

Surveillance Advances
Progrès dans le domaine de la surveillance

The Canadian Immunization Monitoring Program Active (IMPACT): Surveillance of Infectious Diseases in Canadian Children.

Le Programme canadien de surveillance active de l'immunisation (IMPACT) : surveillance des maladies infectieuses chez les enfants du Canada.

April 22, 2025

12:00 – 1:00pm CT / 1:00 – 2:00pm ET

Speaker

Dr. Jared Bullard

Professor & Section Head,
Pediatric Infectious Diseases,
University of Manitoba



National Collaborating Centre
for Infectious Diseases
Centre de collaboration nationale
des maladies infectieuses



Public Health
Agency of Canada

Agence de la santé
publique du Canada



Land Acknowledgment:



Both moderators are located in the City of Hamilton, Ontario.

Situated upon the traditional territories of the Erie, Neutral, Huron-Wendat, Haudenosaunee and Mississauga Peoples, this land is covered by the Dish With One Spoon Wampum Belt Covenant, an agreement between the Haudenosaunee and Anishinaabek to share and care for the resources around the Great Lakes.

Today, Hamilton is home to many Indigenous Peoples from across the Turtle Island. We honour the Indigenous Peoples who have lived on and cared for these lands for generations. We are grateful for the opportunity to share and call this place home.

Housekeeping



- Seminar recording and presentation slides will be available shortly after the seminar at the NCCID website: <https://nccid.ca/>
- If you have technical problems with Zoom, please email us at nccid@umanitoba.ca
- The chat box for participants has been disabled for this session. We will use the chat box to share additional information.
- Please use the Q&A tab to submit your questions for our speakers. You can “like” other people’s questions to push them up in priority



Accreditation



Surveillance Advances is a self-approved group learning activity (Section 1) as defined by the Maintenance of Certification Program of the **Royal College of Physicians and Surgeons of Canada**.

The seminar series is also approved by the Council of Professional Experience for professional development hours for members of the **Canadian Institute of Public Health Inspectors**.

If you would like a letter of participation, please complete the survey which will be shared after the seminar.



Disclaimer



Please note that the views expressed, and content presented are solely those of the speaker(s), unless otherwise specified. These do not necessarily reflect the views or initiatives of Public Health Agency of Canada. The Surveillance Advances Seminar Series is committed to fostering a space for diverse ideas and meaningful dialogue, but does not endorse or approve the content, accuracy or completeness of the information presented.

Today's speaker



Dr. Jared Bullard, MD FRCPC

Professor & Section Head
Pediatric Infectious Diseases
University of Manitoba

The Canadian Immunization Monitoring Program ACTive (IMPACT): Surveillance of Infectious Diseases in Canadian Children

Jared Bullard MD FRCPC

Professor and Section Head, Pediatric Infectious Diseases
Max Rady College of Medicine
Cadham Provincial Laboratory



Conflicts of interest

1. Expert Panel Member – National Advisory Committee on Sexually Transmitted and Bloodborne Infections (NAC-STBBI)
2. Association of Medical Microbiology and Infectious Diseases (AMMI) of Canada – Secretary and Board Member
3. Manitoba Board Representative for the Canadian Pediatric Society (CPS)
4. Central Canada Representative for the Black Physicians of Canada (BPC)



Learning Objectives



- Appreciate the increased relevance and need for IMPACT surveillance of VPD in the setting of vaccine hesitancy and reduced vaccination rates
- Discuss the versatility of IMPACT and its ability to adapt to public health needs
- Discuss the depth and quality of data provided by IMPACT



