# Workshop on Syndromic Surveillance of Health and Climate-Related Impacts:

# Lessons Learned from the use of Syndromic Surveillance Systems for Health and Climate Effects to Support Decision-Making

## Workshop Summary Report

Kingston, Frontenac and Lennox & Addington Public Health
221 Portsmouth Avenue
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**TABLE OF CONTENTS**

## EXECUTIVE SUMMARY

Syndromic surveillance systems are increasingly being expanded to monitor the impact of climate change and environmental exposures on populations. Key public health practitioners, epidemiologists, emergency management officials, and environmental health experts met on March 17 and 18, 2014 at Kingston, Frontenac and Lennox & Addington (KFL&A) Public Health in Kingston, Ontario to discuss lessons learned and share best practices for the use of syndromic surveillance systems for health and climate effects. The workshop brought together participants from Canada, the United States, Mexico, France and the United Kingdom; the interdisciplinary nature of the group allowed a wide variety of experiences to be shared and provided valuable opportunities for knowledge exchange. The workshop also welcomed a number of members of the Climate and Health Syndromic Surveillance Workgroup in the United States who participated via Adobe Connect webinar capacity.

The workshop was divided into four sessions and a roundtable discussion. Each session provided a variety of presentations related to the use of syndromic surveillance for health and climate effects and offered opportunities for meaningful discussion among workshop participants. The workshop sessions were focused around the following themes:

- Surveillance requirements for mass gathering events
- National syndromic surveillance systems for environmental and health monitoring
- Environmental health surveillance methods
- Hazard identification and risk assessment, surveillance needs, and principles of risk communication for the 2015 Pan and Parapan American Games in Toronto, Ontario

The roundtable discussion provided the opportunity to apply lessons learned from the workshop sessions and to consult with participants to collect input aimed at the preparation of a guidance document for the use of syndromic surveillance systems for heat-related health outcomes. The Climate and Health Syndromic Surveillance Workgroup, comprised of members from public health agencies in the United States and Canada, has identified the development of a guidance document for the use of syndromic surveillance systems for heat-related health effects as a priority deliverable. This guidance document will highlight systems and strategies that have been implemented, offer practical instructions, and share best practices and lessons learned for the use of syndromic surveillance systems for heat-related health effects across a variety of jurisdictions. The input solicited from workshop participants during the roundtable discussion will inform efforts moving forward with the development of the guidance document.

A number of key themes emerged during the workshop. The first was the need for greater collaboration, sharing of best practices, and benchmarking between users of syndromic surveillance systems. The second was the critical role of syndromic surveillance for mass gatherings, as described by those involved in the planning of the Boston Marathon and the London and Vancouver Olympics. The third was the need for improved situational awareness for the 2015 Pan/Parapan American Games in Ontario's Greater Golden Horseshoe area, which are expected to attract an estimated 10,000 athletes from 41 nations in addition to approximately 20,000 volunteers and 250,000 visitors. Finally, key challenges for syndromic surveillance of health and climate effects that will benefit from further discussion and research, including

capacity issues and determining the best measures of climate-related health outcomes, were identified and discussed. This report serves as a summary of the workshop proceedings and will support future discussion and next steps moving forward.

## WORKSHOP THEME AND OBJECTIVES

This workshop brought together public health professionals, epidemiologists, emergency management officials, and environmental health experts from Canada, the United States, France, the United Kingdom, and Mexico to:

- Highlight local, national, and international examples of syndromic surveillance systems to monitor health and climate-related impacts
- Discuss lessons learned and share best practices for the use of syndromic surveillance for climate-related health outcomes
- Explore how syndromic surveillance systems can be used for environmental and health monitoring during mass gathering events
- Apply lessons learned, best practices, and expert knowledge in preparation for the 2015 Pan and Parapan American Games in Toronto, Ontario
- Foster supportive partnerships for knowledge sharing among users of syndromic surveillance systems for health and climate effects

The workshop was divided into four sessions and a roundtable discussion over one and a half days. The goals of the workshop were to discuss lessons learned and share best practices for the use of syndromic surveillance systems for climate-related health outcomes, and to guide the future use of such tools and capabilities for monitoring environmental causes of health impacts. Sessions focused on the following:

- To seek feedback, guidance, and input from users of syndromic surveillance systems about their experiences with monitoring climate-related health outcomes
- To highlight surveillance requirements for environmental and health monitoring during mass gathering events, and apply lessons learned in preparation for the 2015 Pan and Parapan American Games in Toronto, Ontario
- To identify key challenges, needs, and future steps related to the use of syndromic surveillance systems for health and climate-related impacts through collaboration and discussion
- To engage workshop participants and members of the Climate and Health Syndromic Surveillance Workgroup to collect input aimed at establishing a framework for the preparation of a guidance document for the use of syndromic surveillance systems for heat-related health impacts

## WORKSHOP CONTENT

## Session 1: Surveillance Requirements for Mass Gathering Events

The goal of this session was to share best practices and lessons learned from the use of syndromic surveillance systems for environmental and health monitoring of populations during mass gathering events.

### 1.1 Biosurveillance for Mass Gatherings: Lessons Learned from the Boston Marathon

Julia Gunn, Boston Public Health Commission

*Overview:*

Mass gathering events present a variety of challenges for public health surveillance activities. The Boston Marathon requires huge planning and coordination efforts, with tens of thousands of runners and spectators in attendance. Field medical services for the marathon include 24 medical stations along the course, 16 first aid stations, and two large medical tents at the finish line. The Metro Boston Emergency Tracking System (ETS) is a coordinated system that integrates the requirements of pre-hospital, hospital, public health, and emergency management activities and services. The ETS uses barcodes, hand scanners, and a web application to provide real-time person or equipment location and movement information. The ETS is useful for mass casualty incidents, mass dispensing clinics, and evacuation and sheltering, and allows marathon planners and medical responders to know what to expect when the runners reach the finish line tents.

Weather, injuries, dehydration, emergency health care, and communicable diseases are the major public health concerns for the Boston Marathon. Weather and environmental factors, and concerns around heat and cold in particular, are the biggest determinant of health outcomes. Both the 2012 and 2013 Boston Marathons offer important examples of environmental and health surveillance requirements, with health outcomes related to unseasonably hot weather in 2012 and the mass casualty-bombing event in 2013. A key lesson learned has been to focus on high value data; there is often a large amount of data available, but it is important to determine which data is most pertinent to the particular area and will best enable accurate and effective decision-making. Other lessons learned include possible disruption of wireless communication and related consequences, the value of monitoring event-related non-critical syndromes, and the importance of flexibility and rapid deployment of syndromes.

*Discussion:*

Discussion focused on what changes would be implemented for the 2014 Boston Marathon given the events of the 2013 marathon. Planning efforts for the 2014 marathon include working with the emergency preparedness office to solicit their information needs. One of the challenges that the syndromic surveillance community faces is that there is often a lack of understanding of the needs of other organizations involved in planning and response efforts. Therefore, enhanced collaboration and dialogue is helpful in bridging this gap. Discussion also focused on how syndromic surveillance helped support the incident response at the 2013 marathon. Specifically, syndromic surveillance helped identify health outcomes that were not anticipated, such as

hearing issues and behavioural and mental health concerns, and subsequently helped to validate some of the information and issues that people were seeing long-term.

**1.2 Syndromic Surveillance Lessons Learned from the 2012 London Olympics**
Alex Elliot, Public Health England

*Overview:*

The Public Health England Syndromic Surveillance Service provides real-time information for public health action, including early warning for seasonal outbreaks of disease, providing situational awareness, and providing reassurance that nothing of major public health importance is occurring. Increasingly, more focus is being placed on the impact of climate and environmental change, particularly looking at heat waves and cold weather surveillance and the health impacts of these extremes in temperature.

Prior to the 2012 London Olympic and Paralympic Games, Public Health England (PHE) operated two syndromic surveillance systems. These included a tele-health and a general practitioner system. In preparation for the Olympics, PHE implemented two new syndromic surveillance systems. The first was an emergency department system, which allowed capture of changes in population dynamics and reliance on emergency departments during the Games, as well as monitoring of more severe infections. The emergency department system is currently also being used to monitor cold weather surveillance indicators, such as sprains and fractures in the elderly. The second system was an out-of-hours general practitioner system, which enabled coverage of evening, weekend, and bank holiday GP activity.

