



**GREEN WAY:** A new “green roof” adjacent to the Birthing Pavilion promises to mitigate temperature fluctuations, reduce runoff, cost less to maintain, and extend the life of the roof up to 200%—not to mention the fact that it provides an appealing patio for patients.

THEN & NOW

A reminder of the pace of change, and of timeless truths, from the Summer 1964 issue of the *Dartmouth Medical School Quarterly*:

“Medicine is unique among the learned professions that deal with . . . individuals . . . in the degree to which content, method and application are all dependent on science,” wrote Dr. Gilbert Mudge, then the dean of DMS. “To be sure, science unadorned is not a sufficient basis but, excluding witchcraft or its various modern counterparts, medicine without science is certainly not much of a profession.”



56

Faculty in the basic science departments in 1964

290

Faculty in the basic science departments in 2010

\$115.6 million

Research income in FY09

**Determining death, when minutes matter**

Death, so the maxim goes, is one of life’s certainties. But in this era of high-tech medical interventions, determining the precise moment of death isn’t always cut-and-dried. That determination is vitally important, however, when the deceased could be an organ donor.

**Organs:** Medical experts all around the world are now taking a closer look at the length of time doctors should wait to determine death before organs are removed for transplantation. One of those experts is Dr. James Bernat, a Dartmouth neurologist and a national authority on medical ethics.

Most vital organ transplants come from donors after they’ve experienced brain death. “The brain-dead donor is the ideal organ donor because circulation continues,” Bernat explains. “So the organs are perfused by the beating heart up to the very moment that they’re procured.”

Over the last two decades, however, “donation after circulatory death” (DCD) has become increasingly common.

In such cases, organs are removed from deceased donors some period of time after their hearts stop beating and their blood stops circulating. DCD, Bernat says, “has become a very common phenomenon that now represents 20 to 25 percent of all deceased organ donation.”

In the U.S. and Canada, DCD protocols allow for organ transplantation in “controlled”

situations, in which circulatory death occurs after the donor has been removed from life support. In controlled situations, doctors know exactly what interventions and medications the donor received before death—but even so, uncertainties remain.

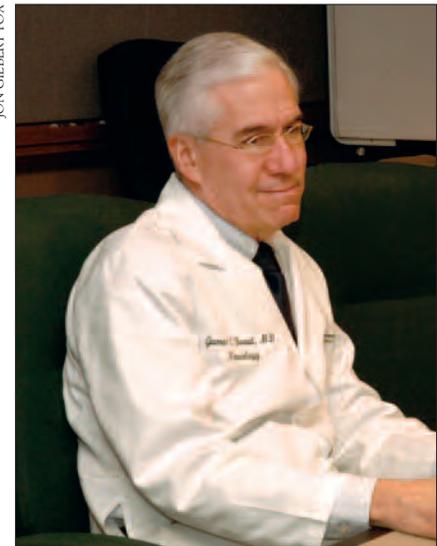
The most pressing question is how long doctors should wait after the heart has stopped before removing organs. In some situations, auto-resuscitation—the spontaneous return of a heartbeat—can occur after a person’s heart has stopped beating. So a surgeon must wait long enough to ensure that the patient has died, but not so long that the organs begin to decay.

**Heart:** According to Bernat, some hospitals wait just 65 seconds after the heart stops beating before organs are removed. Others wait 5 minutes or more. “Individual hospitals that start programs in DCD develop their own protocols,” he explains. “The whole thing is kind of ad hoc, and it cries out for some kind of national standards.”

In an attempt to establish standards, Bernat convened a group of experts from across the U.S. and Canada in late 2008 at the request of the Health Resources Services Administration, a division of the Department of Health and Human Services. Their recommendations were published in *Critical Care Medicine* a few months ago.

Bernat and his colleagues urge that the cessation of circu-

JON GILBERT FOX



Bernat is leading the national effort.

lation, not just heartbeat, be used to determine death for DCD. After circulation stops, a waiting period of 2 to 5 minutes before removing organs is a prudent choice given current data, the group stated. That recommendation applies specifically to controlled situations.

