearing the worst, the ambulance took her to the closest hospital—Burrell Memorial. She wasn't supposed to go there; she was white, after all.”

Doctors at Burrell Memorial saved the woman's life and, when she was stable, they began arranging her transfer to Roanoke Memorial.

“She didn't want to leave—everyone at Burrell Memorial had been so kind and compassionate toward her,” Agee wrote. “She was allowed to stay.”

(photos continued on next page)

PHOTOS: COURTESY OF THE HARRISON MUSEUM OF AFRICAN AMERICAN CULTURE (TOP); CARILION CLINIC ARCHIVES



A HOSPITAL TO CALL ONE'S OWN: In 1915, Burrell Memorial Hospital (left, as it appeared in the 1920s) took over the building of the Allegheny Institute, a preparatory school for boys.

AT THE READY: Ronnell Johnson (left) and Jacquelyn Clark pose with an infant incubator at Burrell Memorial Hospital in the early 1960s. Before the hospital's launch decades earlier, African American babies requiring intensive care had to be transported to Richmond, Virginia, or Washington, D.C.

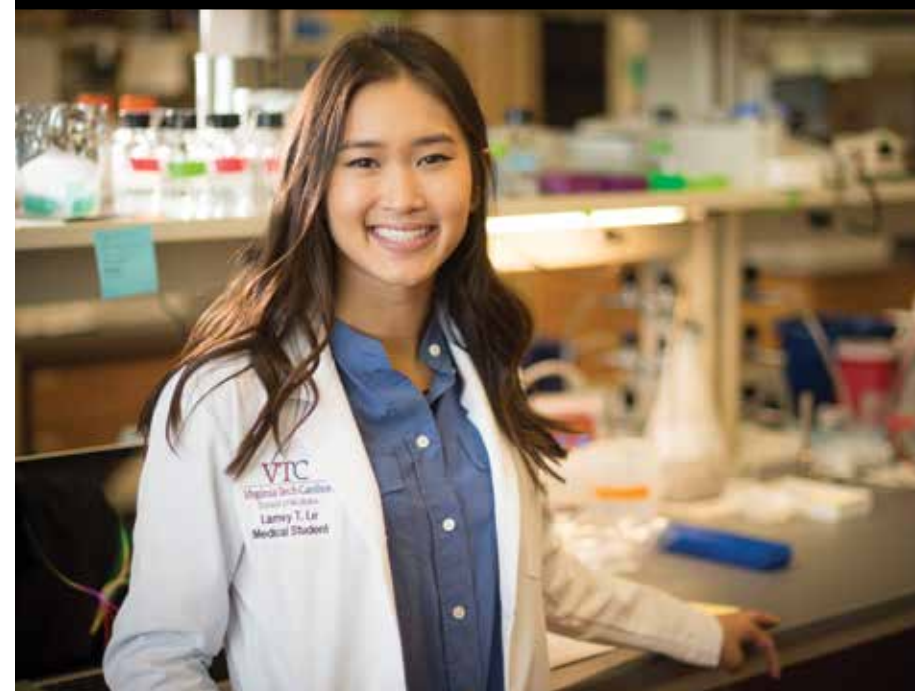
Below, Dr. James H. Roberts joins the nursing staff on the front steps of Burrell Memorial Hospital, circa 1920.



The tragedy of Dr. Burrell's early death served as a catalyst for the opening of a hospital for African Americans.

grand rounds

Education at Carilion Clinic and its affiliates



BENCH RESEARCH: Dr. Lamvy Le worked with her mentor, Dr. Zhi Sheng, to investigate a promising therapy for patients with glioblastoma.

structive surgeon, to evaluate the outcomes of patients who had undergone elective carpal tunnel syndrome surgery.

Dr. Le gave two clinical and five poster presentations on her research and was an author on three publications. She was also a recipient of the St. Baldrick's Foundation Summer Fellowship.

In addition to her academic achievements, Dr. Le served as a student leader for various groups, including the Surgery Student Interest Group and the Group on Women in Medicine and Science. She also served as president of the Alpha Omega Alpha Medical Honor Society.

Dr. Le was an active participant in community service activities as a volunteer at the Bradley Free Clinic and the Boys and Girls Club of Virginia. She was also a leader in the establishment of the Carilion Craniofacial Clinic's Cleft Carnival.

"Lamvy has been an exceptional student, an outspoken ambassador for the school, and an active member of the VTC School of Medicine and Roanoke communities," said Aubrey Knight, M.D., the school's senior dean for student affairs. "She has a bright future ahead of her."

Dr. Le, a graduate of the University of Virginia, begins her residency in plastic surgery at the University of Minnesota Medical School in Minneapolis this summer. She looks forward to continuing to be part of the Virginia Tech Carilion community.

"I cannot imagine going to medical school anywhere else," she said. "The faculty and staff are passionate about crafting the most innovative and progressive medical education curriculum and helping students achieve their goals."

Lamvy Le Named Outstanding Graduating Student

Lamvy Le, M.D., was named the Virginia Tech Carilion School of Medicine's 2019 Outstanding Graduating Student in recognition of exceptional academic achievement, leadership, and service.

Dr. Le received her medical degree during the school's graduation in May.

Upon arriving at the medical school in 2015, Dr. Le quickly established herself as an academically gifted student with considerable leadership potential. She excelled in the school's problem-based, patient-centered curriculum and earned 11 Letters of Distinction, the highest in her class. In addition, she was one of two junior inductees into the Alpha Omega Alpha Medical Honor Society, a recognition reserved for only 15 percent of a medical school class. She was also inducted into the prestigious Gold Humanism Honor Society, a recognition for students who best exemplify humanism and empathy in their medical endeavors.

A first-generation American, Dr. Le spent six weeks on a visiting student microsurgery fellowship in Taiwan, where she studied traditional Chinese medicine.

During her four years of medical school, Dr. Le conducted research under the mentorship of Zhi Sheng, Ph.D., an assistant professor at the Fralin Biomedical Research Institute at VTC. There, Dr. Le helped identify and investigate a promising therapy for patients with glioblastoma, a common and aggressive form of brain cancer in adults.

In addition, Dr. Le conducted two research projects in Carilion Clinic's plastic surgery section. Along with mentor James Thompson, M.D., an associate professor of surgery and a plastic reconstructive surgeon, she identified barriers to care for cleft lip and palate patients and their families in southwestern Virginia. Dr. Le also worked with Anthony Capito, M.D., an assistant professor of surgery and a plastic recon-

Combining Medicine with Business

In 2018, Mercedes Robinson, a third-year student at the Virginia Tech Carilion School of Medicine, set her white coat aside and picked up a briefcase in order to pursue a master of business administration through Virginia Tech's Pamplin College of Business. She was the first of her classmates to take advantage of this relatively new program, developed by both schools, to give future physicians a set of skills that will allow them to navigate many challenges in health care management.

"Earning an M.B.A. really opened up an entire new world for me," Robinson said. "I knew I wanted to go into medical leadership and administration. I came away with more foundational business skills and a better understanding of how organizations operate."

The combined program enabled her to earn her degree in one year, including a few courses she took the summer prior to starting the fall semester. The curriculum included courses in accounting and information systems, business information technology, finance, management, and

marketing. An organizational development class early in the program gave students insight into their own group behavior.

"Learning my own strengths and weaknesses allowed me to understand not only how I can function better within a group but also how I can manage a team effectively and potentially an organization down the line," Robinson said.

Her class of approximately 20 consisted of professionals from a wide range of careers. Normally a two-year curriculum, the combined program for medical students allows them to use some of their medical school experience to earn credits and complete the degree in one year.

But being a pioneer is bound to have its drawbacks.

"The most challenging part for me was being the first medical student to do it," Robinson said. "There was no one to give me insights about the process, especially with navigating coming back after taking a year off. It felt like a risk at the time, but absolutely one worth taking. Plus, I found that I got right back



DOUBLE EXPOSURE: Through a combined M.D.-M.B.A. program, Mercedes Robinson was able to take a year off to earn a graduate degree through Virginia Tech's Pamplin College of Business and then pick right up where she left off in medical school.

into the rhythm of medical school once I started my clinical rotations."

Although she's uncertain what path she will pursue in medicine after graduation, Robinson says she is well equipped for the future.

"Earning my M.B.A. was not a year that was wasted," she said. "I really came away with gaining so many new skills, a fresh perspective, and a well-rounded experience."

Physician Assistant Student of the Year



PEOPLE FIRST: Heidi Rossow finds patient interactions to be the most rewarding part of clinical care.

For Heidi Rossow, the 2019 recipient of the Physician Assistant Student of the Year Award, a career in medicine is about people—their stories and their lives.

"Not only does medicine allow you to genuinely connect with other human beings," she said, "it also gives you the opportunity to make an impact on someone else's 'story' for the better."

The award—presented by the American Academy of PAs, the national professional society for physician assistants—honors one student a year who has demonstrated exemplary service and leadership.

Rossow graduated from the University of Florida with a bachelor's in pre-professional biology in 2015. Two years later, she enrolled in the physician assistant program at Jefferson College of Health Sciences.

"Within my cohort of just 42 students, backgrounds range from dietitian to paramedic to submarine officer," said Rossow of her program, now part of Radford University Carilion. "Having each other's experiences to learn from beyond the PowerPoints and textbooks has made PA school an even more rewarding experience as a whole."

Since joining the American Academy of PAs, Rossow has served as a reference committee scribe for its House of Delegates and as a member on four committees.

"While I'm very proud of what I've accomplished thus far personally, I'm even more proud to have such a large network of inspiring colleagues across the country," Rossow said. "These superstar professionals and students alike inspire me to do better every single day for my future patients."

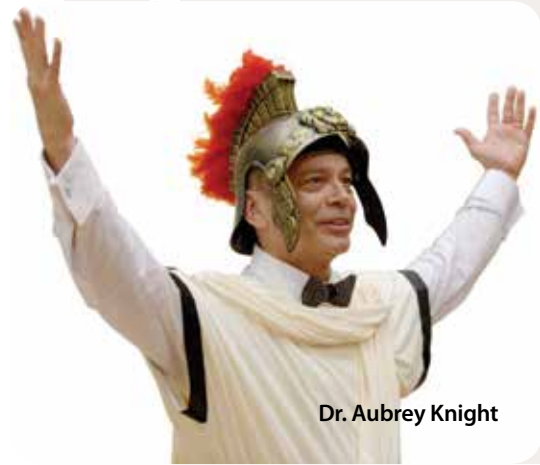
'Ides of March' No 'Match' for the Class of 2019

The soothsayer's warning, "Beware the ides of March," spelled doom for Julius Caesar and shook up the Roman Empire, but it sealed a much different fate for the Virginia Tech Carilion School of Medicine's class of 2019.

Continuing the streak from the five classes before them, all 37 members of the class successfully matched to a residency program to continue their education, making their Match Day theme, "Ides of Match," celebratory instead of ominous.

Medical schools across the country commemorate Match Day. At the exact same moment, students in the National Resident Matching Program open envelopes that reveal where they will pursue their residency. This year, more than 43,000 medical student applicants vied for only 33,000 positions.

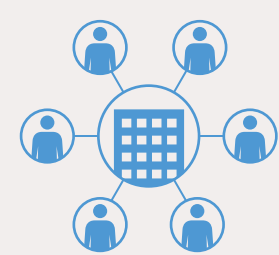
"This is the most successful match in Virginia Tech Carilion School of Medicine history," said Aubrey Knight, M.D., senior dean for student affairs, who dressed for the occasion in Roman headdress and toga, in addition to his signature tuxedo. "Students in this class opened doors for themselves and this school by matching into world-class residencies, particularly programs that are noted as the leaders in their specialty."