Syndromic surveillance activities during the Olympics were "enhanced business as usual." The Olympics necessitated the provision of an enhanced daily service, with daily reports being developed seven days a week. Daily reporting began several months prior to the Olympics to ensure sufficient time for the team to practice and develop daily 'battle rhythms'. One of the key lessons learned was the ability of the syndromic surveillance systems to provide reassurance that nothing of concern or public health importance was occurring. A second lesson learned was related to the flexibility of syndromic surveillance systems; PHE is now expanding from an almost complete focus on infectious disease to now using the same systems to additionally monitor the impact of climate change on public health. It is important to ensure that syndromic surveillance systems are closely linked with public health action. Syndromic surveillance systems and the data that they generate need to serve a broader public health purpose. The 2012 London Olympics has enabled PHE to develop and maintain new syndromic surveillance systems, implement new and improved statistical tests and risk assessments, and share their experience and lessons learned with other countries preparing to host mass gatherings.

*Discussion:*

Discussion focused on whether on-site medical care for the Olympic teams was independent of the larger health care system, and how this was integrated into the syndromic surveillance systems. There were very strict controls in place surrounding the athletes and their health care; therefore, on-site medical care for the Olympic teams was not integrated into the syndromic

surveillance systems. Syndromic surveillance activities focused on the population attending the Olympics and the population in London who were present during the Olympics.

Discussion also focused on the dissemination of syndromic surveillance information during the Olympics. One of the challenges with syndromic surveillance information is that a great deal of interpretation is required, and information may be misinterpreted in the public domain. Therefore, during the Olympics, only the interpreted messages were disseminated publicly, which reduced the risk of the media misinterpreting information or raising false alarms. Additional discussion focused on methods to monitor the impacts of climate change on health, particularly in preparation for the 2015 Pan/Parapan American Games in Ontario. PHE has teams dedicated to monitoring environmental and weather conditions with direct links to the UK Meteorological Office. It is important that there is close collaboration and clear communication between those who are responsible for health monitoring and those who are responsible for environmental monitoring.

**1.3 Syndromic Surveillance Lessons Learned from the 2010 Vancouver Olympics**
Bonnie Henry, British Columbia Centre for Disease Control

*Overview:*

Mass gatherings can be planned or spontaneous, and they each have their own unique challenges and planning requirements. Communicable diseases, such as foodborne outbreaks or meningitis, and adverse-effects of environmental exposures, such as temperature-related illness and air quality, are the two major public health concerns for mass gathering events. The three main areas for mass gathering preparedness are risk assessment, surveillance, and response. The overall objective of the provincial-level surveillance for the 2010 Vancouver Olympics was to detect increases in communicable diseases and syndromes of interest, including those related to cold weather, in British Columbia between February 5 and March 22, 2010. Another important objective was to document the absence of activity related to the above and to dispel rumours; this is a critical aspect of surveillance efforts for mass gatherings. A number of routine surveillance sources, including the BC CDC Alert Analysis System, the BC CDC laboratory, and influenza and enteric surveillance were used. Enhanced surveillance sources were also implemented, including BC Ambulance services, BC HealthLink, Sentinel Emergency Departments, Drug and Poison Information Centres, and the Coroner's Office.

An important outcome of surveillance activities during the Vancouver Olympics was the strengthening of new and existing relationships with surveillance sources, such as the BC Ambulance Service and the Coroner's Office. It was also important to provide situational awareness and to foster a trusting relationship with the Olympic security forces. One of the key lessons learned relates to the complexity of the health sector; the development of strong lines of communication between all actors in the health sector is important for the success of surveillance efforts. A second lesson learned was the importance of medical intelligence and situational awareness, which was necessary for building capacity, building connections and partnerships, and building confidence. Finally, a third lesson learned was not to underestimate the power of rumour control, which is extremely important during mass gatherings when there is increased media coverage and spotlight on public health events.

*Discussion:*

Discussion focused on how to differentiate between Canadians and international athletes and spectators in terms of use of services and surveillance sources. Special insurance codes for international athletes, family members, and spectators allowed this differentiation to occur. Whether an individual had British Columbia health coverage, out of British Columbia health coverage, out of Canada health coverage, or no health coverage was added to the surveillance system for the purposes of the Olympics. Additional discussion focused on the challenge of obtaining accurate background rates. One of the things that occurred prior to the Vancouver games was that a national group produced a radiation map of the area, which provided accurate background radiation levels. However, this raised challenges in terms of discrepancies between reporting to Ottawa versus reporting to the provincial and local agencies.

## Session 2: National Syndromic Surveillance Systems for Environmental and Health Monitoring

The goals of this session were to showcase examples of environmental monitoring and human health surveillance systems, highlight current research initiatives, and share lessons learned and best practices.

### 2.1 Surveillance of Health Outcomes Related to Climate-Sensitive Exposures

Shubhayu Saha, U.S. Centers for Disease Control and Prevention

*Overview:*

The Climate and Health program at the United States Centers for Disease Control and Prevention (CDC) has developed the Building Resilience Against Climate Effects (BRACE) framework (http://www.cdc.gov/climateandhealth/). This five step framework offers a means for local public health agencies to identify climate impacts and specific health vulnerabilities in their area, project the disease burden associated with the climate impacts, assess and implement public health interventions to mitigate those adverse outcomes, and prepare a Climate and Health Adaptation Plan. Ensuring that effective surveillance systems are in place is essential to understanding the climate impacts and vulnerabilities as well as the projected disease burden in specific areas.

In an effort to translate climate science into practical information that can be used by public health agencies, the Climate and Health program has developed a climate change module within the Environmental Public Health Tracking Portal at CDC (http://www.cdc.gov/nceh/tracking/). For example, information on summertime temperature distribution for all counties in the United States from 1979-2011 is available on this portal. Extreme heat is an important cause of weather-related mortality and is widely assessed as an important threat by local health agencies. When issuing heat alerts as a public health agency, it is important to contextualize how hot is too hot for the particular region, and to determine the extent to which the temperature deviates from the norm. The Environmental Public Health Tracking Portal provides data on extreme heat days and events, heat vulnerability, and health effects associated with extreme heat. This information

enables anomalously hot days to be linked with adverse health outcomes in order to estimate the excess health burden that is attributable to ambient heat. The portal also hosts spatial information on a suite of risk factors that help identify vulnerable areas and populations at risk during a heat wave, which can help to focus future surveillance efforts.

For syndromic surveillance of health and climate effects, it is not only necessary to focus on the health outcome of interest, but also to have a fair sense of the environmental exposures that are related to the outcome. This necessitates simultaneous surveillance of health outcomes and climate-sensitive exposures. One of the key challenges for syndromic surveillance for health and climate-related impacts is how to prioritize which environmental exposures and related health outcomes to focus on and how to go about monitoring those exposures and outcomes in the most reliable ways. This challenge is particularly pertinent when you are dealing with limited resources and have to prioritize areas for action. This is an area that will benefit from further discussion and consideration.

*Discussion:*

Discussion focused on methods for monitoring climate-related health outcomes and whether it is best practice to look at mortality data or to look at not so common but relatively more direct heat-related health outcomes. There is room for further discussion and debate regarding the best measures of heat-related health outcomes to use. Discussion also focused on the challenge of obtaining accurate exposure data for rural areas, given that temperature and meteorological monitoring systems do not cover large parts of rural areas. One option that may serve as a partial solution to this challenge is to use model data. Additional discussion focused on monitoring heat-related health outcomes and disseminating messages from an occupational health standpoint, given that an increasingly vulnerable group is men who work in outdoor occupations.

### 2.2 U.S. Syndromic Surveillance Systems at the State/Local Level and Lessons Learned from the Climate and Health Syndromic Surveillance Workgroup

Matthew Roach, Arizona Department of Health Services

*Overview:*

Syndromic surveillance provides a real-time, unfiltered snapshot of population health data. More recently, syndromic surveillance has expanded beyond infectious disease or terrorism preparedness to look at health outcomes associated with extreme heat and climate impacts. In the United States, syndromic surveillance is being used on a large scale for potential terrorism and biological attacks, but only some states are using these systems for climate and health effects. There is great potential for the use of syndromic surveillance systems for climate-related health outcomes and this is an area of current interest. A key message to emphasize is that syndromic surveillance does not replace other traditional methods of public health surveillance; this is a message that has been repeated by several U.S. states in relation to their surveillance activities.

