



ROCKET SCIENCE: Since 1973, 23 physicians have flown in space for the U.S. One of them was Dr. Jay Buckley, a longtime member of the Dartmouth Medical School faculty. He oversaw neuroscience experiments on a 1998 mission on the space shuttle *Columbia*.

THEN & NOW

A reminder of the pace of change, and of timeless truths, from a 1961 publication titled *Medical Education and Dartmouth*:

“Unfortunately the good health Americans have come to take for granted is threatened by an imminent critical shortage of doctors. This alarming conclusion was reached in November 1959 by a special Consultant Group appointed by the U.S. Surgeon General.”



141

Ratio of doctors per 100,000 people in 1961

228

Ratio of doctors per 100,000 people in 2000

30%

Increase over 2002 medical school enrollments now called for by some experts, who fear a shortfall of physicians by 2025

Crohn’s tool is a “home-made” solution

Fortunately for people with Crohn’s disease, Dr. Corey Siegel and his wife, Lori, like to bring their work home. Corey Siegel is a Dartmouth gastroenterologist, and Lori Siegel is an environmental engineer. Together, they developed a tool to help Crohn’s patients make difficult treatment decisions.

There is no cure for Crohn’s disease—an inflammatory bowel disease that can cause pain, ulcers, and other complications that sometimes require surgery.

But medication can also be effective. The problem is figuring out which patients will benefit from which drugs.

Drugs: Traditionally, doctors started patients on mild drugs like antibiotics and switched them to stronger ones only if the weaker drugs failed. But, Corey Siegel says, “we’ve realized that if we . . . use our strongest medications sooner, we do much better. We can prevent complications. We can prevent surgeries.”

But the stronger drugs have more serious side effects. Immunomodulators, which suppress the immune system, can be very effective but can also lead to infections, and even death in 15 of every 10,000 patients. Drugs called biologics also carry risks, albeit minuscule, of life-threatening complications such as lymphoma. “We don’t want to expose anybody to possible side effects who doesn’t need those medications,” Siegel says.

That’s where Lori Siegel, and

her Ph.D. in environmental engineering, came in handy. She uses computers to model complex natural systems, such as weather. “The climate is about as complex as you can get—like the human body,” she says.

As the Siegels talked to each other about their work, they realized that it might be possible to use a computer model to predict a patient’s risk of complications and likelihood of benefiting from

Lori Siegel notes that patients don’t want to hear statistical jargon.

different treatments. So they created a program that takes a patient’s age, gender, location of the inflammation, and blood test results—and predicts the risk of a serious flare-up in the next three years. A physician can then enter different treatments into the program and see the risks and benefits of each option. The results appear as two lines on a graph, baseline risk in blue

and risk with treatment in red.

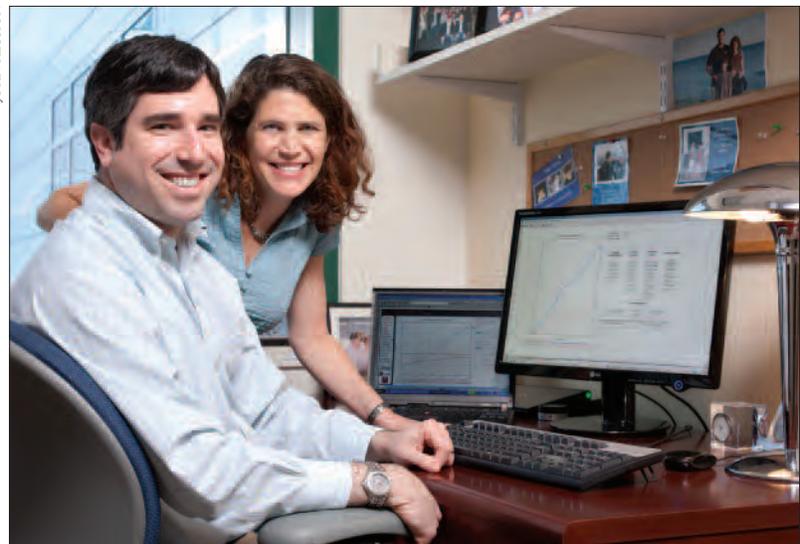
“This model isn’t to convince people to go on medications, it’s to try to find the right people who need those medications,” Corey Siegel says.

