CARRFS ACSRFR

Canadian Alliance for Regional Risk Factor Surveillance

Alliance canadienne de surveillance régionale des facteurs de risque

Strengthening Public Health Systems and Decision-Making

Need for new research, surveillance and methodologies to adapt to a changing world

2022 SYMPOSIUM PROGRAM

June 13, 2022 | Virtual

About CARRFS

The Canadian Alliance for Regional Risk Factor Surveillance (CARRFS) has its roots in a think tank forum initiated by the Public Health Agency of Canada (PHAC) in 2007 that was attended by over 100 public health professionals. The purpose of the forum was to discuss strategies for risk factor surveillance in recognition that relevant data for public health planning was neither timely nor frequent and was rarely granular enough to be used by communities.

CARRFS was established as a voluntary network in 2008 to continue this work. Since then, the committee has run various programs, including training in public health surveillance skills; research; and an environmental scan to document the current status for laying down the road maps for public health surveillance across the country.

Since 2016, CARRFS has focused on organizing an annual symposium as a pre-conference event of the Public Health conference organized by the Canadian Public Health Association (CPHA) as well as organizing a Collaborator Session as part of their conference.

CARRFS Organizing Committee (2022)

Dr. Kavita Singh, Chair (ON)
Dr. Mayilee Canizares, Co-Chair (ON)
Dr. Meg Sears (ON)
Céline Plante (QC)
Dr. Yaping Jin (ON)
Dr. Mai Thanh Tu (QC)
Kristin Weatherall (BC)
Dr. Drona Rasali (BC; Advisory Member)
Dr. Bernard Choi (ON; Advisory Member)

2022 Symposium

This virtual symposium is a pre-conference event of the Canadian Public Health Association (CPHA) Public Health 2022 Virtual Conference (June 14-16, 2022). The CARRFS Symposium will be conducted in English.

Objectives

After attending the CARRFS 2022 Symposium, participants will be able to:

- Explore new approaches for addressing complex problems, such as climate change, disparities, and pandemics.
- Understand the availability of various indicators and data to support decision-making and research.
- Discuss the potential opportunities of emerging technologies, such as artificial intelligence, to support surveillance activities, research and decision-making.

Session 1 Agenda

11:30am-2:00pm ET

Moderated by Dr. Kavita Singh, CARRFS Chair

11:30am Welcoming remarks

11:40am Keynote address

AI and Public Health – Potential, Challenges, and Opportunities
Dr. David Buckeridge, McGill University

12:40pm Rapid Fire Presentations

- *MCDA as a Decision-Making Support Tool for Health Prioritization: A rapid literature review of methods for prioritizing threats and interventions using a One Health lens*
  Jiawei Zhao
- *Visual analytics of temporal patterns of comorbidity occurrences between diabetes and other chronic diseases in British Columbian population, 2000/01 to 2019/20*
  Max Xie

1:00pm Keynote address

The Role of Artificial Intelligence to Inform Public Health Decision-Making
Dr. Laura Rosella, University of Toronto

Session 2 Agenda

3:00pm-5:00pm ET

Moderated by Céline Plante, CARRFS Member

3:00pm Welcoming remarks

3:05pm Keynote address

Using AI to build polypharmacy surveillance: our experience
Dr. Caroline Sirois & Dr. Yohann Chiu, Université Laval

4:05pm Rapid Fire Presentations

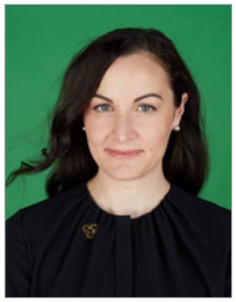
- *Predicting population risk of suicide using health administrative data*
  Fatemeh Gholi Zadeh Kharrat
- *Quantifying the burden of heat-related morbidity (2004-2021) and mortality (1981-2020) in Canada, using health administrative data*
  Jessica Sutinen
- *A new online showcase of indicators to inform the general public and support well-being and public health programs*
  Mai Thanh Tu
- *Development and Implementation of British Columbia's K-12 School COVID-19 Case Cluster Reporting System for the 2021-2022 School Year*
  Sharon Relova & Rita Zhang

4:45pm Closing remarks

Keynote speakers

Dr. David Buckeridge

David Buckeridge is a Professor in the School of Population and Global Health and the Chief Digital Health Officer at the McGill University Health Center. Holding a Canada Research Chair (Tier 1) in Health Informatics and Data Science, he projects health system demand for the Canadian province of Quebec, leads Data Management and Analytics for the Canadian Immunity Task Force, and supports the World Health Organization in monitoring global immunity to SARS-CoV-2. He has a MD (Queen's), a MSc in Epidemiology (Toronto), a PhD in Biomedical informatics (Stanford), and is a Fellow of the Royal College of Physicians of Canada.



