Epidemiology of Rabies Post-exposure Prophylaxis in Ontario: 2007-2011

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Overview

- Rabies in Canada
- Rabies post-exposure prophylaxis (PEP)
- Epidemiology of rabies PEP in Ontario
- Public health implications
- Summary
- Future considerations
- Questions
Rabies in Canada

• Significant health risk globally – an estimated 55,000 human fatalities per year

• Human rabies is extremely rare in Canada
  • **Since 1925**: 25 human cases reported (7 cases from Ontario)
  • **Since 1970**: 6 of 8 reported cases attributed to the bat strain
  • **2012**: Most recent case; Ontario resident exposed in the Caribbean

• Animal rabies cases have been declining since the late 1980’s
  • Largely confined to wildlife (e.g. bats, foxes, racoons and skunks)
  • Decline correlates with Ontario’s animal oral rabies vaccination program (1987)
  • Incidence dropped to <130 cases per year in last five years (CFIA)
Reporting Rabies Risks

• Rabies is designated as a reportable and communicable disease under the Ontario Health Protection and Promotion Act (HPPA)

• Regulation 567 under the HPPA makes provision for the vaccination of household pets and other select animals

• Animal exposures that present a risk of exposure to rabies are reportable

• Ontario provides no-cost rabies PEP to exposed persons at an average cost of $2000-2500 per prophylactic course (Ontario Government Pharmacy, 2012)
Rabies PEP Guidelines

• Guidelines for the Management of Suspected Rabies Exposures

• PEP guidelines for bat exposures changed in August 2008
  • PEP is no longer indicated for scenarios where a bat is found near or in the same room as persons sleeping unattended, young children or cognitively impaired persons
  • PEP is only indicated where there is direct contact with an open wound or mucosa

• ...Impact on trends in rabies PEP in Ontario
Rabies Post-exposure Prophylaxis (PEP)

- Rabies can be prevented by appropriate wound care and prompt medical assessment of need for rabies PEP following exposure
- Appropriate PEP in unvaccinated persons is comprised of rabies immune globulin (RIG) and a four-dose series of an approved rabies vaccine
- Rabies vaccine is also recommended for routine pre-exposure prophylaxis for persons who work with animals, cave explorers and travelers to rabies endemic areas
- Two vaccines are approved for use in Canada
General trends in Rabies PEP

• ~10 million people worldwide receive rabies PEP annually for exposures to potentially rabid animals

• Risk assessments for reported animal exposures are conducted by local health units in Ontario

• Requests for PEP averaged 2,400 per year in the 1980s but declined to 1,500 per year in the 1990s following the implementation of the wildlife vaccination program

• The number of assessments of human contact with potentially rabid animals in Ontario remains high
Rabies PEP and animal rabies trends: Ontario, 1958-2000*

* Nunan, et al, 2002
Rabies PEP Trends: Ontario, 2007-2011

• 8,817 animal exposures requiring PEP were reported in Ontario from 2007 to 2011
  • An average of 1,763 PEP regimens per year (SD = 514)
  • 39% decrease in incidence from 16.3 to 10.0 rabies PEP regimens per 100,000 population from 2007 to 2011
  • Consistent annual decrease except in 2008 (mass PEP following multiple exposures to a rabid puppy)

PEP data: MOHLTC, iPHIS database, extracted by PHO [2012/08/28]; Population data: MOHLTC, IntelliHEALTH Ontario, extracted by PHO [2012/03/15]
Animal Exposures requiring PEP by reported month: Ontario, 2009-2011

• The number of exposures requiring PEP increased during the warmer months
  • 62% of exposures occurred from May to September

• Possible correlation with increased participation in outdoor activities which increases the likelihood of animal and human interactions

• The number of exposures requiring PEP decreased during the colder months
  • 19% of exposures occurred from January to February and from November to December
Animal Exposures requiring PEP by reported month: Ontario, 2009-2011

<table>
<thead>
<tr>
<th>Reported month</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg 2009-2011</td>
<td>60</td>
<td>49</td>
<td>83</td>
<td>92</td>
<td>129</td>
<td>154</td>
<td>194</td>
<td>245</td>
<td>148</td>
<td>97</td>
<td>80</td>
<td>75</td>
</tr>
</tbody>
</table>

PEP data: MOHLTC, iPHIS database, extracted by PHO [2012/08/28]
Animal exposures requiring PEP by health region: Ontario, 2007-2011

