You never meet your doctor.

virtually there

When Andreas Sappok developed flulike symptoms last winter, he had no idea he'd become a test case for a futuristic approach to medicine.

MOUSE ICON ILLUSTRATION BY PHILGOODWIN.CS-TEAM@UNPROJECT.COM

There's been a massive change in how doctors diagnose and treat. Welcome to the promise, power, and problems of remote medicine.

BY BARRY YEOMAN
PHOTOGRAPHS BY CEDRIC ANGELES AND DREW KELLY

Andreas Sappok was at his office last February when he was walloped by an unexpected fever. An athletic 48-year-old, Sappok ran regularly and had just returned from kayaking in Florida. He was not accustomed to sudden fatigue and unexplained sweats. But it had been a wet, cold winter in New York, and he figured maybe it was his turn to get the flu. He had no idea that he was at the edge of a catastrophic health crisis.

Over the next 2 days, as his fever soared to 104.5°F, Sappok went first to a local physician and then to the emergency department at Holy Name Medical Center, near his home in New Jersey. Both times he tested negative for the flu and was prescribed an antibiotic. Finally, with his health worsening and a snowstorm approaching, Sappok and his wife, Gabriele Sappok-Klink, decided to play it safe and drive back to the ER. By then he was having trouble keeping food down and had developed searing pain in his abdomen. The hospital admitted him for what everyone assumed would be a short and routine stay. It was anything but.

The scramble to save his life would involve physicians on two coasts, one of whom would never lay eyes on Sappok. Long-distance medicine, in which the doctor and patient never meet and often don't even interact in real time, is a relatively new field. While MDs and pundits nationwide dispute how the practice fits into the future of our medical system, those who attended to Sappok debate its role in the effort to keep him alive.

Shortly after Sappok arrived in the ER, doctors at Holy Name noticed that his left kidney was enlarged. They suspected a blocked urinary tract and scheduled surgery to put in a stent. Afterward, a doctor pulled Sappok's wife aside. "He said it went really well," Sappok-Klink recalls, "but that there had been no significant obstruction."

Sappok only got sicker from there. His legs and feet swelled. "His testicles were swollen like balloons, and his neck area was huge," Sappok-Klink remembers. His eyes and skin turned yellow. The abdominal pain became so intense that Sappok, usually not one to complain, was moaning in agony.

Four days in, a doctor came by to deliver more bad news. Sappok's bilirubin, a pigment found in bile and broken down by the liver, had spiked, suggesting that his liver was joining a growing list of dysfunctioning organs. The roster of problems was getting overwhelming. Sappok-Klink, a take-charge woman who had vowed to keep her composure in front of her sick husband, had a meltdown in the hall outside his hospital room. "I just don't know what to do," she said to a passing nurse, fighting back tears. "Can you help me?"

The person to whom she would eventually turn for help wasn't at Holy Name. He wasn't in New Jersey at all, in fact. Sumit Shah was an internist at the University of California, San Francisco. He was also part of an elite network of physicians called Grand Rounds. The company has a roster of experts who deliver second opinions on treatment plans and diagnoses for patients who have coverage through their employers—and for nonsubscribers who can afford the $7,500 fee. When Sappok-Klink called her husband's brother to tell

STETHOSCOPE ICON ILLUSTRATION BY MICHAEL-ANDRE JODA OF THENOUNPROJECT.COM

him the bad news, he mentioned Shah, a high school classmate of his. Maybe, Sappok-Klink thought, this doctor can save my husband's life.

Shah had been interested in telemedicine since he was a grad student in public health at Harvard, working in Tanzania and India on technology that used cell phones to help people manage diabetes and hypertension. He knew that rural patients in those developing countries weren't the only ones who had trouble getting seen by doctors. "Health care disparity here in the US is stark—access is largely dependent on socioeconomic status and geography," Shah says. "Virtual medicine can play a strong role in leveling the playing field."

A med school classmate introduced Shah to Grand Rounds' founders, Lawrence "Rusty" Hofmann and Owen Tripp. Hofmann, a deep vein thrombosis expert and professor of radiology at Stanford University, had felt frustrated by how geographic and technological barriers separated physicians like him from the patients who needed them most. Wanting to make advanced medicine more accessible—no matter where the patient lived—Hofmann teamed up with Tripp, a technology entrepreneur who cofounded the online reputation-management company Reputation.com. Tripp shared Hofmann's conviction that the 21st-century tech wave had bypassed the sick. "The Internet has done many things for all of us, but it has done jack squat for the medical field, as far as I'm concerned," Tripp says.

The two envisioned a company at which expertise would trump physical proximity for patients like Sappok. "What really improves a patient's outcome," Tripp says, "is having access to the best physicians in the field." After meeting the founders, Shah felt convinced that Grand Rounds could help provide that access. He also relished the intellectual challenge of cracking complex cases like Sappok's.

