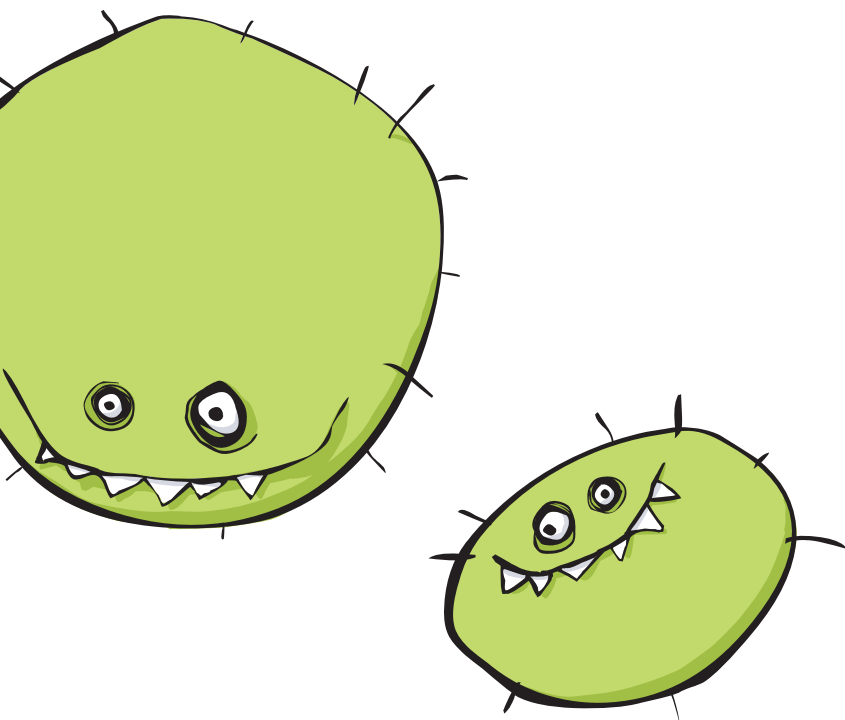
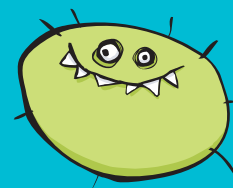