In 2009, the American Recovery and Reinvestment Act authorized $25 billion in incentive payments to hospitals and health care providers to facilitate the adoption of meaningful use of electronic health records. Meaningful use provides hospitals with an incentive to implement

syndromic surveillance systems. Meaningful use offers a valuable opportunity to enhance collaboration between health care providers and public health. Biosense is one of the systems being used for syndromic surveillance at the state level in the U.S. Biosense is a cloud-based system, and the application is the result of a collaboration between the Centers for Disease Control and Prevention and the Association of State and Territorial Health Officials. While Biosense is not being used by every U.S. state, it is one of the many tools that are available for syndromic surveillance. One of the key challenges with Biosense and syndromic surveillance more generally is how to increase the number of hospitals integrated in data sharing and syndromic surveillance systems. Meaningful use is one strategy to overcome this challenge, as hospitals are provided with financial incentive to participate in syndromic surveillance.

The Climate and Health Syndromic Surveillance Workgroup is comprised of 62 members from a variety of public health agencies in the U.S. and Canada. The workgroup has facilitated a series of webinars and meetings to showcase public health agencies from Canada and the U.S. that are using syndromic surveillance for climate and health effects. Some of the shared challenges identified through these case studies include limitations in the number of hospitals that are reporting data, the potential for misclassification, the capacity of syndromic surveillance systems to serve as an accurate tally for all cases, and limitations in coverage for the entire state. The workgroup has provided a platform for public health agencies to share lessons learned and best practices for the use of syndromic surveillance systems for health and climate-related impacts.

*Discussion:*

Discussion focused on the importance of linking cases back to specific exposures with absolute certainty, and whether this is a capability of syndromic surveillance systems or an inevitable limitation. Comparing syndromic surveillance data with hospital discharge data offers a means of gauging the accuracy of the system. This can help to determine how syndromes are defined in relation to whether greater sensitivity or specificity is desired; this depends on the need for the particular health outcome. This is an area that will benefit from future research and discussion, particularly in relation to the use of syndromic surveillance for climate-related health outcomes.

**2.3 Syndromic Surveillance System for Environmental Health Effects in Mexico**
José Jesus Heraclio Herrera Bazán, Federal Commission for the Protection against Sanitary Risk

*Overview:*

The Federal Commission for the Protection Against Sanitary Risk (COFEPRIS) is a federal agency under the Ministry of Health in Mexico that has authority for regulation, control and enforcement to protect public health. COFEPRIS is responsible for medicine and health technologies, consumer products, toxic and dangerous substances, occupational health, environmental health risks, and basic sanitation.

COFEPRIS is doing a substantial amount of work in environmental health, particularly in relation to the current and projected impacts of climate change on health in Mexico. Mexico has a national standard for epidemiological surveillance, which establishes standardized criteria and specifications for the operation of the National Epidemiology Surveillance System. This national

standard was published in February 2013, and includes provisions for syndromic surveillance. Under this national standard, health care providers are required to comply with routine reporting of several syndromes. The Mexican National System for Epidemiological Surveillance includes seven syndromes under routine surveillance in each state and health unit, and surveillance results are published on a weekly basis.

COFEPRIS is responsible for developing and implementing systems to identify environmental health effects using information generated by other organizations in the Ministry of Health, including the Epidemiological Agency (DGE). Together, COFEPRIS and DGE have implemented special surveillance systems, including the syndromic surveillance system, to monitor environmental and climate-related health outcomes. Examples include monitoring of heat waves, dengue fever, and diarrheal diseases. The objectives of the syndromic surveillance system in Mexico include: to achieve timely identification of cases for the establishment of control measures, to promote the use and diffusion of epidemiological information for decision-making, to establish an online system for case notification, and to issue recommendations and actions for response.

*Discussion:*

Discussion focused on the impressive scope of the areas of responsibility for COFEPRIS, particularly in relation to the variety of areas in which surveillance activities are being undertaken. Discussion also focused on how communication occurs with local health departments or states and how surveillance messages are disseminated. Surveillance activities, including analysis, are run centrally, and surveillance results and key messages are disseminated to all states and local health units via reports and a website. Additional discussion focused on the importance of considering the impact of social and behavioural factors in addition to the impact of climate change in relation to Dengue fever.

**2.4 Syndromic Surveillance in France and Europe: the French SurSaUD Syndromic Surveillance System and the European Triple S Project**
Céline Caserio-Schonemann, French Institute for Public Health Surveillance

*Overview:*

The French Syndromic Surveillance System, SurSaUD, was established in July 2004 after the major 2003 heat wave. The main objectives of the system are to detect unexpected public health events, follow trends of expected events, and estimate the health impact of these events. SurSaUD is used to monitor a variety of climate effects, including storms, freezing rain, flooding, heat waves, and cold-related diseases such as injuries, hypothermia and frostbite. Since 2004, a French system for heat wave and health alerts (SACS) has been in place. This system is based on meteorological forecast and biometeorological indicators for alert and health-related indicators, including heat stroke, hyperthermia, dehydration, and hyponatremia. SurSaUD is also used to monitor the health impacts of extreme cold. In the winter of 2012, a 13 day long cold spell was shown to correspond with an increase in mortality data. However, the key challenge is the difficulty in determining the extent to which the increase in mortality was associated with the cold weather versus the circulation of different seasonal viruses such as influenza. French

experience with SurSaUD has shown syndromic surveillance to be a useful tool for health impact assessments of climatic events. Current work is focused on integrating a new data source, electronic certification of death, into the SurSaUD system; this shows promise in providing a more in-depth analysis of winter mortality.

The European Triple S Project was a 3-year project from September 2010 to December 2013 that was coordinated by the French Institute for Public Health Surveillance and co-funded by the European Executive Agency for Health and Consumers. The Triple S Project was intended to give an overview of syndromic surveillance activities in Europe, provide practical tools for the implementation and improvement of syndromic surveillance systems, propose a strategy for syndromic surveillance at a European level, and create an expert network for syndromic surveillance to exchange knowledge and share experiences. Key deliverables of the Triple S Project include guidelines to support the implementation of syndromic surveillance systems, fact sheets summarizing each step of implementation of a syndromic surveillance system, and a proposal for a European strategy for syndromic surveillance. The ideal goal for a European strategy would be to implement pooled syndromic surveillance analysis and reporting at the European Union level.

*Discussion:*

Discussion focused on the potential for collaboration to allow lessons learned from extensive French and European experience to be shared with organizations implementing syndromic surveillance systems in other countries. Direct collaboration through teleconferences and collaboration through the International Society for Disease Surveillance conferences were suggested as means of ensuring that knowledge and experience can be shared effectively. It was agreed that it is important to have further discussion on how different countries can compare findings and share information related to syndromic surveillance. The Climate and Health Syndromic Surveillance Workgroup was suggested as another means to exchange information, through webinars and other methods, around the use of syndromic surveillance systems for climate and health effects.

## Session 3: Focused Environmental Health Surveillance Methods

The goals of this session were to highlight methods for environmental health surveillance, share best practices, and demonstrate how these systems can be used to inform decision-making.

### 3.1 Syndromic Surveillance for Heat and Cold

Tom Kosatsky, British Columbia Centre for Disease Control

*Overview:*

A variety of surveillance feeds can be used to monitor the health effects of heat, including deaths and hospitalizations related to hyperthermia, total or natural mortality by day, hospitalizations, ambulance call-outs, and help-line calls. Work has been done on hot weather mortality in British Columbia, specifically in relation to a 2009 hot weather event in Vancouver, where a spike in

temperature corresponded with a spike in total mortality. Using a rapid mortality feed in British Columbia, a case-only design was applied to determine who was dying, the age of death, where the deaths occurred, and the cause of death. By comparing the hot weeks to weeks previous, it was possible to determine whether shifts had occurred in patterns of mortality. This methodology could be useful in other areas with access to rapid mortality feeds. Familiarity with the rapid mortality feed was coupled with short-term weather forecasts to design a timely heat alert system. In British Columbia, forecast information was combined with real temperatures to train the system to generate timely heat alerts. This system has been in use in British Columbia for three years and has worked very well; there have not been any situations where a false alarm has been generated.

There has been much less work done on cold weather mortality, which is of increasing interest. One of the challenges with cold weather mortality is that hospitalizations and deaths follow much less rapidly after exposure than hot weather mortality. A second challenge is that there is not much information available in terms of the aggregate impact of cold on total mortality. There is a need for different or improved methods when looking at cold weather mortality.

