ANNUAL REPORT

2019-2020

CIRN

CANADIAN IMMUNIZATION RESEARCH NETWORK

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ABOUT THE **CANADIAN IMMUNIZATION RESEARCH NETWORK**

The Canadian Immunization Research Network (CIRN) is a national network of key vaccine researchers who develop and test methodologies related to the evaluation of vaccines as they pertain to safety, immunogenicity and effectiveness, and who conduct implementation research and evaluation. As a "network of networks", CIRN is divided into eight research sub-networks comprised of over 200 investigators across 40 Canadian institutions.

The Networks

CANVAS: Canadian **N**ational **V**accine **S**afety Network
CTN: Clinical **T**rials **N**etwork
SOS: Serious **O**utcomes **S**urveillance Network
SIC: Special **I**mmunization **C**linic Network
PCN: Provincial **C**ollaborative **N**etwork
SSHN: Social **S**cience and **H**umanities **N**etwork
ModERN: Modeling and **E**conomics **R**esearch **N**etwork
RLN: Reference **L**aboratory **N**etwork

MISSION

CIRN hopes to further strengthen Canada's research capacity, evidence base and expertise in the field of vaccines and immunization for vaccine-preventable diseases. CIRN's aim is to play a pivotal role in mentoring early-career researchers, recruiting new investigators, and providing opportunities for trainees, while also delivering meaningful engagement of stakeholders at all research stages.

LETTER FROM THE MANAGEMENT COMMITTEE

We are delighted to provide our 10th CIRN Annual Report. This year we focused on launching several new research projects and programs, while also improving the infrastructure, and operational support that the Network Management Office can provide the networks.

The CIRN Management Committee is pleased to present our 10th annual report. The 2019-2020 year started off strong, with a focus on several new research projects that were selected for year three (Y3) of the grant. CIRN also undertook an intensive stakeholder engagement, which served to inform the network with research priorities for the final two years of funding (Y4 and Y5). The call for project proposals was made at the beginning of 2020, with 23 Letters of Intent (LOI) submitted – though the project selection process was ultimately interrupted by the global COVID-19 pandemic.

2020 will forever be marked as the year of the global pandemic. The very beginning of this unprecedented year interrupted CIRN's regular research activities, as our researchers shifted their priorities towards COVID-19 related research activities in response to both global and national public health needs and priorities.

In response to the COVID-19 global pandemic declaration, Public Health Agency of Canada (PHAC) and Canadian Institutes of Health Research (CIHR) approached CIRN leadership to assess the networks vaccine readiness capabilities by implementing the rapid response research mechanism established by the network during the H1N1 pandemic in 2009.

Over the next year, CIRN's research will continue to play an important role in shaping public health policies and decision making.

OUR FOCUS

- Perform vaccine research to inform public health policy in Canada
- Maintain an active research network capable of immediate response to infectious disease threats in Canada
- Further develop collaborations between Canadian vaccine experts
- Train the next generation of pandemic vaccine researchers
- Perform applied public health research and vaccine evaluations of high priority for Canadian health decision-makers

CIRN MANAGEMENT COMMITTEE

2019

Dr. Scott Halperin
Dr. Julie Bettinger
Dr. Joanne Langley
Dr. Shelly McNeil
Dr. Melissa Andrew
Dr. Karina Top
Dr. Eve Dubé
Dr. Natasha Crowcroft
Dr. Jeff Kwong
Dr. Brian Ward
Dr. Marc Brisson
Dr. David Scheifele
Dr. Mark Loeb
Dr. Philippe De Wals
Dr. Shelley Deeks
Dr. Gaston De Serres
Ms. Emily Adkins Taylor and Ms. Erin Schock representing the Public Health Agency of Canada
Ms. Suzete Dos Santos, representing the Canadian Institutes of Health Research

Network **LEADS**

DR. SCOTT HALPERIN,
NOMINATED PRINCIPAL INVESTIGATOR, CIRN

Dr. Halperin is a Professor of Pediatrics, and Microbiology and Immunology at Dalhousie University. As the Director of the Canadian Center for Vaccinology, Nominated Principal Investigator of CIRN, Co-Principal Investigator of the Immunization Monitoring Program Active (IMPACT), and Executive Committee member of the Canadian Association for Immunization Research and Evaluation (CAIRE), he has played a foundational role in the establishment of Canadian collaborative research networks undertaking evaluative vaccine research. His research focuses on the diagnosis, treatment, and prevention of pertussis and other vaccine-preventable diseases.

DR. JULIE BETTINGER,
NETWORK LEAD, CANADIAN NATIONAL VACCINE SAFETY NETWORK

Dr. Julie Bettinger is an Associate Professor at the Vaccine Evaluation Center in the Department of Pediatrics at the University of British Columbia and a Michael Smith Foundation for Health Research Scholar. Her research interests include vaccine safety and vaccine preventable diseases as well as attitudes and beliefs around immunization uptake and use.

DR. JOANNE LANGLEY,
NETWORK LEAD, CLINICAL TRIALS NETWORK

Dr. Joanne Langley is a Professor of Pediatrics and Community Health and Epidemiology at Dalhousie University, the CIHR-GSK Chair in Pediatric Vaccinology, and Associate Director of the Canadian Center for Vaccinology. Her main research interests are in the epidemiology and prevention of respiratory infections, particularly Respiratory Syncytial Virus and influenza, and immunization decision making.

DR. SHELLY MCNEIL,
NETWORK CO-LEAD, SERIOUS OUTCOMES SURVEILLANCE NETWORK

Dr. Shelly McNeil a Clinical Research Scholar, Dalhousie University and Chief, Division Infectious Diseases at the Nova Scotia Health Authority. She is also the Deputy Director of the Canadian Center for Vaccinology. Her research focuses on immunization policy, evaluation of the epidemiology of vaccine-preventable diseases in adults with a focus on the elderly and pregnant women, as well as the assessment of the effectiveness of vaccines in the prevention of serious outcomes in adults and clinical trials of new vaccines targeted at adolescent and adult populations.

DR. MELISSA ANDREW, NETWORK CO-LEAD, SERIOUS OUTCOMES SURVEILLANCE NETWORK

Dr. Melissa Andrew is an Associate Professor of Medicine and consultant in Geriatric Medicine at Dalhousie University and an Associate Member of the Canadian Center for Vaccinology. As Co-Principal Investigator of the Serious Outcomes Surveillance (SOS) Network, she studies how frailty impacts both vaccine effectiveness and clinical outcomes of influenza and pneumococcal infections in older people.

DR. KARINA TOP, NETWORK LEAD, SPECIAL IMMUNIZATION CLINICS NETWORK

Dr. Top is an Associate Professor of Pediatrics and Community Health and Epidemiology at Dalhousie University and an Investigator at the Canadian Center for Vaccinology. Dr. Top's research focuses on vaccine safety, management of patients who have experienced adverse effects following immunization (AEFI), and vaccine safety and effectiveness in immunocompromised patients.

DR. EVE DUBÉ, NETWORK LEAD, SOCIAL SCIENCES AND HUMANITIES NETWORK

Dr. Eve Dubé is a member of the Scientific Group on Immunization at the Québec National Institute of Public Health, a researcher at the Research Center of the CHU-Québec, and an adjunct professor in the Social and Preventive Medicine Department and Anthropology Department of Université Laval. Her research focuses on the socio-cultural field surrounding immunization and vaccine hesitancy.