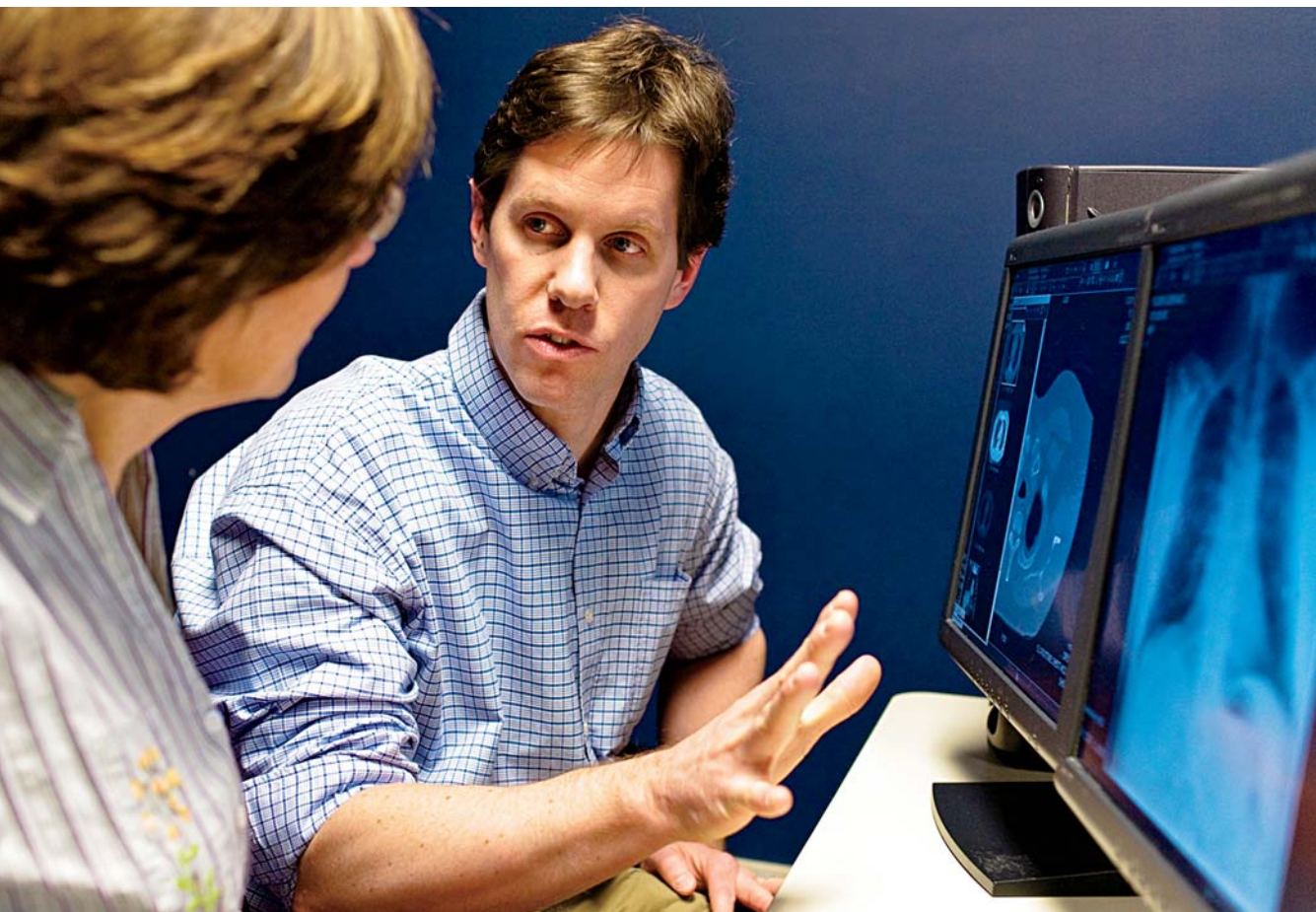
# Critical



# Care



As anxiety about the H1N1 influenza pandemic unfurled across the globe, a Sunnybrook research team led the first studies to detail what the virus looks like, with the shocking conclusion that it hits the young and healthy the hardest—and that hospitals better be prepared *By Jim Oldfield*



DR. ROBERT FOWLER

Surprise, followed by skepticism. That was Dr. Stephen Lapinsky's reaction, in the spring of 2009, to the first data by Dr. Robert Fowler from Sunnybrook Health Sciences Centre showing just how sick HINI patients in Mexico were getting. "It didn't make sense because these were young patients who basically couldn't physically be ventilated," says Lapinsky, the site director of the intensive care unit (ICU) at Mount Sinai Hospital in Toronto. "It was a very unusual situation."

Lapinsky soon lost his skepticism. He contacted his research colleagues at Sunnybrook and in Mexico, and they verified that many of the HINI patients were indeed requiring intensive lung support to breathe, and that several were young—unlike those who typically fall critically ill with influenza. Moreover, a lot of these patients had no underlying medical problems that might explain the severity of their illness, and a significant number had died. Within a few weeks, results from a similar study of Canadian patients confirmed several of the findings from Mexico.

Fowler, an associate scientist at Sunnybrook Research Institute and critical care doctor at Sunnybrook, was the senior researcher on both studies, which were collaborative projects involving members of the Canadian Critical Care Trials Group (CCCTG), including Lapinsky, and the researchers in Mexico. "The implications for resources within hospitals were substantial, knowing that these were patients who would need uncommon forms of lung and life support, not just for a day or two, but for many weeks," says Fowler, who is also an assistant professor at the University of Toronto.

The *Journal of the American Medical Association* published the two studies online in October 2009, noting in an editorial that they were done with "remarkable" speed and that they were two of the first in the world to address the "paucity of data" surrounding HINI. But months earlier, through the summer and fall of 2009, the unpublished findings changed pandemic planning for this new strain of influenza across Canada and around the world.

### Critical Planning

Previously, HINI planners didn't consider ventilators a major issue. "Our pandemic plan at Mount Sinai was to use transport ventilators, or anesthesia-type ventilators, but with the research data we soon realized this would be inadequate," says Lapinsky. By the summer of 2009, Mount Sinai staff had made plans to acquire more sophisticated ventilation equipment, including high-frequency oscillators and extracorporeal membrane oxygenation machines, in advance of the winter flu season.

At Sunnybrook, the ICU already had a range of ventilation devices, but staff collaborated with the Ministry of Health and Long-Term Care to ensure access to more, and developed a plan to accommodate a surge of HINI cases that included caring for patients in areas of the hospital other than the ICU.

At the same time, Fowler and his CCCTG colleagues, with the Public Health Agency of Canada, began taking stock of all Canadian intensive care beds, ventilation equipment and staffing capacity—a task that proved surprisingly difficult. "Remarkably, although we had a sense of ICU beds [in Toronto], nobody really had a good idea of numbers at a national level," says Fowler.

Typical Canadian ICUs are between 90% and 100% occupied at any given time, so there's rarely much room for a surge in patients. Recognizing the importance of a comprehensive ICU inventory, the Public Health Agency freed up a data collector, and the group completed the bulk of the work by the time the studies were published in October. Meanwhile, several Canadian provinces bolstered their central supplies of ventilation equipment to handle potential demand in those ICUs found to have limited resources.