Dr. Aubrey Knight

MATCH DAY BY THE NUMBERS

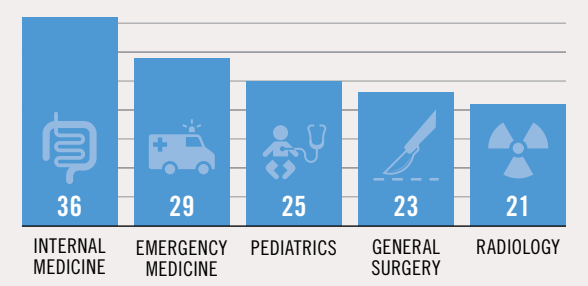
MATCH RATE FOR ALL SIX CLASSES
100
PERCENT



TOTAL NUMBER OF STUDENTS MATCHED OVER SIX CLASSES
240

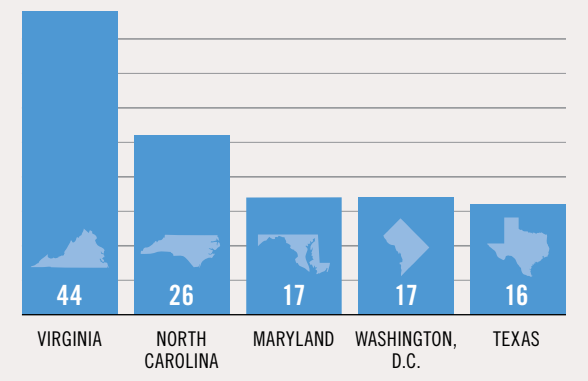
NUMBER OF SPECIALTIES REPRESENTED
24

TOP 5 MOST POPULAR SPECIALTIES



NUMBER OF STATES REPRESENTED
34

TOP 5 MOST POPULAR STATES AND DISTRICTS



FARTHEST FLUNG RESIDENCY SITE
Seattle, Washington



TOTAL NUMBER OF STUDENTS WHO OPT FOR PART OR ALL OF THEIR RESIDENCY AT CARILION
32

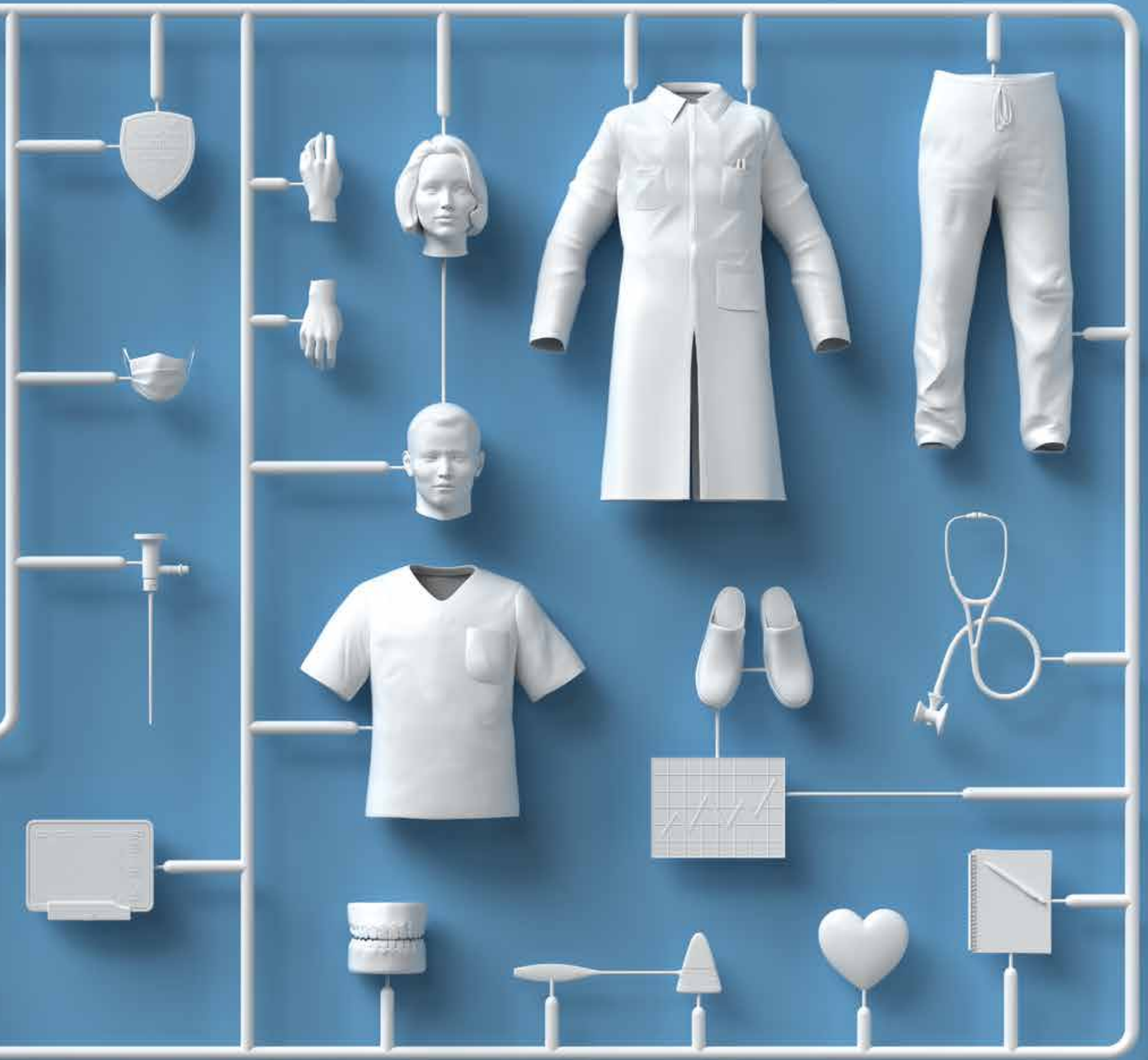
NUMBER OF STUDENT PAIRS PARTICIPATING IN COUPLES MATCHING
13



BUILDING A
BETTER DOCTOR

AMERICA'S NEXT TOP MODEL

In designing the Virginia Tech Carilion School of Medicine from the ground up, the school's leaders were able to cherry pick the best elements of medical education. **BY CHARLES SLACK**



T

HE VIRGINIA TECH CARILION School of Medicine is one of the nation's smallest medical schools, with an average of 42 students per year, and among its youngest.

But these facts haven't stopped the school's administrators from taking on a big mission: creating a new kind of doctor for a new world of medicine. If anything, fledgling status has proved to be a distinct asset.

"When you're starting from scratch, you have a big advantage," says Daniel Harrington, M.D., vice dean of the medical school and vice president for

"WHEN YOU'RE STARTING FROM SCRATCH, YOU HAVE A BIG ADVANTAGE. YOU'RE ABLE TO CREATE SOMETHING THAT IS DIFFERENT."

—Daniel Harrington, M.D., Vice Dean, Virginia Tech Carilion School of Medicine

academic affairs at Carilion Clinic. "You're able to create something that is different."

And it's that word—*different*—rather than small or young, that perhaps best describes the school. In less than a decade since it welcomed its first class in 2010, Virginia Tech Carilion has earned national recognition for innovation. The medical school has reached for bold, new approaches to every aspect of creating new clinicians, from how it admits applicants to how it instructs them to how they interact with the community around them.



THE FIRST CUT: The medical school's shared disaster drills often include practice on surgical teams.

At a time when doctors must stay current with dizzying technological and biomedical breakthroughs, the need has never been greater for clinicians to be sensitive to the human side of medicine. The product of a partnership between Virginia Tech, a renowned research institution, and Carilion Clinic, a health care system with a long tradition of community-based medicine, the Virginia Tech Carilion School of Medicine seems almost uniquely qualified to produce doctors with abundant skills on both sides of that equation.

The process begins with the application.

Finding the Best Candidates

From the start, the school's leaders believed that traditional admissions benchmarks such as academic grades, standardized test results, and formal interviews—while important—failed to reveal key characteristics about which candidates have not just the work ethic and technical skills, but also the human skills required to be effective clinicians.

To help admissions officers gauge those vital qualities, applicants—who now average more than 4,000 for those 42 annual spots—undergo a "multiple mini interview" process, originally developed at McMaster University in Hamilton, Ontario. Virginia Tech Carilion was among the first U.S. schools to recognize its advantages.

Applicants arrive in Roanoke over a weekend, where they have the opportunity to meet and mingle with faculty members, administrators, and current students and learn about the school's patient-centered curriculum. But the heart of the weekend is a full Saturday of one traditional interview and nine decidedly nontraditional interviews.

For the nontraditional sessions, applicants rotate through interview stations. At each one, the applicants read a brief scenario that evokes a medical or ethical question. They then enter a room to have an eight-minute conversation with a member of the community to share their thoughts about the scenario.

"The interviewer might be a faculty member, a minister, a retired physician, a teacher, or a shopkeeper," says Dr. Harrington. "That person won't have seen the student's CV or background." All interviewers have

AT A GLANCE



Multiple Mini Interviews

The Virginia Tech Carilion School of Medicine uses multiple interviewers to identify candidates who communicate well and can thrive in teams.



Problem-Based, Patient-Centered Curriculum

The school's patient-centered learning approach promotes empathy and understanding.



Standardized Patient Program

Community members are trained to give medical students the practice and coaching they need.



Medical Student Research Program

Across the four-year curriculum, medical students devote more than 1,200 hours to research.



Oral Health Program

The medical school is one of a handful of schools nationally to incorporate oral health into its curriculum.



Interprofessionalism

Doctors, nurses, physician assistants, and other team members who learn together work better together.



Ultrasound Technology in the Classroom

The medical school was one of the first nationally to dedicate part of its curriculum to ultrasonography.

an interest in the medical school and are trained in the interview process. Otherwise, though, the conversations are unscripted, without right or wrong answers.

According to Richard Vari, Ph.D., senior dean for academic affairs, "This process gives the interviewer an inside look into the student's ability to think quickly, reason through a problem, and perform under stress."

Questions and follow-ups can help determine how, for example, a student responds to being put on the spot—with equanimity, or by becoming combative. All of this amounts to much more than a feel-good exercise in community relations. Applicants who excel across the multiple mini interviews can rise to the top of the pool, in some cases ahead of those whose college grades and board scores are better.

The Human Side of Medicine

Once the interviews and the application process have yielded a carefully chosen class, the students

"WE TEACH CLINICAL SKILLS AND CLINICAL REASONING FROM THE VERY FIRST DAY OF MEDICAL SCHOOL. IT'S NOT SAVED FOR YEARS THREE AND FOUR, AS IN SOME SCHOOLS."

—Richard Vari, Ph.D.,
Senior Dean for Academic Affairs, Virginia Tech Carilion School of Medicine

begin their journey through the medical school's four "value domains"—basic science, clinical science, research, and interprofessionalism. These form the basis of the school's approach to medical knowledge and clinical skills, woven throughout all four years.

A central tenet of Virginia Tech Carilion's educational philosophy is developing compassionate and scientifically minded future physicians, and one way this happens is through problem-based, patient-centered learning. "We teach clinical skills and clinical reasoning from the very first day of medical school," says Dr. Vari. "It's not saved for years three and four, as in some schools."

Working in groups of seven, students meet three times a week to learn about actual patient cases. The focus at first is on science and clinical diagnosis. When the students are studying the cardiovascular system, for example, they may be presented with a case study of a patient dealing with a cardiac or systemic vascular condition.



HANDS-ON LEARNING: Virginia Tech Carilion School of Medicine students follow a patient-centered, problem-based curriculum that provides a fully dimensional educational experience, with such opportunities as disaster drills (left), practice with standardized patients (below), and work with dental patients (below left).



A NEW DEAN, BUILDING ON SUCCESS



When Lee Learman, M.D., Ph.D., took over the helm of the Virginia Tech Carilion School of Medicine this summer, he began with the intention of listening.

"One of the most important aspects of my first year will be to think deeply about the strategic planning process for the school of medicine with broad stakeholder input," the new dean says. He's looking at how the school might expand while keeping in place what makes it special—the individualized attention for students, the focus on research and patient-centered learning, and the strong connections to the community.

With 25 years as a leader in medical education, Dr. Learman is no stranger to helping young medical schools succeed. He most recently served as senior associate dean for graduate medical education at Florida Atlantic University's Charles E. Schmidt College

of Medicine, which opened its doors in 2011.

"I've always been attracted by several elements I see as high priorities at the Virginia Tech Carilion School of Medicine," Dr. Learman says. "These include humanism and professionalism in medicine, as well as the scientific basis of medical practice."

Dr. Learman adds that he appreciates the school's emphasis on its connections with the community. "A top priority will be deepening my understanding of our community," he says, "and by that I mean not only the Roanoke community, but the larger community of people who care about this medical school and want to see it grow and succeed."

"By examining the case, the students uncover all they know about the cardiovascular system—the anatomy, the physiology, the pharmacology," says Dr. Vari. "More important, they uncover what they don't know."

Over the course of the week, the students research the condition on their own, then present back to the group, offering one another constructive feedback on the strengths and weaknesses of their reasoning. After a final team discussion on Friday, next comes a crucial step—the chance to meet the actual patient who has been the subject of the week's study. According to Dr. Vari, it's a chance to drive home to medical students that the enzymes, blood type, heart rate, biochemistry, and pharmacology they've been analyzing all week add up to someone with a life, a job, a family, and emotions.

"What they're now exploring is the human side of this patient who happens to have this disease," says Dr. Vari, who adds that less than 5 percent of medical schools are able to offer patient wrap-ups. "It puts the learning of their basic science, clinical reasoning, clinical skills, research, and interprofessionalism in the construct of a real human being."

"It's a wonderful way to learn," Dr. Harrington says. "Our students have thrived with this model."

"COMMUNITY MEMBERS REALLY FEEL LIKE A PART OF THE SCHOOL. THEY'RE HELPING EDUCATE THE STUDENTS TO BE BETTER CAREGIVERS, AS PHYSICIANS, WHEN THEY GRADUATE."

—Tracey Criss, M.D.,
Associate Dean for Clinical Science, Years 3 and 4, Virginia Tech Carilion School of Medicine

Vital Community Connections

Members of the community play an important role in helping students learn how to interact with patients, ask questions, and diagnose conditions. The medical school's 10 exam rooms serve as home for the standardized patient program, where students, starting in their first year, examine "patients" simulating conditions the students are currently studying.

While the standardized patients undergo significant training in order to represent various conditions, they do not necessarily have medical backgrounds, says Tracey Criss, M.D., associate dean for clinical science, years 3 and 4.

"The program brings a sense to the community that our standardized patients are part of educating our students," Dr. Criss says. "Community members really feel like a part of the school. They're helping educate the students to be better caregivers, as physicians, when they graduate."

