Telehealth
Innovative Programs Offer Convenience and Broaden Experts’ Reach

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Through the e-ICU Program, UW Health critical-care experts monitor intensive-care patients 24/7 from a central location in Madison.
When Alexander Graham Bell first called his assistant, Thomas Watson, he may have been doing more than proving that the human voice could transmit over a wire. At least one sociologist claims that Bell’s first telephone call was for medical assistance, contending that he had spilled battery acid on his shirt and wanted Watson’s help.

Whether or not this was the first example of “telehealth,” today’s universe of technology—which helps caregivers evaluate, diagnose and treat patients remotely—certainly got its start with the lowly analog phone. Fast forward 150 years to the digital world, and health-care professionals have at their fingertips a huge range of possibilities to improve patients’ access to care and allow them to take an active role in understanding and managing their health.

At the University of Wisconsin School of Medicine and Public Health (SMPH) and UW Health, faculty and staff are developing and using creative approaches to care for patients, conduct research, educate future caregivers and share their knowledge—whether their patients, collaborators or trainees are across the street or around the globe. This article provides a sampling of the numerous telehealth-related services available through this academic medical center.

**e-ICU Program**

In 2008, UW Health was among the first health-care systems in the United States to establish an e-ICU Program. Enrolled hospitals can take advantage of specialty expertise from UW Health’s critical-care physicians and nurses who monitor intensive-care patients 24/7 from a central location. Designed as an extra level of support for hospitals with limited access to critical-care expertise, the “virtual” intensive care unit uses a camera and microphone in the patient’s room to keep a close eye on vital signs and other factors. The e-ICU staff in Madison obtain clinical data about patients over private data lines and can help quickly flag emerging problems before they become life-threatening situations. In addition to this real-time monitoring of patients, the e-ICU Program gives participating hospitals trending data that will improve the care of future patients. Nationally, studies have shown that such virtual ICUs can reduce complications and improve patient outcomes.

**Primary-Care Video Visits**

In fall 2017, UW Health introduced Care Anywhere, a video-visit option for patients who have urgent but relatively minor health problems. By simply downloading the app or logging onto a web site, patients have round-the-clock access to video consultations with physicians or advanced practice providers. Patients can seek care for many conditions, from allergies to coughs to sprains.

The service has proven extremely popular with patients, who value the ease of getting care quickly without leaving home. In the most recent ranking, patients gave Care Anywhere a 4.7-star rating on a 5-star scale.

Another popular feature: The average Care Anywhere visit takes less than seven minutes. Further, out of 407 completed
video visits in December 2019, 178 patients said they would have gone to urgent care if they hadn’t used the remote option. Seven indicated they would have gone to the emergency department, and 37 would have traveled to their doctor’s office.

Vision-Preserving Care

As a board-certified ophthalmologist, Yao Liu, MD, MS ’18, observed the rising national rates of diabetes and knew it would result in more cases of blindness because diabetic retinopathy is the leading cause of blindness in working-age adults in the United States. Early detection and treatment can reduce the risk of blindness from this condition by more than 90 percent, but for a variety of reasons, fewer than 60 percent of diabetic patients get the recommended yearly eye exams.

In 2015, Liu, an assistant professor in the SMPH Department of Ophthalmology and Visual Sciences, received a New Investigator Grant from the Wisconsin Partnership Program to conduct research into why diabetic patients do or do not get screened. Then, working closely with health-care providers at Mile Bluff Medical Center in Mauston, Wisconsin, she and her team piloted a teleophthalmology program. Diabetic patients seen at Mile Bluff for primary care could have retinal images captured by camera there. The images were then sent to UW-Madison for analysis and grading. Patients who had signs of eye damage were referred for in-person evaluation by their local physicians.

In 2019, Liu evaluated data from the first three years of the program. The results far exceeded her expectations: Mile Bluff and its network of local clinics saw a 35 percent increase in the number of eye screenings among diabetic patients.

