

## Spring of Fear: The Ontario SARS Inquiry

The report of the Commission set up to investigate the introduction and spread of SARS in Ontario is out. As the last major infectious disease outbreak SARS offers a wonderful case study for all those engaged in Influenza pandemic planning. The report should be compulsory reading for public health practitioners. In the 2117 pages of his report the Honourable Mr. Justice Archie Campbell gives us all a lot to think about. Download the full report from <http://www.sarscommission.ca/> or read on.

Justice Campbell does not start well. The first paragraph of his introduction is:

*SARS was a tragedy. In the space of a few months, the deadly virus emerged from the jungles of central China, killed 44 in Ontario and struck down more than 3301 others with serious lung disease. It caused untold suffering to its victims and their families, forced thousands into quarantine, brought the health system in the Greater Toronto Area and other parts of the province to its knees and seriously impacted health systems in other parts of the country.*

The “jungles of central China” took my attention so I almost missed the inflationary 0 in the total number of cases. Putting that to one side, Justice Campbell gives us much to chew on; not the least by asking and answering the question, why should we care about SARS now, three years after the event? “We should care about SARS because it was a wake-up call and it holds the lessons we must learn to protect ourselves against future similar outbreaks and against the global influenza pandemic predicted by so many scientists.”

The Campbell report says the evidence discloses no scapegoats. The problem was a system failure. In Ontario, the public health and emergency infrastructures were in a sorry state of decay, starved for resources by governments of all three political parties. The health system’s capacity to protect its workers was in a state of neglect: what little existed was badly malnourished. There was no system in place to prevent SARS or to stop it in its tracks. Ontario was saved from worst disaster by the courage and sacrifice and personal initiative of those who stepped up – the nurses, the doctors, the paramedics and all the others – sometimes at great personal risk, to get them through a crisis that never should have happened.

The Commission spent some time examining the differences between the response in Toronto and that in Vancouver. They concluded that the British Columbia’s index patient, who also stayed at the now infamous Kowloon hotel was admitted to Vancouver General suffering from SARS, but there was no further spread. A combination of a robust worker safety and infection control culture at Vancouver General, with better systemic preparedness ensured that B.C. was spared the devastation that befell Ontario.

The Commission found that stories of the outbreaks at the two Toronto hospitals reveal a systemic province-wide inadequacy of preparedness, infection control and worker safety systems. Common problems and themes emerged from the stories of both outbreaks. They reflect seven systemic problems that run like steel threads through all of SARS, through every hospital and every government agency. Putting your hands on your heart, how many can you sign off on?

- Communication
- Preparation, planning

### Inside this Issue

Spring of Fear: The Ontario SARS inquiry	1
The WHO issues pharmacological guidelines for treating avian flu virus	4
C difficile now endemic in NHS	6
Molecular anatomy of Influenza virus detailed	6
Wellingtonians say “its our fault”	7
Natural Disasters and Epidemics	8
Deadly tornadoes sweep through Louisiana	10
Upcoming Events	10
Editor’s Soapbox	10



Justice Archie Campbell

(Continued from page 1)

- **Accountability:** who's in charge, who does what?
- **Worker safety**
- **Systems:** infection control, surveillance, independent safety inspections
- **Resources:** people, systems, money, laboratories, infrastructure
- **Precautionary principle:** action to reduce risk should not await scientific certainty

### Poor infection control and the use of N95 masks



One of the most contentious issues during SARS was the N95 respirator, which was supposed to protect nurses and other workers during close contact with SARS patients. Although Ontario law required, since 1993, that anyone using an N95 had to be properly trained and fit tested to ensure full protection, few hospitals complied with this law and some even denied its existence. Fit testing was the subject of official confusion and heated public debate. It became a lightning rod for all the underlying problems of worker safety in hospitals.

The real problem was not the N95 respirator but the deep structural contradictions in hospital worker safety. These problems include a profound lack of awareness within the health system of worker safety best practices and principles. They include the failure of the (Ontario) Ministry of Labour to proactively inspect SARS hospitals until June 2003, when the outbreak was virtually over. In B.C., by contrast, the workplace regulator took decisive action and began inspections in early

April, wanting to ensure that workers were being protected from the start as required by law. The problems include those in hospital administration and health bureaucracies who resist advice and enforcement on hospital turf by independent worker safety experts and the provincial Ministry of Labour. Most important, the problems include Ontario's failure to recognize in hospital worker safety the precautionary principle that reasonable action to reduce risk, like the use of a fitted N95 respirator, need not await scientific certainty. There were during SARS two solitudes: infection control and worker safety. Infection control relies on its best current understanding of science as it evolves over time. It is unnecessary to point out again that infection control failed to protect nurses during SARS.

The N95 was sometimes required in other areas of a hospital even when not caring for SARS patients. The provincial directives for the use of the N95 changed throughout SARS were not always clear or consistent.

Worker safety relies on the precautionary principle that reasonable action to reduce risk should not await scientific certainty. The debate about the N95, respiratory protection and fit testing can be understood only in the context of the heavy burden of disease that fell on hospital workers, paramedics and others who worked in Ontario's health system during SARS. Two nurses and a doctor died from SARS. Almost half those who got SARS in hospital were people who got SARS on the job from working there.