As the students proceed through their years, the simulated situations become more complex, testing both their medical acumen and their ability to handle delicate and often emotional situations, including issues involving quality and safety. Dr. Criss describes one scenario in which a student must inform

a patient and a family member that, due to medical error, a chest tube has been inserted on the wrong side of the body. In the tenseness of the moment, the fact that the patient and family member are playing roles seems not to matter.

“Our students don’t know, when they walk in the room, how that simulated patient and family member are going to react,” Dr. Criss says. “Sometimes they respond with calmness and sometimes with fear, anxiety, and anger. Students have to spontaneously react to the emotions of that patient.”

Research as a Core Requirement

Research, something not always prioritized at other schools, plays an integral role at the medical school. Regardless of the medical specialties they hope to pursue, all students must become “scientist physicians”—a term coined by Michael Friedlander, Ph.D., senior dean for research at the medical school, to describe both the primacy of the doctor’s calling and the essential role that research plays in it.

Research is central to all four years of training, totaling more than 1,200 curriculum hours. In years 2 through 4, each student is allotted \$1,000 a year for supplies, and each is expected to produce an original research project starting in the first year, culminating with a final manuscript of publishable quality in the fourth year.

The need for that emphasis may seem obvious for someone bound for a career at a major teaching hospital. But why so for someone hoping to serve as, say, a primary care physician in rural Virginia? As Dr. Friedlander sees it, training students in a scientifically rigorous context aims to create a more complete clinician.

“You approach all your patients and all medical situations from a human perspective, but also from a rigorous scientific perspective,” says Dr. Friedlander, who also serves as executive director of the Fralin Biomedical Research Institute at VTC. “You are versed in the most contemporary scientific understanding of the patient’s condition, and you have actually done biomedical research. Moreover, when you don’t know the most scientifically validated approach to a particular issue, you have the skills, confidence, and knowledge to find that information and deploy it on your patient’s behalf.”

Dr. Harrington adds, “By the time students graduate, they understand how to ask questions and are skilled in finding the answers.”

That idea dates back a decade or more, when Dr. Friedlander, then a faculty member at the Baylor College of Medicine, served on a national task force of the Association of American Medical Colleges and the Howard Hughes Medical Institute dedicated to the scientific foundations of future physicians.

“WE THINK WE’RE PUTTING OUT SOMETHING THE COUNTRY BADLY NEEDS. EVEN WITH ALL THE NEW ALGORITHMS AND ELECTRONIC MEDICINE, ELECTRONIC HEALTH RECORDS, AND COMPUTATIONAL CAPABILITIES, WE NEED PEOPLE WHO UNDERSTAND THE SCIENCE OF MEDICINE AND ARE READY FOR THE NEXT BIG CHANGES.”

—Michael Friedlander, Ph.D., Senior Dean for Research, Virginia Tech Carilion School of Medicine

“Medical education was not keeping up with the scientific revolution in the biomedical science space,” he recalls. “There has been a revolution in molecular biology, molecular genetics, neuroscience, computational bioscience, and other areas. Even as advances were profoundly influencing how medical conditions are diagnosed, medical schools were still teaching medical students the same old way.”

Dr. Friedlander saw the opportunity to help forge new approaches to teaching at the foundational level of the nascent school.

“From day one, students are exposed to possibilities for doing research,” he says. “They meet researchers from the Fralin Biomedical Research Institute and the main Virginia Tech campus in Blacksburg, research-oriented physicians from Carilion Clinic, and leading scientist physicians who visit from across the country to present the latest advances while aligning with the students’ current classes and patient case presentations.”

The results have been impressive, with students involved in nearly 60 published papers and more than 250 presentations at regional, national, and even international medical meetings.

“We think we’re putting out something the country badly needs,” Dr. Friedlander says. “Even with all the new algorithms and electronic medicine, electronic health records, and computational capabilities, we need people who understand the science of medicine and are ready for the next big changes.”

Learning Across Professions

Even as Virginia Tech Carilion strives to create superior individual clinicians, a key driver of the school’s educational philosophy is that no doctor is an island. Studies have shown that flawed communication among health care professionals accounts for some 70 percent of medical errors.

With that in mind, the school became the first in the country to integrate interprofessionalism across its entire, four-year curriculum. In conjunction with another pioneer in adopting shared learning—Jefferson College of Health Sciences, now known as Radford University Carilion—future doctors study with tomorrow’s nurses, physician assistants, and allied health professionals. “They’re learning roles and scopes, conflict resolution, and team-oriented best practices,” says Dr. Vari. Teamwork, he notes, increasingly personifies “the art of medicine and the practice of medicine.”

The students examine ethical dilemmas in health care, approaches to leadership, and strategies for overcoming personal biases and other issues.

“It’s preparing them for the real world of health care where they’re going to have to work with colleagues who aren’t physicians,” Dr. Vari says. In some cases,



THE HEART OF THE MATTER: As a medical student, Dr. Vu Phan spent countless hours in a Fralin Biomedical Research Institute laboratory studying the mechanisms of how viruses cause the heart tissue inflammation known as myocarditis. He is now pursuing a psychiatry residency at Hahnemann University Hospital in Philadelphia.

lessons in teamwork and empathy move beyond the confines of medicine. As one part of the program, for example, students work together to prepare nutritious meals for needy members of the Roanoke community.

In one of the most intensive exercises, the medical students work with students in other health professions on disaster drills. Administrators may simulate the aftermath of a serious interstate accident, a terrorist attack, or a natural disaster. Students, given pieces of information, must respond in real time, assess the condition of trained “patients,” and, most of all, work together to solve problems and save lives.

“They’re paying a lot of attention to the patient, and at the same time they’re gathering information from other team members,” says Dr. Criss. “What you see is students recognizing the value of the team approach.”

Innovation Across the Board

These creative approaches to medical education foster a spirit of innovation that permeates the school. In 2010, for example, Virginia Tech Carilion, with the support of Sonosite, Inc., integrated advanced portable ultrasound machines into the curriculum, enabling students to master an evolving technology that will be essential to their ability to offer patients the best care. In 2018, the school purchased newer, state-of-the-art portable ultrasound equipment to enhance the students’ mastery of the skill.

“THEY’RE PAYING A LOT OF ATTENTION TO THE PATIENT, AND AT THE SAME TIME THEY’RE GATHERING INFORMATION FROM OTHER TEAM MEMBERS. WHAT YOU SEE IS STUDENTS RECOGNIZING THE VALUE OF THE TEAM APPROACH.”

—Tracey Criss, M.D., Associate Dean for Clinical Science, Years 3 and 4, Virginia Tech Carilion School of Medicine

The school is also one of the few in the country to make oral health part of the curriculum, thanks to philanthropic gifts and a partnership with Delta Dental of Virginia, amid growing awareness of the key role that oral health plays in a patient’s overall well-being.

The drive to innovate is sure to continue under Virginia Tech Carilion’s new dean, Lee Learman, M.D., Ph.D., who sees the school’s size and youth as major advantages in advancing the mission of innovation guided by its goals to create new doctors for a new world.

Where will this grand new experiment in medical education ultimately lead? Ever the researcher, Dr. Friedlander says, “We don’t have enough data yet.” It may take 15 or 20 years to determine whether Virginia Tech Carilion’s innovations are truly helping to produce better clinicians. But what he does hear are stories—and they’re great.

“We hear wonderful, wonderful things,” Dr. Friedlander says. “Our graduates are star residents in their programs, highly regarded by the physicians mentoring them. And residents from other medical schools are wowed not only by their knowledge, but also their ability to move facily between scientific discovery and the delivery of quality clinical care.”

Dr. Learman agrees. “I anticipate that, over the next decade, we will go from being one of the most outstanding *new* medical schools,” he says, “to one of the most outstanding medical schools in the country, period.”

BUILDING A
BETTER DOCTOR

SPECIAL EFFECTS

As its graduate medical education program grew and adapted to meet the region's needs, Carilion Clinic became a magnet for top physician talent. **BY ANITA SLOMSKI**

IN 1971, WHEN ROANOKE MEMORIAL HOSPITAL established one of the nation's first family practice residencies, it was embracing the need for a new kind of physician who could help alleviate a dire shortage of primary care doctors while providing better, more holistic care. At the time, Roanoke had far too few general practitioners to go around, and many people in the community had little choice but to go to the hospital's emergency room for routine medical care.

Family medicine, recognized as a specialty just two years earlier, seemed like just what the doctor ordered. Family physicians would serve as the hub of a patient's care, providing most of it themselves, emphasizing prevention, and coordinating

MAKING THE ROUNDS:

At the same time that residents at Carilion Roanoke Memorial Hospital learn from their attendings, they challenge them to become even better teachers.



referrals to other specialists. But to train this new kind of doctor in outpatient medicine as well as in the business side of running a medical practice, Roanoke Memorial needed to create something entirely new. It established the Family Practice Center, a medical office carved out of the hospital's warehouse.

"The heart and soul of the family practice residency was this model unit, which was only the second such family medicine practice in the state," recalls Francis Amos, M.D. The first graduate of the hospital's family practice residency, Dr. Amos became associate director of the program.

To jumpstart the Family Practice Center, Dr. Amos combed the hospital's outpatient records and gave

"THE RESIDENT AND I SEWED LACERATIONS ALL NIGHT, SPLINTED BROKEN BONES, AND ADMITTED THOSE WITH INTERNAL INJURIES."

—Francis Amos, M.D.,
First Graduate of
the Family Practice
Residency, Carilion
Clinic

patients the welcome news that they could be part of the new practice. Making appointments would be much more convenient, waits would be shorter, and they would be able to establish relationships with their own personal doctors rather than seeing whatever physician happened to be on duty in the emergency room or in the hospital's outpatient clinic.

Yet family medicine was so new a specialty that Dr. Amos and directors of the handful of other family practice residency programs nationwide had few guidelines to follow. Often they would gather at the American Academy of Family Practice's headquarters in Kansas City to swap ideas on how best to train residents. With emergency medicine not yet

a specialty, part of that training called for family practice residents to take shifts in the ER. If they needed help, they would call their faculty mentors, and Dr. Amos remembers a July 4 boating accident that landed eight people in the ER.

"The resident and I sewed lacerations all night, splinted broken bones, and admitted those with internal injuries," he says. "Working in the ER was an incredible learning experience for our family practice residents."

A Magnet for New Physicians

But Carilion Roanoke Memorial's pioneering work in family medicine was just one of many efforts, begun in the 1930s, to give new doctors the skills they needed to provide high-quality care to the community. Continuing that tradition, last summer Carilion Clinic, which now includes Roanoke Memorial as well as six other hospitals, welcomed 300 physician trainees to 26 residency and fellowship programs.

During their training, these new residents and fellows will play an essential role in serving the health system's one million patients in southwestern Virginia and southern West Virginia. They'll also be trained according to standards set forth by the Accreditation Council for Graduate Medical Education.

"Training requirements for accreditation are now big documents, not the few pages that existed when I was a resident in the mid-1980s," says Donald W. Kees, M.D., vice chair of pediatrics and designated institutional official for graduate medical education at Carilion. "All programs now have common training requirements that govern such issues as the number of hours a resident can work, patient safety standards, and how residents, faculty, and programs are evaluated."

Many residents and fellows who have trained at the health system's hospitals stay on after they complete their training, joining Carilion's medical staff and establishing practices in underserved areas.

"Every year, about 30 percent of our trainees remain with Carilion when they finish residency or fellowship," says Dr. Kees. "Compared with other rural areas, we have a large number of primary care doctors and specialists available to our patients."

Over the past several years some difficult-to-recruit specialists—including, for example, two child psychiatrists and an addiction medicine psychiatrist—have stayed to practice in the region after training at Carilion. The neurosurgery residency has brought four additional neurosurgeons to the community. Several graduates of the emergency medicine residency, a comparatively new addition to the hospital's offerings, have chosen to practice at Carilion, eliminating the need for locum tenens emergency physicians in some of the system's hospitals.

WELLNESS FOR RESIDENTS



Nine years ago, neurosurgeon Gary Simonds, M.D., was worried about the seven residents in the neurosurgery training program at Carilion Clinic. Dr. Simonds, who established the residency program in 2006 and ran it until his retirement this year, knew these young physicians were under constant stress, and when he asked them to keep a tally of what happened to them in a typical day, the results were eye-opening.

During each night on call, a resident might need to handle scores of urgent phone calls, and a week in the hospital often included at

least a hundred interactions with patients who were seriously ill or dying. Conflicts with coworkers were common, and the residents rarely heard a word of praise.

The survey responses confirmed Dr. Simonds' suspicion that residency was taking an unnecessarily heavy toll on these doctors' lives.

"Rather than assume that residents just needed to toughen up," Dr. Simonds says, "I wanted to change our approach and arm them with techniques to mitigate the burden."

So, in partnership with clinical psychologist Wayne Sotile, Ph.D., an expert on resiliency and physician work/life balance, Dr. Simonds instituted monthly meetings with the residents and the entire neurosurgery team to develop and practice techniques for coping with stress.

"That Carilion supported and encouraged this intensive effort to improve resident well-being was unprecedented; no other medical

center was doing anything like it," says Dr. Simonds.

Soon, other Carilion residency programs were consulting with Dr. Simonds and Dr. Sotile, and in 2015 the two published a guidebook of their techniques, which mostly involve small adjustments in attitude and outlook. Yet the changes seem to make a big difference in how residents perceive their training.