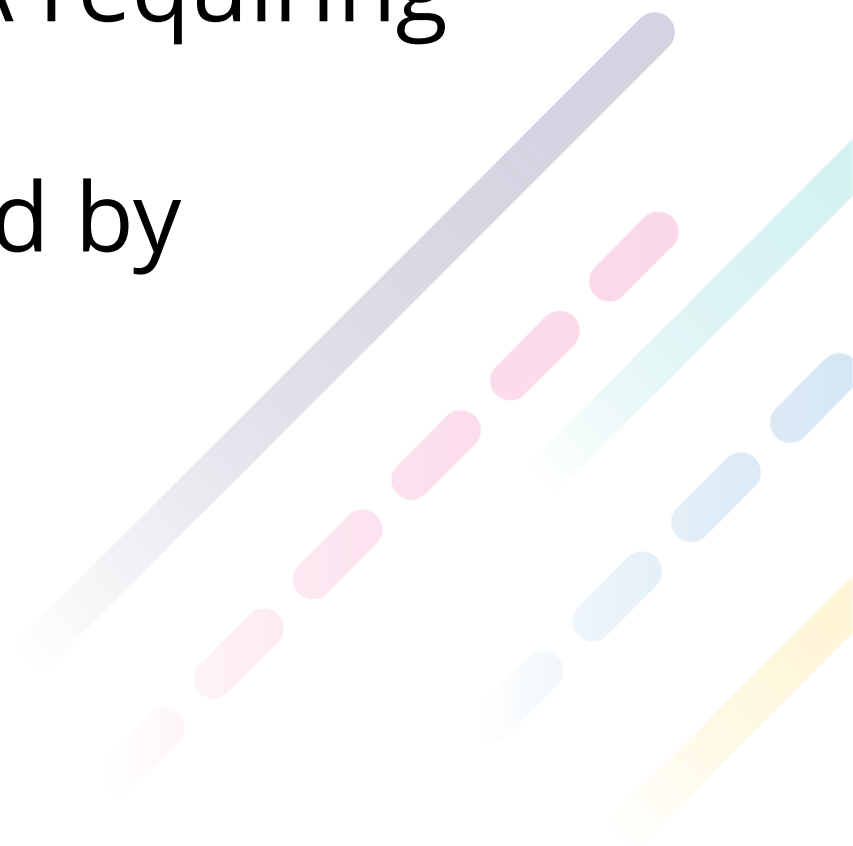
Land Acknowledgement



Case 1



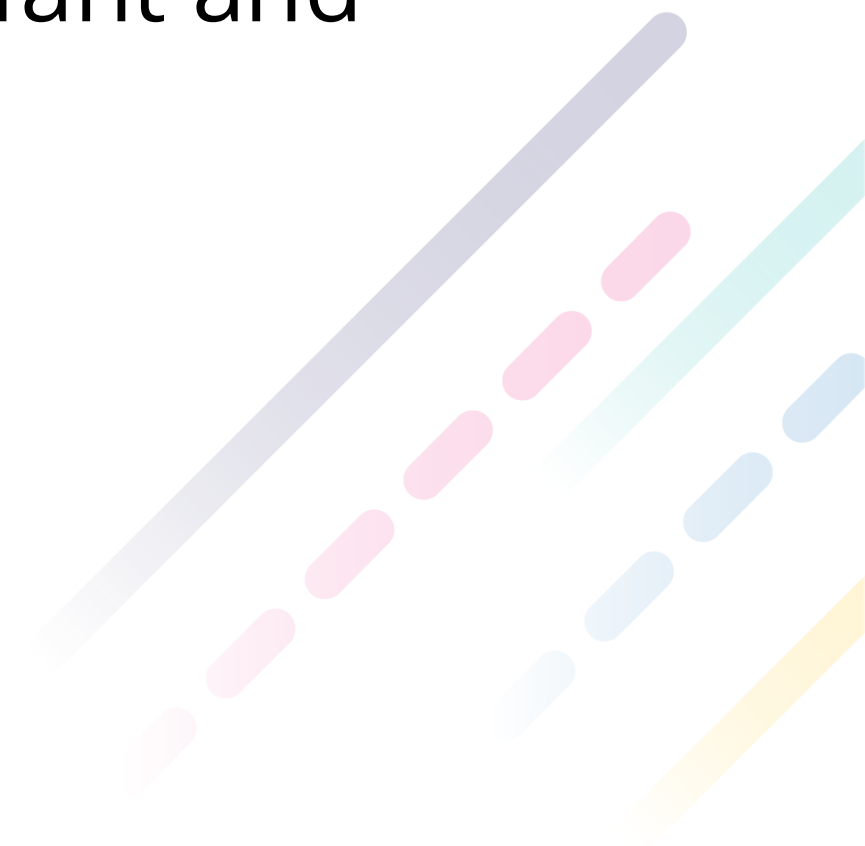
- 6 week old female infant presents with prolonged apneas
- Had mild viral URTI prodrome in the week preceding
- From Southern Manitoba with 3 older siblings
- Ultimately admitted to the PICU for intubation and respiratory support
- Significant lymphocytosis
- Experienced ventilatory associated pneumonia with MRSA requiring treatment and prolonged course in hospital
- Unimmunized due to young age but sibling not immunized by parental choice



Case 2



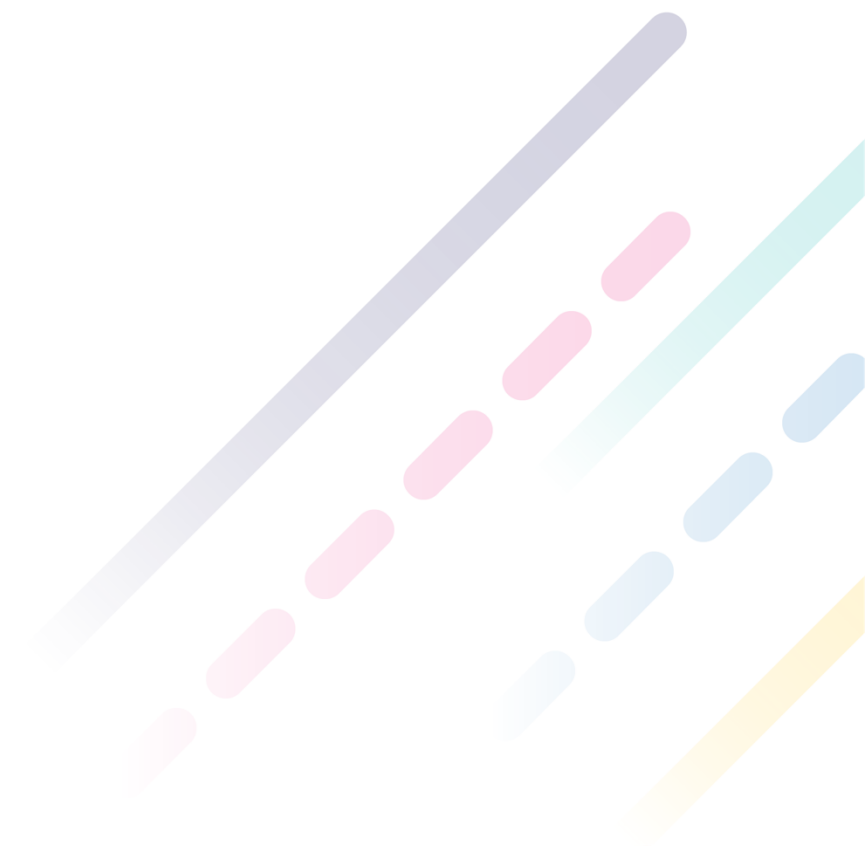
- 7 year old boy from Northern Manitoba (First Nations/Indigenous reserve community)
- Arrives in CHED in septic shock. Purpura noted on initial exam
- Required intubation and pressor support (PICU admission)
- Loses multiple digits and left foot due to complications
- *Neisseria meningitidis* isolated from blood
- Had received meningococcal C conjugate vaccine as an infant and otherwise fully vaccinated
- Isolate typed as serogroup W



Case 3



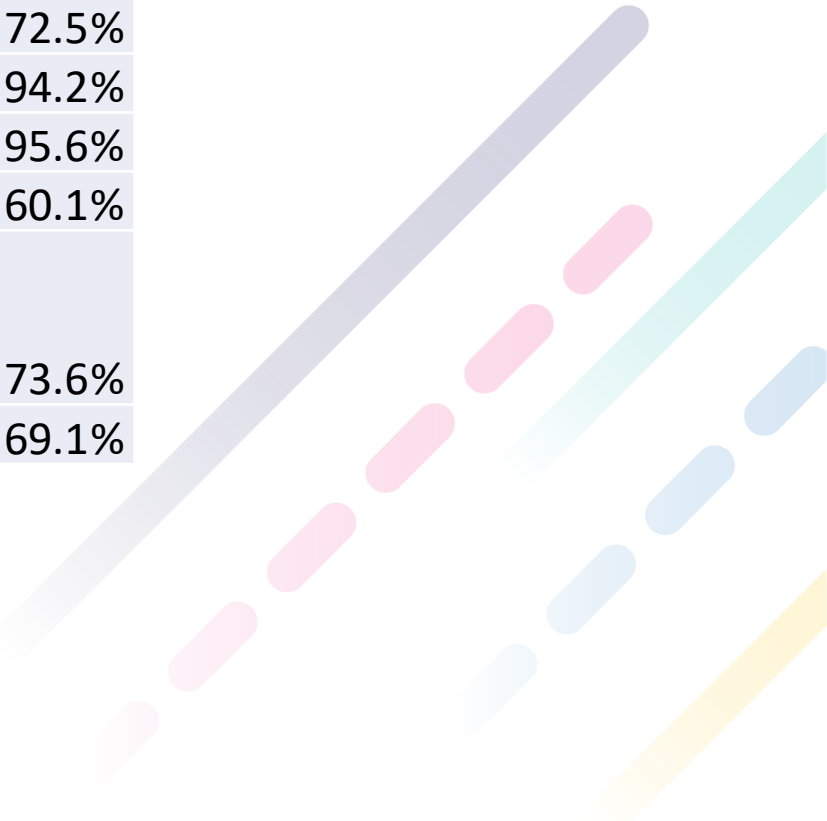
- 14 year old young man admitted to PICU with H1N1 influenza A
- Intubated with gradual improvement, considering extubation
- Acutely worse with fevers, new infiltrates and pressor requirements
- *Streptococcus pyogenes* (group A streptococcus/GAS) isolated from ETT respiratory secretions and BC (invasive GAS/iGAS)
- Prolonged hospitalization required for chest tubes, antibiotics and complications



