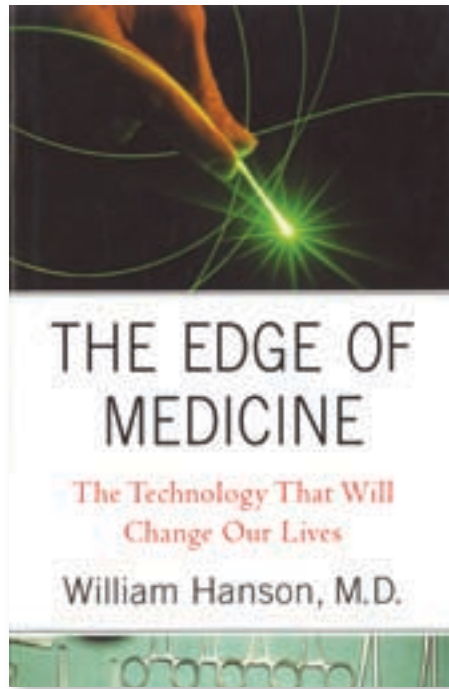


Peering Over the Edge of

In a recent book, William Hanson takes a look at where

William Hanson, M.D. '83, professor of anesthesiology and critical care at the School of Medicine and director of surgical intensive care at the Hospital of the University of Pennsylvania, seems well suited to comment on where medicine is heading. As he writes in his recently published book, *The Edge of Medicine: The Technology That Will Change Our Lives* (Palgrave Macmillan, 2008), he was an early convert to the usefulness of computers in the health-care setting. On the other hand, the computers in use before Hanson entered medical school were much different from the sleek and speedy computers that are powering today's technology. "In the late 1970s and early 1980s, I worked at the same medical center that I do now, in an office that was then called Data Processing – the hospital division that managed patients' bills and accounts payable. There was exactly one computer in the entire hospital – in the basement – and it dined exclusively on IBM punchcards. . . . I was the hospital's only data analyst. . . ."

Hanson's interest in this new technology continued unabated through his medical education and training and beyond. In fact, he taught a class on computers in medicine at Princeton University for several years and is an associate faculty member in Princeton's Department of Computer Science. Back in 1997, Hanson published the first results of a study of an electronic "nose" in *Anesthesiology* and soon after presented his findings on its effectiveness at the annual meeting of the American Society of Anesthesiologists. Produced by a British company called AromaScan, the computerized nose analyzed aromas through its 32 semiconducting polymer sensors. Hanson and a colleague, Heather Steinberger, R.N., used



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the device to diagnose lung infections more quickly, non-invasively, and at a much lower cost than with the diagnostic techniques available at the time.

Still, part of the reason Hanson is well suited to write a generalist's book about the future of medicine is that he is also interested in medicine's past and aware of its merits. That past includes his father's career, from the early 1950s to the early 1990s. The senior Hanson – who also

taught and practiced at Penn, with Sylvan Eisman, M.D., as partner – makes appearances in *The Edge of Medicine* near its beginning and near the end. He serves as a kind of bookmark, representing some of the best care of an earlier time. Hanson the author writes about what he calls "the most sophisticated medical tool available at the time" for his father, back in the old days:

"My father's hands were large, warm, blunt-tipped, and always well manicured. He was an internist and used his hands as diagnostic tools. His fingers probed his patient's neck, abdomen, armpits, and groin – the soft underbelly, as it were – searching for enlarged nodes or organs. . . . When percussing, he used the middle finger of his dominant left hand to strike the last knuckle of the middle finger of his right over the patient's chest and stomach, acquiring information from the resulting sounds."

As Hanson writes later in that chapter, "My father never owned a cell phone, never had a computer in his home, wrote his patient notes in an almost-illegible hand in patient charts he kept in file cabinets in his office, and he made house calls." That's an effective summary of the way things were.

And the way things will never be again in medicine. We are left to wonder, for example, what the senior Dr. Hanson would have made of Tug, who makes a brief appearance in the chapter on robotics. Hanson describes Tug as "a cute little R2-D2 knock-off" now doing the job that would have been performed by a HUP pharmacy technician, who can be used instead for other, more demanding tasks. "Tug travels tirelessly from the basement pharmacy supply area to deliver drugs to patient floors all over the hospital."

medicine is likely to go – and finds plenty to cheer about.