Part of the heated debate during the SARS outbreak was over whether N95 respirators were really necessary. Those who argued against the N95, which protects against airborne transmission, believed SARS was spread mostly by large droplets. As a result, they said, an N95 was unnecessary except in certain circumstances and a surgical mask was sufficient in most instances. They made this argument even though knowledge about SARS and about airborne transmission was still evolving. That more and more studies have since been published indicating the possibility under certain circumstances of airborne transmission, not just of SARS but of influenza, suggests the wisdom and prudence of tak-

ing a precautionary approach in the absence of scientific certainty.

According to the Commission the point is not who is right and who is wrong about airborne transmission. The point is not science, but safety. Scientific knowledge changes constantly. Yesterday's scientific dogma is today's discarded fable. When it comes to worker safety in hospitals, we should not be driven by the scientific dogma of yesterday or even the scientific dogma of today. We should be driven by the precautionary principle that reasonable steps to reduce risk should not await scientific certainty. The Commission is not surprised that in Vancouver, with its greater systemic awareness of and commitment to worker safety, only one health worker contracted SARS.

### Bad Communications

Throughout the report there is repeated reference to bad communication between governments, agencies and hospitals. Although a real effort was made by government and public health to give the public timely and accurate information, performance was mixed. In some instances public communication was excellent, in others public communication was like a train wreck. There is no evidence that information was deliberately withheld. But there is much evidence of serious communication failure. The report notes, "Bad communication is a steel thread throughout the story of SARS." Poor communication exacerbated a confusing and terrible time and it happened again and again. Until mid-May 2003, directives failed to remind employers of their worker safety legal obligations. And over and over when new hospital outbreaks were detected, there were inordinate delays before all workers who might have been exposed were contacted.

### Effective Crisis Communication

There were many systemic problems with crisis communications during SARS. Workplace parties, including unions and the Ministry of Labour, told the Commission of their difficulties in receiving directives in a timely manner and in gaining access to Ministry of Health websites. Employers and workers' representatives often had great difficulty in receiving timely responses

(Continued on page 3)

(Continued from page 2)

to questions to the Provincial Operations Centre, Ministry of Health and the Ministry of Labour, on important issues, including work refusals, safety of pregnant workers, and safety of immunocompromised workers. In some cases, media reports were more informative on SARS than communications by health institutions to their workers.

For the past year or so in New Zealand we have been struggling with the concept of a Health led, Civil Defence supported Influenza Pandemic response. The Commission noted that the SARS response was also hamstrung by an unwieldy emergency leadership structure with no one clearly in charge. A *de facto* arrangement whereby the Chief Medical Officer of Health of the day shared authority with the Commissioner of Public Safety and Security resulted in a lack of clarity as to their respective roles which contributed to hindering the SARS response.

For Ontario, an important lesson from SARS is that the last thing Ontario needs, in planning for the next outbreak and to deal with it when it happens, is another major independent player on the block. The Commission says that there is always a danger in introducing a semi-autonomous body into a system like public health that is accountable to the public through the government. The risk is that such a body can take on a life of its own and an ivory tower agenda of its own that does not necessarily serve the public interest it was designed to support.

### **Emergency Plans for Orderly Hospital Closure**

SARS demonstrated the immense difficulty of closing a hospital in the middle of an outbreak, when no one had done it before, when no one had planned for this possibility, and when no exercises and education had been conducted to train staff on how to do it.

There were three hospital closures during the Ontario outbreaks. The Commission has recommended the development of emergency plans for orderly hospital closure to avoid problems and cover all eventualities and in particular:

- Effective means for immediately notifying staff at the institution of any potential risk.
- Effective means for immediately notifying staff not on duty at the institution of any potential risk.
- Systems for rapidly securing the names and tracing information of everyone at the hospital at the time including visitors to patients.

### **Apportioning Blame**

The Commission says the evidence threw up no scapegoats and noted that it is too easy to seek out scapegoats. The blame game begins after every public tragedy. While those who look for blame will always find it, honest mistakes are inevitable in any human system. There is always more than enough blame to go around if good faith mistakes made in the heat of battle are counted in hindsight as blameworthy.

It is also hard to find blame because blame requires accountability. Accountability was so blurred during SARS that it is difficult even now to figure out exactly who was in charge of what. Accountability means that when something goes wrong you know who to look for and you know where to find them. That kind of accountability was missing during SARS and remains blurred even today. What we need is a system with clear lines of authority and accountability to prepare us better for the next infectious outbreak. This is the time for another hand over the heart moment as we intone another "Tui moment" – we have clear lines of authority and accountability in place for our pandemic response. #

The Commission says that perhaps the most important lesson of SARS is the importance of the precautionary principle. SARS demonstrated over and over the importance of the principle that we cannot wait for scientific certainty before we take reasonable steps to reduce risk. This principle should be adopted as a guiding principle throughout Ontario's health, public health and worker safety systems.

If we do not learn this and other lessons of SARS, and if we do not fix the problems that remain, we will pay a terrible price in the face of future outbreaks of virulent disease, whether in the form of foreseen outbreaks like flu pandemics or unforeseen ones, as SARS was.

