

HEART-SMARTS: High school biology students from Hanover, N.H., and Hartford, Vt., got a chance in May to use a defibrillator in a cardiac simulation lab, to feel a real pig's heart, and to hear a presentation by Dr. Alan Kono, a DHMC heart-failure specialist.



THEN & NOW

A reminder of the pace of change, and of timeless truths, from a 1987 issue of this magazine:

Six years after AIDS was identified, the first mention of the disease appeared in these pages: "An education supplement in the *New York Times* . . . hailed Dartmouth's leadership in educating students about AIDS. 'Some students think they are invulnerable,' [a DMS faculty member told the *Times*]. . . . Though criticized in some quarters, . . . Dartmouth's program is at the forefront of higher education's response to AIDS, according to the executive director of the American College Health Association."



4,000+

Number of occurrences today on Dartmouth websites of the term "AIDS"; for more about AIDS, see page 36 in this issue

Initiatives show that the devil is in the details

Sometimes the best way to improve health care is not by prescribing fancy drugs or buying expensive equipment, but simply by paying attention to details. That seems to be the bottom line of two successful infection-reduction efforts at DHMC and of another that's under way.

In 2003, Melissa Bennett, nurse leader of DHMC's hematology-oncology special care unit (HSCU), set out to reduce infections among bone-marrow transplant (BMT) patients. She and her colleagues had noticed that a lot of BMT patients had to have their central lines removed because of infections. A central line is a catheter placed in a large vein, usually in the chest, instead of in a peripheral artery, such as in the arm.

"For this patient population," says Bennett, "it is a huge [problem] not to have a central line because we give them high-dose chemotherapy through it, blood products, antibiotics, all sorts of things, along with the actual stem-cell reinfusion."

Lines: Bennett found that 60% of BMT patients had to have their lines taken out. This translated into 17 bloodstream infections for every 1,000 catheter-days. Though they could find no national benchmarks for central-line infections in BMT patients, Bennett and her colleagues in the HSCU and interventional radiology—where the lines are inserted—agreed that they could do better.

Over the next two years, with the support of a quality improve-

ment grant through DHMC, Bennett and fellow nurses Judy Ptak and Debra Hastings examined every aspect of central-line implantation and maintenance. They found that often patients weren't getting the right kind of line because of miscommunication between the unit and interventional radiology. So they created a standard ordering system with common language.

They felt that dressing and maintenance procedures could be improved, too, so they designed a new protocol and trained staff in it. They also added an antimicrobial dressing that costs a mere \$7.

These interventions were neither high-tech nor expensive, but they were extremely effective. "The goal," explains Bennett, "was to get our catheter-related bloodstream infection rate less than 10" per 1,000 catheter-days. In fact, there has been just one in a year and a half.

Word of the HSCU improvement project spread quickly throughout DHMC and inspired other units to take similar action. While Bennett's project was gaining momentum, physicians and nurses in the intensive care nursery (ICN) began working to reduce catheter-related bloodstream infections in their unit. They focused on such basics as regular and thorough hand-washing among staff and patients' families, encouraging breast feeding (which strengthens babies' immune systems), reducing the number of intravenous connections on a central

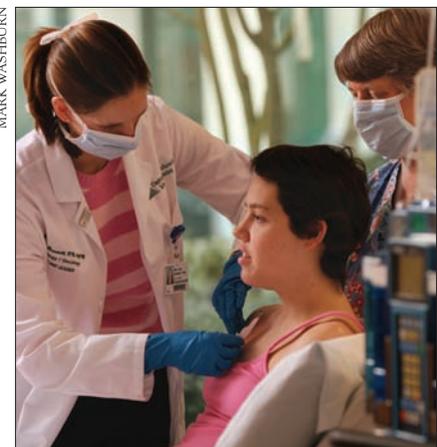
line, and, whenever possible, shortening the length of time a line remains in.

The ICN gauged success by the number of consecutive days without a single infection in babies weighing less than three pounds or born more than 10 weeks early.

Run: "Previously, the average [run] had been around 10 to 15 days," says Dr. William Edwards, ICN section chief. "When we started the project, after the first few months, we began to see runs that were up in the 30 to 40 days. Then between May and mid-December [2005], we had a run of over 200 consecutive days without an infection in this group of babies." The ICN's goal was to halve the infection rate for this group, but they far exceeded the goal, reducing the rate from 40% to 6% (for more on ICN quality improvements, see the feature starting on page 28).

