

Detecting flu and other disease outbreaks sooner

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CSIRO Mathematics, Informatics & Statistics Chief, Professor Louise Ryan, with senior CSIRO scientist, Dr Ross Sparks. (Pic Credit: Chris Taylor)

New methods for detecting disease outbreaks earlier have been developed in a collaborative effort between CSIRO and NSW Health.

According to an article published recently in the journal *Institute of Industrial Engineers Transactions*, the new methodologies may enable [health authorities](#) to take action sooner to implement disease outbreak control measures.

"New methods developed by CSIRO statisticians have the potential to give an earlier-than-ever indication of whether a flu season is behaving normally or not," says CSIRO Mathematics, Informatics and Statistics' Chief, Dr Louise Ryan.

"Diseases such as flu can spread quickly. The swine [flu outbreak](#) - Pandemic (H1N1) 2009 - was, for example, threatening to overload intensive care services in Australian hospitals within weeks of being recognised in Mexico."

Dr Ryan said that e-Health technology provides huge amounts of data on hospital admissions, symptoms and locations that can be challenging to make sense of.

"We used archives of daily counts of emergency department visits from 12 NSW hospitals on seven different syndromes such as abdominal pain, influenza-like illness or respiratory conditions. We then adapted statistical control methods originally used to signal machinery failures in factories.

"We tested them on simulated health data and found we could detect an outbreak up to one day earlier than more conventional methods.

"Our statistical tools answer the question: how do you know when you've got a disease outbreak unfolding? They tell us what the usual pattern would be of, say, winter flu. Then we can understand the variations that might signal something more serious."

A Senior Epidemiologist at NSW Health, David Muscatello, said that, while the research and new techniques are promising, more work is needed to assess how they will perform in real life situations.

"Health data has complexities which make it difficult to monitor, so any new techniques require careful evaluation," Mr Muscatello said. "We don't expect to solve the problem in one go."

Applying the model to e-Health data streams has the potential advantage of detecting not just the seasonal flu but new or rare events such as a

new type of viral illness or an intentional outbreak like a bioterrorism attack. And it could allow health departments to predict the demographics and location of people most at risk.

For example, the methods could help narrow-in on a suburb with an outbreak of diarrhoea amongst school aged children. Preventive measures could then be rolled out, such as hand washing and ensuring infected children stay at home.

CSIRO is using the techniques to analyse flu data from other states and exploring the potential to build the statistical tools into hospital management software.

Statistical surveillance methods developed by CSIRO have also been used in monitoring traffic incidents, pipeline breakages, and financial fraud.

More information: Sparks R., Carter C., Graham P.L., Muscatello D., Churches T., Kaldor J., Turner R., Zheng W., Ryan L.. 2010. Understanding sources of variation in syndromic surveillance for early warning of natural or intentional disease outbreaks. IIE TRANSACTIONS, 42 (9): 613-631

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