It is important to determine ways to increase specificity and sensitivity for surveillance feeds for the effects of heat and cold. One strategy is to look at specific subgroups of the population; rather than looking at total mortality, it may be better practice to look at the most sensitive groups, such as elderly populations. It is also helpful to include multiple outcomes, such as ambulance call-outs and calls to help lines, to capture more detailed information. Validation of data is also extremely important. Finally, it may be helpful to use sequential temperature and health triggers for cold and heat. This is being done in Montreal, where a combination of a heat trigger followed by a death trigger determines whether an alert is generated.

*Discussion:*

Discussion focused on how to incorporate other factors, such as air quality and humidity, within heat alert systems. It was noted that the best fit in terms of which factors to include depends on the location; there is no one size fits all model. For Vancouver, forecast data and actual maximum daily temperature was found to be the best indicator of mortality. Further discussion focused on how to look at process indicators to determine whether heat alerts are working and having an impact on behaviour.

### 3.2 Evaluating the Contribution of Syndromic Surveillance to the Detection of Waterborne Disease Outbreaks

David Buckeridge, McGill University

*Overview:*

Current surveillance systems have a number of limitations, including challenges related to sensitivity, timeliness, and flexibility. The evaluation of surveillance systems is important in order to provide the evidence to help determine how to invest most appropriately in available technologies. Simulation is one available method for the evaluation of surveillance, including syndromic surveillance systems. Simulation is beneficial because it offers an empirical approach

to evaluation that allows parameters to be controlled, and provides an in-depth understanding of the surveillance system performance dynamic in a variety of situations.

The question that this particular study is trying to address is whether, in an urban setting such as Montreal, there is value in syndromic surveillance systems for detecting waterborne illnesses. A model was constructed for simulation that included modeling of the water distribution system, pathogen dispersion, exposure and infection, disease progression, and health-care seeking behaviour. In any simulation, it is important to be skeptical about the parameters and how they were determined. An important lesson learned is to define a parameter distribution that provides a range rather than simply finding a best estimate of the parameter from the literature. One of the key challenges with both surveillance and simulation relates to behavioural factors; there is limited research and information available on behavioural factors. It is critical to have a sufficient understanding of behavioural factors in order to determine the effectiveness of interventions and to interpret surveillance data.

Using simulation, it is possible to demonstrate the effectiveness of boil water advisories by showing the proportion of infections averted. So far, results have demonstrated that the potential benefit of surveillance increases as the duration of exposure increases. Next steps include applying detection methods to simulated laboratory and health care utilization data and analyzing results in terms of morbidity and cost.

*Discussion:*

Discussion focused on evaluation of surveillance systems and how to determine whether surveillance activities are having an impact at the ground level. It was agreed that evaluation of surveillance systems to determine impact and effectiveness is critical. Discussion also focused on how this type of simulation can be used to look at the effects of climate change on health. One suggestion related to this particular study was to look at a variety of waterborne diseases that are impacted by changes in climate. Additional discussion focused on the importance of determining best practices for presenting surveillance information to decision-makers in a way that supports understanding and facilitates effective decision-making. This question requires further consideration within the syndromic surveillance community.

### 3.3 A Research Plan for Surveillance and Forecasting of Acute Respiratory Health Outcomes Associated with Forest Fire Smoke Exposure

Kathryn Morrison, McGill University

*Overview:*

Forest fires are a natural seasonal hazard that occur in many parts of Canada and the United States. Forest fire smoke severely degrades air quality and can have acute and chronic respiratory and cardiovascular effects. Adding to concern, forest fire seasons are getting longer and more severe, which has been linked to climate change. In considering the public health impacts of forest fire smoke exposure, it is necessary to take the retrospective epidemiological evidence and move towards real-time surveillance. Interventions to reduce health impacts of forest fire smoke exposure range from issuing public warnings, to limiting specific activities, to evacuating entire

communities. It is important to have real-time data available to support decision-making surrounding interventions.

In moving towards real-time surveillance of health effects from forest fire smoke exposure, there is a need to link environmental exposure data to health outcome data. This is a unique surveillance application area, which may help to explain why this work has not already been done. Key challenges include limitations of using syndromic surveillance data without a gold standard and challenges of exposure measurement. The two health outcomes of interest are salbutamol dispensations and physician visits using billing data and ICD-9 codes. The hope is that this work will fill an evidence gap in public health smoke surveillance by proposing and evaluating models that can be used for real-time monitoring and forecasting in British Columbia. Results will also be relevant to other forest fire prone regions in terms of providing direction on how to proceed methodologically.

*Discussion:*

Discussion focused on the potential for syndromic surveillance models for monitoring health effects of forest fire smoke exposure to be used for forecasting, and the possible challenges this would pose for public health. This is an area in which future work is necessary; once the model has been validated, greater confidence can be placed in relying on short-term forecasting.

**3.4 Update on Environmental Health Tracking for Ontario**
Elaina MacIntyre, Public Health Ontario

*Overview:*

Public Health Ontario (PHO) has recently completed a review of (i) environmental health tracking (EHT) activities and (ii) tools applicable to EHT from a variety of jurisdictions across North America and Europe. The review has identified novel uses of data for environmental tracking, including poison control centres, drug sales, school reporting, and telehealth. In addition, public health practitioner needs assessments have been conducted to determine the environmental health needs of public health practitioners in Ontario, and which areas they would like to see prioritized for an environmental health tracking system. The majority of public health practitioners surveyed felt that an environmental health tracking system would be useful for improving public health in Ontario. Overall, the assessments identified that there are challenges in addressing environmental health topics due to a lack of adequate data sources. Public health practitioners commonly identified data on extreme weather and climate change as a data gap in environmental health.

Both the Ontario Public Health Standards and the current Strategic Plan for the Ontario Public Health Sector highlight the importance of developing surveillance capacity in general, and specifically related to environmental health. A key challenge for implementing an environmental health tracking system in Ontario is how to ensure that the system is accessible to all provincial health units. There are differences across Ontario's 36 Public Health Units in terms of capacity related to Geographic Information Systems (GIS) and epidemiological analysis; some health units do not have GIS expertise and have limited epidemiological expertise. It is important to

ensure that the system is accessible to people with varying knowledge and skill levels relating to environmental health issues. In addition to utility for public health practitioners, this type of environmental health tracking system has potential utility for epidemiological research.

*Discussion:*

Discussion focused on the issue of the critical gap in knowledge of the relation between environmental agents and chronic diseases. Bringing environmental health data onto one easily accessible platform helps to identify priority areas for data collection to address these knowledge gaps. Discussion also focused on the potential to use activity and program-based data in conjunction with the environmental health tracking system to allow opportunities for evaluation. Further discussion focused on the limitation of the timeliness of environmental health tracking data, most of which is updated on an annual basis, and the challenges this poses for the use of syndromic surveillance for real-time decision-making. The environmental health tracking system would be helpful in terms of looking retrospectively to more effectively and accurately link cases to specific environmental exposures, and to provide baseline data on environment and health indicators.

## Session 4: Environmental Health Hazard Identification and Risk Communication in Preparation for the 2015 Pan American Games

The goals of this session were to highlight environmental health hazard identification and risk assessment, provide an overview of enhanced real-time situational awareness tools for environmental health conditions and outcomes, and review principles of risk communication in preparation for the 2015 Pan/Parapan American Games.

### 4.1 Health System Hazard Identification and Risk Assessment for the Pan/Parapan Games

Brian Schwartz, Public Health Ontario, Jessica Harris, Ministry of Health and Long-Term Care

*Overview:*

A Hazard Identification and Risk Assessment (HIRA) allows emergency management professionals to prepare for the worst and most likely risks, develop exercises, training programs and plans based on the most likely scenarios, and save time and resources. Through the HIRA process, hazards are identified and then scored on probability and consequence. There are limitations of using a standard HIRA for mass gatherings. These include determining whether you are interested in identifying the risks for the gathering itself, the risks for the hosting area caused by the gathering, or a combination of these, as well as understanding how new hazards created by the mass gathering interact with existing hazards in the area. The traditional HIRA process is not ideal for health planning, but this process can be adapted. In preparation for the 2015 Pan/Parapan American Games, the Ministry of Health and Long-Term Care (MOHLTC) Emergency Management Branch has developed a new approach to conducting a health system HIRA in the context of a mass gathering.

