Influenza vaccine cost effectiveness in children in Finland

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ESWI 28 September 2018
ESWI September 2018

Faculty Disclosure

Secretary of NITAG THL Finland
Team co-lead Influenza, THL
Mother of 4 and grandmother of 6

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Honoraria/Expenses</th>
<th>Consulting/Advisory Board</th>
<th>Funded Research</th>
<th>Royalties/ Patent</th>
<th>Stock Options</th>
<th>Ownership/ Equity Position</th>
<th>Employee</th>
<th>Other (please specify)</th>
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<tbody>
<tr>
<td>* GlaxoSmithKline</td>
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<td></td>
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</tr>
<tr>
<td>* Pfizer, Inc</td>
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<td>IMI projects DRIVE RESECEU ADVANCE</td>
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</tr>
</tbody>
</table>
Why did THL Finland perform cost effectiveness analysis of influenza vaccination in children in early 2000?
The Four step approach of NIP decision making in Finland since 2000

How does a new vaccine end up in the national universal vaccination programme?

Main questions are

1. Can one expect that universal vaccination provides sufficient reduction of a **significant public health disease burden**, when taking into consideration the epidemiology and severity of the disease, and the effectiveness of the vaccine?

2. Is the vaccine **safe** enough to those vaccinated?

3. Is the vaccine safe enough on population level?

4. Is the balance between the vaccination related **health benefits and economic costs** acceptable?
Impact on disease burden
Vaccine safety on the individual and population level
Cost-effectiveness

Transmission model
CEA of the vaccination programme

Expert opinion
Expert group recommendation
NITAG recommendation
National Institute for Health and Welfare recommendation

Surveillance Evaluation of Influenza
Decision on vaccination programme (MSAH statute)

Parliament decision on the budget
MSAH budget proposal
MSAH opinion

Decision on a vaccine-specific expert group

Ministry of Social Affairs and Health (MSAH) procedure
Advisory Board on Communicable Diseases consultation

THL, Heini Salo
Cost-effectiveness of influenza vaccination of healthy children

Heini Salo\textsuperscript{a}, Terhi Kilpi\textsuperscript{a}, Harri Sintonen\textsuperscript{b}, Miika Linna\textsuperscript{c}, Ville Peltola\textsuperscript{d}, Terho Heikkinen\textsuperscript{d,∗}

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\textsuperscript{b} Department of Public Health, 00014 University of Helsinki, Finland
\textsuperscript{c} National Research and Development Centre for Welfare and Health, 00531 Helsinki, Finland
\textsuperscript{d} Department of Paediatrics, Turku University Hospital, FI-20520 Turku, Finland

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Available online 7 April 2006

Abstract

Influenza vaccination of children 6–23 months of age is recommended in the United States and Canada because of high rates of influenza-associated hospitalisations, but few other countries have adopted similar policies. Most children with influenza are treated in the primary care setting, and the cost-effectiveness of influenza vaccination of children has not been fully established. We used a decision analysis model to assess the cost-effectiveness of influenza vaccination of children 6 months to 13 years of age in Finland. The analyses were based on comprehensive clinical data on virologically confirmed influenza infections, hospital medical records, and national registers. We estimated the impact of influenza on outpatient and hospitalised children and their families, and performed the analyses from the health care provider and societal perspective. Influenza vaccination resulted in savings in all programs including children ≤13 years of age from both the health care provider and societal perspective. Investing 1.7 million euros in vaccination of children <5 years of age yielded savings of 2.7 million euros in health care costs. From the health care provider perspective, the savings per vaccinated child ranged between 5.7 and 12.6 euros in any program including children up to 13 years of age. The vaccination was cost saving in all age groups even with assumed vaccine efficacy of 60%. The results show that influenza vaccination would be cost saving in all children ≤13 years of age in Finland, which advocates reconsideration of the current influenza vaccine recommendations in all countries.

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Methodology and assumptions

Fig. 1. The decision tree model of influenza vaccination. The structure of the “vaccination” arm is similar to that of “no vaccination”. The node “severe disease” includes cases of pneumonia treated in the hospital setting. The estimates of influenza-associated disease probabilities are shown for children 12–23 months of age. In the analyses the estimates varied by age. The estimates for the “vaccination” arm are shown in parentheses. AOM denotes acute otitis media.