Immunization Coverage in MB up to age 7 2023



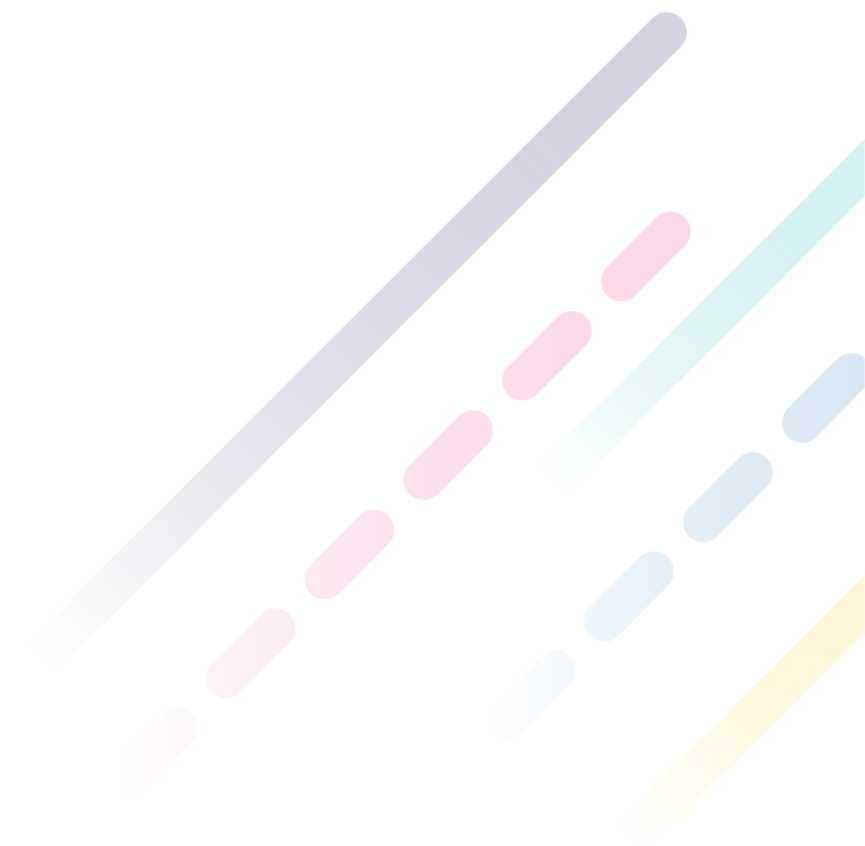
	Manitoba		Winnipeg RHA		Southern Health- Santé Sud		Interlake-Eastern RHA		Prairie Mountain Health		Northern Health Region	
	Population: 18,635		Population: 9,570		Population: 3,451		Population: 1,674		Population: 2,429		Population: 1,506	
	Immunized	%	Immunized	%	Immunized	%	Immunized	%	Immunized	%	Immunized	%
Diphtheria	10727	57.6%	5538	57.9%	1660	48.1%	1015	60.6%	1612	66.4%	901	59.8%
Diphtheria (1 dose since age 4)	12364	66.3%	6412	67.0%	1904	55.2%	1147	68.5%	1806	74.4%	1093	72.6%
Measles	12180	65.4%	6384	66.7%	1840	53.3%	1141	68.2%	1768	72.8%	1045	69.4%
Men-C-C	15309	82.2%	7743	80.9%	2581	74.8%	1446	86.4%	2122	87.4%	1417	94.1%
Mumps	12169	65.3%	6378	66.6%	1839	53.3%	1141	68.2%	1764	72.6%	1045	69.4%
Pertussis	10691	57.4%	5514	57.6%	1655	48.0%	1014	60.6%	1607	66.2%	900	59.8%
Pertussis (1 dose since age 4)	12326	66.1%	6385	66.7%	1901	55.1%	1146	68.5%	1800	74.1%	1092	72.5%
Polio	15246	81.8%	7597	79.4%	2632	76.3%	1461	87.3%	2136	87.9%	1419	94.2%
Rubella	15951	85.6%	8156	85.2%	2679	77.6%	1490	89.0%	2185	90.0%	1439	95.6%
Tetanus	10744	57.7%	5548	58.0%	1660	48.1%	1018	60.8%	1612	66.4%	905	60.1%
Tetanus (1 dose since age 4)	12921	69.3%	6864	71.7%	1948	56.4%	1171	70.0%	1827	75.2%	1109	73.6%
Varicella	12026	64.5%	6297	65.8%	1810	52.4%	1128	67.4%	1748	72.0%	1041	69.1%



IMPACT MB pertussis cases



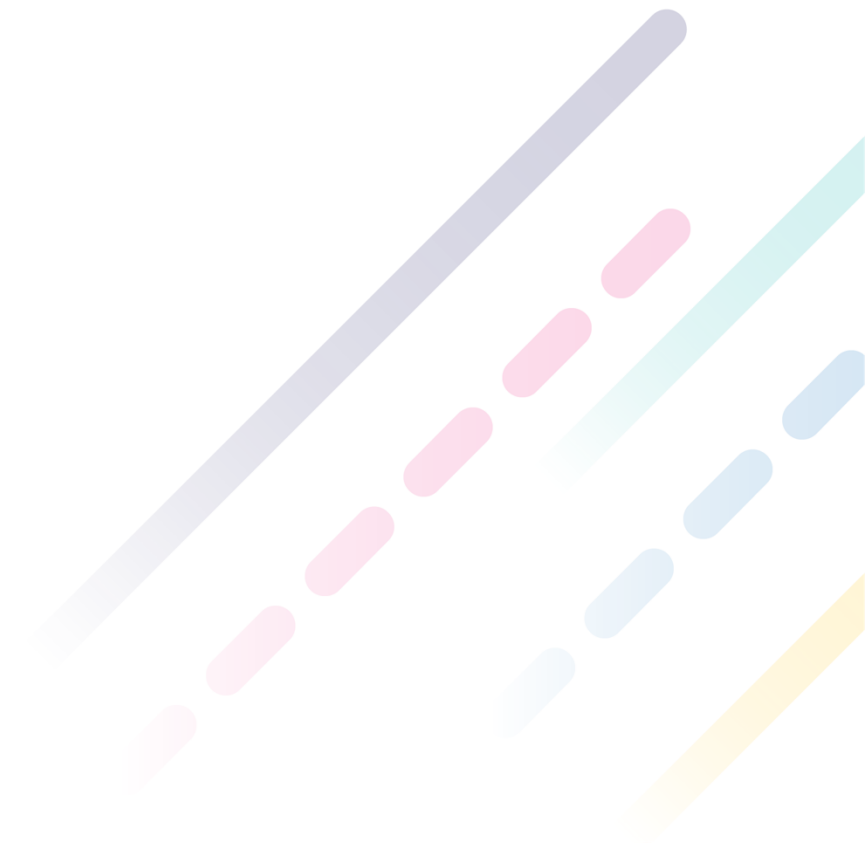
- 2023: 12 cases (10 unvaccinated – 5 ineligible)
- 2024: 30 cases (21 unvaccinated – 8 ineligible)
- 2025: 8 cases (3 unvaccinated)