The HIRA for the Pan/Parapan Games was divided into two parallel approaches; Public Health Ontario was responsible for the HIRA process for communicable diseases, while the MOHLTC Emergency Management Branch was responsible for conducting an "extended health consequence analysis." An important question that arises from this process relates to the types of surveillance systems that need to be put in place in order to detect the types of communicable and non-communicable diseases that have been identified as risks for the games.

There are a number of challenges in conducting a HIRA. First, there are difficulties in assigning numerical scores and prioritizing based on these scores. In addition, it is important to avoid creating the perception of rigour or a hard-evidence base that does not exist or is not accurate. Finally, the HIRA process for the Pan/Parapan Games attempts to take a provincial perspective with respect to issues that vary among different communities and sporting events, and are dependent on additional factors such as the weather. Therefore, it is important to consider a range of planning scores.

*Discussion:*

Discussion focused on the utility of the HIRA process for ongoing situations and the necessity of taking a slightly different perspective when planning specifically for a mass gathering event. When planning for a mass gathering, it is necessary to address all of the risks that could potentially happen at the event and establish effective responses. The adapted HIRA process developed by the Emergency Management Branch will enable this mass gathering lens to be applied. Additional discussion focused on how more detailed discussion around environmental health can be incorporated in the HIRA process in the future. It was agreed that it is important to look retrospectively at events, consider the adverse outcomes, and make effective use of those lessons learned by feeding this information back into the health system for improvement.

**4.2 ACES and PHIMS: Enhanced Real-Time Situational Awareness**
Paul Belanger, KFL&A Public Health

*Overview:*

The Public Health Information Management System (PHIMS) is a geovisualization dashboard that fuses environmental health data, ranging from air quality to meteorological conditions to satellite imagery, in real-time. PHIMS is a useful tool that supports reporting obligations and surveillance activities, and provides enhanced situational awareness. PHIMS incorporates a variety of different modules, a number of which are related to environmental health. PHIMS also includes eight different methods for quantifying and visualizing vulnerable populations. One of the challenges that KFL&A Public Health faces from its public health partners is to provide the ability for other public health units to incorporate local data sets into the centralized PHIMS system. While the PHIMS system is operated from KFL&A Public Health, other public health units are able to incorporate local data sets into the centralized system and bring this information forward in real-time for their own purposes.

The Acute Care Enhanced Surveillance (ACES) system is an emergency department syndromic surveillance system that aims to detect potential threats to public health using emergency

department visit records. ACES began in 2005 with three hospitals in the KFL&A region, and now receives 11,500 registration records per day from over 100 hospitals across Ontario in real-time. Using advanced natural language processing and aberration detection algorithms, the ACES system is able to detect potential threats to public health that may warrant further epidemiological investigation. Current work surrounding ACES has focused on the development of new syndromes, including heat-related illness, opiate use, trauma, and mental health.

There is great potential for PHIMS and ACES to work together to provide complementary real-time monitoring of environmental conditions and health outcomes. This collaboration enables incoming real-time environmental and extreme weather data to be linked with incoming real-time health outcome data. In preparation for the Pan/Parapan American Games, KFL&A Public Health has been working very closely with the public health agencies in the Pan Am area to establish a list of data feeds that they would like to see incorporated into the system. KFL&A Public Health is working to incorporate as many of these feeds as possible. There is real potential for ACES and PHIMS to be used effectively for surveillance during the Pan and Parapan American Games in Ontario in 2015.

*Discussion:*

Discussion focused on the importance of validating the syndromes used for syndromic surveillance systems and determining the extent to which chief complaint is related to emergency department discharge data. Moving forward, the hope is that hospitals in Ontario develop the capacity to provide an immediate electronic signal when the patient is discharged with their discharge diagnosis, which will reduce reliance on chief complaint data. Discussion also focused on the leadership role that KFL&A Public Health has assumed among public health units in Ontario in relation to syndromic surveillance, and the innovative nature of the work being done. Additional discussion focused on the richness of environmental data feeds being incorporated into PHIMS and the potential for PHIMS and ACES to monitor health outcomes related to environmental exposures, such as forest fires in northern Ontario. In preparation for the Pan/Parapan American Games, it will be important to consider how postal code information that is routinely collected through the ACES system can be used to differentiate between Canadian and non-Canadian patients from an infectious disease and environmental health perspective. Lessons learned from the 2010 Vancouver Olympics will be helpful in this regard.

**4.3 Principles of Risk Communication**
Ray Copes, Public Health Ontario

*Overview:*

It is critical to understand that risk communication is an interactive process that involves a bi-directional flow of information. In this regard, it is necessary to have a clear understanding of the target audience and their current knowledge and perceptions of the situation at hand. Peter Sandman's 12 Principle Outrage Components provides an excellent framework for determining whether something constitutes a risk and will pose a potential problem in the public sphere. One of the key messages relating to risk communication that is particularly important for public health professionals is to always acknowledge uncertainty. It is also important to think about the

level of stringency of the public health message that is being communicated and whether that message is associated with actions to be taken by the public. Moving forward, there is great potential to incorporate the use of Geographic Information System (GIS) technology in risk communication strategies. Overall, regardless of the particular situation, risk communication messages for public health should always be clear, concise, and consistent.

It is useful to rely on Peter Sandman's six focus areas for crisis communication. A key lesson learned for crisis communication relates to the importance of the non-information content of the message being relayed. In addition to considering the content of the message, it is critical to effectively portray confidence, certainty, and sincerity in order to successfully reassure the audience. A consideration of these principles is important in preparation for the 2015 Pan/Parapan American Games in order to ensure that effective risk and crisis communication strategies are put in place for the variety of potential risks identified through the HIRA process.

*Discussion:*

Discussion focused on the importance of providing reassurance during mass gatherings, which will be particularly important in the context of the Pan/Parapan American Games. Lessons learned from the 2010 Vancouver Olympics and the 2012 London Olympics will be helpful moving forward in this regard. An important component is to achieve a balance in messaging by clearly communicating which scenarios have been ruled out and which scenarios there is still uncertainty about. Further discussion focused on the challenge for public health to mitigate the effects of misinformation and mixed messages disseminated by the media and members of the public. One of the most effective strategies for countering this is to first acknowledge where misinformation may stem from and then to clearly explain why these views are misguided and incorrect. This approach will help to avoid the creation of an "us versus them" scenario.

## Roundtable Discussion on Developing a Guidance Document for the use of Syndromic Surveillance Systems for Health and Heat-Related Impacts

Geoffrey Hall, Queen's University, Bonnie Henry, British Columbia Centre for Disease Control

The goals of the roundtable discussion were to apply lessons learned from the workshop sessions and to consult with participants to collect input aimed at the preparation of a guidance document for the use of syndromic surveillance systems for heat-related health impacts. The following questions were discussed:

1. For those who have syndromic surveillance systems in place, how did you go about starting these systems and what are some of the lessons that have been learned?

*Establishing Need:*

Participants agreed that before the planning and implementation phases can begin, it is necessary to determine the need for syndromic surveillance. The first question that an organization considering implementing syndromic surveillance for heat-related health impacts must ask itself is whether there is a need for heat-related surveillance in that particular area. To answer this

question, it is necessary to have an understanding of the environmental factors affecting the area. It is important to establish clear objectives for the syndromic surveillance system, and to think through the ways that the surveillance information will be disseminated and used to protect public health. A key lesson learned is that often, surveillance systems are developed and implemented without careful consideration of objectives and the reason for implementing the system. Discussion focused on whether it is enough to implement syndromic surveillance systems just to generate information and expand understanding of the phenomena of surveillance, or whether it is necessary to ensure that surveillance information will be used to support interventions to protect public health.

*Building Partnerships:*

A common theme that arose during discussion was the importance of collaborating with a variety of partners during the planning and implementation phases, and maintaining those partnerships as the syndromic surveillance system continues to operate over the long-term.

In Toronto, learning from other places that had heat emergencies was a catalyst for initiating development of several activities for heat and health effects. One of the most important partnerships formed was with university researchers. This collaboration facilitated the exploration and understanding of the environmental factors that impact Toronto. Researchers were able to look at a variety of parameters that affected whether or not heat-related health impacts were seen in Toronto. Collaborating with individuals who have an understanding of the methodological research background is helpful in facilitating practical application of these principles.

In Europe, the success of the Triple S Project depended on effective collaboration with invested partners. Collaboration between a number of different countries and organizations enabled a cross-border network of experts on syndromic surveillance to be established in Europe. Member states contributed to a shared inventory of past surveillance systems, data sources, and simulation tools, and visits to participating countries provided first-hand experience of how teams and experts in different countries were using syndromic surveillance. An effective approach with the Triple S Project was to ensure that each country was actively engaged in collaboration and had a leadership role and vested interest in the project. To help achieve this, each country became a workshop leader on one specific subject related to their experience and expertise.

