

Proceedings from **Severe H1N1 Disease:** Preventing Cases, Reducing Mortality



September 2nd & 3rd 2009, Winnipeg, Manitoba, Canada



Public Health
Agency of Canada

Agence de la santé
publique du Canada

Canada 

The Public Health Agency of Canada, collaborating with Manitoba Health, the University of Manitoba, and the Critical Care Society of Canada, hosted a conference on September 2nd and 3rd, 2009, bringing together more than 175 national and international critical care, public health, and primary care experts to discuss the clinical care and management of severe H1N1 disease and to prepare for the anticipated fall pandemic wave.

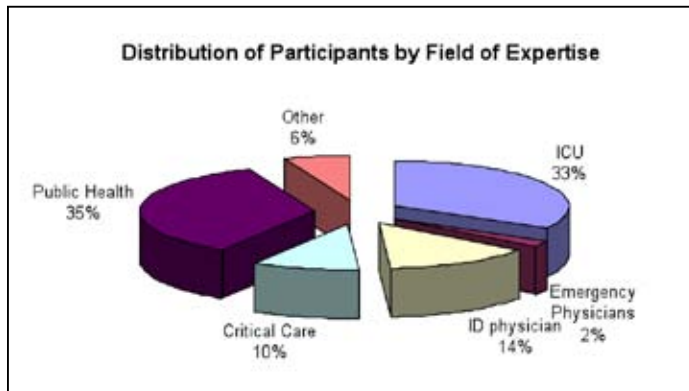


FIGURE 1

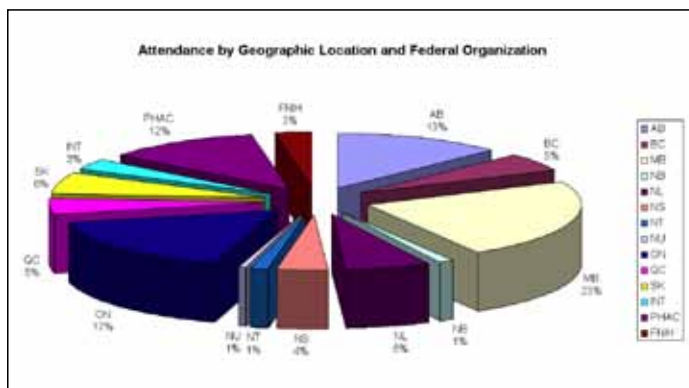


FIGURE 2

While the Public Health Agency of Canada organized this conference, it is important to note that the responsibility to address areas of concern identified remain with many different levels of the health care system.

The conference was opened by The Honourable Minister of Health Leona Aglukkaq, Honourable Theresa Oswald Manitoba Minister of Health, the Chief Public Health Officer (CPHO) of Canada, Dr. David Butler-Jones, and Dr. Frank Plummer, Chief Science Advisor to the CPHO and Scientific Director General of the National Microbiology Laboratory. The opening session emphasized the importance and timeliness of the conference and highlighted the key objectives.

The key objectives for the meeting were:

- To better understand the epidemiology and severity of H1N1 infection.
- To exchange best practices for clinical care and clinical management of patients with severe H1N1 infection.
- To identify key intensive care unit (ICU) challenges/shortfalls and review mitigating strategies in preparation for the anticipated fall pandemic wave.
- To foster connections between public health and intensive care communities in Canada.
- To identify opportunities for collaborative research work.

Plenary and breakout sessions explored various aspects of severe H1N1 disease including:

- Epidemiology
- Strategies for prevention
- Early recognition
- Clinical care
- Disease management
- Resource utilization, and
- Insights from remote and isolated communities

During the conference, participants gathered to discuss technical recommendations on diagnostics, resources and medical therapy of pandemic influenza as well as mechanisms to ensure appropriate and timely communications. Issues regarding surge capacity and personal protection for Healthcare Workers (HCWs) were also discussed. The World Health Organization (WHO) provided an overview of the current global context. Other presentations reviewed the Canadian and Manitoba experience during the first wave of the pandemic, focusing on severe cases. The ability of ICUs to effectively treat patients who develop severe H1N1 disease during the anticipated fall pandemic

wave was discussed as a major factor in mitigating the potential impact. Although the severity of a potential second wave cannot be definitively predicted, front-line healthcare professionals may see a significant increase in outpatient visits and hospitalizations. As heightened pressure on ICUs was experienced during the first wave of the pandemic, concerns remain that ICUs could exceed existing capacity if the number and severity of cases remain high.

