REPORT CARD:

Progress in Protecting the Public’s Health

Report of the Expert Panel on the Legionnaires’ Disease Outbreak in the City of Toronto—September/October 2005

December, 2005

Dr. Bonnie Henry
Dr. James G. Young
Dr. David M.C. Walker (Chair)
Dedication

"To those who lost their lives,
who endured loss and
who cared for the ill
during the Legionnaires’ disease outbreak
in the City of Toronto, fall 2005.”
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Acknowledgements

Members of the Expert Panel

Bonnie Henry MD MPH FRCP(C)
Physician Epidemiologist, BC Centre for Disease Control
Assistant Professor, Department of Health Care and Epidemiology,
Faculty of Medicine, University of British Columbia

James G. Young MD O-Ont.
Special Advisor to the Deputy Minister,
Public Safety and Emergency Preparedness Canada
Former Chief Coroner of Ontario

David M.C. Walker MD FRCPC
Dean, Faculty of Health Sciences
Director, School of Medicine, Queen’s University
Chair, Expert Panel on SARS and Infectious Disease Control

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  Phillip Graham
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Introduction

In the fall of 2005, a long-term care home in the City of Toronto experienced an outbreak of Legionnaires’ disease, a type of pneumonia. A total of 135 people were infected: 70 residents, 39 staff, 21 visitors, and 5 people who lived or worked near the home. Twenty-three residents died. For the first 10 days, the cause of the outbreak was unknown.

The Legionnaires’ outbreak was the first time since SARS in 2003 that Ontario faced the threat of an illness that could not be easily or quickly identified. It was also the first opportunity to test the lessons learned from SARS.

Over the past two years, Ontario’s health system has been working to implement the recommendations in For the Public’s Health: A Plan of Action, the final report of the Ontario Expert Panel on SARS and Infectious Disease Control and improve our ability to respond to emerging health risks and emergencies.

On October 16, the Minister of Health and Long-Term Care established an Expert Review Panel on the Legionnaires’ Disease Outbreak to: assess the progress Ontario has made since SARS; identify the key lessons from the recent Legionnaires’ disease outbreak; and provide advice on how to strengthen infectious disease control in Ontario. (See Appendix 1 for Terms of Reference and methodology.)

Goals of Outbreak Response

The two immediate goals of outbreak response are to:
• provide the best possible care for people who are ill
• prevent or control the spread of the infectious disease.

Based on its review, the Expert Panel found that the outbreak response achieved both these goals. The right things were done in a timely way to care for people who became ill, and to prevent the spread of illness.

The other goals of outbreak response are to:
• identify and eliminate the cause of the outbreak
• support the people involved in the response
• minimize social disruption.

The Expert Panel found evidence that a great deal was done right in the systems’ efforts to achieve these goals. The systems’ response to the Legionnaires’ outbreak was more organized, efficient and effective.

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than it had been during SARS, and it was clear that many of the learnings from SARS had been applied.

Notwithstanding the great strides that have been made, there is an enormous amount of work still to be done. There are still serious weaknesses in the public health system and in the broader health system that must be addressed.

The Legionnaires’ outbreak was not large. It was a single-point event that affected just over 100 people in a contained geographic area served by the province’s largest and most well resourced public health unit. If the outbreak had been larger or the disease more virulent, the system would have been far more stressed, and the outcomes could have been quite different.

As For the Public’s Health stated: “basic public health and core infection control … reflect part of the social contract between the public and its government, and not simply … another fiscal pressure on a burdened health system. Even in an era of fiscal restraint, we must remind ourselves of the cost of ignoring the essentials.”

Two years ago, the SARS outbreak galvanized Ontario into action. We cannot afford to lose that momentum now.

In this report, the Panel provides a mid-term report card on Ontario’s efforts to revitalize the public health system and protect the public’s health. The report identifies what worked well and what we must do better to manage infectious diseases now and in the future.
Overview of the Outbreak

About Legionnaires’ Disease

Legionnaires’ disease is a type of pneumonia. Pontiac fever is a non-pneumonia, influenza-like illness (ILI). Both are caused by Legionella pneumophila, a bacteria first identified in 1977 as the cause of illness in 240 people and 34 deaths after a 1976 American Legion Convention in Philadelphia, USA.

L. pneumophila bacteria are found naturally in water. They grow in biofilms or slime on the surfaces of lakes, rivers and streams. They are present in small concentrations in drinking water systems and are relatively resistant to chlorination. L. pneumophila can grow to high concentrations under the right conditions, which include stagnation and water temperatures between 20°C and 50°C. L pneumophila can multiply in cooling towers, evaporative condensers, hot water heaters that operate below 60ºC and deliver water to taps below 50ºC, humidifiers, fountains, and spas and whirlpools.

People do not become ill from drinking water containing the bacteria. The threat to health occurs when people inhale mist from a water source that contains high concentrations of the bacteria. Legionella is not spread from one person to another.

Most healthy people exposed to Legionella will develop the milder form of illness: Pontiac fever. People who are most susceptible to the most serious and life-threatening Legionnaires’ disease are those with an underlying illness or weakened immune system such as: the elderly, smokers, people with chronic obstructive pulmonary disease, organ transplant patients, and people taking corticosteroid therapy.

According to the US Centers for Disease Control and Prevention (CDC) in Atlanta, between 8,000 and 18,000 people are hospitalized with Legionnaires’ disease each year in the US. Because it is difficult to distinguish Legionnaire’s disease from other types of pneumonia, most cases go unreported, and the number of infections is likely much higher. Outbreaks have been reported worldwide associated with cooling towers, water fountains, whirlpool spas, mist sprayers in grocery stores and potting soil.

Legionnaires’ disease is a type of pneumonia. It has an incubation period of 2 to 10 days. The severity of this disease ranges from a mild cough and low fever to rapidly progressive pneumonia and coma. Early symptoms include malaise, muscle aches, and slight headache. Later symptoms include high fever (up to 41°C), a dry cough, and shortness of breath. Gastrointestinal symptoms including vomiting, diarrhea, nausea, and abdominal pain are common. The disease is treated with antibiotics commonly used to treat pneumonia.

Pontiac fever is a flu-like illness, with an incubation period of 1 to 3 days. Symptoms include fever, lack of appetite, headache and muscle aches. People who develop Pontiac fever usually recover in 2 to 5 days with no treatment.

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About Outbreaks in Long-Term Care Homes

Outbreaks of febrile respiratory illness are not uncommon in long-term care homes. In closed communities, like long-term care homes, infectious diseases can spread easily. Because of age and underlying health conditions, residents are often highly vulnerable to infectious diseases, and outbreaks occur.

Toronto Public Health reports that, at any given time, they are responding to between four and 12 institutional respiratory outbreaks in the more than 100 long-term care homes, non-acute hospitals and acute care facilities in the City of Toronto. Over the course of a year, Toronto Public Health estimates that staff handle between 250 and 450 outbreaks of all sorts (i.e., respiratory and non-respiratory) in health care facilities and the community.

Because respiratory outbreaks are relatively common in long-term care, Ontario has put significant effort into finding and managing them. Long-term care homes in the province have well established procedures to manage respiratory outbreaks, the reporting system is good, and public health has a great deal of experience.

