THE **FUTURE** OF HEALTH**CARE**

Chicago innovators are ushering in a new era of care and connectivity

By Kate Silver

"**H**ealthcare" and "excitement" aren't always two words you expect to see together, but in Chicago, there's an undeniable buzz underfoot. "We're at the most interesting time ever for technology and innovation in healthcare," says Steven Collens, CEO of MATTER, a global healthcare incubator based in Chicago. And, he adds, our fair city is in a prime position to move it all forward.

"We have world-leading companies in essentially every subsector of the healthcare industry: pharmacy, insurance, pharmaceuticals, diagnostics, devices, hospital supply, information technology," Collens says. Plus, Chicago is home to renowned universities, research scientists, data scientists, start-ups, medical technology companies, rehabilitation facilities and so much more.

In talking with innovators and entrepreneurs in Chicago, it's clear that they're laying the groundwork today for a future filled with intriguing possibilities. They're using artificial intelligence (AI) to help detect disease. They're harnessing data drawn from electronic health records to predict how a person might respond to treatment. And they're moving away from a one-size-fits-all approach to medicine, instead treating individuals based on their own biology.

These innovators are envisioning a more connected era, when doctors and patients keep in touch in times of health and not just during distress. They're utilizing telehealth so patients can talk with specialists when and where they need them most. And they're building on their knowledge around all these issues to create a healthier future.

Here's what five local health insiders have to say about what's happening today in Chicago and what they predict might happen tomorrow.

Pinpointing disease with artificial intelligence

When Patrick McCarthy, MD, thinks about cardiac care in the future, his mind turns to AI.

"Artificial intelligence is the next frontier in breakthrough medicine," says McCarthy, executive director of Northwestern Medicine's Bluhm Cardiovascular Institute, which launched its Center for Artificial Intelligence in 2018.

"Cardiovascular disease is still, by far, the number one killer in the United States," McCarthy says. "There are many aspects of cardiovascular medicine that artificial intelligence can help us address." AI can be used to sort through data compiled from thousands of patients to identify patterns, some of which may be too rare and complex for many physicians to recognize.

McCarthy and his team are conducting clinical trials using artificial intelligence to help detect cardiac abnormalities. One of these clinical trials is looking at Eko, a digital stethoscope bolstered with AI technology. Held to a patient's chest, Eko records the electrical signals of the heart for 15 seconds and then uses algorithms to detect heart murmurs and rhythm irregularities.

With traditional stethoscopes, heart murmurs are detected as low as 50% of the time, McCarthy says. Detection relies on a number of variables, including the clinician's experience, background noise and more. Eko removes those variables and performs its analysis based on a database of thousands of heart sounds. With this device, McCarthy's team has been able to detect aortic stenosis murmurs 96% of the time — a detection that could be life-saving. ➤

Patrick M McCarthy, MD
Cardiac Surgery

PATRICK MCCARTHY, MD, NORTHWESTERN MEDICINE.
PHOTO BY JIM VONDRUSKA

MCCARTHY USING EKO DIGITAL TELESCOPE WITH PATIENT. PHOTO BY JIM VONDRUSKA

Crystal ball: "Some friends work for Google and invited me to visit a new company, Verb Surgical. They are building a robot to do operations. They will be able to use and analyze surgical images, like the technology that guides a driverless car. Those medical images can help guide the robotic surgery. Twenty or 30 years from now, a surgeon like me may be doing parts of operations, but a robot using artificial intelligence will be doing parts of it as well."

— Patrick McCarthy, MD, Northwestern Medicine

Crystal ball: "There will still be hospitals, which will take care of very sick and complex patients, [but] a significant amount of care will move into self-service through devices and tools that people will have in their homes that will give them a lot of data about their health. … Care will be much more mobile, portable and in the hands of the individual seeking care. The challenge for healthcare providers and systems is to be the best choice for those partnerships by developing flexible and more integrated care systems so health recommendations are possible anytime and anywhere."

— Lakshmi Halasyamani, MD, NorthShore University HealthSystem

LAKSHMI HALASYAMANI, MD, NORTHSHORE UNIVERSITY HEALTHSYSTEM. PHOTO BY JIM VONDRUSKA

Using predictive models to uncover risks

Electronic health records aren't just digital snapshots of a patient's history. They're a gateway to a wealth of data that allows major health systems to detect patterns and predict health risks for individual patients. Healthcare providers are just beginning to understand the potential of predictive analytics and how to create systems around them that can guide the ways they treat patients.

At NorthShore University HealthSystem, a predictive model called the Clinical Analytics Prediction Engine, or CAPE, may be helping improve care and even save lives. CAPE mines electronic health records to identify patients who are at risk of death or readmission and alerts the healthcare team to perform specific tasks, assessments or communication so that the care delivered is tailored to what the patient needs.

Predictive systems can tell when someone is at high risk, says Lakshmi Halasyamani, MD, chief quality and transformation officer with NorthShore University HealthSystem.