SARS taught us that we must be ready for the unseen. SARS taught us that new microbial threats like SARS have happened and can happen again. And it gave us a first-hand glimpse of the even greater devastation a flu pandemic could create.

There is no longer any excuse for governments and hospitals to be caught off guard, no longer any excuse for health workers not to have available the maximum reasonable level of protection through appropriate equipment and training, and no longer any excuse for patients and visitors not to be protected by effective infection control practices.

All of us could take a lesson from the weather. It pays no attention to criticism.

I used to eat a lot of natural foods until I learned that most people die of natural causes.

Did you ever notice that when you blow in a dog's face, he gets mad at you, but when you take him on a car ride, he sticks his head out the window?

Don't worry; the only person to ever get their work done by Friday was Robinson Crusoe.

# The WHO issues pharmacological guidelines for treating avian flu virus

The World Health Organization (WHO) has issued pharmacological guidelines for prophylaxis and treatment of patients with the avian flu virus, which is highly pathogenic and causes rapid and fatal illness in many bird populations. These recommendations appear in the January 2007 issue of *The Lancet Infectious Diseases*. (*Lancet Infect Dis.* 2007;7:21-31). The full guidelines, which were initially published online by WHO on May 20, 2006, are based on the current situation with sporadic H5N1 human infections and household clusters and do not apply to a pandemic scenario.

"Recent spread of avian influenza A (H5N1) virus to poultry and wild birds has increased the threat of human infections with H5N1 virus worldwide," write Holger J. Schünemann, MD, and colleagues from the WHO Rapid Advice Guideline Panel on Avian Influenza. "Despite international agreement to stockpile antivirals, evidence-based guidelines for their use do not exist."

To develop rapid advice for the pharmacological management of human H5N1 virus infection in the current pandemic alert period, WHO assembled an international multidisciplinary panel that used a transparent methodologic guideline process based on the Grading Recommendations, Assessment, Development, and Evaluation (GRADE) approach to issue evidence-based guidelines. The panel considered the benefits, harms, burden, and cost of interventions in several patient and exposure groups when developing specific recommendations for treatment and chemoprophylaxis of sporadic H5N1 infection.

For all recommendations, the quality of the underlying evidence was rated as very low because it was based on small case series of H5N1 patients, extrapolation from preclinical studies, and high quality studies of seasonal influenza. Partly because of the severity of the disease, the panel made strong recommendations to treat H5N1 patients with oseltamivir and to use neurami-

dase inhibitors as chemoprophylaxis in high-risk exposure populations.

"Emergence of other novel influenza A viral subtypes with pandemic potential, or changes in the pathogenicity of H5N1 virus strains, will require an update of these guidelines and WHO will be monitoring this closely," the guidelines note. "Of all influenza A viruses circulating in birds, H5N1 is currently of greatest public-health concern because it has caused severe and fatal human infections with mortality ranging from 33% to over 50% since the first known outbreak in Hong Kong in 1997. The spread of H5N1 in poultry and wild birds in many countries has raised concerns about the increased risk of transmission of H5N1 virus to human beings."

In February 2004, the WHO published interim clinical guidelines for the use of antivirals for H5N1 infection, and these interim guidelines were updated in 2005 following an expert consultation, resulting in general international agreement to stockpile antivirals for potential use during an influenza pandemic.

Clinical questions addressed by the panel were:

- Should oseltamivir, zanamivir, amantadine, and/or rimantadine be used for treatment or prophylaxis?
- Should ribavirin, corticosteroids, immunoglobulin, and/or interferon be used for treatment?
- Should broad-spectrum antibiotics be used for the prevention of secondary pneumonia?

To answer these questions, the guidelines include a table with the recommended dose and duration of treatment and chemoprophylaxis for management of human infection with avian influenza A (H5N1) virus in different age groups. Recommended agents include oseltamivir, zanamivir, amantadine, and rimantadine for treatment and prophylaxis.

To determine who should receive chemoprophylaxis, the panel defined high-

risk exposure groups as household or close family contacts of a strongly suspected or confirmed H5N1 patient because of potential exposure to a common environmental or poultry source as well as exposure to the index case. Groups at moderate-risk exposure are defined as those with unprotected and very close direct exposure to sick or dead H5N1 infected animals or to poultry implicated directly in human cases, those involved in handling sick animals or decontaminating known infected animals or environments without proper use of personal protective equipment, and healthcare personnel in close contact with strongly suspected or confirmed H5N1 patients or virus-containing samples.

"Because circumstances could change rapidly, it would be reasonable to consider the moderate and high-risk groups together for prophylaxis decisions," the authors write. "If a particular patient has been implicated in possible human-to-human transmission, then these examples of exposures could be defined as high risk."

In a nonpandemic situation, recommendations for treatment of patients with confirmed or strongly suspected infection with avian influenza A (H5N1) are as follows:

- Patients should receive oseltamivir treatment as soon as possible (strong recommendation).
- Clinicians might administer zanamivir (weak recommendation).
- If neuraminidase inhibitors are available, clinicians should not administer amantadine alone as a first-line treatment (strong recommendation).
- If neuraminidase inhibitors are not available and especially if the virus is known or likely to be susceptible, clinicians might administer amantadine as a first-line treatment (weak recommendation).
- If neuraminidase inhibitors are

(Continued on page 5)

(Continued from page 4)

available, clinicians should not administer rimantadine alone as a first-line treatment (strong recommendation).