The Course of the Legionnaires’ Outbreak

This particular incident started as a small respiratory outbreak at the Seven Oaks Home for the Aged. On September 24, residents on two floors had fevers and staff began following normal procedures: line listing the patients, checking temperatures, giving fluids, and reducing activities on the affected floors. By September 27, 2005, six residents were ill and three had been hospitalized with a febrile respiratory illness (FRI). The home contacted Toronto Public Health who had staff on site the same day.

Over the next four days, the number of ill increased, peaking on September 30. By October 1, 2005, 68 of the home’s 249 residents were ill, 17 had been hospitalized and four had died. The illness had spread to staff: five were reported ill and one had been hospitalized. One visitor was also hospitalized with symptoms.

Specimens from ill residents were sent to the Central Public Health Laboratory following standard procedures to be tested for possible causes, including common viral causes, such as influenza, respiratory syncytial virus (RSV) and parainfluenza, as well as Legionella, chlamydia pneumonia, pneumocystis pneumonia and SARS. All samples came back negative.

On Thursday, October 6, laboratory tests done on autopsy samples from residents who had died identified the illness as Legionnaire’s disease. Under the direction of Toronto Public Health, Seven Oaks
shut down its cooling and water systems, and testing of water samples began. When initial samples came back negative, the cooling towers were completely drained and samples were taken from the sides. On Friday, October 21, tests confirmed that the same strain of *Legionella* found in specimens was present in samples from the cooling tower. While *Legionella* was also found in cooling towers of three nearby buildings, the high attack rate within the Seven Oaks facility and the connection of all the cases to the building argues strongly that the release of *Legionella* from the Seven Oaks cooling tower was the cause of this outbreak.

By this time, there had been no new cases for over a week, and no new cases in residents for two weeks. By the time the outbreak was over, a total of 135 people had become ill with signs and symptoms of Legionnaires’ disease or Pontiac fever, and 23 residents had died.

In retrospect, the epidemiologic curve (below) indicates a point source outbreak with a limited number of exposure days (i.e., likely a four or five day period during which people were infected) – after which there were no new infections. The challenge with a disease like Legionnaires’ is to treat people who are ill and find the source. However, until the cause and pattern of the illness was known, the outbreak response system had to behave as though it were on ongoing problem, and take steps to prevent any possible spread of disease.

![Epi-curve: Number of reported legionellosis cases by onset date of respiratory symptoms and case classification. Seven Oaks and Community.](source)

*Source: Legionellosis Outbreak – Descriptive Epidemiology, Communicable Disease Surveillance Unit, Toronto Public Health, November 10, 2005.*
The Outbreak Response

A disease outbreak requires a systems response. The type of organizations involved and their roles depend on size and nature of the outbreak. Although the Legionnaires’ outbreak was not large, it involved a large network of organizations and expertise.
In this case, Ontario was faced with a medium sized outbreak in one public health unit jurisdiction, which meant that it was appropriate for Toronto Public Health to manage the response, and for the province to play a supporting role.

In many ways, this was a textbook response to an outbreak. In general, all parts of the response system deployed properly and worked well together. However, there were still some key weaknesses in:

- the ability to access hospital resources (i.e., finding beds for residents who needed hospitalization) and arrange transfers
- people, skills and expertise (i.e., surge capacity)
- equipment and infrastructure
- information systems and communication.

For purposes of this report card, the Panel looked specifically at the systems’ ability to:

1. Care for patients
2. Provide a coordinated response
3. Protect health care workers and prevent the spread of disease
4. Make the diagnosis
5. Find the source of the bacteria
6. Share information and communicate
I. Caring for Patients

During the outbreak, 135 people became ill. There were 38 confirmed and 44 probable cases of Legionnaires’ disease, and 54 probable cases of Pontiac fever. Of those, 79 people (54 of whom were residents) were cared for in hospital. Seven hospitals provided care including: Rouge Valley Health System (Centenary and Ajax sites), the Scarborough Hospital (General and Grace sites), Markham Stouffville Hospital, Toronto East General Hospital, North York General Hospital, Mount Sinai Hospital, and York Central Hospital.

Because of the uncertainty about the cause of the illness and the large number of new cases that occurred within a four day period, the outbreak was very stressful for residents, families and health care providers. Providing care was challenging because so many residents were frail and vulnerable, and they found changes in routines and staff as well as the transfers to hospital difficult and disorienting.

Did patients receive appropriate care?

Yes. It is the Panel’s opinion that patients received exemplary care in Seven Oaks and in hospital. Clinical management was excellent. Before the cause of the outbreak was known, physicians worked on the assumption that it was a virus, however, for patients with signs or symptoms of pneumonia, they prescribed broad spectrum antibiotics, based on current clinical guidelines, which are effective against *Legionella*.

At Seven Oaks, staff responded effectively to the increase in demand for care, even though a number of staff were off sick. Physicians were on call 24 hours to ensure coverage, and were in the home every day to see patients. The home increased staff working hours and shifts to ensure there were enough people to provide 24 hour care. The home also brought in 19 staff from other city-owned facilities to assist. The nursing care was so effective that residents who were treated and recovered at the home experienced no adverse effects (e.g., weight loss). Even when the water was turned off in the home, the staff were able to adjust and continued to provide quality care.

Nursing care in hospital was also good, given that acute care hospitals are neither staffed nor equipped to meet the complex needs of long-term care residents, and staff did not know the patients or their care routines. The Rouge Valley Health System (RVHS) Centenary site, which provided care for the largest

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**Case Definitions**

**Confirmed Case of Legionnaire’s Disease**

Chest X-ray confirmed pneumonia, clinical diagnosis, or pathological evidence of pneumonia at autopsy; AND Laboratory evidence of infection; AND Lived, worked or visited within a 3.0km radius of 9 Neilson Rd since Sept. 1st.

**Probable Case Of Legionnaire’s Disease**

Chest X-ray confirmed pneumonia, clinical diagnosis, or pathological evidence of pneumonia at autopsy; AND Lived, worked or visited within a 3.0km radius of 9 Neilson Rd since Sept. 1st; AND No evidence of alternate diagnosis.

**Confirmed Case of Pontiac Fever**

Fever or chills; AND At least one of the following: Headache, Muscle aches, Diarrhea, Shortness of breath, Any cough; AND Laboratory evidence of infection; AND Lived, worked or visited within a 3.0km radius of 9 Neilson Rd since Sept. 1st.

**Probable Case of Pontiac Fever**

Fever or chills; AND With at least one of the following: Headache, Muscle aches, Diarrhea, Shortness of breath, Any cough; AND Was a resident of Seven Oaks Long Term Care, 9 Neilson Rd since Sept. 1st OR worked or visited Seven Oaks since Sept. 1st and had onset of symptoms no later than 3 days after an exposure to Seven Oaks; AND No evidence of an alternate diagnosis.
number of patients, had a committed staff who had been through SARS. North York General designated one physician as the lead for all patients associated with the outbreak. The internal teamwork among staff was good.

**Could deaths have been prevented with better care or earlier diagnosis?**

No. Despite the fact the diagnosis was uncertain, residents received appropriate and timely medical treatment that covered Legionnaires’ disease. While the delay in diagnosis created anxiety for patients, their families and health care workers, it did not adversely affect the medical therapy or care received by residents or others who became ill during the outbreak.