Sappok the morning he went kayaking in Florida, 2 weeks before he got sick

COURTESY OF ANDREAS SAPPOK

By the time Shah got the call, he says, Sappok was in multisystem organ failure, with a prognosis that looked grim. Shah had just come off an overnight shift at the San Francisco VA Medical Center. Instead of going home to sleep, he drove to Grand Rounds' downtown San Francisco office, pulled out a memo pad, and called Sappok-Klink to hear the details of her husband's condition. He waived the couple's $7,500 fee because of his relationship with Sappok's brother.

Back in New Jersey, Sappok's body was continuing to swell, and a rash had spread across his legs, belly, and chest. An infectious-disease specialist at Holy Name, Benjamin De La Rosa, noted that Sappok had sepsis syndrome, an often-fatal, whole-body immune response to infection.

> "What really improves a person's chance at survival is having access to the best physicians in the field."

The doctors at Holy Name had considered culprits ranging from lymphoma to infection and autoimmune disease; they were still at a loss for a definitive diagnosis. But two details popped out at Shah. First, Sappok's eyes, already yellow from jaundice, had also reddened. Shah identified this as conjunctival suffusion, which is associated with leptospirosis, a bacterial disease transmitted by water contaminated with animal urine. Leptospirosis is rare in the United States: Only five cases were reported to the CDC during the first half of 2014. But Shah had heard about it during case discussions in his training, and he recognized the symptoms.

Second, while interviewing Sappok-Klink, Shah learned about the Florida kayaking trip 2 weeks earlier. In developed countries, leptospirosis is often traced to freshwater recreation. Shah e-mailed Sappok's wife and brother a list of 10 possible diagnoses, including leptospirosis, with instructions to make sure Holy Name's physicians had entertained them all. Shah says he also shared his suspicion about leptospirosis in a call with Sappok's treating physician, who agreed that the diagnosis was worth considering. Sappok-Klink says that, in retrospect, she feels that Shah's involvement injected an added measure of energy to the pursuit of what was killing her husband.

The following day, Holy Name doctors ordered the first of two leptospirosis tests, though De La Rosa says they weren't necessarily acting on Shah's recommendation. The same day that Shah made his suspicion known, doctors had already started Sappok on doxycycline, an antibiotic recommended for a wide range of infections, including lepto. Sappok-Klink had something new to pin her hopes on: Maybe the meds would work and her husband wouldn't die.

Grand Rounds makes up but a sliver of the small but growing field of virtual medicine. As of this writing, you can get

Sumit Shah, the San Francisco doctor who connected to the Sappok case via Grand Rounds

DREW KELLY

long-distance treatment or an evaluation for everything from a mole or a chronic health problem to a wound or a fever. Studies have shown high patient satisfaction and results that are comparable to those of in-person appointments. And in a country where the average wait time to see a family physician is nearly 3 weeks, some consider telemedicine a necessity. "It's cute and nostalgic to think the in-person doctor visit is important," says pediatrician Jay Parkinson, cofounder of Sherpaa, a company that connects patients and doctors via a smartphone app. "In actuality, doctors have made themselves so inaccessible that the old-fashioned primary-care doctor relationship simply doesn't exist anymore." Several academic and government programs are under way to try virtual medicine as a tool to bridge the growing gap between patient demand and physician availability, and now private companies like Sherpaa and Grand Rounds are getting into the act. Grand Rounds says it covers one million lives through its 35 employer clients.

But it's still a contentious concept. "Health care is complicated," says Robert Wah, president of the American Medical Association. "When somebody has a symptom, we have to evaluate that symptom in the context of all the other things that are going on with the patient." That's why the AMA endorses telemedicine only when a previous relationship between the doctor and patient exists.

Others worry that rather than leveling the playing field, virtual medicine will be relied upon as an insufficient fix for the US medical system's biggest issues. "The more time, money, and effort we pour into technology, the easier it is for us to ignore real solutions," says Jerome Hoffman, professor emeritus of medicine at UCLA. "Instead of having to deal with a whole rural population that has no primary care physicians, we take comfort in saying, 'Well, we have this telemedicine program.' Sure, that's better than nothing…but how about solving the real problem?"

The day after Sappok got his first dose of doxycycline did not go as his wife had hoped. Subtly at first, and then with increasing urgency, Sappok's breathing became labored. Diagnosed with worsening respiratory failure, he was transferred to the intensive care unit. He became agitated, yanking at the IVs in his arms and the monitoring cables attached to his chest. His vital-signs monitor went crazy; his heartbeat was concerningly irregular. Sappok-Klink kept vigil through that night, pondering the chilling prospect of being widowed in her 40s.

And then, slowly, Sappok started to get a little better. He sat up in an armchair. He ate a bit of sausage. He fell into the first sound sleep of his hospital stay. His family members, watching him breathe, felt awash with tentative but powerful relief. Over the next several days, Sappok's bilirubin levels started normalizing. The swelling subsided. His feverishness receded. Doctors moved the patient from the ICU back to a regular bed and then, 2 weeks after his arrival, discharged him.