When the healthcare team is aware that a patient is at a higher risk of particular complications, they're able to better organize care so that they can quickly treat those very challenges. "It isn't just the predicting that's important," Halasyamani says, "it's also the prescribing of what we're going to do about the risk."
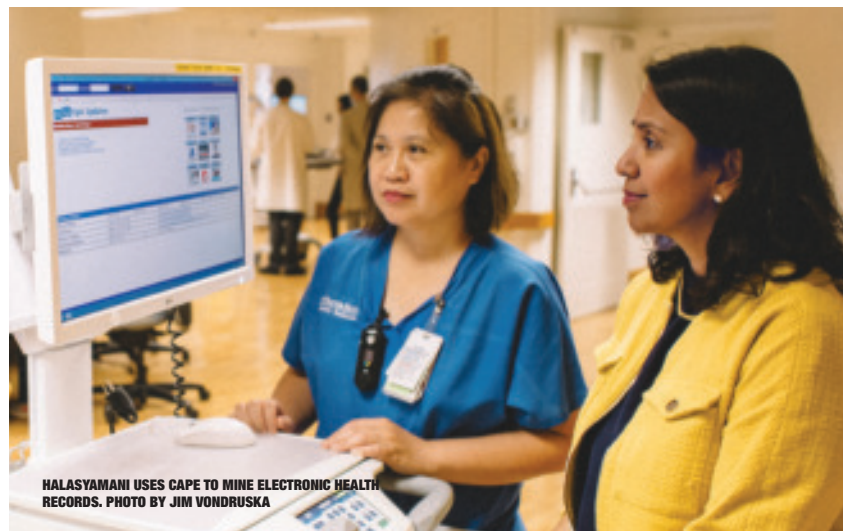
HALASYAMANI USES CAPE TO MINE ELECTRONIC HEALTH RECORDS. PHOTO BY JIM VONDRUSKA

Connecting providers and patients

The concept of meeting in person with healthcare professionals may, one day, seem archaic. Today, in hospitals and at home, more patients are meeting with medical professionals via teleconferencing technology. And this telehealth technology can help not only patients, but also physicians.

AMITA Health launched its telehealth program in 2005 with TeleICU, which uses an off-site critical care team to monitor patients in the intensive care unit. The team identifies any potential health changes and quickly intervenes to provide the highest quality of care for these patients, says Laura Messineo, vice president of telehealth with AMITA Health.

Today, TeleICU is one of 18 telehealth programs at AMITA. With TeleStroke, a neurologist is available via a telehealth monitor to consult with emergency patients suffering an acute stroke. That quick assessment has made an enormous impact, Messineo says, because timing is so critical.

"We've had some amazing outcomes of reduced complications for our acute stroke patients, for example: reduced length of stay, reduced mortality rates and increased compliance with the evidence-based treatments that are appropriate for an acute stroke," she says.

Other initiatives include TelePsychiatry, which brings psychiatric consultations to emergency rooms, general medical floors and outpatient clinics across the city. With Remote Sitter, an off-site patient safety attendant uses a video screen to watch hospital patients at risk of falling. The sitters communicate with the patient or a nurse if they detect a fall risk. Other telehealth programs focus on virtual family visits, hospice, language translation, pharmacy services and more. ▶

LAURA MESSINEO, AMITA HEALTH. PHOTO BY JIM VONDRUSKA

Crystal ball: "I think patients will be able to receive care in the location of their choice to improve access to care and improve the quality of care by using innovative technology. Imagine being able to virtually see your provider whenever care is needed. Only the sickest of patients will enter an acute care facility. Not all conditions can be treated via telehealth, but for your nonurgent or specialty consults where patients are waiting many months to see a provider, I think it's going to become the standard of care rather than a niche market."
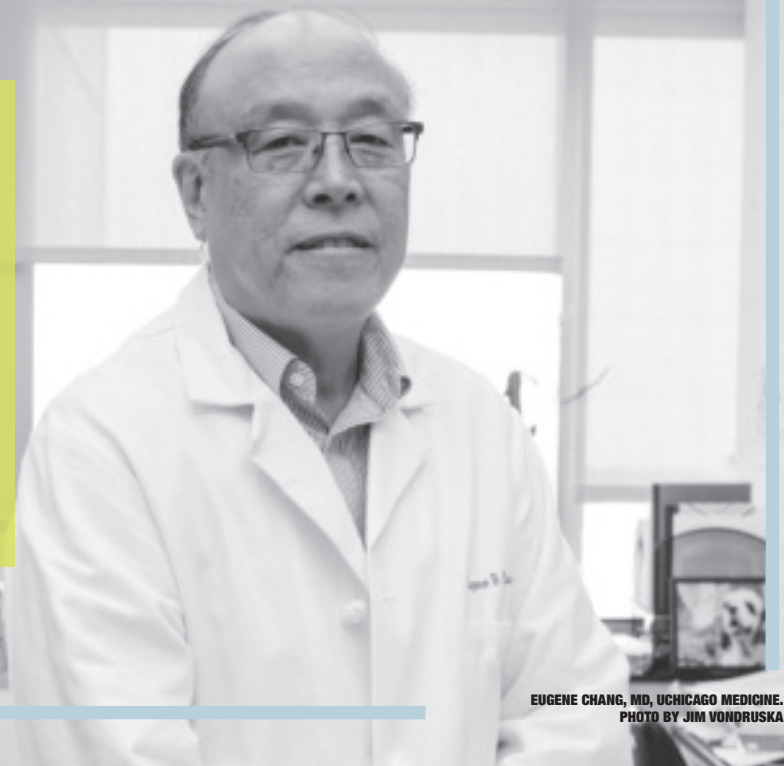
— Laura Messineo, AMITA Health