The current clinical guidelines in effect in Canada for management of community acquired pneumonia are adequate to treat *Legionella* pneumonia. The residents who died had complex underlying conditions, and their deaths could not have been prevented with any other medical treatment.
II. Providing a Coordinated Response

Ontario’s ability to respond quickly and effectively to disease outbreaks depends on all parts of the response system understanding their roles, working closely together, and having the people, skills and resources to fulfill their roles.

During the Legionnaires’ outbreak, did organizations understand their roles and respond effectively?

The Long-Term Care Home

Seven Oaks is experienced with respiratory outbreaks, and the home responded appropriately and quickly. They have policies, plans and procedures in place for managing respiratory outbreaks, and they followed them. The appropriate steps were taken to reduce the risk of spread within the home, including closing down first the affected units and then the home, isolating residents, cohorting staff and using appropriate infection control practices and cleaning procedures. The working relationship between Seven Oaks and Toronto Public Health was good.

Toronto Public Health

Toronto Public Health is also experienced with respiratory outbreaks, and responded appropriately and quickly. Public health staff were on site on the day they received the call about the outbreak, and were available to provide advice throughout the outbreak.

As the number of cases increased, Toronto Public Health established an outbreak team. The health unit reported that it was able to switch quickly and smoothly from the initial small outbreak response to a more enhanced response, and that the experience with SARS resulted in faster and better initial communication. The health unit had also established a Communication Disease Liaison Unit (CDLU). During an outbreak, staff from that unit are assigned to hospitals caring for patients. They become part of the hospital’s infection control team and are able to ensure effective communication between the hospital and the health unit. This deployment strategy meant that Toronto Public Health had easy access to daily – or more frequent – updates from the hospitals, and this use of personnel was very effective during the outbreak. Toronto Public Health also did a good job tracing contacts.

Toronto Public Health followed established procedures and notified the Infectious Diseases Branch, Public Health Division, Ministry of Health and Long-Term Care when the outbreak began to have a significant health impact and became a public issue.
Emergency Medical Services

Emergency Medical Services (EMS) responded quickly and worked hard to locate hospitals with appropriate beds/accommodation (i.e., isolation rooms, negative pressure rooms), and to arrange and coordinate the transfers. However, the system experienced some problems including:

• the lack of a real-time system or procedure for identifying available isolation beds and negative pressure rooms. Instead EMS staff phoned individual hospitals – sometimes hourly – to check on the availability of isolation beds and negative pressure rooms.
• lack of pre-established agreements for hospitals to take patients in the case of an outbreak. Most hospitals were responsive to requests to admit ill residents but some refused.
• transfer coordination and communication issues. For example, residents would be redirected to a different hospital during their transfer so the long-term care home did not always know where residents had been taken. In some cases, hospitals were told to expect a certain patient at a certain time, but the transfer would either be made much later or involve a different patient or patients.

Some of the problems were due to the large number of transfers required within a period of two to three days. But that situation was exacerbated by the lack of systems to support and manage transfers. The Panel noted that the Provincial Transport Authorization Centre (PTAC), a system established during SARS to help coordinate and track transfers between facilities, was not used during the outbreak. Even if EMS had used PTAC, that system would not have provided information back to the home to confirm where residents were taken, and that is a gap that should be addressed. It is clear that more must be done to prepare Ontario for outbreaks where large numbers of people become ill and have to be hospitalized or moved between facilities.

It should be noted that the problem with transfers caused some confusion for the home and for residents’ families, but did not have a negative impact on the residents’ care.

Hospitals

Although hospitals did an excellent job of caring for patients, there appeared to some confusion over their role. There were disagreements among the hospitals about which ones would accept patients. As noted above, most hospitals approached eventually accepted patients, but some refused. Six of the seven hospitals that accepted patients were community hospitals – two of the hospitals were located outside the jurisdiction of Toronto Public Health.

Hospitals sometimes used the requirement for isolation beds or negative pressure rooms as a reason not to accept patients. Some
hospitals appeared to be waiting for direction from the ministry in order to free up beds for the outbreak.

The Panel questions whether outbreak response in Ontario will ever be workable or completely effective if one part of the system – in this case, hospitals – are able to act independently. Bill 138 will give the Chief Medical Officer of Health the authority to direct the use of hospital resources during a provincial outbreak, but there is no comparable requirement during a local or regional outbreak. Had the outbreak been larger, this could have posed a significant problem and risk to health. There should be a mechanism in place – short of declaring a provincial emergency – that will ensure that hospitals work together and as part of a larger outbreak response system. The Panel also questions why the teaching hospitals, which have more resources and expertise, did not play a stronger role in responding to the outbreak.

The hospitals which did take patients reported being better prepared in terms of infection control management, staff education and communication than during SARS. Two of the hospitals had been SARS hospitals and, as a result, had made significant improvements in their capacity to respond to outbreaks.

The main receiving hospitals had one or more of the following in place: a clearly laid out response plan, an internal and external communication plan, a communications officer on call, infection control precautions in effect, and skilled teams, including infection control expertise.

Hospitals should be commended for the progress they have made over the past few years; however, some basic procedures are still not in place, such as an emergency call list or protocol and these gaps should be addressed.

**Laboratory Services**

During an outbreak, the Central Public Health Laboratory (CPHL) plays a key role in helping to identify the cause and in suggesting approaches that can assist in the investigation. CPHL staff responded quickly and worked hard to fulfill their role, but they were limited by a number of factors, which are discussed in more detail in section four, Making the Diagnosis.

**The Office of the Chief Coroner**

Because of the number of deaths, the Office of the Chief Coroner became involved early in the outbreak, and played a key role in helping to diagnose the cause of the outbreak. See section four, Making the Diagnosis, for more detail.
Ministry of Health and Long-Term Care

At the provincial level, the Public Health Division, including the Emergency Management Unit (EMU), also had procedures in place and those were followed. After consultation with Toronto Public Health, the EMU determined that the outbreak required a regional (as opposed to a provincial) response.

During the outbreak, the ministry provided assistance to Toronto Public Health and Seven Oaks in accessing other parts of the health care system (e.g., the Regional Office called hospitals to find beds). Toronto Regional Office helped EMS also by phoning hospitals about beds, and was in contact with other long-term care homes in the region.

Public Health Division and EMU, in consultation with Toronto Public Health, developed the “Important Health Notices” designed to keep health care organizations and providers informed about the outbreak.

Because this was considered a “regional” rather than a “provincial” emergency, there appeared to be some confusion about the ministry’s role and who was in charge: something that should be clarified before future outbreaks.

Did organizations have the people and skills – the surge capacity – to respond effectively?

Most of the organizations involved in the outbreak – with the exception of Seven Oaks and the Central Public Health Laboratory – managed their role in the outbreak using existing staff.