IMPACT MB IMD cases



- 2023: 12 cases (2 unvaccinated – Men-C-C)
- 2024: 18 cases (15 unvaccinated – 7 ineligible)
- 2025: 6 cases (4 unvaccinated – 3 ineligible)
- **May 2024: MenACYW135 conjugate routine at 1 year**



IMPACT MB iGAS cases



- 2024: 46 cases
- 2025: 16 cases (to date)

Cases of Serogroup W Invasive Meningococcal disease (IMD) in


MB

Month	Year		
	2023	2024	2025
January	0	3	0
February	0	2	1
March	0	2	1
April	0	4	
May	1	2	
June	1	2	
July	0	2	
August	2	2	
September	1	3	
October	0	1	
November	2	1	
December	5	1	
Total (annual)	12	25	2
[Crude rate per 100,000 population]	[0.83]	[1.7]	[0.13]
Deaths (annual)			
[% of cases with a fatal outcome]	0	2 [8.0]	0

	2023 Cases to date (January 1-June 30)	2024 Cases to date (January 1-June 30)
Confirmed Cases Crude rate per 100,000 population	124 (8.5 cases per 100,000 population)	170 (11.7 cases per 100,000 population)
Deaths (% of cases with a fatal outcome)	7 (5.6%)	16 (9.4%)
Hospitalizations (% of cases hospitalized)	62 (50.0%)	108 (63.5%)

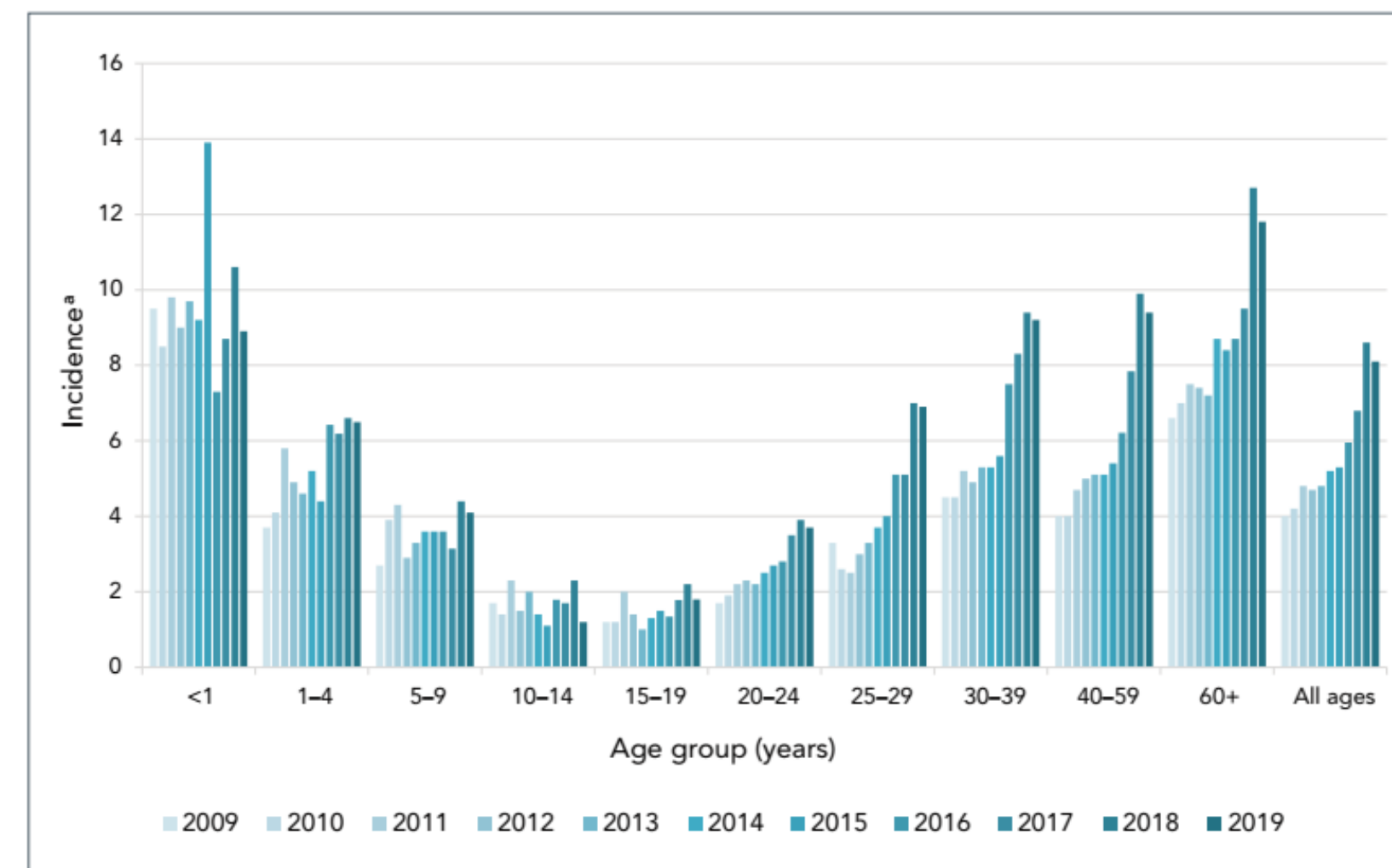
Year	Confirmed Cases	Deaths (% of cases with a fatal outcome)
2023	280 (19.3 cases per 100,000 population)	21 (7.5%)
2022	167 (11.7 cases per 100,000 population)	11 (6.6%)
2021	120 (8.6 cases per 100,000 population)	5 (4.2%)
2020	155 (11.2 cases per 100,000 population)	16 (10.3%)
2019	161 (11.7 cases per 100,000 population)	7 (4.4%)

[Group A streptococcus | Health | Province of Manitoba \(gov.mb.ca\)](#)