Sappok never received a positive lab result for that rare infection, leptospirosis, but both Shah and De La Rosa still believe that's what he had. After the disease ran its course, Sappok was unable to walk for 3 weeks. Now, after 10 months of recovery, he says he's 90% better. He has started running again, albeit shorter distances. And he has stopped working 12-hour days, thanks to a new perspective born of his brush with death. "There was a time in my life when all that mattered to me was my job," he says. "At this point, nothing matters except my health and my family."

Grand Rounds calls Sappok's story unusual; most of its cases are less dramatic. But the company views the story as an example of how long-distance medicine can significantly change outcomes.

Did it?

The written record suggests that Shah was the first to note the kayaking connection and the first to document a suspicion of leptospirosis. "The chart speaks for itself," he says.

But the chart also says that, 13 hours

before Shah wrote anything down, De La Rosa was already planning to start his patient on doxycycline. "I was not thinking about leptospirosis," De La Rosa says. "I was thinking of a group of infections called rickettsia." In the chart, he wrote that a rickettsial infection was "unlikely" but added, "Do not see that current antibiotics are providing any benefits."

De La Rosa says he reached his decision independently; Shah says that he had already communicated his diagnosis with another doctor, the treating physician.

Medical stories are convoluted. Between unrecorded phone calls and unshared thoughts, it can be impossible to construct a clean narrative. Sappok's case was further complicated by the negative test results for lepto. "The patient got better—maybe despite us, maybe despite everything we did," De La Rosa says. "Sometimes that happens in medicine. Despite all the testing and all the treatments you do, people get better, and we never find out why."

In the end, Sappok-Klink believes, it doesn't matter who thought of doxycycline first. "The joint effort made it possible," she says.

Virtual medicine gives us, the patients, new options in a medical bind: access to doctors with excellent track records and deep experience—or access to any doctor at all, in some cases. When it comes to second opinions in particular, the virtual approach also risks creating tensions between local physicians and the long-distance counterparts they don't know. It certainly did in Sappok's case. Perhaps the strong qualifications of a remote independent expert are worth the cost and the added friction. But this is all still an experiment, and it will be many more years until we know for sure.

Doctor, connect thyself

Six ways healing has gone wired—and seems to work

1. Primary Care

Late-night stomach pains? Burn yourself while cooking? A New York company called Sherpaa offers 24-7 access to physicians via a smartphone app and, if needed, a telephone. (Sherpaa contracts with companies, which provide the service as an employee benefit.) Cofounder Jay Parkinson, a pediatrician, says the virtual interaction resolves patients' issues 70% of the time, saving the cost of emergency-room visits. Even if you need surgery or other hands-on care, he says, Sherpaa can often schedule same-day treatment so you can bypass the ER.

2. Emergencies

In Mississippi, many rural hospitals lack the personnel to run fully staffed emergency departments. So they rely on the University of Mississippi Medical Center's TelEmergency program, which provides remote video consults. Nurse-practitioners at the rural facilities dial in to a central control room in Jackson staffed by emergency-medicine docs, who can zoom in on the patient and read reports. A recent study that compared cardiac-arrest cases found that survivability was the same with TelEmergency as it was at the main medical center.

3. Birth Control

"Access to birth control in this country is so difficult that a shocking number of pregnancies are still unintended," says Jason Hwang, an internal-medicine physician in California. Hwang is launching PolkaDoc, a mobile app that will allow women to request $10 birth-control prescriptions. Patients will fill out short questionnaires about allergies and contraindications. The computer system will flag women who require follow-up calls, but Hwang expects 95% of the requests to be approved immediately by his clinicians.

4. Mental Health

Experts have been studying how to use technology to reach more people with depression. One option is computer-assisted cognitive behavioral therapy, which helps patients break out of negative thinking and solve problems more effectively. Good Days Ahead, a program developed at the University of Louisville, consists of nine lessons with quizzes, exercises, and videos. Elsewhere, innovations include e-mail and video counseling, apps that monitor depression and anxiety, and virtual-reality programs for PTSD sufferers.

5. Dermatology and Wound Treatment

Mobile phone cameras enable dermatologists to manage psoriasis, acne, and even skin cancer without seeing patients in the office, and now physicians can evaluate skin lacerations this way, too. At George Washington University, researchers asked 94 emergency room patients to take pictures of their wounds; doctors then reviewed the photos. After determining the need for professional care, the doctors met with the same patients in person. In 95% of cases, the virtual doc had made a safe decision.

6. Chronic-Disease Care

For conditions like diabetes and hypertension, long-distance medicine can be a good substitute for office visits, says Ronald Dixon, director of the Virtual Practice Project at Massachusetts General Hospital. Dixon has done studies in which doctors and patients either videoconference or exchange written messages. In both cases, patients were quite satisfied. Likewise, Hospital Clínic of Barcelona is developing a program to monitor HIV patients through video consultations, chat sessions, and online message exchanges.