"Physicians are so focused on taking care of patients that they fail to recognize when they're overstressed and fatigued," says Dr. Simonds.

Today, thanks to this training, Carilion's neurosurgery residents seem happier and less stressed. Once subject to complaints from coworkers and patients for being short-tempered and abrupt, now they get compliments, and they've been recognized as the best consultants in the emergency room.

"They are light-years from where they once were," says Dr. Simonds.



PIONEERS IN FAMILY MEDICINE: The Family Practice Center (above), within view of Roanoke Memorial Hospital, opened its doors in the 1970s. Dr. Francis Amos (pictured in 2015), the first graduate of the family practice residency, became associate director of the program.

At the same time, the residency programs have drawn many accomplished practicing physicians to the Roanoke area. They come expressly for the opportunity to train young physicians.

"If we didn't have residents at Carilion, we wouldn't have the quality of faculty that we have," says Daniel Harrington, M.D., vice president for academic affairs at Carilion and vice dean of the Virginia Tech Carilion School of Medicine. Dr. Harrington, who established a psychiatry residency at Roanoke Memorial in 1990, led graduate medical education at the hospital for many years before taking his current position.

Residents and fellows also affect the quality of care for Carilion patients through the research they conduct as part of their training. Most residents participate in quality and patient safety research projects with a faculty mentor. In recent years, those projects have resulted in quality improvements such as putting alerts in electronic health records to prevent the ordering of MRIs for patients with pacemakers and standardizing the placement of inferior vena cava filters in patients at risk of blood clots.

Some residency programs and all fellowship programs at Carilion also require research in the physicians' medical specialties. Joshua Eikenberg, M.D., for example, recently received national recognition for a study he conducted of patients who had undergone Mohs surgery for their skin cancer. The dermatology resident found that physicians' perceptions of their patients' pain influenced their opioid-prescribing practices and that patients who received opioids were no more satisfied with their pain treatment than those who did not receive the addictive painkillers.

A History of Education and Service

The first interns at Roanoke Memorial Hospital arrived in 1933, but it wasn't until 1946 that the American Medical Association, then the accrediting body for graduate medical education, put its stamp of approval on the hospital's internship program. At the time, general practitioners could hang a shingle for their own practices after a one-year hospital internship.

World War II had emptied medical schools, and practicing physicians were called to active duty, leaving Roanoke Memorial with just nine staff doctors and interns during the war. By the late 1940s, the hospital had four interns who were paid \$90 to \$150 a month, plus room, board, and laundry.

In the 1950s, as medicine became more sophisticated and specialized, hospitals created residencies to extend and deepen the training of new doctors. Roanoke Memorial established residency programs in surgery, pathology, internal medicine, and "crippled children's orthopedics" between 1956

"IF WE DIDN'T HAVE RESIDENTS AT CARILION, WE WOULDN'T HAVE THE QUALITY OF FACULTY THAT WE HAVE."

—Daniel Harrington, M.D., Vice President for Academic Affairs at Carilion Clinic and Vice Dean of the Virginia Tech Carilion School of Medicine

and 1961. In 1968, the hospital created a one-year general practice residency and the general surgery residency program expanded to four years.

Then came the family practice residency. The hospital, as a leader in the new specialty, had no trouble recruiting physicians.

"We were in demand from the very beginning, because there were so few family practice residency programs," says Dr. Amos. "And even though family practice residency programs at university medical centers had prestige, many young doctors preferred to come to Roanoke Memorial because community hospitals were a better fit for the medical experience and type of patients they wanted to care for."

Another drawing card for Roanoke Memorial was that the hospital's specialists eagerly participated in teaching family medicine residents, and generalists practicing in the community routinely volunteered days off to train the young doctors in the Family Practice Center.

"Those senior physicians had invaluable experience and guided the residents, seeing patients right alongside them," says Dr. Amos, who continued to supervise residents once a week after he established his own practice in Rocky Mount, 30 miles south of Roanoke. In anticipation of Dr. Amos' retirement in 2014, a Carilion family medicine resident joined the practice to help smooth the transition.

A Continuing Commitment

The creation of the Virginia Tech Carilion School of Medicine, started in 2007 and opened in 2010, solidified Carilion's path toward becoming a major academic medical center. The system's hospitals have continued to add faculty and have expanded into new areas of subspecialty care.

"Between 2006 and 2007," says Dr. Harrington, "we had phenomenal growth in the number of residency and fellowship programs we offered."

Yet Carilion's continued development of residency and fellowship programs has required an exceptional commitment to the mission of educating physicians. The primary funders of graduate medical education—the Centers for Medicare & Medicaid Services and the Veterans Administration—subsidize residents' salaries and pay hospitals to train young physicians. In 1997, though, CMS capped the number of residency positions it would support at each hospital, leaving the institutions to cover the cost of any additional residencies.

Carilion stepped into the breach, and today, when those 300 new trainees start working at Carilion this summer, the government will fund the training of only 190 of the residents and fellows. Carilion will pay the remaining 110 physicians' salaries and training costs.

"Training those additional physicians affects our bottom line," says Dr. Kees. "But Carilion is committed to providing the region with high-quality primary and specialty care."

And the residents and fellows continue to repay that investment handsomely.

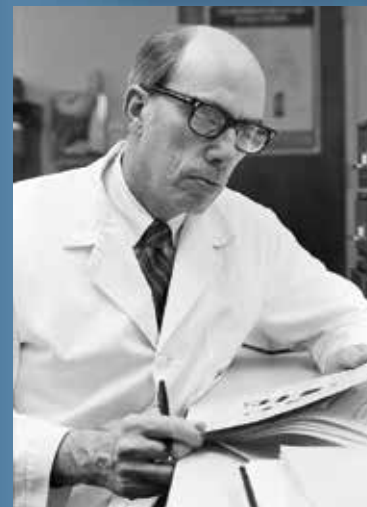
"I'm so impressed with the caliber of physicians entering residency and fellowship programs today," says Dr. Harrington. "As U.S. medical schools have increased the standards required for graduation, these doctors have become increasingly

well-prepared to practice medicine when they join clinical settings."

And just as trainees emerge from their time at Carilion's hospitals as better doctors, having been educated by a multitude of specialists and subspecialists, the faculty benefit as well, with residents and fellows challenging them to become better teachers and communicators, adds Dr. Harrington. And most important, patients benefit from better and safer care when all of their physicians are at the top of their game. **CM**

CarilionClinic.org/carilionmedicine

A PIONEER OF GRADUATE MEDICAL EDUCATION



During his 20-year tenure as director of Carilion Roanoke Memorial Hospital's surgical residency program, Robert E. Berry, M.D., oversaw many surgical firsts.

"We did the first arterial pressure measurement, the first shunts for renal dialysis, the first duplex scans, the first dual-chambered cardiac pacemaker, and the first parathyroid transplant in

Virginia," recalls Dr. Berry, who retired in 1992 as the longest serving director of a residency program at the hospital. The program also trained the first woman in a Carilion general surgery residency; she completed her training in 1978.

Dr. Berry was recruited to launch the hospital's new surgical residency program in 1971. Previously he had served as director of medical education at Methodist Hospital in Philadelphia, and he had been a medical missionary in Nepal for four years. He recalls performing that country's first heart surgery and tending to climbers who were injured on Mount Everest.

At Carilion Roanoke Memorial Hospital, every resident who completed surgical training under his tutelage achieved board certification, and at the time of Dr. Berry's retirement in 1992, the residency program had become so well-known and respected that it was receiving 300 applications annually from young doctors around the country. That year,

36 residents completed the program: two in plastic surgery, two in thoracic surgery, and the rest in general surgery. In addition, two physicians finished vascular fellowships.

Established as a tribute to Dr. Berry's dedication to training the surgeons of tomorrow, the Dr. Robert Berry Resident Education Fund recognizes outstanding residents for their contributions and participation in the surgical residency program. Supported by faculty members and surgical residency graduates, the fund supplies books and curriculum materials to residents and makes a \$2,500 award each year to enable a resident to attend a national medical conference.

Dr. Berry's insistence on clinical excellence and compassionate patient care remains a hallmark of the surgical training program he established. It's part of his lasting legacy, carried on at Carilion Roanoke Memorial Hospital and by the hundreds of surgeons he helped train over two decades.

BUILDING A
BETTER DOCTOR

LIFELONG LEARNING

Traditionally designed to keep physicians at the top of their game, Carilion Clinic's Continuing Medical Education program is reaching more medical professionals than ever.

BY VERONICA MEADE-KELLY

A DOZEN YEARS AGO, A COLLEAGUE approached Apostolos (Paul) Dallas, M.D., Carilion Clinic's long-tenured director of Continuing Medical Education, and made what was, to Dr. Dallas, an intriguing observation.

"You know, nobody's teaching portable ultrasonography in the United States," Dr. Dallas recalls the colleague saying. "I think we can be the first people to teach it."

Ultrasonography, a technique that uses the echoes of soundwaves to create images of what's inside the body, is perhaps best known for helping obstetricians track what's happening in the

womb during pregnancy. Yet its use in medical practice is far-reaching. Since its introduction in the United States in the 1960s, ultrasonography has been adopted by fields as disparate as cardiovascular medicine, urology, emergency medicine, and dermatology to help make diagnoses and guide treatment.

And, by ditching cumbersome machinery for more mobile, handheld devices, portable ultrasonography has opened up more applications for this powerful tool. The portable devices can be dispatched in the field quickly—inside or outside the hospital—making them especially useful in critical care



STEPS IN THE RIGHT DIRECTION: Continuing medical education courses ensure that providers receive training on the latest assistive devices, such as ReWalk, a wearable robotic exoskeleton that helps people with spinal cord injuries stand, walk, and climb and descend stairs.

and emergency medicine, where cases are delicate or life-threatening and time is of the essence.

The notion that portable ultrasonography devices, which were widely available by the late 1990s, were not being used to their full potential because of a lack of training was disconcerting. And it's exactly the type of gap that CME, which is designed to keep physicians updated on the latest technologies and practices, was meant to address. To Dr. Dallas, it was a perfect opportunity for Carilion doctors to fill an unmet need in medical education.

"It's one thing to do something that everyone else is doing and try to do it incrementally better," Dr. Dallas says. "It's another thing to do something no one else has done. It was exciting."

There's Always More to Learn

Mandatory CME programs began to pop up across the United States back in the 1930s, once it was recognized that the initial training of physicians wasn't enough to sustain them through their long careers. Patients would be better served, it was thought, if their doctors continued to learn over the years.

That philosophy has proven ever more relevant as the responsibilities of modern physicians have mounted. Physicians today not only care for the sick and injured, but also find themselves with additional responsibilities, most often as teachers, administrators, researchers, and advocates. Learning all these skills—on top of those needed to treat patients—would be impossible during the relatively short term of medical training. And new information and procedures always arise. Without CME, it would be difficult for physicians to keep fresh and updated.

Shari Whicker, Ed.D., director of the Office of Continuing Professional Development, of which CME is a part, looks at the issue from the perspective of health care delivery.

"WHILE IT MAY BE IMPERCEPTIBLE TO THEM, CME MATTERS TO PATIENTS. WHEN THEY COME IN, THEY EXPECT THEIR PHYSICIANS AND HEALTH CARE TEAM TO HAVE ANSWERS."

—Shari Whicker, Ed.D.,
Director of the Office of Continuing Professional Development,
Carilion Clinic



WATCH AND LEARN: Continuing medical education programs at Carilion teach a range of topics, including portable ultrasound technology.

"While it may be imperceptible to them, CME matters to patients," Dr. Whicker says. "They expect the level of expertise that CME helps provide. When they come in, they expect their physicians and health care team to have answers. While providers are never going to be all-knowing, it's absolutely critical for them to stay up with the latest technologies and information so they can provide the best possible care."

"One would hope that if you're educating a physician on a new technique or practice," Dr. Dallas adds, "then on the very next opportunity the physician has to see a patient with a relevant condition, there's the potential that the patient will benefit."

He offers the emergence of new medications as an example. If a physician learns during a CME course that a new anticoagulant has come onto the market that causes less bleeding and is better at preventing clots than older therapies, then that doctor can immediately switch patients to the better agent. Similarly, if physicians learn that a new antibiotic is available, they'll know they can prescribe it if other treatments fail.

Carilion's portable ultrasonography course provides additional instances. Dr. Dallas notes that one student used the tool days after taking the course to identify the location of a dangerous clot. Another diagnosed fluid buildup around the heart of a woman who was suffering from low blood pressure.

"There have been cases," he says, "where a physician has been able to help a patient in a significant way by having attended one of our CME courses."

TEACH to Learn

With physicians' responsibilities increasing, and with medical and scientific knowledge growing at exponential rates, CME has had to keep pace. Dr. Dallas reports that, in his time as CME director, Carilion has gone from offering 7,000 credit hours each year to more than 80,000 hours—an increase of about 20 percent each year.

Some of that increase can be traced to the growth of the Virginia Tech Carilion School of Medicine, which has brought more students, residents, and fellows into the system, creating an even greater demand for instruction. In tandem, and through collaboration with the Virginia Tech Carilion School of Medicine and Jefferson College of Health Sciences (now Radford University Carilion), Carilion has recognized the importance of support for quality teaching.