“Teleophthalmology has tremendous potential to prevent blindness, and it will be critical to meet the growing need for eye care among diabetic patients,” Liu says. “The technology continues to improve, and we have a better understanding of the workflow, training and communication issues that need to be addressed for this kind of approach to be successful.”

Realizing that approximately 1.5 million Wisconsinites live in rural areas, Liu is working to expand the reach of the program beyond the Mile Bluff network. Primary care patients at UW Health’s East Clinic and Yahara Clinic in Madison now have access, along with Fort Healthcare in Fort Atkinson, Wisconsin. Liu also is developing a toolkit for health-care organizations across the state to adopt teleophthalmology and—through a National Eye Institute grant—she and her team are working to further test and refine the program.

Telestroke Service

The U.S. Food and Drug Administration’s approval of tissue plasminogen activator—widely known as tPA, the medication that can break up clots in the brain—revolutionized stroke care in the late 1980s. Its introduction made it possible to intervene, ideally very early in the course of a stroke, to prevent catastrophic damage and disability among ischemic-stroke patients.

Soon afterward, health-care systems began to develop “telestroke” networks around the country. Using video cameras, microphones and computers, a telestroke network gives participating hospitals

Choosing the convenience of UW Health’s Care Anywhere Program, Katie Locke conducts a video visit for her daughter without needing to pack up her family and head to the clinic.
Telehealth and the Academic Mission

As telehealth programs expand nationally, several faculty members at the University of Wisconsin School of Medicine and Public Health (SMPH) are researching and using telehealth tools geared toward their specialties. Among them is Kara Hoppe, DO, MS ’19, assistant professor, Department of Obstetrics and Gynecology. Her team tested an innovative telehealth approach to managing severe hypertension in postpartum women after hospital discharge. About 10 percent of pregnant women (22 percent in Wisconsin) are affected by disorders related to high blood pressure. Even for women with normal pressures, it is common for blood pressure to drop after delivery but rise after going home from the hospital. Hypertensive disorders of pregnancy are the most common diagnoses associated with postpartum readmissions, and consequences of unrecognized or untreated hypertension can be serious.

Hoppe’s team conducted an original feasibility study based on more than 1,400 deliveries at UnityPoint Health-Meriter Hospital in Madison. Nineteen percent of the patients (263) had hypertension—specifically chronic, gestational, pre-eclampsia or eclampsia—during pregnancy. The 55 study participants received a tablet computer, blood-pressure cuff, weight scale and oxygen sensor. Researchers collected their data, and women without symptoms of severe hypertension were treated successfully at home.

Of participants, 16 percent developed severe hypertension after discharge, and 53 percent needed treatment, but none required re-admission to the hospital. In addition, 84 percent of participants said they preferred the telehealth approach rather than having to visit a clinic or hospital.

The team conducted a further non-randomized clinical trial of 428 women to investigate whether home telehealth with remote blood pressure monitoring versus standard postpartum outpatient care would reduce readmission rates in women with hypertension during pregnancy. Researchers note that the telehealth approach with linked interventions to manage postpartum hypertension was associated with reduced hospital readmissions compared to standard care.

UnityPoint Health-Meriter found the results so persuasive that its Obstetrics and Gynecology Service instituted a blood-pressure telemonitoring service for postpartum women. In 2019, the program served 887 patients.

Hoppe says early research findings extend those of previous studies, but more research is needed to assess the value of the approach in various populations.

As another example of telehealth in academic medicine, Jonathan Kohler, MD, assistant professor, Department of Surgery, heads a range of collaborative learning projects using video. These include Project ECHO (Extension Community Healthcare Outcomes), which is part of an international program to share medical expertise with other practitioners. The SMPH is one of 120 “hubs” in the nationwide program, and the only one delivering content for pediatric emergency care, as well as primary-care management of surgical diseases. Kohler also created a statewide opioid-education initiative, Safer Prescribing of Opioids after Trauma and Surgery, and an interactive seminar on the management of pediatric umbilical hernias through the Surgical Collaborative of Wisconsin.

