COMPASSIONATE RELEASE

Having worked almost continuously as a critical-care registered nurse at Massachusetts General Hospital since 1983, I’ve seen my share of horrific resuscitative events such as the ones described in Danielle Ofri’s short story (“Against Nature,” Summer 2012). In response I’d like to quote—as best as memory will serve—a note I read years ago, entered into a patient’s chart by psychiatrist Ned Cassem in his role as consultant on end-of-life issues: “This patient should be compassionately preserved from the assault of CPR.”

Mark Hammerschmidt // Medical Intensive Care Unit, Massachusetts General Hospital, Boston

Bioterror’s Shadow

In your story about fears over publishing the details of new avian flu work (“Playing Chicken,” Summer 2012), I was surprised to see microbiologist Vincent Racaniello ask: “Why would a terrorist want to use something that worked on a ferret without having a clue if it would do the same thing in people?” He is making the same error that so many educated people in the West make. International terrorists don’t think conventionally. Why would anyone want to fly planes into skyscrapers? Why would anyone want to strap a bomb to his chest, walk into a hotel and set it off? Why would anyone want to put a bomb in his undies? None of these makes any sense to us, but to the terrorist mind it all makes perfect sense. To see that such a brilliant mind is stuck in such naiveté is troubling.

My only worry is that our terrorist surveillance capabilities might not be as geared to anomalies in biomedical research attempts as they are to transportation anomalies.

Donald J. Dudley // Department of Obstetrics & Gynecology, University of Texas Health Science Center at San Antonio

THE TESTOSTERONE POLEMIC

In “Gaining Strength” (Summer 2012), testosterone replacement therapy is depicted in Marvel comic book terms: superhero versus diabolical villain. Therapy proponent Abraham Morgentaler feels “it’s becoming impossible to ignore the notion that low testosterone is a threat to overall health.” The skeptics, on the other hand, argue that the risks of testosterone “triggering prostate cancer cells...outweigh the potential benefits.”

The truth likely resides somewhere between the two strident conclusions. In patients with symptoms and signs of male hypogonadism and unequivocally low serum testosterone levels, there is usually a clinically significant benefit with testosterone therapy. In men who do not have strong evidence of male hypogonadism and are seeking improved vitality or sexual function, testosterone therapy generally confers little benefit.

The symptoms of androgen deficiency are common and often attributable to other causes, thus the diagnosis of male hypogonadism and initiation of therapy often hinges on measurement of low testosterone levels. Hence the glib summary of the marketing campaign: “Is it low T?”

Because millions of men take testosterone, our government and scientists must address the following: standardization of testosterone assays; establishment of a universal normal range for testosterone levels; and funding for studies on the clinical outcomes of long-term therapy in men of different age groups, testosterone levels and health conditions. Until then, it is Iron Man vs. Dr. Doom.

Bradley Anawalt // Chief of Medicine, University of Washington Medical Center, Seattle

WHAT’S YOUR TAKE? Write to protoeditor@mgh.harvard.edu to comment on a story—or offer suggestions for future topics.
stat: an abbreviation for the Latin statim, an adverb that signals a need—for a surgical instrument, a medical supply or, as in this magazine, a short, compelling story—to be met without delay.

FOCUS //

UNEXPECTED CAVE DWELLERS have contributed to the growing belief that bacterial resistance to antibiotics isn’t just a matter of humanity’s excessive use of the drugs; it’s hardwired into the genes of bacteria. In Lechuguilla Cave in New Mexico, a team of researchers from McMaster University and the University of Akron has discovered 93 strains of antibiotic-resistant bacteria. Since 1984, explorers have mapped more than 120 miles of the cave, which had been sealed off for millions of years. Only a handful of researchers and cavers have entered the caverns, allowing the site to remain pristine. Given that bacteria create their own unique antibiotics, the diversity of the cave’s resistant bacteria (none of which is dangerous to humans) indicates that many undiscovered molecules with antibiotic properties exist in the environment.
INTERVIEW //
The Case for Research
BY LINDA KESLAR

As Congress wrestles with how to reduce the budget deficit, the future of U.S. federal biomedical funding has been called into question. Proposals before lawmakers urge reductions in the current $31 billion annual budget of the National Institutes of Health, which devotes most of its funds to research grants for scientists at more than 3,000 universities. But cutting federal support would undermine the promise of improved health for Americans, economic growth and innovation, warns Lawrence H. Summers, one of the nation’s leading experts on labor, finance and the economy. He has served in three presidential administrations, most recently as director of the National Economic Council for President Barack Obama, and as president of Harvard University, where he continues to teach. Summers argues that despite the need to limit government spending overall, health research must remain a top priority.