That commitment is exemplified by the Teaching Excellence Academy for Collaborative Healthcare (TEACH). The program, which Dr. Whicker directs, brings together faculty and other professionals at Carilion united by the common thread of teaching within the health professions. The academy provides organi-

zational support, opportunities for networking and collaboration, and recognition for medical experts whose educational roles are too often overlooked.

It's hoped that some additional CME programming might continue to come out of the collaborations and training provided by the academy. Still more stems from existing trainings offered by individual departments.

"Almost every department has a requirement to teach residents and fellows. If their trainees can benefit from it," Dr. Dallas says, "then we ask: why not make it so other physicians can benefit from it also and get CME credit?"

Additionally, Carilion's CME program offers various conferences and symposia, including a spring symposium that has, for the past 70 years, offered a concentrated mix of interdisciplinary training for interested Carilion physicians.

"We conduct regular needs assessments to see where our gaps are and what our faculty and professionals need to learn more about," Dr. Whicker says. "Once we establish what those needs are, we seek experts who can provide that training internally and, if necessary, we'll bring in outside experts to fill those gaps. This is true when it comes to teaching, as well as a variety of other developmental needs that reach our physicians and other health care providers."

Dr. Whicker adds that topics include basic research, quality improvement, communication skills, team-building, well-being, and anything else that will improve the patient and learning experiences throughout the organization.

Crossing Borders

In Virginia, physicians are required to accrue 60 hours of CME every two years. Although requirements vary by state, it's safe to say that demand for training nationally is high.

Carilion is doing its part. While most of its offerings cater to physicians within the Carilion system, many courses allow physicians from all over Virginia, neighboring states, and the country to train as well. Past conferences have even attracted doctors from abroad.

And Carilion has projected outward. Some courses—particularly those that are unique or in high demand—are taught outside of Carilion's walls.

The portable ultrasonography course that Carilion designed—a detailed, hands-on, CME program first offered to critical care physicians at Carilion—proved so popular that it gained national attention. In addition to extending the program to primary care physicians and others, the experts who taught it were ultimately asked to design a portable ultrasonography course for the Society of Critical Care Medicine and, later, the American College of Physicians.



Apostolos (Paul) Dallas, M.D.

"ALMOST EVERY DEPARTMENT HAS A REQUIREMENT TO TEACH RESIDENTS AND FELLOWS. IF THEIR TRAINEES CAN BENEFIT FROM IT, THEN WE ASK: WHY NOT MAKE IT SO OTHER PHYSICIANS CAN BENEFIT FROM IT ALSO AND GET CME CREDIT?"

—Apostolos (Paul) Dallas, M.D.,
Director of Continuing Medical Education,
Carilion Clinic

Carilion faculty also teach courses nationally that weren't developed through the CME program, yet depend on a faculty member's unique expertise. Joseph Moskal, M.D., chair of Orthopaedics, for example, teaches courses on an anterior approach for total hip replacement surgery that he helped pioneer. Surgeons from across the globe have visited Carilion to learn the procedure, which allows access to the hip socket without cutting through major muscle groups, potentially speeding recovery. Dr. Moskal has also taught the technique in Europe.

Similarly, Carilion's chief of Otolaryngology, Benjamin Cable, M.D., is one of only three experts nationally who teach surgeons how to perform sialoendoscopies in children. The minimally invasive surgery has been shown to be a safe and effective treatment for obstructive salivary gland disorders.

And the reach of Carilion's program extends even further. Classically, CME has been defined as "by physicians, for physicians." Yet the Carilion program has, over the past several years, committed to extending offerings to other health care professionals, such as nurses, physical therapists, and physician assistants.

"So many of the courses we offer are valuable for other health care professionals, and we don't see a reason we should ever limit it," Dr. Whicker says. She emphasizes that, as health care professionals increasingly work together on teams, it's essential that they work from a shared knowledge base.

"As health care evolves, interprofessionalism becomes even more critical to patient care, and if we're not learning in the same way we're practicing, we're losing a lot," she says. "It's important to tear down the walls, engage in conversation together, and learn from one another."

BUILDING A
BETTER DOCTOR

MEDICINE IN MINIATURE

Through fun, informative programs aimed at all ages, Carilion Clinic and its collaborators administer a therapeutic dose of community medical education, with far-reaching benefits.

BY MARYA JONES BARLOW

WHEN SUSAN TOLLIVER AND COLLEAGUES AT JEFFERSON COLLEGE of Health Sciences hosted the first “Senses and ScienceAbility”—a free day of art and science immersion for area schoolchildren—they weren’t sure what the response would be.

“With relatively little promotion and a small program, we had over 300 people,” says Tolliver, an instructor in laboratory management and biomedical sciences. “Many came when the doors opened and didn’t leave until we closed. We learned that they wanted us to do it again. We learned they wanted *more*.”

Since that first event in 2017, Senses and ScienceAbility has grown to include new community partners, multiple downtown Roanoke venues, schools and homeschoolers throughout southwestern Virginia, approximately 40 hands-on activities and exhibits, at least 140 volunteers, and crowds of more than 700 eager participants.



SCRUBBING IN: A young participant in Senses and ScienceAbility—a medical education program for community members—gets ready to step into an operating room.



DEM BONES: Artist Jennifer Anderson Printz sketches a skeleton during the Virginia Tech Carilion School of Medicine's first Mini Medical School, "Anatomy for Artists and Other Curious Sorts."

"We have kids who cry at the end of the day because they don't want to go home," Tolliver says. "We have parents who write to tell us their children are eager to come back—or that they've decided to pursue a career in health care *because* they attended."

More than the glowing reviews, Tolliver says the real reward is "that look in their eyes when you know that they are curious, intrigued, and stimulated."

It's an observation echoed for Carilion Clinic and its many collaborators: Offer medical education programs, and the local community will embrace them with enthusiasm, revealing the region as an eager partner in building a healthier population.

"FOUR YEARS OF MEDICAL SCHOOL CONDENSED INTO FOUR NIGHTS" IS WHAT EACH MINI MEDICAL SCHOOL OFFERS.

—David Trinkle, M.D., Associate Dean for Community and Culture, Virginia Tech Carilion School of Medicine

Medical School, Abbreviated



The Virginia Tech Carilion School of Medicine offers the public a **Mini Medical School** that David Trinkle, M.D., the school's associate dean for community and culture, playfully describes as "four years of medical school condensed into four nights." While the program doesn't confer a medical degree, it does allow participants to explore the school, along with timely topics in medicine and public health.

The premier installment, "Anatomy for Artists and Other Curious Sorts," gave painters, sculptors, and other interested community members glimpses into the human body. Other Mini Medical Schools have tackled what it's like to be a medical student, mental health issues and treatment, global health and international medicine, genetics and population health, and military medicine and healing for veterans.

Dr. Trinkle says the objective is to put an engaging, interactive spin on the world-class research and learning going on inside the decade-old medical school. Over the course of several two-hour evening sessions, participants might play with the school's virtual anatomy table, dive into simulated patient treatment scenarios, or participate in hands-on workshops on moulage—the art of fabricating mock injuries for the purpose of training emergency response teams.

The Mini Medical School is one of the many ways the medical school extends itself into the community with creative and broadly appealing programs, including art shows, service-learning projects, and multicultural events. "From the start, we wanted to make our school as welcoming as possible to members of the community and thank them for their enthusiasm," Dr. Trinkle says. "Through their engagement and the connections we make at these events, we're able to serve the community even better."

Nursing a Passion



Through a course called "**Introduction to Nursing Careers**," juniors and seniors at all five of Roanoke County's public high schools have the opportunity to train and complete requirements to become certified nursing assistants. Launched last fall, the program graduated its first 27 CNAs this spring and has a full roster of 50 students scheduled to start this fall.

Offered at the Burton Center for Arts and Technology, the class meets every other morning. Students

learn about the health care field, anatomy and physiology, medical terminology, patient rights, health information privacy, safety, and more, while also practicing CNA skills in laboratory and clinical settings. They leave well-prepared for the CNA exam and to pursue degrees in nursing and other health care fields.

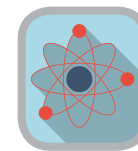
The course is a partnership of Roanoke County Public Schools, Carilion, and Medical Facilities of America, a Roanoke-based company that operates long-term care facilities, with support from the Claude Moore Scholars Program. Together they developed a curriculum that would meet requirements of the Virginia Board of Nursing, as well as the needs of the region's population and health care employers.

"I was heartened to witness the affection, caring, and empathy demonstrated by the young men and women in this course toward the elderly population," says Karen Zimmerman, R.N., a Carilion instructor who leads the course. "They give of themselves from the heart—not just to meet a course requirement. On their own, for example, the students wrote and delivered 250 Christmas cards to the patients at the Salem Health & Rehabilitation Center, where we do our clinical rotations."

A second introductory course is planned next year for returning students who want to delve deeper into such areas as diabetes management, mental health, EKG technology, and phlebotomy.

The program is one of two that offer medical-related instruction to area high schoolers. In 2017, Roanoke County Public Schools partnered with Jefferson College of Health Sciences and Roanoke County Fire and Rescue on a program that prepares students to earn Level 1 emergency medical technician certification.

Gathering Steam



Each year, hundreds of students—from kindergartners to high school seniors—eagerly arrive by bus and car for **STEAM Day** in downtown Roanoke. After engaging in dozens of free hands-on activities promoting science, technology, engineering, art, and math, they return home wearing surgical scrubs and excited about health care careers.

That's the reward for lead organizer Cathy Jennings, R.N., and the 54 Carilion employee and student volunteers who put in 12 months of planning and 300 hours of volunteer time each year on the event.

"All of my team looks forward to this. It's one of our favorite days of the year," says Jennings, a cardiac surgery clinical nurse specialist at Carilion. "We provide an inside view on how we take care of people, what therapies we use, and how we monitor their progress. Health care careers in our area are thriving and growing, and we need good people to do these jobs. When I

"WE PROVIDE AN INSIDE VIEW ON HOW WE TAKE CARE OF PEOPLE, WHAT THERAPIES WE USE, AND HOW WE MONITOR THEIR PROGRESS. HEALTH CARE CAREERS IN OUR AREA ARE THRIVING AND GROWING, AND WE NEED GOOD PEOPLE TO DO THESE JOBS."

—Cathy Jennings, R.N., Lead Organizer for STEAM Day, Carilion Clinic

see the kids' excitement, it renews my own excitement for my work."

Last year's STEAM Day drew more than 500 children from throughout Virginia and West Virginia. They met dogs and handlers in Carilion's Pet Pals therapy program, stepped aboard the Life-Guard air ambulance, learned to pack wounds and place tourniquets with paramedics, and "scrubbed in" to perform simulated surgery with the hospital's OR team, among other experiences.

The event, held each fall, partners Carilion with the Science Museum of Western Virginia, the Virginia Museum of Transportation, the Taubman Museum of Art, and Virginia Tech to enable children to experience a variety of locations and activities spanning every step of their academic careers.

Jennings also coordinates Carilion's participation in the Virginia Tech Science Festival, held each fall in Blacksburg. At last year's event, Carilion hosted seven activities, including a virtual teddy bear clinic, DermaScan screenings that illustrate skin damage from the sun, and demonstrations of the da Vinci robotic surgical system.

Time for Hissing Cockroaches



At **Senses and ScienceAbility**—the annual partnering of Jefferson College of Health Sciences with the Taubman Museum of Art and Roanoke Public Libraries—children of all ages can choose from dozens of hands-on activities that present science as play.

At this year's event, more than 700 participants conducted virtual dissections of the human body, donned scrubs and experienced the operating room, held Madagascar hissing cockroaches, explored the properties of water, or simply burned off some steam on an obstacle course.

As the free Saturday event has grown each year, so has the enthusiasm from organizers and the public.

"I say often that I have the best job in the college," Tolliver says. "This arts and sciences festival is a big reason for that. The organizing committee is composed of scientists who work long and hard to ensure that the event is spectacular, and we're joined by nearly 200 faculty, staff, and student volunteers who engage with the visitors. Our community partners add a dimension we could not have without them."

Tolliver says she expects next spring's Senses and ScienceAbility celebration to be even larger and with amplified impact, now that Jefferson College of Health Sciences has completed its recent merger to become Radford University Carilion.



THE PLAY'S THE THING: When Jefferson College of Health Sciences—now Radford University Carilion—introduced its first Senses and ScienceAbility event, the children didn't want to leave.

Launching Teens into Health Care



Jeremy Slater, a Roanoke native entering his junior year at Emory University, says Carilion Roanoke Memorial Hospital always “felt like home.” He spent many hours of his childhood

there, accompanying his father to treatments for a rare blood disorder and his mother to her job as a respiratory therapist.

When Slater was old enough to join the hospital's **summer teen volunteer program**, he didn't hesitate. He spent three summers during high school tending to patients and families and helping staff.

“It meant a lot to be able to contribute to the hospital community and provide some happiness and support for patients in a stressful situation,” he says. “It was a full, enriching experience that taught me a lot about listening and communicating with people.”

The icing on the cake was a \$1,500 Teen Volunteer Scholarship toward Slater's college education as an interdisciplinary studies major, minoring in Hindi and Persian. “I feel very blessed,” Slater says. “Volunteering at Carilion allowed me to help make the community a healthier, happier place. To receive a

“THE ORGANIZING COMMITTEE IS COMPOSED OF SCIENTISTS WHO WORK LONG AND HARD TO ENSURE THAT THE EVENT IS SPECTACULAR, AND WE'RE JOINED BY NEARLY 200 FACULTY, STAFF, AND STUDENT VOLUNTEERS WHO ENGAGE WITH THE VISITORS.”

