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Reducing Pneumococcal Disease in Canada: How are we doing?

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LEARNING OBJECTIVES

1. Provide an overview of the history of pneumococcal immunization programs in Canada, including coverage rates in children & adults
2. Understand the general societal impact of pediatric pneumococcal immunization programs in Canada (Dr. Jim Kellner)
3. Assess the benefit of adding PCV13 to the immunization schedule of older adults (Dr. Allison McGeer)
4. Discuss barriers as well as novel ways, including interdisciplinary teams, to optimize protection of patients at risk for pneumococcal disease (Panel)

OUTLINE

- History
  - Epidemiology
  - What vaccines are on the market today
  - Publicly-funded programs
- Pneumococcal Polysaccharide – 23 Vaccine
  - Introduction into routine program
- Pneumococcal Conjugate Vaccine (7, 10, 13)
  - Introduction into routine program
  - The different programs across Canada + how the programs have changed
- Coverage Rates
  - A general look at coverage rates
  - How coverage rates can vary between districts
  - The variation in how vaccine coverage is determined
- Questions:
  - Is there any impact on disease (individual or population) from those who have received the PCV13 privately?
  - What about antibiotic resistance?
  - Patients have been seeking influenza vaccination at pharmacies, does this impacted PPSV23 uptake for 65yrs+?

HISTORY

- Publicly-funded programs:
  - polysaccharide vaccine in the late 90s for adults 65+
  - conjugated pneumococcal vaccines from 2002 for pediatric programs
- Overall pediatric programs have been effective
  - herd effect in the adult population
    - Remains significant burden of disease that is difficult to diagnose and treat and can significantly impact health and well-being of ageing adult
- Enhanced public health measures
  - aim to increase protection against pneumococcal disease in overall population
  - lead to improved disease management for invasive pneumococcal disease (IPD) and community-acquired pneumonia (CAP)

HISTORY
EPIDEMIOLOGY INVASIVE PNEUMOCOCCAL DISEASE (IPD)

- Spectrum of clinical illness [1]
  - Pneumonia + secondary bacteremia
  - Bacteremia
  - Meningitis
  - (Non-invasive = sinusitis, otitis media, non-invasive pneumonia)
- Disease Distribution
  - Worldwide-> major cause of morbidity & mortality [1]
    - ~500,000/yr deaths <5 yo due to pneumococcal disease
  - ~3,000/yr cases of IPD are reported in Canada [2]

1 CIG-Part 4 Active Vaccines-Pneumococcal Vaccine-Epidemiology https://www.canada.ca/en/public-health/services/publications/healthy-living/canadian-immunization-guide-part-4-active-vaccines/page-16-pneumococcal-vaccine.html#a2

2 Public Health Agency of Canada-Invasive Pneumococcal Disease for Healthcare Professionals https://www.canada.ca/en/public-health/services/immunization/vaccine-preventable-diseases/invasive-pneumococcal-disease/health-professionals.html

HISTORY

EPIDEMIOLOGY INVASIVE PNEUMOCOCCAL DISEASE (IPD)

- *Streptococcus pneumoniae* [1]
  - 15 serotypes cause majority of disease
  - carried in nasopharynx [2]
- Transmitted [1]
  - direct oral contact
  - respiratory droplets
  - indirect contact with respiratory secretions
- Incubation period? [1]
  - may be as short as 1-3 days.

1 Public Health Agency of Canada-Invasive Pneumococcal Disease for Healthcare Professionals https://www.canada.ca/en/public-health/services/immunization/vaccine-preventable-diseases/invasive-pneumococcal-disease/health-professionals.html

2 CIG -Part 4 Active Vaccines-Pneumococcal Vaccine-Epidemiology https://www.canada.ca/en/public-health/services/publications/healthy-living/canadian-immunization-guide-part-4-active-vaccines/page-16-pneumococcal-vaccine.html#a2

HISTORY
WHAT PNEUMOCOCCAL VACCINES ARE AVAILABLE? [1]