DR. JEFF KWONG, NETWORK CO-LEAD, PROVINACAL COLLABORATIVE NETWORK

Dr. Kwong is Program Leader for the Populations and Public Health Research Program at the Institute for Clinical Evaluative Sciences (ICES) and a scientist at Public Health Ontario. Dr. Kwong is also a family physician at the Toronto Western Family Health team and an Associate Professor in the Department of Family and Community Medicine at the Dalla Lana School of Public Health at the University of Toronto. His research interests include infectious diseases epidemiology and health services research using linkable data, influenza vaccine and vaccination program evaluation, and assessing the burden of infectious diseases.

DR. NATASHA CROWCROFT, NETWORK CO-LEAD, PROVINACAL COLLABORATIVE NETWORK

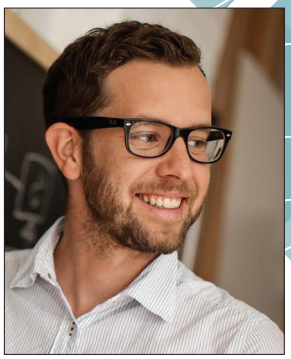
Dr. Crowcroft is Director of the Centre for Vaccine Preventable Diseases, Professor at the Department of Laboratory Medicine and Pathobiology and the Dalla Lana School of Public Health, University of Toronto, Canada, and Adjunct Scientist at ICES. Dr. Crowcroft is an internationally recognized expert in immunization who provides expertise to the World Health Organization and Gavi. She was a member of the Canadian National Advisory Committee on Immunization (NACI) from 2008-13, is a current member of the CIRN Management Committee, and co-lead for the Provincial Collaborative Network

DR. SHELLY BOLOTIN,
NETWORK CO-LEAD, REFERENCE LABORATORY NETWORK

Dr. Bolotin is a scientist at Public Health Ontario and an Assistant Professor at the Dalla Lana School of Public Health and the Department of Laboratory Medicine and Pathobiology at the University of Toronto. Her research program utilizes a multi-disciplinary approach to evaluate whether our population is adequately protected from vaccine-preventable diseases. Applying a public health lens, Dr. Bolotin's studies combine epidemiological and microbiological methods to answer questions related to population immunity and vaccine effectiveness, and determine our future risk for outbreaks or epidemics.

DR. TODD HATCHETTE,
NETWORK CO-LEAD, REFERENCE LABORATORY NETWORK

Dr. Hatchette is the Chief of Service for the Division of Microbiology, QEII Health Science Center, and the Director of the Virology and Immunology. He is a Professor in the Department of Pathology with cross-appointments in the Departments of Immunology and Microbiology and Medicine where he is a consultant Infectious Diseases. As co-lead of the RLN, his work with CIRN has focused on providing laboratory support for the Seroepidemiology research stream led by Shelly Bolotin and the SOS Network. Dr. Hatchette is the President of the Association of Medical Microbiology and Infectious Diseases (AMMI) Canada.



DR. MARC BRISSON,
NETWORK LEAD, SOCIAL SCIENCES AND HUMANITIES NETWORK

Dr. Brisson is a full-time Professor at Université Laval where he leads the Research Group in Mathematical Modeling and Health Economics of Infectious Diseases. His research aims at developing mathematical models that predict the effectiveness and cost-effectiveness of interventions against infectious diseases to help policy decision-making. His current research mainly focuses on human papillomavirus and varicella-zoster-virus vaccines. He has a BSc in Actuarial Science, a certificate in Statistics and an MSc in Epidemiology from Université Laval, and a Ph.D. in Health Economics from City University in London, England.

CIRN

CANADIAN IMMUNIZATION RESEARCH NETWORK

Networks

AND THEIR PROJECTS

CANVAS CANADIAN NATIONAL VACCINE SAFETY MANAGEMENT COMMITTEE

WHAT IS CANVAS?

The Canadian National Vaccine Safety Network (CANVAS) assesses vaccine safety immediately after the implementation of vaccine campaigns. CANVAS researches the effects and effectiveness of vaccines on Canadians to assure safety in the research and administration of vaccines.

The Network comprises sites in Vancouver, Calgary, Toronto, Ottawa, Quebec City, Sherbrooke, and Halifax.

2017/18 AT A GLANCE

STUDIES	CO-INVESTIGATORS	STUDY LOCATIONS	PUBLICATIONS/ PRESENTATIONS
1	11	7	1

UPDATE FROM THE NETWORK LEAD
DR. JULIE BETTINGER

This year CANVAS initiated its tenth annual influenza vaccine safety surveillance campaign, with more than 47,000 participants providing safety data. Adults and parents of children vaccinated with the seasonal influenza vaccine participated in web-based active surveillance of vaccine safety by completing an online survey for health events occurring in the first 7-days after vaccination; participants who received the influenza vaccine in the previous year and participated in the study served as unvaccinated controls. Participants received an online survey 7-14 days before the start of the immunization campaign. CANVAS submitted weekly safety reports to the Public Health Agency of Canada (PHAC) from October to December 2019, with safety information on the following seven influenza vaccines captured: Flumist, Fluviral, Vaxigrip, Agriflu, Fluzone, Influvac, and Fluad. No unexpected side effects were observed in adults or children following the 2019 influenza vaccine campaign, although in both 2017 and 2018, higher rates of events were reported following seasonal influenza vaccination than in the pre-vaccination period. This signal was associated with several seasonal influenza vaccine products.

In addition to monitoring seasonal influenza vaccine safety, CANVAS continues to monitor vaccine safety for other and new vaccines (such as meningococcal B vaccine) and provides a platform for vaccine acceptability studies.

CO-INVESTIGATORS

Brenda Coleman
Mount Sinai Hospital

Gaston De Serres
Université Laval

Jennifer Isenor
Dalhousie University

Jim Kellner
University of Calgary

Anne McCarthy
Ottawa Hospital

Shelly McNeil
Dalhousie University

Matthew Muller
University of Toronto

Karina Top
Dalhousie University

Louis Valiquette
Université Sherbrooke

Otto Vanderkooi
University of Calgary

CTN CLINICAL TRIALS NETWORK

WHAT IS CTN?

The Clinical Trials Network (CTN) answers public health questions about immunization and vaccines by conducting randomized controlled clinical trials.

The network primarily focuses on research questions that are specific to Canada, addressing topics such as adverse events following immunization, immunogenicity, different dosing schedules/numbers of doses, and vaccine use in special populations.

CTN is the only infectious disease related vaccine clinical trial network in Canada,

2017/18 AT A GLANCE

STUDIES	CO-INVESTIGATORS	STUDY LOCATIONS	PUBLICATIONS/ PRESENTATIONS
6	52	9	5

CO-INVESTIGATORS

Joenel Alcantara
University of Calgary

Laura Arbour
University of Victoria

Julie Bettinger
University of British Columbia

Francois Boucher
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Susan Bowles
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Erin Brown
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Kristin Burnett
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Hugues Charest
Université de Montréal

Brenda Coleman
Mount Sinai Hospital

Curtis Cooper
University of Ottawa

Joe Cox
Université Laval

Mark Dionne
University of Winnipeg

Joanne Embree
University of Winnipeg

Soren Gantt
University of British Columbia

Rodica Gilca
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David Goldfarb
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Donna Halperin
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Scott Halperin
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Jia Hu
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Radha Jetty
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Jim Kellner
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Fawziah Lalji
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Mark Loeb
McMaster University

Cathy MacDonald
St. Francis Xavier University

Shelly McNeil
Dalhousie University

Amber Miners
University of Ottawa

UPDATE FROM THE NETWORK LEAD

DR. JOANNE LANGLEY

This year, Clinical Trials Network (CTN) aimed to increase clinical trial capacity in Canada to enhance readiness to respond to emerging infectious diseases, and to answer public health questions about immunization and vaccines by conducting randomized controlled clinical trials. Several CTN study activities have been ongoing, and updates are as follows:

