

HOW HOSPITALS ARE REINVENTING THEMSELVES FOR 21ST-CENTURY CARE

By Beth Howard

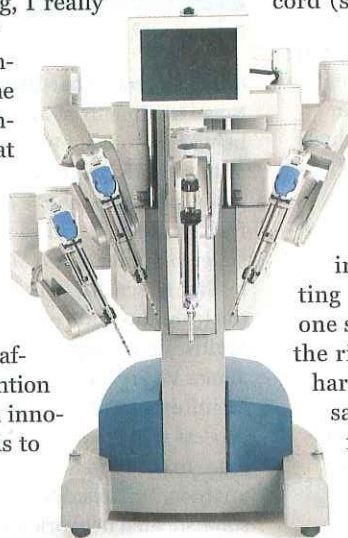
Maija Eerkes was expecting her chemotherapy to take place in a drab, depressing infusion center like the ones she had seen at other cancer treatment facilities, reclining chairs lined up and separated only by curtains. So when the retired 59-year-old bank executive from Seattle sought treatment for pancreatic cancer at Virginia Mason Medical Center a few years ago, she was surprised

and relieved to find herself in a peaceful and private infusion room with a pleasing view of the city. "I often had friends come visit during the infusions, and there was plenty of space for them," she says. "It was such a comforting setting, I really didn't mind being there."

Improving patients' comfort and surroundings is one of the more obvious, consumer-friendly ways that Virginia Mason and a growing group of hospitals are retooling for the 21st century. Presented with data from countless studies showing that the physical environment affects outcomes, not to mention an explosion of high-tech innovations from "smart" beds to

wearable devices that measure vital signs, these medical centers are aiming to deliver care that is safer, more effective, potentially less costly and a better customer experience.

Fixing medicine's worrying safety record (some 180,000 deaths each year are caused by medical errors, injuries or avoidable complications) requires more than changing procedures, experts have realized. The hospital itself has to change. Hundreds of decisions go into designing and outfitting these facilities, and "each one should make it easier to do the right thing for patients and harder to do the wrong thing," says Blair Sadler, a senior fellow at the nonprofit In-



Rush University Medical Center's butterfly design gives all patient rooms a window. Above, the tool-wielding part of the da Vinci surgical system



Jose Perez's wife sleeps in his room at Rush, and a smart device can track his vital signs.

stitute for Health Improvement and past president of Rady Children's Hospital in San Diego.

An early adopter of so-called evidence-based design, Virginia Mason focused closely on patient comfort and safety when it made over its cancer center, orthopedic unit and emergency department. Architects reconfigured the orthopedic unit to have parallel corridors, one for patients who may be taking their first tentative steps after knee surgery, the second for all other traffic. A new critical care unit will open next year with an imaging suite inside, so vulnerable patients don't have to leave the unit to get a scan. Not only is that much safer for patients, who may be on ventilators, but also it saves nurses' time. "We realized we were losing 14 hours of nursing care per week to travel with patients to get scans," says Deborah Cutchin, a specialist in the hospital's office of process improvement.

Designed for safety

► Building from scratch lets hospitals realize even grander visions. Rush University Medical Center in Chicago opened in its new butterfly-shaped incarnation in January 2012.

Besides adding drama to the city's skyline, the design is intended to play a healing role, affording every room an expansive view; exposure to natural light and inviting landscapes has been linked to faster recovery and less need for pain medicine. Rather than sit at a central station, nurses keep an eye on their charges from small satellite work stations that offer a clear line of sight into several rooms at once. The building also contains a state-of-the-art bioterrorism preparedness facility. In the event of a biological, chemical or radiological crisis, the ambulance bay converts into a decontamination area and panels hidden in the lobby's pillars provide access to oxygen and other gases and electrical lines (story, Page 39).

Like Rush and other cutting-edge hospitals, Seattle Children's Hospital's new addition for critically ill kids and the new University Medical Center of Princeton at Plainsboro, N.J., put every patient in a private room, which data show thwarts the spread of infection. Foldout couches or beds allow family members to stay, too, and provide emotional support. The New

Jersey hospital's rooms are arranged in a uniform way, so it doesn't take time to search for emergency equipment like oxygen; beds face the windows.