TYPES OF VACCINES	MARKETED	SEROTYPES
Pneumococcal **polysaccharide** vaccines **(PPSV)**	PPSV23 Pneumovax® 23 Merck Canada Inc.	**1, 3, 4, 5, 6B, 7F, 9V, 14, 18C, 19A, 19F, 23F,** 2, 8, 9N, 10A, 11A, 12F, 15B, 17F, 20, 22F, 33F
Pneumococcal **conjugate** vaccine **(PCV)**	PCV13* Prevnar 13® Pfizer Canada Inc.	**1, 3, 4, 5, 6B, 7F, 9V, 14, 18C, 19A, 19F, 23F,** 6A
	PCV10 Synflorix® GlaxoSmithKline Inc.	**1, 4, 5, 6B, 7F, 9V, 14, 18C, 19F, 23F**

*PCV13 replaced PCV7, which included: **4, 6B, 9V, 14, 18C, 19F, 23F** serotypes

1 Canadian Immunization Guide -Part 4 Active Vaccines-Pneumococcal Vaccine https://www.canada.ca/en/public-health/services/publications/healthy-living/canadian-immunization-guide-part-4-active-vaccines/page-16-pneumococcal-vaccine.html#a4

HISTORY

S. pneumoniae Serotypes Included in Pneumococcal Vaccines [1]

Vaccine	4	9 V	6 B	14	18 C	19 F	23 F	1	5	7 F	3	6 A	19 A	2	8	9 N	10 A	11 A	12 F	15 B	17 F	20	22 F	33 F
PCV 7 *	X	X	X	X	X	X	X																	
PCV 10	X	X	X	X	X	X	X	X	X	X														
PCV 13	X	X	X	X	X	X	X	X	X	X	X	X	X											
PPSV 23	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X

1 Canadian Immunization Guide -Part 4 Active Vaccines-Pneumococcal Vaccine Table 2 https://www.canada.ca/en/public-health/services/publications/healthy-living/canadian-immunization-guide-part-4-active-vaccines/page-16-pneumococcal-vaccine.html#a4

* No longer available on the Canadian Market

PNEUMOCOCCAL POLYSACCHARIDE – 23 VACCINE INTRODUCTION INTO ROUTINE PROGRAM

- PNEUMOVAX 23 Original Market Date: 1978-12-31 [1]
- Following initial NACI recommendation in 1989, all Canadian provinces and territories have implemented PNEU-P-23 *(PPSV23)* vaccination programs for adults who are 65 years of age and older [2]
- A routine polysaccharide immunization program was introduced in 1997 to high risk persons over the age of two years (Alberta) [3]

1 Drug Product Database https://health-products.canada.ca/dpd-bdpp/info.do?lang=en&code=2969

2 NACI Statement Update on the use of pneumococcal vaccines in adults 65 years of age and older – A Public Health Perspective *ADVANCE COPY NOVEMBER 2018*

3 Alberta Notifiable Disease Incidence A Historical Record 1919-2014 https://open.alberta.ca/dataset/09ff0f40-1cfc-48fd-b888-4357104c3c32/resource/c5ceca04-ccda-4811-9ed0-03a3cbe8c0fb/download/7019844-notifiable-disease-incidence-1919-2014.pdf

PNEUMOCOCCAL CONJUGATE VACCINES INTRODUCTION INTO ROUTINE PROGRAM

P/T	PCV 7	PCV 10	PCV 13
BC	September 2003	N/A	June 2010
AB	September 2002	N/A	July 2010
SK	April 2005	N/A	July 2010
MB	October 2004	N/A	July 2010
ON	January 2005	December 2009	November 2010
QC	December 2004	June 2009	January 2011
NL	March 2005	October 2009	September 2010
NB	April 2005	N/A	July 2010
NS	January 2005	N/A	July 2010
PE	June 2003	N/A	September 2010
YT	June 2005	N/A	May 2011
NT	January 2006	September 2009	September 2010
NU	April 2002	N/A	September 2010

