

FALL 2020

PENN Medicine



The Pandemic Year

How COVID Could Change Medicine for Good
The Future Battle on the Immune Front

Also: A Century of Women in Medicine at Penn



KNEELING IN REMEMBRANCE AND RISING TO THE CHALLENGE

By MaryKate Wust

In early June, faculty and staff came together at Penn Medicine sites across the region to join silent demonstrations organized with #WhiteCoatsForBlackLives, which aims to eliminate racism from medicine and promote the health and wellness of Black and minority communities. At Penn Presbyterian Medical Center, staff spilled out of the concourse and into the street, while at Penn Medicine Lancaster General Health, employees were met with honks and cheers as they lined the sidewalk. At the main event at Franklin Field on Penn's campus, hundreds of members of the Penn and Children's Hospital of Philadelphia communities filled the turf and spread into the bleachers.

For eight minutes and 46 seconds—the amount of time a Minneapolis police officer fatally knelt on George Floyd's neck—participants took a knee in remembrance of his life and the lives of all victims of police brutality, in defiance of the racist systems that allow oppression to flourish, and in support of the protests sparked across the nation.

"We kneel in the hope that we don't have another hashtag next week or next month. We kneel so that moments like this turn into movements," said Florencia Greer Polite, MD, chief of General Obstetrics and Gynecology, whose powerful words soared across Franklin Field. But kneeling, she cautioned, is not enough. "Breaking down systemic racism is going to take real work. The question is: Are we willing to do the hard work of confronting implicit bias and recognizing our role in the current system?"

To that question, Penn Medicine has responded with a resounding "yes."

To meet this moment with the urgency it demands, the Office of Inclusion and Diversity partnered with Penn Medicine Academy to develop the Action for Cultural Transformation (ACT) plan—a framework that champions diversity, inclusion, and equality. ACT seeks to drive both long- and short-term goals that will make Penn a better place to work, learn, and receive care. The ACT agenda includes cultural shifts like widening opportunities for research and advancement for underrepresented minorities, addressing the social determinants of health that affect patients' lives, and setting the next generation of physicians up for success by ensuring culturally competent care is at the center of their education.

In an open letter titled, "My Heart is Broken, But I Am Sustained by Hope," Vice Dean for Inclusion and Diversity Eve Higginbotham SM, MD, ML, wrote, "I am reminded during this difficult time of the phrase, 'to whom much is given, much is required.' As professionals, we have had opportunities that few others will ever realize. ... Thus, using our gifts, our opportunities, our blessings, what can we do to help craft the alternative path ... and emerge as a better society?"

The Penn Medicine community has already taken several key steps on the path to an antiracist health system, including initiating authentic conversations and requiring that each member of the workforce complete unconscious bias training by year's end. As Higginbotham noted in an interview for the Penn Medicine News Blog, sustainable, transformational change requires widespread support from faculty, staff, and students alike: "There's nothing more powerful than a community being galvanized and pushing to become the best it can be." □



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The Immune Front



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PENNMEDICINE

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COVID-19 is changing medicine in real time—and likely for good.

24 Profiles of Women in Medicine, 1920-2020
By Carol Benenson Perloff
One century, bracketed by two global pandemics. Between 1920 and 2020, women rose from second-class citizenship to take the reins as pioneering leaders in medicine, among all other areas of public life.

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The Pandemic Year— and How We're Getting Through It

We called it “Flu Forward.” Two years ago in the pages of this magazine, we looked back 100 years to the 1918 flu pandemic and speculated on whether such a disease could strike again. Our experts’ chorus: It wasn’t a question of if humanity would face another great global pandemic, but when.

The answer to that question came sooner than many of us would have expected with COVID-19. And this issue serves, in a few ways, as an elaboration of that answer.

We have also broadened our scope as we grapple with what a contemporary pandemic means in our lives and work in academic medicine. Our story about the 1918 flu implicitly posed a third question after “if” and “when” the next global pandemic would strike: How would we deal with it? The answers we delved into two years ago proved prescient to the approaches now undertaken here and around the world—public health surveillance, novel treatment strategies, and rapidly deployed, fresh approaches to vaccines including RNA-based and DNA-based vaccines pioneered at Penn Medicine. Our cover story in this issue offers glimpses of this full-force effort underway at our institution since the spring, including the immediate clinical response, support for the workforce, and planning for a changed future.

Before COVID struck, we had already embarked on another 100-year look back for this issue, timed to the centennial of women’s suffrage in the United States, with profiles of Penn medical alumnae from each decade from 1920 to the present. As the reality of 2020 unfolded, we reshaped the story’s direction. Our 1920 graduates, including Julia Morgan, MD, were conscripted to treat influenza patients while still in medical school in 1918. Our 2020 graduates were kept away from their clinical duties at the spring peak of COVID, before the start of residency this summer put them back on the front lines at hospitals across the country. Not only do we now highlight the transformation of the landscape for women in medicine, but also what changed in the space of a century bracketed by two global pandemics.

Back in 2018, there were other “how” questions we didn’t think to ask about a deadly modern global pandemic. How would it change us, our fears, our focus? How would we face it, and what strengths would we lean on to survive and help those in our care? Many of the stories in these pages—cover to cover—now answer that question and show how COVID-19 has driven our focus on what matters most. That includes public health, surviving the pandemic; creativity, whether in finding unexpected sources of PPE or in using artistic expression to cope with hardship; and justice, driving out longstanding inequities. It includes caring for our colleagues, for



Marc Goldfarb, RN, BSN, CNOR, was inspired to take portraits of his masked and shielded colleagues in the spring. “As nurses were asked to remain flexible and provide care in different settings, we began to lean on each other for support,” Goldfarb said. “I found myself working alongside a lot of familiar faces, only the expressions had changed. I didn’t see fear. I saw concern. I didn’t see hopelessness, I saw bravery. I never saw weakness, I saw strength. And more than anything else, I noticed camaraderie.”

our loved ones, and for ourselves. It includes being there to extend a helping hand—even if virtually, from a physical distance—as we all strive to get through this.

And sometimes the answer to “how” is evident even without words, but with a feeling of compassion, support and camaraderie as we’ve supported one another in different ways than before. It was 5:30 on a chilly morning in April when Colleen Kelly, RN, BSN, CNOR, paused before starting her shift outside the entrance of the Hospital of the University of Pennsylvania to allow a colleague to take her photo—the photo now on this issue’s cover. Moments later, patients saw the warmth of Kelly’s kind eyes to calm their fears as they arrived for surgeries that couldn’t be delayed, even in the earliest peak of the pandemic when many non-emergency procedures were put on hold. At the time, visitation restrictions to protect our patients and staff meant they were unable to have a loved one with them—no family member could hold their hand. Kelly, a 19-year Penn Medicine employee, was redeployed to welcome patients to help them feel at ease as they came through the door.

“It felt rewarding to help patients and their families, to help them feel a little better about the situation,” Kelly told me recently. She’s now back at the Perelman Center aiding in outpatient surgeries again, where her patients are allowed to bring a visitor and things are mostly back to normal, albeit with masks and shields. It’s a changed world, but Kelly’s expression remains kind—and reminds us that the way we’ll get through this is by looking out for each other, together.

RE

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CARE IN THE COMMUNITY

The COVID-19 pandemic has disproportionately impacted communities of color, and particularly Black and Hispanic individuals. Combined with a summer of civil unrest sparked by police brutality, the pandemic has highlighted longstanding systemic inequities that have put the health of racial and ethnic minority groups at risk.

To break down barriers preventing underserved community members from accessing COVID-19 care, Penn Medicine leveraged its 16-year partnership with the Dr. Bennett L. Johnson Jr. Sayre Health Center. Adding to their list of collaborative clinical, research, educational, and advocacy initiatives, Penn and Sayre created a drive- and walk-through testing site in Cobbs Creek, a predominantly Black neighborhood in West Philadelphia. The site is one of nearly a dozen Penn Medicine COVID-19 testing sites serving communities throughout the region, including several testing sites that were stood up rapidly and efficiently in the earliest days of the pandemic.

In the first week alone, Sayre staff performed 906 tests. Since May, more than 15,800 Philadelphians have been tested there, and the site continues to run like a well-oiled machine, offering COVID-19 tests, behavioral health screenings, and flu vaccinations. The combination of barrier-free medical and behavioral health care ensures that people who have historically lacked access to resources feel seen and supported.

“Whether the result of the test is positive or negative, having access is an intervention in itself,” said Kent Bream, MD, Sayre medical director and an associate professor of Clinical Family Medicine and Community Health. “As people self-isolate, these kind of small but meaningful interpersonal interactions have been missing. Being here gives people a small sense that both we and they can control what’s happening.”

Drive- and walk-through COVID-19 testing is one of countless ways that Penn Medicine connects with underserved communities in need. Learn about the ways in which faculty, staff, and students have stepped up to support Penn Medicine’s neighbors through our new community impact report, *Service in Action*.

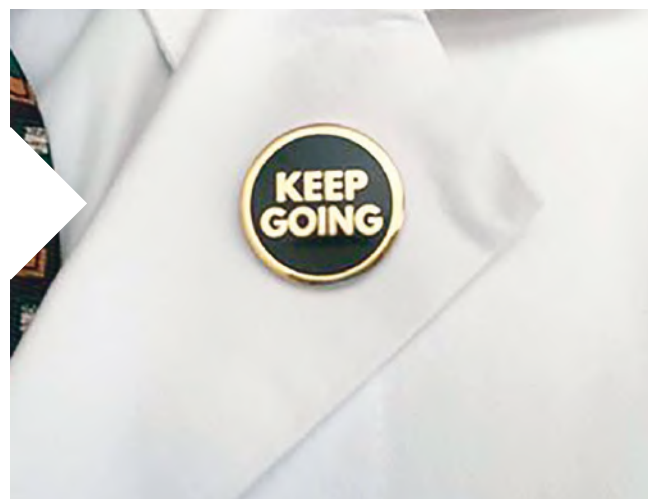
Explore photos, animated graphics, videos, and more at CommunityImpact.PennMedicine.org.



IN THE MIDST OF A STRUGGLE...

“HISTORY HAS SHOWN THAT CRISES HAVE A WAY OF DAMAGING OUR MOST VULNERABLE COMMUNITIES AND COVID-19 IS NO DIFFERENT. YET, WHEN I CAME ACROSS THIS PIN, I FOUND SOME ENCOURAGEMENT.”

In March, Claiborne B. Childs, MD, MS, director of Diversity & Inclusion Initiatives for the Internal Medicine residency program, rediscovered an inspiring lapel pin in his collection that he had purchased from the Smithsonian Museum of African American History last year. In a blog post for the Office of Inclusion and Diversity, Childs recalled the message that he took away from his experience at the museum: “Our ancestors showed us that in the midst of a struggle you don’t quit, you keep going.” The pin’s gold lettering not only offered him a timely reminder to remain resilient in the face of this newest struggle, the pandemic, but also a prescient message ahead of the civil unrest that spread a few months later.

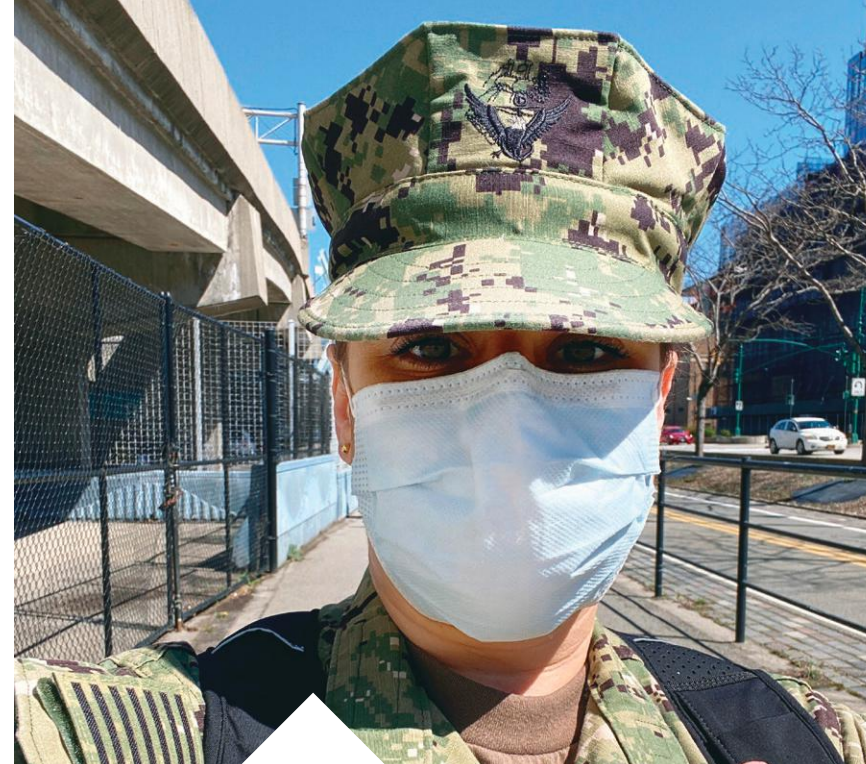


WISE WORDS WITHIN

Susan Summerton, MD, an associate professor of Radiology at the Perelman School of Medicine, usually reads mammograms and performs breast biopsies, but for a time, she shifted to chest imaging to help with the growing number of scans of patients with known or suspected COVID-19 infections. Summerton also took inspiration from the pandemic in her creative outlet—artwork she crafts from “letters” found in the human body in medical images—and delivered a crucial message in a blog post published by the Office of Inclusion and Diversity: “We should keep calm and stay home and soon we will all be on the other side of this dark time in our shared history.”



After three weeks at Chester County Hospital severely ill with COVID-19, Deborah Hocker was surprised with music, balloons, and a hospital lobby lined with staff cheering for her as she was discharged into her husband’s embrace. Hocker was the hospital’s first patient to be discharged after spending time on a ventilator. Penn Medicine’s other hospitals celebrated COVID success stories in a variety of ways, including playing “Here Comes the Sun” by the Beatles, and by planting a garden of colorful paper flowers outside HUP—one for each patient discharged.



FIGHTING AN “INVISIBLE ENEMY”

In the early days of pandemic, many staff members across Penn Medicine were redeployed to new roles, some taking temperatures at hospital entrances, others communicating with patients via telemedicine. Taylor VanderWoude, RN, LT, a nurse in the Heart and Vascular ICU at the Hospital of the University of Pennsylvania, was also reassigned to help where she was needed most, though her mission took her out of the health system and into New York City.

VanderWoude, a reservist in the United States Navy Reserve, was mobilized to the military-run medical center set up in the Javits Center, which treated more than 1,000 COVID-19 patients between its opening in March and closure in May. During those two “crazy” months, she often worked multiple shifts in a row and did her best to connect with patients in the ICU and provide their families with updates on their care. “We were working in a field hospital, so it was definitely different from our typical jobs. But we signed up to help people. You expect war, not a pandemic, but I was excited to help however I could,” she said.

Veterans Care Concierge liaison Paula Crawford-Gamble, CRNP, CAPT, NC, USN (Ret), could not have been more grateful for the “overwhelming support” that VanderWoude and nearly 20 other staff members received as their teams rallied around them. “Managers were calling me to make sure we could provide virtual farewell parties and mobilization packages. There truly was this recognition that whether you were in scrubs or a uniform, everyone was in this battle together.”

Kevin B. Mahoney, CEO of the University of Pennsylvania Health System, agreed. “I imagine this mobilization was different in many ways and not one that you trained for. It required you to make sacrifices, ones that not many would, to fight an invisible enemy on the home front,” he wrote in a letter thanking mobilized staff for their courage and commitment. “You continue to answer the call of those around you, whether in uniform or as civilians, and I’m honored to have you on board.”



BEGINNING A NEW CHAPTER IN THE COVID ERA

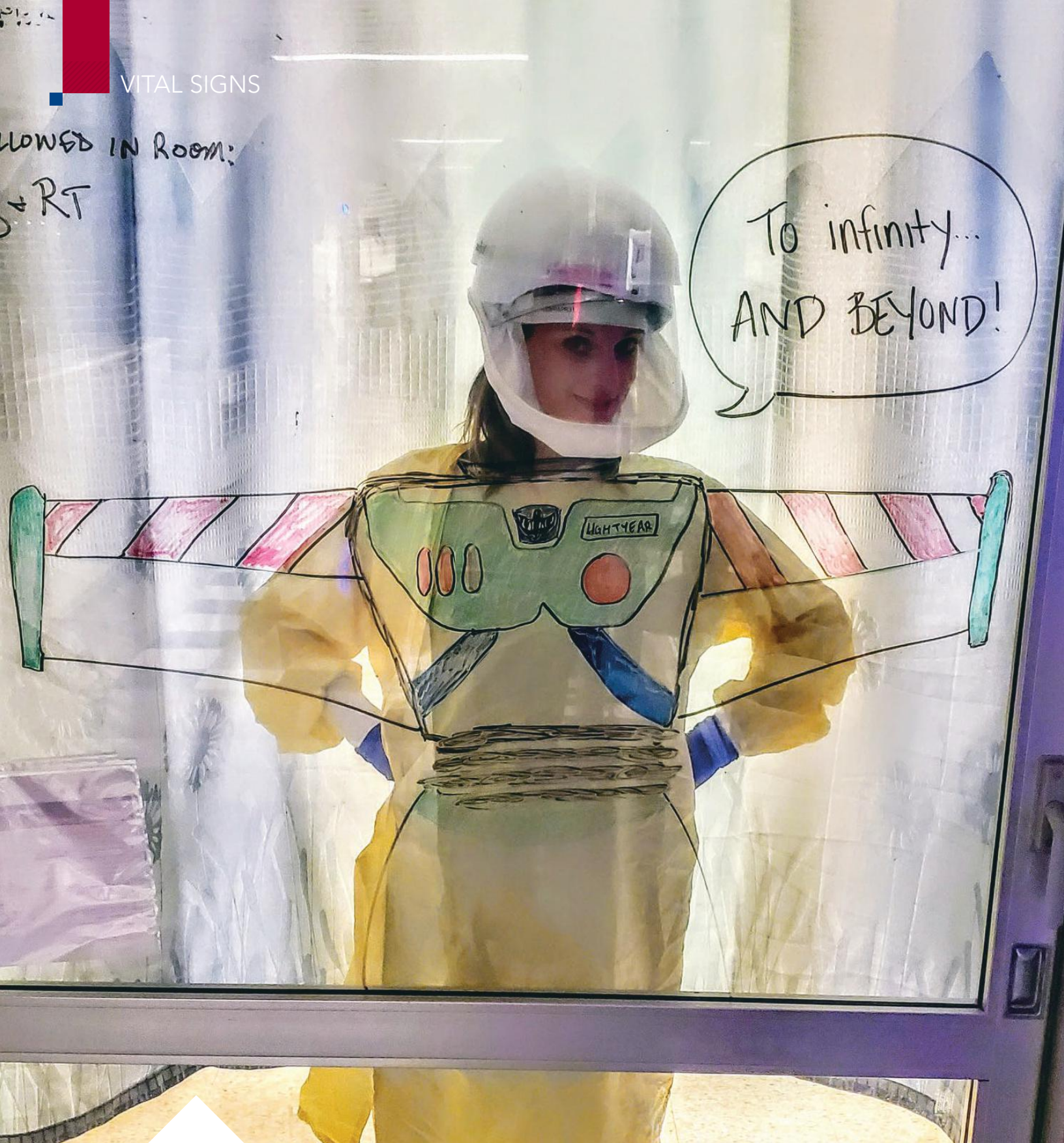
“THESE EXTRAORDINARY CIRCUMSTANCES HAVE BROUGHT OUT OUR BEST, AND ARE MAKING US AN EVEN STRONGER ACADEMIC MEDICAL CENTER. [...] THE INCREDIBLE WORK OF OUR FRONTLINE PROVIDERS DURING THE SURGE OF CASES IN THE SPRING WAS BEYOND HEROIC. THEIR SKILL AND COMPASSION WERE ENHANCED BY TRANSFORMATIONAL CHANGES IN CARE DELIVERY.”