- Study visits continued for "A randomized controlled trial to compare a 1-dose vs 2-dose priming schedule of 13-valent pneumococcal conjugate vaccine (PCV13) in Canadian infants", with an expected study completion date of September 2020.
- Study visits in "A randomized controlled trial to compare protection in adolescents between different meningococcal immunization schedules used in Canada" are ongoing.
- "A Multicenter Study of the Immunogenicity of Recombinant Vesicular Stomatitis Vaccine for Ebola-Zaire (rVSVΔG-ZEBOV-GP) for Pre-Exposure Prophylaxis (PREP) In Individuals at Potential Occupational Risk for Ebola Virus Exposure" continues to follow-up with participants, with some being randomized to boosters at 18 months post-primary vaccination.
- Data for "Impact of repeated vaccination against influenza on influenza antibody titres and laboratory-confirmed illness" led by Dr. Brenda Coleman was completed in June 2018, with the study outcomes demonstrating that repeated annual influenza vaccination does not impact vaccine effectiveness in adults.
- "Studies in support of a new vaccine to prevent invasive Haemophilus influenzae type a (Hia) disease in Canadian Indigenous communities" were completed at several of the study sites, while the work being done out of the Vaccine Evaluation Centre in BC and the University of Saskatchewan by both Dr. Manish Sadarangani and Dr. Ben Tan has been completed.
- In May 2019, CIRN funded "Burden Ethnographic Modeling Evaluation Qaujilisaaqtuq (BEMEQ) RSV", a multi-network study that will take place in Inuit communities in Nunavut.
- A study to assess the effectiveness of priming with MF59-adjuvanted influenza vaccine compared to quadrivalent inactivated vaccine in naïve infants completed its second year of enrolment. The planned last year of follow-up will occur in 2020-2021.

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Jesse Papenburg
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Michael Patterson
Chief Medical Officer of Health, Government of Nunavut

DaGuillaume Poliquin
Public Health Agency of Canada and University of Winnipeg

Caroline Quach
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Manish Sadarangani
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Kathryn Slayter
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Ben Tan
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Beth Taylor
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Nancy Waite
University of Waterloo

Brian Ward
McGill University

SOS SERIOUS OUTCOMES SURVEILLANCE NETWORK

WHAT IS SOS?

The Serious Outcomes Surveillance (SOS) Network is a hospital based surveillance network that collects information about adults who are admitted to hospital with influenza or pneumonia.

The SOS Network has become a core infrastructure in Canada's influenza surveillance program. The net provides real-time, regular reports to the Public Health Agency of Canada and the National Advisory Committee on Immunization to inform public health decision-making.

2017/18 AT A GLANCE

STUDIES	CO-INVESTIGATORS	STUDY LOCATIONS	PUBLICATIONS/ PRESENTATIONS
3	13	11	7

UPDATE FROM THE NETWORK LEADS

DR. MELISSA ANDREW & DR. SHELLY MCNEIL

The Serious Outcomes Surveillance Network (SOS) continues to demonstrate the importance of vaccines as a key part of an overall strategy for healthy aging and leads the field in the study of the impact of frailty and how frailty is used to measure the effectiveness of vaccines. SOS data has demonstrated that 15% of people 65 years of age and older admitted to the hospitals with influenza do not get back to their usual baseline of activity and may never get that function back. For the 2019-20 influenza season, surveillance of influenza vaccine effectiveness was funded through an external contract with Public Works Canada via PHAC. This year, SOS conducted active surveillance for laboratory-confirmed influenza among adults hospitalized in participating Network hospitals and provided weekly epidemiologic data on cases to PHAC for inclusion in FluWatch, Canada's weekly influenza surveillance report.

In April 2020, SOS expanded its mandate and began to report cases of COVID-19 admitted to Canadian Hospitals through a directed grant from PHAC/Canadian Institutes of Health Research (CIHR) entitled "Sentinel surveillance, viral shedding, clinical characteristics and outcomes of confirmed and suspected hospitalized cases of COVID-19/SARS-CoV-2 infection in the Canadian Immunization Research Network (CIRN) Serious Outcomes Surveillance Network". Two additional sites were added to the network this season to expand geographic coverage, and SOS research continued to focus on hospitalized COVID-19 cases and influenza burden of disease as well as interim/end of season Influenza vaccine effectiveness. Adult patients who are admitted to SOS Network hospitals with suspected COVID-19 illness will be tested for the novel coronavirus as part of their usual care. Patients with confirmed COVID-19 will be enrolled in the surveillance study, meaning that key data about their health will be collected, such as age, sex, chronic conditions, frailty and COVID-19 risk factors, such as travel and contact history. Their health outcomes will be tracked, including the need for treatments such as oxygen therapy, breathing tubes, admission to Intensive Care Units and survival. A subset of patients will be invited to volunteer for repeated swab testing during the course of their illness to help understand how long people are potentially infectious.

In the next year, the work of SOS will help inform PHAC and the scientific community about COVID-19 in Canada and contribute to global efforts to manage this pandemic. The network's collaboration with the Global Influenza Hospital Surveillance Network (GIHSN) will also be maintained as the SOS Network continues to contribute Canadian data in an effort to calculate global vaccine effectiveness estimates.

CO-INVESTIGATORS

Guy Boivin
Université Laval

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Dalhousie University

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Dalhousie University

Kevin Katz
University of Toronto

Jason Leblanc
Dalhousie University

Mark Loeb
McMaster University

Anne McCarthy
The Ottawa Hospital Research Institute

Janet McElhaney
Northern Ontario School of Medicine

Allison McGeer
University of Toronto

Sunita Mulpuru
University of Ottawa

Loius Valiquette
Université Sherbrooke

SIC SPECIAL IMMUNIZATION CLINIC NETWORK

WHAT IS SIC?

The Special Immunization Clinic (SIC) Network aims to improve the assessment and management of patients with medically challenging adverse events following immunization (AEFIs) and underlying medical conditions that may complicate immunization.

SIC conducts standardized assessments of patients with previous AEFIs and underlying medical conditions, and assesses the risk of AEFI recurrence following revaccination.

SIC evaluates vaccine safety, immunogenicity and coverage in immunocompromised patients across six provinces.

SIC has built a national registry of patients assessed in the clinics and their outcomes after vaccination.

2017/18 AT A GLANCE

STUDIES	CO-INVESTIGATORS	STUDY LOCATIONS	PUBLICATIONS/ PRESENTATIONS
4	44	11	6

CO-INVESTIGATORS

Zainab Abdurrahman
McMaster's University

Adelle Atkinson
The Hospital for Sick Children

Julie Bettinger
University of British Columbia

Tom Blydt-Hansen
University of British Columbia

Francois Boucher
Université Laval

Catherine Burton
University of Alberta

Rupesh Chawla
University of Calgary

Cora Constantinescu
University of Calgary

Shelley Deeks
Public Health Ontario

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Jean Philippe Drolet
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Susan Gilmour
University of Alberta

Scott Halperin
Dalhousie University

Kyla Hildebrand
University of British Columbia

Simon Hotte
Children's Hospital of Eastern Ontario

Gina Lacuesta
IWK Health Center

Sasson Lavi
The Hospital for Sick Children

Athena McConnell
University of Saskatchewan

Shelly McNeil
Dalhousie University

Shaun Morris
Hospital for Sick Children

UPDATE FROM THE NETWORK LEAD

DR. KARINA TOP

This year the Special Immunization Clinics (SIC) Network continued with its primary focus in 6 provinces on the revaccination of individuals who have experienced adverse events following immunization (AEFI), as well as those with medical conditions that may affect their immunizations. Updates on the networks various projects are as follows:

