Epidemiology of Intussusception in New Zealand Pre Rotavirus Vaccination

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Introduction - Intussusception

- Invagination of intestine into adjacent distal segment.
- Often initiated by infection and gut adenopathy.
- Disrupts vascular supply $\rightarrow$ perforation and death.
- World-wide incidence 74 /100,000 in children < 1 year.
Introduction - Rotavirus

- Worldwide:
  - Deaths - 200,000 - 450,000 per year
  - Hospitalisations - 2.4 million per year

- New Zealand pre rotavirus vaccination
  - 1 in 43 children hospitalised by age of five.
Introduction – Vaccination

- Rotashield (1999)
  - Increased intussusception risk (1:5000 – 1:10,000)

  - Pre-licensure studies, no increased risk.
  - Post licensure studies, small increase (5.6:100,000)
  - Increase particularly associated with first dose.

- NZ - RotaTeq at 6 weeks, 3 and 5 months from July 2014.
Aim

- Describe epidemiology of intussusception:
  - New Zealand children (0 – 36 months)
  - Before routine rotavirus vaccination
Method

- ICD-10 data from January 1994 to December 2013.
- NZ census birth data
- Population incidence rates by:
  - age
  - sex
  - ethnicity
  - season
- Poisson distribution and non-parametric statistics
- Compared rates to international norms
Data

961 intussusception discharges

794 cases

167 re-presentations
### Incidence

<table>
<thead>
<tr>
<th>Age</th>
<th>Cases</th>
<th>Population</th>
<th>Incidence</th>
<th>95% C.I.</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1 year</td>
<td>531</td>
<td>946614</td>
<td>56.1</td>
<td>41.7-71.2</td>
</tr>
<tr>
<td>1-2 years</td>
<td>176</td>
<td>959666</td>
<td>18.6</td>
<td>9.4–25.9</td>
</tr>
<tr>
<td>2-3 years</td>
<td>87</td>
<td>915909</td>
<td>9.2</td>
<td>3.3–15.2</td>
</tr>
<tr>
<td>Total</td>
<td>794</td>
<td>2822189</td>
<td>28.0</td>
<td>17.5–38.2</td>
</tr>
</tbody>
</table>
Trend over Time

Total Incidence of Intussusception by Year

Cases per 100,000 child years

- 1998
- 1999
- 2000
- 2001
- 2002
- 2003
- 2004
- 2005
- 2006
- 2007
- 2008
- 2009
- 2010
- 2011
- 2012
- 2013
Season

Cases per 100,000 Child Years (95% C.I.)

Jan  Feb  March  April  May  June  July  Aug  Sept  Oct  Nov  Dec

p < 0.001
Sex

Cases per 100,000 child years (95% C.I.)

Female: 20 (95% C.I.: 10-30)
Male: 50 (95% C.I.: 40-60)

P < 0.001
Age

P < 0.001

Cases per 100,000 Child Years (95% C.I.)

Age (months)
Ethnicity and Age

Median Age in Months (95% C.I.)

- Other
- European
- Maori
- Pacific
- Asian

P < 0.03
Discussion

- World-wide intussusception rates vary enormously.
- Emphasizes need for local data.
- Our study:
  - NZ comparable to other developed countries
  - Incidence constant over 16 years.
Discussion

- Previous studies:
  - No definitive link with wild-type rotavirus infection
  - No clear seasonal pattern

- Our study
  - Weak seasonal pattern
  - Peaks in spring and autumn
  - Association with wild-type rotavirus infection unknown
Discussion

- Uncertainty whether rotavirus vaccination -
  - increases intussusception incidence
  OR
  - causes earlier age of onset

- Preliminary evidence supports early vaccination strategy.

- Our study:
  - Median age at intussusception 8.9 months.
  - Older than recommended age for vaccination completion.
Discussion

• Earlier intussusception in Maori and Pacific infants.

• Possible causes:
  • Increased infectious disease burden?
  • Heavier?

• Implications for intussusception risk uncertain
Discussion

- Findings emphasize importance of vaccine timeliness
- NZ vaccine timeliness problematic, particularly for Maori
- Impact of vaccine delay on intussusception risk unknown
Limitations

• Anonymous retrospective coding data

• Coding data usually under-estimates incidence rate

• Comparing our data with prospective data may:
  ▪ under-estimate vaccine risk
  ▪ over-estimate vaccine risk
  ▪ be insufficiently sensitive
Conclusions:

- Establishes contemporary intussusception data for NZ
  - NZ incidence similar to other developed countries
  - Peaks in Spring and Autumn
  - Peak incidence later than vaccine completion
  - Earlier intussusception in Maori and Pacific infants
- Emphasizes need for ongoing monitoring
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Conflicts of Interest

- None