In a letter welcoming the Perelman School of Medicine (PSOM) community back for another academic year, J. Larry Jameson, MD, PhD, dean of PSOM and executive vice president of the University of Pennsylvania for the Health System, offered a glimpse into the ongoing evolution of Penn’s campus, curriculum, and clinical research in response to COVID-19.

ALLOWED IN ROOM:

RT



HEALTH CARE HEROES

Katie Lord, BSN, RN, a nurse at the Hospital of the University of Pennsylvania, couldn't "explain what coronavirus is or why mommy isn't home" to her toddlers, but she could show them. While Lord stayed at a hotel between shifts this spring to avoid the potential to carry the coronavirus home, she and her colleagues drew inspiration from her personal protective equipment—and drew toy cartoon wings on the glass—to illustrate that she's trying to be a hero just like her 3-year old's idol, Buzz Lightyear.

CONTINUOUS CARE

Life—and birth—goes on with or without a global pandemic. Across Penn Medicine, more than 11,300 babies have been born since early March. For the health system's tiniest patients who need some extra time and support before they can head home with their families, staff like Rachelle Haworth, BSN, RN, a nurse in the Intensive Care Nursery at the Hospital of the University of Pennsylvania, are there to provide compassionate care they need.



MORE LIVES TO SAVE

"AS OUR ICUs FILL UP WITH PATIENTS STRUGGLING TO BREATHE, WE LOOK AROUND AND ASK: CAN WE SAVE A BED, CAN WE SAVE TWO BEDS, FOR THE GUNSHOT VICTIMS WE KNOW ARE COMING NEXT?"

In an impassioned piece for the *New York Times*, Elinore Kaufman, MD, MSHP, an assistant professor of Surgery in the Division of Traumatology, Surgical Critical Care, and Emergency Surgery, discussed the difficulties of balancing the global coronavirus pandemic with the nation's gun violence epidemic and the consequences of both on desperately needed hospital resources.



MATCH DAY 2020 CELEBRATING AMID CORONAVIRUS

As Kate Hutchison and Scott Symonds sat on their couch with details of their futures in their hands, a range of emotions washed over them.

There was excitement to learn where they would go for residency after graduating from the Perelman School of Medicine (PSOM) in May. There was a tinge of disappointment, too; due to the COVID-19 pandemic and concerns about social distancing, the roommates were celebrating their long-awaited Match Day in their apartment rather than the atrium of the Jordan Medical Education Center. There was a sense of longing for their friends, families, and mentors, who, in normal times, would stand beside them cheering as they feverishly tore open their envelopes. But above all, they felt a wave of relief. In a world seemingly becoming more uncertain by the day, they finally had something concrete to hold onto. At noon, they would know where the next step of their medical training would take them.

"I'd been excited about residency for a long time, and it felt like everything going on in the world was overshadowing this milestone. But there are so

phones and laptops were charged and ready. In an effort to preserve some of the suspense, the friends wrote down each other's matches and tucked them away in envelopes, even making one for Kipp's dog, Mason.

One by one, they revealed their residency destinations: Back to the West

"I probably got 20 times the amount of notifications I usually get in a day," Hutchison said. "A lot of large-scale crises bring people together to support each other, but physical separation is required right now. It has been interesting to find different ways to build community and togetherness. There has been a lot of FaceTiming!"

Of the 155 PSOM students who matched this March, 30 percent stayed at Penn, joining residency programs at the Hospital of the University of Pennsylvania, Pennsylvania Hospital, Scheie Eye Institute, and CHOP, while the other 70 percent scattered across 27 different states—all facing an unprecedented challenge of beginning residency amid a global pandemic.

"I know that this is not the format for Match Day that we all planned for, but I hope that you find joy in your accomplishments," said Suzanne Rose, MD, MEd, senior vice dean for Medical Education at PSOM. "You all have the determination, creativity, resilience, and compassion to rise to the current challenges and to face your very bright futures."

Coast for Hutchison to train in orthopaedic surgery; and a pair of western Pennsylvania posts for Symonds and Kipp, at the University of Pittsburgh Medical Center for emergency medicine and Penn State Health in State College for family and community medicine, respectively. They immediately shared the exciting news with their loved ones, and their phones buzzed nonstop with updates from classmates.

"EVEN THOUGH THIS WASN'T EXACTLY WHAT WE IMAGINED, WE WERE STILL IN IT TOGETHER."

many people who missed important events because of COVID. Even though this wasn't exactly what we imagined, we were still in it together," Symonds said of the home celebration in March.

To ensure their DIY Match Day was still special, Hutchison, Symonds, and his partner Ryan Kipp—a Penn State Hershey medical student who also matched this year—had flowers, cake, and champagne to celebrate, and their



FACING THE UNCERTAINTY

When a group of first-year medical students joined together to create a literary magazine fused with scientific communication, they never expected that "a pandemic would leap out of our lecture slides and into our reality." But even as they spread across the country to self-isolate, their creative venture, *apenndx*, did not fall by the wayside. Rather, another wave of submissions flooded in, offering snapshots of students' COVID-19 experiences. The excerpts below represent a selection of those perspectives.

"Learning how to listen, to empathize, to do reflection, to dwell with ambiguity.... These are also critical physician skills, and the arts and humanities help to promote that," said Horace DeLisser, MD, associate dean for Diversity and Inclusion, in an interview with the *Philadelphia Inquirer*.

PHILLY'S CHILDREN ARE OUR CHILDREN



"AS MANY OF US GRADUALLY EXIT QUARANTINE WITH CELEBRATION, OUR CITY'S CHILDREN WILL NEED EVEN MORE RESOURCES FOR THE ADDITIONAL CHALLENGES THEY WILL FACE DURING THIS CHRONIC READJUSTMENT PHASE."

In a city where health, food security, graduation rates, and more are largely determined by zip code, the socioeconomic impact of COVID-19 will linger long after businesses and schools reopen. First-year MD-PhD students Likhitha Kolla and Diane Rafizadeh discussed the resources Philadelphia's most vulnerable children need to cope with this ever-changing new normal in an *apenndx* essay.

MY HEART ACHES, BUT

Day 245

My heart aches, but the Healthcare workers ride to work. Heroes, before dawn.

Philadelphia, PA

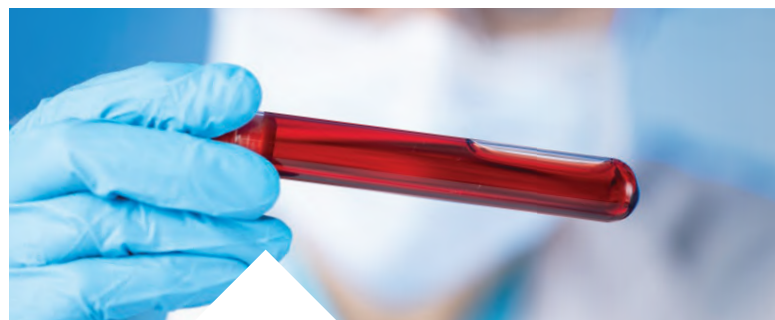


To connect with the memory of her mother—a surgeon, poet, and avid runner—fourth-year Perelman School of Medicine student E. Berryhill McCarty has hit the pavement, running at least one mile and writing a haiku to accompany a photo snapped every day. Through her three-line verses, some of which reflect on the bright spots of normalcy that remain in "a world so changed," others revealing her uneasiness in this "grim" new era, McCarty has been able to process her feelings throughout the pandemic. A collection of her poems and photos was published in the inaugural issue of *apenndx*.

Find *apenndx* online at <http://www.apenndx.com>.

ICYMI: IN COVID YOU MISSED IT

COVID-19 has dominated the headlines, but even during a pandemic, new Penn Medicine research findings from a range of disciplines found their way to publication in top journals. In case you missed it, here are some highlights.



CATCHING THE DEADLIEST CANCERS WITH A BLOOD TEST

By the time a patient is diagnosed with pancreatic cancer, the disease has most likely spread; it's one of the deadliest cancers. Catching it early is vital in order to connect patients with treatment. A Penn team recently found that a liquid biopsy can detect the most common form of pancreatic cancer in its early stages by screening for multiple biomarkers. The test was more accurate at detecting disease in a blinded study than any other known biomarker alone, and was also more accurate at staging disease than imaging is capable of alone, according to the study published in *Clinical Cancer Research*. This finding was one of several significant steps forward for liquid biopsy approaches for cancer this year. Another Penn team found that imaging of glioblastoma—another of the deadliest cancers—can determine whether a more-invasive surgical biopsy is needed. Others showed a liquid biopsy could identify patients with metastatic non-small cell lung cancer most likely to benefit from immunotherapy treatment.

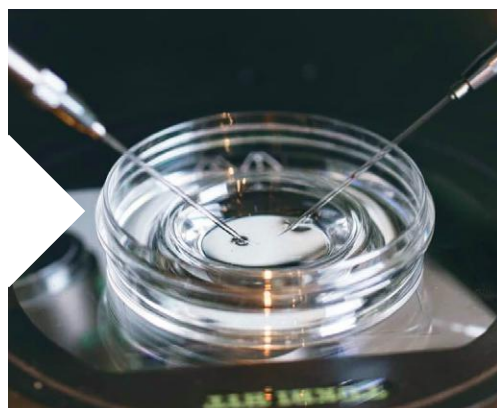


MUSCLE RELAXANT USE SKYROCKETS

In a study published in *JAMA Network Open*, Penn researchers found that between 2005 and 2016, doctor's office visits for ongoing muscle relaxant prescriptions tripled nationally from 8.5 million to 24.7 million, largely among older adults. Nearly 70 percent of these patients also received prescriptions for opioids. The team hypothesized that the spike in muscle relaxant prescriptions was a response to the opioid epidemic, but noted that they can have potentially adverse effects—especially when combined with opioids—and may not be more effective than Tylenol or Advil. The findings suggest further research is needed to understand the effects of long-term use of muscle relaxants, and that patients need access to better options for pain management.

CLUES TO IMPROVE INFERTILITY TREATMENT OUTCOMES

Millions of babies have been born with the aid of assisted reproductive technology (ART), but some moms can experience complications. Penn researchers conducted a study in mice to explore the underlying cause of placental abnormalities, pre-eclampsia, and abnormal fetal growth. They examined how four steps of the ART process impacted placental development and fetal growth. The mouse models indicated that the embryo culture—where the fertilization of the egg with the sperm takes place in a medium meant to replicate the oviduct's essential nutrients and is placed in an incubator that mimics the womb—had the strongest effect on adverse outcomes, and the abnormalities were unrelated to infertility. The findings, which were published in *Development*, suggest that optimizing the embryo culture process may ensure healthier outcomes. ◻

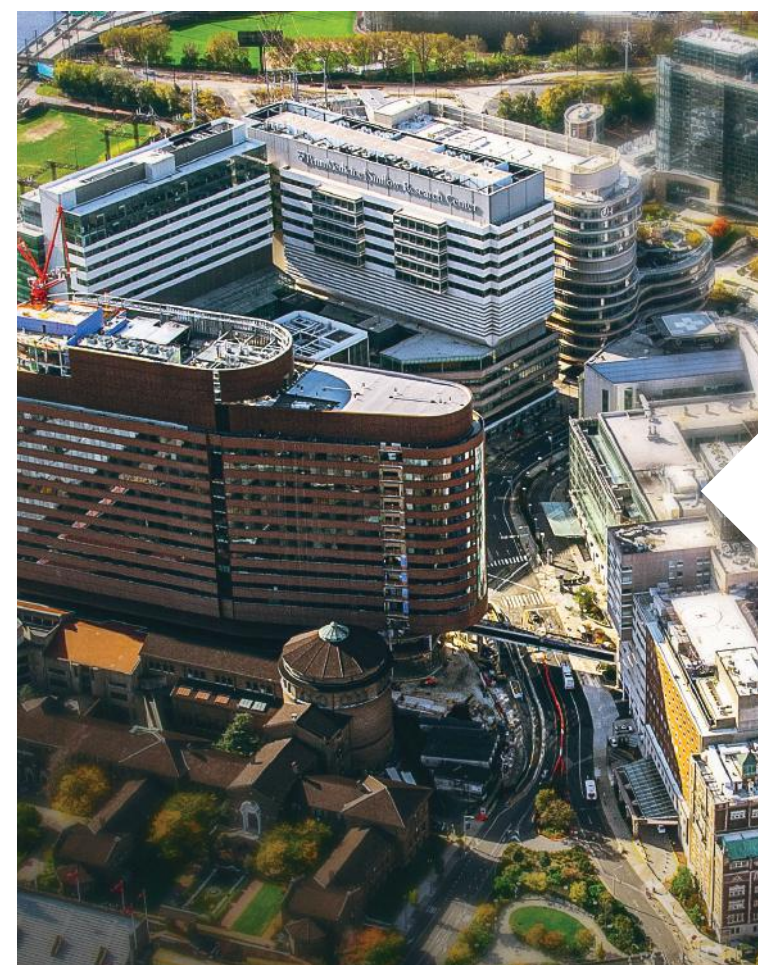


PENN MEDICINE RANKED AMONG TOP HOSPITALS IN THE NATION

Penn Medicine hospitals have once again been ranked among the top hospitals in the nation by *U.S. News & World Report*. Out of more than 4,500 hospitals analyzed nationwide, Penn Medicine is among only 20 institutions to be named to this year's Honor Roll, and the only one in the Philadelphia region.

The combined enterprise of the Hospital of the University of Pennsylvania and Penn Presbyterian Medical Center was recognized for the 14th consecutive year, earning distinction as the #1 hospital in Pennsylvania and in the Philadelphia metro area. HUP-PPMC also received top marks among 12 clinical specialties and in all 10 of the common adult procedures and conditions evaluated by the survey.

Lancaster General Health ranked #4 in the state, and was nationally ranked in Orthopedics. Pennsylvania Hospital was named #4 in Philadelphia, #8 in the state, and was nationally recognized in Gynecology. Chester County Hospital earned #5 in the Philadelphia region, #10 in the state, and national distinction in Diabetes & Endocrinology. Princeton Health ranked #9 in New Jersey, #24 in the New York metro area, and was recognized as high-performing in Orthopedics.



PSOM NAMED TOP TRAINING GROUND

The nation's first medical school continues to rank among the best in the United States, according to *U.S. News & World Report's* annual "Best Graduate Schools" report.

For the second consecutive year, the Perelman School of Medicine (PSOM) was ranked #3, continuing a 23-year streak among the top-ten research-oriented medical schools. PSOM, which is also consistently among the nation's top recipients of federal funding from the National Institutes of Health, earned additional top marks in eight areas of specialty training: Pediatrics, Internal Medicine, Obstetrics & Gynecology, Radiology, Anesthesiology, Psychiatry, Surgery, and Family Medicine.

"The Perelman School of Medicine has an international reputation for unique training programs and a groundbreaking curriculum which combines basic sciences and clinical experience, preparing students for a future of innovative research and patient-centered care," said J. Larry Jameson, MD, PhD, dean of PSOM and executive vice president of the University of Pennsylvania for the health system. "This continued recognition exemplifies Penn's rich tradition of scientific discovery and academic excellence. We are so proud of the incredible learning environment in our clinics and labs, our inspiring faculty, and our inquisitive students."

ROBERTS PROTON THERAPY CENTER CELEBRATES 10 YEARS OF ACHIEVEMENTS

In January 2010, the first patients received treatment at the newly opened Roberts Proton Therapy Center. Featuring a technology that was revolutionary at the time, Penn Medicine brought scientific rigor to a new radiation therapy modality in a facility that remains the largest, most comprehensive proton therapy center of its kind.

Perhaps the center's most important research contribution to the field of proton

therapy was a study published in *JAMA Oncology* in December 2019 that evaluated patients with non-metastatic brain, head and neck, lung, gastrointestinal, and gynecologic cancers. The research delivered scientific proof of its ability to significantly lower the risk of side effects while having almost identical cure rates to traditional radiotherapy. "Even we did not expect the effect to be this sizeable," said senior author and Radiation Oncology Chair James Metz, MD.



CLINICAL RESEARCH AND BEYOND

Nearly 50 Clinical Trials

3,000+ Clinical Trial Participants

Space Travel Safety Research
With aerospace industry partners using the Albert Chadwick Research Room



SPEEDING TREATMENT

One-Dose FLASH Radiotherapy
Penn Radiation Oncology demonstrated the feasibility of giving an entire course of radiation treatment in less than a second with "super-concentrated" FLASH radiotherapy, working in collaboration with Penn's School of Veterinary Medicine.



DEVELOPING NEW TECHNIQUES

Pencil-Beam Scanning
Better spatial distribution of the radiation dose, expanding the different types of tumors that can be treated

Cone Beam Computed Tomography
Superior imaging of soft tissue

Prompt Gamma Imaging
A proton range verification tool



EDUCATING AND EXPANDING ACCESS

21+ Countries Learn Here
Experts from across the globe attend Roberts Center's Annual Course on Proton Therapy.

80% of New Proton Centers Receive Training from Penn Medicine
It is considered the world's preeminent training program.