Dr. Laura Rosella

Laura Rosella is an Associate Professor in the Dalla Lana School of Public Health, University of Toronto (UofT), where she holds the Canada Research Chair in Population Health Analytics and leads the Population Health Analytics Lab, which focuses on developing methods and tools to use population-level data to inform health system decision-making. She holds Inaugural Stephen Family Research Chair in Community Health at the Institute for Better Health, Trillium Health Partners and scientific appointments at Vector and ICES. She leads training at the Temerty Centre for Artificial Intelligence Research and Education in Medicine and the Data Sciences Institute at the University of Toronto. She leads a Pan-Canadian team that launched in 2022 known as AI for Public Health (AI4PH), which is focused on building capacity in AI and big data skills for transformative change in addressing population and public health challenges and understanding how these tools impact health equity.

Dr. Caroline Sirois

Caroline Sirois is a pharmacist and full professor at the Faculty of Pharmacy at Université Laval. She holds a master's degree in hospital pharmacy and a PhD in pharmacoepidemiology. Her research focuses on medication use in older adults, with a particular interest in polypharmacy, deprescribing and potentially inappropriate medications. She is a researcher affiliated with the National Institute of Public Health of Quebec where she develops the surveillance of polypharmacy.

Dr. Yohann Chiu

Yohann Chiu is a postdoctoral fellow at the Faculty of Pharmacy at Université Laval, embedded at the Institut national de santé publique du Québec. His current work aims at developping artificial intelligence methods for surveillance of polypharmacy. He holds a PhD in biostatistics and has also worked in environmental health and primary care.

Rapid fire presentation abstracts

* Presenters are bolded

Predicting population risk of suicide using health administrative data

Fatemeh Gholi Zadeh Kharrat[1], Alain Lesage[2], Christian Gagné[1,3], Geneviève Gariépy[4], Caroline Sirois[1], Yuhong Guo[5], Jean-François Pelletier[2], Louis Rochette[6], Victoria Massamba[6], Éric Pelletier[6], Pascale Lévesque[6], JianLi Wang[7]

[1] Université Laval
[2] Université de Montréal
[3] Canada CIFAR AI Chair
[4] Public Health Agency of Canada
[5] Carleton University
[6] Institut national de santé publique du Québec
[7] Dalhousie University

Introduction: Suicide is a complex, multidimensional event and a significant challenge for prevention globally. The objective of this study was to develop and validate sex-specific statistical and machine learning (ML) models for predicting population risk of suicide.

Methods: The sample for this study included Quebec Chronic Disease Surveillance System (QICDSS) data from the Quebec Institute of Public Health (INSPQ), covering up to 98% of the population in Quebec and containing data for over 20,000 suicides. Additional data from the Canadian Urban Environmental Health Research (CANUE) was linked by postal code. We used a case-cohort study design. Individuals considered cases in this study aged 15+ from January 1st, 2002 to December 31st, 2010 (n= 9 440). The comparison cohort was a random sample of 1% of the Quebec population aged 15+, who were alive on December 31st of each year, from 2002 to 2010, identified from the QICDSS (n=661 780). We computed operating characteristics, including sensitivity, specificity, and positive predictive value (PPV). After that, we assessed a model by generating the receiver operating characteristic (ROC) curves to predict suicides and calibration measures.

Results: An extensive set of variables at the individual, program, and system levels taking an explicit sex perspective has indicated an AUC of (0.81, 0.89), sensitivity of (37%, 55%), and specificity of (98%, 98%) for male and female models, respectively.

Conclusions and implications for policy, practice or additional research: We developed Machine learning models for predicting population risk of suicide using routinely collected health administrative data. Additionally, we are simulating changes coming from policies by modifying the population composition for reflecting the effect of policies change (e.g., mental disorders prevalence; local quality of health care; regional mental health and addictions expenditures) and evaluate their effect on the suicide rates predicted, comparing these with rates obtained with the current population and population modified differently.

