

monary stenosis and other obstructive defects, abnormal blood vessels, and valve problems such as Ebstein's anomaly and pulmonary atresia. Tetralogy of Fallot, also common, is a constellation of problems that includes a hole between the ventricles, alignment problems of the great vessels, and, often, problems with the pulmonary artery. A fair-sized population of children have only one functioning ventricle, a problem solved by a series of two or three operations that ends with a procedure called a Fontan.

Since coming to Weill Cornell last March, Chen has done approximately one hundred surgeries, about sixty of which were full open-heart procedures. He has a joint appointment at NewYork-Presbyterian Hospital/Columbia University Medical Center, where he completed medical school and residency, training under the renowned pediatric surgeon Dr. Jan Quaegebeur. There he performed such operations as the arterial switch (for transposition of the great arteries), repair of total anomalous pulmonary venous return (TAPVR) or hypoplastic left heart syndrome, and transplantations. In 2004 the congenital heart surgeons at NewYork-Presbyterian/Columbia performed more pediatric heart transplants than any program in the U.S.; Chen was responsible for 85 percent of these.

"Every week there's a child born with some constellation of anomalies that you cannot imagine," says Chen, noting that surgeons who've been around for decades frequently see something that they have never encountered before. "You get one chance at repairing a lot of these kids, one chance for all the things to be right. And if they're not right, then that's it; you've blown it. But you do a perfect arterial switch in a neonate, and they're fixed for life. No more operations." A successful surgery on a child, he says, is one with "eighty years of life, value-added."

The patient population represents its own challenges. Many diagnostic procedures performed on adults, such as exercise

tests, obviously can't be done on infants and small children. And since surgeons can't elicit sophisticated verbal responses from young patients, they must rely on intuition. But hardest of all, Chen says, is relating to the parents as well as the child. "It's a field full of miracle and tragedy," he says, "so the most challenging part always is emotionally interacting with parents of sick children."

Though nearly 90 percent of heart surgeries today are done on adults, Chen's field traces its roots to the advent of modern cardiac techniques: the famous Blalock-Taussig shunt to treat so-called blue-baby syndrome was first done in 1944. But pediatric cardiac surgery—particularly for neonates—didn't really take off until the 1980s, when technology provided a smaller heart-lung bypass machine.

Now, congenital heart surgeons are starting to operate on many adults who had life-saving childhood operations in the 1970s and '80s. Those procedures weren't what surgeons would do today, but they kept patients' hearts functioning for

decades. Now adults, these patients are coming back to correct problems in how blood was re-routed, or because the repairs are beginning to break down. Adult congenital work is a bit of a no-man's land, says Chen. The patients have pediatric problems, which means they fall outside the purview of adult cardiologists, but they have adult-related issues—gynecological health, for example—that pediatric cardiologists don't typically consider.

The patients also offer a window into earlier stages of cardiothoracic treatment. "They're a little bit of history," says Chen, with obvious admiration for the surgeons who went before him. "Many of them were operated on by the giants of cardiac surgery, and they're like living legends because they made it through all these crazy operations. It's like asking a ninety-year-old what it was like to live through World War II."

— Andrea Crawford

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Information Please

EPOCRATES PUTS A WORLD OF KNOWLEDGE IN YOUR POCKET

aS A MEDICAL STUDENT SOME FIFTEEN YEARS ago, Richard Fiedotin, MD '92, was often struck by how much time he spent simply trying to access information. "You were always looking up a disease or a drug," he recalls, "but you could only carry around so many manuals or retain so much in your head." As a resident, the X-rays he required for a consultation might mean visits to three places: the emergency room, and the day and evening X-ray departments. If he wanted to know what drugs a patient was on, he'd have to go looking for the cardex (medication card). Even an electronic look-up meant logging in and out of different, incompatible systems.

"Everything was done manually and with a lot of effort," Fiedotin recalls. "It seemed to me that computer systems could make the work a lot more efficient." This faith in the power of technology and information management to improve health care eventually prompted Fiedotin to found Epocrates, the San Mateo, California-based software maker whose name has become virtually synonymous with its drug reference software for handheld computing devices.

But before Fiedotin would have such an impact on the daily lives of his fellow physicians, he would stop practicing himself. He dropped out of his residency in general surgery after completing

the first year, landing a job as a clinical systems consultant for electronic medical records developer HBO & Company (now McKesson HBOC). At the same time, he developed a series of four-by-six-inch cards on which students and residents could track lab results and vital signs; he licensed them to several pharmaceutical companies, including Pfizer, Warner-Lambert, and Merck. By 1997, the budding entrepreneur returned to school, this time to get an MBA at Stanford.

One summer day in 1998, Fiedotin stumbled across a newspaper story about residents at Massachusetts General Hospital using Palm Pilots. He realized that physicians could use such personal digital assistants (PDAs) to access the information that he'd had trouble keeping track of in school. Back at Stanford that fall, Fiedotin and a friend drew up a business plan and set about developing prototype software for Epocrates. A year later, armed with their MBAs and flush with money from leading venture capitalists such as Draper Fisher Jurvetson, the pair launched the company's first software program, the qRx clinical drug reference (now called Epocrates Rx).