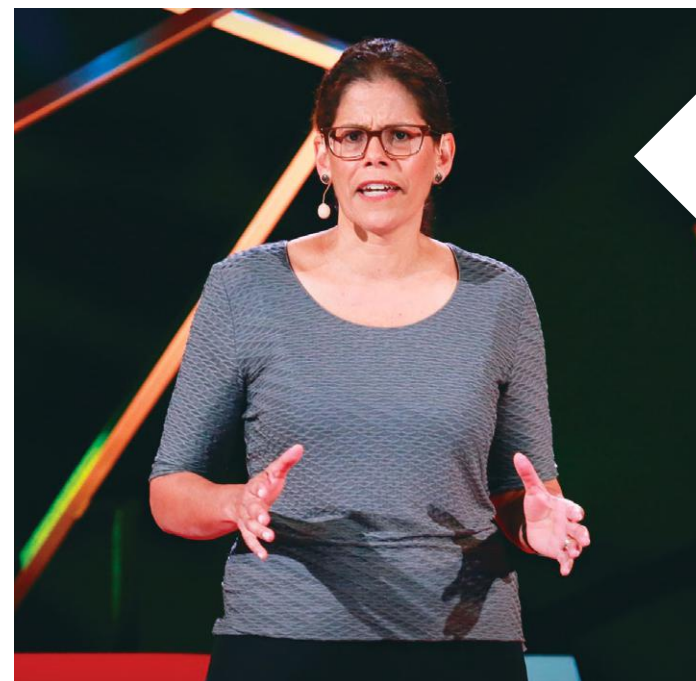
Thousands More Patients Will Gain Access by 2022
New centers opening in Lancaster, Pa. and Voorhees, N.J. will serve more patients close to home.



Mourning a Beloved Benefactor: Suzanne Roberts

Any celebrations of these accomplishments would have been bittersweet because of the passing of Suzanne Roberts in April 2020. Known as a woman of many talents—as an actress, broadcaster, and educator—she was devoted to having a positive impact on the world, which made her a proud contributor to her family's landmark gift creating the Roberts Proton Therapy Center. She and her late husband, Ralph, never missed the center's annual Proton Patient Alumni reception, and guests looked forward to and were inspired by her presence. Perelman School of Medicine Dean J. Larry Jameson shared, "Suzanne's boundless compassion and energy will surely be missed at Penn Medicine and in the greater Philadelphia community. Her vibrant positivity was a treasure for our patients and physicians."

HOWELL TAKES THE HELM AS OB/GYN CHAIR



On the TEDMED stage in 2018, Howell shared how she is working to drive maternal health reform in the United States, which has the highest maternal mortality rate in the developed world.

Elizabeth Howell, MD, MPP, has been named chair of the Department of Obstetrics and Gynecology in the Perelman School of Medicine (PSOM) at the University of Pennsylvania. She joined Penn in September after more than 20 years at the Icahn School of Medicine at Mount Sinai, where she most recently served as the director of the Blavatnik Family Women's Health Research Institute and a professor of Obstetrics, Gynecology, and Reproductive Science, Psychiatry, and Population Health Science and Policy.

Howell has served on several expert committees, scientific advisory boards, and editorial boards, published a wealth of policy-shaping research in premier academic medical journals. Her work primarily focuses on the impact of racial and ethnic disparities on maternal and infant health and mortality.

Howell succeeds Deborah Driscoll, MD, who in 2019 was named vice dean for professional services of PSOM and senior vice president of the Clinical Practices of the University

of Pennsylvania. Driscoll's 14 years of transformative leadership propelled innovative work in areas ranging from pregnancy loss to remote monitoring for new mothers and led Penn Medicine's OB/GYN department to become a renowned leader in research, clinical care, and education.

SENSORY PROCESSING EXPERT BEGINS AS NEUROSURGERY CHAIR



Daniel Yoshor, MD, was appointed chair of the Department of Neurosurgery for the Perelman School of Medicine (PSOM) and vice president of clinical integration and innovation for the health system in July. A dynamic leader and accomplished administrator, he held several appointments in Neurosurgery, Neurology, and Neuroscience over the past 20 years at Baylor College of Medicine in Houston, most recently serving as the Marc J. Shapiro endowed professor and chair of Neurosurgery.

Yoshor's research centers on the mechanisms of sensory processing in the visual cortex. His team has learned to bypass the optic nerve and send visual information straight to the brain, which helps blind people to "see" shapes. He also has extensive experience in endoscopic pituitary and skull base surgery, brain tumor and epilepsy surgery, clinical brain mapping, and developing neuro-technologies.

His appointment comes after longtime chair M. Sean Grady, MD, transitioned to the role of physician director of the Neurosciences Service Line. Grady's exceptional, energetic leadership led to advanced research in areas like traumatic brain injury, a substantial increase in the amount of female residents, and the development of patient-centered programs like the Mind Your Brain Conference.



Charlotte Tisch's first patient was a man named Nesmin. During a two-year internship, Tisch honed her observational skills and learned to better understand his needs, collaborated with an interdisciplinary team to develop personalized treatment plans, and used her growing expertise to care for him. The twist: Nesmin had been dead for more than two thousand years.

Before embarking on her journey as a physician-in-training at the Perelman School of Medicine

of the Rhode Island School of Design (RISD), Tisch started an internship that gave her firsthand experience in repairing and restoring artwork.

"Things go into a museum so that they can live forever, and as a conservator's intern, it's your job to help preserve an object's integrity and honor the culture that it came from," she said.

This is also where she met Nesmin, a mummified Ptolemaic priest who lived more than two millennia ago in what is now Akhmim, Egypt.

FROM PRESERVING MUMMIES TO PRACTICING MEDICINE

By MaryKate Wust

(PSOM) at the University of Pennsylvania, Tisch attended Brown University for her undergraduate studies. She had long planned to pursue the pre-med track, but after taking an Egyptian archaeology class that she added to her schedule for fun, everything changed.

"I grew up going to museums like the Metropolitan Museum of Art, but I had never engaged with art and artifacts at this level," she said. "Rather than just admiring objects for their beauty, that class encouraged me to consider the meaning behind them. What purpose did they serve? What could these objects teach me about the people and cultures that created them? I just fell in love."

Tisch decided to major in Egyptian archaeology and psychology. When she wasn't poring over books and documents in the library, she was excavating a site two blocks from campus to unearth the foundation of a house that had been there 200 years prior. Tisch was especially intrigued by how museums and collections preserve and create historical narratives. After a professor connected her with a conservator at the Museum



Though she wasn't entrusted with preserving his physical life, Tisch was deeply invested in determining how the museum could ensure his body and story lived on. Nesmin became the topic of her thesis, and she developed changes for his display and delved into the history of the cultural popularity of Egyptian mummies in the U.S.

"I started looking into how different institutions emphasize the fact that these are human remains and that these people's final wish was to be left alone in their tombs," she said. "How can we keep their bodies intact in ways that are congruent with their religious beliefs? How can we address the issues of colonialism that led to these mummies being removed from their country and, for a long time, barbarically unwrapped once they got here? How can we teach visitors to take a step back from the Hollywood depiction and understand that these are people who lived?"

At the same time that Tisch was studying and caring for Nesmin, she was also watching her pre-med friends spend days studying for the MCAT and applying to medical schools—and she was jealous. "Even if you're full of enthusiasm and passion,



During her two-year RISD internship, Tisch examined and cared for priceless objects—some even older than Nesmin! Here, she uses an X-ray fluorescence spectrometer to determine the elemental composition of a clay jar created in the Naqada II period of ancient Egyptian history. The jar is more than 5600 years old.

the MCAT is a pretty miserable test. And here I was wishing that I was studying for it!" she said. "I realized that something was either seriously wrong with me, or maybe I should reconsider whether medicine was something I wanted to get back to."

She graduated from Brown in 2017 without having taken the MCAT, and yet she wasn't too far behind her classmates. Not only had her psychology major checked off some required science classes, but her experiences with archaeology had applications outside of the museum. Tisch's days spent digging in the dirt taught her how to look for clues and draw informed conclusions; her internship sharpened her fine motor skills and helped her learn to 'listen' to the objects in her care and maintain their 'health'; and her thesis work prepared her for future anatomy courses and patient care by teaching her to see Nesmin as a man, not a mummy. Working for a year in the tech sphere reaffirmed that she wanted to spend her life helping people and giving back, so she completed Goucher College's post-baccalaureate premedical program, then started at PSOM last year.

A PANDEMIC INSPIRATION

The coronavirus pandemic complicated her first year of medical school, but Tisch still took each challenge in stride—even when she was

diagnosed with COVID-19 in March. While self-isolating, she brainstormed ways in which she could support the mounting needs of the community from her bed. One night while trying to figure out if her sense of smell had returned, she suddenly recalled something important—the face masks that she used during conservation work at RISD were very similar to the masks she used in the hospital.

Knowing that health care workers nationwide were struggling with a shortage of personal protective equipment (PPE) in the early days of the pandemic, she reached out to her museum networks and asked if they had untapped pools of masks, gloves, and other protective gear that they could donate. Jackpot.

Tisch was "overwhelmed and humbled" by the generosity and eagerness to help that she found as donations came in from the Whitney Museum, New York Historical Society, Brooklyn Museum, Philadelphia Museum of Art, and Penn Museum, contributed through the PPEnn Pals program created by fellow PSOM first-year Noa Erlitzki. Tisch was also grateful to have found a meaningful way to get involved after initially feeling a bit helpless while away from the clinic and the classroom.

"While it's been stressful, it's also been an amazing time to be in medical school," Tisch said. "We're all excited to get back onto the wards and to interact with patients again, but I think that this time has been invigorating for our education and will impact our clinical experiences in the future."

For Tisch, her memory of the COVID-19 era and her first year at Penn will also forever be colored by her two "worlds colliding" perfectly, demonstrating that perhaps there isn't such a large gap between preserving mummies and practicing medicine. □

► Read this story online at PennMedicine.org/magazine/mummies

FACING THE PANDEMIC

By Steve Graff

COVID-19 is changing medicine in real time — and likely for good.

After intubating a patient one night in mid-April, M. Kit Delgado, MD, walked out of emergency department at Penn Presbyterian Medical Center (PPMC) for fresh air, pulled off his N95 face mask, and snapped a selfie that would find its way online, like the hundreds, if not thousands, of shots his fellow health care workers took in the thick of the COVID-19 pandemic for the world to see.

The deep red sores on their noses and the weary expressions in their eyes showed us, however briefly, just how exhausting and painful the trenches can be.

It was the humanity in their eyes that inspired perioperative nurse Marc Goldfarb, RN, BSN, to grab his smartphone to capture masked colleagues in similar moments at the Hospital of the University of Pennsylvania (HUP). In their eyes, he saw bravery after stepping out of COVID-19 units. He saw resilience up against emergencies they'd had no practice for. He saw sadness and concern as the virus took the lives of their patients, many without families by their side.

"We are real people doing a really stressful job," Goldfarb said, "and this is what we look like."

The photos have not only filtered into the public consciousness, with Delgado's selfie published in *USA Today*, and Goldfarb's photos shared to Penn Medicine's Instagram followers and countless others. They've also become historical artifacts; powerful reminders of what health workers have endured ever since the pandemic began. When the cases first hit, they rushed to the front lines, along with researchers on the hunt for answers, while others innovated ways to keep operations moving safely and often virtually.

By late spring, the early surge in Philadelphia-area hospitals had subsided, though nationally and globally, the coronavirus pandemic is still unfolding. But if a few months of facing down a pandemic crisis has left the Penn Medicine community confident about anything, it's this: The ways of caring for patients, organizing work, and collaborating and conducting research together have been permanently changed—for the better.

Black and white photos by Marc Goldfarb, RN, BSN.
Color photo: Kit Delgado, MD.



In the spring, all six of Penn Medicine's hospitals raised tents outside of the emergency department to efficiently triage patients to reduce the risk of spreading COVID-19 inside the hospital.

EXPANDING CARE CAPACITY

"Moving to the Next Music"

Readying Hospitals for a Surge

The rapid clinical and leadership response to build capacity for COVID-19 patients at Penn Medicine turned on hundreds of decisions every day at the onset of the pandemic.

Outside PPMC on March 17, Peter D. Sananman, MD, director of Disaster Preparedness and an associate professor of Emergency Medicine in the Perelman School of Medicine (PSOM), gathered up a team to erect a tent to triage patients before they entered the ER to reduce the risk of spreading COVID-19. By 4 p.m., the tent—which would go on to serve as a model for the other five hospitals—stood tall and ready to take patients.

Out in the suburbs, Penn Medicine Chester County Hospital (CCH), saw an opportunity to expand its inpatient care capacity. Five floors of the hospital's new \$300 million patient tower sat ready to go, slated for opening later in the spring. With emergency authorization from the state to use the tower for COVID-19 patients (the standard state inspection was sidelined by the pandemic), the CCH team readied an intensive care unit (ICU) and several surgical floors to care for patients.

Placing COVID care units in the new tower worked out well for both patient and staff safety, said Michael Duncan,

CEO of CCH. Each ICU room was already cordoned off with glass, unlike the "legacy" ICU in the original hospital, and the floors were more spacious and nursing stations spread out, making it more suited for social distancing.

Although they were working in a new space, caring for COVID-19 patients still required creativity on the staff's part, like engineering patient rooms to safely perform surgeries to help cut down on transport and reduce risk of infections. "It's a little like watching a symphony where the sheet music changes every few bars and everybody just moves to the next music," Duncan said.

Meanwhile, at HUP and PPMC, by the middle of April, there was a steady stream of COVID-19 patients, many arriving by ambulance, requiring evaluation, oxygen, critical

"It's a little like watching a symphony where the sheet music changes every few bars and everybody just moves to the next music."

care beds, and ventilators. On the HUP campus, leaders also took the step of accelerating construction to ready 120 rooms in the Pavilion, also known as HUP East, ahead of its scheduled completion date in 2021. By mid-October, more than 3,800 COVID patients had been cared for across all six of Penn Medicine's hospitals, with a peak of about 400 patients at once in late April. Clinical staff worked tirelessly to care for them, with physicians, nurses, respiratory therapists, environmental service workers, and others constantly changing in and out of gowns to move from one to the next. "At that point in time it felt like it was all about mental and physical endurance," said Delgado, an ED clinical researcher, "as we had more COVID-19 patients than any other type and everything took more effort and precaution."

Ultimately, the extra space at HUP East was never needed, as the surge of patients never reached overwhelming levels, thanks in large part to multiple efforts across the health system to build capacity before and during the influx of COVID patients. Other scheduled surgeries and procedures were postponed, and many outpatient visits went online, with more than 5,000 clinicians leaping to provide virtual care.

"Absolute Must-Have"

The Right Care in the Right Places

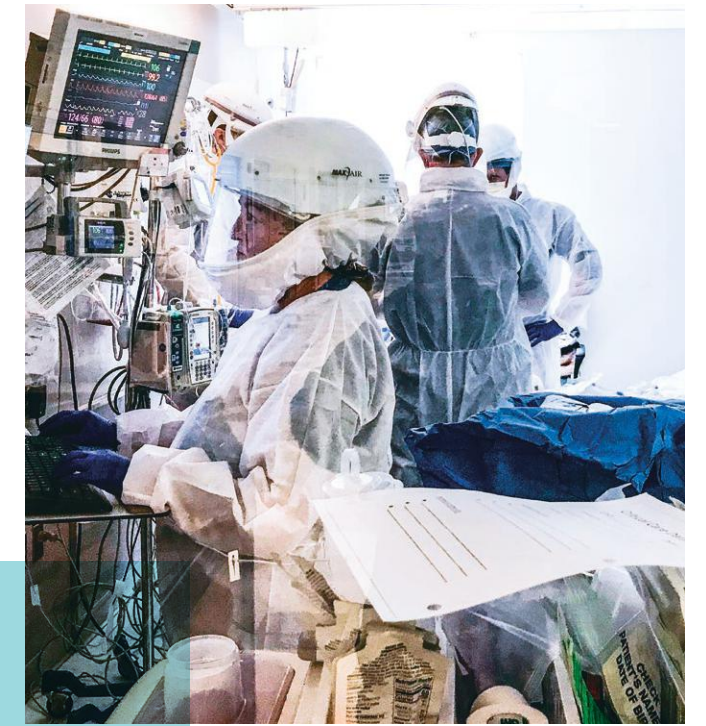
From the sound of her labored breathing and her struggle to finish sentences, Sara S. Samimi, MD, an assistant professor of Dermatology at PSOM, knew the 23-year-old woman with asthma needed to be seen at the hospital. The patient was one of more than 27,000 who received phone calls from Penn Medicine clinicians like Samimi who were redeployed from their regular duties as operations shifted to support COVID care between March and June; she was working as part of one of several new telemedicine programs stood up at Penn during the pandemic, this one for communicating COVID test results. Positive tests led to discussions about potential clinical trial enrollment, coordinating care, and enrollment in another new telemedicine tool called COVID Watch that uses text messaging to support and monitor patients not sick enough for hospitalization.

Penn Medicine's 24-hour hub-and-spoke telemedicine operation, the Center for Connected Care, is one of the largest in the nation. So when the pandemic hit, a well-oiled apparatus was already in place to provide continuous care for patients—including those who were safest staying out of the hospital while COVID cases were surging. It just needed to be supersized. Before, Penn coordinated roughly 200 tele-visits a month, mostly urgent care, ICU, or stroke consultations. In March, that number jumped to 7,000 a day—a 10,000 percent increase. Tele-licensed clinical staff also increased from about 500 to nearly 10,000, spanning disciplines that telemedicine previously hadn't touched.

"It's been a massive, massive ramp up," said C. William Hanson, MD, the chief medical information officer and vice president at UPHS. "Telemedicine has gone from being a-nice-to-have to an absolute must-have."

Not all care can be given over the internet, of course. Penn needed to go where patients were, and keep them out of the hospital when possible, so Penn Medicine at Home (PMH) took on a larger role. Already well-known for home health, palliative care, and hospice, PMH expanded its cancer care and infusion therapy services and took on new patients, like transplant and wound care, in addition to caring for COVID-19 patients at home. Staff either visit patients' homes, check in virtually with the clinical team through video chats, or both.

"I see this as a period of tremendous development, growth and creativity," said Nina R. O'Connor, MD, chief medical officer of PMH. "I think we are going to continue to see more of that because when patients experience care at home, and it's safe and it's comfortable, they often don't want to go back to the infusion suite or the clinic visit."



While the COVID Watch text-messaging program monitors positive or suspected patients at home with less severe symptoms, PMH cares for the sicker COVID-19 patients, including those discharged from the hospital. Since mid-March, more than 7,100 patients were monitored through COVID Watch, and more than 1,100 COVID-19 patients have been treated at home.

"If even half of them had been in the hospital at the peak of the surge, instead of at home, that would have really pushed capacity for the hospitals," O'Connor said. "I think it was a very important component of taking care of the right patients in the right place during this."

PEOPLE MAKE IT POSSIBLE

"Biggest Successes" New Opportunities Amid a Pandemic

With many inpatient and outpatient services paused due to COVID-19 and the pressing need for workers on the front lines, people stepped up for new roles—often relying upon the health system's robust collaborative systems to make that work seamless.