The Long-Term Care Home

Although Seven Oaks’ response to the outbreak was excellent, by October 1, the home could no longer manage the outbreak with existing staff – despite increasing staff working hours and shifts. The home is part of a network of City of Toronto homes, and the general manager of the organization called in extra support from head office (seven or eight management staff). The company tried to hire agency staff to assist, but was unable to do so. Instead, the company brought in 19 staff from other City homes. This type of staffing contingency was not covered in the current collective agreement. Had the union not agreed to the arrangement, the home would have faced a serious staffing issue, and this is an issue that should be addressed to ensure all organizations have access to surge capacity in the future. In this case, Seven Oaks had the advantage of being part of a network of long-term care homes; other homes may not find it as easy to arrange surge capacity.
Public Health

Toronto Public Health reported that it was better prepared in terms of human resources than it been during SARS – although the Panel notes that there has not been a significant increase in personnel at the health unit and that the health unit has not been able to find people to fill the new positions related to infectious disease control. Although Toronto Public Health had the staff resources, it was working to capacity to respond to a medium-sized outbreak. Anything larger would have overwhelmed the unit – and Toronto Public Health is the largest, most well resourced health unit in the province. Smaller health units would not be able to manage a comparable outbreak without assistance from other health units.

In the Panel’s opinion, many of the human resource issues within the public health system still urgently need to be addressed. Seven health units across the province still do not have a permanent Medical Officer of Health. Although some 180 positions have been added, many are unfilled for a variety of reasons, such as lack of skilled people, unattractive pay scales and ever increasing job complexity and accountability. The report of the public health Capacity Review Committee will make specific recommendations about HHR needs, and the Panel urges the province to act quickly and decisively to develop the public health workforce.

Hospitals

Although hospitals did not report any specific staffing problems, the problems accessing beds were, in part, staffing issues. The Panel remains concerned that hospitals do not have enough surge capacity to accept large numbers of infectious disease patients over a short period of time. This issue must be addressed as part of planning for an influenza pandemic. Hospitals must have plans that include contingency arrangements for situations such as an influenza pandemic, when a proportion of hospital staff may themselves be sick.

The Laboratory

The human resource problems at the CPHL are long-standing and well-known. An organization that was once internationally recognized for its work in Legionnaires’ disease (CPHL is the national reference lab for Legionnaires’ disease and other illnesses) has been severely under-resourced and weakened. The lab is in urgent need of people and expertise, including microbiologists and epidemiologists with the skills to actively assist in disease outbreaks. A soon-to-be-released report on the CPHL will make recommendations about staffing levels and skills. Once again, the Panel strongly supports these recommendations and urges the province to act quickly to create the
quality and caliber of laboratory services Ontario needs to cope with existing infectious diseases (e.g., West Nile, HIV), and to be prepared for future outbreaks.

The Office of the Chief Coroner

The Office of the Chief Coroner has an established disease investigation team, and a pathologist and coroner from the team worked hard on the investigation on top of their regular caseload. The same coroner responded to the first four deaths, which provided excellent continuity throughout the response.

Ministry of Health and Long-Term Care

The Panel was alarmed to learn that the Public Health Division at the Ministry of Health and Long-Term Care is less well staffed in terms of communicable disease expertise and experience with outbreak management than it was during SARS. The province plays a critical role in coordinating the management of outbreaks that cross health unit boundaries and providing expertise to the rest of the system. Some of this gap may be filled by the new Ontario Public Health Agency, but Ontario must still have receptor capacity within government. This issue will be addressed in the pending Capacity Review Committee report, and the Panel urges the government to act quickly to address this human resource issue.

Did organizations have the expertise to respond effectively?

Post-SARS, there has been a significant increase in infection control expertise in the health system. For example, Seven Oaks had a nurse manager in infection control who provided excellent leadership in the home during the outbreak; Toronto Public Health had infection control expertise; and at least one hospital reported now having an infection control practitioner on call 24/7. Despite the cost, the hospital reports that this investment has paid off in terms of reducing infections in the hospitals, and enhancing its ability to respond to an outbreak.

While there is more expertise, the Panel is concerned that it is not evenly distributed across the province. Smaller communities and smaller organizations are less likely to have easy access to the skills and information they need.

The Panel commends the government for the efforts to date to provide more consistent access to infection control information and expertise. In the Panel’s view, the establishment of the Provincial Infectious Diseases Advisory Committee (PIDAC) is a significant strength. The committee is doing excellent work and played an important role providing expert advice during the outbreak. The Panel is also pleased
to see that the progress that has been made in establishing the regional infection control networks and recommends that Ontario move as quickly as possible to put all these resources in place.

During the Legionnaires’ outbreak, people on the front lines of the response found it easier and less bureaucratic to get advice and assistance than it had been during SARS. However, finding the right experts takes time. In the future, it would be helpful if organizations such as the Public Health Agency of Canada and the Ontario Public Health Agency would play a strong role in identifying and maintaining a list of provincial, national and international experts in infectious diseases, investigation and outbreak response. They can play a useful part in smaller outbreaks by contacting experts and linking them with people in the field. The Panel recognizes that the informal process of obtaining advice and assistance from experts outside the country occurs regularly between professionals and this essential information exchange must happen quickly and efficiently; however, when formal assistance is requested or experts are invited to provide on-site help, appropriate protocols must be followed.

Did organizations have the supplies and physical capacity to respond effectively?

Because this was a relatively small outbreak, affecting a small number of institutions, supplies were not a major issue, except for Seven Oaks, which ran out of masks and other supplies, and had to rely on other City homes and hospitals to provide some supplies.

The home also faced some challenges getting supplies to maintain its operations. Some suppliers were reluctant to deliver supplies, such as water, to the home because of the outbreak. This experience reinforces the importance of business continuity planning as part of outbreak planning.

At one point during the outbreak, there were 40 people in hospital who, because of the uncertainty about diagnosis, were placed in isolation beds or negative pressure rooms. This created a challenge for hospitals that were already operating at close to 100% capacity.

Although this level of precaution was not actually required for Legionnaires’ disease, this experience highlights the urgent need for hospitals and the rest of the health care system – as part of pandemic planning – to establish priorities for the use of critical hospital resources, so decisions can be made quickly during an outbreak.
Were organizations able to provide psychosocial and other support for front-line staff?

As the size of the outbreak grew and the cause remained unknown, front-line staff in all organizations – the long-term care home, Toronto Public Health, EMS and hospitals – experienced some anxiety.

Staff at Seven Oaks were naturally anxious because many of their colleagues were also ill, but they coped well. The Panel believes that their highly professional response was due in large part to the way management supported staff. Managers from the home and from the corporation were on site at all times, employee assistance programs were available to help staff, and the chaplain at Seven Oaks and from another home were also on site.

Some hospitals reported having a psycho-social support network for all staff. However, one hospital had a significant number of staff who, early in the outbreak, did not show up for work. This represents a higher rate of refusals to work than during SARS, and highlights one of the key ethical dilemmas facing the health care system: the reluctance of some health care professionals to work in the face of risk. It also reinforces the need for consistent infection prevention and control practices that are based on science (see section three), for more education and information, and for the professions themselves to play a stronger role in helping to resolve this issue.
III. Protecting Health Care Workers and Preventing Disease Transmission

In any disease outbreak where the cause and source of the illness is unknown, health care workers will be concerned about their own health and the health of their families. Will their personal protective equipment protect them? Are they using the right equipment? This fear is particularly acute since the SARS outbreak in Ontario, during which a number of health care workers became ill and some died. It has been identified by some as a type of post traumatic stress syndrome.

During the Legionnaires’ outbreak – with the exception of a group of workers at one facility who did not come to work – health care workers responded professionally, providing care when and where it was needed; however, there were disagreements about the appropriate level of personal protective equipment, and contradictory advice from different parts of government.

Did health care organizations and providers have access to consistent evidence-based infection prevention and control advice?