The conference proceedings highlight a number of key issues that need to be addressed by all levels of the healthcare system. Addressing these issues will help to better prepare Canada for the severe H1N1 cases that are expected in subsequent waves of the pandemic.

Epidemiology and severity of H1N1 disease

Observations:

- As of August 2, 2009, 1,411 deaths associated with severe H1N1 disease have been reported worldwide. Pregnant women, infants and children less than five years of age, the elderly and those with co-morbid conditions (diseases such as cardiovascular, renal, respiratory, liver disease, diabetes) appear to be most at risk of severe or complicated disease. The WHO estimates that up to 40% of severe illness and deaths have occurred in “otherwise healthy” individuals.
- The Canadian epidemiology, mortality and hospitalization for specific risk groups was discussed. For the week ending August 22, 2009 Canada reported 7,107 cases of Pandemic (H1N1) 2009 flu virus. These are laboratory confirmed cases and represent a fraction of the total number of actual cases. Twenty percent of cases were hospitalized and 4% were admitted to the ICU. Canada’s mortality rate was .21 per 100,000.
- The Province of Manitoba experienced a significant outbreak of severe H1N1 disease during the spring of 2009. 25% of cases in Manitoba were admitted to hospital and 5% were admitted to ICU.
- While the mortality rate is relatively low, patients can spend up to two months in the ICU. A second wave could result in significant pressure on ICU staffing, equipment, supplies and availability.
- Special populations describe a diverse group including children; immigrant and refugees; low-income persons; homeless; disabled; First Nations and Inuit; pregnant women; and residents of remote and isolated communities. Each has unique challenges to ensuring healthcare equity.

Best practices for clinical care and clinical management of patients with severe H1N1 disease

Observations:

- Most H1N1 patients admitted to ICU had clinical symptoms for 3 to 7 days prior to admission to ICU.
- During a pandemic, laboratories face capability and capacity limitations, an increase in testing demand for all sectors and must have appropriate and active lines of communication.
- Non-invasive ventilation (e.g., continuous positive airway pressure (CPAP)) as a bridge was not successful in majority of patients with pneumonitis.
- Modelling is becoming an increasingly important adjunct technology for understanding the severity of disease as well as anticipating and mitigating the impact for both the healthcare system and population health.

Considerations:

- Diagnosis
 - Communication of clear criteria regarding those who must be tested for H1N1 flu virus and minimum laboratory turn-around-times should be established. Clinical protocols should take into account potential delays in specimen transportation times to the laboratory testing facility.
 - An increased capacity to detect H1N1 flu virus closer to the patient, especially for tertiary care (e.g. in a hospital diagnostic capacity) should be explored.