Lori Siegel notes that when patients are considering treatment options, they don’t want to hear statistical jargon. “They want to see what their personal risk is and how to make sense of that,” she says.

Data: The Siegels used data from about 800 children with Crohn’s disease to create the program. They plan to validate it by testing its predictions against a second set of patients. If the predictions line up with what that dataset shows, the tool could then be rolled out for use with patients. For now, it will be limited to use in children, but the Siegels hope soon to start collecting the data they’ll need to create a similar tool for adults with Crohn’s disease.

AMOS ESTY

JOHN HESSON



The Siegels show off a screen shot of one of the graphs that their tool produces.

REALLY BIG GREEN: Dartmouth-Hitchcock was admitted to the Environmental Leadership Circle, the highest recognition awarded by Practice Greenhealth, a national organization of health-care facilities committed to environmentally responsible operations.



Elective is valuable, beyond a shadow of a doubt

Starting when they meet their first patient at a doctor's side, medical students see physicians as their teachers. Typically, they don't see nurses in that role. But times are changing. In 2004, DMS first- and second-year students responded in impressive numbers to a new elective—one that offered them a chance to learn from nurses about their role in health care. Other schools are now inquiring about the popular Shadowing a Nurse course.

Dynamic: Before she took the course, "my thoughts of the nursing profession were incredibly naive," says Erica Holland, DMS '13. "I had never really talked with a nurse or taken the time to notice them in the hospital." She learned that a physician's attitude toward nurses makes all the difference in their working dynamic.

That's the kind of lesson that Dr. Joseph O'Donnell, senior advising dean, and Ellen Ceppetelli, director of nursing education, had in mind seven years ago. At the time, both were teaching in a fourth-year case-based course and found that students couldn't solve a problem for which the best solution was to seek information from a nurse.

This concerned Ceppetelli, as well as O'Donnell, whose daughter, Jenny, was a nursing student in Pennsylvania at the time. She had gone on rounds with medical and pharmacy students and suggested to her dad that DMS offer an elective with nurses in a teaching role and give students a chance to talk with each other

afterward about their experience.

So O'Donnell and Ceppetelli set up Shadowing a Nurse. Wanda Handel, a nurse in the neuroscience special care unit, has participated in the elective for several years. "My goals are for the students to observe collaborative communication between nurses and physicians and to learn to see the patient through a nurse's holistic view," she says. "I also want them to see just how smart nurses are."

Holland was indeed surprised by how much nurses know and by the amount of record-keeping they oversee. "I was absolutely amazed by how many different tasks the nurses could juggle and still have a smile on their face," she says.

Clinton Orloski, DMS '13, who took the elective to better understand how a medical team functions, was impressed that Pe-



Jessica Ash, left, is one of the nurses who's taught in the shadowing elective.

PHOTO: COURTESY OF DARTMOUTH COLLEGE

ter Nolette, a specialist in wound care, was able to ease a patient's anxiety by explaining and applying a different bandage.

Reflection: After two shadowing stints, students in the elective meet in three 90-minute classes to share their experiences and lessons learned. A reflection paper is also a requirement of the elective. In a 2009 article that Ceppetelli and O'Donnell wrote for *Academic Physician and Scientist*, they identified two themes that emerged from these papers:

nurses' intimate knowledge of patients and their

families and how they cultivate those relationships, and nurses' oral and written communication to maintain quality and safety for patients.

O'Donnell calls the elective "very successful" in preparing students to work in an interdisciplinary way with nurses. He'd like to see the subject brought into the mainstream for all medical students.

Profession: Handel says teaching the elective made her "very proud," as she saw students walk away with a better understanding of nursing as a profession.

From the student perspective, Holland says she'll "definitely remember" her shadowing experience. "I now understand how much of a resource the nurses can be," she says, "and, if you treat them with the respect they deserve, how productive and effective a healthy relationship [can] be for the nurse, the doctor, and especially the patient."