Another partnership that was identified was the importance of collaborating with both the providers and users of syndromic surveillance information. It is necessary to determine what the users are going to do with the information and what type of information they will need in order to achieve this. In addition, it is necessary to consider the level of certainty that users are looking for, as well as the lead-time that they will need to make informed decisions and issue alerts or interventions. It is also important to collaborate with environmental data providers to determine their capacity and whether they will be able to provide the type of data that is needed for the system to make predictions and provide timely information to users.

Finally, participants agreed on the importance of building partnerships with local organizations, such as Emergency Medical Services, Telehealth, fire, and police. Discussion focused on ways

that these partnerships can be strengthened and potentially used to help address information needs related to syndromic surveillance.

2. What have your experiences been in terms of securing funding for syndromic surveillance systems?

Learning from the experience of the Triple S Project in Europe, it was initially very difficult to secure funding for the project. However, there was strong interest at the European level to develop cross-border health data, networking and collaboration, particularly in relation to the International Health Regulations. This shared desire, as well as the strong partnerships and mutual interest established between member states, helped the Triple S Project to secure funding from the European Commission.

In the United States, much of the initial work done around establishing syndromic surveillance systems came out of preparedness funding. It was noted that while there are many upfront costs associated with developing and implementing the system, once the system is up and running it is not that expensive to operate on a day to day basis. A cost analysis conducted in Boston demonstrates that once the syndromic surveillance system and activities are incorporated into daily business practices, the system can be extremely helpful and have a number of beneficial impacts, driving down costs in other areas. Beyond investing in the technology, it is necessary to make better investments in the end users to ensure that people have a clearer understanding of the syndromic surveillance information to inform decision-making and public health action. This highlights the importance of striking a balance in the system in terms of translating data into information that becomes actionable.

An important lesson learned is that often, funding for syndromic surveillance is linked to high profile events or health emergencies. Participants agreed that it was helpful to take advantage of the events in your area, such as mass gatherings, that can help to stimulate funding to ensure that syndromic surveillance systems with the capacity for environmental and health monitoring of populations during these high profile events are put in place. Experience from KFL&A Public Health has demonstrated that the easiest time to get funding for syndromic surveillance is often after a major health event; KFL&A Public Health received the initial funding for their syndromic surveillance system following SARS. Experience has shown that once the syndromic surveillance system is up and running, an outbreak is an effective way to demonstrate the utility of the system. Once the system has proven itself to be valuable in understanding and responding to these types of public health events, the system will take off.

3. What are the next steps moving forward?

The Climate and Health Syndromic Surveillance Workgroup, comprised of members from public health agencies in Canada and the United States, has identified the development of a guidance document for the use of syndromic surveillance systems for heat-related health effects as a priority deliverable. Some members of the workgroup do not have syndromic surveillance systems in place in their jurisdictions and want to be able to learn from and build on the experiences of others in working towards implementing these systems. The goal behind developing this guidance document is to highlight systems and strategies that have been

implemented, offer practical instructions, and share best practices and lessons learned for the use of syndromic surveillance systems for heat-related health effects across a variety of jurisdictions.

The guidance document will include a scoping section, which will highlight examples of syndromic surveillance systems that have been put in place, review successful strategies, and offer practical solutions for best practices. Moving forward, the first step will be to work with partners to identify case studies of syndromic surveillance systems that are being used to monitor heat-related health outcomes. These case studies can include success stories or challenges that have resulted in important lessons learned. The input solicited from workshop participants during the roundtable discussion is intended to support and inform efforts moving forward with the development of the guidance document. Furthermore, the experiences and lessons learned shared by participants and presenters throughout the workshop should offer valuable insight and guidance moving forward.

## KEY TAKE AWAY MESSAGES

- Syndromic surveillance systems are increasingly expanding beyond a traditional focus on infectious disease to monitor the impact of climate change and environmental exposures, including extreme temperatures, on public health. Experience has demonstrated that syndromic surveillance systems are a useful tool for conducting health impact assessments of climatic events, given their real-time capacity.

- One of the key challenges for syndromic surveillance for health and climate effects is to determine the best measures for climate-related health outcomes. Collaboration and further discussion is necessary in order to determine ways to increase sensitivity and specificity for surveillance feeds for the health effects of heat, cold, and other environmental exposures. It is important to work with environmental data providers to determine whether they have the capacity to provide the type of data in a sufficient timeframe to allow syndromic surveillance systems to make predictions and provide valuable information to users in a timely manner. These challenges will benefit from further discussion and research.

- Evaluation of surveillance systems is important in order to provide the evidence to help determine how to invest most appropriately in available technologies. Evaluation allows for a consideration of whether syndromic surveillance is having an impact on public health on the ground.

- It is necessary to establish clear objectives for syndromic surveillance systems and devise effective strategies for the dissemination of surveillance information to decision-makers. Syndromic surveillance should be linked with public health action to ensure that surveillance information is used to support interventions to protect public health. The syndromic surveillance community must work to ensure that surveillance data is translated into information that becomes actionable.

- An important role of syndromic surveillance systems is to provide reassurance to the public that nothing of public health importance is occurring. This is a particularly vital role during mass gatherings, when there is increased media attention and spotlight on public health events. Moving forward in preparation for the 2015 Pan/Parapan American Games in Ontario, it will be critical to ensure that effective risk communication strategies are established for each of the potential risks identified through the HIRA process for the Pan/Parapan American Games.

- There is a need for greater collaboration between users of syndromic surveillance systems across different organizations and countries. This will allow valuable experience, best practices and lessons learned to be shared, and will enable those looking to develop and implement syndromic surveillance systems to build on the work that has already been done. This workshop has facilitated discussion and sharing between public health professionals, emergency management officials and academia. It was also an opportunity to stimulate additional collaborations that aim to develop a guidance document on the use of syndromic surveillance for heat-related health impacts. However, further discussion on how to facilitate these ongoing collaborations is necessary.

**APPENDIX A – AGENDA**

**Monday, March 17**

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**9:00-9:30** **Registration**
**9:30-9:45** **Welcome** – Dr. Ian Gemmill, Medical Officer of Health, and Dr. Kieran Moore, Associate Medical Officer of Health (KFL&A Public Health)
**9:45-10:00** **Introductions**

**10:00-12:00 Session 1: Surveillance Requirements for Mass Gathering Events**

*Goal: To share best practices and lessons learned from the use of syndromic surveillance systems for environmental and health monitoring of populations during mass gathering events.*

**Chair: Brian Schwartz**

**Julia Gunn,** Boston Public Health Commission – Biosurveillance for Mass Gatherings: Lessons Learned from the Boston Marathon

**10:40-10:50 Break**

**Alex Elliot,** Public Health England – Syndromic Surveillance Lessons Learned from the 2012 London Olympics (Via Adobe Connect)

**Bonnie Henry,** BC CDC – Syndromic Surveillance Lessons Learned from the 2010 Vancouver Olympics

**12:00-1:00 Lunch**

**1:00-2:45 Session 2: National Syndromic Surveillance Systems for Environmental and Health Monitoring**

*Goal: To showcase examples of environmental monitoring and human health surveillance systems, highlight current research initiatives, and share lessons learned and best practices.*

**Chair: David Buckeridge**

**Shubhayu Saha,** US CDC – Surveillance of Health Outcomes Related to Climate Sensitive Exposures

**Matthew Roach,** Arizona Department of Health Services – U.S. Syndromic Surveillance Systems at the State/Local Level and Lessons Learned from the Climate and Health Syndromic Surveillance Workgroup (Via Adobe Connect)

**José Jesus Heraclio Herrera Bazán,** COFEPRIS (Mexico) – Syndromic Surveillance System for Environmental Health Effects in Mexico

**Céline Caserio-Schonemann,** InVS (France) **–** Syndromic Surveillance in France and Europe: the French SurSaUD Syndromic Surveillance System and the European Triple S Project

**2:45-3:00 Break**

**3:00-4:45 Session 3: Focused Environmental Health Surveillance Methods**

*Goal: To highlight methods for environmental health surveillance, share best practices, and demonstrate how these systems can be used to inform decision-making.*