NACI Statement Update on the use of pneumococcal vaccines in adults 65 years of age and older – A Public Health Perspective Table 1: Routine childhood conjugate pneumococcal vaccine program introduction by province and territory

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Canada's P/T Routine Vaccination Routine Schedule Infants and Children

P/T	PCV 13	PCV 10	3+1->2+1 (Healthy)
BC	2, 4, 6 if high risk, 12 months [1]	N/A	2+1 (2007) [8]
AB	2, 4, 6 if high risk, 12 months [2]	N/A	2+1 + 1 if High Risk
SK	2, 4, 12 months [3]	N/A	2+1
MB	2, 4, 6 if high risk +FN, 12 months [4]	N/A	2+1 + 1 if High Risk
ON	2, 4, 12 months [3]	N/A	2+1
QC	PCV13 -> PCV10 May/18 [5]	2, 4, 12 months [5]	2+1 (2004) [8]
NL	2, 4, 6 if high risk, 12 months [3]	N/A	2+1 + 1 if High Risk
NB	2, 4, 12 months [3]	N/A	2+1
NS	2, 4, 12 months [3]	N/A	2+1
PE	2, 4, 6 if high risk, 12 months [3]	N/A	2+1 + 1 if High Risk
YT	2, 4, 6 if high risk, 12 months [6]	N/A	2+1 + 1 if High Risk
NT	2, 4, 6, 18 months [3]	N/A	3+1
NU	2, 4, 6, 15 months [7]	N/A	3+1

See next slide for full references
1, 2, 4, 5, 6, 7 P/T schedules
3 Adapted from https://www.canada.ca/en/public-health/services/provincial-territorial-immunization-information/provincial-territorial-routine-vaccination-programs-infants-children.html
8 NACI Statement Update on the use of pneumococcal vaccines in adults 65 years of age and older – A Public Health Perspective Table 14: Routine childhood conjugate pneumococcal vaccine program introduction by province and territory *ADVANCE COPY NOVEMBER 2018*

FULL REFERENCES FOR SLIDE 12

[1] BC - https://immunizebc.ca/sites/default/files/docs/vaccine-schedule-infants-children.pdf

[2] AB - http://www.health.alberta.ca/health-info/imm-routine-schedule.html

[3] Health Canada- Canada's Provincial and Territorial Routine (and Catch-up) Vaccination Routine Schedule Programs for Infants and Children https://www.canada.ca/en/public-health/services/provincial-territorial-immunization-information/provincial-territorial-routine-vaccination-programs-infants-children.html

[4] MB - https://www.gov.mb.ca/health/publichealth/cdc/div/schedules.html#child

[5] QC - https://www.quebec.ca/en/health/advice-and-prevention/vaccination/pneumococcal-conjugate-vaccine/

[6] YT http://www.hss.gov.yk.ca/pdf/im_manual_section3.pdf

[7] NU https://gov.nu.ca/sites/default/files/nunavut_routine_childhood_immunization_schedule_19dec2017.pdf

[8] NACI Statement Update on the use of pneumococcal vaccines in adults 65 years of age and older – A Public Health Perspective Table 14: Routine childhood conjugate pneumococcal vaccine program introduction by province and territory *ADVANCE COPY NOVEMBER 2018*

COVERAGE RATES PPSV 23

Vaccine uptake in Canadian adults ≥ 18 years: 2014 adult National Immunization Coverage Survey [1]

Participants	N	Pneumococcal *(PPSV 23)*
18-64 years of age with a chronic medical condition	715	**17.3** (13.7, 20.8)*
≥ 65 years of age	831	**36.5** (32.7, 40.3)*

***Vaccine coverage (%) for at least one dose (95% confidence interval)**

1 https://www.canada.ca/en/public-health/services/publications/healthy-living/vaccine-uptake-canadian-adults-results-2014-adult-national-immunization-coverage-survey.html

