Testing the MEM R-Shiny Interface

Canada Data
Kinda Zureick - CDC
Christina Bancej - PHAC
Surveillance Indicators – ILI, % Positive, Pediatric Hospitalizations
ILI - Overview

The Moving Epidemics Method Shiny Web Application

Summary, graphs, goodness and optimization of the MEM model

- **11** Seasons in the model
- **48** Average epidemic start week
- **19.0** Average epidemic length
- **61.2%** Epidemic percentage
- **31.8** Epidemic threshold
- **43.2** Medium threshold
- **69.2** High threshold
- **85.2** Very high threshold
ILI - MEM

CANADA - ILI

Legend
- 2002/2003
- 2003/2004
- 2004/2005
- 2005/2006
- 2006/2007
- 2007/2008
- 2010/2011
- 2011/2012
- 2012/2013
- 2013/2014
- 2014/2015

- Typical
- Epidemic thr.
- Medium thr.
- High thr.
- Very high thr.
- Mean start
ILI – Average Curve

CANADA - ILI

Legend
- Weekly rates
- Epidemic thr.
- Medium thr.
- High thr.
- Very high thr.

Start

X-axis: 35 38 41 44 47 50 1 4 7 10 13 16 19 22 25 28 31 34
Y-axis: 0 10 20 30 40 50 60 80 90
ILI - Optimization

Summary, graphs, goodness and optimization of the MEM model

- Sensitivity: 0.49
- Specificity: 0.93
- Positive predictive value: 0.65
- Negative predictive value: 0.87
- Percent agreement: 0.84
- Matthews correlation coefficient: 0.47
- Current parameter: 2.0
- Optimum parameter: 2.0
Percent Positive - Overview

The Moving Epidemics Method Shiny Web Application

- 15: Seasons in the model
- 51: Average epidemic start week
- 19.0: Average epidemic length
- 87.1%: Epidemic percentage
- 12.5: Epidemic threshold
- 23.5: Medium threshold
- 36.9: High threshold
- 44.9: Very high threshold
Percent Positive – Average Curve

CANADA - percent positive

Legend
- Weekly rates
- Epidemic thr.
- Medium thr.
- High thr.
- Very high thr.
- Start
### The Moving Epidemics Method Shiny Web Application

#### Percent Positive - Validation

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td>0.84</td>
</tr>
<tr>
<td>Specificity</td>
<td>0.91</td>
</tr>
<tr>
<td>Positive predictive value</td>
<td>0.78</td>
</tr>
<tr>
<td>Negative predictive value</td>
<td>0.94</td>
</tr>
<tr>
<td>Percent agreement</td>
<td>0.89</td>
</tr>
<tr>
<td>Matthews correlation coefficient</td>
<td>0.73</td>
</tr>
</tbody>
</table>
Pediatric Hospitalizations - Overview

- **6** Seasons in the model
- **49** Average epidemic start week
- **17.5** Average epidemic length
- **85.5%** Epidemic percentage
- **15.1** Epidemic threshold
- **36.3** Medium threshold
- **85.8** High threshold
- **125.4** Very high threshold
Pediatric Hospitalizations - MEM
Pediatric Hospitalizations – Average Curve

CANADA - pediatric hospitalization:

Legend:
- Weekly rates
- Epidemic thr.
- Medium thr.
- High thr.
- Very high thr.
- Start
Pediatric Hospitalizations - Validation

- Sensitivity: 0.79
- Specificity: 0.93
- Positive predictive value: 0.79
- Negative predictive value: 0.93
- Percent agreement: 0.90
- Matthews correlation coefficient: 0.72
- Current parameter: 2.0
- Optimum parameter: 2.0
Conclusions

• User-friendly interface, intuitive, easy to use - FUN
• Ideal indicators (ILI, % pos, hospitalizations) will differ between jurisdictions
• Optimal slope parameter lower for Canada 2.0 – 2.1
• Consistent with other modelling methods Canada has used to established seasonal threshold
• Has face validity with accepted/understood seasonal patterns in Canada – start/end and duration of season
• Confirms signal for extra-ordinary season seen in 2015/16 pediatric population
• Useful to develop curves across multiple populations (e.g., strain specific, age-specific, region-specific).