- Capacity for appropriate antiviral susceptibility testing should be assured.
- Clear and appropriate protocols and lab capacity are needed to differentiate disease due to different respiratory viruses.
- Clear and appropriate communication of the role of Pandemic (H1N1) 2009 flu virus serology should be established as current recommendations limit serology to use in defined seroprevalence surveys.
- Clear articulation of the indication for appropriate specimen types, namely lower respiratory tract aspirates, should be communicated to front-line HCWs.
- Multiple specimens (nasopharyngeal aspirate and endotracheal tube) and repeated testing are required for intubated patients.
- Pulmonary manifestations of severe H1N1 disease
 - Shortness of breath is a danger sign in all patients. Patients with shortness of breath should be rapidly and fully assessed for primary lung pathology including H1N1 viral pneumonitis.
 - Either arterial blood gas or oximetry may be useful as part of such an evaluation; chest radiograph may be required
 - Hypoxemic patients must be closely monitored as they may have rapid deterioration requiring intubation.
 - Clinicians should be familiar with the variety of pulmonary syndromes seen with severe H1N1 disease (exacerbation of underlying disease, exacerbation of underlying pulmonary disease, secondary bacterial pneumonia, bronchiolitis/croup (children), diffuse viral pneumonitis, etc.)
 - Various pulmonary clinical presentations must be recognized and appropriate empiric antiviral therapy must be rapidly initiated.
- Non-pulmonary aspects of severe influenza
 - Clinicians need to be vigilant in recognizing non-pulmonary presentations of severe H1N1 disease.
- Antiviraltherapies
 - The WHO guidelines (http://www.who.int/csr/resources/publications/swineflu/h1n1_guidelines_pharmaceutical_mngt.pdf) regarding the use of antiviral therapies have been recently updated and published. Provincial and regional guidelines should reflect local risk factors and epidemiology.
 - Antiviral therapies should commence as early as possible (e.g., at nursing stations, primary care locations, emergency rooms, etc.) and appropriate samples should be obtained for laboratory testing.
 - Severe or progressive clinical disease cases should be treated empirically in the early course of illness.
 - Severely ill patients presenting after 48 hours of symptom onset should be treated with antiviral therapies.
 - Although 75 mg po BID dosing appears adequate, further studies are needed.
 - Clinical observations suggest that individuals deteriorate after cessation of a standard five day course of antiviral therapy. Research and further study is required regarding the appropriateness of 10 days of antiviral therapy for severe H1N1 disease, as opposed to the standard 5 day course.
 - For severe disease, high risk patients presenting as clinically/epidemiologically suspicious should be treated despite negative initial tests for H1N1 flu virus (unless an alternate pathogen is isolated).
 - Antibiotic therapy should be reevaluated if bacterial cultures are negative AND H1N1 flu virus testing is positive.
- Supportive management strategies for severe H1N1 pneumonitis
 - Open lung strategy has shown good results, particularly if done early and should be considered in individuals with non-compliant lungs.
 - Patients frequently require very large doses of sedating agents.
 - If the supply of short acting benzodiazepines and narcotics becomes limited, antipsychotics (Haloperidol,

atypicals), and long-acting opioids or benzodiazepines should be considered as tools for sedation.

- Adjunctive therapies in case of oseltamivir failure
 - Should oseltamivir therapy failure be observed, antiviral resistance vs. persistence should be studied. Co-infection with other viruses should be studied.
 - Additional research is needed before recommendations can be made regarding the use of Interferon or Ribavirin as antiviral therapies. (Please refer to the WHO Guidelines) (http://www.who.int/csr/resources/publications/swineflu/h1n1_guidelines_pharmaceutical_mngt.pdf)
 - Immunosuppressive doses of steroids are not recommended.
- Potential risks to health care workers and nosocomial transmission
 - More specific guidance (e.g. days after onset of infection) as to when additional infection prevention and control precautions can be discontinued in patients with Pandemic (H1N1) 2009 flu virus was requested by many in attendance . It should be recognized that there is insufficient published evidence to date to support a definitive recommendation. Further research is needed to determine:
 - the duration of virus excretion in different subsets of patients (e.g. those on corticosteroids, the immune compromised, ventilated patients)
 - clinical markers predictive of virus excretion
 - non-microbiological laboratory markers of virus excretion
 - PCR testing correlation with virus viability/infectivity
 - Tools for operationalizing existing guidance documents should be developed outlining how:
 - the guidance can be applied in high volume/high acuity care areas such as emergency departments and critical care units
 - the guidance can be applied in family physicians' offices or other care areas that may have fewer infection prevention and control resources
 - Information regarding HCW experiences caring for patients with Pandemic (H1N1)2009 flu virus should be collected and analysed, including:
 - knowledge, attitudes and behaviours in regards to use of personal protective equipment (PPE)
 - psychological impact of caring for these patients, comparing experiences in critical care and non-critical care areas
 - availability of PPE
 - predictors of use of PPE
 - efficacy of PPE
 - adverse effects of PPE
 - risk of occupationally acquired Pandemic (H1N1) 2009 flu virus