The Palomar Medical Center in Escondido, Calif., which opened in August 2012, boasts many of the same amenities as well as access to landscaped terraces on each floor and a 1.5 acre rooftop garden.

To decrease falls, showers have no "curb" to trip over, and hand bars circle the bathroom. Hydraulic lifts built into the ceiling can be used to move heavier patients to and from the bathroom, reducing the risk of injury to both patient and caregivers. Other popular trends: placing monitors and access to oxygen and outlets in such a way that a standard room can convert to critical care, and using curtains, floor coverings and finishes engineered to resist bacteria.

These features aren't cheap. According to research by a team of health care leaders and architects led by Sadler, 16 of the most solid evidence-based design measures, from high-tech surveillance systems in the ICU to highly filtered air, add 7 percent to a typical

construction budget. But the features pay for themselves with fewer injuries and errors and shorter stays within three years. Says Sadler: "These ideas are game changers."

Technology trends

▶ At the same time, leading-edge hospitals are rapidly getting wired. The goal: so-called ubiquitous computing, the continuous flow of data from medical equipment and apps, plus the ability to make sense of it all to improve care. Hospitals are already using sensors that alert nurses that a patient at risk of a fall is getting out of a bed, technology that monitors whether doctors and nurses are washing their hands, and flat screen TVs that ask patients to rate their pain and then notify the nurse if they're really hurting.

Key to the computing stream are robust electronic health records (EHR), which have evolved from tools for billing into troves of information such as patients' allergies and the results of their last colonoscopy. These records help doctors "connect the dots" and patients avoid repeated tests and unnecessary exposure to radiation, says Rasu Shrestha, vice president of medical information technology at the

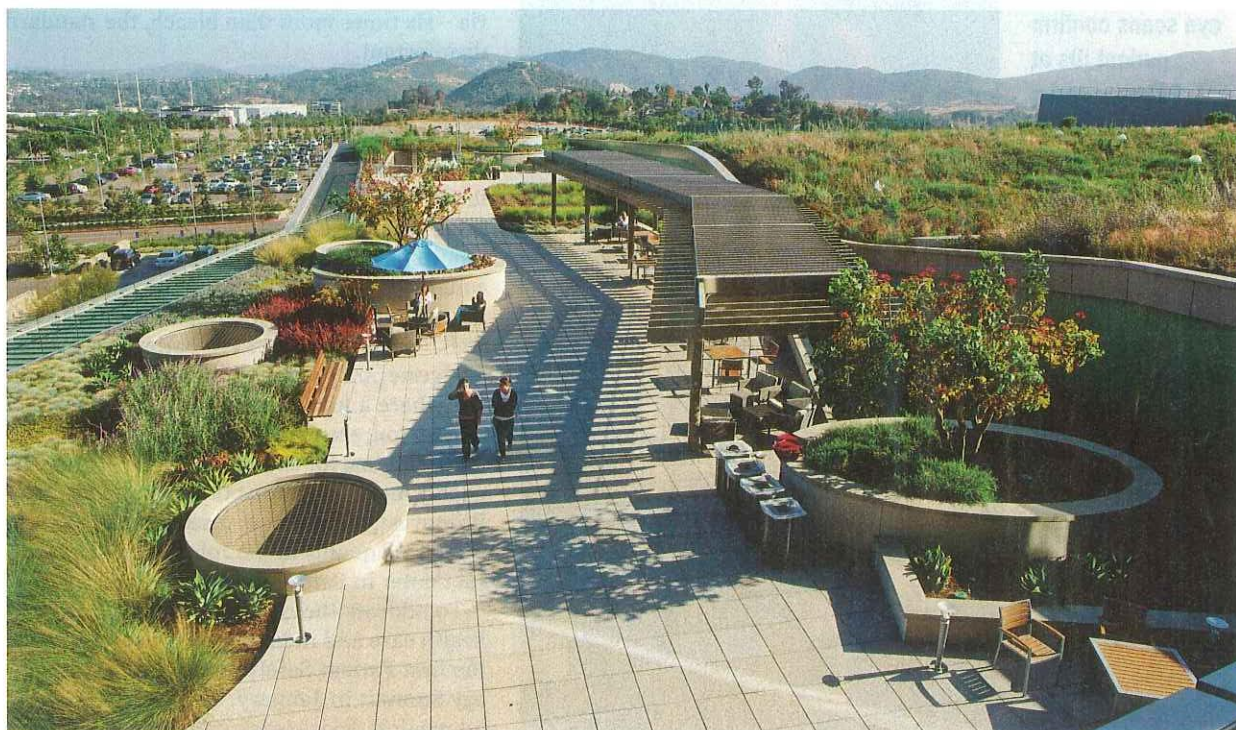
University of Pittsburgh Medical Center. The proportion of hospitals with an EHR system has grown from 9 to 80 percent since 2008, according to the U.S. Department of Health and Human Services. "My own hospital is essentially paperless," says Robert Wachter, chief of hospital medicine at the University of California, San Francisco Medical Center, and a leading hospital safety expert.