Another bloodstream infection reduction initiative is now

MARK WASHBURN



Melissa Bennett, left, applies an antimicrobial dressing to transplant patient Erica Miller. Simple steps like this have dramatically cut central line infections.

under way in the intensive care unit (ICU). Like the HSCU and the ICN, “we’re taking a systems approach,” says Dr. Athos Rassias, who is leading the initiative with clinical nurse specialist Ingrid Mroz. “We’re analyzing . . . the most minute little details,” he adds. Among the changes already made are a new training video on aseptic techniques, a PowerPoint presentation on best catheter-insertion practices, new procedure checklists and protocols, and lots of observations to identify aspects of care that can be improved.

The ICU will also be working with the Cardiothoracic Intensive Care Unit, of which Rassias is the medical director, and the Coronary Care Unit. Although in the past the ICU has had central-line infection rates safely below national benchmarks, in 2005 its rates rose. So far, 2006 is tracking well but it will be several months before Rassias and Mroz can determine if their efforts are having an effect.

Yet the potential for making a difference is great—since hospital-acquired infections affect approximately 2 million people annually, according to the Centers for Disease Control and Prevention, and such infections can be avoided.

Key: “Many health-care infections are preventable if we just pay attention to every detail along the way,” says Dr. Kathryn Kirkland, associate director of the Infection Control Program at DHMC. The key, she says, is to recognize that “the smallest thing actually matters.”

JENNIFER DURGIN

INVESTIGATOR INSIGHT



In this section, we highlight the human side of biomedical investigation, putting a few questions to a researcher at DMS-DHMC.

Angeline Andrew, Ph.D.
Research Assistant Professor of Community and Family Medicine

Andrew, a molecular epidemiologist, studies combinations of genetic factors and exposures to toxic metals that may increase the risk of bladder cancer or affect the prognosis of the disease.

How did you decide to become a scientist?

I started working in environmental risk assessment and realized that there was a need for more toxicologic research to set safe exposure limits.

And when did you become interested in epidemiology?

My thesis project in molecular toxicology utilized cell lines grown in the laboratory. My post-doctoral experience in epidemiology has helped me to translate this research into real human exposures.



If you weren't a scientist, what would you like to be?

I spent a couple of years in teaching—but being a ski bum would be more fun!

What do you consider your most important work and why?

My most important work is in disease prevention. I feel that effective communication of the risks associated with certain exposures and behaviors is critical. Elevated levels of arsenic are occasionally found in unregulated private drinking water wells, even in parts of the U.S. This exposure may be a health concern, particularly when combined with smoking.

What is the greatest joy in your work?

Working on collaborative research projects with scientists from around the world. For example, I am participating in an international bladder

cancer consortium that fosters collaboration among studies.

And the greatest frustration?

Writing grants instead of doing science.

If you could change one thing about your career, what would it be?

Increase the level of job security—living from “grant to grant” is stressful.

What famous person, living or dead, would you most like to spend a day with?

Leonardo da Vinci. I am particularly impressed by his observational skills and his ability to communicate with so many generations of people.

What's your favorite nonwork activity?

I enjoy skijoring with my dogs in the winter and horseback riding in the summer.

What kind of music do you listen to most?

Right now I am into Green Day and the Red Hot Chili Peppers.

Hollywood is doing a movie of your life. Who plays you?

Angelina Jolie.

What advice would you offer to a graduate student contemplating going into epidemiology?

Take some formal coursework in the field early on. Focus on a specific scientific question, but don't limit the tools that you can use to try to answer it. Interdisciplinary training has allowed me to take advantage of scientific advances in multiple fields and combine them in new ways. Dartmouth is a wonderful place to do molecular epidemiology because of its size, collegial atmosphere, and buildings like the Norris Cotton Cancer Center that integrate disciplines such as population sciences and laboratory research.

What misconceptions do people have about epidemiology?

Epidemiology is not limited to “black box” association studies between exposure and disease. Collecting tissue samples allows investigators to assess multiple intermediate biomarkers of exposure and disease-relevant biologic effects.