Key intensive care unit (ICU) challenges/shortfalls and review of mitigating strategies in preparation for the anticipated fall pandemic wave

Observations:

- Strategies to address Pandemic (H1N1) 2009 flu virus will include antiviral treatment, vaccination and non-pharmacological interventions to minimize cases of severe respiratory illness (SRI) and reduce mortality.
- Not all high-risk individuals are aware of their health status and underlying medical conditions, therefore, may not be recognized and appropriately treated (e.g. antiviral for ILI).
- Over-treatment may take place while confirming the diagnosis of H1N1 flu virus.
- The Federal/Provincial/Territorial (F/P/T) Antiviral and Clinical Care Task Group will continue to review

recommendations with respect to who should receive antivirals. This will include a clinical definition of ILI along with individual risk factors and severity indicators that would trigger consideration of antiviral use. A national education campaign will also be launched informing the public of the clinical ILI definition, risk factors and severity indicators. Risk factors will be explicitly stated to inform both the public and health care providers.

- It may be very difficult for the public and patients to understanding triage decisions, therefore it is crucial that information is available to clarify decisions.

Considerations:

- School closures:
 - Although isolation and school closures have been implemented in the past, at this time, it is thought that societal impact of school closure would be greater than the potential benefit on decreasing the incidence of Pandemic (H₁N₁) 2009 flu virus.
 - School closure may be of benefit in the future and in remote and isolated communities and should be addressed on an individual community basis.
- Accessibility and clarity of current and future guidelines
 - The mass gathering guidelines, currently being revised by the F/P/T Public Health Measures Task Group, should be easily accessible to local, provincial and federal authorities.
 - Clinical guidelines and specific criteria for antiviral therapy currently being developed by the Antiviral and Clinical Care Task Group should be made accessible in both web-based and hard copy such that appropriate patients can have therapy initiated earlier for influenza-like illness (ILI).
 - Provincial and regional guidelines should be revised to reflect local epidemiology, using and adapting the Canadian Pandemic Influenza Plan (CPIP) (<http://www.phac-aspc.gc.ca/cpip-pclcpi/index-eng.php>) as appropriate.
 - The rationale used to develop Pandemic (H₁N₁) flu virus vaccine prioritization, objectives and potential discrepancies between different regions should be clearly outlined in the up coming vaccine guidelines.
 - A clear statement regarding the use and interpretation of point of care testing for suspected H₁N₁ disease in isolated and remote communities should be established, noting that significant sensitivity and specificity issues exist for diagnostic purposes, as outlined in Annex C (<http://www.phac-aspc.gc.ca/cpip-pclcpi/ann-c-eng.php>) of CPIP.
- Special populations
 - In remote and isolated communities some high-risk individuals may be unaware of their health status. In such communities, local treatment guidelines should reflect this reality and should be able to treat those with unidentified risk factors.
 - Clear communication and collaboration must be fostered with special populations, including First Nations and Inuit, to ensure healthcare equity in the conception and implementation of plans for Pandemic (H₁N₁) 2009 flu virus.
 - Established and trusted institutions in special population groups, such as prenatal and vaccination clinics, shelters and food banks, should be utilized to facilitate communication.
 - Guidelines regarding the specific triggers for treatment in high risk groups should be established within the recommendations currently being developed by the Antiviral and Clinical Care Task Group.
 - With input from the Critical Care Society on remote ICU capabilities, an on-site management plan is required to address situations where patients become critically ill and cannot be transported from remote communities. Possible considerations could include:
 - Stabilization may be possible for a limited duration within remote and isolated communities
 - Limited capabilities of nursing stations