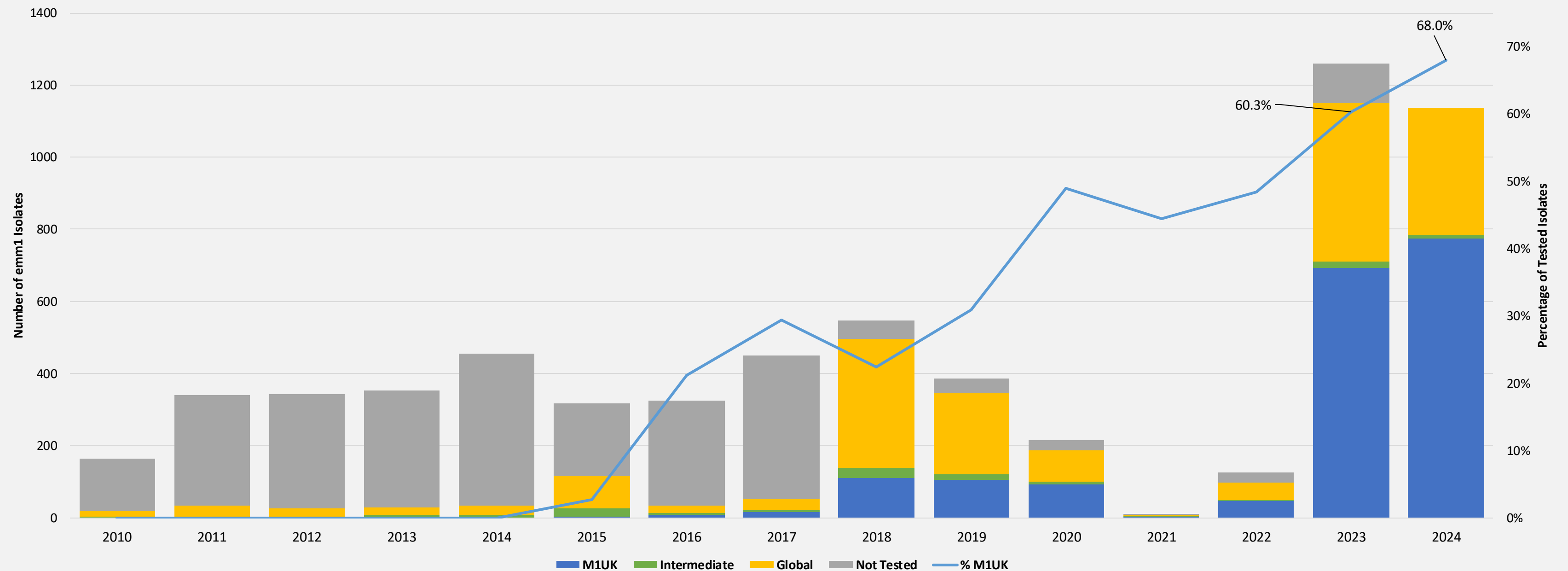
Invasive group A streptococcal disease surveillance in Canada, 2020

Alyssa Golden^{1*}, Averil Griffith¹, Walter Demczuk¹, Gregory Tyrrell², Julianne Kus^{3,4}, Allison McGeer⁵, Marc-Christian Domingo⁶, Linda Hoang⁷, Jessica Minion⁸, Paul Van Caesele⁹, Hanan Smadi¹⁰, David Haldane¹¹, George Zahariadis¹², Kristen Mead¹³, Laura Steven¹⁴, Lori Strudwick¹⁵, Anita Li¹⁶, Michael Mulvey^{1,17}, Irene Martin¹

Figure 1: Annual incidence rates of invasive *Streptococcus pyogenes* cases in Canada by age group, 2010–2019



^a Cases per 100,000 population



Notes: Prior to 2018, WGS was not routinely performed for iGAS. All *emm1* from 2018 onward have been sequenced for an upcoming manuscript.

"M1UK" refers to the hypervirulent *emm1* genotype originally described by Lynskey et al. (Lancet Infect Dis. 2019;19(11):1209-1218). M1UK differs from other *emm1* isolates by 27 key single nucleotide variants (SNVs).

M1UK = all 27 SNVs present. Intermediate = 1-26 SNVs. Global = 0 SNVs. Not tested = WGS not performed.

Linking iGAS clinical and WGS data



Paediatric Investigators Collaborative
Network on Infections in Canada

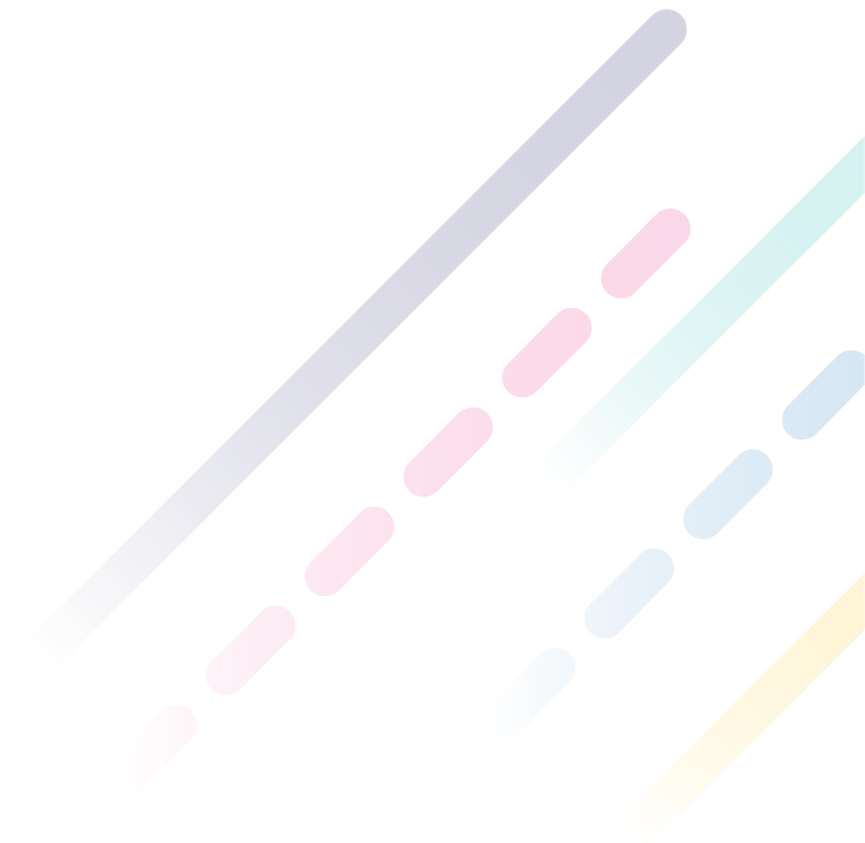


Canadian Immunization Monitoring Program, ACTive
Programme canadien de surveillance active de l'immunisation

Active Surveillance



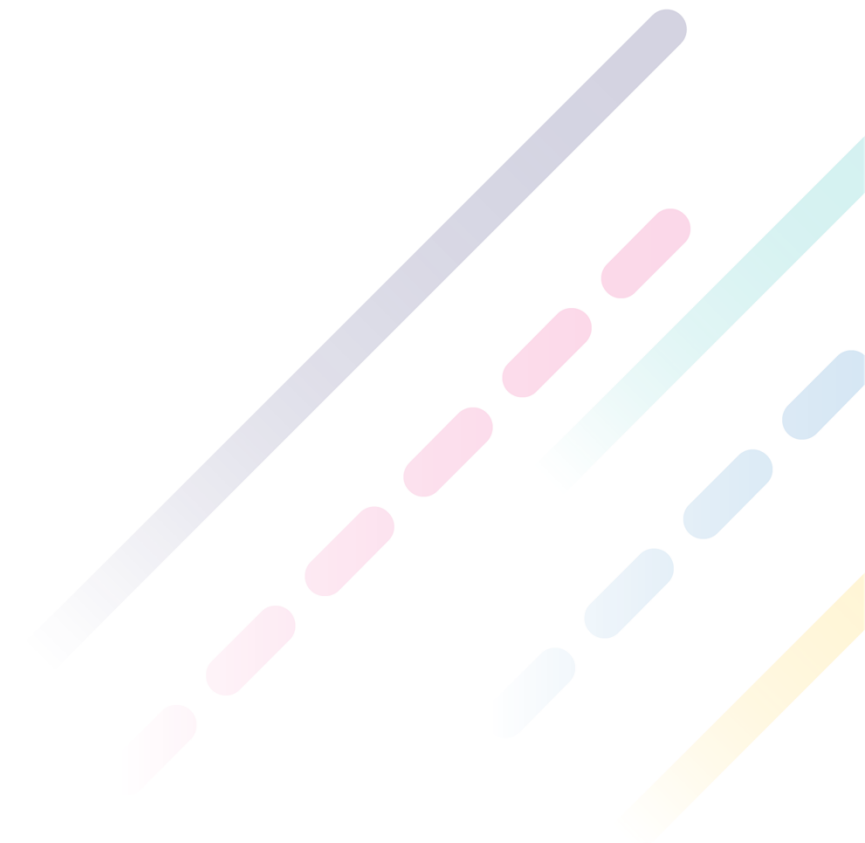
- Outreach to detect cases
- Active case searching of hospital records, laboratory reports, discharge summaries
- More resource intensive than passive
- More representative than passive
- More timely results:
 - Examples: Canadian National Vaccine Safety Surveillance Network (for influenza vaccines); VaxTracker (Australia)



