Moderate to high seasonal influenza vaccine effectiveness in Ireland: a test-negative case-control study

I-MOVE project, 2013-2014

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IMOVE study
& seasonal influenza vaccination in Ireland

• Part of a multicentre European Study
  \(I\text{-MOVE: Influenza Monitoring of Vaccine Effectiveness in Europe}\)

• Influenza viruses continuously evolve, vaccines are reformulated every year

• Vaccine uptake in adult population = 21% (season 2012-13)

• Start of 2013-14 vaccination campaign in Ireland:
  7th October 2013

• Inactivated Influenza Vaccine (Split Virion) BP manufactured by Sanofi Pasteur MSD (used in majority)
Objective

→ to estimate the trivalent influenza vaccine effectiveness (IVE) in Ireland for the 2013-14 season.
Test negative case control study

ILI Patients
(no contraindication for vaccination)

 Participating sentinel GP

Negative PCR
(all influenza viruses)

Swabbing
+ 

questionnaire

Positive PCR

Controls

Cases
Data collection & timeline

• **Questionnaire** on:
  – vaccination history *(vaccination: >14 days before disease onset)*
  – demographic
  – clinical symptoms
  – medical condition(s)
  – antiviral treatment

• Nose and throat **swab** for influenza testing

❖ **Timeline:** week 51 2013 - 17 2014
Analysis

- **Influenza vaccine effectiveness (IVE):** $1 - \text{OR} \ (95\% \ CI)$

- **Statistical analysis:**
  - Univariable analysis $\rightarrow$ Crude IVE
  - Logistic regression $\rightarrow$ IVE adjusted for potential confounders
Results – **GP participation (n=23)**

- 31 GP practices agreed to participate
  - 52% (31/60) of all sentinel GP practices in Ireland

- 23 GP practices finally participated
  - 38% (23/60)
Recruitment of patients (n=213)

- 213 recruited patients
  - 19 Did not meet the EU ILI definition
  - 194 patients
    - 10 > 7 days between symptom onset & swabbing
    - 184 patients
      - 8 Onset week < 51-2013 and > 17-2014 (onset week of first and last confirmed influenza case)
      - 176 patients
        - 3 Missing information (lab result, onset date, date of swab, vaccination status or date of vaccination)
        - 173 patients

70 controls (40%)
103 influenza cases (60%)
Distribution of ILI patients by laboratory results and onset of symptoms (n=173)

Week of symptom onset

* source: GP influenza sentinel surveillance system Ireland, ILI rate based on date of consultation
Description of cases and controls by age and sex (n=173)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Cases (n=103)</th>
<th>Controls (n=70)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median age in years (q25 – q75)</td>
<td>33 (17-46)</td>
<td>42 (28-53)</td>
<td>0.006</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>53 (51%)</td>
<td>39 (56%)</td>
<td>0.642</td>
</tr>
</tbody>
</table>
# Vaccine effectiveness (n=173)

<table>
<thead>
<tr>
<th>Influenza type</th>
<th>Cases vaccinated / total</th>
<th>Controls vaccinated / total</th>
<th>Crude IVE [95% CI]</th>
<th>Adjusted IVE* [95% CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>All individuals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All types</td>
<td>8/103</td>
<td>14/70</td>
<td>66% [7.1 – 88]</td>
<td>72% [10 – 91]</td>
</tr>
<tr>
<td>A(H3)</td>
<td>5/55</td>
<td>14/70</td>
<td>60% [-29 – 89]</td>
<td>-</td>
</tr>
<tr>
<td>A(H1)pdm09</td>
<td>3/41</td>
<td>14/70</td>
<td>68% [-29 – 94]</td>
<td>-</td>
</tr>
<tr>
<td><strong>Target groups</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All types</td>
<td>8/23</td>
<td>10/23</td>
<td>31% [-167 – 82]</td>
<td>-</td>
</tr>
<tr>
<td>A(H3)</td>
<td>5/13</td>
<td>10/23</td>
<td>18% [-295 – 84]</td>
<td>-</td>
</tr>
<tr>
<td>A(H1)pm09</td>
<td>3/9</td>
<td>10/23</td>
<td>35% [-308 – 91]</td>
<td>-</td>
</tr>
</tbody>
</table>

* Adjusted for onset month, sex, age group (10-year age bands)
Limitations

- Small numbers + low vaccine coverage in recruited patients
  - Low statistical power and imprecise VE estimates
  - Limited stratified/multivariable analysis

- EU ILI definition

8 (42%) tested positive for influenza
Conclusions & recommendations

→ Moderate to high VE

• Raise awareness of the public on the effectiveness of seasonal influenza vaccination

• Increase GP participation
• Increase patient recruitment by GPs
• Continue the study:
  – in Ireland
  – in Europe, to benefit from the pooled analysis estimates
Thank you!
Acknowledgments

Study team
• Joan O’Donnell, HPSC
• Lisa Domegan, HPSC
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• Suzie Coughlan, NVRL
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• Claire Collins, ICGP
• Darina O’Flanagan, HPSC

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• Alain Moren
• Marc Rondy

GPs & patients
Influenza vaccination 2013/2014 (1)

- **Target groups** (free vaccine, but have to pay for administration unless having medical card or GP card)
  - Those aged ≥ 65 years
  - Those aged >6 months with underlying medical conditions
  - Pregnant women
  - Health care workers
  - Residents of nursing homes, and other long stay institutions
  - Carers
  - People who have close, regular contact with pigs, poultry or water fowl

- **Those not in the at risk groups could get the vaccine if they pay privately**
Influenza vaccination 2013/2014 (2)

- **Places of vaccination**
  - GP practices
  - Pharmacies
  - Occupational health departments

- **Vaccine brands**
  - Non-adjuvanted Inactivated Split Virion BP (SP MSD)
  - Fluarix from GSK and Influvac (Boots stores) (n=1)
ILI case definition

- Sudden onset of symptoms
- At least one of the following systemic symptoms:
  - Fever
  - Malaise
  - Headache
  - Myalgia
- At least one of the following respiratory symptoms:
  - Cough
  - Sore throat
  - Shortness of breath
Genetic characterisation of influenza

• NVRL - influenza positive IMOVE specimens are genetically characterised
  – subset included:
    • notified vaccine failures (as defined by IMOVE protocol) and
    • a selection of specimens from individuals of varying age groups, risk profiles and vaccination status
• All A(H1)pdm09 sequences clustered with A(H1)pdm09 clade representative A/California/7/2009 – A/St Petersburg/27/2011 group
• All AH3 sequences clustered with the vaccine strain A/Texas/50/2012 (subgroup 3C)
• One B specimen - B/Victoria lineage
  – B(Vic)-lineage clade 1A representative B/Brisbane/60/2008
Antigenic characterisation of influenza

- Influenza A(H3) antigenically similar to the vaccine strain
  - A(H3) A/Texas/50/2012 (H3N2)-like
- Influenza A(H1)pdm09 antigenically similar to the vaccine strain
  - A(H1)pdm09 A/California/7/2009-like