

SIM CITY: Dartmouth's 8,000-square-foot simulation center is the third-largest such center in the nation. Health-care providers can practice procedures there on lifelike manikins programmed to bleed, cry, drool, and sweat.



THEN & NOW

A reminder of the pace of change, and of timeless truths, from a 1943 book titled *Fifty Years of Service: A History of the Mary Hitchcock Memorial Hospital*:

"As early as 1776, mention is made of [a hospital] 'located in the Lebanon woods.' . . . During the next year, the college mill on Mink Brook, just below the bridge on the Lebanon road, was converted temporarily into a hospital. These, however, were isolation centers rather than hospitals in the true sense. . . . As a result of . . . the fear that these hospitals might serve as centers of contagion . . . neither served its purpose for very long."



1893

Year Mary Hitchcock Memorial Hospital opened

225

Acreage of the wooded site in Lebanon where the Hospital is now housed

DHMC develops a "green" yardstick for hospitals

It sounds like it must be a very good, "green" thing for a hospital to calculate its ecological footprint, but what exactly does that mean? It's a process DHMC recently went through, so John Leigh, manager of waste and recycling, is very familiar with the concept. He explains that an ecological footprint is "a measure of natural resources consumed as compared with the Earth's ability to regenerate those resources." To achieve sustainability, a population shouldn't consume more than its proportional share of those resources.

The Earth contains 28 billion productive acres, such as forests and croplands (which excludes deserts, polar areas, and some ocean areas). Dividing that acreage by the Earth's population, 6.8 billion, gives 4.1 acres for each person (which doesn't even factor in the 25 million other species on the planet).

Rise: "We now know that humans are exceeding the biocapacity of the Earth by about 24 percent," says Leigh. "We began to overshoot it in the mid-1980s, and we can reliably predict that the overshoot rate will continue to rise because the population is growing, the per-capita consumption rate is growing, and technology continues to drive our consumption ability."

The calculation of an ecological footprint is a complicated process. Leigh led the development of the spreadsheet-based tool that allowed DHMC to calculate its footprint, thanks to a grant from the Maverick Lloyd

Foundation. He broke the institution's environmental impact into seven categories: products, energy, food, waste, transportation, water, and built land.

Gas: Some measurements are firmer than others. For example, experts agree on the greenhouse gas emissions associated with consuming electricity and fuel oil, and DHMC engineers have tracked energy consumption for years. It was much harder to

get a handle on the impact associated with the wide variety of products that a major medical center uses—from disposable rubber gloves to massive imaging machines.

When all the best measurement models and conversion factors were settled on and applied to DHMC's calculation, the result was 13.8 acres per full-time-equivalent employee—of which there are 5,700 on the Lebanon, N.H., campus. And that doesn't even factor in the resources that all those employees consume at home.

So how does that figure compare to other hospitals? That's a good question, but it's one for which there is, as yet, no answer. DHMC

is so far ahead of the curve that no other U.S. hospital has calculated its footprint. Leigh is offering the tool he developed to other hospitals, but no one has completed the process yet.

Meanwhile, Leigh has already begun to apply the results of the calculation. For example, one startling finding was that 32% of the overall impact came from transportation. That includes by patients, visitors, and staff, with staff transportation to and from work the biggest factor.

The average one-way commute to work for DHMC employees is nearly 42 miles.

The Medical Center already helps underwrite the local bus system, Advance Transit; has supported the construction of nearby affordable housing; and has taken other steps to minimize commuting. But Leigh would like to see more done in this area. As the Medical Center considers its options, he can now plug data associated with differ-

The calculation of an ecological footprint is a complicated process.

JON GILBERT FOX



John Leigh is the manager of waste and recycling at DHMC.

ent actions into the ecofootprint tool to learn each action's relative impact.

And best of all, as changes are made, it will be possible to clearly track and not just guess at their impact on the institution's ecological footprint.

Leigh believes a hospital should do all it can do reduce its ecological impact in part because it's unavoidably high. For example, infection-control procedures require the consumption of vast amounts of disposable supplies. The temperature in patient-care areas must be kept comfortably warm in winter and cool in summer. Life-safety features like automated doors and a constant oxygen supply are energy-intensive. Some of the anesthetics used in surgery are greenhouse gasses, so there is a cost to handling them. The list of special needs goes on and on.

Lots: Besides Leigh, one of the people who helped to make DHMC a pioneer in sustainability was his predecessor, Laura Brannen. She now works for a national program called Waste Management Health Care Solutions. "Successful programs," she says, "depend on people to make them happen." Lots of people, she adds. "It was certainly helpful to get buy-in from the top" when DHMC made sustainability a priority 20 years ago, Brannen says, but real success comes when every employee tosses bottles in the recycling bin instead of the trash or considers walking instead of driving to work.

Sometimes the steps toward sustainability are quite literal.

ROGER P. SMITH, PH.D.

INVESTIGATOR INSIGHT

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

Charles Cole, Ph.D.

Professor of Biochemistry and of Genetics

Cole studies how messenger RNA and mRNA/protein complexes are exported from the cell nucleus to the cytoplasm to be translated into proteins. He has been at DMS since 1983.

How did you get interested in your field?

Growing up in the post-Sputnik era, there was increased interest in teaching science and math, and I was fortunate to participate in an accelerated math and science program. I was also quite interested in chemistry. I had a chemistry set with a large number of compounds and became very interested in chemical mixtures that sparkled or smoked or smelled bad.

What do you consider your most important work?

I've changed the primary focus of my research during the course of my career, which many do not do. In my lab's work on DNA tumor viruses, we made an important contribution to the understanding of the immortalization and malignant transformation of cells by the virus SV40. Then 20 years ago, we began studying mRNA export, and we developed a screen to identify mutants of yeast defective in this fundamental process.



What was your first paying job?

The summer before I entered college, I had an incredibly boring job transferring data about farmers' tractors to huge ledger sheets. Farmers who subscribed to *Farm Journal*, published in Cincinnati where I grew up, had been asked to fill out questionnaires about their tractors, and I had to enter the data by hand from about 2,500 questionnaires. This was early in the era of

computers, and it was clear to me that this was a task for a computer.

Who are your heroes?

Yoda, for his perspective on the world (or universe might be more accurate). I'm a big fan of Hermione in *Harry Potter*, and Grover has always been a favorite of mine. I like the whimsical and the ironic, both in fiction and in life.

What are your favorite books?

While I was growing up, the works of Hermann Hesse were being translated into English. Starting with *Siddhartha*, I read and enjoyed all of them. *The Glass Bead Game*, probably his crowning achievement, was my favorite. I really like future histories—*The Glass Bead Game* is one—and many of my other favorites are from that genre, including Olaf Stapledon's *Star Maker*.

If you invented a time machine, where would you go?

Far into the future. We have a pretty good idea what happened in the past. But we have no idea what is going to happen. I won't be around then, but I'd be really interested in knowing how it all comes out. I recently read a book called *Year Million*, and almost all those writing in the book had no doubt that there would be some sort of human civilization at that time. So let's set the time machine for the year one million.

What about you would surprise most people?

I am quite good at sewing and have made clothes for my children for many years. I learned how from a woman who stayed with my siblings and me when my parents were on vacation. She brought her sewing machine and made clothes for our stuffed animals. I bought my first sewing machine soon after college.

What's your favorite nonwork activity?

That depends on the season—cross-country skiing in winter, kayaking and hiking in summer, cooking all the time, and travel.

What is a talent you wish you had?

I wish I could play an instrument. If I had my choice, I'd probably want to be able to fiddle.