- "Immunizing patients with prior adverse events following immunization and potential contraindications to immunization", is an ongoing study and results to date indicate that the risk of a recurrence of the adverse event is low in most patients and that such recurrences are generally milder than the first event. Patients with AEFI continue to be referred to the clinics, and two analyses of outcomes of patients evaluated for AEFIs from 2013-2018, including a detailed analysis of patients with allergic-like adverse events, are ongoing with presentations and publications planned in 2020-21. A pilot analysis of the safety of rotavirus vaccine in infants exposed to biologic monoclonal antibodies in utero among infants assessed at the Calgary SIC is ongoing and an abstract was submitted for presentation in late 2020.
- "Vaccinating children after chemotherapy for acute lymphoblastic leukemia (ALL)" was completed in 2019 and published in Clinical Infectious Diseases in 2020.
- The analysis for the "Immunization practices in children with primary immune deficiencies (PID)" study has been completed and a manuscript is in preparation.
- In May 2019, the network's study proposal for "Optimizing Varicella Immunization in Children with Solid Organ Transplant to Prevent Disease and Improve Long-Term Health" was awarded funding through both CIRN and the Canadian Donation and Transplant Research Program Innovation Grant. This study is evaluating the implementation of a new guideline for live varicella vaccination in solid organ transplant recipients through qualitative interviews with healthcare providers and parents, and an observational study of varicella vaccine safety and immunogenicity. Healthcare provider and parent interviews are ongoing. Enrollment of patients for vaccination was put on hold during the COVID19 pandemic and is expected to resume in fall 2020.

Vicky Ng
University of Toronto

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McGill University

Anthony Otley
Dalhousie University

Jeffrey Pernica
McMaster University

Anne Pham-Huy
University of Ottawa

Marie-Noëlle Primeau
Montreal Children's Hospital

Earl Rubin
McGill University

Manish Sadarangani
University of British Columbia

Alberto Severini
University of Manitoba

Sneha Suresh
University of Alberta

Bruce Tapiéro
CHU Sainte-Justine

James Tee
Dalhousie University

Chia Wei Teoh
Hospital for Sick Children

Wendy Vaudry
University of Alberta

Yarden Yanishevsky
University of Alberta

Joseline Zafac
Université Laval

Parent Partners:
Elaine Yong, Founder of The Addison Fund

Collaborators:
Upton Allen, MD
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University of Toronto

SSHN SOCIAL SCIENCES & HUMANITIES NETWORK

WHAT IS SSHN?

SSHN projects focus on vaccine acceptance and vaccine hesitancy. The network's goal is to generate evidence and approaches that will enable vaccination programs, and support healthcare providers and policy decision-makers.

The Social Sciences and Humanities Network (SSHN) is a multidisciplinary network of social scientists and humanities researchers across Canada who examine the ethical, legal, and social implications of vaccine programs.

2017/18 AT A GLANCE

STUDIES	CO-INVESTIGATORS	STUDY LOCATIONS	PUBLICATIONS/ PRESENTATIONS
4	44	7	7

CO-INVESTIGATORS

Erin Bentley
Health PEI

Julie Bettinger
University of British Columbia

Melisa Boland
Nova Scotia Health Authority

Andrea Bunt
University of Manitoba

Eliana Castillo
University of Calgary

Jeannette Comeau
Dalhousie University

Kim Corace
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Natasha Crowcroft
Public Health Ontario

Shelley Deeks
Public Health Ontario

Michelle Driedger
University of Manitoba

Vinita Dubey
AMOH Toronto Public Health

William Fisher
University of Western Ontario

Arnaud Gagneur
Université de Sherbrooke

Janice Graham
Dalhousie University

Joshua Greenberg
Carleton University

Devon Greyson
University of British Columbia

Maryse Guay
Université de Sherbrooke

Juliet Guichon
University of Calgary

Donna Halperin
St. Francis Xavier University

Scott Halperin
Dalhousie University

UPDATE FROM THE NETWORK LEAD

DR. EVE DUBÉ

The multidisciplinary SSHN network addresses societal issues in all proposed projects and serves as a hub for social science and humanities-focused research generated by CIRN. Updates on the networks various projects are as follows:

• "Addressing Vaccine Hesitancy: Pan-Canadian validation of an effective strategy" and "Developing and evaluating public health messages to address vaccine hesitancy" (led by Drs. Arnaud Gagneur and Michelle Driedger) is currently in the analysis phase, with manuscript preparation underway.

- "Identifying effective communication materials to enhance vaccine acceptance" (Dr. Eve Dubé) will be wrapping up in late fall, with a content analysis of existing Canadian vaccination materials targeting childhood vaccines already completed.
- Phase 1 of "Determinants of HPV vaccine uptake in school-based programs in Canada" has been completed. It included an environmental scan to gain an overview of the HPV vaccination program. Phase 2 of the study, which involves conducting individual/group interviews in person or via telephone with decision-makers and public health experts at local or regional levels, immunization managers and school principals at local levels, and schools nurses, teachers and parents, and students (if 12 years or older), is currently in the analysis phase with manuscript preparation underway.
- "Unpacking Vaccine Hesitancy among Perinatal Healthcare Providers: Influences on Beliefs and Practices" is a 3 phase qualitative study that aims to understand the knowledge, attitudes, beliefs, and behaviors (KABB) of maternity care providers around immunization in pregnant women. Interviews have been conducted in British Columbia, Manitoba, Ontario, Québec, Alberta, and Nova Scotia.
- The network is also participating in the newly funded BEMEQ project, which is a multi-disciplinary study that will have SSHN researchers exploring KABB and structural/contextual barriers related to childhood vaccination and RSV prevention in Inuit communities in Nunavik and Nunavut (more on this in Sec 5 below). Protocol development is completed and ethics approval is in process.
- Additionally, "A multifaceted evaluation of provincial maternal Tdap immunization programs" is another newly funded study, which will make use of the SSHN expertise and team members. This project will strive to inform the implementation of Tdap programs by evaluating demand-side and access side components.

Jennifer Isenor
Dalhousie University

Cindy Jardine
University of Alberta

Kevin Katz
University of Toronto

Joanne Langley
Dalhousie University

Noni MacDonald
Dalhousie University

Shannon MacDonald
University of Alberta

Allison McGeer
University of Toronto

Samantha Meyer
University of Waterloo

Monika Naus
BC Centre for Disease Control

Gina Ogilvie
University of British Columbia

Jennifer Potter
University of Manitoba

Caroline Quach
CHU Sainte-Justine

Lisa Robinson
University of Toronto

Margaret Russell
University of Calgary

Deana Sabuda
Alberta Health Services

Manish Sadarangani
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Chantal Sauvageau
Université Laval

Karina Top
Dalhousie University

Dat Tran
University of Toronto

Jordan Tustin
Ryerson University

Holly Witteman
Université Laval

RLN REFERENCE LABORATORY NETWORK

WHAT IS RLN?

The Reference Laboratory Network (RLN), is comprised of a group of provincial Public Health laboratories, the National Microbiology Laboratory, and various academic research laboratories. As a network, RLN collects and manages the archive of material collected in CIRN studies, retaining sera and other biological material for future studies. RLN focuses on studies of population immunity to vaccine-preventable diseases, as well as supporting laboratory testing for studies led by other networks (notably providing influenza testing for several ongoing or completed studies for members of CIRN and the SOS Network surveillance studies). The network has built a national infrastructure to conduct research studies, with additional capacity to conduct responsive research or laboratory testing during a public health emergency.