PEP data: MOHLTC, iPHIS database, extracted by PHO [2012/08/28]
Animal exposures requiring PEP by animal type: Ontario, 2007-2011

- Contact with companion animals (cats, dogs and ferrets) accounted for 51% of all exposures requiring PEP from 2007 to 2011
  - Shifted to an increased proportion of total exposures due to the decline in bat exposures since 2008

- Contact with bats and other wild animals (squirrels/chipmunks, foxes, skunks and raccoons) accounted for 44% of all exposures from 2007 to 2011
  - Contact with bats → 34% of exposures overall, a significant decrease of 71%
  - Contact with other wild animals → 11% of exposures overall, a significant increase of 34%

- Contact with domestic/farm and other animals accounted for 5% of all exposures requiring PEP from 2007-2011
  - No significant year over year change
Animal exposures requiring PEP by animal type: Ontario, 2007-2011

PEP data: MOHLTC, iPHIS database, extracted by PHO [2012/08/28]
Animal exposures requiring PEP by animal type: Ontario, 2007-2011

PEP guideline change for bat exposures
Bat exposures requiring PEP: Ontario, 2007-2011

• The incidence and number of PEP related to exposures to bats decreased following the 2008 Guideline change
  • 22% decrease in the proportion of exposures due to bats in 2009 compared to 2008
  • Stabilization of the proportion of exposures due to bats to an average of 25% per year since 2009
Animal exposures requiring PEP by exposure type: Ontario, 2007-2011

- Direct exposures through bites and scratches accounted for 66% of exposures requiring PEP
- 63% of direct exposures were due to companion animals (i.e. cats, dogs and ferrets)

<table>
<thead>
<tr>
<th>Type of Exposure</th>
<th>Number of exposures</th>
<th>% of all exposures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bite</td>
<td>5294</td>
<td>60%</td>
</tr>
<tr>
<td>Scratch</td>
<td>528</td>
<td>6%</td>
</tr>
<tr>
<td>Indirect</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handling</td>
<td>548</td>
<td>6%</td>
</tr>
<tr>
<td>Nearby</td>
<td>728</td>
<td>8%</td>
</tr>
<tr>
<td>Unknown</td>
<td>1719</td>
<td>19%</td>
</tr>
<tr>
<td>Total</td>
<td>8817</td>
<td>100%</td>
</tr>
</tbody>
</table>

PEP data: MOHLTC, iPHIS database, extracted by PHO [2012/08/28]
Limitations of surveillance of rabies PEP

• Passive reporting system likely results in under-reporting of exposures
  • But higher sensitivity for the reporting of human rabies cases

• Data elements required for reporting does not allow for assessment of compliance with rabies PEP guidelines

• Surveillance data from iPHIS cannot be used to enumerate the volume of PEP delivered by public health nor completion of indicated treatment
Summary

• Exposure to wildlife and unvaccinated domestic animals remain important potential sources of exposure for humans

• Consistent annual decreases in the number of animal exposures requiring PEP from 2007 to 2011, except in 2008 …

• … but the rate of decrease in the number of exposures requiring PEP is not equivalent to the rate of decrease in animal rabies

• Current trends highlight the importance of continued control measures and prevention messages pertaining to responsible pet ownership and avoiding contact with wildlife
Public health implications

- The rate of decrease in the number of exposures requiring PEP is not equivalent to the rate of decrease in animal rabies

- A high proportion of PEP is likely administered without complete rabies determination
  - 74% and 35% of cat and dog exposures were reported as strays, respectively

- PEP due to bat exposures declined significantly after more stringent guidelines for indication were implemented
  - Compliance is high
  - Potential opportunities for further reductions in the use of PEP

- Rabies PEP costs CA $2,000 - $2,500 per exposed person, excluding the cost of public health and medical assessments (OGP)
Considerations for the future

• Enhanced promotion of the guidelines for the management of suspected rabies exposures to primary care practitioners to improve judicious and appropriate use of PEP

• Provision of more accessible resources to clinicians in the assessment of exposures and in the determination of post-exposure treatment (e.g. development and dissemination of algorithms for assessing human exposures) at the local level

• Improve data collection and reporting in iPHIS through a review and update of the PEP user guide and development of a standardized data collection tool
Key Resources

- Ontario Infectious Diseases Protocol, 2013
- Ontario Guidelines for the Management of Suspected Rabies Exposures, 2010
References


Acknowledgements

• Ontario’s 36 public health units

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Questions?