MCDA as a Decision-Making Support Tool for Health Prioritization: A rapid literature review of methods for prioritizing threats and interventions using a One Health lens

Jiawei Zhao, MPH[1]

[1] Public Health Agency of Canada

Introduction: Multi-Criteria Decision Analysis (MCDA) is a decision-making support tool that can be used in public health emergency management decision-making in Canada. The use of a One Health approach in MCDA can support the prioritization of complex threats which cut across the human, animal, and environmental domains. The objective of this review is to examine how MCDA & similar decision support methodologies are used to prioritize health threats and interventions with a focus on One Health principles, the criteria used, and the stakeholders engaged.

Methods: We conducted a literature search for articles published from January 1, 2010 to present on MEDLINE, EMBASE, SCOPUS, the CAB database, and a limited online grey literature search in partnership with a librarian from Health Canada.

Results: 1098 records were screened, of which 62 were included for synthesis. A large proportion of articles included elements of One Health (61%), of which most were Canadian studies (20%); and were within the human health domain (69%). The most common groups of stakeholders comprised of the government sector, non-governmental organizations, subject matter experts and the health workforce, and the general public. Approximately 8 to 18 criteria were used (range: 4-135) in any given study, and common criteria include health impacts, surveillance, societal impact, strategic impact, and economic considerations.

Conclusions and implications for policy, practice or additional research: A key contribution of this research to the field of public health decision-making is the inclusion of a One Health lens. Current literature on health prioritization varies in terms of the depth of integration of the One Health framework and on the use of MCDA methods and criteria, thus requiring better guidance on the use of MCDA methodologies given the study objectives and on the integration of One Health principles.

Visual analytics of temporal patterns of comorbidity occurrences between diabetes and other chronic diseases in British Columbian population, 2000/01 to 2019/20

Drona Rasali, PhD, FACE[1,2]; **Max Xie, MSc[1,2]**, Crystal Li, MSc[1], Naveed Janjua, MBBS, MSc, DrPH[1,2]

[1] BC Centre for Disease Control, Vancouver, British Columbia
[2] School of Population and Public Health, University of British Columbia

Introduction: Diabetes, a leading cause of morbidity and mortality worldwide, co-occurs with several chronic diseases that share same risk factors. The purpose of this study is to visualize temporal patterns of diabetes' comorbidity co-occurrences in British Columbian population

Methods: Using data from British Columbia's Chronic Disease Registries (CDR) for the period from 2000/01 to 2019/20, visual analytics approach was applied to two population cohorts of all adult British Columbians (20+) as incident cases of diabetes and those without diabetes diagnosis in 2000/01. Calculating cumulative probabilities of diabetes' comorbidity occurrences with 19 other chronic diseases, we used R software to visualize the heat-maps of their animated temporal patterns in the two cohorts following through the study period.

Results: By 2019/20, the diabetes cohort showed co-occurrence of comorbidity with hypertension (67%), mood & anxiety (47%), osteoarthritis (27%), ischemic heart disease (26%), asthma (17%), chronic kidney disease (16%), chronic obstructive pulmonary disease (11%), heart failure 10%), osteoporosis (9%), acute myocardial infarction (7%), Alzheimer's/ dementia (4%), hospitalized stroke (3%), epilepsy (1%), hospitalized transient ischemic stroke (1%), Parkinsonism (1%) and multiple sclerosis (<1%). While 83% of the people with diabetes acquired one or more chronic conditions, and 43% acquired three or more conditions. The probabilities of occurrences of these comorbidities when visualized by the animated heat-maps showed more intense occurrence of comorbidities, beginning from earlier age, in the diabetes cohort than the cohort without diabetes over the study period.

Conclusions and implications for policy, practice or additional research: Individuals with diabetes have more comorbidity conditions, beginning at younger age compared with individuals without diabetes. This has implications for prevention and integrated management of these conditions. Further research to elucidate the relationship between the diabetes and comorbidity conditions in conjunctions with socio-demographic and risk factors for informing the prevention strategies would be important for the BC population.

Quantifying the burden of heat-related morbidity (2004-2021) and mortality (1981-2020) in Canada, using health administrative data

Jessica Sutinen, MSc[1]

[1] Health Canada

Introduction: In Canada, extreme heat events pose significant health risks and are projected to increase in frequency and severity as climate change accelerates. Surveillance and monitoring of heat-related morbidity and mortality at the national level are necessary to understand the burden of heat-related health impacts. Currently there is not a national surveillance and monitoring system in place. Health administrative databases (HADs), developed for administration and billing purposes, can be used to capture surveillance information, but are not intended for surveillance purposes. In this study, we used nationally-available HADs to describe the burden of heat-related morbidity and mortality across Canada in the absence of a national surveillance and monitoring system.