Salo et al 2006
Estimated costs of influenza from registers, publications and expert opinion

Table 1
Unit costs used in the analyses

<table>
<thead>
<tr>
<th>Variable</th>
<th>Base value</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated average cost of influenza and acute otitis media</td>
<td>208.3</td>
<td></td>
</tr>
<tr>
<td>Estimated average cost of influenza and pneumonia (outpatient)</td>
<td>202.1</td>
<td></td>
</tr>
<tr>
<td>Estimated average cost of influenza and sinusitis</td>
<td>66.8</td>
<td></td>
</tr>
<tr>
<td>Average length of stay in hospital for influenza (days)</td>
<td>2.2</td>
<td>b,c</td>
</tr>
<tr>
<td>Average cost per stay in hospital for influenza</td>
<td>1555.0</td>
<td>b,c</td>
</tr>
<tr>
<td>Cost per visit to a primary care physician</td>
<td>58.5</td>
<td>[28]</td>
</tr>
<tr>
<td>Cost per visit to hospital emergency department</td>
<td>210.5</td>
<td>[28]</td>
</tr>
<tr>
<td>Cost of antimicrobial therapy of acute otitis media</td>
<td>8.5</td>
<td>d</td>
</tr>
<tr>
<td>Cost of antimicrobial therapy of pneumonia (outpatient)</td>
<td>6.9</td>
<td></td>
</tr>
<tr>
<td>Cost of one dose of vaccine (wholesale price)</td>
<td>2.3</td>
<td></td>
</tr>
<tr>
<td>Total hourly cost of regular working time of a nurse</td>
<td>18.5</td>
<td>[28]</td>
</tr>
<tr>
<td>Average gross income per working day</td>
<td>166.7</td>
<td>[29]</td>
</tr>
<tr>
<td>Average travel cost per visit in primary health care</td>
<td>6.0</td>
<td>[30]</td>
</tr>
<tr>
<td>Average travel cost per visit to emergency department</td>
<td>30.7</td>
<td>[30]</td>
</tr>
</tbody>
</table>

All costs are in euros.

- a Includes all diagnostic and treatment costs.
- b Health Care Register, Finland.
- c National Research and Development Centre for Welfare and Health (STAKES).
- d MIKSTRA program: new strategies for antimicrobial use in Finland.
Annual savings per vaccinated child and total annual savings depending on perspective

Fig. 2. Annual savings per vaccinated child and total annual savings from the health care provider and the societal perspective in cumulative cohorts of children in the vaccination program.
Annual savings / vaccinated child
Sensitivity analysis

Fig. 3. Annual savings per vaccinated child in the sensitivity analyses from the health care provider perspective.
? How about the indirect effect ?
Cost-effectiveness of various additions to current flu programme

All additions involving vaccination of children were cost-effective even at low uptake (30%)

Little additional benefit by adding older age groups but big increase in programme costs

Baguelin M BMC Med 2015

Cost in £ per QALY gained
How successful has the childhood influenza vaccination programme been?
Influenza vaccine coverage in Finland during seasons 2009/18 among young children and elderly as of 26 May 2018

* ... Fully vaccinated (2 doses if not given min. 2 doses before, otherwise 1 dose as for all the other age groups)
<table>
<thead>
<tr>
<th>Year</th>
<th>Vaccine</th>
<th>Target group</th>
<th>Main reason for recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>SIV</td>
<td>Medical risk groups</td>
<td>Burden of Disease (BoD)</td>
</tr>
<tr>
<td>2002</td>
<td>SIV</td>
<td>&gt;65 year old</td>
<td>BoD</td>
</tr>
<tr>
<td>2007</td>
<td>SIV</td>
<td>Children 6 – 35 mo</td>
<td>Cost saving when given to children &lt;13 yrs (Salo et al 2006)</td>
</tr>
<tr>
<td>2009</td>
<td>AH1N1 + AS03</td>
<td>Everyone according to prioritization order</td>
<td>Pandemic threat, expected BoD Obs! not part of NIP</td>
</tr>
<tr>
<td>2010</td>
<td>SIV</td>
<td>Pregnant women HCW taking care of at risk patients</td>
<td>BoD Indirect protection (IP)</td>
</tr>
<tr>
<td>2011</td>
<td>SIV</td>
<td>All HCW and social workers</td>
<td>BoD; IP – 2018 CommDis Act mandates Employer responsibility</td>
</tr>
<tr>
<td>2012</td>
<td>SIV</td>
<td>Close contacts Army conscripts</td>
<td>IP BoD</td>
</tr>
<tr>
<td>2014</td>
<td>SIV</td>
<td>Pharmacy workers in direct customer contact</td>
<td>BoD IP</td>
</tr>
<tr>
<td>2018</td>
<td>SIV</td>
<td>Children &lt; 7 yrs of age Prisoners</td>
<td>CEA (2006)</td>
</tr>
</tbody>
</table>
How effective has the childhood influenza vaccination programme been?
Has it been cost-effective?
Influenza vaccine effectiveness against laboratory confirmed influenza and ILI among children 6-35 mo of age – nation wide register linkage cohort study