- Other MediVac options, including the possibility of military transport.
- Evidence-based strategies, planning and communication:
 - Epidemiological, vaccine and antiviral data must continue to be accumulated and analyzed to help inform existing strategies.
 - Operational planning should be occurring quickly.
 - Processes and screening tools should be available to ensure policies are equitable and transparent.
 - A communication strategy should include tools for clinicians and patients. Information should be made readily available in doctors' offices.
- Case definitions for influenza-like illness
 - The clinical and surveillance definitions for ILI should be clearly articulated to public health and front-line health care providers.
- Resource utilization
 - Existing local resource utilization and practices should be reviewed across the region/province before priority setting or additional resources are sought.
 - Patient flow through the health care system should be optimized for both paediatric and adult patients.
 - Innovative primary care capacity should be urgently built as a catalyst to enduring change.
- Triage and care delivery
 - Triage policies should be standardized and applicable to all patients and modified at a jurisdictional level where appropriate.
 - Obstacles to creating and implementing triage policies should be minimized. This includes the establishment of legal protection for those involved in all phases of the triaging process.
 - Separate paediatric triage guidelines should be established.
 - Adherence to triage protocols should be monitored.
 - Up-to-date patient-specific material should be made available through a variety of mechanisms to explain and support triage decisions.
 - Systems should be established to rapidly disseminate triage policies and information to relevant groups, including care givers, clinicians and patients (e.g., electronic/web-based).

Opportunities for collaborative research work

Observations:

- Research must be a critical part of the response and the incident command structure.

Considerations:

- Leadership and system improvements
 - Overall national leadership should be created to prioritize areas of research, minimize duplication of efforts and enhance communication.
 - Links between epidemiology and laboratory resources must be established and enhanced, including data sharing.
 - Collaboration between researchers and clinicians should be expanded and enhanced.
 - Databases should be created and monitored to avoid duplication of data collection and research.
 - An inventory of specimens should be available to many different researchers.

- Funding mechanisms and approval processes
 - Rapid funding models must be developed. The models must address issues related to the levels of funding, timing and mechanisms for rapid review of proposals
 - Research ethics boards (REB) should have a ‘fast-tracking’ mechanism and develop seamless ethics approval on a national basis potentially using federal and provincial Public Health Acts.
 - Mechanisms to transfer REB full approval between institutions should be examined.
- Topics for further research
 - Research must focus on identifying those at risk for severe disease and understanding why they are at risk.
 - Animal model capabilities should be expanded to investigate disease mechanisms, therapeutics, and vaccines.
 - Mechanisms to rapidly (<2 months) evaluate second line antiviral therapies (e.g. Hyperimmune globulin, IFN) are needed to avoid/minimize drug resistance. There should be an increased focus on the host, not the pathogen.
 - Vaccines should be evaluated to determine efficacy and side effects.
 - Improved diagnostics should be developed, including biomarkers for severe disease and high through put rapid non-molecular diagnostics (serology).
 - Research should be conducted regarding the duration of excretion of virus (viability, shedding time intervals) and the effects of antivirals on these aspects.
 - Ongoing future research is required to identify safety issues with the more widespread use of antivirals in special populations.

Links to Federal and Provincial/Territorial H1N1 Sites

Public Health Agency of Canada	http://www.phac-aspc.gc.ca/alert-alerte/h1n1/index-eng.php
Alberta	http://www.health.alberta.ca/health-info/influenza-H1N1.html
British Columbia	http://www.gov.bc.ca/h1n1/
Manitoba	http://www.gov.mb.ca/flu/
New Brunswick	http://www.gnb.ca/cnb/Promos/Flu/index-e.asp
Newfoundland Labrador	http://www.health.gov.nl.ca/health/hsi/default.htm
Northwest Territories	http://www.hlthss.gov.nt.ca/english/services/communicable_disease_control_program/h1n1.htm
Nova Scotia	http://www.gov.ns.ca/hpp/cdpc/h1n1-influenza.asp
Nunavut	http://www.gov.nu.ca/health/h1n1.shtml
Ontario	http://www.health.gov.on.ca/en/ccom/flu/default.aspx
Prince Edward Island	http://www.gov.pe.ca/health/index.php3?number=1021139
Québec	http://www.pandemiequebec.gouv.qc.ca/en/news/news.shtml
Saskatchewan	http://www.health.gov.sk.ca/influenza-monitor
Yukon	http://www.hss.gov.yk.ca/programs/nursing/health_officer/swine_influenza/