MESSINEO USING AMITA HEALTH'S TELEHEALTH SYSTEM. PHOTO BY JIM VONDRUSKA

EUGENE CHANG, MD, UCHICAGO MEDICINE.
PHOTO BY JIM VONDRUSKA

Understanding wellness

At the Duchossois Family Institute (DFI) at UChicago Medicine, researchers are studying wellness — not sickness. Since its founding in 2017, researchers at DFI have been studying and activating the body's inner workings to understand more about genetics, the microbiome and immunity, all geared toward helping patients better fight disease and maintain health.

Eugene Chang, MD, associate section chief for research in the Section of Gastroenterology, Hepatology and Nutrition at UChicago Medicine, describes the work as a mix of precision medicine — which is a customized treatment tailored to an individual — and preventive medicine.

"We need to understand ways that we can improve and maintain health. That's very important because we have to be able to identify risk factors that can be mitigated to prevent disease," Chang says.

Teams of physicians, researchers and data scientists at DFI are studying the microbiome, which consists of more than 100 trillion microbes that live inside the human body. These microbes can help us ward off or succumb to different diseases. Some of the questions the teams are asking include: Can ginseng be used to fight colorectal cancer? Can our own bodies hold the keys to preventing surgical infections? Are there particular microbes that can help prevent or even treat autoimmune diseases?

CHANG AND RESEARCHERS WORK IN THE DUCHOSSOIS FAMILY INSTITUTE LAB AT UCHICAGO MEDICINE. PHOTO BY JIM VONDRUSKA
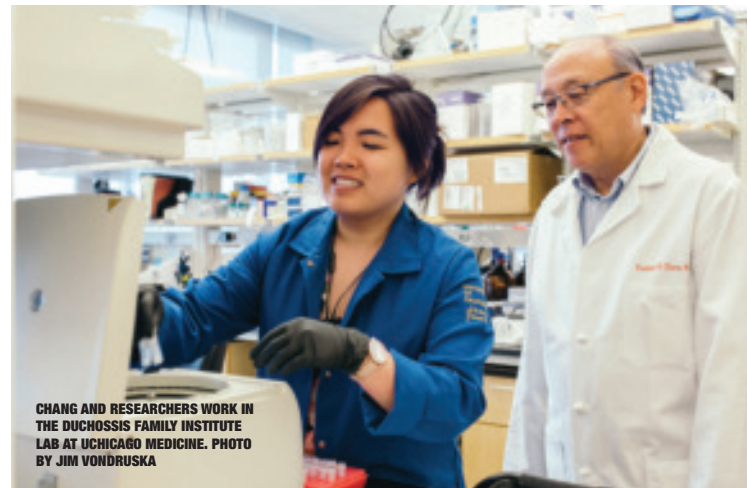
CHANG AND RESEARCHERS WORK IN THE DUCHOSSOIS FAMILY INSTITUTE LAB AT UCHICAGO MEDICINE. PHOTO BY JIM VONDRUSKA

Increasing connectivity

At MATTER, more than 200 companies, ranging from start-ups to businesses with more than 100 employees, are working toward a more effective and efficient future in healthcare. Some of the exciting developments revolve around connectivity.

"Our healthcare system is episodic," says MATTER CEO Steven Collens. "People engage with the healthcare system when they go to their doctor's office, when they show up at a hospital, when they walk into a pharmacy. But then they disengage from it for most of the time." In the future, he expects that will change.

Collens speaks excitedly about Chicago companies at MATTER helping to evolve communication for the sake of better health. One example is SonarMD, a care-coordination system created by a gastroenterologist that uses text messages to allow a doctor's office to easily follow up with patients.

Another company, physIQ, monitors a person's physiologic data using biosensors. Based on that data, the system can learn a person's usual patterns and decipher when something is irregular.

"There's a combination of technologies allowing us to move toward this anytime-anywhere healthcare scenario, which is ultimately going to be much more effective in keeping people healthy, in managing chronic disease and in really focusing on health rather than focusing on episodic and acute needs," Collens says. ✚

STEVEN COLLENS, MATTER.
PHOTO BY JIM VONDRUSKA

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