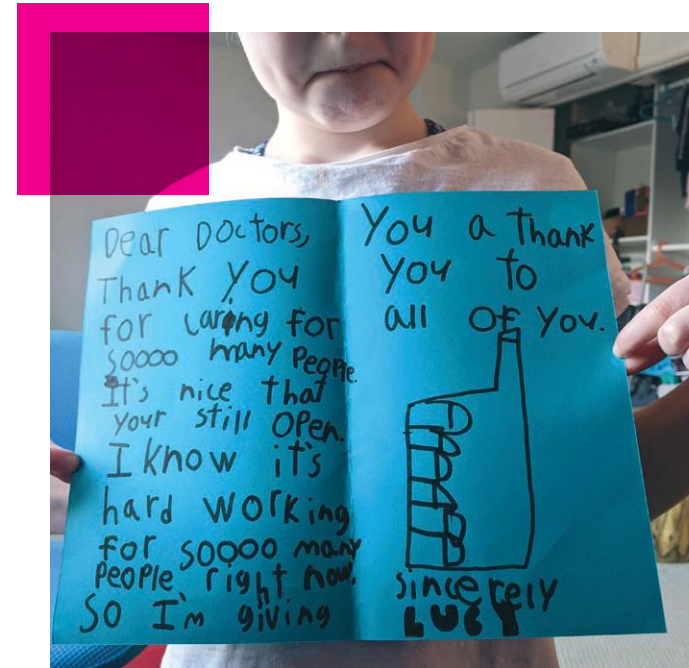
While dermatologists like Samimi took the lead on the telemedicine efforts, some downtown Philadelphia physicians traveled to Princeton Health to help on its front line. Infusion suite nurses from the Perelman Center for Advanced Medicine joined PMH. Human resources professionals coordinated the outpouring of food and other dona-

tions to support front-line staff, and many teams rapidly shifted at least a portion of their work to remote operations.

For perioperative nurse Goldfarb, who was redeployed to thermal scanning at HUP's entrance and aiding clinicians on donning and doffing personal protective gear, it was his first time working outside the operating procedure room since he left nursing school more than 13 years ago. Ashley F. Haggerty, MD, MSCE, a gynecologic oncology surgeon, delivered five babies while picking up shifts at the HUP labor and delivery unit. "It was nice to reminisce back to my residency days," she said, looking back on her OB-GYN training at HUP.

In all, roughly 500 people across the health system were redeployed, and more than 1,600 employees retrained to work in new positions, all coordinated through a virtual Workforce Redeployment Center created by Human Resources and the Penn Medicine Academy (PMA), as well as the COVID Learning Site. Developed by the UPHS COVID Learning Committee and PMA, that website houses the latest knowledge on COVID-19 anyone in the world can now access.

The HR team also had to stand up staffing processes for the health system to handle new needs COVID-19 had created, like thermal screening and COVID testing sites around the region, in what Lea Rubini, director of Change Management and Performance Improvement considers "one of the biggest successes of redeployment efforts."



The "Spread the Love" feature on the PennMedicineTogether website provided a place to send photos and messages of support to health care workers. These were displayed on hospital digital signs to boost morale.

The shift in the workforce also forged new partnerships, as groups came together quickly to expedite tasks.

One example is the department of Pathology and Laboratory Medicine. Beefed up with support to handle the influx of COVID-19 tests, the team went from performing about six a day to nearly 3,000.

"We removed barriers around cultural change and system integration in a couple of weeks in what probably would have taken years," said Cindy Morgan, vice president of Learning and Organizational Development.

"Idiosyncratic Experience" Wellbeing of Staff Takes Top Priority

The pandemic has required mental stamina on everyone's part to weather the challenges and stress it brings. But what helps ER physicians like Delgado and Sananman may look very different from the help other health care workers or Penn employees in non-clinical settings may need during these times. The trick was figuring out the components of what the Workforce Wellness Committee, led by Lisa Bellini, MD, senior vice dean for Academic Affairs, calls a stepped-care model that would provide a net as wide—and personalized—as possible.

"We know that stress is a completely idiosyncratic experience," said Jody Foster, MD, chair of Psychiatry at Pennsylvania Hospital. "What stresses me out, might invigorate you. People are different."

That led to the creation of PennMedicineTogether, a website layered with resources for staff and their families that address basic, physical, and emotional needs—everything from housing help and tips on homeschooling to exercise guides. It includes platforms like the Coping with COVID blog for people to ask questions anonymously and "Spread the Love" that allows users to post messages to front-line workers, which were also streamed on all the hospitals' digital boards.

"It meant so much to [health care workers] to be able to see that one picture that a kid drew or that one message from the community, as they were taking off their PPE," Bellini said. "It was pretty powerful."

One of the most widely used digital tools is PennCOBALT. It's a targeted assessment that takes users to the most appropriate resource or virtual face-to-face care for mental health and other support needs, so they don't get overwhelmed with waves of information. It can also be used anonymously, which half do.

When the COVID crisis first started, the wellness team opted to dust off the near-complete COBALT that Cecilia Livesey, MD, chief of integrated psychiatric services in Psychiatry in PSOM, and Kelley Kugler, MSc, innovation manager at the Center for Health Care Innovation, had been working on for nearly three years.



When COVID hit, it took them two weeks to finalize plans and stand it up. And it's here to stay. COBALT proved its value quickly, given the number of people who have accessed it (more than 7,000) and the advantages it affords patients, like privacy and convenience, two barriers that keep many people from seeking care.

"I really feel this has fundamentally changed how people are going to access mental health care in the future," Bellini said. "The concept of going to a psychiatrist's office—I'm not sure what that means post-COVID."



BUILDING THE POST-COVID FUTURE

“One Step Further”

Lasting Transformation of Health Care in a COVID-19 World

It took a pandemic to kickstart broader changes that some health systems had in their sights for years. At Penn, it's not only rocketing telemedicine into a new stratosphere and removing institutional barriers, it's also shifting care practices.

The first goal after the spring surge subsided has been to rebuild trust, as the hospitals saw dwindling numbers of COVID-19 patients and began to reopen their doors to resume routine services for others. Stories from around the country of patients turning down life-saving procedures or avoiding emergency care out of fear of COVID-19 underscore how important it is for the health system to not only tell patients it's safe to come back but also show them.

It takes an open line of communication between patients and the physicians they trust, a continued focus on hygiene and hand washing, screening staff and patients before entering, and universal masking, said Alyson Cole, an associate executive director at HUP and co-chair of the Patient Experience Leadership Team.

“A lot of it is assurance,” Cole said, “and then when they get here making sure we are delivering on what we promised.”

Clinical teams have also started to think about how care may look on a more permanent basis in a COVID-19 savvy world.

The expansion of telemedicine has largely been seen as a positive and convenient feature to keep patients and providers connected during these times. But the benefits could branch out beyond that. Virtual care could help raise the threshold for admissions, triage more efficiently, even for high-risk patients, expedite care, add convenience, and maintain more privacy. The list is long.

“I do think it's a substantial part of the future of health care,” said David Asch, MD, MBA, executive director of the Center for Health Care Innovation. “And it took a pandemic to help us get there faster because there are so many regulatory and financial headwinds under normal circumstances.”

The problem is that the health insurance industry worries that if telemedicine makes necessary care easier, it can also make unnecessary care too easy, Asch said. So insurers often require that health care be delivered face to face in order for health care providers to be reimbursed for their services. “That's perverse,” he said. “The answer can't be to make all care harder. If the care is needed, it shouldn't matter if it's delivered over the [internet] or in person. Every

other industry advances by making its services easier to receive, not harder.”

Waiting rooms and food areas, along with clinical space, could also take on a new shape, so it's safer and more convenient for patients. Early on, HUP designated an area to COVID-19 patients, turning entire floors into negative pressure areas. While these spaces have scaled back as the number of patients has decreased in the hospitals, some form of an infectious disease unit will likely be a mainstay in hospitals to keep patients in a separate area in the event of another outbreak.

Leaning more heavily on mobile technology used during the pandemic to reduce wait times in the clinic or ER could become a reality, as well.

“There are so many silver linings to this where innovation has truly happened rapidly,” Cole said. “What we are trying to do right now is capture that and continue to bring it forward.”

“All Hands On Deck”

Researchers Band Together to Push the Science

For every outbreak—HIV, Ebola, Zika—Penn Medicine has initiated new research. COVID-19 was no different, except the efforts materialized at unprecedented speed and folded in researchers from far more disciplines.

“Within a matter of about two-and-a-half weeks, we went from no trials to 11 clinical trials, and have since added [more],” said Emma A. Meagher, MD, vice dean and chief clinical research officer, and co-chair of the COVID-19 research oversight committee. “It was all hands on deck.”

By the time Penn admitted its first COVID-19 patient in early March, clinical trials with the antimalarial drug hydroxychloroquine and the antiviral drug Remdesivir were already up and running. Others followed, like a trial designed around heart failure patients, an observational study gathering up biospecimens, and studies investigating antibodies and immunity in health care workers and the community.

Ravi K. Amaravadi, MD, an associate professor of Medicine, who has been studying hydroxychloroquine as a cancer therapy for the last decade, shifted over to COVID-19 to lead that trial. E. John Wherry PhD, director of the Institute for Immunology and chair of Systems Pharmacology and Translational Therapeutics, is immunoprofiling patients to tease out the different responses in sick patients and partnering with Nuala J. Meyer, MD, an associate professor of Medicine, in rapid translational efforts to inform their care—trading insights and inquiries between lab and clinic on a daily basis (see more on p. 56).

Meanwhile, work on DNA-based vaccines presses on with David B. Weiner, PhD, an emeritus professor in the PSOM, and Pablo Tebas, MD, a professor of Medicine, while an RNA-



Leticia Kuri-Cervantes, PhD, a senior research associate in Microbiology, is profiling the immune system of patients with COVID-19 in the lab of Michael Betts, PhD.

The multidisciplinary approach to infectious diseases will likely grow, but expect the focus on zoonotic diseases and collaborations with Penn Vet to intensify, FitzGerald said, along with even stronger translational science—Penn's “sweet spot,” he said—and more private partnerships to get clinical trials off the ground faster.

“I also think the issues around trial design are more acute than they ever have been before,” Meagher said. “If anything, there has been an increased focus on the right research question, the right patient population, the right sample size, and the right end point.”

How those trials are conducted may change, too. Working within the safety constraints of COVID-19 has shown that remote consenting and testing and delivering experimental medications to a patient can be done without weakening the study's integrity. And it lightens the burden on patients and research teams.

What Meagher doesn't want to lose is steam.

“Everything we have been doing since March 1 has been so intensely focused on COVID, and it's exhausting, but I would like to see some part of that transmit beyond this very intense period,” she said. “Where it becomes part of our practice.” ◻

based vaccine work continues under the auspices of Norbert Pardi, PhD, a research assistant professor of Medicine, and Drew Weissman, MD, PhD, a professor of Medicine.

The clinical research efforts are paired with a full pipeline of basic science expertise through the work of Susan Weiss, PhD, a virologist and professor of Microbiology who has spent the last 40 years studying coronaviruses and was named the co-director of the Penn Center for Research on Coronavirus and Other Emerging Pathogens with Microbiology Chair Frederic Bushman, PhD. Penn Medicine's Gene Therapy Program, led by James M. Wilson, MD, PhD, is also conducting vital preclinical studies of a unique gene-therapy-based vaccine candidate.

“What is really striking here, mainly because of the existential threat to all of us, is that people across the spectrum of medicine and science, way beyond infectious diseases, virology, epidemiology—everybody, including myself—has gotten mobilized,” said Garret FitzGerald, MD, FRS, a professor of Medicine and Systems Pharmacology and Translational Therapeutics, who chairs the oversight committee. “[They said,] ‘What can I do? What bright ideas can I bring to the table?’”

Pouncing on the virus has paved the way for how future science will be conducted.

► [Read this story online with related links at PennMedicine.org/magazine/covid](https://www.pennmedicine.org/magazine/covid)

PROFILES OF WOMEN IN MEDICINE



By Carol Benenson Perloff

One century, bracketed by two global pandemics. Between 1920 and 2020, women rose from second-class citizenship to take the reins as pioneering leaders in medicine, among all other areas of public life. Decade by decade, the lives of women medical graduates from the Perelman School of Medicine offer snapshots of that shift.

A century ago, the United States was embroiled in change. The nation had recently weathered the 1918 flu pandemic and welcomed home its veterans from the Great War. The pandemic had drafted Penn medical students from the classes of 1919 and 1920 into volunteer medical service as the deadly disease ravaged Philadelphia.

In August 1920, ratification of the 19th amendment to the U.S. Constitution gave women the right to vote. Progressive-era movements opened up educational and career opportunities.

The University of Pennsylvania School of Medicine opened doors to women shortly before 1920—but for several decades to come, women made up only a tiny sliver of the medical student population and the medical profession writ large. One hundred years later, women comprised 54 percent of the graduating Class of 2020, a class moving on amidst the COVID-19 pandemic. In the decades between the two pandemics, women medical students, physicians, and biomedical students have faced shifting challenges in pursuit of distinguished careers and lives. Each one has a story.



1849

Elizabeth Blackwell, MD, becomes the first woman in the United States with a medical degree from Geneva Medical College in New York.



1914

University of Pennsylvania Trustees make the School of Medicine co-educational. Three women matriculate in the fall of 1914, of whom two graduate in 1918.



1917

Clara Hillesheim, a transfer student, becomes the first woman to receive a Penn medical diploma, but she does not ultimately remain in a medical career. The 1940 U.S. Census lists Hillesheim as living with her younger brother, a farmer and "head of household."

1920

THE MEDICAL MISSIONARY

Julia Morgan, MD 1891-1948

Penn awarded Julia Morgan, MD, her medical degree just two months before ratification of the 19th amendment gave her the right to vote.

Morgan hailed from Carlisle, Pa., the daughter of James Henry Morgan, president of Dickinson College. Sights set on practicing medicine in China after her graduation from Dickinson in 1911, Morgan taught high school to earn money for medical school and obtained a master's degree in science. She matriculated at Penn in 1916 as one of four women in the class of 1920.

As she began her third year in September 1918, the influenza pandemic struck Philadelphia. With roughly 75 percent of the city's physicians and nurses deployed overseas in WWI hospitals, the School of Medicine called on all third- and fourth-year students to volunteer in 19 hospitals throughout



Philadelphia. With essentially no training in treating influenza, Morgan and her classmates assumed the responsibilities of nurses while fourth-year students stepped up as de facto interns during the crisis.

Morgan didn't shy away from her male-dominated class. She took on the job of class historian for three years and, if the 1919 Scope yearbook is any indication, earned her classmates' respect:

*There is one girl in our class
Who's surely bound to fool ya.
When it comes to Ophthalmology,
You'd better page "Our Julia."*

After her internship at the Hospital of the University of Pennsylvania (HUP), Morgan worked a few months at a tuberculosis sanitarium near Harrisburg, before departing to be a medical missionary—a practitioner and a teacher in China.

Morgan learned Mandarin, a necessity for teaching internal medicine and tropical medicine at Shantung Christian University Medical School (also known as Cheeloo) in Tsinan. (Coincidentally, James Boyd Neal, MD, an 1883 Penn medical alumnus, founded the medical school and served as dean from 1909 to 1919.) She prepared students to treat patients in rural areas, and she taught them to make homemade instruments to treat tuberculosis, according to a Dickinson College student's 2010 honors thesis about Morgan. She practiced medicine at several hospitals and, in the 1930s, was appointed administrator of Cheloo University Hospital.

Periodic yearlong furloughs brought Morgan back to Pennsylvania. In 1927-1928, an anti-Christian movement in China precipitated her evacuation; she spent part of that furlough studying tuberculosis and tropical diseases, including time in India.

Morgan returned to Penn in 1942 for the short twilight of her career. In 1948, the 57-year-old professor of tropical medicine and physical diagnosis died at HUP. Her commitment to women in medicine outlived her; she bequeathed a generous sum to the United Board for Christian Colleges in China for the medical education of Chinese women.



1920

The first women are appointed to Penn's medical school faculty: Marion Hague Rea, MD (wife of Penn pathologist Baldwin Lucke), medical director for women students; Anne Thomas, MD, in Medicine; and Annie E. Taft, MD, in Neurology.



1930

A PREVENTIVE HEALTH MAVEN IN A MAN'S WORLD

Katharine O'Shea Elsom, MD 1903-1996

"We were a doughty band, not noted for our physical beauty, not greatly caring," Katharine Elsom wrote of her three female medical school classmates in the class of 1930, in a letter to her granddaughter in 1984. "Our goal was firmly fixed on making it through to a license to practice medicine. That end was not easily achieved. From the outset we, individually, were targets for harassment by many of our instructors." An excellent student, she succeeded nonetheless and was lauded in the 1930 Scope as "Best Crammer."



1932

Florence Barbara Seibert, PhD, is appointed assistant professor of Biochemistry in the University's Henry Phipps Institute, making her the first woman on the medical school's standing faculty; she becomes the first woman in the medical school with tenure in 1937.

In 1931, after completing her internship at Abington Memorial Hospital, she established a private practice and joined the Penn faculty as an assistant instructor, the start of a long career in teaching and research at Penn that culminated as associate professor of Research Medicine.

In 1928, while a medical student known as "Kay" O'Shea, she married kindergarten classmate Kendall Adams Elsom, MD, who also went on to a career on the Penn faculty and with whom she sometimes collaborated on research. They had their first child in 1939.

Katharine Elsom lectured to medical students in the Department of Medicine, served as staff physician on HUP's medical wards, and conducted independent research. Working within the Gastro-Intestinal Section of the Medical Clinic at HUP, she became the first to demonstrate the impact of vitamin B deficiency in humans, publishing her clinical results in 1934. She studied the effects of vitamin deficiency on the intestine, as well as on human mental capacity.

In 1957, Elsom earned a master's degree in Medical Administration from Columbia University, received a Rockefeller Foundation fellowship and, with two other medical faculty members and a Wharton statistics professor, started work on the Periodic Health Examination Research Project. Based at Penn and supported by a U.S. Public Health Service grant, the study evaluated the effectiveness of periodic health examinations and what should be included in them. Son Kendall A. Elsom Jr. noted in her obituary, "She was way ahead of her time in her concern and knowledge of public health and preventive medicine."



did not include her among its 1940 honorees—the society first allowed women in 1941. On her path to pediatrics, she trained at Philadelphia’s Jewish Hospital (later known as Albert Einstein Medical Center) and then at Bellevue Hospital and NYU Medical School in New York City.

With hard work and determination, Snyderman overcame obstacles in the path of a woman making her way in medicine in the 1940s. Yvette Schein shares her 105-year-old grandfather’s perspective:

She was not someone who would ever come home and talk about any experiences of discrimination based on gender. Any suggestion of inability or inferiority would only deepen her quiet determination. She was humble and didn’t have to shout her knowledge to be respected for her work. She did all this and still made dinner for her family every night after work.