Sentinel Surveillance



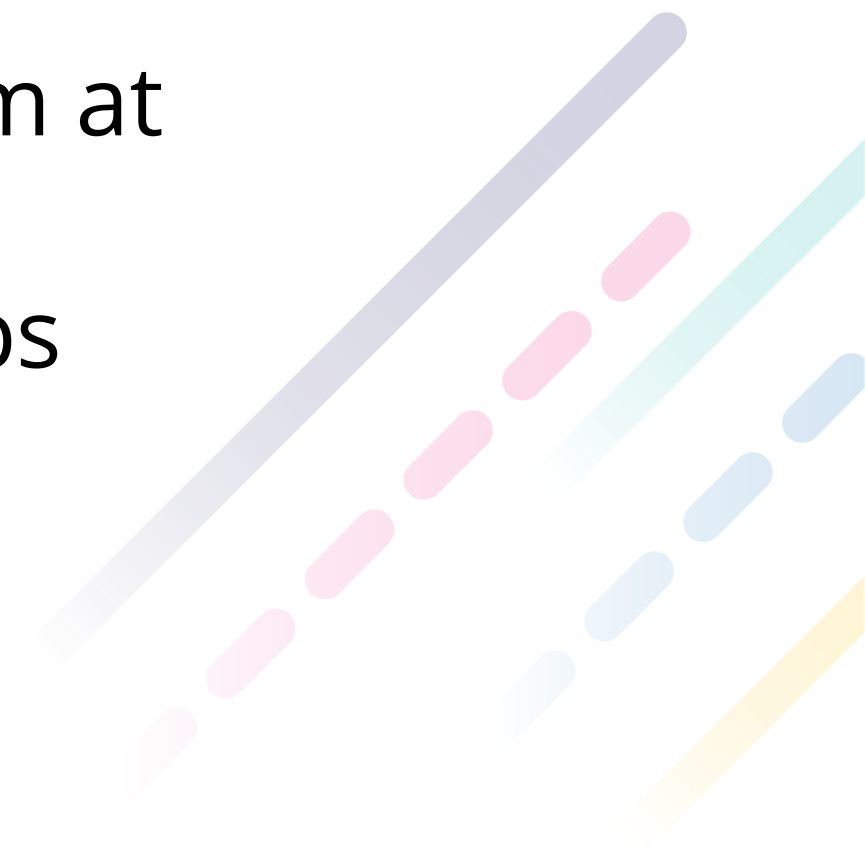
- Monitoring of selected groups/populations
- Populations represents entire group
- Standard case definitions and protocols
 - Examples: IMPACT, Sentinel Initiative (US), Active Bacterial Core (US)



IMPACT in Manitoba: Teamwork!



- Dedicated research nurse (Kris)
- Infectious Diseases (ID) specialist PI (with medical microbiology background)
- Links to public health and the communicable disease control in Manitoba Health
- Links to Cadham Provincial Laboratory (provincial public health laboratory)
- Collaboration with the infection control & prevention team at Children's Hospital (part of CNISP)
- Over 30 years to establish and refine working relationships



- 14 pediatric tertiary care centers, conducting active surveillance for select serious adverse events following immunization (AEFIs) since 1991 for children 0-16 years
- Current network:
 - Covers over 90% of tertiary care pediatric beds
 - Referrals from all provinces, territories
- Nurse monitors actively scan hospital admissions for conditions under surveillance, review chart and vaccine records



IMPACT

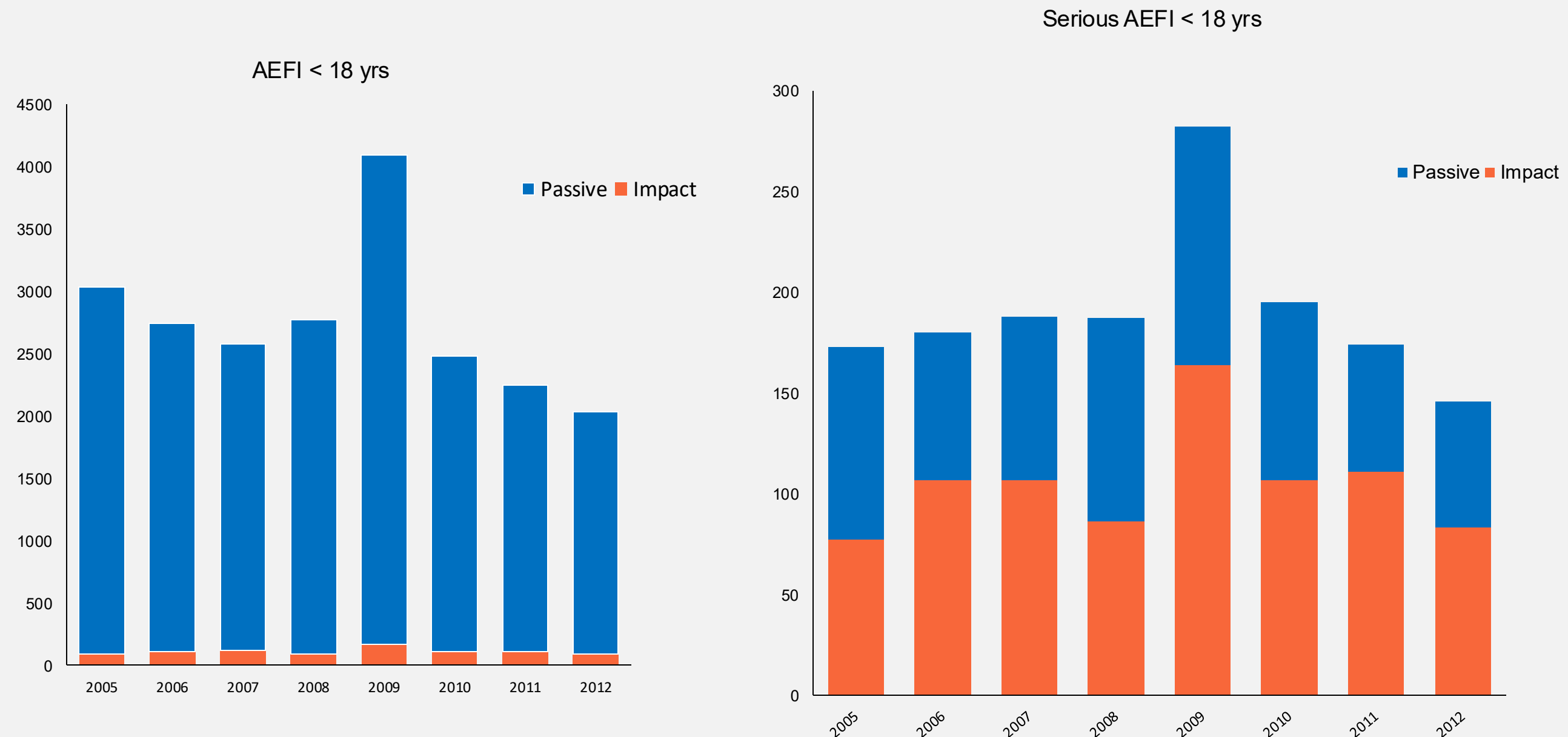
Canadian Immunization Monitoring Program, **ACT**ive
Programme canadien de surveillance active de l'immunisation