**Chair: Ray Copes**

**Tom Kosatsky,** BC CDC – Syndromic Surveillance for Heat and Cold

**David Buckeridge,** McGill University – Evaluating the Contribution of Syndromic Surveillance to the Detection of Waterborne Disease Outbreaks

**Kathryn Morrison,** McGill University – A Research Plan for Surveillance and Forecasting of Acute Respiratory Health Outcomes Associated with Forest Fire Smoke Exposure

**Elaina MacIntyre,** PHO – Update on Environmental Health Tracking for Ontario

**4:45-5:00 Wrap-up Day 1** – Jim Frehs (Health Canada)

**6:30 Complimentary Dinner at Historic Fort Henry**

**Tuesday, March 18**

**8:45** **Registration**

**9:00-10:20** **Session 1: Environmental Health Hazard Identification and Risk Communication in Preparation for the 2015 Pan American Games**

*Goal: To highlight environmental health hazard identification and risk assessment, provide an overview of enhanced real-time situational awareness tools for environmental health conditions and outcomes, and review principles of risk communication in preparation for the 2015 Pan American Games.*

**Chair: Kieran Moore**

**Brian Schwartz,** PHO, **Jessica Harris,** MOHLTC – Health System Hazard Identification and Risk Assessment for the Pan/Parapan Games

**Paul Belanger,** KFL&A Public Health – ACES and PHIMS: Enhanced Real-time Situational Awareness

**Ray Copes,** PHO – Principles of Risk Communication

**10:20-10:30** **Break**

**10:30-12:00** **Roundtable Discussion on Developing a Guidance Document for the use of Syndromic Surveillance Systems for Health and Heat-Related Impacts**

*Goal: To apply lessons learned from the workshop sessions and to consult with participants to collect input aimed at the preparation of a guidance document for the use of syndromic surveillance systems for heat-related health impacts.*

**Moderators: Bonnie Henry and Geoffrey Hall**

**12:00** **Closing Remarks –** Kieran Moore (KFL&A Public Health)
**Lunch**

**1:00-2:30** **PHPM Resident Workshop on Public Health Roles and Responsibilities for Mass Gatherings (for PHPM Residents only)** – Dr. Bonnie Henry (BC CDC)

## APPENDIX B – SPEAKER BIOS

### Julia Gunn

Julia E. Gunn, RN, MPH, has worked for the Boston Public Health Commission in the Communicable Disease Control Division for over 15 years, assuming the position of Director in 2008. During this time, she has contributed to dozens of publications and presentations enhancing the understanding of communicable disease surveillance and response, tuberculosis, food-borne illness, and other communicable illnesses. Julia has played a key role in the development and integration of enhanced surveillance systems in Boston, including the syndromic surveillance system and emergency tracking for mass casualty events. She was also a member of the meaningful use workgroup that developed the 2011 ISDS Recommendations for Emergency Department and Urgent Care.

### Dr. Alex Elliot

Dr. Alex Elliot is the Project Lead for the Public Health England Real-time Syndromic Surveillance Team. Alex was appointed to this position in 2008, and with Dr. Gillian Smith (Consultant Epidemiologist for the team), has since expanded and developed the team to deliver a World leading syndromic surveillance service, providing vital national surveillance support during pandemics, floods, volcanic ash clouds and Olympic Games! Alex is committed to further strengthening the utility of syndromic surveillance within PHE, exploring innovative sources of health surveillance data and working with public health colleagues across the World to explore the usefulness of syndromic surveillance in responding to public health incidents and mass gatherings. Alex has held positions within the Royal College of General Practitioners and the MRC National Institute for Medical Research. He has a PhD in molecular virology and has over 50 peer reviewed publications on syndromic surveillance and influenza research.

### Dr. Bonnie Henry

Dr. Bonnie Henry is currently the Medical Director of Communicable Disease Prevention and Control and Public Health Emergency Management with the British Columbia Centre for Disease Control, and is Medical Director for the provincial Emerging and Vectorborne Diseases program as well as a provincial program for surveillance and control of healthcare associated infections; a position she started in February of 2005. Previously she was Associate Medical Officer of Health for Toronto Public Health, where she was responsible for the Emergency Services Unit and the Communicable Disease Liaison Unit. She is a specialist in Public Health and Preventive Medicine and is Board Certified in Preventive Medicine in the US. She graduated from Dalhousie Medical School and completed a Masters in Public Health in San Diego, residency training in preventive medicine at University of California, San Diego and in community medicine at University of Toronto.

Dr. Henry worked with the WHO/UNICEF Polio eradication program in Pakistan in 2000 and with the World Health Organization to control the Ebola outbreak in Uganda in 2001. She joined Toronto Public Health in September 2001 and in 2003 the operational lead in the response to the SARS outbreak in Toronto. She was on the executive of the Ontario SARS Scientific Advisory

Committee and is an Associate professor at the University of British Columbia, Faculty of Medicine. She is the Chair of the Canadian Coalition for Immunization Awareness and Promotion and a member of the Canadian National Advisory Committee on Immunization and the National Infection Control Guidelines Steering Committee. She chaired the Canadian Public Health Measures Task Group and was a member of the Infection Control Expert Group and the Canadian Pandemic Coordinating Committee responding to pandemic H1N1 (2009) influenza. She has been involved with planning, surveillance and response to mass gatherings in Canada and internationally, most recently with the 2010 Vancouver Olympic and Paralympic Games. She is the author of "Soap and Water & Common Sense" a guide to staying healthy in a microbe filled world.

**Shubhayu Saha**

Shubhayu Saha is a health scientist with the Climate and Health program at the Centers for Disease Control and Prevention (CDC). Part of his research involves spatiotemporally linking environmental exposures (like heat, precipitation, pollen) with health outcomes to assess the epidemiologic risk associated with those exposures. He also conducts cost-effectiveness analysis of community-level health intervention strategies. He joined the CDC as a Prevention Effectiveness Fellow after completing his Ph.D. in Environmental Economics. He is a member of the International Health Economics Association, International Society of Environmental Epidemiology, and American Meteorological Society.

**Matthew Roach**

Matthew Roach currently serves as the Climate & Health Program Manager at the Arizona Department of Health Services, where he is responsible for managing activities for the Building Resilience against Climate Effects (BRACE) cooperative agreement between Arizona and the CDC. He has a Master of Public Health in Epidemiology and previously served as an Environmental Epidemiologist at the Arizona Department of Health Services, working under CDC's Developing Public Health Capacity and Adaptations to Reduce Human Health Effects of Climate Change grant awarded to Arizona. His work focused on enhancing surveillance of heat illness, in addition to advancing policy efforts on heat safety and improving health outreach. Matthew co-facilitates a climate and health syndromic surveillance workgroup, which has over 60 participants from public health agencies in the US and Canada.

**José Jesus Heraclio Herrera Bazán**

José Jesus Heraclio Herrera Bazán is the Executive Deputy Director of Risk Policies for the Federal Commission for the Protection against Sanitary Risk, Health Ministry, Mexico. He previously served as the Manager of Sampling and Monitoring at the Federal Commission for the Protection against Sanitary Risk, where he was responsible for methodology design for sampling, monitoring and human health risk evaluation for exposure to food additives, cosmetic ingredients, pesticides and plant nutrients, toxic substances, environmental contamination and polluted places. José has a Master of Biological Sciences in Experimental Biology with a specialization in Genetic Toxicology.

**Dr. Céline Caserio-Schonemann**

Dr. Céline Caserio-Schonemann has a medical degree and a Master of Public Health, and currently serves as the head of the Syndromic Surveillance Unit in the Department of Coordination of Alerts and Regional Offices at the French Institute for Public Health Surveillance. Céline has been involved in coordinating the French syndromic surveillance system SurSaUD since 2011, and has contributed to the European Triple S project. She is responsible for the national syndromic surveillance strategy in France, and serves as co-leader of the drafting group for the "Data collection, preparation and provision" section of the Triple S project *Guidelines for designing and implementing a syndromic surveillance system.* Céline has expertise in the fields of infectious diseases, environmental events, and mass gathering events, and in the use of a variety of data sources such as mortality data, data from emergency departments, and data from General Practitioners' offices.

**Dr. Tom Kosatsky**

Dr. Tom Kosatsky is Medical Director of Environmental Health Services at the BC Centre for Disease Control and Scientific Director of the Public Health Agency of Canada-funded National Collaborating Centre for Environmental Health. He is a public health physician who has worked for the US CDC, the WHO and the Montreal Health Department, and has taught at McGill University. Current interests are in heat and health, bio-monitoring, environmental epidemiology methods, and new surveillance initiatives.