In 1946, Snyderman began almost 50 years on the pediatrics faculty at NYU, rising to the rank of professor of Pediatrics. Her studies of amino acid metabolism established the daily requirements of amino acids in the diets of healthy and premature newborns. She developed special diets to treat infants and children with genetic metabolic disorders including pediatric phenylketonuria (PKU) and the then-fatal maple syrup disease, enabling them to grow into healthy adults. Snyderman directed Bellevue Hospital’s Metabolic Disease Center, established in 1965 as the first center of its kind for treating these rare diseases. She served as founding vice president and second president of the Society for Inherited Metabolic Disorders.

In 1995, at age 78, Snyderman was recruited by Mount Sinai School of Medicine to help build their clinical and research programs in metabolic disorders. Loyal by nature, she accepted the position of professor of Human Genetics and Pediatrics with the condition that a 65-year-old colleague, and someone with whom she had worked for many years, came with her.

Snyderman received PSOM’s 2004 Distinguished Graduate Award for 60 years of contributions to science and medicine. Meanwhile, she encouraged her five granddaughters to choose any path they wanted. At age three, when Yvette said she wanted to be an alien when she grew up, the pioneering scientist-physician laughed and responded, “What does that look like to you and how can we help make that happen?”



1945

The University of Pennsylvania awards the Graduate School of Medicine’s degree of Master of Medical Science to Helen Octavia Dickens, MD, the first African American woman to earn the M.Sc. [Med.] degree at Penn.



Friedman (fourth from left in the front row) was a member of the Alpha Omega Alpha medical honor society.

1940

METABOLIC DISEASE AUTHORITY AND MEDICAL FAMILY MATRIARCH

Selma Eleanor Snyderman, MD 1916-2012

Medicine runs in the family. The daughter of a pediatrician, not only did Selma Eleanor Snyderman become a physician, so did her younger brother Reuven Snyderman, MD’46, her husband Joseph Schein, MD’41, their two sons, Roland and Oliver Schein, and soon granddaughter and current Penn medical student, Yvette Schein. The family’s medical matriarch, who spent most of her career at New York University (NYU), earned international recognition for her work on infant nutrition and the treatment of various inborn genetic metabolic diseases.

After receiving a Penn undergraduate degree in just three years in 1936, Snyderman enrolled in the medical school. There she met Joseph Schein, a humanities major whom she helped with chemistry during his first year. They married just before her final year of medical school. She was one of five women in her class of 130 and wrote two theses: “Experimental Cancer due to Hormones” and “Isohemolysins in Human Blood.” Although Snyderman graduated at the top of the class, the Alpha Omega Alpha medical honor society

1950

PENN’S FIRST MAMMOGRAPHER

Lois Adele Kynette Friedman, MD 1923-2012

She grew up in the small town of Alice, Texas, the child of a poor single mother with little education. They resided in an intergenerational home with her great-grandmother, who was living off her Civil War widow’s pension. Self-driven, Adele Kynette studied chemistry at the University of Texas, Austin, where she conducted cancer research in the University’s Biochemical Institute. A mentor saw her gift for science and planted the seeds of medical school. In the fall of 1946, Adele Kynette made her way to Penn, alongside men attending under the GI Bill. She became one of 12 women to receive a medical degree in 1950, graduating with distinction as a member of the Alpha Omega Alpha medical honor society.

The 1950s was a decade in which American society largely saw a woman’s place as in the home, a time when the baby boom was booming. For Adele Kynette Friedman, MD, Penn’s Department of Radiology would become her professional home. (In 1956, she married Sidney Friedman, MD’43, a pediatric cardiologist at Children’s Hospital of Philadelphia; Penn radiologist Philip Hodes, MD, gave away the bride.) She became the second woman to complete a radiology residency at Penn and then joined the faculty.

Until her retirement as associate professor in 1989, Friedman spent most of her time as an outpatient clinician practicing general radiology, and an educator, teaching a popular

elective course on radiology. She also earned the title of Penn’s first mammographer. When mammography was a developing method and people were yet unsure of its value, Eugene Pendergrass, MD, chair of Radiology (1939-1961), selected Friedman to obtain the needed training and introduce this technique at Penn. One of the medical students in her first-year radiology class, Marisa Weiss, MD’84, would go on to become a preeminent breast oncologist and founder of the national nonprofit Living Beyond Breast Cancer and BreastCancer.org. Weiss would also become her daughter-in-law, marrying David F. Friedman, MD’83, an associate professor of Pediatrics at Penn and CHOP.

Friedman’s choice of radiology in part stemmed from her desire to successfully juggle work as a physician with raising a family, she explained in a 1982 *Health Affairs* article. “I love radiology, but also it’s a specialty in which you can work a set number of hours and then leave.” She believed in family dinners and home-cooked meals, even if the recipe was left for household help to prepare on a day she’d be running late. “Both my parents were physicians. Medicine and academic politics were discussed at the dinner table,” says her son, David. “As a kid, I never saw it as anything but normal. She made it work.”



1956

Emily Mudd, PhD, a pioneer in marriage counseling and family studies, becomes the School of Medicine’s first female full professor with an appointment of Professor of Family Study in the Department of Psychiatry.

1960

THE BELOVED SINGING PROFESSOR

Helen C. Davies, PhD

"Call me Helen." That's how Helen C. Davies, PhD, professor of Microbiology, introduces herself to students. A woman who doesn't believe in barriers between herself and the students, since 1993 she has lived among undergraduates in the Quad, a dormitory located 200 yards from the medical school's Johnson Pavilion—the commute sometimes shortened by a lift from a custodian hauling away dorm trash on a golf cart. For over half a century, Davies taught cell biology and infectious diseases to more than 10,000 medical students—often through song in her classroom.

The daughter of a rabbi, Davies grew up in New York City. During World War II, she earned her bachelor's degree in chemistry at Brooklyn College; she was 19 years old and the only woman in her class. Davies received her master's degree in biochemistry from the University of Rochester in 1950, and then her doctorate in physical biochemistry from Penn in 1960. She has been at Penn ever since, becoming the first woman to receive a faculty appointment in the Department of Microbiology in 1965.

Some people develop mnemonics to memorize material. As a student, Davies composed rhyming songs. As a teacher, she sang to medical students to help them learn about pathogens. For example, "Leprosy," sung to the tune of the Beatles' "Yesterday":

*Leprosy,
Bits and pieces falling off of me
But it isn't the toxicity
It's just neglect of injury.*

*Suddenly,
I'm not half the man I used to be
Can't feel anything peripherally
From swollen nerves, hypersensitivity.
Why don't lerpae grow in vitro we cannot say
In vivo they grow very slow, once in 12 days.*

*Hard to get,
But the stigma hasn't faded yet
Don't keep an armadillo as a pet,
Don't forget...*

Or an excerpt from "Herpes Simplex 1 and 2" sung to Simon and Garfunkel's "Sounds of Silence":

*Hello, herpes our old friend
Will be with us till the end.
'Cause the virus softly creeping,
Left its gene while we were sleeping*

Penn's microbiology nightingale married Robert E. Davies, a biochemist and professor in Penn's Veterinary School, who died in 1993. That's when she moved into the dorms as the first woman faculty master, the top administrator on site, for Ware College House, leading the Women in Science and Infectious Disease programs.

A longtime advocate for minorities and women, Davies marched with Martin Luther King Jr. at Selma in the 1960s. From 1968 to 1976, she headed Penn's High School Education Program, which helped bring disadvantaged students to university laboratories. Davies mentored minority students from Cheyney State College in a summer medical intern program and taught a 20-week biology course to African American gang leaders as part of the Urban Leadership Training Program. She also helped found the Association

"What I love is when you're working up to an intricate concept and you pause and watch the light go on in the faces as they reach it themselves one by one. When the whole class has lit up, you know you're a teacher."

for Women in Science, the International Association for Women Biochemists and Biophysicists, and the Women for Equal Opportunity at the University of Pennsylvania. Davies received the Lifetime Achievement Award from Women of Color at Penn in 2004. She has served as the academic coordinator for the Department of Microbiology and Associate Dean for Students and Housestaff Affairs in the PSOM, focusing on the recruitment, mentoring, and retention of minority group members and women in biomedical careers.

Passionate about teaching, Davies won the school's annual Excellence in Teaching Award 16 times. Upon receiving the 1977 award, she commented: "What I love is when you're working up to an intricate concept and you pause and watch the light go on in the faces as they reach it themselves one by one. When the whole class has lit up, you know you're a teacher."



1960

The FDA approves the first commercially produced birth control pill, giving women control over when and if they want to have children.

1962

Arlene P. Bennett, MD (1964)

AGENT OF CHANGE AND CHANGEMAKER, PSOM'S FIRST AFRICAN AMERICAN WOMAN GRADUATE

Born in West Philadelphia's Women's Hospital and growing up in the care of a female pediatrician there, Arlene P. Bennett assumed most doctors were women. At age nine, Bennett decided she, too, would become a doctor. When the time came, she realized the G.I. Bill was the only way she'd be able to afford college and medical school—especially with her sights set on the University of Pennsylvania. Three years in the U.S. Air Force as a radio mechanic made it possible to earn both those Penn degrees, the first in 1960. In 1964, Bennett became the first African American woman to graduate from the Perelman School of Medicine. Accepting the school's Women in Medicine award 50 years later, she remarked, "Now it is a joy to see so many women, and so many women of color, among the ranks of students and recent alumni."

Bennett was one of six women in her medical class, all very close, and the only woman of color. She recalls, "The fellows were very respectful and it was an unusual class, with a large number of good musicians. We'd go to a classmate's parents' apartment, have a chamber music group, and study for finals. We were not competitive."

After an internship at Presbyterian Hospital, Bennett began her career in general pediatrics and worked as a school physician. She took off time when her husband did a post-doc at Yale and their son was born. Upon returning to Philadelphia—with the help of her mother who moved in with them for childcare—Bennett switched gears into psychiatry, completing a residency in 1977. "I was much more intrigued by people's emotional states that seemed to be neglected and wanted to help underserved populations of color in psychiatry."



Bennett started a solo private practice with an emphasis on psychotherapy. For several years, she also worked part-time in Community Mental Health at Pennsylvania Hospital, treating patients with chronic illnesses and severe mood disorders. Her approach to psychiatry: "I take my own personality and do it my way. If you don't rule out underlying medical problems, you can't solve psychiatric problems." At any given time, she's had a very racially and culturally diverse practice: people of color, white, Asian, and patients of less familiar religions that have kept her learning.

Actively involved in her East Mount Airy community, Bennett takes great pride in the work she and neighbors did to protect prime parkland from development. Though Bennett is too humble to mention it, East Wissahickon Park, the six-acre park acquired by the City of Philadelphia, also bears the name Arlene Bennett Park.



1963

The Equal Pay Act prohibiting sex-based wage discrimination between men and women performing the same job is signed into law.



1964

The Civil Rights Act is signed into law, with Title VII banning employment discrimination based on race, religion, national origin, or sex.

1970

THE NURSE-TURNED-DOCTOR WHO EMPOWERS WOMEN'S HEALTH

Marie Savard, MD

Classes of 1970 (HUP), 1972 (Nursing) & 1976 (SOM)

It didn't take long after becoming a nurse that Marie Savard knew she wanted to be a doctor. "One night, a patient in the surgical ICU was having seizures. I knew he needed Valium, but I had to get a doctor's order to inject it," she recalls with frustration. "Why was I taking orders when I could give orders?"

Following in her mother's footsteps, in 1970, Savard had graduated from HUP's Training School for Nurses (discontinued in 1978). After the epiphany in the ICU, she attended Penn's School of Nursing to attain the bachelor's degree and pre-med courses she needed to apply to medical school.

The '70s were interesting times for women in society and at Penn. The women's movement and laws against gender discrimination opened more doors to medical school, but not without growing pains. During Savard's application interview, a male professor inquired about her plans to manage family and her profession. She recalls words of advice received soon after from her professor, Helen Davies: "You have to work harder and be smarter to open doors." And protest when necessary. Savard remembers, "a lecture during which the professor presented a slide of a *Playboy* centerfold with her anatomic parts labeled. We women walked out of the lecture hall en masse."

The Class of 1976 was among the last to rotate through Philadelphia General Hospital, where Savard had her first clinical course. "I knew how to talk to patients and make them comfortable, thanks to nursing." She graduated at the top of her class of 155 students, of which 24 (15 percent) were women. Savard remained at Penn for an internship and residency in internal medicine with only one other

"Why was I taking orders when I could give orders?"

woman; the program opened up to women on a much larger scale the following year. That first year, she had another life-changing moment in an ICU: Savard got to know her future husband, fellow intern Brad Fenton, MD, over a case of Legionnaires' disease. They both pursued fellowships in general internal medicine at the University of Colorado; before long they had a son followed by twin sons.

General internal medicine offered Savard a holistic approach to medicine that aligned with her nursing roots. She joined a practice at Pennsylvania Hospital at a time when women's health, not just OB/GYN, was gaining attention. That focus led to directing her own practice, the Medical College of Pennsylvania's Center for Women's Health, and emerging as a media personality as a go-to person about women's health. She developed a national audience with "Ask Dr. Marie," a column for *Woman's Day* magazine that morphed into a blog, a book about how to manage your own health care, and TV appearances.

With her focus now fully on her public outreach and education, Savard misses the one-on-one practice of medicine, but feels good about her impact and influence on others: having mentored students to approach their patients holistically, and continuing to empower patients to seek information, think for themselves, and have a say in decisions affecting their health care.



1972

Title IX of the Education Amendments guarantees women equal access to any education program or activity receiving federal funds.





1980

AN UNSTOPPABLE INTERVENTIONIST

Marcelle J. Shapiro, MD

Marcelle Shapiro grew up in suburban Philadelphia. The whole family pitched in at the family business selling furniture and appliances, heeding her father's guidelines: "Listen to what the customer is saying, be helpful and respectful." Shapiro would live by those words as an interventional radiologist for much of her career and as a mentor.

After completing undergraduate studies at Temple University, as well as graduate work in neuro-anatomy and neurobiology, "I considered veterinary school, but sick animals made me very sad," Shapiro says. Instead, she matriculated at the PSOM in 1976, on the tail end of the nation's summer bicentennial celebrations. Her class consisted of roughly 25 percent women, who supported each other through the Women in Medicine program and informally. They had a limited number of female mentors who championed them: Helen Davies, Anna-Marie Chirico, MD, Diane Jorkasky, MD'77, FEL'83, and Gail Morrison, MD'71, FEL'76. Although one Graduate Hospital surgeon declared, "I won't have the fairer sex on my service," Shapiro generally felt accepted by male faculty members.

Her internal medicine residency at Penn opened Shapiro's eyes to diagnostic angiography and interventional radiology (IR). The combination of doing something therapeutic and diagnostic appealed to her, which led to a second residency in diagnostic radiology and a fellowship in IR at HUP. "At that time, just a few women around the country were doing IR; it was generally considered a macho field," explains Shapiro. The dearth of women in IR stemmed from their own concerns about radiation exposure during procedures done under X-ray guidance and practices' hesitancy to hire women because of pregnancy potential.

In 1987, Shapiro and three male colleagues organized the Cardiovascular Interventional Radiology division at Jefferson University Hospital. As the first woman in IR at Jefferson, she recalls, "Several senior physicians did not realize I was one of the IR doctors." After several years in academic practice, Shapiro wanted to start a family and needed to tackle the issue of radiation exposure during pregnancy because sitting out for nine months was not an option. "I worked with the radiation safety officer and devised a maternity lead apron that could expand to protect the baby as my abdomen grew."

Shapiro was working at Jeanes Hospital when, in early 2010, she found herself on the other side of the doctor-patient experience. Diagnosed with acute myelogenous leukemia, she spent seven weeks in a drug-induced coma during chemotherapy treatment and then underwent a stem cell transplant.

After returning to health, Shapiro retired from clinical practice but not from three of her passions—medical education, the Perelman medical school, and advocacy for women in medicine. She has served as a preceptor in the Doctoring course, is vice chair of the Medical Alumni Advisory Council, and has participated in Penn's Women in Medicine program throughout her career. The Perelman School awarded the 2013 Women in Medicine Award and 2015 Alumni Service Award to Shapiro, who remains deeply committed to the school "to inspire others, to give back and nourish my soul. These women and Penn Medicine have been an incredible lifetime gift."



1980

Margaret Gray Wood, MD, is appointed acting chair of Dermatology at Penn, the first woman to serve as acting chair of a School of Medicine department.

1990

EPIGENETIC INNOVATOR

Jeannie T. Lee, MD, PhD

Jeannie Lee grew up in a medical family in New York and always thought she would do something in medicine. As a Harvard undergraduate majoring in biochemistry and molecular biology, she embraced research opportunities. Her interest in mechanisms of diseases brought Lee to Penn in September 1986 for the MD/PhD program, where she devoted her studies to epigenetics, which involves modifications of gene expression that do not involve alterations of the genetic code itself, including X-chromosome inactivation (XCI), the biological silencing of one X chromosome so there's only one active X chromosome in each body cell of female organisms. Influenced by the work of Penn faculty including Robert Nussbaum, MD, on Fragile X Syndrome and Davor Solter, MD, PhD, on genomic imprinting, Lee says, "I would not be doing what I do today without this formative experience at Penn."

Two decades after the civil rights movement, the late 1980s was a relatively good time to be a female medical student at



Penn. Lee experienced "a real push in the '80s to make opportunities available for women. There were a lot of strong female role models in the genetics department." That's not to say everyone was without bias. She recalls that a fellow PhD student asked her, "If you had the choice, would you choose to be born a woman again?" Lee ignored such comments and kept going. As a young scientist, she did not join women's student organizations because she didn't want to make a fuss about being female in a male-dominated world—while still acknowledging today that women in science and medicine face challenges at different stages in their careers, including a glass ceiling for successful senior women.

After graduating from Penn, Lee undertook postdoctoral work at the Whitehead Institute & MIT, and in 1997, joined the Harvard faculty to pursue her studies in XCI. She is currently professor of Genetics at Harvard Medical School, the Blavatnik Institute, and Massachusetts General Hospital. Her lab has been investigating how RNA interfaces with protein at each step of XCI and how to unlock the silent copy of each gene for therapeutic benefit. The basic science knowledge she's pioneering offers hope for treating human disorders, particularly neurodevelopmental disorders and X-linked intellectual disabilities such as Rett Syndrome, Fragile X Syndrome, and CDKL5 Syndrome.