2017/18 AT A GLANCE

STUDIES	CO-INVESTIGATORS	STUDY LOCATIONS	PUBLICATIONS/ PRESENTATIONS
8	16	4	4

UPDATE FROM THE NETWORK LEADS

DR. SHELLY BOLOTIN & DR. TODD HATCHETTE

CIRN's Reference Laboratory Network (RLN) continues to focus on studies of population immunity to vaccine-preventable diseases, as well as support laboratory testing for studies led by other networks. The network will soon begin work on the study "Is Ontario prepared for the return of Measles?" which will evaluate whether population immunity in Ontario is sufficient to avoid large outbreaks, and to predict when waning immunity may become a risk to measles control. In addition, the network will begin to provide support to the newly funded SIC network study, "Optimizing varicella immunization in children with solid organ transplants to prevent disease and improve long-term health" by performing the varicella serology as well as the varicella-zoster virus (VZV) genotyping. Previous RLN study activities, including studies relating to population immunity to varicella and mumps, are ongoing. In addition to carrying out various research endeavors, RLN members hosted an international workshop funded through CIRN, CIHR, and CAIRE on sero-epidemiology as part of the CIRN Annual General Meeting in November 2019. The RLN network remains focused on expanding the ability to perform sero-epidemiology studies to include new methods, data sources, and disease targets. The network is also focused on promoting inclusion into the RLN of investigators from other CIRN networks, particularly those who are directly involved in laboratory testing.

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ModERN MODELING AND ECONOMICS RESEARCH NETWORK

WHAT IS ModERN?

The Modeling and Economics Research Network (ModERN) continues to focus on conducting epidemiological analyses, mathematical modeling, and economic analyses to study the cost-effectiveness and population-level effectiveness of public health interventions. ModERN continues to work towards its goal of building modeling capacity in an effort to help inform immunization policy decisions in Canada.

2017/18 AT A GLANCE

STUDIES	CO-INVESTIGATORS	STUDY LOCATIONS
2	25	2

UPDATE FROM THE NETWORK LEAD

DR. MARC BRISSON

As ModERN continues to work toward its goal of building modeling capacity in an effort to help inform immunization policy decisions in Canada, here are a number of network updates from this year:

- The analyses of the CIRN year 1 project, "Measuring social and sexual contact patterns in Canada to improve the control and prevention of infectious diseases," with more than 5,000 participants in Canada, was completed. The results were partly presented in reports published by the Institut national de santé publique du Québec (INSPQ) and have been used by Quebec public health to guide social distancing recommendations during the COVID-19 pandemic. Two supplementary phase of CONNECT will be undertaken with external funding to document the impact of lockdown and social distancing measures on social contacts. The results of connect have been touched upon in the Quebec media, and two manuscripts are in preparation.
- The development and calibration of the model for "Effectiveness of interventions to control pertussis using agent-based modeling" has been completed. The main experiment testing vaccine interventions have been coded into the model with an expected study completion date of summer 2020. Several presentations and publications relating to the two aforementioned studies are currently being prepared.
- A new network study, being led by Dr. Shannon MacDonald of the University of Alberta, was funded in May of 2019, entitled "Using dynamic transmission and economic modeling to inform RSV immunization policy". This project is in its final stage, with the RSV model developed and calibrated with and without vaccination and the health economic parameters currently being added into the model. Different vaccination simulations will be running in the coming weeks. Two papers are in preparation and one Post-doctoral fellow is working on this project (Dr. Ellen Rafferty).
- The CTN-driven project "Burden Ethnographic Modeling Evaluation Qaujilisaaqtuq (BEMEQ) RSV" will utilize expertise from within ModERN by using modeling and simulations to evaluate the potential impact of RSV preventive interventions on the disease burden in infants in Nunavut and the cost-effectiveness of these strategies. Protocol development for this study is currently underway

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PCN PROVINCIAL COLLABORATIVE NETWORK

WHAT IS PCN?

The Provincial Collaborative Network (PCN) brings together leading researchers from multiple provincial governments, public health agencies, and research institutes to conduct a wide range of public health-relevant research and evaluation. PCN studies characteristically do not involve collecting information directly from people or clinical studies, but rather bring together a range of existing types of large-scale data to answer important questions efficiently and effectively. These studies increase the evidence base to inform immunization strategies and programs in Canada and beyond.

2017/18 AT A GLANCE

STUDIES	CO-INVESTIGATORS	STUDY LOCATIONS	PUBLICATIONS/ PRESENTATIONS
8	88	5	12

UPDATE FROM THE NETWORK LEADS

DR. NATASHA CROWCROFT & DR. JEFF KWONG

The CIRN Provincial Collaborative Network (PCN) brings together leading researchers from multiple provincial governments, public health agencies, and research institutes to conduct a wide range of public health-relevant research and evaluation. The PCN studies characteristically do not involve collecting information directly from people or clinical studies, but instead, typically bring together a range of existing types of large-scale data to answer important questions very efficiently and effectively. These studies increase the evidence base to inform immunization strategies and programs in Canada and beyond.

PCN goals for 2019-2020 included continuing to seek opportunities for partnerships, such as the Institute for Clinical Evaluative Sciences (ICES), the Vector Institute, Alberta Health, PopDataBC, and the newly launched Centre for Vaccine Preventable Diseases at the University of Toronto. The network also accessed multi-provincial data through the new CIHR-funded Strategy for Patient-Oriented Research (SPOR) Canadian data platform and explored how it could mobilize the knowledge generated by PCN studies to maximize their impact on health outcomes.

This past May, two new PCN studies were funded: “Effectiveness of influenza vaccination during pregnancy on laboratory-confirmed seasonal influenza among infants under 6 months of age” and “The benefits of pneumococcal immunization programs for preventing invasive pneumococcal disease (IPD), acute otitis media (AOM), community-acquired pneumonia (CAP) in British Columbia and Ontario.” The infant flu study will evaluate the effectiveness of maternal seasonal influenza vaccination during pregnancy on laboratory-confirmed influenza outcomes among infants aged <6 months, while the pneumococcal immunization programs study aims to strengthen policy-relevant evidence on the prevention of pneumococcal disease in order to optimize decision-making. Investigators on the pneumococcal project are also part of a separate study looking at the benefit of pneumococcal vaccination for seniors, which will offer the opportunity to leverage resources and find synergies to elevate each project. Project initiation activities such as data access requests and contract drafting for both studies are underway.

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CIRN TRAINNEE SCHOLARSHIP PROGRAM

ABOUT

The CIRN Training and Education Committee (TEC) was formed in September 2017 to update the CIRN Trainee program and launch the 2018 CIRN Trainee Scholarship competition. The Management Committee allocated $200,000 over a two-year period for scholarships to support graduate students and postdoctoral fellows and tasked the TEC with the responsibility of conducting an open, peer-reviewed competition. In June 2018, the TEC received 19 trainee applications for its inaugural intake, which included 1 Master's, 14 PhDs, and 4 Post-doctoral applicants. The scholarship review committee consisted of five reviewers (three from the TEC and two CIRN investigators), with applications reviewed and ranked based on CIHR criteria. A total of nine trainees were funded. As part of their funding requirement, mandatory participation in the CIRN Trainee Curriculum is expected, as well as participation in the monthly trainee-focused seminars on core topics of vaccinology.

2019/20 UPDATES

As all available funds were allocated in the 2018 funding competition, no competition was held in 2019-20. However, the TEC reviewed applications from trainees funded through CIRN project budgets for the appropriateness of the training program and suitability of the candidate. Progress reports of trainees funded through CIRN scholarships in 2018 were also reviewed this year and approved for a second year of funding.