**Dr. David Buckeridge**

David Buckeridge is an Associate Professor of Epidemiology and Biostatistics at McGill University in Montreal where he holds a Canada Research Chair in Public Health Informatics and directs the Surveillance Lab. He is also a Medical Consultant to the Montreal Public Health Department and the Quebec Public Health Institute. His research focuses on the informatics of public health surveillance and disease control. Dr. Buckeridge has consulted on surveillance to groups such as the Public Health Agency of Canada, the US Institute of Medicine, the US and Chinese Centers for Disease Control, the European Centers for Disease Control, and the World Health Organization. He has a M.D. from Queen's University, a M.Sc. in Epidemiology from the University of Toronto, and a Ph.D. in Biomedical informatics from Stanford University. Dr. Buckeridge is also a Fellow of the Royal College of Physicians and Surgeons of Canada with specialty training in Public Health and Preventive Medicine.

**Kathryn Morrison**

Kathryn Morrison is a PhD student in epidemiology at McGill University, working in the Surveillance Lab under the supervision of Dr. David Buckeridge. Her co-supervisor is Dr. Sarah Henderson, a senior environmental health scientist at the British Columbia Centre for Disease Control. Her background is in geographic information science and statistics, and she is interested in methods for modeling spatial and temporal epidemiological data, particularly applied to surveillance and public health.

**Elaina MacIntyre**

Elaina MacIntyre holds a PhD from the University of British Columbia and completed her Post-Doc at the German Research Centre for Environmental Health. She is currently an Epidemiologist Specialist in Environmental and Occupational Health at Public Health Ontario.

**Dr. Brian Schwartz**

Brian Schwartz currently serves as Chief, Emergency Preparedness at Public Health Ontario (PHO). In this capacity he is responsible for leading the development of PHO's strategy, design, policies, procedures and response to health emergencies and incidents, including hazardous materials, catastrophic events and outbreaks. Prior to joining PHO, he practiced emergency medicine for over 30 years in both community and academic settings, as well as held the position of Director of Sunnybrook Osler Centre for Prehospital Care from 1996-2009.

Dr. Schwartz chaired the Ministry of Health and Long-Term Care's Scientific Response Team during the 2009 H1N1 pandemic. He also held the position of vice-chair of Ontario's SARS Scientific Advisory Committee and served as scientific advisor to the Emergency Management Branch of the Ministry of Health and Long-Term Care from 2004 until 2011. Dr. Schwartz is an author of over 40 peer reviewed papers on emergency medicine, prehospital care and emergency preparedness and response. He holds the rank of Associate Professor in the Department of Family and Community Medicine and the Dalla Lana School of Public Health at the University of Toronto.

**Jessica Harris**

Jessica Harris is a Senior Consultant at the Ministry of Health and Long-Term Care Emergency Management Branch, and has worked for the ministry for more than 15 years. She has been involved in a number of major emergency preparedness projects, including health system preparedness for the G8 and G20 Summits in 2010.

**Dr. Paul Bélanger**

Dr. Paul Bélanger is KFL&A Public Health's Associate Director of Knowledge Management. He is an adjunct Associate Professor of Geography and adjunct Assistant Professor of Public Health Sciences at Queen's University. His team leads KFL&A's research, health informatics, and evaluation programmes, mandated to bring more advanced analytic techniques to its syndromic surveillance system, spatial epidemiological studies, and to develop novel health informatics solutions. He more recently served with the United Nations Economic Commission for Africa where he and his family were stationed in Addis Ababa, Ethiopia. In addition to overall responsibility for the UN's GIS operations in Africa, Paul was charged with developing spatial data infrastructures for several member States, applied disaster response and early warning systems, and on rebuilding the geomatics capacity of post-conflict countries like Sierra Leone and Liberia. His research interests lie in contextual modelling, space-time cluster detection techniques, and Bayesian methods for risk mapping. Dr. Bélanger holds a doctorate in geography from the State University of New York at Buffalo and he is a certified GIS Professional.

**Dr. Ray Copes**

Ray Copes completed his undergraduate degrees in psychology and biology at Simon Fraser University. He subsequently attended McGill University where he obtained his MD and MSc. After medical school, Ray did his residency training in Family Medicine at the University of Western Ontario and in Occupational and Environmental medicine at St. Michael's Hospital and the University of Toronto. He has worked as an occupational physician, first in industry and then with the Alberta Occupational Health and Safety Division as Senior Medical Consultant and later as Director of Health Services. In 1990, he moved to British Columbia to become Medical Consultant in Environmental Health, Risk Assessment and Toxicology with the BC Ministry of Health in Victoria. Later Ray moved to the BC Centre for Disease Control where he was Director of Environmental Health and the founding Scientific Director of the National Collaborating Centre for Environmental Health, one of six National Collaborating Centres in Public Health funded by the Public Health Agency of Canada.

Ray has taught courses in environmental health, toxicology, risk assessment, risk management and risk communication at the University of Victoria, the University of British Columbia and University of Toronto. He holds appointments as a Clinical Professor at the University of British Columbia and Associate Professor, Dalla Lana School of Public Health, University of Toronto. Since July 2009, Ray has been with Public Health Ontario, and is the Chief of Environmental and Occupational Health in Toronto.

## APPENDIX C – PRESENTATIONS

All of the workshop presentations are available on the KFL&A Public Health Informatics website under the Knowledge Exchange: Conferences and Presentations heading. To access the KFL&A Public Health Informatics website, please go to www.kflaphi.ca. To access the PDF versions of the presentations directly, please use the following links:

Julia Gunn: http://www.kflaphi.ca/wp-content/uploads/Biosurveillance%20for%20Mass%20Gatherings%20-%20Boston%20Marathon%20-%20Julia%20Gunn.pdf.

Alex Elliot: http://www.kflaphi.ca/wp-content/uploads/Syndromic-Surveillance-for-London-Olympics-Dr.-Alex-Elliot.pdf.

Bonnie Henry: http://www.kflaphi.ca/wp-content/uploads/Disease-Surveillance-at-the-Vancouver-Olympics-Dr.-Bonnie-Henry.pdf.

Shubhayu Saha: http://www.kflaphi.ca/wp-content/uploads/Monitoring-Health-Impacts-Related-to-Climate-Sensitive-Exposures-Shubhayu-Saha.pdf.

Matthew Roach: http://www.kflaphi.ca/wp-content/uploads/Climate-and-Health-Syndromic-Surveillance-Matthew-Roach.pdf.

José Jesus Heraclio Herrera Bazán: http://www.kflaphi.ca/wp-content/uploads/Syndromic%20Surveillance%20for%20Monitoring%20Environmental%20Health%20Effects%20-%20Jose%20Jesus%20Herrera%20Bazan.pdf.

Céline Caserio-Schonemann: http://www.kflaphi.ca/wp-content/uploads/Syndromic-Surveillance-in-France-and-Europe-Dr.-Celine-Caserio-Schonemann.pdf.

Tom Kosatsky: http://www.kflaphi.ca/wp-content/uploads/Syndromic-Surveillance-of-Heat-and-Cold-Dr.-Tom-Kosatsky.pdf.

David Buckeridge: http://www.kflaphi.ca/wp-content/uploads/Syndromic-Surveillance-for-Waterborne-Disease-Outbreaks-Dr.-David-Buckeridge.pdf.

Kathryn Morrison: http://www.kflaphi.ca/wp-content/uploads/Syndromic-Surveillance-of-Respiratory-Health-Outcomes-associated-with-Forest-Fire-Exposure-Kathryn-Morrison.pdf.

Elaina MacIntyre: http://www.kflaphi.ca/wp-content/uploads/Update-on-Ontario-Environmental-Health-Tracking-Elaina-MacIntyre.pdf.

Brian Schwartz and Jessica Harris: http://www.kflaphi.ca/wp-content/uploads/HIRA-for-the-PanParapan-Am-Games-Dr.-Brian-Schwartz-and-Jessica-Harris.pdf.

Paul Belanger: http://www.kflaphi.ca/wp-content/uploads/ACES%20and%20PHIMS%20-%20Real-time%20Situational%20Awareness%20-%20Dr.%20Paul%20Belanger.pdf.

Ray Copes: http://www.kflaphi.ca/wp-content/uploads/Risk-Communication-Dr.-Ray-Copes.pdf.

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