—Susan Tolliver, Instructor in Laboratory Management and Biomedical Sciences, Radford University Carilion

scholarship that funds my education to be a better person is extremely motivating.”

Since 2010, Carilion has awarded almost \$63,000 in scholarships to 37 student volunteers, says Shanna Flowers, manager of volunteer services at Carilion. Volunteers raise the money through donations to the hospitality snack carts that they wheel into hospital waiting rooms, offering beverages and food to patients' family members.

Slater is spending the summer in Tajikistan on a Fulbright scholarship to study Persian. His principal interest is international sustainability and development, with a major focus on health. He hopes to work at the World Health Organization, United Nations, or another organization with global reach.

Taking to the Skies



An interactive exhibit at the Virginia Museum of Transportation invites visitors to experience the history of Virginia's first air ambulance, Life-Guard. Opened in 2018, the permanent exhibit showcases the evolution of Life-Guard since it first took to the skies in 1981. Today, Carilion's air

transport program operates a three-helicopter fleet that reaches patients throughout Virginia, parts of West Virginia, North Carolina, and Tennessee.

Carilion curated, produced, and donated the exhibit to offer a glimpse of how pilots and first responders help save lives when time is short and distances are long. Highlights include an interactive look at the history of the rescue program, behind-the-scenes rescue videos, and a review of safety features.

“We really hope to be able to inspire some future aviators, whether they want to become a pilot or a flight nurse, flight paramedic, aviation mechanic, or dispatcher,” says Susan Rivers, Life-Guard program director at Carilion. “Unfortunately for our patients, when we are called to transport them, it's often the worst day of their lives. They are not able to take it all in during their short flight. This exhibit gives the community an opportunity to take a peek behind the curtain to learn more about Life-Guard's very special mission—what it looks like from start to finish and how the team gets the job done safely, quickly, and with the best clinical care possible.”

Brain Teasers



One of Carilion's principal academic partners, Virginia Tech, delivers a series of highly attended annual programs that inform the community about the frontiers of medicine and science. One example includes the Maury Strauss Distinguished Public Lecture Series, a Fralin Biomedical Research Institute at VTC program that brings leading experts in research, health care, and policy to Roanoke. Also popular is the institute's **Brain School**, in which researchers and physicians share contemporary advances in brain science with community members.

“Right here in Roanoke, remarkable discoveries are being made that influence the worldview of neuroscience and implementation of brain health across the lifespan,” says Michael Friedlander, Ph.D., executive director of the research institute and Virginia Tech's vice president for health sciences and technology. “With the help of groundbreaking neuroscience research taking place at our institute, Roanoke has transformed from a ‘train city’ to a ‘brain city.’”

For the past seven years, Dr. Friedlander and his colleagues have invited the public to attend Brain School, a celebration of the brain held each March in conjunction with Brain Awareness Week, which is spearheaded internationally by the Dana Alliance for Brain Initiatives, a private philanthropic organization that supports brain research.

“Brain School gives community members the chance to learn about the brain, hear from scientists working on the leading edge of discovery at the Fralin Biomed-

“BRAIN SCHOOL GIVES COMMUNITY MEMBERS THE CHANCE TO LEARN ABOUT THE BRAIN, HEAR FROM SCIENTISTS ON THE LEADING EDGE OF DISCOVERY, AND HEAR FROM OUR PHYSICIAN COLLEAGUES WHO ARE PROVIDING HIGH-QUALITY CARE FOR PATIENTS.”

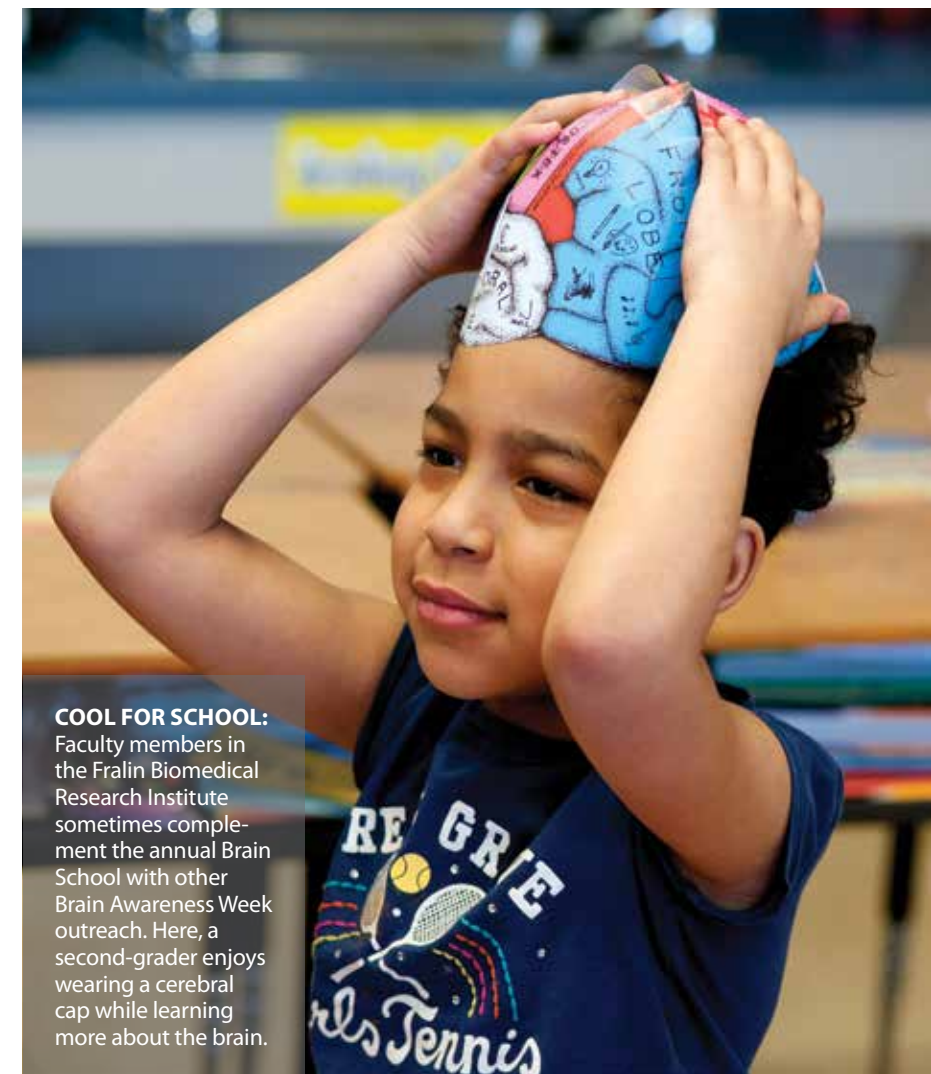
—Michael Friedlander, Ph.D., Executive Director, Fralin Biomedical Research Institute at VTC

cal Research Institute, and hear from our physician colleagues at Carilion who are providing high-quality care for patients with brain disorders,” Dr. Friedlander says. “This is an opportunity for our scientists and the public to have a dialogue on some of the most fascinating topics in the science of brain and mind.”

While the subject matter is undoubtedly cerebral, it's also fun and accessible for people of all ages. Interactive presentations by leading Virginia Tech researchers and Carilion physicians are paired with hands-on activities, such as holding an actual brain.

Past Brain Schools have delved into such topics as aging and dementia, sleep and circadian rhythms, pain, addiction, traumatic brain injury, animal brains, and the impact of digital technology.

“We want residents to learn more about the rapidly changing understanding of the capacity, function, and resilience of the brain,” says Dr. Friedlander. “We're proud that these changes include some of the discoveries being made daily here at the research institute by our students, fellows, and faculty.”



COOL FOR SCHOOL: Faculty members in the Fralin Biomedical Research Institute sometimes complement the annual Brain School with other Brain Awareness Week outreach. Here, a second-grader enjoys wearing a cerebral cap while learning more about the brain.

Handle with Care

By Jessica Cerretani

CARILION WOMEN'S NEW OFFICE-BASED
TREATMENT PROGRAM MEETS PREGNANT,
OPIOID-DEPENDENT PATIENTS WHERE THEY ARE.

SHE'S STRUGGLED WITH OPIOID ADDICTION on and off for what seems like forever. She tried to stop using when she was pregnant with her son—and she did for a little while, until the disease reeled her back in. Now she's expecting again, and reluctant to ask for help. Along with the fear of losing custody of her young son and new baby, she has a deep-seated feeling of humiliation. The only thing more shameful than being an addict, she thinks, is being a pregnant one.

Despite the stigma, opioid use in pregnancy is on the rise, with devastating effects. According to the Centers for Disease Control and Prevention, the number of women with an opioid-use disorder at the time of labor and delivery more than quadrupled between 1999 and 2014, reflecting the same pattern of prevalence in the general population.

For Virginians, those statistics hit close to home: Here, the number of infants born with neonatal abstinence syndrome—the withdrawal symptoms that result after a baby has been exposed to opioids in the womb—increased by 11 percent just from 2016 to 2017.



The risks of opioid use are clear in new mothers, too. One recent study found that even though opioid overdoses decrease during pregnancy, they rise again during the postpartum period, particularly in the second six months after delivery. Women who do overdose tend to be younger, single, unemployed, less educated, and less likely to have received adequate prenatal care.

Indeed, the judgment surrounding substance-use disorders and pregnancy is especially strong, leading many women with opioid dependency to forgo prenatal care altogether.

“Opioid-use disorder is a chronic disease that’s really put into focus during pregnancy, when you now have two lives at risk,” says Jennifer Wells, M.D., a physician in Carilion Clinic’s Department of Psychiatry. “But because of the stigma, women often feel ashamed and unworthy of help.”

To address this crisis, Dr. Wells and her colleague Kimberly Simcox, D.O., a physician in Carilion’s Department of Obstetrics and Gynecology, have established one of Virginia’s first office-based opioid treatment (OBOT) programs specifically for pregnant women. The Roanoke-based program—which opened its doors in February through Carilion Women’s—offers medications, counseling, and psychosocial and pregnancy-related support to expectant mothers.

“What makes us unique is that we allow women with an opioid-use disorder to come to a place that provides coordination

of care, where the clinicians understand both substance use and pregnancy,” says Sarah Dooley, R.N., the program’s operations manager.

More than Medication

The OBOT model offers medication-assisted therapy (MAT), on-site behavioral health services, and care coordination. This treatment involves behavioral therapy combined with the use of FDA-approved drugs such as buprenorphine, methadone, and naltrexone to address the withdrawal symptoms and cravings that accompany opioids. When administered appropriately, the treatment can help opioid users safely sustain recovery.

OBOT clinics integrate MAT into a comprehensive outpatient treatment plan that views opioid-use disorder as a chronic medical condition. It’s an approach that aims to provide collaborative care without the stigma associated with addiction, while giving patients the tools they need to manage their disease.

“We should be thinking of opioid-use disorder as we do diabetes or hypertension,” says Dr. Simcox. “It should be viewed like any other long-term chronic condition that requires treatment.”

Obstetrics-specific OBOT clinics tailor this model to the needs of opioid-dependent pregnant women. Like traditional OBOT programs, they offer MAT, but they also include information aimed at breaking down misconceptions about its use—reliance on med-

There’s THIS IDEA THAT MAT IS A CRUTCH, THAT YOU’RE NOT REALLY IN RECOVERY IF YOU’RE ON SUBOXONE OR ANOTHER MEDICATION,” SAYS DR. WELLS. “THAT’S PRIMARILY A PROBLEM OF NOT UNDERSTANDING THE BRAIN PROCESSES BEHIND ADDICTION.”

ications, for example, doesn’t mean just swapping one drug for another. In fact, the American College of Obstetricians and Gynecologists recommends MAT as the preferred treatment for pregnant women. Compared with MAT, medically supervised opioid withdrawal in expectant mothers is associated with higher relapse rates and worse outcomes, such as preterm birth and miscarriage.

“There’s this idea that MAT is a crutch, that you’re not really in recovery if you’re on Suboxone or another medication,” says Dr. Wells. “That’s primarily a problem of not understanding the brain processes behind addiction. We try to educate women and their families about how critical MAT is for the safety of the fetus and for having a healthier baby—and that’s everyone’s goal.”

To that end, the Carilion Women’s OBOT goes beyond medication and counseling to include a spate of services focused on pregnancy and the postpartum period. “We’re not just seeing women coming in for medication and therapy, and it’s not your typical quick clinic visit,” says Leanna Stone, the center’s care coordinator, who also provides patients with psychotherapy services. “It’s helping women apply for Medicaid if they need insurance and helping them find food banks if they lack access to good nutrition. We’re looking at each patient as a whole person, not just a pregnant woman or a woman with substance-use disorder.”

Birth and Beyond

That support continues beyond labor and delivery. Although the program doesn’t yet offer obstetric care, its clinicians work closely with patients’ obstetricians to ensure a safe and seamless experience. “Our hope is to bring prenatal care to the program in the near future,” says Dr. Wells. “For now, our responsibility is to provide medication, psychological care, and overall support.”