- 
- **AEFI (1991-2023)**
 - Seizures (febrile, non-febrile)
 - Encephalopathy/itis, ADEM
 - Myelitis
 - GBS and other Acute Flaccid Paralysis
 - Thrombocytopenia
 - Intussusception
 - Miscellaneous
 - **COVID (2020-2022)**
 - Acute COVID/SARS-Cov-2
 - Myocarditis/pericarditis
 - Multisystem inflammatory syndrome in children
 - **Vaccine Preventable Diseases**
 - Influenza (2004-2023)
 - *Haemophilus influ.*
 - Pertussis
 - Varicella
 - Zoster
 - Pneumococcal
 - Meningococcal*
 - Rotavirus (2005-2022)*
 - RSV (2017-2022)

*Industry funded surveillance target

IMPACT AEFI Surveillance

- IMPACT accounted for 4% of AEFI reports in national passive surveillance in children < 18 years of age from 2005–2012
- >50% of all serious AEFI reports (70–90% of neurologic AEFI)



- 16 publications on vaccine safety:
 - Hazards of BCG in aboriginal infants
 - Benign outcome of ITP after MMR
 - Reduced risk of seizures, HHE with aP
 - Absence of encephalopathy cases after aP
 - Post-immunization rate of GBS
 - Evaluation of Brighton Collaboration seizures definition in surveillance
 - Kawasaki disease following immunization



Publication List: <https://www.cps.ca/en/impact>

Effect of COVID-19 on Influenza Admissions

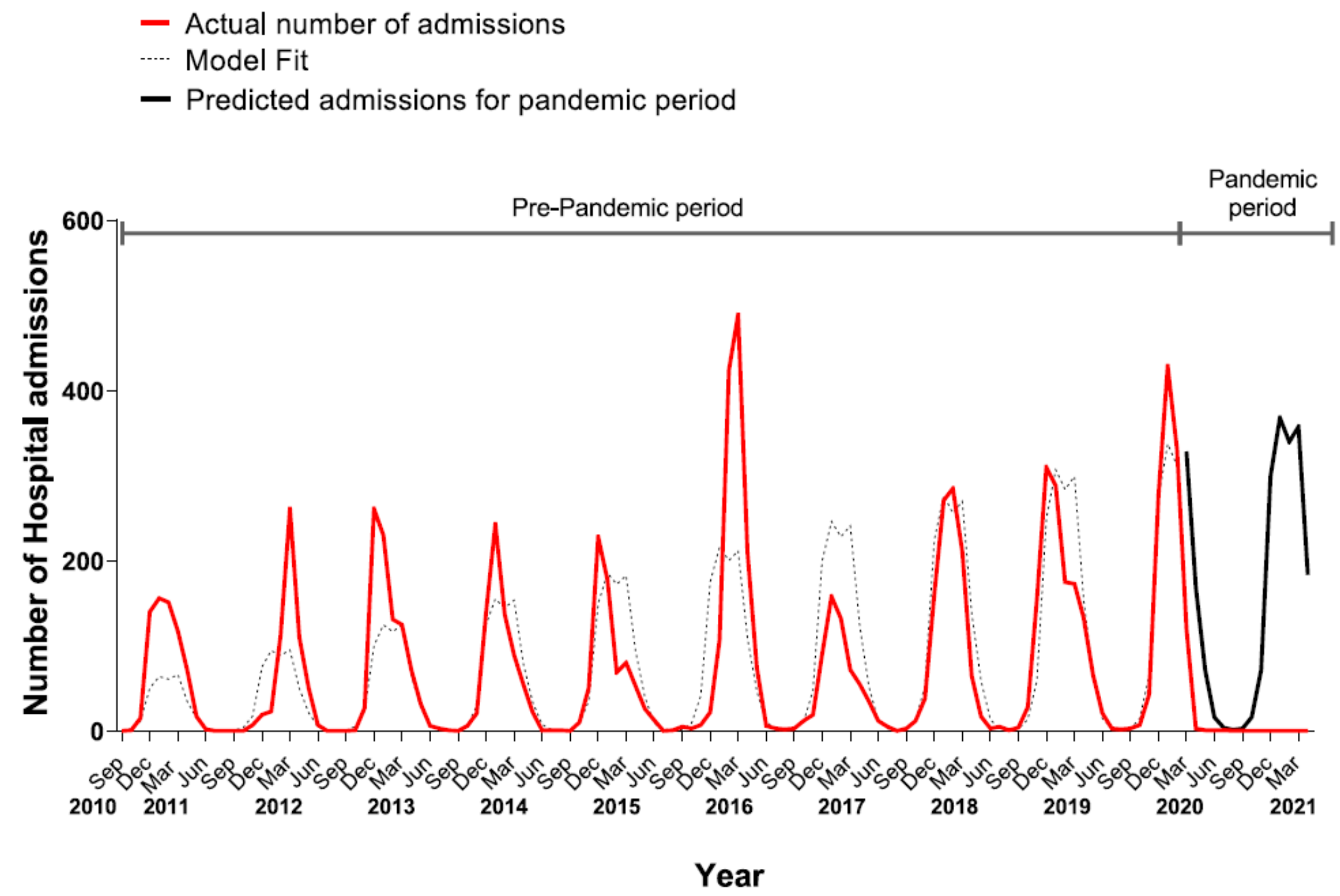


Figure 2. Time series analysis of influenza-related hospitalisations for children in Canada for the period of 1st September 2010 to 30th April 2021 inclusive. Graph represents the monthly actual (crude) number of influenza-related hospital admissions and modelled numbers for each season with predicted numbers of admissions for the pandemic period (1st March 2020 to 30th April 2021 inclusive). (Spearman correlation of model fit, $R = 0.93$).