Registered Meeting Participants

- The Honourable Leona Aglukkaq - Minister of Health (Speaker)
- Stéphane Ahern - Université de Montréal
- Sandra Allaire - Alberta Health Region
- Marcia Anderson - University of Manitoba (Speaker)
- Fred Aoki - University of Manitoba (Speaker)
- Nicholas Argent - Health Canada
- Cory Aronec
- Horacio Arruda - Ministère de la Santé et des Services sociaux (Québec) (Speaker)
- Jennifer Baird - Regina Qu'Appelle Health Region
- Natalie Bandrauk - St. Clare's Mercy Hospital (Newfoundland & Labrador)
- Kimberley Barker - Assembly of First Nations
- Nathalie Bastien - Public Health Agency of Canada
- Carole Beaudoin - Public Health Agency of Canada (Speaker)
- Marissa Becker - University of Manitoba
- Scott Becker - Association of Public Health Laboratories (Maryland)
- Luna Bengio - Public Health Agency of Canada
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- Sheila Bodnar - Health Sciences Centre (Manitoba)
- Peter Boronowski - Inuvik Regional Hospital (NWT)
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- Natalie Bridger - University of Manitoba (Facilitator)
- Cameron Buchanan - Public Safety Canada
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- Jared Bullard - University of Manitoba (Facilitator)
- Karen E. A. Burns - St Michael's Hospital (Toronto)
- Jeff Burzynski - Pediatric Intensive Care Unit (Victoria)
- David Butler-Jones - Public Health Agency of Canada (Speaker)
- Nicole Caron-Boulet - Veterans Affairs Canada
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- Maureen Cividino - Ministry of Health and Long-Term Care
- Eilish Cleary - New Brunswick Department of Health
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- Cathy Egan - Ontario Agency for Health Protection and Promotion
- Lawrence Elliott - University of Manitoba
- Joanne Embree - University of Manitoba
- Gerald Evans – Queen's University (Ontario) (Speaker)
- Shirli Ewanchuk - Southern Chiefs Organization Inc.
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- Michael Gardam - Ontario Agency for Health Protection and Promotion
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- Julie Kentner - Province of Manitoba
- Murray Kesselman - Health Sciences Centre (Manitoba)
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- Kosar Khwaja - McGill University Health Centre - Montreal General Hospital
- Gary Kobinger - Public Health Agency of Canada (Speaker)
- Lenore Kowalchuk - Province of Manitoba
- Michael Krause - Covenant Health
- Hank Krueger - Public Health Agency of Canada
- Anand Kumar - University of Manitoba (Plenary & Breakout Session Chair - Speaker)
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- Brian Laursen - Ministry of Health (Saskatchewan)
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- Bruce Martin - University of Manitoba. (Speaker)

- Laura Mazuri
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- Moira McKinnon - Saskatchewan Ministry of Health
- Lanna Mess - University of Alberta
- Alison Morris - Labrador Grenfell Health
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- Frank Noel - Health Sciences Centre (Winnipeg)
- Sean Norris - Sturgeon Hospital (Alberta)
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- Michel O'Connor - Queens University (Speaker)
- Kendiss Olafson - Health Sciences Centre (Winnipeg) (Speaker)
- Mary Orr
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- Ward Patrick - Dalhousie University
- Melinda Patterson - Public Health Agency of Canada
- Wes Payne - Manitoba Nurses' Union
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- Gerard Sheehan - Mater Misericordiae University Hospital (Ireland)
- Faisal Siddiqui - University of Manitoba (Speaker)
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- Jirina Vlk - Public Health Agency of Canada
- Patrick Ward - Dalhousie University (Nova Scotia)
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- Elaine Warren - Eastern Health (Newfoundland)
- Dan Wiebe
- Rachelle Wiebe - Public Health Agency of Canada
- David Williams - Health Canada (First Nations and Inuit Health)
- Alice Wong - University of Saskatchewan
- Gordon Wood - Vancouver Island Health Authority
- Michelyn Wood - Public Health Agency of Canada
- Pamela Young - Public Health Agency of Canada
- Ryan Zarchanski - University of Manitoba
- Maxine Zasitko - Public Health Agency of Canada