Lee is most proud of debunking the myth of "junk DNA," i.e., non-coding DNA, thought to have no purpose. Her lab demonstrated that non-coding RNAs almost entirely control XCI, a discovery that revolutionized the field of epigenetics and earned Lee the 2016 Lurie Prize from the Foundation for the National Institutes of Health. She has also received the Molecular Biology Prize from the National Academy of Sciences, U.S.A., Penn's Distinguished Graduate Award, election to the National Academy of Sciences, and other honors, in addition to serving as president of the Genetics Society of America. She is an inventor on 30+ patents and played a major role in founding two biotechnology companies to translate her discoveries into new therapeutics to treat human genetic disorders. She attributes her success in large part to her passion for science, a willingness to take risk, persistence, and—critically—the influential years at Penn.



1996

The first women are appointed to serve as permanent PSOM department chairs: Priscilla A. Schaeffer, PhD, Microbiology, and Marjorie A. Bowman, MD, Family Practice and Community Medicine.



FOCUS

ON HEALTH AND LEADERSHIP FOR WOMEN

Established in 1994

what substantive things we can do to make a difference, rather than just lip service,” Johnson said. “These FOCUS chats have made me feel hopeful.”

These sessions have provided a safe space for women faculty to share their struggles and crowdsource solutions while fostering a sense of community during an isolating time. They also reflect the core belief that permeates all FOCUS programming—that together, and with institutional support, women of all backgrounds, disciplines, and career stages can break through barriers and help each other advance.

FOCUS, which completed its 25th year in 2020, supports the advancement and leadership of women in academic medicine and promotes research centered on women’s health and careers. In addition to capturing gender representation and advancement data in a biennial benchmark report, FOCUS provides support through community building and leadership training. Faculty and trainees at all levels in both clinical and research-oriented careers can participate in a wide range of career workshops, leadership seminars, and mentorship opportunities.

FOCUS hosts an annual professional development conference and regular hour-long lunchtime seminars on topics like imposter syndrome, authentic leadership, time management, work-life challenges, and trending health care issues. The Multi-Session Career Evolution Series also helps women manage challenges unique to their career stages. “We want to increase the proportion of women in traditional leadership roles, but we also want them to pave paths as leaders in innovative administrative, clinical care, education, research, government, and community positions,” said Stephanie Abbuhl, MD, FACEP, executive director of FOCUS—part of a multidisciplinary leadership team—and a professor of Emergency Medicine.

The program has also conducted multiple research efforts like the first-of-its-kind NIH-TAC (Transforming Academic Culture) Trial, which examined whether coordinated interventions could improve the productivity and job satisfaction of junior women faculty over a three-year period in a cluster-randomized design. FOCUS also brings in outside funding to finance programs like the Medical Student Fellowship in Women’s Health in which Penn medical students receive a stipend while working on women’s health research. “It’s a triple win,” Abbuhl said. “The students get six months of mentorship and further expertise in the field; faculty members have students working alongside them to advance their research; and the field benefits from new investigations as well!”

Though she says there is more work to be done, particularly in the areas of leadership and salary equity, over the course of her 40-year career, Abbuhl has seen “steady and exciting changes” that have opened long-closed doors and allowed women and underrepresented minorities to bring their considerable talents to medicine with striking benefits for patients, education and research. “I believe that the atmosphere of academic medicine has never been more responsive and ready to create an environment in which every faculty member can thrive.”

— MaryKate Wust

Waves of “angst and anger” punctuated the experience of 2020 for Michelle Johnson, PhD, an associate professor of Physical Medicine and Rehabilitation at the Perelman School of Medicine. Between COVID-19 and the uprisings sparked by the murders of George Floyd and Breonna Taylor, the year’s cataclysmic events have had a profound, disproportionate impact on Black Americans and people of color. For Johnson, juggling personal and professional responsibilities amid a pandemic became even more complicated—a struggle she saw reflected in her colleagues and students.

Though COVID-19 has prevented people from coming together in person during these hard times, there has been an outlet that Johnson has found “tremendously uplifting and helpful” as a Black woman faculty member: a series of virtual discussions launched by PSOM’s FOCUS on Health & Leadership for Women program. These sessions have covered the gamut of timely topics, including systemic racism and academic productivity—at a time when there are signs that the pandemic has placed special burdens on women that have impacted their careers. For example, a brief analysis of preliminary data published in *The Lancet* in June found that across disciplines, including medicine, women’s rate of authorship in academic journals has declined this year compared to 2019.

The sessions and their participants “demonstrated a genuine effort to try to understand, to query, and to figure out



2000

A ‘CAN DO’ BIOMEDICAL EDUCATOR

Julie Davis Good, PhD

The daughter of a third-generation brick mason and a beautician, Julie Davis Good grew up in rural Whitley County, Indiana, helping to tend a family garden and can yearly supplies of fruits and vegetables. She was valedictorian and one of only 15 of the 250 students in her high school class to attend college. At Hanover College, “I was a first generation college student when no one realized what that meant...and so I used my ‘can do’ attitude to work harder and longer to catch up with what my peers already seemed to know.” Her pre-med aspirations waned when she became involved with pharmacology research at Indiana University School of Medicine.

Good’s exploratory career has taken her full circle to her home state, where since 2018 she has been developing an undergraduate biology program at Indiana Tech—originally an engineering school.

Even before starting a doctorate in cell and molecular biology at Penn’s Biomedical Graduate Studies (BGS) program

in 1992, Good made several stops along the way: graduate studies in microbiology and immunology at Emory University, service work with her church in Ecuador, a secondary education certificate, and teaching high school science in Atlanta.

At Penn, Good found tremendous leadership in classical virology and the advancing wave of molecular biology by Neal Nathanson, MD, and Susan Weiss, PhD. Good worked in Weiss’s lab on the mouse coronavirus, Mouse Hepatitis Virus, strain A59, more specifically on what the genome encoded and the protease that made functional coronavirus. “I can’t believe it was a virus like the one I was working on that we’re now seeing with COVID-19,” she says. In 1995, Good moved to the lab of James Hoxie, MD, where she studied HIV. Her thesis, “Molecular characterization of biological inhibitors of viral entry (HIV),” was, she says, “incredible formative training for a farm girl!”

Despite a fairly equal gender balance at BGS in the 1990s, Good faced additional challenges as a woman who’d made certain choices about family life. Pregnant in the spring of her first year, she kept it hidden through her preliminary/comprehensive exam. “Even at that point in my career, I had decided I wanted neither to be ‘passed’ because I was pregnant nor to be failed because of this choice.” By the time she defended her dissertation, while doing a postdoc at the CDC and working at biosafety level 3 on HIV/tuberculosis synergy, she was pregnant with her third child.

Good went on to coordinate and then run the University of Virginia’s medical microbiology program for eight years, plus a small research effort that studied the efficacy of the tuberculosis vaccine (BCG) for treating high-risk bladder cancer. In 2009, she joined Van Andel Institute in Grand Rapids, Michigan, as assistant dean and later associate dean of the Graduate School. There she organized a group of the Association of Women in Science. Her advocacy efforts extended to high school outreach programs, encouraging girls in STEM, the pipeline for future women in science.

Good regards her accomplishments as a scientist with modesty, but her numerous teaching awards reflect her dedication and impact as an educator and mentor. During the COVID-19 shutdown, that has meant working 16 hours a day preparing for and conducting virtual classes. “I don’t convey knowledge,” she says. “My goal is that my students learn how to learn.”



2004

FOCUS introduces the *FOCUS Award for the Advancement of Women in Medicine*. The first award goes to Lisa M. Bellini, MD, then associate professor, Department of Medicine.



2010

FROM PIROUETTES TO PEDIATRICS—AND PANDEMIC EMERGENCY RESPONSE

Anna Weiss, MD, MEd

Anna Weiss had just begun a career as a professional ballerina when a serious injury changed her direction. Onward to Harvard for studies of Russian language, history and literature. Subsequently a Rhodes scholar at Oxford University, Weiss became interested in public health and human rights in the post-Soviet system, particularly the treatment of HIV-AIDS patients. That interest led her to field study in South Africa to learn more by working with a pediatric HIV program—and her direction changed again. “On the policy side, I was overwhelmed by how powerless I felt to affect lives on the ground and questioned the best path for me to make a difference,” she explains. That path led to PSOM in 2006, following a two-year interval for a pre-med, post-baccalaureate program and work with the U.S. President’s Emergency Plan for Aids Relief (PEPFAR) in Nigeria.

The medical school’s Doctoring course dedicated to humanism in the curriculum made a huge impact on Weiss, now a CHOP Emergency Medicine physician and a current Doctoring preceptor. So, too, did research mentor Samir Shah, MD, with whom she wrote her first, first-author paper. “He insisted that I run the statistical analysis myself and gifted me a sense of self-efficacy for which I will always be grateful. I very consciously try to pay this forward in my own teaching practice—giving learners autonomy to make mistakes from which they will grow, while setting safe guardrails that protect both them and their patients.”

The roles of physician and mother have always gone together for Weiss, who married and gave birth to the first of three children while a medical student; her son was 10 weeks old when she started her intern year at CHOP.

Weiss knew she wanted to work in pediatrics since working with PEPFAR. Although she assumed she’d focus on infectious diseases, “the first time I rotated through the ED, I knew those were my people.” Weiss loves being a West Philly community emergency medicine doc, cracking a new diagnosis, providing care for local children and their families, and being at the front line of a highly specialized quaternary referral center. “We have the privilege of caring for families in their most vulnerable moments, so there can be an emotional toll when we are communicating unexpected or crushing news.”

Passionate about medical education, Weiss earned a master’s in Medical Education at Penn in 2018. Now as associate director for education in the CHOP ED, she oversees curricula



for multiple learner groups and serves as the educational interface between the ED and the rest of CHOP. “Teaching is one of the most rewarding parts of my job—not only bedside teaching, but medical education as a scientific discipline.” Her credo as an educator: “Be willing to say you don’t know the answer and embrace not knowing as a gift to spur you onward rather than an obstacle to overcome.” Sort of like putting the pointe shoes away and leaping in a new direction.

In March 2020, Weiss joined thousands of health care workers, including her husband, a Temple University emergency physician, in uncharted waters of the front lines of the COVID-19 pandemic. She calls the experience a privilege. “While there is a palpable sense of anxiety among both the care team and patients in the ED these days, I am so proud of—and impressed by—the way that Philadelphia’s health care teams have risen to meet this remarkable challenge,” she says. “On the home front, we are facing the reality of parenting in a two-front-line physician household. We have weighed the risks of both caring for COVID+ patients, but feel strongly that each of us belongs in our respective EDs and with our respective teams right now. This pandemic is Emergency Medicine’s moment, and we are grateful to be a part of it.”



2010

Women substantially outnumber men in this year’s PSOM graduating class: 80 of 145 newly minted MDs.

2020

ASPIRATIONS IN GLOBAL HEALTH, GRADUATION IN A PANDEMIC

Hanna Elmongy, MD

An Egyptian American, Hanna Elmongy grew up in a bilingual household in New Orleans and then Philadelphia. Her family spent time in Egypt, staying connected with their Egyptian relatives and culture; the visits also fostered Elmongy's proficiency in Arabic. This cultural and language experience would help shape her path. So, too, did Elmongy's parents, both of whom studied science. Her father, an oncologist, "went above and beyond for his patients, keeping their humanity at the center of their

care," she explains. "He motivated me to see the kind of impact you could have on people."

As a Penn undergrad (SEAS'15) studying chemical and biomolecular engineering, Elmongy wanted to learn how the natural world works and use that knowledge to benefit people. She also genuinely likes talking to people, hearing their problems—hence, medical school.

Elmongy entered the Class of 2020, in which 88 out of 162 graduates (54 percent) were women. Despite women outnumbering men—and the presence of many more women faculty—Elmongy still sees subtle differences in the male/female experience. "It seemed easier for men to say something, to project confidence, and be taken seriously. We had to work on projecting ourselves in a certain way to be taken seriously."

In her first year, Elmongy met Alexandra Vinograd, MD, a CHOP emergency medicine physician who had volunteered in refugee camps in Greece. In the summer of 2017, Elmongy joined the Syrian American Medical Society in Greece, where a group of volunteers running primary care clinics in refugee camps needed interpreters. The Arabic language she'd learned as a child proved invaluable. So, too, did the experience. "It was life changing. It triggered me to pursue global health in my career and give back to communities. I want to learn more about public policy and population level public health, someday make more big picture decisions."

Meanwhile, Elmongy was also giving back to communities locally. She established a Muslims in Medicine group at Penn that has attracted Muslim and non-Muslim participation and support. She has worked on stress relief workshops for Syrian and Congolese refugee women struggling to navigate their way in this country, nutrition workshops for West Philadelphia residents, and the Alianza seminar series on the Cuban health care system. For her big heart and outreach efforts, Elmongy was inducted into the PSOM's Gold Humanism Honor Society.

In the final semester of her fourth year, the COVID-19 outbreak hit—and changed the landscape rapidly. "It went from being a nuisance preventing my international rotation and last requirement of med school to a very real fear as I began to know of friends of friends falling ill—both young and old," Elmongy reflects. "I've had to mourn the idea of what my fourth year would look like as rotations, then Match ceremony, then graduation got cancelled, and I realized there were friends I might not see again for a long time. But simultaneously I feel so grateful that that is all I have to endure: that I and my family are healthy and safe."

Elmongy is now training at Massachusetts General Hospital for a residency in medicine and pediatrics. She believes that understanding disease systems of both children and adults will make her the most versatile and useful in her future role in global health care. Though becoming a physician during a global pandemic is frankly scary, Elmongy says, she also reminds herself that medicine is a



calling: "Medicine gives me purpose and feels like the most impactful way I can serve those around me. I worry about how this pandemic and the aftermath will disproportionately affect the most vulnerable of patients—those who are poorer, those with limited English proficiency—and it renews my motivation to work for them." ◡



2020

Of the PSOM's 162 graduates, 88 (54 percent) are women.

REMEMBERING A VISIONARY PHILANTHROPIST

On April 15, Penn Medicine lost beloved friend, stalwart champion, and Emeritus Trustee Madlyn Abramson, ED'57, GED'60.



A cancer survivor herself, Madlyn Abramson and her husband, Leonard, are best known for their tireless support of the Abramson Cancer Center (ACC) and Abramson Family Cancer Research Institute (AFCRI).

“It’s safe to say that Madlyn Abramson was the spark that ignited Penn Medicine’s groundbreaking ImmunoRevolution,” said Dean J. Larry Jameson, MD, PhD. “With an historic gift to launch the AFCRI, she and her husband Leonard transformed the landscape of cancer research—and with the dedication of the ACC, brought to life a new vision of compassionate cancer care.”

A Transformative Gift

In December of 1997, the Abramson Family Foundation made a transformative gift to the University of Pennsylvania Cancer Center, establishing the AFCRI. At the time, it was the

largest-ever single contribution for research for a federally designated comprehensive cancer center and the second-largest gift ever made to Penn.

The gift came with a visionary directive: Attract top scientists in this field, and free them up to do their research full-time. The Abramson family has donated over \$150 million to Penn to further cancer research and compassionate care.

Longtime friend and former ACC Director John H. Glick, MD, reflects, “Madlyn wanted every patient facing cancer to be cared for throughout their journey, from diagnosis through survivorship—and beyond their immediate medical needs. Her generosity helped create a national model that

includes support services like nutrition, support groups, social work, and others that remains strong today.”

This commitment to groundbreaking research yielded unprecedented impact: Among the recruits made possible by the Abramsons’ gift was Carl June, MD, the immunotherapy pioneer responsible for the development of what became the first personalized cellular therapy for cancer.

Penn Medicine CEO Kevin Mahoney shared, “It was a special moment for me at our now-famous flash mob to stand alongside Madlyn and Leonard, celebrating Dr. Carl June and his team’s accomplishments—all of which started with a radical idea and a passionate philanthropist like Madlyn to back it. I’m going to miss her.”

“The reputation we enjoy today as one of the nation’s pre-eminent cancer centers has been built on the strong foundation that Madlyn laid,” said Robert Vonderheide, MD, DPhil, director of the ACC. “The exciting progress we’ve made in pursuit of curing cancer unites us every day to do more for our patients and across the world, and we have Madlyn, together with her husband Leonard, to thank for the vision that set us on this path.”

A Life Dedicated to Others

A Philadelphia native, Madlyn graduated from Philadelphia High School for Girls and earned bachelor’s and master’s degrees in education from Penn. She devoted her career to the education of others, including teaching in both the Upper Darby and Philadelphia school districts. She married Leonard in August 1957.

Madlyn’s impulse to help, share, and inspire is one she learned from an early age from her father, dentist Maurice Kornberg, and his devotion to his patients.

Madlyn’s passionate volunteerism and advocacy was unmatched in Philadelphia. She joined the Penn Medicine Board in January 2002 and was appointed as a Charter Member in November 2011. She served on the Executive Committee of the Penn Medicine Board, as well as its Patient Care & Clinical Quality Committee. She was also board chair of the AFCRI, and honorary chair of the ACC Director’s Leadership Council.

Most recently, Madlyn and her daughter, Nancy Abramson Wolfson, were the guiding force behind the committee for Philly Fights Cancer, an annual event benefiting the ACC that has raised more than \$39 million, with proceeds funding essential clinical trials that are powering the next generation of cancer cures.

“A True Force of Nature”

Always leading the way in support of patients, Madlyn and Leonard were the first to step up at the onset of the COVID-19 pandemic, contributing \$1 million in support of COVID-19-related research. It was one final example of her tireless dedication to the betterment of public health.

“Madlyn Abramson was a true force of nature, and her loss is deeply felt throughout our community,” said University of Pennsylvania President Amy Gutmann, PhD. “Madlyn stands out among our most influential philanthropic partners for her vision in inspiring change, and her dedication to ensuring that change took place. Together, she and her husband Leonard made a tremendous impact on Penn,



Philadelphia, and the world. They inspired their daughters to carry on the torch, and we send our heartfelt sympathies to the entire Abramson family.”

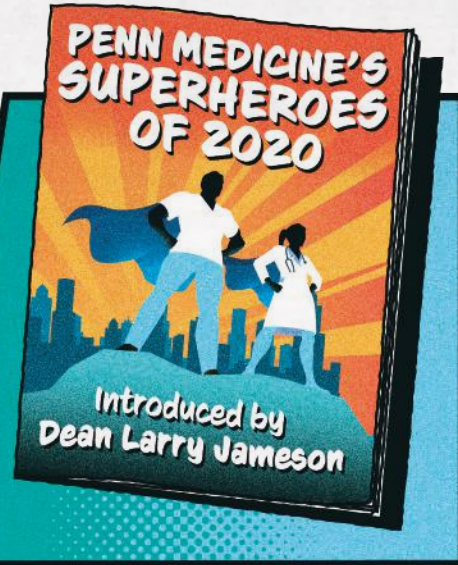
In addition to Leonard, Madlyn is survived by her three daughters—Marcy Abramson Shoemaker, Nancy Abramson Wolfson, and Judith Abramson Felgoise—and her many grandchildren, two of whom followed in her Penn footsteps: Samantha Felgoise, C’20, and David Wolfson, L’20, WG’20.