- If neuraminidase inhibitors are not available and especially if the virus is known or likely to be susceptible, clinicians might administer rimantadine as a first-line treatment (weak recommendation).
- If neuraminidase inhibitors are available and especially if the virus is known or likely to be susceptible, clinicians might administer a combination of neuraminidase inhibitor and M2 inhibitor (weak recommendation). This should only be done in the context of prospective data collection.
- High-risk exposure groups should receive oseltamivir as chemoprophylaxis continuing for 7 to 10 days after the last known exposure (strong recommendation).
- In moderate-risk exposure groups, oseltamivir may be administered as chemoprophylaxis, continuing for 7 to 10 days after the last known exposure (weak recommendation).
- Low-risk exposure groups should probably not receive oseltamivir for chemoprophylaxis (weak recommendation).

Additional recommendations address prophylaxis and treatment with other agents and in specific groups including pregnant women.

"The greatest barrier to implementation results from the limited availability of the neuraminidase inhibitors and the lack of resistance data," the panel concludes. "Emergence of novel human influenza A viral subtypes or a change in the pathogenicity or transmissibility of H5N1 virus strains, availability of new pharmacological agents, or important clinical research data on H5N1 will necessitate an update of these guidelines. In view of the potential for rapid change in the situation in relation to avian influenza, WHO will continue to monitor these factors carefully before deciding when to revise or update the recommendations. #

## Study Highlights

The expert panel convened in March 2006 by WHO consisted of clinicians, infectious disease experts, influenza specialists, basic scientists, and public health officers.

In general, the scientific evidence for caring for patients infected with H5N1 influenza was of low quality and consisted of experience with a small group of patients and extrapolations from larger studies with other strains of influenza.

In one case series of 37 patients infected with H5N1, treatment with oseltamivir did not significantly affect the rate of mortality, but the study carried a caveat in that treatment was started between 4 and 22 days after the onset of illness. Given evidence from earlier trials that oseltamivir can reduce complications of other forms of influenza, the authors make a strong recommendation for treatment with oseltamivir for patients with H5N1 influenza. This recommendation includes adults, including pregnant women, and children.

Zanamivir received a weak recommendation for treatment of patients with H5N1 influenza because of its inhaled route of delivery and poor evidence of reducing the rate of complications of influenza. The bioavailability of zanamivir outside of the respiratory tract may be lower compared with oseltamivir. Because of an increased risk for adverse events and higher degrees of viral resistance, amantadine and rimantadine should be used for the treatment of H5N1 influenza only when neuraminidase inhibitors are not available. Rimantadine may be favored over amantadine because of its better adverse effect profile.

Combination therapy with a neuraminidase inhibitor and M2 ion channel inhibitor is poorly studied and generally not recommended until further data are available.

Oseltamivir prophylaxis following influenza exposure has been found to reduce the risk for laboratory-confirmed influenza by 50% to 89%. Based on this indirect data, the authors recommend prophylaxis with oseltamivir for 7 to 10 days following the last contact with H5N1 influenza. However, oseltamivir has been used for up to 8 weeks for influenza prophylaxis.

Chemoprophylaxis against H5N1 infection should not be routinely offered to low-risk groups, including health-care workers without a direct exposure to H5N1 influenza infection or healthcare or poultry workers who used appropriate protective equipment during a potential exposure.

Ribavirin should not be used in pregnant women because of known adverse events associated with this medication

## C. difficile now endemic in NHS

The infection *Clostridium difficile* is now 'endemic throughout the health service, with virtually all trusts reporting cases', a leaked English Department of Health memo has warned. The document, sent from DoH director of health protection Liz Woodeson to ministers, provides a 'stocktake' of the NHS's efforts to combat healthcare-associated infections, in particular MRSA. But the memo warns that the risks posed by *C. difficile* loom much larger: 'There are far more cases of *C. difficile* than MRSA infections - and more people die from it.

'Although there have been some high-profile outbreaks - most notably at Stoke Mandeville - it is endemic throughout the health service, with virtually all trusts reporting cases.' Investigations have shown that at least 33 people of 334 infected with *C. difficile* died from the infection during the outbreak at Stoke Mandeville Hospital in Buckinghamshire in 2005.

But the memo claims that the problem is widespread. It also warns that the bug is harder to tackle than

MRSA, given that it generates air-borne spores which contaminate the environment around the patient. It also warns that some anti-MRSA measures, such as alcohol hand rubs, do not work against *C. difficile*. The note quotes figures showing that in 2004 there were an estimated 360 deaths from MRSA while there were an estimated 1,300 deaths from *C. difficile*. In 2005-06 there were 7,087 cases of MRSA and 51,690 cases of *C. difficile*.

*C. difficile* is not a problem in this country. But then it wasn't in England either when we first began reporting outbreaks in North America a few years ago.