Q: What is the fundamental economic rationale for government funding of biomedical research?
A: The societal return of biomedical research far exceeds the private return. It has been estimated that improved health care had as much impact on increased well-being during the past century as came from all growth in gross domestic product. And yet those expenditures that improved health care represented only a small part of the overall economy, and an even smaller part was devoted to biomedical research.

Q: One criticism of the resources the United States devotes to biomedical research and development is that it’s impossible to measure the impact of that investment because breakthroughs can take decades.
A: It does take time to move from basic understanding of cellular processes to cures for disease. But I suspect an economic revolution will come from progress in the life sciences during the next quarter-century.

Q: What of the complaint that despite spending more on health care as a share of GDP than any other developed nation in the Organisation for Economic Co-operation and Development, the United States ranks 27th in life expectancy in a 40-country study?
Act in Shakespeare’s *A Midsummer Night’s Dream* in which Bottom alludes to the healing benefits of spider silk: “I shall desire you of more acquaintance, good Master Cobweb. If I cut my finger, I shall make bold with you.”

Millennia during which silk, which is biocompatible, has been used in sutures

Year in which scientists published a study describing how they grew a healthy layer of skin by harvesting spider silk, weaving it into a mesh on a steel frame and seeding the mesh with cells and nutrients

Degrees Fahrenheit at which one vaccine and two antibiotics were able to remain potent for two weeks or more by stabilizing them in a silk protein, as found in a study by Tufts University; the silk prevented the drugs’ bioactive molecules from changing, thus preserving their potency

Dollars awarded to William Marcotte, a professor in genetics and biochemistry at Clemson University, to support his research on how to insert a spider’s silk-making genes into plants to produce synthetic silk for artificial tendons, cell scaffolds for bone and cartilage implants, and for other uses

Number of surgeries that bone graft patients commonly undergo; once fractured bones are healed, the second operation removes the implants (often made of titanium or ceramic, both of which can cause health problems) that are used to hold bone pieces tightly together; by replacing these with silk scaffolds, the second procedure might one day be eliminated, because silk degrades naturally after healing.
In a recent essay in *The New England Journal of Medicine*, Institute of Medicine President Harvey Fineberg urged hospitals to “rely on systems engineering and operations research to smooth the flow of patients through the health care system.” Those are the tools that make assembly lines, fast-food restaurants and other industries run efficiently—but which health care has been slow to adopt. Here’s how hospitals have made headway with OR scheduling.

### MILESTONE // The Bone Collector

One hundred years ago, when Thomas Wingate Todd arrived from England to become chair of anatomy at Case Western Reserve University School of Medicine in Cleveland, he seized upon a compelling opportunity. The year before, Ohio had passed legislation (drafted in part by Carl Hamann, who was to become dean of the medical school) that allowed medical schools to receive cadavers otherwise destined for a potter’s field. Todd took advantage of the law to begin building a collection of bones and detailed records that would have a profound influence on medical science.

By the time of Todd’s death in 1938, the collection contained meticulous records and more than 3,000 skeletons. It also included fossil casts of early man and a rare compilation of X-rays from pioneering child bone growth studies that Todd conducted. In the 1950s and early ’60s, the collection—now called the Hamann-Todd Osteological Collection—was transferred piecemeal on permanent loan to the Cleveland Museum of Natural History. All of the skeletons in the assemblage are accompanied
Litvak advocates separating the beds used for unplanned operations from those for patients getting scheduled surgeries, and then determining how many beds a hospital needs for each type. The next step is to smooth the schedule of elective surgeries. Cincinnati Children’s Hospital, by separating scheduled and unscheduled surgeries and adding rooms for urgent cases, was able to shorten patient waiting times for surgeries while simultaneously boosting its volume and revenue.