COVERAGE RATES PCV 13

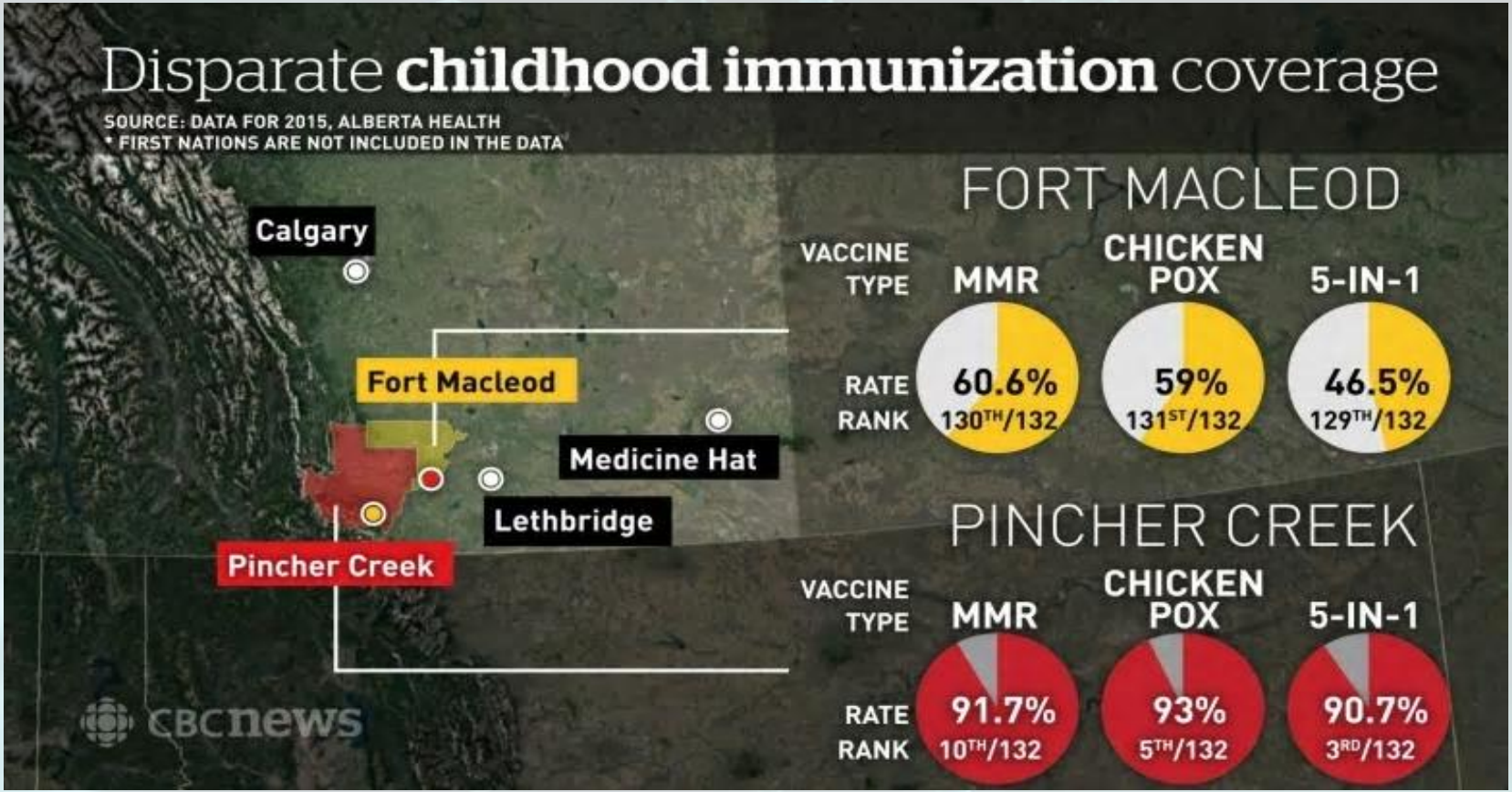
Vaccine Coverage in Canadian Children: Two Surveys