In November 2019, the CIRN Network AGM dedicated a portion of its meeting program to highlight the work of trainees (both CIRN scholarship funded and other non-CIRN funded trainees) through poster sessions and a three-minute thesis competition.

In the first quarter of 2020, TEC also reviewed and updated the CIRN trainee scholarship application forms and SOPs in preparation for the 2020 CIRN trainee scholarship competition. A call that was ultimately delayed until May 1, 2020, due to the COVID-19 pandemic. Another round of CIRN TEC trainee applications will be accepted in June 2020.

CIRN will continue to encourage the development of Canada's future vaccine researchers and place training and mentoring high on the list of network priorities and initiatives.

FINANCIAL REPORT

Term of the PHAC/CIHR Grant Funding: April 2009 - March 2020

PHAC/CIHR Grant to 2018:
PCIRN $18,428,728 | CIRN $11,616,345.16 | CIRN II $6,233,334

Total PHAC/CIHR Grant to 2020 $36,278,407

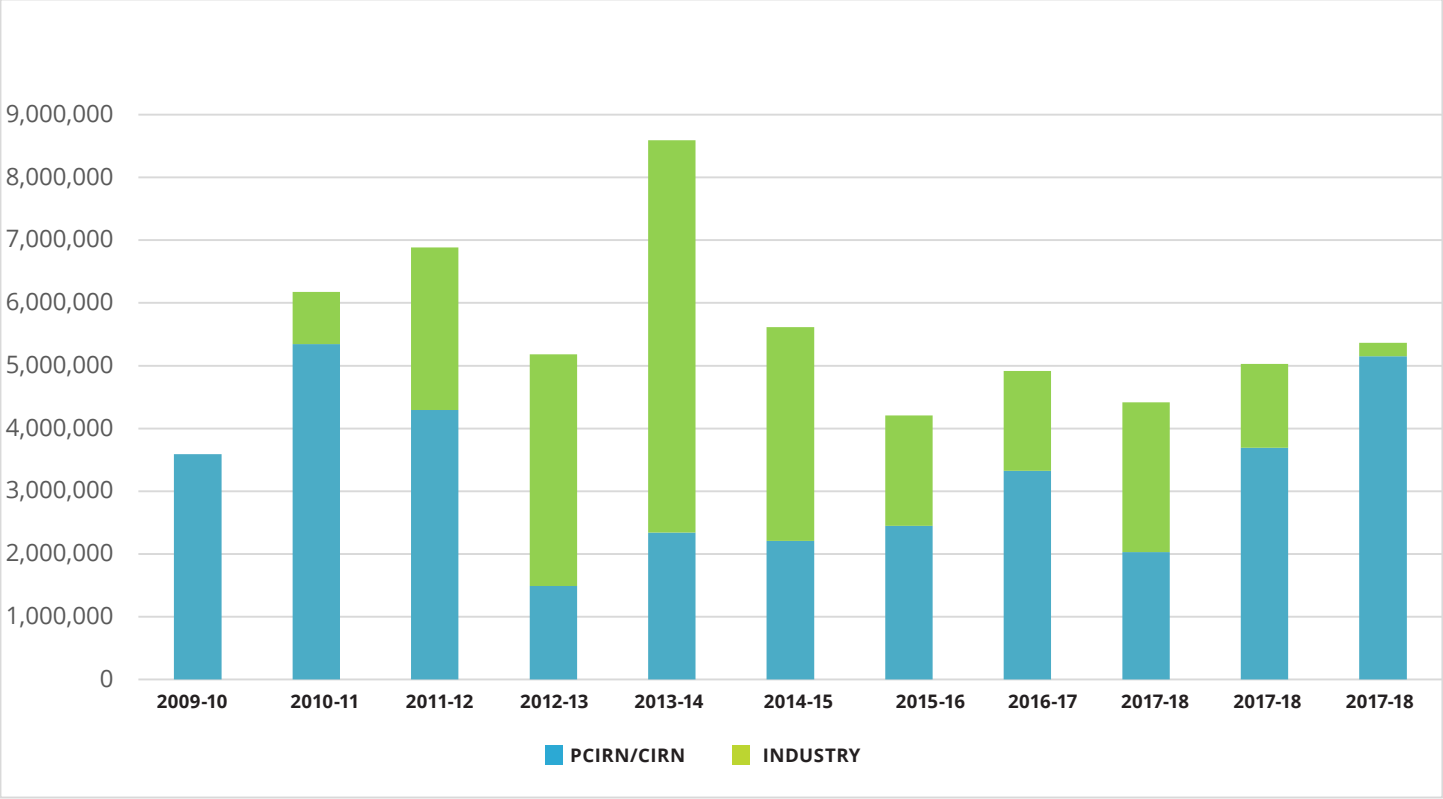
Industry funding assigned to research studies 2009 - 2020: $24,058,469

Total number of network research studies funded 2009 - 2020: 79

Total number of participating investigators & contributors to date: 200+

Total number of participating institutions and organizations to date: 40

TOTAL NETWORK FUNDING TO MARCH 31, 2020 **$60 MILLION**



LIST OF PUBLICATIONS, ABSTRACTS AND PRESENTATIONS

2019-2020

CIRN uses an integrated approach to disseminating knowledge as well as training. The network provides a highly collaborative, team-oriented framework for delivering research impact.

CANADIAN NATIONAL VACCINE SAFETY NETWORK

- Ahmed MA, Naus M, Singer J, Valiquette L, Coleman BL, De Serres G, et al. Investigating the association of receipt of seasonal influenza vaccine with occurrence of anesthesia/paresthesia and severe headaches, Canada 2012/13-2016/17, the Canadian Vaccine Safety Network. Vaccine. 2020 Apr 23;38(19):3582-90.

CLINICAL TRIALS NETWORK

- Cerqueira A, Byce S, Tsang RSW, Jamieson FB, Kus JV, Ulanova M. Continuing surveillance of invasive Haemophilus influenzae disease in northwestern Ontario emphasizes the importance of serotype a and non-typeable strains as causes of serious disease: a Canadian Immunization Research Network (CIRN) Study. Can J Microbiol. 2019 Nov;65(11):805-13.

- Gaultier GN, McCready W, Ulanova M. Natural immunity against Haemophilus influenzae type a and B-cell subpopulations in adult patients with severe chronic kidney disease. Vaccine. 2019 Jun 19;37(28):3677-84.

- Isenor, J. E., Kervin, M. S., Halperin, D. M., Langley, J., Bettinger, J. A., Top, K. A.,et al. Pharmacists as immunizers to Improve coverage and provider/recipient satisfaction: A prospective, Controlled Community Embedded Study with vaccineS with low coverage rates (the Improve ACCESS Study): Study summary and anticipated significance. Canadian Pharmacists Journal. 2020; 153(2): 88–94. https://doi.org/10.1177/1715163519900221

- Kubinec C, Kelly L, Byce S, Tsang R SW, Ulanova M. Invasive Haemophilus influenzae disease in Northwestern Ontario First Nations communities: Case Series. International Journal of Case Reports. 2020: 4(140).

- Langley J M, Gantt S, Quach C, Bettinger J A, Halperin S A, Mutch J, et al. Randomized trial of 2 schedules of meningococcal B vaccine in adolescents and young adults, Canada. Emerging Infectious Diseases. 2020: 26(3): 454–462. https://doi.org/10.3201/eid2603.190160

PROVINCIAL COLLABORATIVE NETWORK

- Bell CA, Russell ML, Drews SJ, Simmonds KA, Svenson LW, Schwartz KL, et al. Acellular pertussis vaccine effectiveness and waning immunity in Alberta, Canada: 2010-2015, a Canadian Immunization Research Network (CIRN) study. Vaccine. 2019 Jul 9;37(30):4140-6.