The use of more sophisticated robots to perform surgery is another of the remarkable advances that Hanson discusses. Hanson manages to paint the vivid differences between the older and newer forms of surgery while also evoking some names from Penn's past (Jonathan Rhoads, M.D., the legendary former chair of the Department of Surgery) and present (Gregory Weinstein, M.D., professor and vice chair of Otorhinolaryngology – Head and Neck Surgery). Watching an operation, Hanson describes himself as mesmerized as automaton hands worked busily with instruments and several flat-screen televisions around the room displayed what was happening in the back of the patient's throat. It was, we learn, a partial laryngectomy, in which the surgeon removes cancerous portions of the vocal cords.

"Looking around, I found the man behind the machine, the surgical Wizard of Oz, Dr. Gregory Weinstein, sitting in the corner of the operating room at a large, humped grey console, where he peered through a pair of goggles and rapidly manipulated both hands and feet, like a church organist playing a complicated fugue." Hanson points out that the robot-assisted procedure does much less damage to the patient. "The nonrobotic surgery requires an incision that essentially cuts the face in half to get at the cancer. The robotic operation is done through the mouth. All else being equal, which would you choose?"

In an earlier chapter, Hanson refers to an operation performed in 2001, in which a surgeon operating in New York successfully removed the gall bladder of a woman in France, using a remote-controlled laparoscopic device. Once again, reality has caught up with fiction: in *Remote Intrusion* (1996), Howard A.

Olgin, M.D. '65, a surgeon and novelist, wrote about a surgeon in Los Angeles who operates from afar on a V.I.P. patient in Japan (*Penn Medicine*, Fall 1998).

Part of Hanson's first chapter looks at one of the new technologies that has stirred excitement on the Penn Medicine campus – proton therapy. Again an interested onlooker, Hanson describes the materials that must come together for the

AS AN INTENSIVIST IS MAKING ROUNDS, WRITES WILLIAM HANSON, "SMART SOFTWARE IS WORKING AWAY IN THE BACKGROUND, CULLING THROUGH THE DATA STREAMS LOOKING FOR ANOMALIES OR WORRISOME TRENDS."

Roberts Proton Therapy Center, now under construction within a stone's throw of HUP's Ravdin Pavilion. (The center is scheduled to open in Summer 2010). As centerpiece, there is the cyclotron, weighing 220 tons, which will generate the proton beams. There are also the metal cages known as gantries, 35 feet tall and weighing 90 tons, as well as the 20,000-pound magnet that will guide the beams. The walls of the treatment rooms will be 18 feet thick, enough to contain "stray neutron radiation."

As Hanson told Terry Gross last fall on her *Fresh Air* show on National Public Radio, radiation treatments of the past were much less controlled: "There is damage to all the tissue surrounding the tumor." With the new technology,

"The proton beam approach is so precise that we can train a beam of protons on a tumor millimeters in size or even a millimeter in size that may be located in somebody's eyeball, kill that tumor, and leave sight intact."

At Penn, Hanson has championed a form of telemedicine known as Penn E-lert eICU. Launched at HUP in November 2005, it features real-time data, audio, and video monitoring of ICU patients from a central command center located at least four blocks away from the patient beds it monitors. As Hanson, the medical director, put it then, "One intensivist and two critical-care nurses will cover between 50 and 75 beds remotely." He expounds on the virtues of such a system in "Eye in the Sky," the second chapter of *The Edge of Medicine*, where he also ups the number of beds that can be covered effectively by the team to more than 100. The doctor at the monitor "is often the first to know about evolving patient problems because she's effectively in the crow's nest with a higher dimensional view of the landscape," which includes access to test results, vital signs, and so forth.

Abigail Zuger, reviewing *The Edge of Medicine* in *The New York Times*, called it "an enthusiastic travelogue, a guide to the universe of marvels coming soon to a hospital near you." She singled out the sections in which Hanson brings the "marvels" to life by describing patient cases. For his part, Hanson concedes that the book presents "an optimist's view" – in particular that medicine in the future "will be preventative rather than the rear-guard action it too often seems to be today." In the end, he hopes that health-care professionals will be able to "do a lot more, for a lot more of us, for a lot less." ♥

– John Shea