A growing array of smart devices is feeding the flow of data and cracking down on safety hazards. Palomar patients wear ViSi Mobile System wrist devices that constantly measure their vitals and wirelessly transmit the data to the EHR, eliminating the need to enter the data or to wake the patient for a 2 a.m. blood pressure reading. Manufacturers are rolling out beds that weigh and turn over patients and pivot slightly from hour to hour to redistribute their weight, reducing the risk of pressure sores. Radiofrequency identification tags on ID badges and on room sinks monitor staffers' hand-washing habits. Thanks to chips embedded in surgical instruments and sponges, surgeons can wave a wand over their patient before sewing him up to locate anything that might be left inside.

With flat screen monitors offering the Internet and entertainment and easy ordering of meals

More
than 800
robots
now rove
the halls
of U.S.
hospitals.

Patients can enjoy
some peace and
sunlight in the
garden atop one of
Palomar's wings.



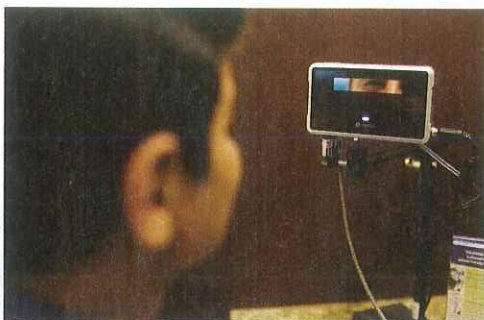
Natural light and views have been linked to faster recovery.

To prevent error, eye scans confirm patient IDs at Palomar and a pharmaceutical robot prepares prescriptions.

and snacks using a remote control device, the modern hospital room may sound more like a five-star hotel suite. Such amenities undoubtedly attract customers and nudge up the price tag. But room monitors perform other useful duties, too. When providers at the University of Pittsburgh Medical Center stop in on a patient being tended with the help of SmartRoom, an ultrasound tag on their ID badges brings their name and role up on the TV screen and can pull up the patient's EHR. Patients can play games, receive email and find out about an upcoming test.

Robots on call

▶ When Lucille Anderson, 91, was admitted to UCLA Medical Center for bleeding in the brain not long ago, she received an unusual visitor – a 5-foot 5-inch robot named “EVA” (for executive virtual attending). Outfitted with sophisticated two-way video and sound capabilities, EVA, a creation of InTouch Health and iRobot, rolled up to Anderson's bedside and connected her virtually with Paul Vespa, the director of neurocritical care, who examined her from his



office. “That’s an experience I didn’t think I’d have in my lifetime,” marvels Anderson, who was transferred to rehab after Vespa’s remote evaluation.

More than 800 similar “remote presence devices” now rove the halls of U.S. hospitals, increasing doctors’ efficiency by letting them be in two places at once (story, Page 32). And stand-ins for people are taking on other duties, too. At the UCSF Medical Center, a robot packages 13,000 doses of medication, including IV solutions, every day, “virtually eliminating the opportunity for human error,” says Michael Blum, a cardiologist and chief medical information officer at the center. Each dose gets a bar code that a nurse must match to a patient’s wrist band before the medication is administered. The number of robot-assisted surgeries – for everything from gallbladder removal to hysterectomy – has soared, though critics say there’s still little evidence that the method produces better results than comparable minimally invasive procedures. (The FDA has been looking into robotic surgery in response to growing reports of problems, such as the arms moving improperly.) Other robots emit beams of ultraviolet light to kill potentially deadly bugs. A recent MD Anderson Cancer Center study found that a unit from a company called Xenex killed 95 percent of *C. difficile* bacteria – six times more than bleach, the standard disinfectant.