No. Staff in the long-term care home and in the hospitals were initially providing care using the droplet and contact precautions for febrile respiratory illness (FRI) set out in the recently released *Preventing Febrile Respiratory Illnesses: Protecting Patient and Staff*, developed by the Provincial Infectious Diseases Advisory Committee (PIDAC), an expert committee on infectious diseases established as a result of the SARS review.

EMS workers were wearing a higher level protection, including N95 masks, as is the norm for their practice. EMS workers have a different standard for personal protective equipment because they regularly go into environments where the health risks are unknown. Their standard PPE is designed to protect them from toxins and chemical contaminants in the environment as well as infectious disease. Although the differences in PPE are based on science and practice, they are not well understood in the workplace.

As the outbreak continued with the cause still unknown, some of the hospitals caring for patients with illness switched to N95 masks. Toronto Public Health did not think this level of precaution was required but – given the uncertainty regarding diagnosis – it recommended the use of N95 masks for consistency. Not all hospitals thought this was justified, and some continued to use the FRI guidelines. Hospitals located in other health unit areas received differing advice from their local health units.
On October 5, 2005, PIDAC was asked for its opinion on infection control measures for this outbreak, and recommended droplet and contact precautions as set out in the FRI guidelines. Two days later, the Ministry of Labour visited Seven Oaks and advised staff to use N95 instead of surgical masks, contrary to the PIDAC recommendations. The Ministry of Labour also began inspecting hospitals, and writing orders for facilities related to N95 masks, fit testing and other practices.

These conflicting messages led to confusion, uncertainty and anxiety, and made the outbreak much more difficult and stressful for health care providers.

While many may think that, in terms of infection prevention and control, “more is better” – that is not the case. There are serious and inherent risks – to health care providers, to patients and to the system - - in using higher level precautions when they are not required.

In the Panel’s opinion, the creation of PIDAC, the development of the FRI guidelines, and the Important Health Notices issued jointly by Public Health Division and the Emergency Management Unit are positive steps toward achieving those goals. Since SARS, there has been a significant improvement in the availability and credibility of infection prevention and control information. Based on the response of staff at Seven Oaks and in many of the hospitals, there has also been a significant improvement in education programs and in health care providers’ understanding of infection control practices.

However, Ontario must take steps to ensure that the messages about infection control practices are consistent across ministries and that, when there are profession-specific differences in personal protective practices, the differences are based on risk and science. This will be particularly important during a pandemic, when equipment may be in short supply, and must be used appropriately.

This issue must be addressed. Ontario needs a much more coordinated approach to protecting health care workers and preventing disease transmission. The Panel strongly recommends that:

- all decisions about the use of personal protective equipment and other infection control practices during an outbreak be based on science
- the Ministry of Health and Long-Term Care be responsible for establishing policy regarding the appropriate infection prevention and control measures in an outbreak, based on science
- PIDAC be involved as early as necessary in an outbreak to help establish the standard, explain the science behind it, and provide expert advice throughout an outbreak
- the Ministry of Labour be responsible for enforcing and ensuring compliance with that science-based policy

**Risks of Inappropriate Use of Higher Level Precautions**

- personal protective equipment is uncomfortable and difficult to put on, so it is often misused or worn improperly
- errors are more common
- workers tend to become over confident in their equipment and neglect other key measures, such as hand hygiene
- health care providers experience health problems (e.g., rashes, problems breathing)
- patient care may suffer
- it is costly and uses supplies that may be required when the system is faced with diseases that require that level of protection
• all health care organizations and providers receive education on the importance of using appropriate, science-based precautions and on the reason for different levels of precautions in different practices
• during an outbreak, all health care organizations and providers have easy immediate access to information and advice about the appropriate PPE and other precautions.

Were health care providers confident in the infection control/occupational health and measures taken?

The fact that a significant number of staff did not report for work at one hospital after the outbreak started may indicate that some workers do not have confidence in the recommended practices. It may also indicate the extent to which the SARS outbreak affected health care workers.

On the other hand, there is clear evidence that staff at Seven Oaks and other hospitals continued to come to work and to provide excellent care, following the infection control practices recommended by their institutions.

It would have been more difficult for staff to maintain their confidence when they began to receive conflicting messages about appropriate levels of protection. That is why the more coordinated approach recommended above is urgently needed.

Did organizations have enough personal protective equipment for staff?

As noted earlier, this was a relatively small outbreak so access to supplies was not a major issue except for Seven Oaks. In this case, Seven Oaks was able to obtain additional supplies from some other homes. Had the outbreak been larger or involved more homes, supplies would have been an issue.

This experience should be used to identify the types and amounts of supplies long-term care home should have on hand in case of an outbreak, and to inform pandemic planning.

During a pandemic, supplies will be an issue – particularly for smaller health organizations. The Panel suggests that there may be a role for the LHINs or the Regional Offices in coordinating supplies and access to equipment.
IV. Making the Diagnosis

Making the diagnosis is a critical part of an outbreak response. The diagnosis helps inform care and prevention strategies. It can also help find and eliminate the source of the illness.

To make a diagnosis, requires close cooperation among the public health epidemiologists, the clinicians, the laboratories and, in some cases, the Office of the Chief Coroner. An epidemiological investigation is conducted and information is gathered from a variety of sources, including:

• information on signs and symptoms, as well as responses to treatment from the clinicians providing care
• epidemiological information gathered from tracking and managing cases, and observing the pattern of the disease (e.g., who was affected? when? where?)
• results from laboratory tests and advice from laboratory personnel about possible avenues of investigation
• in cases where there are deaths, information from tests on autopsy specimens. During both SARS and the Legionnaires’ outbreak, where the pathogens were difficult to isolate, autopsy specimens played a key role in identifying the causal agent and making the diagnosis.

In the Panel’s opinion, the clinical investigation at the bedside (i.e., clinical signs and treatment) was well done. Clinicians used their judgement well, kept their options open, and treated patients for all treatable possibilities. They also provided valuable information and insight that helped guide laboratory testing. The other investigations were also well done, but experienced some challenges, problems or delays because of resource issues.

Were the right people involved? Did they do the right things?

Yes. During the investigation of the Legionnaires’ outbreak, there was excellent cooperation among all those involved: including management at Seven Oaks, clinicians at the hospitals, Toronto Public Health, the Central Public Health Laboratory and the Office of the Chief Coroner. Contact tracing and follow-up with cases was well done, and the epidemiologists were able to link case contact information to the clinical and laboratory information, albeit with some difficulty.
Did they have the resources and infrastructure they needed to conduct the investigation?

No.

The epidemiologic investigation

The epidemiologic investigation suffered from lack of effective information systems. During the Legionnaires’ outbreak, the public health information system, iPHIS, was not fully operational, so Toronto Public Health relied on an Access database to track patients. Although the database gave staff access to information and allowed them to produce reports, it was a “home made” solution that would have been overwhelmed by a larger outbreak. The system would also have been unworkable if the outbreak had involved another health unit area, because it could not link with other health unit systems.

Public health staff also reported that it took a great deal of time to gather information on contacts for contact tracing.

Ontario’s public health system needs effective information systems to support outbreak management and epidemiological investigations. The Panel urges Ontario to move quickly to fully deploy and improve the functionality of iPHIS in order to give public health units the capacity to collect and share data, and to produce reports. The system should also be compatible with national public health information systems.