In a section about how best to handle the MRSA target, Ms Woodeson acknowledges that the battle to combat MRSA 'doesn't seem to be having much impact on *C. difficile*, which is a far bigger problem.' The memo is critical of the attitude of some trusts, stating: 'we suspect there are some that simply see *C. difficile* as an unavoidable fact of hospital life.'

Much of the document focuses on the likelihood that the NHS will not

achieve the national MRSA target of halving the incidence of infection from its 2004 rate. Options to 'handle' this suggest switching to a system of local targets - which the memo acknowledges could be seen as a 'cop out' - or introducing a new combined target, either bringing together *C. difficile* and MRSA or introducing a general target to reduce healthcare-associated infection.

Options discussed include delaying the deadline, which the paper admits would leave the government 'open to the accusation of fiddling', and switching to locally set targets, which 'would be presented by the media as a cop-out'. It says: 'We have a three-year target to halve the number of MRSA bloodstream infections by April 2008. Although the numbers are coming down, we are not on course to hit that target and there is some doubt about whether it is in fact achievable.'

The paper stresses that failure 'is not due to a small number of trusts doing badly but 116 underperforming'. The whole NHS in England is off course by 27 per cent. #

## Molecular Anatomy of Influenza Virus Detailed

Scientists at the National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS) have succeeded in imaging, in unprecedented detail, the virus that causes influenza.

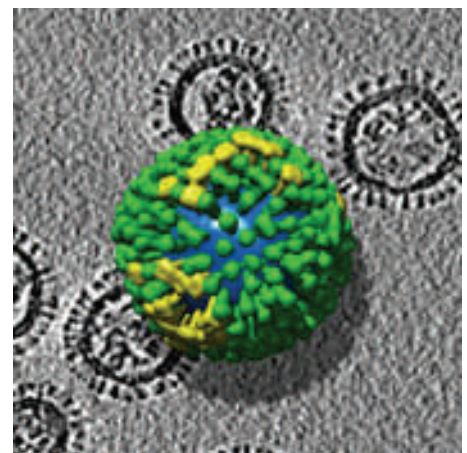
They have been able to distinguish five different kinds of influenza virus particles in the same isolate (sample) and map the distribution of molecules in each of them. This breakthrough has the potential to identify particular features of highly virulent strains, and to provide insight into how antibodies inactivate the virus, and how viruses recognize susceptible cells and enter them in the act of infection.

One of the difficulties that has hampered structural studies of influenza virus is that no two virus particles are the same. In this fundamental respect, it differs from other viruses; poliovirus, for example, has a coat that is

identical in each virus particle, allowing it to be studied by crystallography.

The research team used electron tomography (ET) to make its discovery. ET is a novel, three-dimensional imaging method based on the same principle as the well-known clinical imaging technique called computerized axial tomography, but it is performed in an electron microscope on a microminaturized scale.

*The mission of the National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS), a part of the Department of Health and Human Services' National Institutes of Health, is to support research into the causes, treatment and prevention of arthritis and musculoskeletal and skin diseases; the training of basic and clinical scientists to carry out this research; and the dissemination of information on research progress in these diseases.*



*The three-dimensional structure of influenza virus from electron tomography. The viruses are about 120 nanometers — about one ten thousandth of a millimeter — in diameter*

## Wellingtonians say “its our fault”

And the rest of New Zealand would happily agree. Unfortunately, this is not the long awaited “mea culpa” from our politicians. But it is an admission by our Wellington cousins that their forefathers might not have made the wisest choice in building their settlement on a melody of earthquake fault lines.

A major research project is underway to improve the understanding of the vulnerability of the Wellington region to large earthquakes. The aim of the seven-year, \$3.5 million project is to better define Wellington’s earthquake risk using the latest geological techniques and sophisticated computer modelling.

The information provided by the project, called ‘It’s Our Fault’, will help Wellington become better prepared for and safer from earthquakes. It will do this by enabling better decision making to protect assets and reduce potential casualties.

Government-owned research and consultancy company GNS Science will lead the project, which will involve collaboration with a number of public and private sector organisations. Financial support is coming from the Earthquake Commission, the Accident Compensation Corporation, Wellington City Council, and Greater Wellington.

The Wellington region has four major active faults and a number of second-order faults, including some in Cook Strait, all of which are capable of producing a damaging earthquake. The project will improve knowledge of the individual faults, and also the way they interact with each other. A large earthquake on one fault may advance or retard earthquakes on neighbouring faults. But the extent of this effect is not well understood at present.