The unique experience of the staff—Dr. Wells and Dr. Simcox are among a handful of physicians in the country both trained in obstetrics and board certified in addiction medicine—presents a significant opportunity to address all aspects of support.

“The advantage is that we’re knowledgeable about both pregnancy and opioid use, so we can talk to patients and their physicians about pain at delivery, neonatal withdrawal, and other concerns,” says Dr. Simcox. “We’re coordinating with obstetricians throughout the process so there are no surprises and everyone is aware of the care plan.”

They also work closely with Carilion pediatrician Jacinda Hays, D.O., to help prepare mothers for the withdrawal symptoms of neonatal abstinence syndrome—common in infants born to opioid-dependent women. These babies are not born addicted to opioids, but do experience the uncomfortable withdrawal process after birth. Babies diagnosed with neonatal abstinence syndrome are seen by Dr. Hays in a new transitional, low-stimulation nursery housed in Carilion’s Mother/Baby Unit.

“We talk about how they can console their babies and use skin-to-skin contact, which is the best medicine for newborns,” says Dr. Wells. “We try to educate women as early as possible, so they know what to expect.”

Because the months following childbirth can be particularly dangerous for moms, the OBOT program continues to offer support and resources for at least six weeks after delivery. “Opioid-dependent women are typically abandoned in the post-pregnancy period, and most cases of overdose occur during this time,” explains Dr. Simcox. “We try to follow patients closely after delivery before transitioning them to long-term addiction care.”

Growing by Leaps and Bounds

The Carilion Women’s OBOT program has grown quickly since its inception. Within two months, the program was already serving about 15 patients at weekly appointments. “We’re growing every week, and we expect to expand even more within the next six months,” says Dooley, who adds that the plan is to offer prenatal care as well.

Some patients come from other local programs, seeking consults. Others arrive through word of mouth. But physicians play a crucial role in helping pregnant patients find OBOT clinics, too.

“Some women come to their OB/GYN terrified that they’ll lose custody of their baby or be judged, so they try to hide their opioid-use disorder,” says Dr. Wells. “But with sensitive questioning and an open dialogue, they may feel comfortable enough to reveal their disease.”

Indeed, the American College of Obstetricians and Gynecologists recommends early universal screening for substance use as part of comprehensive obstetric care, beginning at a woman’s first prenatal visit. “We should be asking every patient, ‘Can I ask if you’re struggling with substance use?’—and then be asking again,” says Dr. Simcox.

In the past, physicians were hesitant to question their pregnant patients, mainly because they felt they couldn’t provide guidance or treatment. Now, the establishment of the Carilion Women’s OBOT program gives clinicians the confidence to discuss opioid dependency with their patients.

“Providers used to be afraid to ask patients, ‘How can I help?’ because they didn’t have the answer,” says Dr. Wells. “Now they know that there’s a place for women to get treatment and support, so they feel more comfortable bringing up the issue.”

The program, which is only expected to grow over time, already serves as a model that Dr. Simcox and her colleagues hope will be implemented in other areas as well. “We’ll be adding more resources as our patient population increases,” she says. “It’s such a unique opportunity for care.” **CM**



DOUBLE EXPOSURE: Dr. Jennifer Wells (left) and Dr. Kimberly Simcox are among a handful of physicians nationally who are both trained in obstetrics and board certified in addiction medicine.

CAREFUL LISTENING: During a four-month follow-up appointment, Dr. Edwin Polverino checks the lungs of Louise Wolfe, a longtime patient with hypertension.



There's No Place Like **HOMIE**

Carilion Clinic's primary care practices are structured as "medical homes," a delivery model that uses a team approach to care.

TEXT BY LINDA STALEY | PHOTOS BY JARED LADIA

EDWIN "TED" POLVERINO, D.O., HAD BEEN a primary care physician in private practice for 22 years before joining, in 2015, one of Carilion Clinic's patient-centered medical homes.

"I wanted to bring evidence-based medicine to the community," he says. "Yet keeping up with all the data and latest studies is virtually impossible as a solo practitioner."

As a physician at one of Carilion's 47 medical homes, Dr. Polverino now has a full team to help bring all resources to bear on patient care. He has the support of teams both at his practice and off-site, so he can focus his time on direct care. "The provider doesn't need to own it all," he says.

Although his office staff resembles that of a typical physician practice, behind the scenes, off-site teams are proactively identifying gaps in care, such as an overdue mammogram, and preparing orders for his signature. Care coordinators connect with patients who need education and coaching between appointments. They also tap community resources to eliminate barriers to care, such as a lack of food, housing, or transportation.

Beyond his own practice, Dr. Polverino serves as a regional medical director with responsibility for clinical and quality oversight for several practices. Such intense management is integral to Carilion's operation as an accountable care organization that focuses on realigning care delivery from fee-for-service to fee-for-value.

It's especially beneficial for patients suffering from chronic conditions—such as diabetes, hypertension, and heart failure—that can be further complicated by behavioral health issues. In one case, for example, care coordinators arranged psychotherapy when they discovered that a patient with heart failure had stopped taking her medication after her husband died.

"With the full team," says Dr. Polverino, "I'm confident that each visit has follow up, referrals are made, and nothing falls through the cracks."



A TEAM EFFORT

Clockwise from right: Clinical team lead Gary Bilbro, R.N., checks expiration dates on medications in the practice inventory. Off-site, Summer Baker, the accountable care strategies manager, reviews information from Carilion's electronic data warehouse, which captures millions of terabytes of patient data from multiple sources to identify gaps in care. Dr. Polverino meets with patient Parker Marshall. Colette Carver, F.N.P., senior director of ambulatory nursing practice, and Jamie Wagner, R.N., clinical educator, review the refrigerator's temperature log to ensure the safety of vaccines stored at the practice. Emily Woodie, a care coordinator, searches a customized database of community resources to prepare for a call with a patient.



CHECKING IN

Dr. Polverino walks to his office between appointments with patients.

BEAUTY OF THE BLUE RIDGE

The Virginia Tech Carilion School of Medicine's most recent art show celebrated the state's mountainous region. **BY CATHERINE DOSS**

THE DISTINCTIVENESS OF THE BLUE Ridge Region recently came to life in the hallways of the Virginia Tech Carilion School of Medicine, as the school's latest art show captured the stories of the Blue Ridge Mountains through acrylic, oil, and watercolor painting, as well as photography and sculpture.

The theme, "Virginia's Blue Ridge, a Metro-Mountain Adventure" set the stage for art that featured the splendor and uniqueness of the region.

"We chose the theme of the art show with the sheer beauty and diversity of the Blue Ridge Region in mind," said David Trinkle, M.D., associate dean for community and culture at the medical school. "From scenic overlooks and recreational activities to wineries, art, culture, and the Blue Ridge Parkway, the 42 local artists exhibiting in the show had a wide open canvas."

The region, whose population tops 300,000 people, is a vibrant destination.

"A big piece of our medical school's success is in its ability to attract top-caliber students, faculty, and researchers to the Roanoke Valley," said Dr. Trinkle. "The beauty of our surrounding area, our outdoor amenities, and the promotion of our region by Visit Virginia's Blue Ridge go a long way in making this happen."

Sponsored by the school's Creativity in Healthcare Education Program, the exhibition was one of three held annually for local artists—and sometimes medical students—to showcase their work to the school community as well as the local one.

"We launched the program to expand the social, cultural, and humanistic awareness of the school's students, faculty, and staff by integrating the arts into their daily routines," Dr. Trinkle said. "The program also serves as a way to involve community members in the life of our school." **CM**



A



C



E



D

THE UNFOLDING LANDSCAPE

A range of local artists offered their takes on the Blue Ridge Mountains in "Virginia's Blue Ridge, a Metro-Mountain Adventure": **A.** *Blue Ridge Farm*, by Whitney Brock **B.** *Determination*, by Edwina Dickson **C.** *James from Springwood*, by Hazel Bowers **D.** *Making Tracks Through the Blue Ridge*, by Whitney Brock **E.** *Untitled*, by Denise Swayne



B



Emergency Medicine

JOEL BASHORE, P.A., presented “It Won’t Stop Bleeding!: Epistaxis Management in the ED and Urgent Care” to the annual continuing medical education conference of the Arizona State Association of Physician Assistants in Prescott.

SARAH KLEMENCIC, M.D., was appointed to a three-year term on the Board of Directors of the Virginia College of Emergency Physicians.

Family Medicine

As a member of the U.S. Preventive Services Task Force, **JOHN EPLING, M.D.**, coauthored recommendations about interventions to prevent perinatal depression that were published in the *Journal of the American Medical Association*. Dr. Epling was also appointed as an associate editor of *Peer-Reviewed Reports in Medical Education Research (PRIMER)*, the journal of the Society of Teachers of Family Medicine.

DAVID GREGORY, M.D., is serving on the Board of the Virginia Academy of Family Physicians and on the Executive Committee of the Virginia Neonatal Perinatal Collaborative.

He spoke at the Virginia Neonatal Perinatal Collaborative’s First Maternity Mortality Summit in January and was lead author of “The Pregnant Patient: Managing Common Acute Medical Problems,” which appeared in *American Family Physician* in November.

MARK GREENAWALD, M.D., vice chair of Academic Affairs and Professional Development and vice chair of Family and Community Medicine, served as the closing keynote speaker for the third annual Bounce Back Project Resilience Conference 2018 in Minneapolis in December.

MICHAEL JEREMIAH, M.D., chair of Family and Community Medicine, was invited to extend his board role for the Association of Departments of Family Medicine and continue his role as chair of the association’s Healthcare Delivery Transformation Committee.

Internal Medicine

GREGORY DEHMER, M.D., director of quality and outcomes at the Cardiovascular Institute, was reappointed to a two-year term to the Medicare Evidence Development and Coverage Advisory

Committee beginning in January. Dr. Dehmer also served as Rating Panel Moderator for the American College of Cardiology’s Appropriate Use Criteria Task Force.



RAHUL SHARMA, M.D., interventional cardiologist, coauthored the National Cardio-genic Shock

Initiative (National CSI) study and presented the findings at the Society for Coronary Angiography and Interventions 2019 Scientific Sessions in Las Vegas. Dr. Sharma was also named a 2018 Rick Nishimura, MD, MACC, and Patrick T. O’Gara, MD, MACC, Emerging Faculty Leader by the American College of Cardiology.

Orthopaedics

Coauthors **J. RANDOLPH CLEMENTS, D.P.M.**, chief of Podiatry; **KELLEY WHITMER, M.D.**, Diagnostic Radiology; **HOA NGUYEN, M.D.**, a medical resident in Obstetrics and Gynecology; and **MATTHEW RICH, M.D.**, a 2018

Virginia Tech Carilion School of Medicine graduate—published “Safe Placement of Intramedullary Nail and Inter-Physician Variability in Guidewire Placement in Retrograde Tibiototalcaneal Fusions,” in *The Journal of Foot & Ankle Surgery*.

THOMAS K. MILLER, M.D., chief of Sports Medicine, received the Virginia Career Award from the Virginia Orthopedic Society. He was also appointed to a second year as a principal reviewer for the *American Journal of Sports Medicine*.



DR. MILLER and JOSEPH MOSKAL, M.D., chair of Orthopaedics, coauthored with

Virginia Tech Carilion School of Medicine students **MALEK BOUZAHER** and **SUSAN GIAMPALMO** a cover article in *AAOS Now*, the news magazine of the American Association of Orthopaedic Surgeons, on the disposal of unused opioid medications.

Psychiatry

MICHAEL GREENAGE, D.O., residency director for Psychiatry, and **ROBERT TRESTMAN, M.D., PH.D.**, chair of Psychiatry and Behavioral Medicine, wrote a chapter, “Legal and Forensic Aspects of Aggression,” in a book, *Aggression: Clinical Features and Treatment Across the Diagnostic Spectrum*, published in January by the American Psychiatric Association.

DR. TRESTMAN was also named to the Psychiatric and Substance Abuse Services Council of the American Hospital Association.

Surgery

CHARLES BISSELL, M.D., chief of Surgery for Carilion New River Valley Medical Center, and **BECKY FRITZ**, director of Surgical Services, presented at the Press Ganey National Client Conference in Orlando. Their topic was “Using Shared Decision Making to Improve the Patient Experience.”



BRYAN COLLIER, D.O., chief of trauma surgery, was chosen by the Association of Women

Surgeons as the 2019 recipient of the AWS Past Presidents’ Honorary Member Award. The prestigious award is given annually to a nonmember leader in surgery who inspires, encourages, and enables women to realize their professional and personal goals.

Carilion’s Bariatric program, led by **A. DAVID SALZBERG, M.D.**, and **TANANCHAI A. LUCKTONG, M.D.**, received reaccreditation in April for the three-year maximum as a Comprehensive Center of Excellence by the Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program of the American College of Surgeons/American Society of Metabolic and Bariatric Surgeons.

The Cleft and Craniofacial Center, led by **JAMES T. THOMPSON, M.D.**, was fully approved by the American Cleft Palate-Craniofacial Association’s Commission on Approval of Teams as a Cleft Palate Team for a period of five years.

spotlight on International Contributions

PAUL DAVENPORT, R.N., vice president of Emergency Services, spoke at the Health Service Journal Provider Summit in Nottingham, England. His talk was titled “An International Perspective: The Role of Command Centres to Tackle Operational Variation and Integrate Large Not-for-Profit Health Systems.”