At Boston Medical Center, vascular surgeons working with IHO agreed to schedule no more than two elective surgical cases per day, spreading operations more evenly over the week and putting less stress on the OR and inpatient wards. Meanwhile, in collaboration with MIT’s Sloan School of Management, Massachusetts General Hospital took a data-intensive approach to smooth out variability in its surgical block schedule, which allocates ORs to specific surgeons for scheduled blocks of time. Retsef Levi, a professor of operations management at MIT, says that with more than 50 ORs at MGH and varying resources needed for the many kinds of surgery performed there, computer power was needed to run through every permutation of the schedule. Before the project, 38% of MGH patients requiring unplanned surgery experienced excessive delays. To reduce the wait, the team reserved some OR blocks as open and let administrators rather than surgeons decide when to schedule nonelective surgeries.

Peter Dunn, executive medical director of perioperative services at MGH, says that such operations research tools have far-reaching implications for hospitals that go beyond patient flow. The MGH-MIT team, for example, is also looking at how to better smooth the schedule within each day and applying methods used to optimize factory production in managing ORs’ materials, supplies and surgical instruments.

by information that includes name (or alias), age, sex, ethnicity, cause of death, and more than 70 anthropomorphic measurements. Files also contain stereoscopic photographs and X-rays made before the remaining flesh was removed from the bones, along with the results of autopsies or dissections.

According to Kevin F. Kern, an associate professor of history at the University of Akron who has written extensively about Todd, more researchers visit the collection annually than all other museum bone collections combined. More than 1,000 scholarly publications have been based on research that used the Hamann-Todd skeletons.

Investigators include orthopedic specialists who take comparative measurements for prosthetic designs and midwives who examine pelvic shapes as potential obstacles to birthing. “Medical researchers are attracted by the opportunity to examine a large range of variation in the human species and to reference the extensive scientific documentation,” says Lyman Jellema, physical anthropology collections manager. He estimates a minimum of 20 visits per month.

The museum has received funding to photograph and digitize all of the collection’s photos and X-rays. Jellema plans to add them to the museum’s Website not only to protect the physical specimens, but also to provide easier access for researchers—extending Todd’s influence a century on.
Five years ago, the University of Michigan Health System was one of a handful of U.S. hospitals that voluntarily admitted when it had made a mistake that harmed a patient. Following each admission was an apology and an offer of compensation. Since *Proto* reported on the bold experiment (“The Hardest Word,” Fall 2007) to find an alternative to the medical liability tort system, many other hospitals have begun adopting the model, dubbed DA&O (disclosure, apology and offer).

Critics predicted that this alternative approach would invite more malpractice lawsuits. But just the opposite has occurred, with pioneers of DA&O reporting an impressive reduction in claims and litigation expenses, perhaps because their honesty in admitting fault—or defending their care when it seemed an adverse event was unavoidable—may dissuade some patients from filing a claim. According to a 2010 study in the *Annals of Internal Medicine*, UMHS had to defend an average of 38.7 medical malpractice lawsuits per year before it started DA&O in 2001. Now that’s down to 17 a year, an improvement that has cut litigation costs for UMHS by 61%, or about $2 million a year. A similar program at Stanford Medical Center begun in 2007 has resulted in a 36% decline in claim frequency and a $3.2 million savings in annual malpractice insurance premiums. And the University of Illinois Medical Center at Chicago, which started fully disclosing errors in 2006, says the number of lawsuits filed against it each year has dropped 40%. In just the first two years of the program, the medical center made nearly 200 safety improvements based on more than 4,000 adverse incident reports.

Several Massachusetts hospitals are developing protocols to test DA&O. “We needed fundamental reform to improve patient safety and reduce the motivation to practice defensive medicine,” says Alan Woodward, an emergency physician and a leader of the Massachusetts reform effort. The Massachusetts Medical Society initiated legislation, recently signed by the governor, that requires a six-month waiting period before a patient can sue, giving hospitals time to perform a root cause analysis and apologize and offer compensation if appropriate.