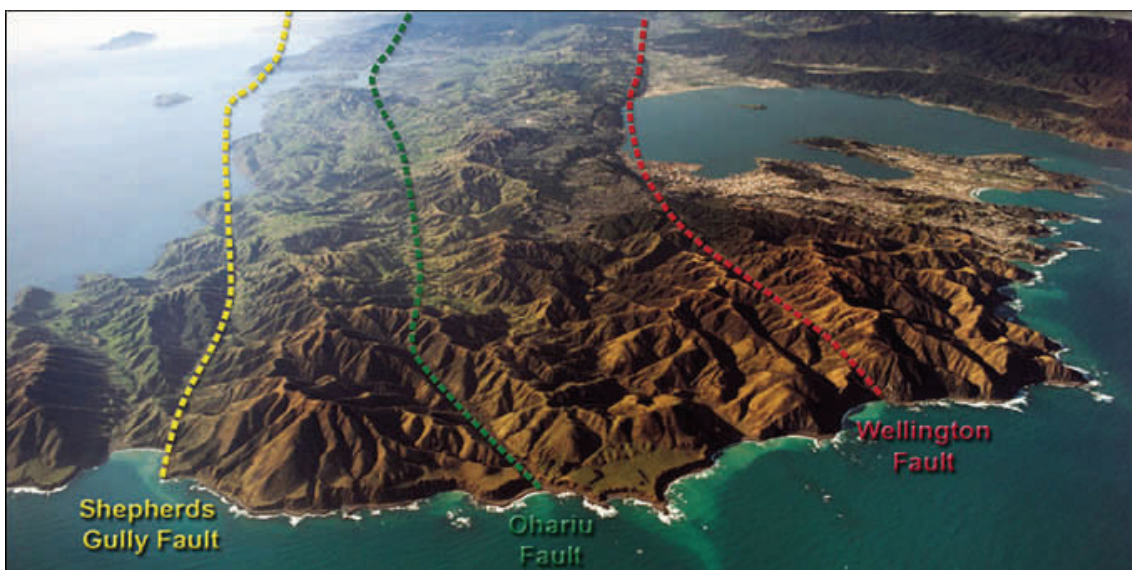
There are four main strands to the research – the likelihood and frequency of large earthquakes, the expected size, the physical effects, and the social and economic impacts. There

are knowledge gaps in all these areas. Mayor of Wellington, Kerry Prendergast, said the project was a step forward in understanding better the risk to Wellington and Wellingtonians from earthquakes. “It’s not a matter of if, but when, and the more we know about earthquakes and the impact a major earthquake would have on our city, the better prepared Wellington can be,” she said.

GNS Science Chief Executive, Alex Malahoff, said the name of the project was an acknowledgement that earthquakes were a community issue and not the preserve of scientists and civil defence organisations. “It will provide an unprecedented amount of information on the earthquake risk in the Wellington region, which is particularly vulnerable because of its geography and its location on a major faultline,” Dr Malahoff said. “The project is designed so that the information can be taken up readily and used in civil engineering, infrastructure planning, emergency management, and the insurance industry.”

The Earthquake Commission’s General Manager David Middleton said the research was needed because not enough was known about the risk of earthquake occurrence in the Wellington region. “It is important that conventional wisdom is not allowed to crowd out scientific advances. The better our understanding of the hazards we face, the better equipped we can become to deal with them,” Mr Middleton said.

Richard Geisler, Manager, Stakeholder & Customer Relationships at the ACC said it was hoped the project would help in understanding the number and types of injuries that a major earthquake in Wellington would cause. “That will help us and the health services be prepared. This research might also help inform decisions about what forms of injury prevention work are most appropriate.” #



The view from the port window for anyone flying into Wellington

# Natural Disasters and Epidemics

The relationship between natural disasters and communicable diseases is frequently misconstrued. In the January 2007 edition of *Emerging Infectious Diseases*, John T. Watson, Michelle Gayer, and Maire A. Connolly from the World Health Organization discuss the risk of epidemics after natural disasters.

The risk for outbreaks is often presumed to be very high in the chaos that follows natural disasters, a fear likely derived from a perceived association between dead bodies and epidemics. However, the risk factors for outbreaks after disasters are associated primarily with population displacement. The availability of safe water and sanitation facilities, the degree of crowding, the underlying health status of the population, and the availability of healthcare services all interact within the context of the local disease ecology to influence the risk for communicable diseases and death in the affected population. They outline the risk factors for outbreaks after a disaster, review the communicable diseases likely to be important, and establish priorities to address communicable diseases in disaster settings.

Historically, fears of major disease outbreaks in the aftermath of natural disasters have shaped the perceptions of the public and policymakers. These expectations, misinformed by associations of disease with dead bodies, can create fear and panic in the affected population and lead to confusion in the media and elsewhere.

The risk for outbreaks after natural disasters is low, particularly when the disaster does not result in substantial population displacement. Communicable diseases are common in displaced populations that have poor access to basic needs such as safe water and sanitation, adequate shelter, and primary healthcare services. These conditions, many favourable for disease transmission, must be addressed immediately with the rapid reinstatement of basic services. Assuring access to safe water and primary healthcare services is crucial, as are surveillance and early warning to detect epidemic-prone diseases known to occur in the

disaster-affected area.

A comprehensive communicable disease risk assessment can determine priority diseases for inclusion in the surveillance system and prioritize the need for immunization and vector-control campaigns. There are five basic steps that can reduce the risk for communicable disease transmission in populations affected by natural disasters. (see side bar page 8)

Disaster-related deaths are overwhelmingly caused by the initial traumatic impact of the event. However, disaster-preparedness plans, appropriately focused on trauma and mass casualty management, should also take into account the health needs of the surviving disaster-affected populations. The health effects associated with the sudden crowding of large numbers of survivors, often with inadequate access to safe water and sanitation facilities, will require planning for both therapeutic and preventive interventions, such as the rapid delivery of safe water and the provision of re-hydration materials, antimicrobial agents, and measles vaccination materials.