At the facility level, long-term care homes, hospitals and other settings where care is delivered should develop a consistent mechanism to record the name and contact numbers of visitors – if not all the time, at least during an outbreak.

The laboratory investigation

Although staff at the Central Public Health Laboratory worked extremely hard on the investigation, they were limited by a number of organizational and structural factors, including:

• lack of human resources – particularly at the senior levels (e.g., microbiologists) – which has already been discussed
• an outdated physical plant. The lab is housed in an outdated facility, located far from other resources and expertise in the system, such as university and larger health science centres.
• lack of electronic information systems. The Central Public Health Laboratory still relies on a largely paper-based system. The electronic systems it does have are not consistent across different parts of the laboratory. This meant that the process of getting and sharing information (i.e., by fax, by phone, manually inputting information into separate systems) was more time consuming and
prone to error. It also made it difficult to track specimens and match samples within the lab.

- problems accessing tests. When the urine antigen tests done using the CPHL’s own test were negative, the laboratory was unable to access a commercial test available in the US first because the test is not approved by Health Canada and, second, because the US manufacturing plant had recently moved and the new site had to be inspected before they should ship test kits.

- lack of emphasis on research and development. In the 1980s, the CPHL had significant expertise in Legionella, but has not been able to maintain its international reputation in this field because of under-resourcing and lack of investment in research and development.

Many of these problems were identified during SARS, and a soon-to-be completed review of public health laboratory services is expected to make a number of recommendations to strengthen the laboratory system, including relocating the CPHL close to and functionally integrating it with university and academic health science centres.

The Panel strongly urges Ontario to act on these recommendations immediately. The Panel would also like to stress the urgent need for electronic information systems to support laboratory operations. We are aware that the Ontario Laboratory Information System (OLIS) is currently under development, but it will be two to three years before it is operational. In our view, that is too long. Our ability to respond to disease

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**Laboratory Diagnosis of Legionella**

Legionnaires’ disease is difficult to diagnose and confirm. At least 46 species and 68 serogroups of Legionella bacteria have been identified. L. pneumophilia accounts for over 90% of infections in humans and the majority of these are caused by L. pneumophilia serogroups 1, 4 and 6. Diagnosis of Legionellosis may be confirmed by any one of the following:

- isolating Legionella from respiratory secretions(sputum) or tissues;
- microscopic visualization of the bacterium in respiratory secretions or tissue by direct fluorescent antibody testing;
- detection of L. pneumophila serogroup 1 antigens in urine by radioimmunoassay or ELISA; or
- a fourfold rise in L. pneumophila serogroup 1 antibody titre in blood tests taken 3 to 6 weeks apart.

These tests complement each other: performing more than one when Legionella is suspected increases the probability of confirming the diagnosis. However, because none of the tests is 100% sensitive, the diagnosis is not ruled out even when one or more of the tests are negative.

The CPHL is the reference laboratory for Legionella in Canada and has developed an in-house urine antigen ELISA test that has been used since the 1980s. The sensitivity of this test was believed to be in the 75% range. Two other commercial urine antigen tests are available:

1. the Binax test from the USA and
2. the Biotest urine antigen EIA from Germany.

Because each of these tests has a different ability to detect certain subspecies of Legionella, using two or more together can dramatically increase the sensitivity of testing. Neither of these tests are currently approved by Health Canada for use in Canada.
outbreaks now and in the future is highly dependent on the capacity of the public health laboratories to conduct tests and diagnose disease in a timely way.

**Autopsy capacity**

The ability of the Office of the Chief Coroner to conduct autopsies is also limited by structural factors. The autopsy suite at the Office of the Chief Coroner is old and outdated, and has inadequate ventilation. It is not built to the standards required to safely conduct autopsies on people who may be carrying infectious pathogens, such as HIV, drug resistant TB or diseases that are unknown.

The Office of the Chief Coroner has a formal arrangement with the University Health Network to conduct higher risk autopsies, but the decision to conduct autopsies on the first deaths from this outbreak was made on a Saturday, and the hospital could not easily arrange for the necessary staff and equipment to conduct the autopsies on the weekend. The Office of the Chief Coroner was willing to make special arrangements to do the autopsies right away but, during the daily teleconference, the consensus was that it was reasonable to wait until Monday.

In retrospect, the delay was a concern – primarily because the urine antigen tests all came back negative and autopsy delays can affect the quality of the samples. Since the outbreak, the situation has been partially rectified: the Coroner’s Office and the hospital now have a written protocol for off-hour autopsies. However, in the Panel’s view, this is still a stop-gap measure.

Given the crucial role that autopsy specimens can and – as both SARS and this outbreak indicated – do play in diagnosing disease and determining the cause of an outbreak, the Panel recommends that a new autopsy suite be built for the Office of the Chief Coroner that meets adequate, up-to-date safety requirements.
V. Finding the Source

An environmental investigation requires close collaboration between public health, building managers and environmental inspectors and laboratory staff. The goal is to find and eliminate the source of the pathogen as quickly as possible, and to identify any changes required in the environment to prevent a recurrence.

The environmental investigation began October 6, as soon as Legionnaires’ disease was identified as the cause of the outbreak. Toronto Public Health instructed Seven Oaks to shut down all air handlers, hot water systems, fans and equipment that used water. The city water mains were flushed and tested for chlorine levels. One hundred samples were collected in a day on October 7, and delivered to the laboratory; all these samples tested negative.

More sampling was done over the weekend of October 8 and 9. The investigation started with the home and then spread outside, including RVHS (Centenary site) and the Shoniker Building, next door to the home, and all buildings within a 1.5 km radius of Seven Oaks.

On Friday October 21, tests found Legionella of the same strain obtained from patients in samples from the cooling towers at Seven Oaks. Legionella was also found in the cooling towers at the Shoniker Building, at the RVHS (Centenary site) and another building.

Given the high attack rate in the Seven Oaks facility, it seems very likely the long-term care home’s cooling tower was the source – despite the fact that the home and its water and cooling systems were well maintained and that the maintenance program met current standards.

A combination of unusual factors likely led to the growth and then release of the bacteria including:

- record breaking summer heat, which led to much heavier use of the cooling system
- construction on the hospital across the street (construction dust is known to be a factor in Legionella growth)
- the design of the home’s ventilation and cooling systems, which placed the home’s air intake next to the cooling tower
- a cold spell in September during which the water in the cooling tower would have dropped below a certain temperature, followed by another warm period when heavy use of the cooling systems resumed.

Environmental Testing for Legionella

Legionella is common in the environment but difficult to find in the laboratory. Samples must include the slurry, sludge or sediment from a water tank ideally without the water. The sample must then be grown in the lab. As a result, it can take up to a week to test environmental samples for Legionella.
Were the right people involved in the environmental investigation? Did they do the right things?

Yes. Public health staff with expertise in environmental health planned the investigation and received directions from the chief technician at the laboratory on where and how to sample. They completed an environmental scan of the home and developed a list of equipment for swabbing and sampling. They worked closely with staff at the home and with other sites to obtain samples. They also contacted the internationally recognized Legionella laboratory at the US Centers for Disease Control and Prevention in Atlanta. Experts there were able to provide valuable advice on size and location of samples, and someone from the CDC came to assist with the testing.