Methods: We used HADs Discharge Abstract Database, National Ambulatory Care Reporting System, and Canadian Vital Statistics Death Database to identify heat-related hospitalisations, emergency department (ED) visits, and deaths in Canada (respectively). Annual incidence rates were calculated nationally, regionally, and by age and sex. Daily historical weather data were

used (i.e., maximum temperature) to explore morbidity and mortality during extreme heat events.

Results: Reported heat-related mortality rates have increased since 1981. Rates in the 1980s and 90s peaked at 0.7 deaths per million population – in 2018, the rate rose to 2.6 per million. During the 2021 BC heat dome, the number of daily heat-related hospitalisations and ED visits between June 25th and July 3rd increased by ~15 times the daily seasonal average.

Conclusions: Extreme heat events and hotter summers increase heat-related morbidity and mortality. There were a number of limitations to using HADs, including: a lag period before data were released, inconsistent reporting and coverage of ED visits, lack of a standardised definition of heat death, and lack of exposure information. Developing a national surveillance and monitoring system for climate change health impacts would improve upon the limitations of HAD data.

A new online showcase of indicators to inform the general public and support well-being and public health programs

Mai Thanh Tu, PhD[1], Nancy Illick, MSc[1], Marie-Andrée Gravel, MSc[1]

[1] Institut de la statistique du Québec

This presentation aims to provide an example of how the Institut de la statistique du Québec (ISQ) has partnered with public agencies and organizations in recent years to translate census, administrative and survey data into indicators designed to inform the general public and support well-being and public health decisions. For instance, in 2013, a partnership was established with the “Secrétariat à la jeunesse” (SAJ), an administrative department of the Quebec government whose mandate is to advise the government on youth issues, as well as to assist the premier in the exercise of his responsibilities and coordinate governmental actions in this area. First, the ISQ prepared a report containing statistics on youth in 2014 and 2019. Meanwhile, the SAJ released an action plan for 2021–2024 that includes 21 objectives broken down according to seven axes: employment, entrepreneurship, the environment, culture, education, health, and citizenship. This partnership then led to the creation, in June 2021, of an online showcase called “Vitrine statistique sur les jeunes de 15 à 29 ans.” This showcase aims to monitor 60 indicators of youth well-being on a regular basis until 2024. The indicators are grouped according to the axes featured in the action plan. Building on that partnership experience, the ISQ is now working with other public agencies and organizations to develop similar showcases.

Development and Implementation of British Columbia’s K-12 School COVID-19 Case Cluster Reporting System for the 2021-2022 School Year

Sharon Relova, MSc (Epidemiology)[1*], **Li Rita Zhang, MPH**[1*], Michelle Spencer, MSc[1], Geoffrey Mckee, MD, MPH, FRCPC[1]

[1] BC Centre for Disease, Control, Provincial Health Services Authority, Vancouver, British Columbia (BC)

Introduction: The risk of COVID-19 in British Columbia (BC) K-12 schools looked different in 2021-2022 compared to 2020-2021 due to the evolution of the virus and the expansion of vaccine eligibility and availability. At the request of the BC Ministries of Health and Education, and building on pre-existing regional surveillance model and the provincial pediatric surveillance system, a K-12 School Cluster Reporting System was developed to monitor COVID-19 transmission patterns in schools.

Methods: In collaboration with regional health authorities (RHA), the BC Centre for Disease Control (BCCDC) led the development and implementation of standardized definitions of school case clusters for provincial reporting. Through review of contact tracing records, regional epidemiology and case management teams examined the COVID-19 cases reported starting September 7, 2021, among students and staff in K-12 schools. These analyses assessed where the individual may have acquired COVID-19 as well as any transmission that may have occurred in the school setting. The BCCDC created standardized data forms and transfer processes, and a provincial data infrastructure to collate and analyze the data submitted by the RHAs.

Results: Given the evolving environment of COVID-19 in BC, it was critical to contextualize indicators and provide interpretation to decision makers and the public in a transparent way. Accordingly, a monthly BC COVID-19 Situation Report for K-12 Schools was available on the BCCDC public-facing website. Descriptive statistics of school case clusters were reported, including proportion of affected schools, frequency of active and closed clusters, and size of clusters. The Reporting System was assessed for feasibility and relevancy throughout the year.

Conclusions and implications for policy, practice or additional research: The K-12 School Cluster Reporting System supported evidence-informed public health guidance and action in K-12 settings. Transparency and context were important to the interpretation and utilization of the results for decision making.