Pertussis in Ontario

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Overview

• Pertussis vaccine in Ontario
• Pertussis epidemiology
• Pertussis outbreak
Background: Pertussis Vaccine in Ontario

1943
Whole cell fluid vaccine*


1984
Adsorbed whole cell vaccine

2003
Adolescent Tdap program

1997
Acellular vaccine

2011
Adult Tdap booster

• Primary series (DTaP-IPV-Hib)
  • 2, 4, 6 months
• Booster doses
  • 18 months (DTaP-IPV-Hib)
  • 4-6 years (DTaP-IPV / Tdap-IPV as of May 2012)
Pertussis and tetanus vaccine coverage among Ontario students, 2011/12 school year

<table>
<thead>
<tr>
<th>Year</th>
<th>Tetanus Coverage (%)</th>
<th>Pertussis Coverage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>79.7</td>
<td>76.0</td>
</tr>
<tr>
<td>8</td>
<td>87.0</td>
<td>82.4</td>
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<tr>
<td>9</td>
<td>88.7</td>
<td>84.1</td>
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<tr>
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<tr>
<td>17</td>
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<td>67.7</td>
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</table>
Reported cases and incidence of pertussis in Canada, 1924 to 2012*

*Case data for 1924 to 2011 was obtained from the Canadian Notifiable Diseases Surveillance System. Case data from 2012 was obtained directly from P/T partners by CIRID and is preliminary. Population data was obtained from Statistics Canada July 1st annual estimates.

Slides courtesy of CIRID, PHAC
Incidence of pertussis in Canada by age group and year, 1980 to 2012*.

*Case data for 1980 to 2011 was obtained from the Canadian Notifiable Diseases Surveillance System. Case data from 2012 was obtained directly from P/T partners by CIRID and is preliminary. Population data was obtained from Statistics Canada July 1st annual estimates.
Annual number of cases and incidence of pertussis* in Ontario by year with projected 2013 rate: Jan 1, 2000 – Jun 30, 2013

* includes sporadic and outbreak associated pertussis cases with the following reportable case classifications selected: confirmed (all years); confirmed and probable (2009-2013). Source – Public Health Ontario, iPHIS; 2013
Confirmed pertussis cases in Ontario by month and year, January 2003 to April 2013
Age-specific rates of pertussis in Ontario: January 1, 2012 – June 30, 2013 (n=1145)*

Note: Four cases with unknown age were excluded
*Includes sporadic and outbreak-associated confirmed and probable pertussis cases reported through iPHIS
Source – Public Health Ontario; 2013 and Statistics Canada, population projections; 2012 and 2013
Age-specific rates of pertussis in Ontario: January 1, 2012 – June 30, 2013 (n=1145)*

Note: Four cases with unknown age were excluded
*Includes sporadic and outbreak-associated confirmed and probable pertussis cases reported through iPHIS
Source – Public Health Ontario; 2013 and Statistics Canada, population projections; 2012 and 2013
Pertussis Outbreak in Southwestern Ontario

- A total of 443 cases (344 confirmed, 99 probable) reported between November 1, 2011 and April 15, 2013
- 7 health units in southwestern Ontario (1.2 million)
- Overall rate was 25.8 cases per 100,000 population
- 56% (248/443) of outbreak cases were female
- Age range from 14 days to 68 years (median: 9.4 years)
- 13 cases hospitalized, no deaths
Pertussis cases by onset date, classification and community status, Nov 1, 2011 to Apr 15, 2013 (n=443)

- General population - Probable: 31.2%
- Religious community B - Probable: 7.2%
- General population - Confirmed: 61.6%
- Religious community B - Confirmed: 0.8%
- Religious community A - Probable: 0.2%
- Religious community A - Confirmed: 0.2%
Pertussis Cases by Age and Community Status: Ontario, Nov 1, 2011 to Apr 15, 2013 (n=437*)

* Excludes 6 cases for whom age was missing
Immunization Status

Religious community (A+B)

- Unimmunized: 86.6%
- Partially immunized: 5.3%
- Complete-for-age: 8.1%

General population

- Unimmunized: 53.1%
- Partially immunized: 27.2%
- Complete-for-age: 20.7%

Significant difference in proportions unimmunized and complete-for-age between two populations (p < 0.01)
**Complete-for-age**

- 121 cases in general population
- Median 12 years (range 2 months to 43 years)
- 51% between 10 and 14 years
- Median of 5.6 years since last immunization (range 15 days to 9.9 years)
Discussion

• Waning immunity: Children 10-14 years of age account for
  • 5.7% of Ontario’s population
  • 20% of outbreak cases overall
  • 28% of GP outbreak cases
  • 51% of GP cases who were complete-for-age with their immunizations

• RC cases were significantly younger and had a significantly lower proportion who were immunized compared to GP cases

• Transmission to the general community during an outbreak is not unexpected and issues that need to be considered include:
  • Vaccine coverage
  • Vaccine effectiveness / waning immunity
Considerations for Pertussis Epidemiology

• Ontario experienced a prolonged outbreak of pertussis that proved difficult to control

• Reasons for pertussis resurgence could include low vaccine coverage and waning immunity among young adolescents affected by the outbreak

• Pertussis epidemiology in the under-immunized community is similar to that seen prior to immunization in Canada

• An assessment of vaccine effectiveness is underway in Ontario
Acknowledgements

- Dr. Natasha Crowcroft
- Heather Deehan
- Dr. Sarah Wilson
- Gillian Lim
- Jill Fedurek
- Kenny Wong
- *Pertussis Outbreak Team from affected HUs and Ontario Ministry of Health and Long-Term Care*
Questions?