A. Annual birth cohort ~55 000, coverage 13 – 36 %
Laboratory confirmed influenza reported to NIDR
National Infectious Disease Register
Influenza vaccine effectiveness
cohort of 54,611 children 24-35 mo of age
register linkage cohort study, season 2017/18

Inactivated vaccine (IIV3)
- Vacc coverage = 9%

<table>
<thead>
<tr>
<th>Cases*</th>
<th>VE** and 95%CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza</td>
<td>318/ 44</td>
</tr>
<tr>
<td>... type A</td>
<td>145/ 19</td>
</tr>
<tr>
<td>... type B</td>
<td>177/ 25</td>
</tr>
<tr>
<td>‘ILI’</td>
<td>159/ 18</td>
</tr>
</tbody>
</table>

Live-attenuated vaccine (LAIV4)
- Vacc coverage = 22%

<table>
<thead>
<tr>
<th>Cases*</th>
<th>VE** and 95%CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza</td>
<td>318/ 67</td>
</tr>
<tr>
<td>... type A</td>
<td>145/ 59</td>
</tr>
<tr>
<td>... type B</td>
<td>177/ 11</td>
</tr>
<tr>
<td>‘ILI’</td>
<td>159/ 30</td>
</tr>
</tbody>
</table>

* Not vaccinated/ vaccinated
** in %, adjusted for age and sex
Laboratory confirmed influenza A/B findings (N=37,508) by age by end of season 2018 (as of 27.9.2018)

<table>
<thead>
<tr>
<th>Age group yrs</th>
<th>Influenza A</th>
<th>Influenza B</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4</td>
<td>1211</td>
<td>1298</td>
</tr>
<tr>
<td>5-14</td>
<td>1466</td>
<td>3398</td>
</tr>
<tr>
<td>15-64</td>
<td>6770</td>
<td>9979</td>
</tr>
<tr>
<td>65+</td>
<td>7209</td>
<td>6177</td>
</tr>
</tbody>
</table>

![Graph showing influenza cases by age group and season](image)
Given the differences in observed effectiveness of available vaccines, what role economic analysis should play in choosing influenza vaccines for the National immunization programme?
X = yhteiskunnan maksuhalukkuus yhdestä lisä-QALYsta
Q = oireisen influenssatapauksen keskimääräinen QALY menetys
H = oireisen influenssatapauksen keskimääräinen kustannus

**Assumption = QIV prevents 8 % units more Lab+ influenza**

**Tulokset**

Children 6 – 35 mo old

0.5–2-vuotiailla valmisteiden suurin sallittu hintaero on 4.8 euroa / annos, jos maksuhalukkuus yhdestä lisä-QALYsta on 20 000€ ja QIV-ohjelma estää 8 prosenttiyksikköä enemmän influenssatapauksia (Taulukko 1).


<table>
<thead>
<tr>
<th></th>
<th>0.5–2-vuotiaat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keskimääräinen oireisten tapausten ilmaantumisosuus, p$^1$</td>
<td>0.1806</td>
</tr>
<tr>
<td>Oireisen influenssatapauksen keskimääräinen kustannus (€), H$^2$</td>
<td>180</td>
</tr>
<tr>
<td>Oireisen influenssatapauksen keskimääräinen Qaly-menetys, Q$^3$</td>
<td>0.0075</td>
</tr>
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</table>

Maksuhalukkuus (€ / lisä-QALY)

<table>
<thead>
<tr>
<th></th>
<th>$\Delta R$</th>
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<tbody>
<tr>
<td>10 000</td>
<td>3.7</td>
</tr>
<tr>
<td>15 000</td>
<td>4.2</td>
</tr>
<tr>
<td>20 000</td>
<td>4.8</td>
</tr>
<tr>
<td>25 000</td>
<td>5.3</td>
</tr>
<tr>
<td>30 000</td>
<td>5.8</td>
</tr>
</tbody>
</table>

$^1$(Heikkinen ym. 2004)
$^2$(Salo ym. 2006)
$^3$(van Hoek 2011)
≥65-vuotiailla valmisteiden suurin sallittu hintaero on 1.13 euroa / annos, jos maksuhalukkuus yhdestä lisä-QALYsta on 20 000€, keskimääräinen oireisten tapausten ilmaantumisosuus on 10% ja QIV-ohjelma estää 4 prosenttiyksikköä enemmän influenssatapauksia (Taulukko 2). QIV-ohjelman lisähinta riippuu ≥65-vuotiailla ennen kaikkea oletetusta oireisten tapausten ilmaantumisosuudesta ja influenssan kuolleisuudesta.

Taulukko 2. QIV-ohjelman suurin sallittu lisähinta ΔR (€ / annos) verrattuna TIV-ohjelmaan eri maksuhalukkuuksilla ≥65-vuotiailla. QIV-ohjelman oletettiin estävän 4 prosenttiyksikköä (ΔΘ) enemmän influenssatapauksia.