Kohler and his colleagues offer a teleconference that supports community providers across the health care spectrum as they treat complicated pediatric cases. Sessions include discussions about cases and situations submitted by participants.

Department of Family Medicine and Community Health (DFMCH) faculty and staff also participate in Project ECHO. In conjunction with the Wisconsin Department of Health Services, the DFMCH offers telementoring for addiction treatment and videoconferences about substance abuse.

Additionally, Alexander Lepak, MD ’05 (PG ’08, ’10), assistant professor, Department of Medicine, developed a tool within the medical-records system to alert physicians when a patient has a positive blood culture for *S. aureus*. Infectious-disease consultation for these patients is associated with a 50 percent decrease in patient morbidity and mortality. Lepak is among three SMPH faculty members who are leading the multidisciplinary UW Health Antimicrobial Stewardship Initiative to improve accessibility to infectious-disease expertise via telehealth to optimize the use of antimicrobials and improve patient outcomes.
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immediate access to stroke specialists. These experts can communicate with patients, family members and caregivers to assess patient status, and determine and carry out treatment plans. Imaging scans and relevant medical data can be shared within the narrow time window for effective stroke treatment, ideally before permanent damage occurs.

In summer 2009, UW Health established Wisconsin’s first telerestroke network. Watertown Regional Medical Center was the first to sign on to the UW Health offering, and many others have joined since then.

Patients who present with stroke symptoms to a network hospital can be quickly assessed via videoconferencing by UW Health stroke neurologists, who work with the on-site treatment team. In addition to expanding access to highly specialized stroke care, the network offers the prospect of prompt assessment and treatment for patients with this condition, when time is of the essence. Patients who can be effectively treated at their local hospital save the time and expense of traveling to Madison via ambulance or helicopter. When patients need to be transferred to Madison, the UW Health stroke team is already aware of their medical situation, another time-saving benefit.

The telerestroke network conducts about 10 consults per week from its member hospitals, and more than 1,000 patients have been treated since its inception. Medical director Natalie Wheeler, MD, JD, notes that the value extends to the educational setting, as well.

“Telerestroke experience is part of the training we provide to stroke fellows. We also work with emergency medicine residents when they rotate in hospitals that are part of the network. We are working on ways to incorporate even more telerestroke exposure into our residency training,” says Wheeler, an assistant professor in the SMPH Department of Neurology.

Today and Tomorrow

Tom Brazelton, MD, MPH, a professor in the SMPH Department of Pediatrics and medical director of the UW Health Telehealth Program, explains, “We provide video consults in several subspecialty fields to our patients at UW Health at The American Center and the UW Health Rehabilitation Hospital on Madison’s east side. This allows access to our subspecialty physicians in infectious disease, endocrinology, diabetes, wound care, psychiatry and other specialties that cannot be in-house at those locations.”

In addition to these examples, UW Health offers telehealth services in several other fields, including pathology, cardiology, radiology and critical-care transport with support from SMPH faculty and staff.

Brazelton says the touchstones require transparency and connectedness to assure quality care coordination and communication among providers and with patients and their families.

“Some parents practically run mini-ICUs at home for their kids following surgery, and digital technology gives us a huge opportunity to improve care coordination. We can use an app to do daily assessments of these kids, with the goal of reducing complications and reducing the number of times their parents have to bring them to the clinic,” he says. “Similarly, our pediatric pulmonologists are interested in using digital technology to monitor their complex care patients at home.”

Brazelton asserts, “However, at no time should the standard of care be compromised. That said, we are looking closely at all of the health-care system’s activities that could, and perhaps should, be done in the digital space because it is the most patient-centric thing we can do as providers—to meet patients on their terms, at times and places convenient for them.”

Thus, nearly 150 years after the human voice first traveled over a wire, telehealth’s possibilities seem almost endless. Bell’s first call to Watson has led to a creative burst of options that continues to generate new ways of thinking, caring for patients, training caregivers and expanding research.