### Critical Collaboration

While the two studies altered ICU resource planning in Canada, their standardized case-reporting forms enabled researchers

in Canada and Mexico to determine which patients were getting critically ill and not surviving. “We really wanted to get a handle on, of the people who were dying, what they were dying of,” says Fowler. “Did they have other medical conditions, or was this flu actually killing them?”

To develop the case-reporting form for Mexico, Fowler consulted with members of the CCCTG, and with Sunnybrook’s president and CEO Dr. Barry McLellan, whose background in the Ontario coroner’s office helped Fowler draft a framework to attribute cause of death. Sunnybrook’s research ethics board fast-tracked approval of the draft, and the result was a form—ready just four days after the Mexicans requested it—that enabled them to describe accurately the course of H1N1 in specific types of patients.

The investigators in Mexico had contacted Toronto researchers early in 2009, in part because they wanted the benefit of Canada’s experience with SARS in 2003. Based on their SARS experience, Toronto researchers and critical care physicians conveyed infection prevention measures they thought would be useful, and stressed the importance of research; additionally, the form that Fowler and his colleagues produced, which enabled the Mexicans to determine that H1N1 was killing young, healthy patients, was crafted from a SARS case-report form.

But another important reason that Mexico came to Canada for help, according to Fowler, was the cooperative nature and research achievements of the CCCTG. “The Canadian critical care community has for many years been collaborative in their approach to academics and clinical care, and has to a degree ‘pollinated’ critical care groups around the world with the idea of collaborative research,” says Fowler. As well, he says, the Mexicans viewed the CCCTG as a trusted team that would not undermine their work by claiming it as their own.

### Critical Message

The CCCTG is a model of collaborative success. Since its founding in Hamilton in 1989, the group has published over 75 peer-reviewed papers, 10 in the high-impact *New England Journal of Medicine*, and inspired similar groups in about a dozen other countries. Fowler calls his participation in the CCCTG “the richest education I’ve ever undertaken,” and was thrilled when critical care groups in Australia, the U.K., Europe and the U.S. asked the CCCTG to help them roll out the H1N1 reporting structure in their own countries, which they did through the summer and fall of 2009.

This global proliferation in turn laid the foundation for the International Forum for Acute Care Trialists (InFACT) H1N1

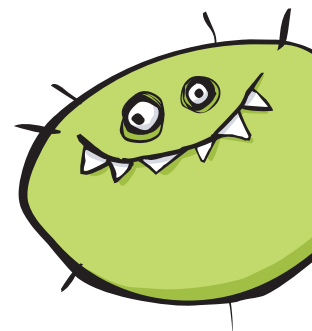
Collaboration, which is being led by Dr. John Marshall, chair of the CCCTG and a scientist at St. Michael’s Hospital in Toronto. The InFACT initiative, in which Fowler is participating, will see researchers in several countries sharing data to develop common metrics to improve critical care for H1N1 patients over the coming months—or years, depending on the severity of the pandemic. Marshall says the data sharing will be easier owing to the standardized case-reporting form and Fowler’s interaction with other critical care groups. “Rob has done a heroic job of bringing people together and melding this into a very global response to the pandemic,” says Marshall. “And I think it’s his incredible willingness to pass credit around that has really driven the success of the process so far.”

One of the findings that came from a comparison of the Mexican and Canadian studies—the sort that should emerge as the InFACT effort progresses—was that 40% of patients who became critically ill with H1N1 in the Mexican study died, versus 20% in Canada. Many of the Mexican patients came into the hospital much sicker, and later, than those in Canada, and they didn’t have access to the same life-supporting technology and care. “The message,” says Fowler, “was that it may be important for young, otherwise healthy people to present for aggressive care early rather than later in their illness.”

Critical care researchers and pandemic planners around the world clearly took that message seriously. The studies were cited by other peer-reviewed research more than a dozen times within six weeks of publishing, and media outlets across the world devoted coverage to the findings. In Canada, knowledge of the severity of H1N1, and of which patients were most at risk, likely limited the impact of the virus in 2009.

Despite some tragic and highly publicized deaths, and considerable difficulty getting rapid funding for H1N1 research—the latter a problem the CCCTG is lobbying hard to fix—Marshall says he’s reasonably happy with how Canada has dealt with the virus to date. “There’s understandably a huge amount of anxiety about H1N1 that has led to hyperbole on both sides, either understating or overstating the seriousness of the problem,” says Marshall. “But I think what’s necessary is to be somewhat sanguine about the fact that we’re learning as we go, and as long as people are maximally engaged and committed to that process, then we will make it through pretty well.”

Fowler’s research was funded by the Canadian Institutes of Health Research, Public Health Agency of Canada, Ontario Ministry of Health and Long-term Care, and Heart and Stroke Foundation of Canada.



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