Developed by a team of some three dozen specialists, the original qRx included information on more than 1,600 brand-name and generic medications (it now tops 3,000). A few quick taps on a PDA screen and users could call up drug names, interactions, even pricing. With their PDAs and an Internet connection, they could download or "hotsync" medication updates. (Traditional—and costly—reference materials, by contrast, are revised every one to three years.) Best of all: qRx was free, thanks to the venture capital and revenue from advertising banners.

Within its first six months, Epocrates boasted more than 60,000 active users.

Two years later, the number had mushroomed to 350,000. Today, nearly two-thirds of younger doctors and virtually all medical students and residents use some kind of handheld device, and 170,000 physicians (more than one-fourth of all U.S. MDs) are running some version of the company's software. "Epocrates was way out in front of the competition—they

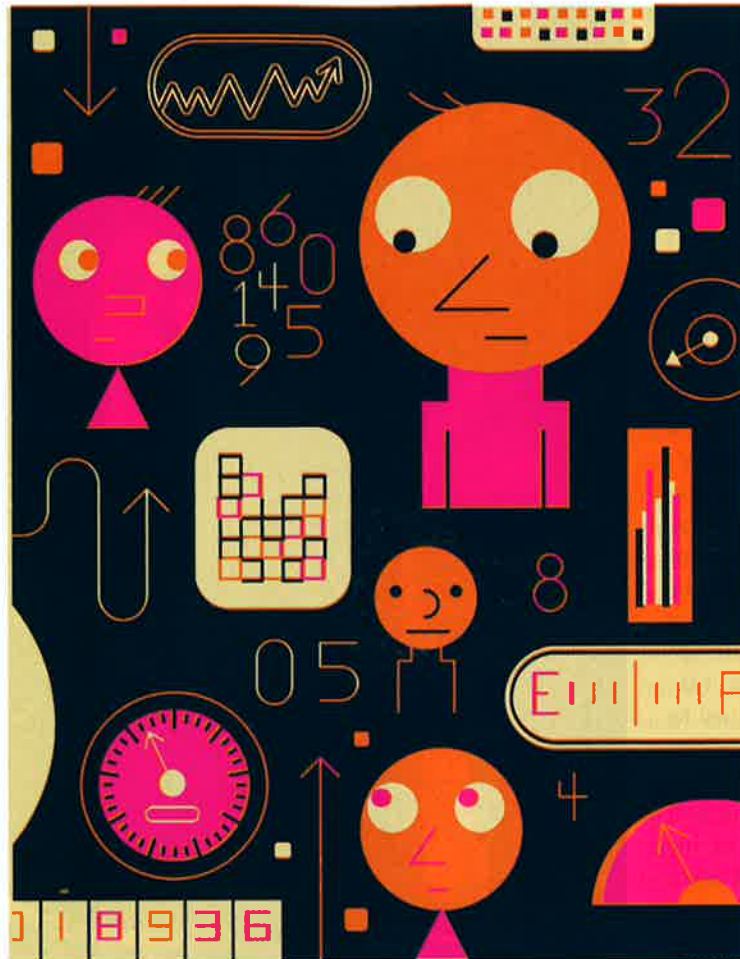
pany—over a three-year period, he served as vice president of marketing, business development, and clinical products—but he also kept Epocrates focused on the software's core functions, such as checking dosage and drug interactions.

If start-up companies could once coax millions from investors impressed by the promise of a big market share and advertising revenue, today they must also prove they can turn a profit. Epocrates adapted to these changes by releasing an enhanced version of its free software in October 2001, offering paid subscribers such added features as an infectious-disease treatment guide and a wide range of quick-reference tables. And last summer the company released a premium package it calls Epocrates Essentials, which also includes quick references for more than a thousand diseases and hundreds of diagnostic tests, for a \$140 annual fee. To date, the company claims that more than 40,000 physicians are paying customers, though it says it will continue to offer its Epocrates Rx software for free.

Epocrates continues to add about 600 new users each day to its current base of more than 420,000. The company has also expand-

ed the number of platforms that can run its software (which is currently available on Palm and Pocket PC platforms). And it has partnered with mobile-computing application companies to support practice management applications. Fiedotin—who is returning to work at Epocrates after more than a year spent consulting on electronic medical records for other organizations—is pleased to see this progress. "Physicians constantly need information, and there's no way to remember everything about a drug," he says. "Condensing that into something they can use at the point of care is what this company has learned to do best."

—Paul Zakrzewski



GREG MABLY

had a very large base of users," says Eric Brown, a health-care analyst with Forrester Research. Brown says the company grew so successful that its signature qRx software defined the image of the PDA-toting physician. Like many new technology companies of that era, Epocrates was under pressure from its backers to expand its software's scope, says co-founder Jeffrey Tangney. "They wanted us to be able to pull up everything on each patient and tell you everything that was wrong with them," he says. "They wanted software that would be all singing and all dancing." For his part, Fiedotin helped to keep the company on track. He wore many hats within the com-

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Dr. Jean Pape and
the GHESKIO clinic

Hope
is alive
in Haiti