Surveillance in areas affected by disasters is fundamental to understanding the impact of natural disasters on communicable disease illness and death. Obtaining relevant surveillance information in these contexts, however, is frequently challenging. The destruction of the pre-existing public health infrastructure can aggravate (or eliminate) what may have been weak pre-disaster systems of surveillance and response. Surveillance officers and public health workers may be killed or missing, as in Aceh in 2004. Population displacement can distort census information, which makes the calculation of rates for comparison difficult. Healthcare during the emergency phase is often delivered by a wide range of national and international actors, which creates coordination challenges. Also, a lack of pre-disaster baseline surveillance informa-



tion can lead to difficulties in accurately differentiating epidemic from background endemic disease transmission.

Although post disaster surveillance systems are designed to rapidly detect cases of epidemic-prone diseases, interpreting this information can be hampered by the absence of baseline surveillance data and accurate denominator values. Detecting cases of diseases that occur endemically may be interpreted (because of absence of background data) as an early epidemic. The priority in these settings, however, is rapid implementation of control measures when cases of epidemic-prone diseases are detected. Despite these challenges, continued detection of and response to communicable diseases are essential to monitor the incidence of diseases, to document their effect, to respond with control measures when needed, and to better quantify the risk for outbreaks after disasters.

Natural disasters include earthquakes, volcanic eruptions, landslides, tsunamis, floods, and drought. They can have rapid or slow onset, with serious health, social, and economic consequences. During the past 2 decades, natural disasters have killed millions of people, adversely affected the lives of at least 1 billion more people, and resulted in substantial economic damages. Developing countries are disproportionately affected because they may lack resources, infrastructure, and disaster-preparedness systems.

## Dead Bodies and Disease

Despite the absence of evidence that

(Continued on page 9)

(Continued from page 8)

dead bodies pose a risk for epidemics after natural disasters, the sudden presence of large numbers of dead bodies in the disaster-affected area may heighten concerns of disease outbreaks. When death is directly due to the natural disaster, human remains do not pose a risk for outbreaks. Dead bodies only pose health risks in a few situations that require specific precautions, such as deaths from cholera or hemorrhagic fevers. Despite these facts, the risk for outbreaks after disasters is frequently exaggerated by both health officials and the media. Imminent threats of epidemics remain a recurring theme of media reports from areas recently affected by disasters, despite attempts to dispel these myths.

### **Displacement: Primary Concern**

The risk for communicable disease transmission after disasters is associated primarily with the size and characteristics of the population displaced, specifically the proximity of safe water and functioning latrines, the nutritional status of the displaced population, the level of immunity to vaccine-preventable diseases such as measles, and the access to healthcare services. Outbreaks are less frequently reported in disaster-affected populations than in conflict-affected populations, where two thirds of deaths may be from communicable diseases. Malnutrition increases the risk for death from communicable diseases and is more common in conflict-affected populations, particularly if their displacement is related to long-term conflict.

Although outbreaks after flooding have been better documented than those after earthquakes, volcanic eruptions, or tsunamis, natural disasters (regardless of type) that do not result in population displacement are rarely associated with outbreaks. Historically, the large-scale displacement of populations as a result of natural disasters is not common, which likely contributes to the low risk for outbreaks overall and to the variability in risk among disasters of different types.

### **Risk Factors for Communicable Disease Transmission**

Responding effectively to the needs of the disaster-affected population requires an accurate communicable disease risk assessment. The efficient use of humanitarian funds depends on implementing priority interventions on the basis of this risk assessment.

A systematic and comprehensive evaluation should identify:

- \* endemic and epidemic diseases that are common in the affected area;
- \* living conditions of the affected population, including number, size, location, and density of settlements;
- \* availability of safe water and adequate sanitation facilities;
- \* underlying nutritional status and immunization coverage among the population; and
- \* degree of access to healthcare and to effective case management. #

## **Priority measures to reduce the risk for communicable diseases after natural disasters**

### **Safe water, sanitation, site planning**

Ensuring uninterrupted provision of safe drinking water is the most important preventive measure to be implemented following a natural disaster. Chlorine is widely available, inexpensive, easily used, and effective against nearly all waterborne pathogens

Settlement planning must provide for adequate access for water and sanitation needs and meet the minimum space requirements per person, in accordance with international guidelines

### **Primary healthcare services**

Access to primary care is critical for prevention, early diagnosis, and treatment of a wide range of diseases, as well as for providing an entry point for secondary and tertiary care. The immediate impact of communicable diseases can be mitigated with the following interventions:

- Early diagnosis and treatment of diarrhoeal diseases and ARI,\* particularly in those aged <5 y.
- Early diagnosis and treatment for malaria in malaria-endemic areas.
- Availability and use of treatment protocols for the main communicable disease threats.
- Proper wound cleaning and care.
- Availability of drugs
- Distribution of health education messages emphasizing:

Good hand hygiene practices; Safe food preparation techniques; Boiling or chlorination of water; Early treatment seeking behaviour in case of fever; Use of insecticide-treated mosquito nets as a personal protection measure in malaria-endemic areas; Vector control interventions adapted to the local context and disease epidemiology

### **Surveillance/early warning system**

Rapid detection of cases of epidemic-prone diseases is essential to ensure rapid control. A surveillance/early warning system should be quickly established to detect outbreaks and monitor priority endemic diseases.