- **Vaccine coverage in Canadian children: Highlights from 2013 childhood National Immunization Coverage Survey (cNICS)**
  - Pneumococcal conjugate **79.3%** by two years of age
  - based on combined parent/guardian records

- **National vaccination coverage by antigen for children 2 years of age (2015)**
  - Pneumococcal conjugate **80.3%** by two years of age
  - based on combined parent and physician records

1 https://www.canada.ca/en/public-health/services/publications/healthy-living/vaccine-coverage-canadian-children-highlights-2013-childhood-national-immunization-coverage-survey.html
2 https://www.statcan.gc.ca/eng/statistical-programs/document/5185_D1_T9_V1

COVERAGE RATES PCV 13
VARIATIONS IN PROTECTION



Why these 2 small towns in southern Alberta have vastly different vaccination rates
Robson Fletcher · CBC News · Posted: Feb 21, 2017 5:30 AM MT | Last Updated: February 25, 2017
https://www.cbc.ca/news/canada/calgary/pincher-creek-fort-macleod-vaccination-rates-1.3987887

COVERAGE RATES PCV 13 - VARIATIONS IN PROTECTION - AB

Alberta Health Area - 2015 (132 Local Health Zones)	Pneumococcal Conjugate 3rd dose by age 2 (2,4, 12 months)	Meningococcal Conjugate 3rd dose by age 2 (2, 4, 12 months*)
MD Wainwright	95.4 (1st)	91.1 (5th)
High River	95.2 (2nd)	93.7 (1st)
Edmonton – West Jasper Place	90.4 (10th)	88.4 (11th)
Calgary - SE	90.2 (11th)	86.8 (14th)
Pincher Creek	89.9 (14th)	89.5 (7th)
Calgary - West Bow	81.9 (90th)	77.9 (91st)
Edmonton - Eastwood	79.2 (100th)	75.5 (100th)
Fort Macleod	60.6 (128th)	56 (128th)
High Level	43.3 (132nd last)	43.3 (132nd last)
% difference between 1st & last	52.1%	50.4%

MMR Vaccine Rates Alberta https://infogram.com/8c2c140c-b6c9-44af-ac23-56c4f6702e81

*Men-C-conj was 2,4 12 until Aug/14

COVERAGE RATES PCV 13 - VARIATIONS IN PROTECTION - SK

HEALTH REGION	3 MONTHS 1 DOSE	8 MONTHS 1 DOSE	8 MONTHS 2 DOSES	13 MONTHS UP-TO-DATE	24 MONTHS UP-TO-DATE
SASKATCHEWAN	84.7%	93.8%	88.3%	59.2%	86.5%

Does how immunization rates are determined impact disease prevention and the connection to herd immunity?

Immunization Services Saskatchewan Ministry of Health; 2017 Vaccine Preventable Disease Monitoring Report Pneumococcal, 2015 and 2016 Report release date: August, 2017 http://publications.gov.sk.ca/documents/13/108149-Pneumococcal%202015%20%202016%20Report%2020170831.pdf

QUESTIONS…

- PCV 13 has been indicated for 18 yrs+ for over 5 years
  - Is there any impact on disease (individual or population) from those who have received private vaccine?
  - Estimated vaccine rates in adults?
- What about antibiotic resistance?
  - Medicines, such as penicillin, used to work well for the treatment of pneumonia and meningitis. These diseases have recently become resistant to these medicines. For this reason it is important to try to prevent the infections by having the PCV or PPV vaccine. [1]
- In AB, pharmacists have been providing influenza vaccine since 2009. Last season, pharmacists provided 50%+ of all of publicly funded flu vaccines.
  - Before the pharmacists' involvement in this program, 65yr+ were getting their influenza vaccines at public health where they were getting assessed for PPSV23 eligibility.
  - Has the fact that more patients have been seeking influenza vaccination at pharmacy, impacted PPSV23 uptake for those who are eligible?

1 MyHealthAlberta.ca Pneumococcal Vaccineshttps://myhealth.alberta.ca/health/pages/conditions.aspx?hwid=tv8594&