- Bolotin S, Johnson C, Quach S, Ambrose A, DeCoutere S, Deeks SL, et al. Case-control study of household contacts to examine immunological protection from Bordetella pertussis transmission - study protocol. CMAJ Open. 2017 Dec 19;5(4):E872-7.

- Burchell et al. Anal HPV prevalence soon after implementation of publicly funded vaccine for gay, bisexual and other men who have sex with men: A CIRN Study. Presented at: The Canadian Immunization Research Network (CIRN) Annual General Meeting; 2019 Nov 19; Toronto, ON, Canada.

- Chambers, et al. Vaccine protection against prevalent anal HPV infection among young men who have sex with men: a Canadian Immunization Research Network-funded study. Presented at: The Canadian Immunization Research Network (CIRN) Annual General Meeting; 2019 Nov 20; Toronto, ON, Canada.

- Crowcroft N, et al. Pertussis vaccine effectiveness in a frequency matched population-based case-control Canadian Immunization Research Network study in Ontario, Canada 2009-2015. Presented at: The Ontario Public Health Convention (TOPHC) 2019; March 27-29, 19; Toronto, ON, Canada.

- Crowcroft N, et al. The challenges of assessing pertussis vaccine effectiveness in the field: A Canadian Immunization Research Network Study. Presented on: 12th International Symposium; April 9-12, 19; Bordetella, Brussels, Belgium.

- Grewal R, et al. HPV vaccination across a cascade of knowledge, willingness and uptake in gay, bisexual, and other men who have sex with men (gbMSM) in Canada: a Canadian Immunization Research Network-funded study. Presented at: The Canadian Immunization Research Network (CIRN) Annual General Meeting; 2019 Nov 20; Toronto, ON, Canada.

- Grewal R, et al. Barriers to HPV vaccination among gay, bisexual, and other men who have sex with men (gbMSM) in Canada: A CIRN Study. Poster presented at: The STI & HIV 2019 World Congress Joint Meeting. 2019 July 14; Vancouver, BC, Canada.

- Grewal R, et al. Healthcare engagement and HPV vaccination among gay, bisexual, and other men who have sex with men (gbMSM): A CIRN study. Poster presented at: The STI & HIV 2019 World Congress Joint Meeting.; 2019 Jul 14; Vancouver, BC, Canada.

- Kwong JC, Chung H, Jung JK, Buchan SA, Campigotto A, Campitelli MA, et al. The impact of repeated vaccination using 10-year vaccination history on protection against influenza in older adults: a test-negative design study across the 2010/11 to 2015/16 influenza seasons in Ontario, Canada. Euro Surveill. 2020 Jan;25(1):1900245. doi: 10.2807/1560,7917.ES.2020.25.1.1900245.

- Mah et al. Factors associated with valid self-collected anal swabs for HPV genotyping in gay, bisexual and other men who have sex with men: A CIRN study. Presented at: The Canadian Immunization Research Network (CIRN) Annual General Meeting; 2019 Nov 20; Toronto, ON, Canada.

- Wilkinson K, Righolt CH, Kwong JC, Schwartz KL, Russell ML, Crowcroft NS, et al. A nested case-control study measuring pertussis vaccine effectiveness and duration of protection in Manitoba, Canada, 1992-2015: A Canadian Immunization Research Network Study. Vaccine. 2019 Nov 15;37(48):7132-7.

REFERENCE LABORATORY NETWORK

- Bolotin S. Waning Immunity in the era of measles elimination – is there cause for concern? Presented at: University of Toronto Vaccines Sciences Symposium. 2019, May 16. Toronto, ON, Canada.

- Bolotin S. Waning Immunity in the era of measles elimination – is there cause for concern? Presented at: PHACtually Speaking (National PHAC rounds); 2019, June 20.

- Bolotin S, Severini A, Hatchette T, McLachlan E, Savage R, Hughes SL, et al. Assessment of population immunity to measles in Ontario, Canada: a Canadian Immunization Research Network (CIRN) study. Hum Vaccin Immunother. 2019;15(12):2856-64.

- McLachlan E, Scholz H, Bolotin S, Crowcroft NS, Hatchette TF, Jackson C, et al. Calibration and evaluation of quantitative antibody titers for varicella-zoster virus using the BioPlex 2200. J Clin Microbiol. 2019 Jun 5. pii: JCM.00296-19. doi: 10.1128/JCM.00296-19.

SERIOUS OUTCOMES SURVEILLANCE NETWORK

- Andrew MK, McElhaney JE, McGeer AA, Hatchette TF, Leblanc J, Webster D, et al. Influenza surveillance case definitions miss a substantial proportion of older adults hospitalized with laboratory-confirmed influenza: A report from the Canadian Immunization Research Network (CIRN) Serious Outcomes Surveillance (SOS) Network. Infect Control Hosp Epidemiol. Epub: 2020 Mar 9;41(5):499-504.

- Baselga-Moreno V, Trushakova S, McNeil S, Sominina A, Nunes MC, Draganescu A, et al. Influenza epidemiology and influenza vaccine effectiveness during the 2016-2017 season in the Global Influenza Hospital Surveillance Network (GIHSN). BMC Public Health. 2019 May 2;19(1):487,019-6713-5.

- Godin J, Theou O, Black K, McNeil SA, Andrew MK. Long-Term Care Admissions Following Hospitalization: The Role of Social Vulnerability. Healthcare (Basel). 2019 Jul 15;7(3):91. doi: 10.3390/healthcare7030091.

- LeBlanc JJ, ElSherif M, Mulpuru S, Warhuus M, Ambrose A, Andrew M, et al. Validation of the Seegene RV15 multiplex PCR for the detection of influenza A subtypes and influenza B lineages during national influenza surveillance in hospitalized adults. J Med Microbiol. 2020 Feb;69(2):256-64.

- LeBlanc J, ElSherif M, Ye L, MacKinnon-Cameron D, Ambrose A, Hatchette TF, et al. Age-stratified burden of pneumococcal community acquired pneumonia in hospitalised Canadian adults from 2010 to 2015. BMJ Open Respir Res. 2020 Mar;7(1):e000550. doi: 10.1136/bmjresp,2019-000550.

- Mulpuru S, Li L, Ye L, Hatchette T, Andrew MK, Ambrose A, et al. Effectiveness of Influenza Vaccination on Hospitalizations and Risk Factors for Severe Outcomes in Hospitalized Patients With COPD. Chest. 2019 Jan;155(1):69-78.

- Nichols MK, Andrew MK, Ye L, Hatchette TF, Ambrose A, Boivin G, et al. The Impact of Prior Season Vaccination on Subsequent Influenza Vaccine Effectiveness to Prevent Influenza-related Hospitalizations Over 4 Influenza Seasons in Canada. Clin Infect Dis. 2019 Aug 30;69(6):970-9.

SOCIAL SCIENCES & HUMANITIES NETWORK

- Mijovic H, Greyson D, Bettinger JA. Are primary healthcare providers in British Columbia able to recommend and provide pertussis vaccine in every pregnancy? Presented at: University of British Columbia and Perinatal Services BC - Healthy Mothers and Healthy Babies Conference; 2020 Feb; Vancouver, Canada.