The family has requested that contributions in Madlyn’s memory may be made to the Abramson Cancer Center. □

► To donate online, please visit PennMedicine.org/Abramson/Tribute.

Gratitude that Befits Our Heroes

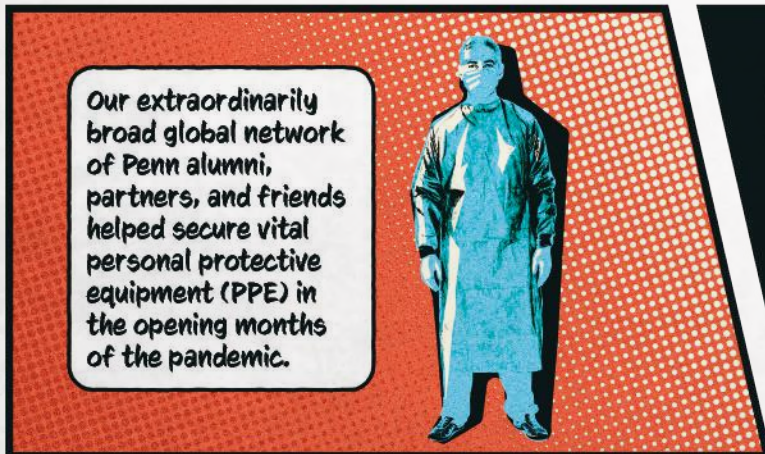
When the COVID-19 pandemic hit, it was clear that unprecedented times would call for an unprecedented response. From across Penn Medicine and the family of "Penn Proud" supporters around the globe, true heroes have taken many forms. To honor these extraordinary individuals, we are proud to present...



The **PHILANTHROPIC FIRST RESPONDERS** who sprang into action as early as March and April provided critical support as the pandemic began hitting the Philadelphia region.



We're grateful to members of the Penn family including Sara Gowing, Margaret Anne Nolen and James A. Nolen IV, Laddie and Linda Montague, Richard Axilrod, W'85, the John Templeton Foundation, and so many others whose support enabled Penn Medicine to move nimbly—to quickly develop the infrastructure and processes that would shape our approach going forward.



Our extraordinarily broad global network of Penn alumni, partners, and friends helped secure vital personal protective equipment (PPE) in the opening months of the pandemic.

In all, our clinical teams received more than 30,000 masks—crucial to their efforts to safely deliver the care our patients needed.



BIG NAMES IN PHILLY SPORTS got into the game in early April, and we were so delighted to welcome them onto our team.

Jeffrey Lurie, owner of the Philadelphia Eagles, contributed \$1 million to establish the COVID-19 Immunology Defense Fund.

NBA All-Star and Philadelphia 76er Joel Embiid—along with the 76ers' managing partner Josh Harris W'86 and co-managing partner David Blitzer, W'91—offered \$1.3 million to establish a funding campaign for COVID-19 antibody testing.

Together, their contributions have helped us develop a better understanding of the virus's impact on patients and test more than 2,000 of our health care workers.

UNRESTRICTED RESEARCH SUPPORT got us ahead of the virus—and continued funding is keeping us there.

When the outbreak hit our area, hundreds of researchers across our campus could focus their efforts on developing tests, treatments, and vaccines for COVID-19.

They were backed in late March by the establishment of the brand-new Center for Research on Coronavirus and Other Emerging Pathogens.

Donors like Leonard and the late Madlyn Abramson, Song Li, Pam Giannini, and Margie and Andy Rooke and family were among the hundreds who helped Penn Medicine raise more than \$8 million in support of COVID-19 research.

Support for **OUR CLINICAL TEAMS** sent a powerful statement of solidarity for every one of our frontline health care professionals.

Nearly **500 DONORS** have **RAISED MORE THAN \$750,000** for our health care workers, helping them navigate pandemic-related financial hardship and answer the call of their community.

In addition, **PENN MEDICINE TOGETHER**, launched by the Penn Medicine Board, **RAISED MORE THAN \$4 MILLION**—with some funds directed to the community for providing off-campus services like food distribution, testing, and contact tracing.

Even as classrooms stood empty, **OUR WONDERFUL STUDENTS** proved eager to step into their roles as the next generation of exemplary caregivers. With our donors' help, they were free to do so.

Perelman School of Medicine students began dedicating their time to volunteering, including making significant contributions to our telemedicine work—with approximately 6,000 "visits" a day.

They've also become deeply involved with contact tracing, which has reached out to more than 4,000 individuals over the course of more than 6,000 calls.

ENGAGEMENT FROM OUR WORLDWIDE PENN PROUD COMMUNITY through virtual events, town halls, and symposia has demonstrated the collective commitment to transforming health.

Thousands of viewers tuned in from dozens of countries, submitting questions, chatting with faculty about the latest in COVID-19 research and care, and offering their own words of encouragement.

Joining Forces to Take on Something Much Larger than Any of Us...

It's a story larger than life: dedicated people from wildly different backgrounds, united.

We couldn't be more grateful to the thousands of kind-hearted and generous individuals all over the planet who have reached out and made themselves a part of this effort. Thank you from all of us here at Penn Medicine ...

...For the health of all.

The Center of Excellence in Environmental Toxicology (CEET) received an \$8 million grant from the National Institute of Environmental Health Sciences for research with a focus on exposures that affect Southeastern Pennsylvania and its communities.

Laura Dember, MD, a professor of Medicine and Epidemiology, received the National Kidney Foundation's 2020 J. Michael Lazarus Award, which recognizes individuals whose research has yielded novel insights related to renal replacement therapy.



Nwamaka D. Eneanya, MD, MPH, a nephrologist and an assistant professor of Medicine and Epidemiology, who is also the first female Black nephrologist on Penn's faculty, was named one of the 40 Under 40 Leaders in Minority Health by the National Minority Quality Forum (NMQF). The award recognizes the next generation of thought leaders in reducing health disparities to build sustainable communities.



César de la Fuente, PhD, an assistant professor in Psychiatry, Microbiology, and Bioengineering, was awarded the first Langer Prize for Innovation and Entrepreneurial Excellence by the

American Institute of Chemical Engineers (AIChE). In addition, he was honored with an ACS Infectious Diseases Young Investigator Award by the ACS Division of Biological Chemistry and ACS Infectious Diseases and was named to the first edition of In Vivo's "Rising Leaders" in the life sciences list.

Two teams of Penn researchers received \$525,000 grants from the Chan Zuckerberg Initiative to explore emerging ideas regarding the role of inflammation in disease. The teams are comprised of **Jorge Henao-Mejia, MD, PhD**, an assistant professor of Pathology and Laboratory Medicine, **Sarah Henrickson, MD, PhD**, an assistant professor of Pediatrics, **Golnaz Vahedi, PhD**, an assistant professor of Genetics, **Kellie Ann Jurado, PhD**, an assistant professor of Microbiology, **Monica Mainigi, MD**, an assistant professor of Obstetrics and Gynecology, and **Dan Donegeun Huh, PhD**, an associate professor of Bioengineering.

Rebecca Hubbard, PhD, an associate professor of Biostatistics, won the 2020 Mid-Career Award from the Health Policy Statistics Section (HPSS) of the American Statistical Association, recognizing outstanding contributions and a promise of continued excellence at the frontier of statistical practice.



Frances E. Jensen, MD, chair of Neurology, joined the American Brain Foundation's (ABF) board of directors to advance the ABF mission of bringing researchers and donors together to cure brain diseases and disorders.

Paul J. Mather, MD, a professor of Cardiovascular Medicine, was named the American Heart As-

sociation's (AHA) 2020 Physician of the Year for his outstanding contributions to advancing the AHA's mission of building healthier lives, free of cardiovascular disease and stroke.



Raina Merchant, MD, an associate professor of Emergency Medicine and the director of the Penn Medicine Center for Digital Health, earned the Mid-Career Investigator Award from the Society for Academic Emergency Medicine (SAEM) for her work exploring the connections between digital media use and health behaviors.

Mitesh Patel, MD, the director of the Penn Medicine Nudge Unit and an assistant professor of Medicine, earned the Society of General Internal Medicine's Quality and Practice Innovation Award, which recognizes those who have established exemplary systems for practice improvement in ambulatory or inpatient clinical practice.

Scott A. Peslak, MD, PhD, a fellow in Hematology-Oncology, and **Senthil Selvaraj, MD, MA**, assistant program director of the Cardiovascular Fellowship Program, are two of only six winners nationally who received the Doris Duke Charitable Foundation's (DDCF) Physician Scientist Fellowship grants. Each grant comes with \$220,000 in research funding over two years.

Benjamin L. Prosser, PhD, an assistant professor of Physiology, is the North American coordinator for a team that received a \$6.5 million grant from the Leducq Foundation. **Kenneth B. Margulies, MD**, a professor of Medicine, is Prosser's collaborator for the team that will explore the role the heart cell cytoskeleton plays in heart disease.

Sandra Ryeom, PhD, an associate professor of Cancer Biology, is the co-leader of a team which received a \$3 million Stand Up to Cancer (SU2C) grant to improve early detection in stomach cancer. The team will explore innovative techniques, including a pill-sized camera that can be swallowed by a patient to identify abnormal cells in the stomach.

Jamie Shuda, EdD, director of life science outreach and co-principal investigator for BioEYES and director of education and outreach for the Institute of Regenerative Medicine, and **Steven Farber, PhD**, scientific director of BioEYES, received the 2020 Bruce Alberts Award for Excellence in Science Education from the American Society for Cell Biology (ASCB). The award is for their development of Project BioEYES, a science education program that offers hands-on workshops for K-12 students.

Hongjun Song, PhD, Perelman Professor of Neuroscience, received an R35 Research Program Award from the National Institute of Neurological Disorders and Stroke. Song's work focuses on neurogenesis in the hippocampus, a brain region critical for learning, memory, and modulation of affective behavior.

Christoph Thaiss, PhD, an assistant professor of Microbiology, was selected to join the Pew Scholars Program in the Biomedical Sciences. Thaiss will receive four years of funding to invest in foundational research to pursue scientific breakthroughs and advance human health.

Christine Willinger, a 2020 MD-MPH graduate of the Perelman School of Medicine, received the 2020 Excellence in Public Health Award from the U.S. Public Health Service (USPHS) Physician Professional Advisory Committee, which recognizes medical students who exemplify the USPHS mission to protect, promote, and advance health and safety.

Send your progress notes and photos to:
Donor Relations
Penn Medicine Development and Alumni Relations
3535 Market Street, Suite 750
Philadelphia, PA 19104-3309
medalum@dev.upenn.edu

1980s

Jacob Paul Lalezari, MD'86, was named interim chief medical officer at CytoDyn, Inc., a biotechnology company developing leronlimab, a CCR5 antagonist with potential for multiple therapeutic indications. He is currently chief executive officer and director of Quest Clinical Research, and previously was co-director of the HIV Clinical Research Center at Mt. Zion Medical Center at the University of California, San Francisco.



David B. Sable, MD'86, joined the board of directors at Ohana Biosciences, a biotechnology company pioneering reproductive health through sperm biology. Widely acknowledged as a reproductive health innovator and early adopter of preimplantation genetic diagnosis, Sable currently directs healthcare and life sciences investing for the Special Situations Life Funds and serves as an adjunct professor of biology at Columbia University.

Marc Jeffrey Kahn, MD'87, GME'90, was appointed dean of the University of Nevada School of Medicine. He previously

served as senior associate dean for Tulane University School of Medicine, overseeing admissions and student affairs. He was also a professor of Medicine and the School of Medicine's Peterman-Prosser Professor, a position established to introduce students of science-oriented disciplines to the humanities.

Edward Gordon Eventash, MD'89, was appointed chief medical officer at Alydia Health, a medical device company dedicated to making childbirth safer. He previously served as division chief of Obstetrics and Gynecology at Tufts Medical Center, as well as medical director and vice president of Global Medical Affairs at Hologic, where he expanded their portfolio to include products that improve women's health.

1990s

Elyse G. Seltzer, MD, GME'93, was appointed chief development officer at UroGen Pharma Ltd., a biopharmaceutical company dedicated to building novel solutions that treat specialty cancers and urologic diseases. Prior to UroGen, she served as chief medical officer at Nabriva Therapeutics and as vice president of Global Clinical Sciences and Operations at GlaxoSmithKline.

Peter Linde, MD, GME'96, was named chief medical officer at Morphic Therapeutic, a biopharmaceutical company developing oral integrin therapies to treat chronic diseases. As the company advances toward clinical trials, Linde will oversee the development of small molecule integrin inhibitors. Previously, he was vice president of medical research at Acceleron Pharma Inc. and a project leader in Clinical Asset Development at AbbVie, Inc.

Christina M. Coughlin, MD'99, PhD'99, was appointed chief medical officer at Rubius Thera-

peutics, Inc., a biopharmaceutical company that engineers red blood cells to create medicines. She previously served as chief medical officer at Tmunity Therapeutics, Inc., where she developed the CAR-T and TC-T cellular therapy pipeline across pre-clinical, regulatory, and clinical development activities.

2000s

James M. Metz, MD, GME'00, was appointed as a medical advisor and member of the Board of Directors at Proton Therapy Partners, which offers a joint venture model to provide health systems with access to proton therapy. Metz is a Henry K. Pancoast Professor and chair of Radiation Oncology at the Perelman School of Medicine. He oversees the operations of the Roberts Proton Therapy Center and serves as the executive director of OncoLink, an online tool for accurate educational cancer information.



Lara S. Sullivan, MD'01, was appointed chief executive officer and director at Pyxis Oncology, an immune-oncology company that uses insights into the tumor microenvironment to develop antibody-based immunotherapies. She previously served as the founder and president of SpringWorks Therapeutics, where she conceived of and executed the clinical stage spin-out from Pfizer and raised Series A funding.

Tapan Nitin Maniar, MD'03, was appointed head of clinical development at Dragonfly Therapeutics, Inc., a biopharmaceutical company. Maniar will aid in the development of Dragonfly's novel TriNKET and cytokine programs and will lead the company's clinical development on phase 1 clinical trials of novel immunotherapies.

OBITUARIES

1940s

Bertram A. Ruttenberg, BA'44, MD'46, GME'50, a child psychiatrist; Apr. 8. After earning a medical degree and completing an internship at the



University of Pennsylvania School of Medicine, he became a pioneer in the field of autism, later founding The Center for Autism in Philadelphia.

Jacob Shragowitz, BA'43, MD'47, an obstetrician and gynecologist; Apr. 13. After earning a medical degree from the University of Pennsylvania School of Medicine, he joined the U.S. Army and later served in the Korean War as a captain in the U.S. Air Force. Following his military service, he practiced privately for more than 30 years. He also worked at Queens General Hospital and the Jacobi Medical Center, and he was an associate clinical professor emeritus at Albert Einstein College of Medicine when he retired.

1950s

Milton C. Westphal, Jr., MD'51, GME'55, a pediatrician; Jan. 2. After graduating from Yale University, he earned his medical degree at the University of Pennsylvania School of Medicine. He later joined the Medical University of South Carolina in Charleston as chairman of the Department of Pediatrics.

H. Alan Hume, MD'53, GME'57, a surgeon; Feb. 20. After serving in the U.S. Navy, he earned a medical degree from the University of Pennsylvania School of Medicine. He completed an internship and surgical residency at Penn Presbyterian Medical Center (PPMC), then a surgical fellowship at The Lahey Clinic. He maintained a private surgical practice in Philadelphia while serving as chief of Surgical Services at PPMC and chief of staff at two hospitals in Delaware County. He then became director of Emergency Medical Services for the state of Maine before serving as chief of staff at Mid-Maine Medical Center. He helped establish the Colby-Hume Center at Colby College, where he became an overseer and later worked as director and attending physician in the Colby Student Health Center. He was a founding member of the American Trauma Society, as well as a fellow of the American College of Surgeons and the Philadelphia Academy of Surgery.



Marilyn Rohrer Curran, BA'50, MD'54, a child psychiatrist; Jan. 19. After earning a medical degree at the University of Pennsylvania School of Medicine, she completed her residency in psy-

chiatry at Norristown State Hospital. She pursued additional training in child and adolescent psychiatry and psychoanalysis in suburban Philadelphia, where she maintained an outpatient psychiatry practice, staff positions at area hospitals, and active membership in professional organizations until her retirement. She continued her medical education well into her 80s, receiving the American Medical Association's Physician Recognition Award for her dedication several times.

Ruth Panzer Gottlieb, BA'50, MD'54, GME'58, a pediatrician; May 2. She earned her medical degree at the University of Pennsylvania School of Medicine, where she was one of only four women in her class, and where she met and married her husband, Marvin Gottlieb. She worked as a general pediatrician and a pediatric nephrologist and practiced at Thomas Jefferson University, where she also served as a clinical professor of Pediatrics.

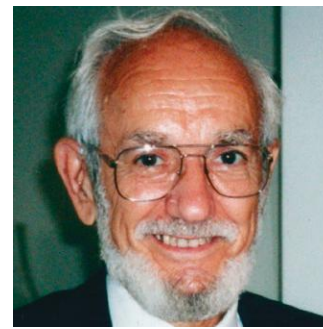


Gifford Grimm, MD'54, GME'58, an obstetrician and gynecologist; Jan. 16. After earning a medical degree and completing a residency at the University of Pennsylvania School of Medicine, he served in the U.S. Army, where he served at Ft. Bragg as a general surgeon and delivered more than 5,000 babies. He was deployed as a MASH surgeon, attending to casualties in the aftermath of multiple earthquakes in Chile. Upon honorable discharge, he joined Monmouth County Associates in Neptune, N.J., where he practiced for 53 years until his retirement.

Abraham H. Miller, BA'50, MD'54, a cardiologist; Jan. 16. After earning his medical degree at the University of Pennsylvania School of Medicine, he continued his training at Pennsylvania Hospital and completed a cardiology fellowship at Hahnemann Hospital. He served with the Public Health Service in Florida, before moving to Manhattan, Kansas, where he practiced with the Manhattan Medical Center for nearly 30 years. Upon retiring, he practiced medicine for another 17 years at the Boeing aircraft facility in Everett, Wash.

Frank H. Barranco, MD'56, GME'60, a physician; Mar. 14. After earning his medical degree from the University of Pennsylvania School of Medicine and completing his family practice training at the Hospital of the University of Pennsylvania, he served as a captain in the U.S. Army at Walter Reed Army Hospital. He joined the Santa Ynez Valley Medical Clinic in Solvang, Calif., where he practiced family medicine for more than 30 years. He helped establish the Santa Ynez Valley Community Hospital, serving as its chief of staff for many years, and he was a clinical instructor in Family Practice at UCLA Medical Center.