Despite these efforts, it appears that expertise in environmental investigation of Legionella is limited in Ontario and in Canada. In the Panel’s view, it would be useful for the Public Health Agency of Canada to maintain an up-to-date list of jurisdictions with recent experience investigating different disease outbreaks, so they can act as a resource to the rest of the system.

Did maintenance on the cooling towers meet current standards?

The maintenance program at Seven Oaks seems to have met existing facility and maintenance standards. The maintenance and custodial staff are knowledgeable. Maintenance is done by contractors and city employees, who follow maintenance check lists. Seven Oaks works above the standard for chemical maintenance, and the facility had passed all recent inspections.

Are existing environmental and maintenance standards adequate to protect residents and staff in long-term care homes?

Ontario does not have specific standards for environmental maintenance. However, long-term care homes are required to have staff responsible for managing maintenance services and for checking and maintaining water systems, and the Occupational Health and Safety Act sets out some standards for timing and reporting for maintenance of heating, ventilation and air conditioning (HVAC) systems.

Given the vulnerability of residents in long-term care homes to respiratory infections, the Panel is concerned that current standards may not be adequate. We recommend that the Ministry of Health and Long-Term Care:
• establish an expert group to review the design and maintenance of cooling towers in long-term care homes, hospitals and other facilities housing people with complex health needs. The Panel notes that there is now new technology that does not involve cooling towers, which would significantly reduce the risk of environmental exposures to Legionnaires’ disease, and suggests that this new technology be explored as part of the design review.

• review the province’s environmental standards against those in place in other jurisdictions to ensure they are adequate to protect residents and staff in long-term care homes. In particular, the guidelines published by the American Society of Heating, Refrigeration and Air-Conditioning Engineers Inc, titled *Minimizing the Risk of Legionellosis Associated with Building Water Systems* (ASHRAE Guideline 12-2000) should be reviewed in light of the situation in Ontario.
VI. Sharing Information

During a disease outbreak, communication is critical. Everyone involved – patients, patients’ families, health care providers, health care organizations, laboratories, and individuals conducting the investigations – needs timely access to the right information. Many of the recommendations from SARS focused on ways to improve communications with organizations, within organizations, with families, and with the public and the media.

In our review of communications during the Legionnaires’ outbreak, the Panel found some significant improvements in some aspects of communication, but we also found some weaknesses that must be addressed – particularly in the area of information systems and the use of electronic communications.

Were health care organizations and providers kept informed?

Over the course of the outbreak, the Ministry of Health and Long-Term Care issued four “Important Health Notices” that provided key information for health care providers. This system, established during SARS, appears to be an effective way to communicate with health care organizations. However, the ministry’s ability to distribute the “Important Health Notices” in a timely way was limited by technical problems. The information system designed to send the notices to 30,000 people and organizations across the province failed, and the ministry had to use a slower, less efficient back up system.

In their efforts to communicate with the field, the organizations managing outbreaks continue to face key challenges, including:

• keeping contact information up to date. Providers and organizations move, and it is difficult to keep addresses current.
• getting information to community providers. Many community providers do not have e-mail or fax to receive important health information quickly.
• ensuring information gets to front-line staff in a timely way. The ministry or public health unit cannot be sure that information sent to organizations reaches the people delivering care who need it.

Was there effective communication among organizations?

Communication among organizations has improved since SARS. On the day the outbreak peaked, Toronto Public Health held a meeting at Seven Oaks, and convened daily teleconferences thereafter to discuss case data, patient status, transfers and precautions. Although the
teleconferences appear to have been effective, the Panel believes it is important for the system to have the capacity to bring people together face-to-face when necessary to manage an outbreak.

The Panel also questions the system’s heavy reliance on phone calls and faxes as a way of notifying other organizations. Because the outbreak occurred over a weekend, many of the calls and faxes were not received until Monday morning when people returned to their offices.

Some hospitals identified problems with the type and level of information they received on patients transferred from the home, and this reinforces once again the need for a more coordinated approach to transfers during an outbreak and better systems for sharing information on cases being transferred.

Was there effective communication within organizations?

Communication within organizations has improved since SARS, and appears to have been quite effective. Most organizations had formal communication plans and used them. Hospitals and the long-term care homes developed routines that included daily staff briefings as well as written materials. Face-to-face communications continue to be key in informing and supporting staff.

Were family members kept informed?

Seven Oaks did an excellent job of communicating with family members. They were contacted at least once a day, and notified before press releases were sent out.

Families reported that the information they received was very good, and the phone calls were well done. When families called the home, their questions were usually answered by office staff, who were very good but often did not have detailed information. Some family members would have liked more opportunity to talk to the people actually caring for their relative (e.g., the physician, floor staff), but realized that they were often too busy providing care to take calls.

Family members were also contacted regularly by staff from Toronto Public Health, as part of contact tracing and to provide reassurance.

Was the public kept informed?

Despite the best efforts of public health units, hospitals and the ministry to organize press conferences and to develop information for the public, outbreak teams have relatively little control over how the media delivers information to the public. In this case, the media broke the story before Toronto Public Health had issued any information.
Because of SARS and recent coverage of avian flu, media coverage was intense. It was also inaccurate. It focused initially on people being hospitalized at one facility and likely played a role in the large number of employees who did not report to work on Saturday.

Toronto Public Health held its first news conference primarily to correct misinformation and allay fears. To help manage the media, the City assigned a public relations person to Seven Oaks, while most hospitals had a communications person available or on call. Toronto Public Health continued to organize news conferences throughout the outbreak, but several sites – particularly the long-term care home – reported that media attempts to obtain information were disruptive.

In general, public health has a good relationship with the media, but more must be done – both before and during any outbreak – to encourage informed media coverage. It is also important for health units and the Ministry of Health and Long-Term Care to coordinate communication messages.

**Are there ways to improve information sharing in the future?**

The Panel recognizes that, during an outbreak – particularly one where there is uncertainty about the cause -- people will always want “more” information and it may not be possible to resolve all communication issues. Communication is and will continue to be the most difficult challenge.

In the Panel’s view, the most serious gap in the system’s ability to share information relates to the lack of information systems and ineffective use of electronic communications. One issue that has not been adequately addressed since SARS is the need for information systems to help organizations respond to a disease outbreak. We identified a number of activities where information systems were inadequate or makeshift including: arranging transfers for patients, collecting epidemiological data, in the laboratory, and communicating with health care providers and organizations. To respond effectively to disease outbreaks, Ontario needs real time data on cases, their health status, hospital capacity, contacts, events and the investigations underway. Every effort must be made to develop these systems and ensure they can communicate with one another.

The people within the system must also make more effective use of electronic communications to share information. It is no longer adequate to rely on phones and faxes to distribute information. All health care providers and organizations should be e-literate and have access to appropriate technology that will allow them – when necessary -- to receive vital information during off hours as well as during working hours.
VI. Conclusion

When the Legionnaires’ outbreak occurred in Toronto in the fall of 2005, did the system do a better job of responding than it had in the past? Did the changes since SARS make a difference?

Yes. In the Panel’s view, the steps that Ontario has taken since SARS have made a difference. The system’s response to the Legionnaires’ outbreak was more organized, efficient and effective. Patients received good care, and the system took appropriate steps to prevent the spread of disease and to track the outbreak. Many procedures and protocols are now in place. There has been progress within individual organizations as well as in the system as a whole.