A smarter ICU

▶ Change is also coming to the ICU, which faces a daunting challenge. In any given hospital, as many as 15 medical devices, including monitors, ventilators and infusion pumps, are connected to an ICU patient, but because they are made by different companies, they don’t “talk” with one another. Patient-controlled analgesic pumps that deliver powerful narcotics, where a known side effect is respiratory depression, aren’t linked to devices that monitor breathing, for example. “Today’s ICU is arguably more dangerous than ever,” says Peter Pronovost, senior vice president for patient safety and quality at the Johns Hopkins Medical Center in Baltimore.

To address the need for “interoperability,” health care and industry executives convened the first Patient Safety, Science and Technology Summit in January, and nine of the largest medical device companies pledged to share



The Case for Coming Clean

Malpractice lawyers have long counseled doctors and hospitals not to admit to medical mishaps, much less apologize for them. But the twin imperatives of improving safety and cutting the soaring cost of health care are inspiring a different tack. Several years ago, the University of Michigan Health System pioneered the Disclosure, Apology and Offer model, in which patients who have been the victim of an error are quickly told, issued an apology and offered a settlement – a stark contrast to the traditional “deny and defend” approach. Since then, legal costs have dropped by 60 percent, and the system has had 36 percent fewer medical claims lodged against it, according to a 2010 study in the *Annals of Internal Medicine*. Similarly, a 2011 Institute for Healthcare Improvement study found that

Stanford University’s hospitals save \$3.2 million a year by saying “I’m sorry” to aggrieved patients.

“You suck all the air out of the room when you say I could and should have done better – I’m sorry,” says Richard Boothman, a former trial lawyer and the Michigan health system’s executive director for clinical safety. More important, experts say, being open about mistakes allows hospitals to learn from them. Patients and their families often just want to know why an error occurred and to be assured that the hospital is taking steps to prevent a repeat. Apology policies reflect a growing view that medical harms are usually the result of a bad system, not of a bad doctor or nurse.

At Kaiser Permanente, which serves patients in California, Colorado, Ohio, Maryland and several other states, patients are offered an

apology, a description of the events that led to the error, and a commitment to do things differently next time, says Doug Bonacum, Kaiser’s vice president for quality, safety and



resource management. Specially trained ombudsmen help facilitate the difficult conversations between patients who have been harmed and health care professionals, who themselves are often devastated. In fact, studies show that physicians who are being sued have significantly higher rates of divorce, depression, heart attacks and suicide, says Alan Woodward, chair of the committee on professional liability for the

Massachusetts Medical Society, who helped to spearhead a pilot apology program for hospitals in Massachusetts as an alternative to tort reform. It’s too early, at this point, to gauge the pilot program’s impact.

Other states are warming to the idea.

Oregon passed a law in March that encourages mediation between hospitals and injured patients and allows doctors to apologize without worry that the apology could be used as evidence in court. So, although a recent Johns Hopkins study found that only 2 percent of the country’s hospitals even inform patients immediately of a mistake, many experts think the tide may soon turn. –B.H.

data and standardize device interfaces. According to a new report from West Health Institute, a research organization focused on reducing health care costs, true interoperability could save \$30 billion by avoiding mistakes.

Meanwhile, design plays a role in intensive care, too. At Memorial Sloan-Kettering Cancer Center’s 20-bed unit in New York, sliding glass doors are glazed with LCD privacy glass, which

transitions from clear to opaque at the touch of a button and can be cleaned far more effectively than curtains. Monitors, medication pumps, oxygen, suction and power outlets reside in ceiling mounted mobile columns, and no cables snake across the floor. “That allows us latitude and freedom that we would never have in standard rooms,” says Neil Halpern, chief of the hospital’s critical care medicine ser-

vice. Seattle Children’s similarly puts access to power and gases into movable booms so the medical team can quickly and easily get to the patient.

Wachter is cautiously optimistic that all this innovation will lead to better, safer care. But the smartest technologies still leave no room for complacency. “We’ve learned how amazingly complicated it is,” he says, “to reliably deliver care to sick people.” ●