Many European countries allow for DCD in uncontrolled situations. In those cases, the deceased donor has suffered cardiac arrest, often outside a hospital, and can’t be revived. The U.S. may consider uncontrolled DCD protocols in the future, Bernat says. His group hopes to meet again to discuss death determination in those instances.

**Standards:** Bernat decries the fact “that doctors practicing in one state are using different standards of death determination than in another state. There’s really a pressing need,” Bernat concludes, “for some type of standardization.”

KIRSTEN WEIR

**LOWDOWN:** The New Hampshire Department of Health and Human Services says DHMC's rate of hospital-acquired infections is 36% lower than the U.S. average. Nationwide, such infections lead to an estimated 99,000 deaths and \$30 billion in excess costs each year.



## An alarming result (and that's a very good thing)

Amid the bustle of DHMC's orthopaedic unit sits a monitor displaying each patient's vital signs in neat, orderly rows. As a nurse zips by, she hovers for a moment, assesses the colored squares, then bustles off again. If a patient's oxygen level or heart rate should plummet, she knows her beeper will sound and that within seconds she can be at the proper patient's bedside.

"Many people, nationwide, have died because they weren't monitored" continuously, says DHMC's Kenneth Lee. "They could have been rescued." Lee, a clinical manager in biomedical engineering, helped install and test the new monitoring system, Patient SafetyNet, on DHMC's 36-bed orthopaedic unit.

**Pagers:** The system uses a network of pulse oximeters, which measure heart rate and blood oxygenation through a probe placed on a patient's finger. The devices are linked to the central monitor and to nurses' pagers.

In most hospitals, monitoring

in surgical units involves "sampling of intermittent vital signs and clinical examinations," plus closer surveillance of high-risk patients, wrote Drs. Andreas Taenzer and George Blike of DHMC in *Anesthesiology*. The paper detailed the orthopaedic unit's experience with Patient SafetyNet, which is made by a company called Masimo.

**Unit:** For 11 months before and 10 months after the system's installation, the unit tracked how many patients had to be transferred to the ICU or treated by special resuscitation teams. The authors also compared results on the orthopaedic unit to those of other units.

They found the system significantly reduced rescues and ICU transfers; they estimate it will save 150 ICU bed-days a year. "It's not a given that every safety investment is cost-effective," says Blike, "but in this case it was. The system paid for itself."

The results were so impressive that the project received this year's Health Devices Achievement Award from the ECRI Institute, a non-profit dedicated to evidence-based patient care. Two addition-

al DHMC surgical units and four medical units have since adopted the system. More are likely to follow, says Jean Avery, senior clinical quality specialist.

But the system's success was not a foregone conclusion. On a busy inpatient unit, where one nurse cares for several patients, it is important that alarms sound only when action needs to be taken. Otherwise, nurses can become desensitized to

alarms, as the authors of the paper found when they tested the Masimo system on another unit. If it's calibrated for high sensitivity, it can generate too many false alarms—such as if a patient changes position and bumps the pulse oximeter. By the time the nurse gets to the patient's bedside, his or her vital signs would have recovered.

**Delays:** To combat this problem, the team built in two delays: a 15-second delay before the alarm goes off at the bedside, and an additional 15-seconds before the nurse is paged.

Such monitoring "could potentially become the standard of care," Avery believes, since it reduces costs and complications and keeps ICU beds open for patients who really need them.

She had a chance to experience its benefits from a patient's as well as a nurse's perspective. A relative and a friend had surgery at DHMC during the test period. "I felt better knowing that they had that system there watching them at night," says Avery. "It was comforting."

ELIZA C. MACKINTOSH

## THEN & NOW

A reminder of the pace of change, and of timeless truths, from the 1980 DMS admissions brochure:

"Although Dartmouth did not admit its first woman medical student until 1960, the percentage of women in DMS classes since 1968 has consistently exceeded the national average. . . . Since 1976, graduating classes have averaged 26% women."