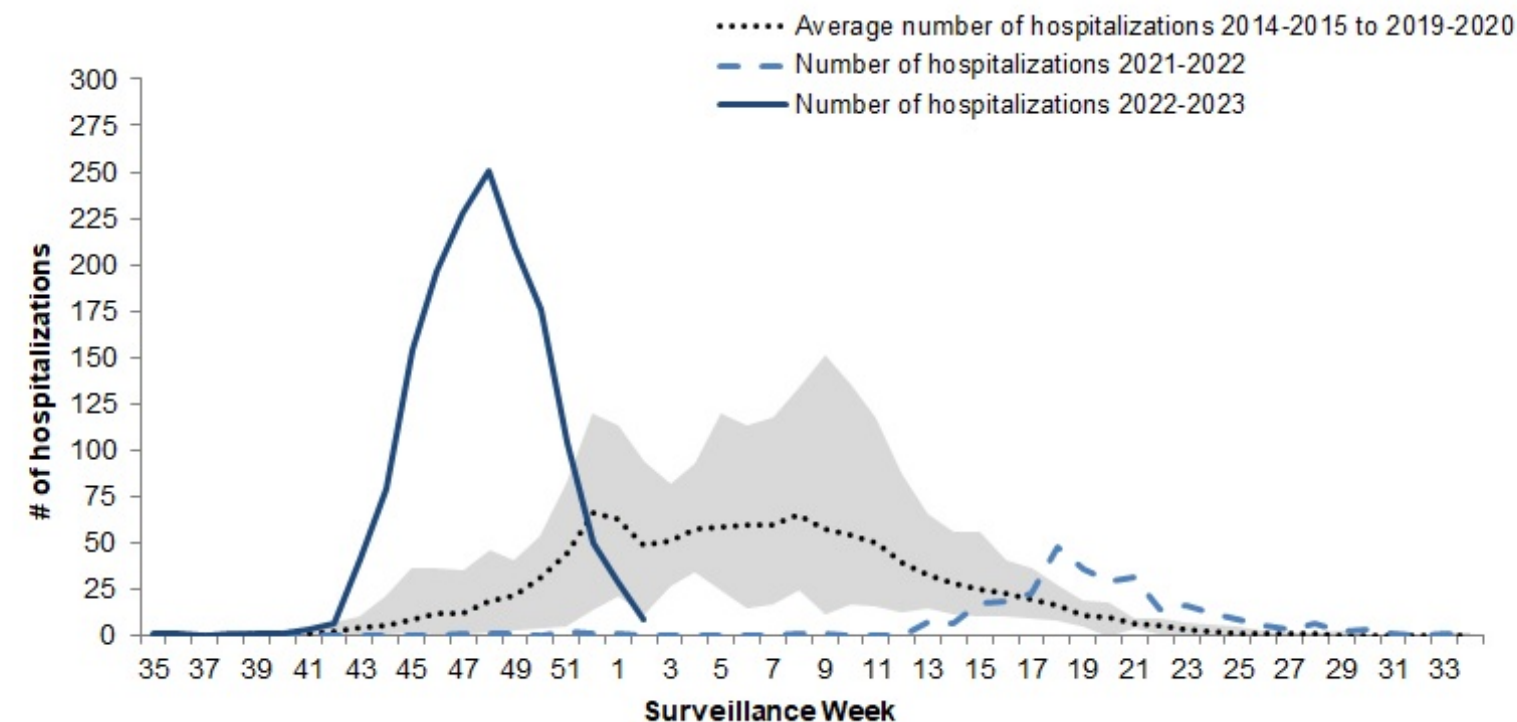
Pediatric Influenza Hospitalizations and Deaths

In week 2, 9 influenza-associated pediatric (≤ 16 years of age) hospitalizations and less than five ICU admissions were reported by the Immunization Monitoring Program Active (IMPACT) network. The number of weekly influenza-associated hospitalizations is now below typical of this time of year ([Figure 9](#)). All hospitalisations reported in week 2 were associated with influenza A. This week, no influenza-associated pediatric deaths were reported.

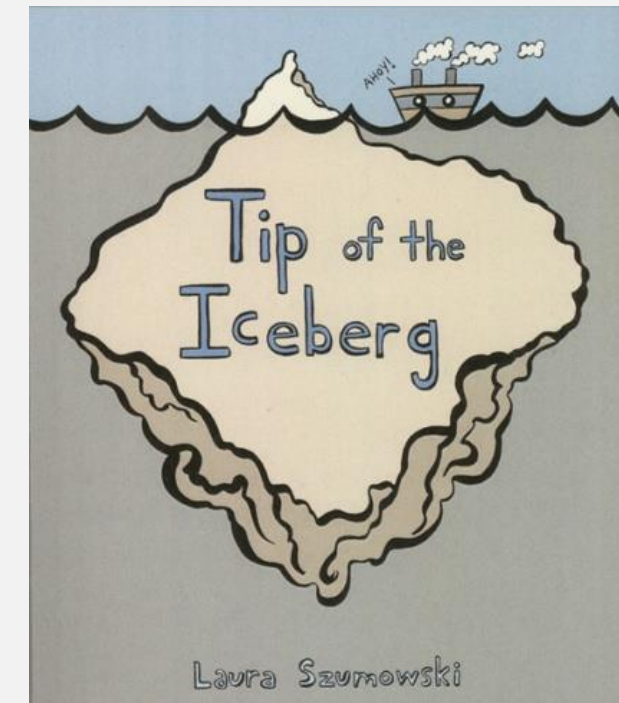
To date this season (August 28, 2022 to January 14, 2023):

- 1,543 pediatric influenza-associated hospitalizations have been reported.
- Children aged between 2-4 years and 5-9 years account for 56% of the reported pediatric hospitalizations ([Figure 10](#)).
- 190 ICU admissions were reported; children aged between 2-4 years and 5-9 years account 52% of the reported pediatric ICU admissions.
- 9 influenza-associated pediatric deaths have been reported.

Figure 9 – Number of pediatric (≤ 16 years of age) hospitalizations reported by the IMPACT network, by week, Canada, week 2022-35 to 2023-02



- Only catches the “tip of the iceberg” – AEFI/VPDs severe enough to require hospitalization
- Immunization history often difficult to obtain:
 - No national immunization schedule or registry
 - Information in chart usually incomplete
- Case identification dependent on local testing and admitting practices
- Labour-intensive: ~6000 cases screened to identify 100–120 reportable AEFIs annually
- COVID specific: Omicron wave with RSV wave overwhelmed sites



Any questions?



Discussion Period

Any questions?

Please use the **Q&A tab** to submit your questions for our speaker. You can “**like**” other people’s questions to push them up in priority.



Closing Remarks



Thank You!

The seminar recording and presentation slides will be posted on <https://nccid.ca/> in the coming weeks.

Please complete our **post-seminar evaluation survey** by scanning its QR code. Today's survey will also be distributed to you shortly after the seminar.

Join us on **Tuesday, May 27, 2025** (1:00-2:00pm ET) for the next seminar.

Visit <https://nccid.ca/surveillance-advances-seminar-series/> for more information about the Surveillance Advances seminar series.