ROSEMARY LUNARDINI

THEN & NOW

A reminder of the pace of change, and of timeless truths, from the Spring 1984 issue of this magazine:

"In an effort to broaden its range of services and strengthen the clinical faculty in maternal and child health, [DHMC] has instituted a program of certified nurse midwifery. . . . A team of four midwives . . . [is] offering a wide range of services to interested individuals and families."



1931

Year the first U.S. school for nurse midwives was established

1983

Year the nurse midwifery service opened at DHMC

9

Number of certified nurse midwives now practicing at DHMC

THEN & NOW

A reminder of the pace of change, and of timeless truths, from the 1960 Mary Hitchcock Memorial Hospital (MHMH) Annual Review:

Dr. Sven Gundersen wrote: “These are challenging times in medicine from many points of view, including scientific, socioeconomic, political, and philosophic. . . . In the final analysis, a hospital will prosper mainly in relation to the quality of its professional staff, that is, the ability, training, integrity, motivations, and dedication of its members.”



890

MHMH employees in FY60

6,841

Dartmouth-Hitchcock employees in FY08

63

Residents in FY60

366

Residents/fellows in FY08

Educators are beating a path to this door

If you build it, they won't necessarily come. That concern was something Drs. Norman Berman and Leslie Fall kept in mind as they created a series of virtual training programs for medical students.

Droves: “Just developing stuff will not get it used,” Berman says. But if you build “stuff”—online learning tools, in their case—in the right way, “they” will in fact come, in droves.

Berman and Fall, who are both pediatricians, haven't had any trouble getting medical educators to use a case-based program they created 10 years ago. More than 120 medical schools now subscribe to their Computer-assisted Learning in Pediatrics Program (CLIPP) and another series of cases

called SIMPLE (for Simulated Internal Medicine Patient Learning Experience). Both are housed on www.Med-U.org, a site Fall and Berman created to serve as a portal for CLIPP, SIMPLE, and their newest series, Family Medicine Cases (fmCASES). (The site also houses a surgical series, WISEMD, that was developed at New York University.)

Core: Written, edited, and peer-reviewed by medical educators nationwide, the programs cover the core content of the third-year primary-care clerkships—or all of it that can be taught with virtual patients.

“Think of our cases as a replacement for textbook reading and lectures,” says Fall, not for

real patients. The cases “give a safe place for cognitive practice,” she adds, letting students learn about various illnesses and even make mistakes before encountering live patients. “We spend a lot of time telling people not to make [the programs] an add-on,” explains Berman.

Given the number of subscribers, it's clear that medical educators like the programs. But are they better teaching tools than the textbooks and lectures they replace?

Six: “No one has ever been able to do the education equivalent of a multicenter, randomized, placebo-controlled trial,” says Fall, “but . . . we can study learning effectiveness.” So she, Berman, and some of their colleagues surveyed 611 students at six schools about CLIPP's effectiveness and its integration into their clerkships.

“Overall student satisfaction with the virtual patients was high,” the team reported in *Academic Medicine*. On a scale of 1 to 5, with 1 being strongly disagree and 5 strongly agree, the mean score was 3.98 for the statement that “The cases were a valuable use of my time.”

Berman and Fall estimate that the average student whose school uses CLIPP spends from 15 to 20 hours working through about 20 virtual cases during the typical six-week clerkship.

Since it takes about \$500,000 to develop a series of cases and \$350,000 a year to sustain each



JON GILBERT FOX

Berman, Fall, and their programs' site.

series, assessing the value of the programs is important both academically and financially.

CLIPP was initially funded by two federal grants that ended in 2006. So Fall and Berman established the nonprofit Institute for Innovative Technology in Medical Education to promote and maintain CLIPP. Not long after, they were approached by national organizations in family medicine and internal medicine to develop similar programs in those specialties; fmCASES and SIMPLE were the result.

More: Subscriptions work out to about \$30 to \$40 per third-year student, says Fall. When they first started charging for CLIPP, a lot more schools subscribed than they expected. And when they piloted fmCASES, about 100 schools signed up.

Fall thinks that's because “we facilitated a for-the-people-by-the-people approach.” For example, the programs' editorial boards include educators from over a dozen medical schools. Maybe that's why their concern hasn't come to pass. They've built “it” with input from users, so “they” keep coming.

JENNIFER DURGIN