Healthcare workers should be trained to detect priority diseases and promptly report them to lead health agency.

### **Immunization**

Mass measles immunization and vitamin A supplementation are immediate health priorities in areas with inadequate coverage. Where baseline coverage rates among those <15 y of age are <90%, mass measles immunization should be implemented as soon as possible. The priority age groups are 6 mo to 5 y, and up to 15 y, if resources allow.

### **Prevention of malaria and dengue**

Specific preventive interventions for malaria must be based on an informed assessment of the local situation, including on the prevalent parasite species and the main vectors.

An increase in mosquito numbers may be delayed following flooding, which allows time for implementing preventive measures.

For dengue, the main preventive efforts should be directed toward vector control. Social mobilization and health education of the community should emphasize elimination of breeding sites as much as possible.

# HEMNZ Bulletin

The HEMNZ Bulletin is published monthly by the Risk Management Unit of St John Northern Region for all those interested in emergency management in health care settings

Articles and comment on emergency management issues are welcomed

Editor: Bruce Parkes  
St John, Northern Region  
[bruce.parkes@stjohn.org.nz](mailto:bruce.parkes@stjohn.org.nz)

Check out our Web site at  
[www.hemnzt.org.nz](http://www.hemnzt.org.nz)

## Up coming Events

19 - 20 February 2007  
**Integrated Emergency Management Conference**

Duxton Hotel, Wellington  
Cost: \$1895 +GST before 22 January  
More information from  
[www.conferenz.co.nz](http://www.conferenz.co.nz)

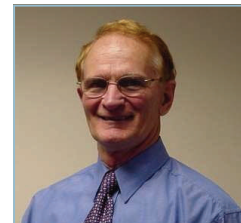
23 - 25 February 2007  
**International Meeting on Emerging Diseases and Surveillance (IMED 2007)**

Vienna Hilton, Vienna, Austria  
Cost: EUR € 375.00  
More information from  
<http://imed.isid.org/>

13 - 16 May 2007  
**15th World Congress on Disaster and Emergency Medicine**

Amsterdam, Netherlands  
Cost: EUR € 760.00 before 10 February  
More information from  
[www.wcdem2007.org](http://www.wcdem2007.org)

## Editor's soapbox



As I was finishing this Bulletin the latest Ruapehu crater lake status report dropped into my in box. What a wonderful research laboratory the government has given our lahar experts. A mountain lake building behind an eroding tephra dam. We all know the end result—a whacking great lahar thundering down the mountain taking everything in its path with it—we just don't know the exact time and date. Rather than breach the dam and ease the pressure, we are going to wait until ever capricious mother nature does her thing. That must be a vexation for the TV stations looking for a live broadcast during prime time.

If it all goes horribly wrong, will the inevitable inquiry repeat the cautionary principle expounded by Justice Campbell in the Ontario SARS report, "we cannot wait for scientific certainty before we take reasonable steps to reduce risk. This principle should be adopted as a guiding principle throughout (Ontario's) health, public health and worker safety systems. "

The other potential lahar we have building up is Exercise Cruikshank this May. Four days of "all of government" influenza pandemic exercise. The difference with the Ruapehu event is that we do know the dates and times. What we do not know is how ready we are going to be. At the moment we would be battered, broken and swept away.

This January 24th all emergency planners have been invited to Wellington to debate and agree on a coherent way forward. Lets have a vigorous debate and lets work out what we need to do and how we are going to do it. That exercise lake is building up ahead of us.

*Bruce Parkes*

## Deadly Tornadoes Sweep through Louisiana

There is a health emergency management conference scheduled for New Orleans this March with an optional "Katrina Tour". Attendees might get more than they bargained for. This January tornadoes left people dead as they touched down during a strong cluster of storms in southern Louisiana. The twisters tore off roofs and ripped seven mobile homes from their foundation. At least 15 people were taken to area hospitals.

The tornadoes were part of a severe band of storms that hit the area. The storms flooded roads and Gov. Kathleen Blanco declared a state of emergency in the parishes of Acadia, Allen, Sabine and Vermillion. In New Orleans, crews were dispatched to clean drains and prepare for possible flooding ahead of a weather system expected to drop several inches of rain on an area that has been drenched for two weeks. A flash flood watch was in effect for portions of southeast Louisiana and southern Mississippi.

The National Weather Service forecast predicted two to four inches of rain, with heavy amounts possible locally, creating potential flooding.

While stormy weather this time of year isn't unusual, this latest system comes after two storms that helped bring December's rainfall total in New Orleans to more than 10 inches, nearly twice the normal average. One of the storms, just before Christmas, caused widespread flooding in parts of the city and neighbouring Jefferson Parish, and raised concerns about how well the area, hit hard by Hurricane Katrina in 2005, would fare in another hurricane. #