Norman N. Cohen, MD'56, GME'60, an internist; Apr. 16. A pioneer of fiberoptic endoscopy, he earned his medical degree from the University of Pennsylvania School of Medicine. He completed his internship at Philadelphia General Hospital, residency at the Philadelphia Veterans Hospital, and gastroenterology fellowship at the Hospital of the University of Pennsylvania. He was appointed chief of Gastroenterology at Mercy Fitzgerald and Misericordia Hospitals, then chair of Medicine at Mercy Catholic Medical Center, where he founded and oversaw the gastroenterology fellowship program. He also served as the president of the Pennsylvania Society of Gastroenterology and chair of the Board of the Philadelphia Gastroenterology Training Group for more than 25 years.



Henry J. Powsner, MD'56, GME'60, a radiologist; Aug. 12. After earning a medical degree from the University of Pennsylvania School of Medicine, he completed a residency at Columbia-Presbyterian Medical Center and was certified by the American Board of Radiology and American Board of Nuclear Medicine. He served as a U.S. Air Force physician in Florida and England. He then moved to Princeton, where he worked as a radiologist, later specializing in mammography. He also served on the boards of the Princeton Regional Schools, New Jersey Commission on Radiation Protection, Princeton Board of Health, and Physicians for Social Responsibility of Central New Jersey.



Saul Winegrad, BA'52, MD'56, professor emeritus at the Perelman School of Medicine; Mar. 13. After receiving a medical degree from the University of Pennsylvania School of Medicine, he continued his training and completed a research fellowship at the National Institutes of Health. He spent a year at University College London, then returned to Penn as assistant pro-

REMEMBERING THE DOCTOR BEHIND A BRILLIANT BREAKTHROUGH

Stanley J. Dudrick realized that some of his patients were dying after surgery not from any failure of the procedure—but from malnutrition. He developed a method to help them and millions of others worldwide.



Stanley J. Dudrick, MD'61, GME'67, was widely regarded among the country's most accomplished surgeons for developing total parenteral nutrition (TPN), a groundbreaking discovery that has saved the lives of tens of millions of infants, children, and adults.

Born in Nanticoke, Pa., Dudrick earned his medical degree at the University of Pennsylvania School of Medicine, later completing a general surgery residency at the Hospital of the University of Pennsylvania. As a young resident, Dudrick felt compelled to invest his time researching ways to save patients who underwent successful surgeries yet were still dying. His devotion to research led him to discover that malnutrition was a major cause of these deaths. TPN, his medical breakthrough, allowed those struggling to eat to receive the nutrients essential to their physical health, saving millions worldwide.

After completing his residency, Dudrick later joined the school's faculty, ascending from instructor to professor of Surgery, and eventually became chairman of Surgery at the Corporal Michael J. Crescenz VA Medical Center in Philadelphia.

Dudrick held a number of other esteemed titles, including as the first professor and founding chairman of the department of Surgery at the University of Texas Medical School at Houston, professor of Surgery at the M.D. Anderson Hospital and Cancer Center, chairman of the department of Surgery at Pennsylvania Hospital, and professor of Surgery at Yale University Medical School. Later, he joined

Misericordia University in Dallas, Pa., as the first Robert S. Anderson, MD, Endowed Chair, professor, and medical director of physician assistant studies. He then became professor of Surgery at the Geisinger Commonwealth School of Medicine in Scranton.

Known as the "father of intravenous feeding," as well as the founder of LifeFlight—the first helicopter acute care ambulance service in the United States—Dudrick contributed to

"I want to leave something better behind when I go, rather than just practice medicine the way it has always been done."

— Stanley Dudrick, MD, in 1978

more than 800 publications and held membership in more than 100 academic, professional, and honorary medical and scientific societies. For his innovative efforts in medicine, he was awarded more than 210 honors, including the Distinguished Graduate Award from the Perelman School of Medicine and the American Surgical Association Medallion, its highest honor.

"I want to leave something better behind when I go," Dudrick said in a 1978 interview with *People*, "rather than just practice medicine the way it has always been done."

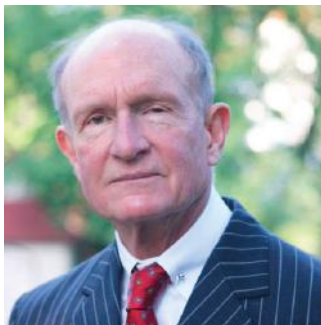
fessor of Physiology and Medicine. He became a full professor and organized the Biomedical Graduate Studies program. Upon his retirement, the Saul Winegrad Award for Outstanding Dissertation was established. He also received international recognition as a Fulbright Fellow, National Science Foundation Fellow, Guggenheim Fellow, and Fogarty-CNRS International Fellow. He also was a founding member of the Pennsylvania Muscle Institute, and he served as vice president for research for the American Heart Association, from which he received the National Award of Merit.

C. Theodore Blaisdell, MD'59, GME'62, an anesthesiologist; Apr. 3. After serving in the Field Toxicology Branch of the U.S. Air Force during the Korean War, he earned a medical degree from the University of Pennsylvania School of Medicine, where he also completed his internship and residency. He was the first board-certified anesthesiologist at Sacred Heart Hospital in Allentown, Pa., where he became director of anesthesia. He helped to build the Allentown/Sacred Heart Hospital Center, which became the Lehigh Valley Health Network, and was a member of the American Board of Anesthesiology and Pennsylvania Society of Anesthesiologists. He frequently served as an examiner for the American Anesthesia Boards.

John L. Wanamaker, MD'59, GME'63, a cardiologist; Jan. 29. After earning a medical degree from the University of Pennsylvania School of Medicine, he completed an internship at Philadelphia General Hospital and a cardiology fellowship at the Hospital of the University of Pennsylvania. He served 10 years in the U.S. Air Force as a cardiologist at Wilford Hall Medical Center and as a flight surgeon at Andrews Air Force Base. He then moved to Sayre, Pa., to practice at the Guthrie Clinic, where he was elected to the board of physicians and later served as chief of Cardiology.

1960s

Chalmers E. Cornelius, III, MD'64, GME'68, a dermatologist; Dec. 3. The author and co-author of 28 articles in leading medical journals, his research and early clinical trials contributed to the development of the pharmaceutical Retin A, which revolutionized the treatment for acne and aging skin. Cornelius earned his medical degree from the University of Pennsylvania



School of Medicine and completed an internship at Temple University and a residency at the Hospital of the University of Pennsylvania. He served for two years in the U.S. Public Health Service at the Centers for Disease Control. He later joined the staff of Bryn Mawr Hospital and practiced in the Philadelphia area for 45 years.

Thomas D. Mull, MD'65, GME'74, an anesthesiologist; Feb. 20. After earning a medical degree from the University of Pennsylvania School of Medicine and completing an internship at Walter Reed Army Hospital, he served tours of duty in Texas and Vietnam. He returned to Penn and completed a residency in anesthesiology at the Hospital of the University of Pennsylvania (HUP). He served on the faculty and staff at HUP and the Philadelphia Veterans Administration Hospital before accepting a position at Bryn Mawr Hospital, where he was chief of Anesthesiology for many years.



1970s

William L. Meadow, MD'75, GME'76, a pediatrician; Sep. 14, 2019. A pioneer in the development of neonatal bioethics, he co-authored a book, lectured extensively throughout North America and Europe, and published more than 90 academic papers on medical and neonatal ethics, as well as more than 200 scholarly abstracts. After earning



Eric Papineau Gall, BA'62, MD'66, GME'70, a rheumatologist; Feb. 26. After earning his undergraduate and medical degrees from the University of Pennsylvania, he continued his training at the University of Cincinnati. Amid training, he served in the U.S. Army in Vietnam and received the Bronze Star and Army Commendation Medal, before completing his residency at the University of Pennsylvania School of Medicine. He spent 27 years at the University of Arizona, where he was section chief of Rheumatology and was the co-founder and director of the Arthritis Center. He also served as chief of Rheumatology at the VA, then as the chair of Medicine at Rosalind Franklin Medical School in Chicago. He served on many national committees and was the president of the Association of Rheumatology Health Professionals. Over the course of his career, he received numerous awards, including Master in the ACR, Master in the American College of Physicians, and the Freedom of Movement Award from the Arthritis Foundation.

Peter R. Heisen, MD'69, GME'73, an infectious disease physician; Feb. 23. After earning his medical degree and completing an internship at the University of Pennsylvania School of Medicine, he took over his father's medical practice at Mercer Hospital in Trenton, N.J. He later began developing commercial software for use in organizational management. As chair of the Methodology Committee at William M. Mercer, Inc., he oversaw statistical modeling used for the annual "100 Top Hospitals" report.

a medical degree from the University of Pennsylvania School of Medicine and a doctorate from the University of Pennsylvania, he began his residency at the Children's Hospital of Philadelphia, followed by a year at the University of Chicago Hospitals, where he also completed fellowships in infectious disease and medical ethics. He joined the faculty there, eventually becoming full professor of pediatrics, taking over the neonatology fellowship program and becoming co-director of Neonatology.

William G. DeLong Jr., MD, GME'79, an orthopaedic surgeon; Mar. 13. After earning his medical degree from the Temple University School of Medicine, he completed an orthopaedic surgery residency at the University of Pennsylvania Health System (UPHS). He served leadership roles at Cooper University Hospital, UPHS, and Temple University Hospital. As network chairman of Orthopaedic Surgery at St. Luke's University Health Network, he oversaw the rapid development of a community program into a large network of academic specialists. He was the team physician for the Philadelphia Flyers and consulted

with multiple professional, collegiate, and youth sports teams. He was a member of the Trauma Critical Care Team of the Department of Homeland Security for many years and was also a board member of the Orthopaedic Trauma Association, the Pennsylvania Orthopaedic Society, and Healing the Children of Philadelphia County. He lectured nationally, wrote numerous book chapters and scientific publications, and was recognized with multiple professional, teaching, and research awards.

Michael J. Forsythe, MD, GME'79, an anesthesiologist; Sep. 30, 2019. After earning his medical degree from the University of Virginia School of Medicine, he completed a fellowship in adult and pediatric cardiothoracic anesthesia at the University of Pennsylvania School of Medicine. After a few years working in academia, he practiced privately at South Miami Hospital in Miami, Allegheny General Hospital in Pittsburgh, and, for the last 13 years, JFK Hospital in Atlantis, Fla.

1990s

Robertson Buell Tucker, BA'90, MD'95, a psychiatrist; Nov. 10. After earning a medical degree from the University of Pennsylvania School of Medicine, he completed a residency at Thomas Jefferson University and a fellowship at the Children's



Hospital of Philadelphia. He specialized in adolescent medicine and child and adolescent psychiatry at the Warren E. Smith Health Center in Philadelphia, where he worked for nearly 20

years. He also had a private psychiatry practice with adult patients and specialized in anxiety disorders.

FACULTY

Richard L. Tannen, MD, a retired senior vice dean at the Perelman School of Medicine; Feb. 22. After earning a medical degree from the University of Tennessee, he completed his residency and fellowship in nephrology at the Brigham Hospital in



Boston. He was a major in the U.S. Army at Walter Reed Hospital during the Vietnam War. Before becoming senior vice dean at the Perelman School of Medicine, he founded the department of Nephrology at the University of Vermont, served as division chief of Nephrology at the University of Michigan—where he was also director for the Kidney Research Center—then was appointed chair of Medicine at the University of Southern California. He co-authored several textbooks on nephrology, published numerous scientific articles, lectured nationally and internationally, and received research support from the National Institutes of Health for most of his career. He also served as president of the American Society of Nephrology and on the board of the American Heart Association. Upon retirement, he studied computerized ambulatory medical record databases, laying the foundation for continued research in the field of biostatistics.

Saul Winegrad, MD; See Class of 1956.

Bequest Makes Dreams Come True

"I dreamed of earning a medical degree from the Perelman School of Medicine," says Alexis Holmes, MD'21. "Today, I am learning how to incorporate all of my interests—mentorship, clinical research, global health, and entrepreneurship—into my future career as a physician. The support and generosity of my donor has allowed my dream to become my reality."

Penn Medicine donors who contribute to scholarship funds have a direct impact on student lives, helping to shape the future of medicine and patient care. Elizabeth Urian Lauer, ED'42, known to friends as "Libby," was one such donor whose gift will impact student and patient lives for generations to come.

Up until her death at age 96, Lauer was devoted to education and intellectual pursuits, working as an administrator and teacher at a residential school for special needs children and taking an active role in her community. She held leadership roles in the Brooke Valley Conservancy and Junior Saturday Club, and was a member of the Radnor Historical Society as well as the garden club.

Lauer left a gift in her will to support scholarships for medical students at the Perelman School of Medicine. This generous gift encapsulates her devotion to education and her desire to help her community. Further, with one-third of Perelman School of Medicine graduates remaining in the Penn Medicine system for their advanced training—and many making Philadelphia their permanent home—her gift has a direct impact on the health of the region. Lauer's forward-thinking gift of scholarships will change the lives of students and patients for generations.

For the 2019-2020 academic year, 86 percent of Perelman School of Medicine students received financial aid. Scholarships remove many of the obstacles students face, which allows them to reach higher and achieve more. "They make it possible for us to recruit and train talented and gifted students who will become tomorrow's health care innovators," says Dean J. Larry Jameson, MD, PhD.

The Perelman School of Medicine is determined to ensure the most brilliant, promising, and qualified students can afford a world-class education through scholarships and fellowships. The Financial Aid Challenge is currently underway and combines outright gifts with matching dollars, allowing you to make an even greater impact at no additional cost. Donors who are 75 years of age or older can take even further advantage of the Challenge by combining outright gifts with planned gifts, such as bequests—both of which are matched through the Challenge. To learn more, contact Christine S. Ewan, JD, Senior Executive Director of Planned Giving, at 215-898-9486 or cewan@upenn.edu.

► For more information, please visit our website at www.plannedgiving.med.upenn.edu.



THE IMMUNE FRONT

Translational Research
at Penn Medicine is
Speeding the Battle
Against COVID-19

By Melissa Moody

CCOVID-19 is not just a virus. The clinical disease caused by the novel coronavirus, SARS-CoV-2, is the result of a complex and ongoing battle within the body between the invading virus and the body's defense system.

"The immune system is going to be involved in all COVID-19 infections that we see in patients, in fighting the infection, in the resolution of the infection, and in what protects us in the future," said E. John Wherry, PhD, a chair of Systems Pharmacology and Translational Therapeutics and director of the Institute for Immunology at the Perelman School of Medicine. "The immune system evolved over hundreds of millions of years to do exactly this—to balance protection versus tissue damage. And it gets it right quite a lot of the time. But it also gets it wrong, sometimes making things worse or failing to control the infection, especially when it's a virus new to our system."

Timing Matters

Timing really matters when it comes to infections like COVID-19, Wherry said.

The virus enters the nose or mouth to infect the lung cells, where it can replicate fast. For a tactical victory, all the virus has to do is delay the immune response by a couple of days, and from 100 infected lung cells on day one, tens of millions are conquered four or five days later.

Timing also matters in a pandemic. And Penn's immunology group was able to get their research off the ground incredibly quickly. Less than a half hour after landing at Philadelphia International Airport March 18 on his way home from a conference, Wherry was on the phone with his friend and colleague Michael Betts, PhD, to talk about the SARS-CoV-2 virus and the disease it causes, COVID-19. At that moment, Betts, a professor of Microbiology and viral immunologist at Penn, was walking out of a school board meeting in his children's district, where he'd warned that the virus was a serious concern.

And following that phone call, Wherry and Betts would both be venturing in new research directions.

Wherry's research typically focuses on the immune response of patients with cancer and chronic infections, with a goal of understanding overall immune health and developing personalized, targeted therapeutics. Betts' work revolves around the human immune response to viral pathogens, mainly HIV.

Now Wherry and Betts set out to investigate how patients' immune systems were responding to COVID-19. The pair hoped to inform potentially life-saving treatments to a disease that at that point had none, by understanding the battle that wages within the body between a virus and the immune system's response.

After a virus invades, the innate immune system responds first, detecting a foreign invader and creating antibodies. But if a virus subverts these early defenses, the body next needs to deploy its special operations forces that have been trained through past experiences (if they've had any) to fight the specific invader that the body is facing—the T cells.

But every step of this battle can ravage the body in its way. COVID-19 disease becomes severe when viruses evade the innate immune system and replicate in the lungs. T cells can help fight the disease. But if that battle rages too large, the fortress of your body can suffer as much from the havoc wreaked by your own troops as from the infection itself.

Basic Science on the Clinical Front Lines

When the pandemic hit, Nuala Meyer, MD, an associate professor of Pulmonary, Allergy and Critical Care, was working with COVID-19 patients in the hospital. And she, too, took a well-timed call from John Wherry.

Meyer's translational research has focused on understanding how a patient's body responds to infections and finding novel treatments. When she got Wherry's call, that research accelerated. Their daily phone calls to discuss COVID data marked an exchange between basic scientists and clinicians that was almost unheard of prior to the pandemic.

"I had a patient whose particular circumstances made us question whether he would mount a strong immune response or not," Meyer said. She wanted to know if a therapy that would attack a specific part of the immune system would be the right choice.

Wherry and Betts' teams came in on a weekend and had results telling Meyer what was happening in the patient's immune system in just ten hours. Normally, she said, the time from enrolling a patient in a study to getting data back to use at the bedside would be from six months to two years.

"Our research is having a direct effect on how patients are being treated, Betts said, "almost in real time."

The Future Fight

There are a number of really big questions still open that Wherry, Betts, and others at Penn are investigating, Wherry said, including how immune people remain after infection.

Immunologists are increasingly examining how T cells learn to fight the virus effectively but not overzealously. "One big area that we're focused on trying to understand is the formation and quality of T cell memory," Wherry said.

Wherry is also looking at the immune system in COVID-19 patients with long-term symptoms, the relationship of the immune system to vascular problems, and how previous infections might impact our immune response to the virus.

Betts' lab is pursuing how immunity develops in those with milder infections, how long-term protective immunity differs over time, and the implications of those answers for the development of vaccines.

And the collaborative and multidisciplinary push in Penn's immunology community continues.

"This is the first time I've ever seen a cohesive, unanimous response to a scientific charge," Wherry said. "We've gained expertise through these studies that have changed the landscape of what kinds of things we can do in human immunology really quickly in collaboration with clinicians." □

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An Outpouring of Thanks

The COVID-19 pandemic has required mental stamina to weather unimaginable challenges and stress. For health care workers at Penn Medicine, the PennMedicineTogether website was launched early in the pandemic as a resource for support—including moral support and gratitude. The site’s “Share the Love” feature enables community members to send messages that are posted online and streamed to digital signs in the hospitals.

► [Read more on page 16.](#)