Yet could DA&O work in every hospital? Until now, only academic medical centers that employ and insure their own medical staffs have tried the approach—for good reason. When a medical mistake occurs in a hospital with a so-called closed medical staff, the hospital and its physicians are viewed as a unified entity, which allows the hospital to disclose the error and offer compensation on behalf of medical personnel. That keeps physicians from being reported to the National Practitioner Data Bank, an electronic repository of judgments, settlements and disciplinary actions against physicians. Most community hospitals (where most people receive care) have open medical staffs made up of independent doctors who must carry their own malpractice insurance. Whenever a private insurer makes a payment to a harmed patient, it must report the settlement and the physician’s name to the Data Bank, which then notifies hospitals and state licensing boards. Yet in more than 90 out of 100 cases, harm to patients is caused by insufficient hospital safety measures rather than by a reckless or incompetent act by a physician. “But the Data Bank doesn’t allow that nuance to be explained,” says Richard Boothman, chief risk officer at UMHS.

Giving physicians and hospitals the freedom to discuss mistakes can only lead to greater patient safety, insists Boothman. “Five years ago, I worried that if I got hit by a bus, we’d backslide to deny-and-defend,” he says. “I’m not worried about that anymore. The focus on patient safety is clear now.”
Thousands of medical apps have sprung up to cater to patients and physicians alike; for the former, apps such as Stress Check and Cardiograph let patients monitor their health data themselves. Provider-focused apps, meanwhile, allow for portable, quick access to drug information and medical literature.

But as with any new technology, the road to adoption hasn’t been smooth, say two doctor bloggers.

ISLANDS OF INFORMATION
It’s rare that I see a patient in my office who doesn’t have a smartphone. My last patient visited to go over her MyFitnessPal.com data, as she’s still not able to lose weight. Other patients show me pictures of rashes or wounds.

Patients want me to participate and share in their activity and to see their data reflected in my electronic medical record—and therein lies the problem with apps. Mobile health care apps dangle the tantalizing solution to both of these issues. But for the most part they are isolated islands that don’t communicate with each other or with me. They’re only just beginning; FitBit, for example, now measures the steps you take and can send that data to MyFitnessPal—but not vice versa. I look forward to the day that they all communicate.

—David Voran, a family practice physician and medical director for clinical process improvement at Heartland Health System, at medcitynews.com, July 23, 2012

CERTIFY FOR SAFETY
While some might say that standards for the certification of medical apps add even more barriers to the commercial adoption of these technologies, there are substantial reasons for such certification. Medical apps present a new paradigm in health care, and new ways of evaluating them are necessary.

Right now health and medical apps are the Wild West. Patients and health care providers want reliable, safe apps, while commercial enterprises, hospitals and others will desire the apps they develop to meet standards expected of their CIOs, clinical administrators, risk management group and institutional regulators.

Certification standards will serve as a guide for app developers. If a comprehensive set of standards is available, the development process can be streamlined and economized. Certification might become a standard for reimbursement and formulary placement by payers. It’s possible that payers will position apps on formularies as they do pharmaceuticals. A certification designation might trigger a higher formulary position.

—David Lee Scher, senior medical adviser at mobile health app store Happtique, at davidleescher.com, July 13, 2012

THE CUTTING EDGE //
Vocal Cords Restored
Mimicking the extraordinary properties of vocal cords is a challenge that has long defied scientists, but laryngeal surgeon Steven Zeitels at Massachusetts General Hospital and MIT bioengineer Robert Langer may have found a way. Having developed a gel made from polyethylene glycol, a polymer typically found in personal care products such as moisturizing cream, they produced a form that vibrates at the frequency of vocal cord tissue.

Injected under the vocal membranes, the gel changes the vibratory characteristics of vocal cords so that they respond naturally to airflow and muscle contraction. Stiff, scarred vocal cords—the result of overuse, surgery or trauma—become pliable again, and hoarse voices smoother. Physicians can fine-tune the gel by slightly changing its composition to match a particular voice and its tasks, which may range from simple conversation to a singer’s complex, intense delivery. So far the gel has passed safety testing in animals, and clinical trials in people are expected to begin in 2013. If successful, the gel could give voice to millions of people with damaged vocal cords—and, notes Zeitels, might even one day be used to make older voices sound youthful again.