DAVID HARTMAN, M.D., chief of Adult Outpatient Psychiatry, and **CHERI HARTMAN, Ph.D.**, Psychiatry, presented their quality improvement study titled “A Retrospective Review of Retention of Opioid-Dependent Adults in an Outpatient Buprenorphine/Naloxone Clinic” at the Global Addiction Psychiatry 2018 Conference in Madrid. Study coauthors also included **ANITA KABLINGER, M.D.**, clinical trials research director for Psychiatry.

JOSEPH MOSKAL, M.D., chair of Orthopaedics, helped develop and gave more than a half dozen presentations at the first European meeting of the International Congress of Joint Replacement Direct Anterior Approach in Innsbruck, Austria. Dr. Moskal helped pioneer the anterior approach for total hip replacement surgery in the United States in 2004. Now more than a quarter of all hip replacements in the United States are performed that way. The meeting, which attracted surgeons from around the world interested in learning the new technique, included live surgeries and hands-on cadaver workshops. Dr. Moskal has also been invited to serve as a visiting professor at the University of Belgium Medical Center and join the European Hip Society.

Translating Human Factors into Safety



Carilion Clinic received the Next Generation Innovator Award from the National Quality Forum in the category of Operational Efficiency and Design. Carilion is one of the first health care systems in the United States to fully implement the latest evidence-based guidelines from the National Patient Safety Foundation: Root Cause Analysis and Action (RCA²). The National Quality Forum recognized Carilion’s Clinical Advancement and Patient Safety team for implementing RCA² with human factors integration.



HONORED: Dr. Clifford Nottingham is flanked by Dr. Patrice M. Weiss (left), Carilion’s chief medical officer, and Nancy Howell Agee, president and chief executive officer.

Provider Excellence

CLIFFORD NOTTINGHAM, M.D., received the 2019 Dr. Robert L.A. Keeley Award for exceptional service to patients and to the community. The honor is given annually to a physician who embodies the values of Dr. Keeley, who was a beloved thoracic surgeon. Dr. Nottingham completed medical school at the Medical College of Virginia in 1978 and a residency in family medicine at Roanoke Memorial Hospital in 1981. He retired in 2018 after 40 years of practice, including 27 at Carilion. Beginning in 1997, he had been recognized as a “Top Doc” in Roanoke every year.

ADVANCING HEALTH IN AMERICA

Leading the American Hospital Association was the opportunity of a lifetime to help transform a field ripe for change. **BY NANCY HOWELL AGEE**

CHAIRING THE BOARD OF TRUSTEES OF THE American Hospital Association was one of the most memorable and humbling experiences of my career.

The actual “swearing in” took place in a hotel conference room at a board meeting in January 2018, a modest affair compared with the ceremonial investiture five months later at the association’s annual meeting.

Before a crowd of hundreds, including the governor of Virginia, I accepted the mantle from an outstanding leader, Gene Woods, president and chief executive officer of Atrium Health. I was deeply moved by the ceremony and grateful that close family and friends—including Carilion Clinic board members and colleagues—could share the experience with me.

Serving as chair is actually a three-year commitment, beginning with chair-elect and continuing as immediate past chair, so my responsibility doesn’t end until December.

Since taking office, I’ve logged enough miles to circle the globe twice. While New York, Chicago, Washington, D.C., Phoenix, and San Diego have been frequent destinations, I was also among a small delegation that ensured U.S. representation at the International Hospital Federation annual meetings in Brisbane, Australia, and Taipei, Taiwan.

Highlights also included attendance at a Rose Garden ceremony with the president, speaking at the National Press Club, and meetings with the secretary of health and human services, the senate majority leader, and dozens of other legislators.

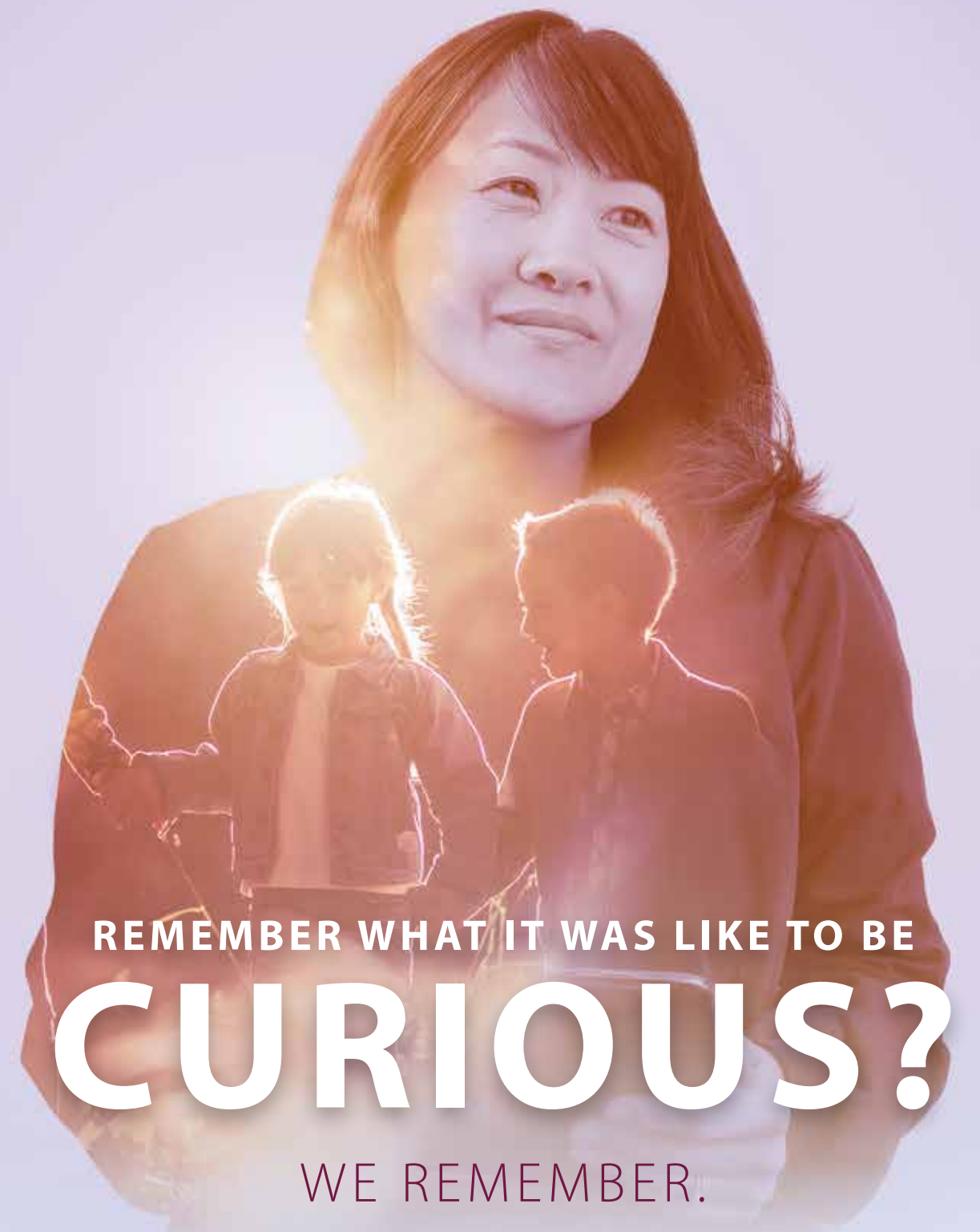
Underlying all this travel has been the hard work of helping shape public policy and providing leadership to advance the field during a time of tumultuous change.

Working with colleagues across the country from hospitals large and small, I’ve focused on two things: improving quality and addressing access and affordability. I’m passionate about the association’s initiatives to innovate and transform health care. The Value Initiative, through which the association provides thought leadership on access and affordability, is something I initiated. The program wasn’t on the radar three years ago, and now it’s a formal part of the organization, with a design studio and fund to foster innovation in health care.

My year as chair was an exciting one for Carilion, too. We worked hard to get Medicaid Expansion passed and finally it did. It’s been a game changer for us and thousands of previously uninsured patients. We also improved our financial position, planned a major expansion, and grew our partnership with Virginia Tech.

Holding down basically two jobs has meant a significant time commitment. I’ve been blessed with a great team—both at Carilion and at the American Hospital Association. I can’t think of anything more exciting than advancing health in Virginia and in America. **CA**

Nancy Howell Agee is president and chief executive officer of Carilion Clinic and immediate past chair of the American Hospital Association, which represents more than 5,000 hospitals and health care systems across the country. She began her career as a nurse at Carilion Roanoke Memorial Hospital, which is part of the system she now leads.



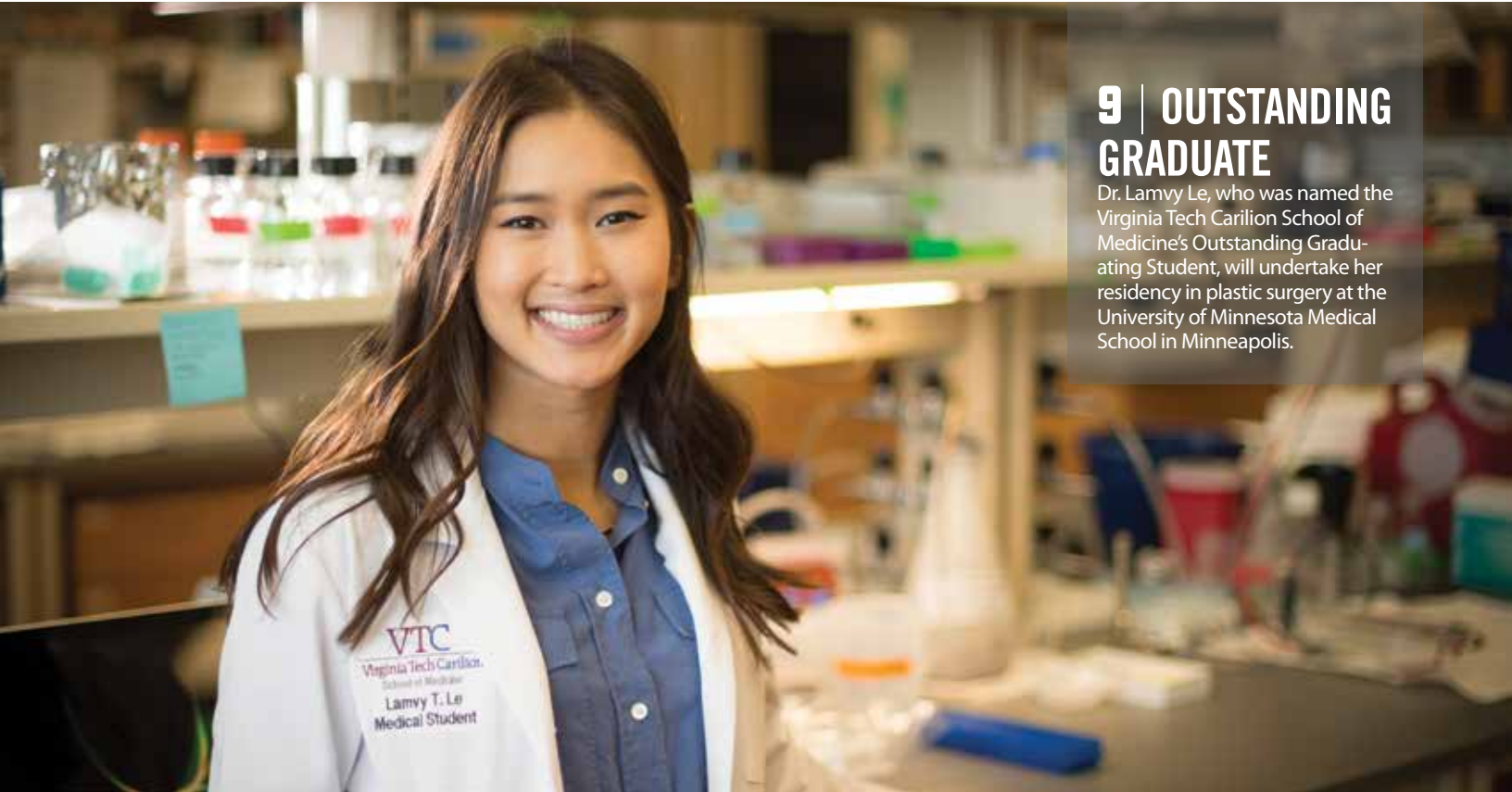
REMEMBER WHAT IT WAS LIKE TO BE
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WE REMEMBER.

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9 | OUTSTANDING GRADUATE

Dr. Lamvy Le, who was named the Virginia Tech Carilion School of Medicine's Outstanding Graduating Student, will undertake her residency in plastic surgery at the University of Minnesota Medical School in Minneapolis.

online exclusives




Preparation Meets Practice

 Carilion Clinic's more than two dozen residencies and fellowships provide doctors with vital training.




Building for the Future

 Carilion Roanoke Memorial Hospital's \$300-million expansion will add 400,000 square feet of space.



Conversation Pieces

 The Virginia Tech Carilion School of Medicine uses multiple mini interviews to help identify the best future doctors.

Please visit us at CarilionClinic.org/carilionmedicine. If you would like a complimentary subscription to Carilion Medicine, please email us at CarilionMedicine@carilionclinic.org.