1852

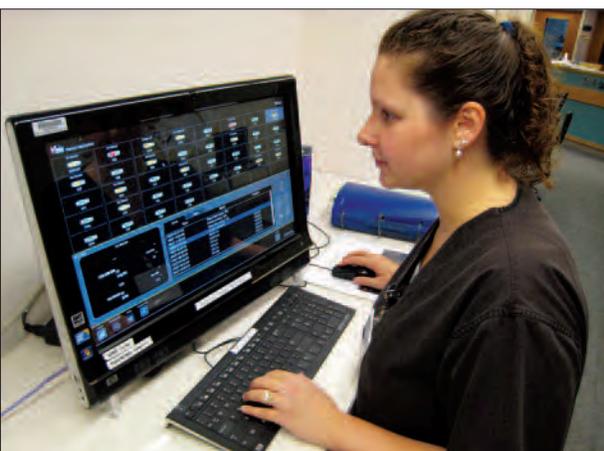
Year DMS denied admission to Emily Blackwell, sister of Dr. Elizabeth Blackwell, the first American woman to earn an M.D.

58%

Percentage of women in DMS's 1987 entering class

49%

Percentage of women in all graduating classes nationwide in 2007



JUNIPER TRAILS

Staff nurse Kimberly Belanger-Demers checks the monitor.

**TUBE TOPS:** A TV show featuring Drs. Ira Byock and Elliott Fisher of DMS has won a George Foster Peabody Award for excellence in journalism and been nominated for an Emmy. The show, on *60 Minutes*, was titled "The Cost of Dying."



THEN & NOW

A reminder of the pace of change, and of timeless truths, from a 1991 history of Mary Hitchcock Memorial Hospital, which opened in 1893:

"Until well into the 20th century, hospitals weren't considered a proper place to have a baby; respectable women had their children at home. No exception to the rule, Mary Hitchcock was open for two years before the first baby was born within its walls, and until 1920 the hospital's exquisitely detailed annual reports . . . did not even bother to detail the specific number of births. Not even the hospital's own medical staff . . . saw the institution as a fit place to give birth."



1,135

Births at Dartmouth-Hitchcock Medical Center in fiscal year 2009

**DMS exports its measurement methodologies**

**D**MS researchers have become well known throughout the United States for their measurement of usage patterns within the health-care system. Now they're helping to develop similar efforts in other countries, including the small, newly independent nation of Kosovo.

**Ties:** In 1999, DMS's Dr. James Strickler began working, under the auspices of the International Rescue Committee, with refugees from the Serbian conflict in Kosovo. Since then, he has led a number of initiatives that have forged strong ties between DMS and Kosovo, including student exchanges.

In 2003, a medical student named Ilir Hoxha was one of the Kosovars who visited DMS. The contacts he made at Dartmouth sparked his interest in health-care economics and policy, so Strickler encouraged him to apply for a grant to study at the Dartmouth Institute for Health Policy and Clinical Practice (TDI). In 2009, Hoxha returned to DMS as a Fulbright Scholar and spent four months working with TDI faculty. His aim was to assess whether the methods developed there to study the U.S. health-care system could be applied to Kosovo.

**Skeptical:** Dr. David Goodman, the director of TDI's Center for Health Policy Research, worked closely with Hoxha. At first, Goodman says, he was a little skeptical of the idea of using TDI's methodologies in Kosovo

because of the country's extremely limited resources.

But Hoxha was confident that studying variations in health care was essential in Kosovo, which is still early in the process of rebuilding its health-care system following its decimation during the war. "For a country with few resources, the study of efficient use of resources becomes even more important," he says.

Goodman soon agreed. "In under-resourced countries, small measurements may have very big effects, because the needs are great," he says. "If you start building it in now, you gain benefit as you start reconstructing the health-care system."

Andrew Goodman, a 2010 graduate of the M.P.H. program

at TDI (and David Goodman's son), was likewise interested in studying health-care variations in Kosovo, but he had two questions: First, were Kosovar physicians interested in studying variations in the practice of medicine? And second, how much did they already know about the concept? With the help of Hoxha and TDI faculty members, he drafted a survey to answer those questions.

**Nuances:** After developing the draft, Andrew Goodman spent three weeks in Kosovo this past spring, meeting with physicians and policymakers to get their feedback on the survey. He used their comments and suggestions to hone it, ensuring that it was sensitive to cultural nuances and that the concept of variation was explained clearly.

