The Human Lung: A National Resource, Desperately Needed

Teaching and research don't always overlap—but for **Susan Murray,** associate professor of biostatistics, the two have merged in an unexpectedly rich way.

It began in 2000, when Murray was teaching a course on clinical trials to graduate students in the school's On Job/On Campus program in Clinical Research Design and Analysis. Two students in the class, both members of the Division of Pulmonary and Critical Care at the University of Michigan Medical School, asked Murray whether she'd ever done pulmonary research. She said she hadn't, and they asked if she'd consider working with them.

"Because I'd trained them in clinical research, we spoke the same language," Murray remembers. "I'm very glad I said yes when I did. It's been one of my most rewarding collaborations—my love of teaching paid me a service."

Today Murray is engaged in several research studies involving pulmonary disease. She's a senior biostatistician with the Scientific Registry of Transplant Recipients, and she is a member of the Cystic Fibrosis Foundation's Data and Safety Monitoring Board as well as their Clinical Research Committee. Last summer, Murray's work on revising the statistical methodology used to identify lung transplant recipients led to a nationwide change in policy.

"Lung transplants are a last resort," Murray says, noting that the survival rates for heart transplants are far higher than for lung. "You generally don't attempt a lung transplant unless you have no other options."

On any given day, some 2,000 Americans are in urgent need of a lung transplant—but on average, just 1,000 Americans a year receive one. The obvious question, then, is how do policymakers decide who gets a lung and who doesn't?

Initially, lungs were allocated on a first-come, first-serve basis, Murray explains. But the system soon became clogged as more and more patients joined the waitlist. Ultimately, those with the stamina to wait received lungs, while more critically ill patients died. "Virtually no statistics were involved in the allocation system," Murray recalls.

Susan Murray, with twin sons Josh and Ben. She notes with a laugh that before her pregnancy, her chief research interest was paired censored survival data, a methodology that is often used to study twins. Now Murray juggles child care with a research program focused primarily on pulmonary disease.

To address the problem, Murray and her colleagues first devised a statistical method for estimating how many days in the next year a given patient could be expected to live if he or she did not receive a lung transplant in the current year. "This measured urgency," she says. To avoid futile transplants, Murray and her colleagues also developed a means of estimating how many days in the next year a patient could be expected to live if he or she received a transplant.

"If you subtract one from the other, you get an idea of the average number of days to be gained in the next year from either getting or not getting a lung," says Murray. "The idea is to get organs to patients who have high urgency and a pretty good chance of gain."

Last June, Murray and her colleagues proposed this new statistical allocation system to the Organ Procurement and Transplantation Network Board of Directors, and it was unanimously approved. But Murray's team is continuing to update the algorithm as information on new risk factors becomes available, an ongoing process.

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"These organs are a national resource in a way," Murray says. "You have to constantly be diligent."