- Lively J, Mijovic H, Greyson D, Gemmell E, Dubé E, MacDonald S, et al. Should conversations about infant vaccines begin in pregnancy? Findings from a qualitative study among Canadian primary healthcare providers. Poster presented at: University of British Columbia and Perinatal Services BC - Healthy Mothers and Healthy Babies Conference; 2020 Feb; Vancouver, Canada.

- Mijovic H, Greyson D, Gemmell E, Vivion M, Trottier ME, Dube E, et al. The impact of Canada's fragmented healthcare model on pertussis vaccination in pregnancy: a qualitative study of perinatal healthcare providers. Poster Presented at: The Canadian Immunization Research Network (CIRN) Annual General Meeting; 2019 Nov 20-21; Toronto, ON, Canada.

- Lively J, Mijovic H, Greyson D, Gemmell E, Dubé E, MacDonald S, et al. Should conversations about infant vaccines begin in pregnancy? Findings from a qualitative study among Canadian primary healthcare providers. Poster presented at: The Canadian Immunization Research Network (CIRN) Annual General Meeting; 2019 Nov 20-21; Toronto, ON, Canada.

- Mijovic H, Greyson D, Bettinger JA. Are primary healthcare providers in British Columbia able to recommend and provide pertussis vaccine in every pregnancy? Poster presented at: International Qualitative Health Research Conference; 2019 Oct 25-29; Vancouver, Canada.

- Mijovic H, Greyson D, Gemmell, E, Vivion M, Dubé E, Graham JE, et al. Canadian healthcare providers' experiences with recommending and providing pertussis vaccine during pregnancy. Poster presented at: 5th International Neonatal & Maternal Immunization Symposium; 2019 Sept 15-17; Vancouver, Canada.

- Pringle W, Greyson D, Mijović H, Dubé E, Graham JE, Russell, M., et al. Challenges and opportunities in promoting vaccine confidence among registered midwives and clients. Poster presented at: The Canadian Immunization Research Network (CIRN) Annual General Meeting; 2019 Nov 20-21; Toronto, ON, Canada.

SPECIAL IMMUNIZATION CLINIC NETWORK

- Top KA. Managing patients with adverse events following immunization in the Special Immunization Clinic Network [webinar]. Presented at: Public Health Ontario Grand Grounds; 2019 Feb 5; Toronto, ON, Canada.

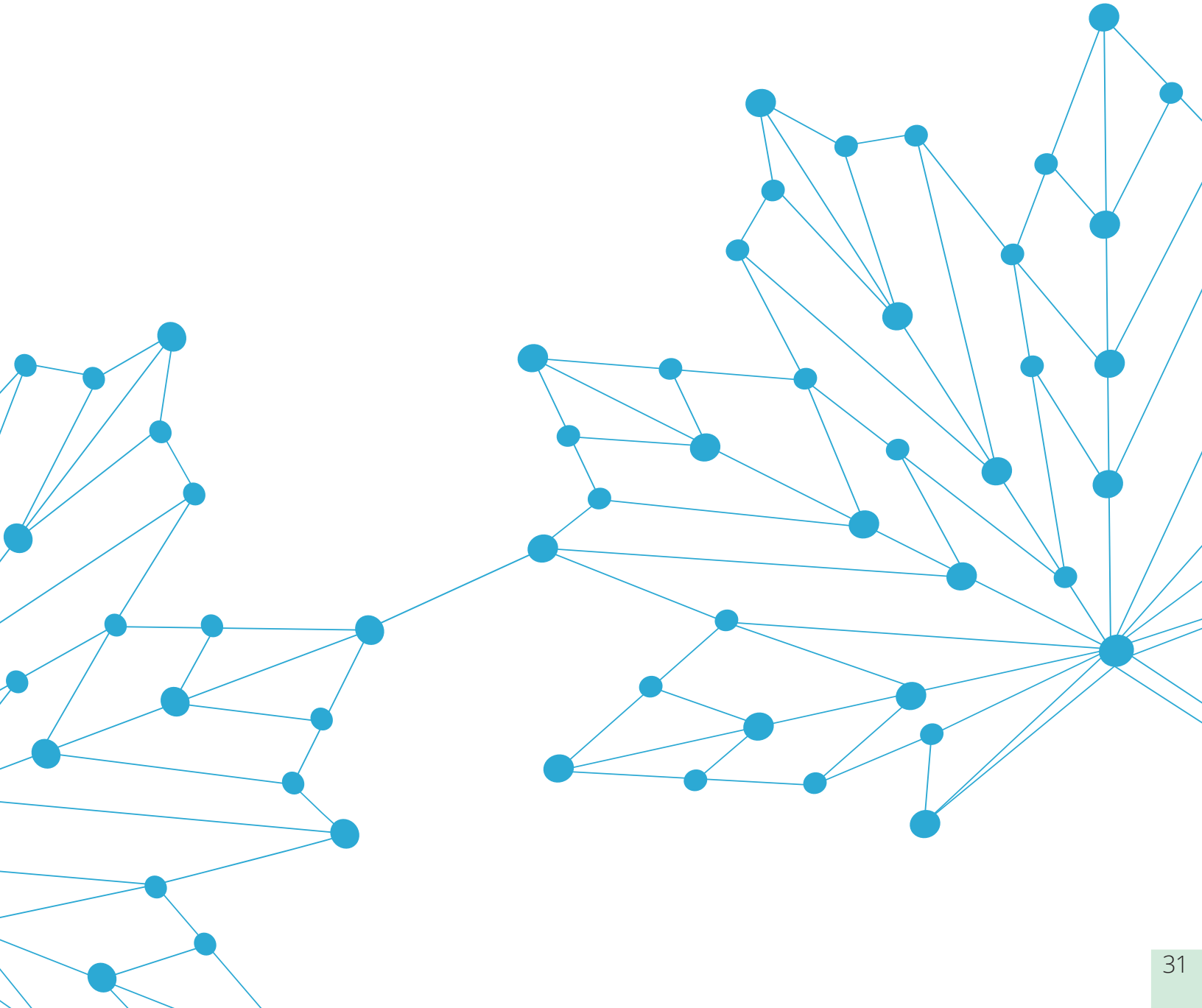
- Top KA. Managing patients with adverse events following immunization in the Special Immunization Clinic Network [webinar]. Invited presention at: Canvax webinar; 2019 Feb 11; Halifax, NS, Canada.

- Top KA. Special Immunization Clinic Network: Update on managing adverse events following immunization. Presented at: Western Canada Immunization Forum; 5 March 2019; Vancouver, BC, Canada.

- Top KA. Waning immunity and vaccine responses among children who completed chemotherapy for acute lymphoblastic leukemia. Presented at: Vaccine Evaluation Centre & Vaccines, Infections and Host Defense Academic Rounds, BC Children's Research Institute; 4 March 2019; Vancouver, BC, Canada.

- Top KA, Tapiero B, Pham-Huy A, Pernica JM, Vaudry W, Price V, et al. Evaluation of diphtheria-tetanus-acellular pertussis-polio-Haemophilus influenzae type b in children who completed chemotherapy for acute lymphoblastic leukemia: A Canadian Immunization Research Network Study. E-poster session presented at: European Society of Pediatric Infectious Diseases 2019; 9 May 2019; Ljubljana, Slovenia.

- Top KA, Tapiero B, Pham-Huy A, Pernica JM, Vaudry W, Morris SK, et al. Waning immunity against Streptococcus pneumoniae, pertussis, and tetanus in children treated for acute lymphoblastic leukemia: A Canadian Immunization Research Network Study. Presented at: European Society of Pediatric Infectious Diseases 2019; 9 May 2019; Ljubljana, Slovenia.



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