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# UNB mathematician works to predict the spread of infectious diseases like H1N1

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James Watmough is working to do the math on H1N1.

The University of New Brunswick professor is part of a few research projects, spearheaded by York University's nationwide **MITACS** research network, designed to statistically model and analyze communicable diseases like influenza.

**MITACS** stands for mathematics for information technology and complex systems.

The **MITACS** centre for disease modelling is the hub of a network of researchers across Canada who work on mathematical theories to predict the spread of infectious diseases like H1N1. The centre has run several workshops together with the Public Health Agency of Canada (PHAC) with the aim of closing the gap between academic research and the government's practical needs.

"This fall in New Brunswick we will see a race between the influenza outbreak ... and a vaccination campaign," Watmough said. "An important question is 'Who should we vaccinate first?' This question is in part political, part logistic and part ecological."

Watmough said he and his fellow researchers are working to clarify the ecological side of the issue to lead to better-informed political decisions and bring about the best ends for the public. He said their models for the spread of influenza include a system of mathematical relations involving the number of people susceptible, exposed, infected and ill.

Their work can also help in the design of complex computer simulations that mimic the potential spread of the infection through an artificial city.

"These models are playing an important role in the response to the pandemic, " he said. "They can be used to predict (the infection's potential) spread and to examine the dependence of a vaccination program on various factors."

Watmough said the research team is also exploring other potential pandemics relevant to New Brunswickers like tunicates, which can cripple mussel farms, along with alien invasive forest insects like the emerald ash borer and the brown spruce longhorn beetle.

"Mathematically, the study of a disease outbreak and an insect pest outbreak share many common features, such as a threshold for invasion, a spreading speed and a pattern of spread through a host population," he said.

"It is always important to think outside the box (because) the influenza virus changes each year, and this year the virus has undergone a major shift," he added.

"In effect, we are dealing with a new virus which will lead to different symptoms and complications and transmit differently than seasonal influenza. Most of what we know about influenza will serve us well in preparing for H1N1, but there will be differences."

He said that work is crucial in gaining a better understanding of how to not only fight the disease, but understand its potential danger.

"Since the virus has changed, it is impossible to predict the severity of the pandemic," he said. "We should be prepared for something immense. Of course if our interventions... (like) hand washing and vaccination... are effective, the epidemic will be minor."

He added that following and believing in those interventions is crucial because they can not only lower the potential for a pandemic -- they can also stem widespread panic.

"The potential for danger is very real, but with luck, everyone will be disappointed in the end."

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