First, the Panel would like to extend its heartfelt condolences to the families and friends of those affected by this outbreak, particularly those of residents whose deaths were precipitated as a result of Legionnaires’ disease. The Panel would also like to commend the organizations involved in the response for their commitment and dedication. In general, we found that the right people were involved and the right things were done at the right time.

While many things worked well, there is still much more to be done. We cannot afford to become complacent or to lose momentum. The Legionnaires’ outbreak showed where we have improved; it also showed clearly where the system is still weak.

Summary of Recommendations

What can and should we do better?

The Panel recommends that Ontario continue to implement the recommendations from *For the Public’s Health: A Plan of Action*. We also recommend the following.

1. Close gaps in the outbreak response system by:

   1.1 Ensuring all organizations have a clear understanding of their own and one another’s roles and responsibilities
   
   1.2 Developing a mechanism to ensure that hospitals are part of a coordinated response during local and regional outbreaks
   
   1.3 Improving the processes and procedures used to transfer patients between facilities
   
   1.4 Establishing priorities for the use of limited hospital resources (e.g., isolation beds, negative pressure rooms) during outbreaks
   
   1.5 Encouraging all organizations to develop business continuity plans as part of outbreak planning
2. **Provide the right people and build surge capacity by:**

2.1 Acting quickly to implement the human resource recommendations of the public health Capacity Review Committee and build the public health workforce locally and provincially

2.2 Starting immediately to recruit and develop the expertise required to make the Central Public Health Laboratory a strong provincial and national resource

2.3 Encouraging all facilities to negotiate agreements with their unions that will allow staff to work at different sites during an outbreak and provide surge capacity

2.4 Encouraging hospitals and other facilities to develop staffing contingency plans in the event of outbreaks where a significant portion of staff become ill and are unable to work

2.5 Moving quickly to establish the Ontario Public Health Agency and making it responsible for maintaining an up-to-date list of experts locally, nationally and internationally who can assist during outbreaks

3. **Improve occupational health and safety, and infection prevention and control by:**

3.1 Ensuring that all decisions about the use of personal protective equipment and other infection prevention and control practices during an outbreak are based on science

3.2 Clarifying the responsibilities of different ministries and ensuring consistent messages (i.e., making the Ministry of Health and Long-Term Care responsible for establishing policy regarding the appropriate infection prevention and control measures in an outbreak and the Ministry of Labour responsible for enforcing and ensuring compliance with that science-based policy)

3.3 Continuing to make effective use of the Provincial Infectious Diseases Advisory Committee (PIDAC) and involving the committee as early as necessary in an outbreak to help establish the standard for infection prevention and control, explain the science behind it, and provide expert advice throughout an outbreak

3.4 Ensuring all health care organizations and providers receive education on the importance of using appropriate, science-based precautions and on the reason for different levels of precautions in different practices
3.5 Ensuring all health care organizations and providers have easy, immediate access to information and advice about the appropriate PPE and other precautions

3.6 Engaging the health professions to educate their members about their duty to care and the safeguards in place to reduce their risk in the workplace

4. **Enhance Ontario’s capacity to investigate outbreaks by:**

4.1 Revitalizing the Central Public Health Laboratory, and acting on recommendations to relocate the laboratory and integrate it with the university and academic health science centres

4.2 Building a new autopsy suite for the Office of the Chief Coroner that meets current safety standards

5. **Improve Ontario’s capacity to share accurate information during an outbreak by:**

5.1 Developing an information system to manage transfers between facilities

5.2 Moving quickly to fully deploy and improve the functionality of iPHIS and give public health units the capacity to collect and share data, and to produce reports.

5.3 Developing an information system for the Central Public Health Laboratory

5.4 Developing an information system to support timely communication among all health care organizations and providers during an outbreak

5.5 Requiring all health care organizations and providers to be e-literate and to have the technology to obtain information in off hours as well as work hours during an emergency

5.6 Working with the media to ensure more informed coverage of disease outbreaks

6. **Ensure facility standards in Ontario are adequate to protect residents and staff in long-term care facilities by:**

6.1 Establishing an expert group to review the design and maintenance of cooling towers in long-term care homes, hospitals and other facilities housing people with complex health needs.

6.2 Reviewing the province’s environmental standards against those in place in other jurisdictions to ensure they are adequate to protect residents and staff in long-term care homes.
Expert Review on Legionnaires' Outbreak in the City of Toronto

TERMS OF REFERENCE

The purpose of the review is to examine the response by the organizations involved during the outbreak using lessons learned during and following Ontario's SARS emergency. A report will be produced by the reviewer to advise the Minister of Health and Long-Term Care on how the outbreak was handled and to highlight the strengths and weaknesses of the capacity of organizations involved to respond.

Mandate

To determine the key lessons learned in the Ontario health system and related agencies' handling of the Legionnaires' Disease outbreak and with this understanding, provide practical, focused and forward-looking advice on all appropriate measures to strengthen infectious disease control on a sectoral and system-wide level in Ontario.

Objectives

- Review the actions taken by the Ministry of Health and Long-Term Care, the Ministry of Community Safety and Correctional Services, the City of Toronto and relevant public hospitals during the Legionnaires' Disease outbreak.

- Review the protocols and procedures that were in place before, during and following the Legionnaires' Disease outbreak and identify the key measures required to strengthen Ontario's capacity to prevent, respond to and manage future infectious diseases on a system-wide level.

- Produce practical, focused and forward looking advice pertaining to all levels and sectors regarding enhanced future approaches to infectious disease control and identification of sources of diseases.

Special emphasis should be placed upon how learnings from the SARS emergency were applied, as appropriate, to the prevention, identification and management of the Legionnaires' Disease outbreak.

The review will be conducted in a manner that does not impede the work of the local Medical Officer of Health in investigating and/or controlling of the Legionnaires' Disease outbreak.
Composition

The Minister of Health and Long-Term Care shall appoint a Reviewer.

The Reviewer may appoint a panel of members with recognized expertise in their respective fields to assist with the review.

Timing

The Reviewer shall deliver a final report to the public and the Minister of Health and Long-Term Care by November 30, 2005 unless a reasonable extension is granted by the Minister of Health and Long-Term Care.
REVIEW METHODOLOGY

The Expert Panel on the Legionnaires’ Disease Outbreak in the City of Toronto conducted three types of inquiry within a five week time period, including:

i) Interviews:
- Approximately 40 interviews, involving over 60 individuals
- Organizations represented include:
  - Ministry of Labour
  - Ministry of Health and Long-Term Care
  - Ministry of Community Safety and Correctional Services
  - Toronto Public Health
  - Toronto EMS
  - Toronto Homes for the Aged, Community and Neighbourhood Services
  - Seven Oaks Home for the Aged
  - Rouge Valley Health System
  - York Central Hospital
  - Markham Stouffville Hospital
  - North York General Hospital
  - Mount Sinai Hospital

ii) Focus Groups:
- Toronto Public Health
- Seven Oaks Home for the Aged - Staff
- Seven Oaks Home for the Aged – Family Committee

iii) Literature Review
A review of relevant:
- Legislation
- Standards
- Correspondence
- Scientific literature on legionella
- Epidemiological information
- Chronologies
- Activities since SARS
- Inquests, reports and studies