He and Hoxha had anticipated that knowledge of health-care variations would be quite low,

**In 2009, Hoxha returned to DMS from Kosovo as a Fulbright Scholar.**



Everything in Kosovo's health-care system, from the ambulances that ply the streets of Pristina to the infrastructure in the country's hospitals, needs to be rebuilt.

**CHINA CABINET:** Dr. Murray Korc, DMS's chair of medicine, traveled to China in July to be honored by the Chinese Society of Clinical Oncology for Distinguished Achievement in Pancreatic Cancer Research and Clinical Management.



THEN & NOW

A reminder of the pace of change, and of timeless truths, from the 1970 MHMH-DHMC annual review:

"The cleanliness of every area of the Hospital is the responsibility of Housekeeping. . . . Until 1933 there was no such thing as a housekeeping department. This work was delegated to nurses. Volunteers helped out during wartime. Not until 1948 were nurses freed from cleaning patient beds, using disinfectant solutions on the metal and a whisk broom on the mattress. Even keeping 'hoppers' and other bathroom fixtures shining . . . was left to nurses and, particularly, student nurses."



200

Number of housekeeping employees in 2009

2 million

Square feet they keep clean

Medical students continue to reach out to Haiti

The contrast was stark. One evening this past May, Dartmouth students enjoyed delicious food and live music and dance in Hanover, N.H., while 2,000 miles away in Haiti, hundreds of thousands of people struggled to find food, shelter, and basic medical care.

But there was a direct tie between the two settings. It was four months since an earthquake had left Haiti in ruins, but Dartmouth students were continuing to seek ways to help the ravaged nation. That evening, the help came in the form of the fourth annual Dance for a Dream, a DMS-led fund-raiser.

**Local:** The evening featured an auction of Haitian artwork, the sale of handmade Haitian candles, a raffle with prizes donated by local businesses, and toe-tapping performances by seven student music and dance groups.

This year's Dance for a Dream proceeds went to an organization based in Port-au-Prince called GHESKIO. The acronym is derived from the French version of the group's name: Haitian Study Group on Kaposi's Sarcoma and Opportunistic Infections. "We chose to support GHESKIO," says Stephanie Rolin, the M.D. student who spearheaded the fund-raiser, "because they have a lot of rebuilding to do."

GHESKIO has managed to "embrace what is . . . necessary to provide education, care, housing, shelter, medical care for this population," explains Dr. Peter Wright, a pediatric infectious disease specialist at Dartmouth.

He has worked with GHESKIO since 1990 and spoke at Dance for a Dream about conditions in Haiti. "There is little question," he says, "that Dartmouth is very committed to . . . doing something long-term in Haiti."

"Just to see how motivated people are to help out in Haiti . . . is a great thing," agrees Daphnée Charles, one of two Haitian undergraduates admitted to Dartmouth after the disaster. She also spoke at Dance for a Dream, as did the other Haitian undergrad, Ronel Lefranc.

Among the performers at the event were DMS's *a cappella* group, the Dermatones; an Irish dance troupe; a bluegrass group; a contemporary dance ensemble; and a group that melds South Asian dance with hip-hop. Dartmouth officials estimate that students have collectively raised over \$1.5 million for the Haiti relief effort—

including \$5,000 from Dance for a Dream. The funds will be put to good use. "GHESKIO is responsible for providing HIV care . . . for about 40% of the people in the country that are getting such care," Wright

says. In fact, GHESKIO, which was founded in 1982, was the first organization in the world dedicated to fighting HIV/AIDS. After the quake, the group set up refugee camps and field hospitals, in addition to continuing to care for AIDS patients.

**Trial:** Two months after Dance for a Dream, Rolin flew to Haiti, thanks to a Fogarty Grant from the National Institutes of Health, to work for six weeks at GHESKIO on a multinational

**"Dartmouth is very committed to . . . doing something long-term."**

trial aimed at preventing the transmission of HIV from mother to child. Accompanying her were Wright and another DMS student and Fogarty Grant recipient, Jody Epstein, a certified lactation consultant.

Such contributions of time and money may seem minuscule compared to the massive needs in Haiti. But their significance, says Wright, "is really the effort . . . and what that means."

KRUPA PATEL



These Haitians are waiting for care at a clinic run by GHESKIO.