<table>
<thead>
<tr>
<th></th>
<th>p 5%</th>
<th>p 10%</th>
<th>p 15%</th>
<th>p 10%, ΔΘ 0.06</th>
<th>p10%, VOS-osuus 5%</th>
<th>p 10%, kuolleisuus 0.02%</th>
</tr>
</thead>
<tbody>
<tr>
<td>ΔΘ</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.06</td>
<td>0.04</td>
<td>0.04</td>
</tr>
<tr>
<td>p¹</td>
<td>0.05</td>
<td>0.10</td>
<td>0.15</td>
<td>0.10</td>
<td>0.10</td>
<td>0.10</td>
</tr>
<tr>
<td>VOS osuus²</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.05</td>
<td>0.05</td>
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<tr>
<td>Kuolleisuus³</td>
<td>0.0001</td>
<td>0.0001</td>
<td>0.0001</td>
<td>0.0001</td>
<td>0.0001</td>
<td>0.0002</td>
</tr>
<tr>
<td>ICER (€ / lisä-QALY)</td>
<td>ΔR</td>
<td>ΔR</td>
<td>ΔR</td>
<td>ΔR</td>
<td>ΔR</td>
<td>ΔR</td>
</tr>
<tr>
<td>10 000</td>
<td>0.39</td>
<td>0.78</td>
<td>1.17</td>
<td>1.17</td>
<td>1.27</td>
<td>1.27</td>
</tr>
<tr>
<td>15 000</td>
<td>0.48</td>
<td>0.95</td>
<td>1.43</td>
<td>1.43</td>
<td>1.45</td>
<td>1.47</td>
</tr>
<tr>
<td>20 000</td>
<td>0.56</td>
<td>1.13</td>
<td>1.69</td>
<td>1.69</td>
<td>1.62</td>
<td>1.66</td>
</tr>
<tr>
<td>25 000</td>
<td>0.65</td>
<td>1.30</td>
<td>1.95</td>
<td>1.95</td>
<td>1.79</td>
<td>1.86</td>
</tr>
<tr>
<td>30 000</td>
<td>0.74</td>
<td>1.47</td>
<td>2.21</td>
<td>2.21</td>
<td>1.97</td>
<td>2.06</td>
</tr>
</tbody>
</table>

¹Keskimääräinen oireisten tapausten ilmaantumisosuus
²Vuodeosastohoidottujen osuus infektoituneista
³
Guideline on Influenza Vaccines
Non-clinical and Clinical Module

Brand / Product specific Effectiveness data requested
Development of Robust and Innovative Vaccine Effectiveness (DRIVE)

www.drive-eu.org

@drive_eu #driveflu

26.05.2018

Acknowledgement
DRIVE project has received funding from the Innovative Medicines Initiative 2 Joint Undertaking under grant agreement No 777363, This Joint Undertaking receives support from the European Union’s Horizon 2020 research and innovation programme and EFPIA.
DRIVE Consortium is expanding

15 partners: 3 PHIs + 6 Public Partners/Academia + 2 SMEs + 4 EFPIA

Public coordinator:

Project Leader:
Future plans to improve influenza programme in Finland

- Continue refining IVE estimation in light of propensity, health status, previous vaccination history, and circulating strains
- Establish hospital based IVE surveillance for children
- Improve understanding on who gets influenza vaccine, why / why not
- Study impact of real-time IVE communications on uptake and willingness to get vaccinated

Next season

- Finland has purchased QIV 1,7 mi doses (all) and LAIV (2-6 yr olds)
- Expand IMI-DRIVE network and activities
- TND study among adults olds (DRIVE) ?
- Repeated dose immunological study among HCW
- IVE among immune-compromized patients
- Behavioral economics
Take home messages

- Cost effectiveness analysis (CEA) is a useful tool to justify health interventions on population level
- Economic analyses are sensitive to the assumptions made
- Secondary use of health records data allows real time estimation of vaccine 1) coverage and 2) impact
- Register data can be used both for programme monitoring and development, as well as guiding decision making, and informing society at large
- We need to better understand bias and confounding in interpreting IVE before we make conclusions on preferential recommendations
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Backup slides
Parental attitudes towards SIV 2015

Miten suhtautuu kausi-influenssarokotteent antamiseen lapselle

Positive

- 5) Erittäin myönteisesti
- 4) Melko myönteisesti
- 3) Ei myönteisesti eikä kielteisesti
- 2) Melko kielteisesti
- 1) Erittäin kielteisesti

Negative

- Keskiarvo 5-1

N = 697

Kaikki, n=697

% 0 10 20 30 40 50 60 70 80 90 100

n=kaikki vastaajat

Keskiarvo 3,29

THL & Terveystutkimus Oy, 2015
Influenza vaccine coverage among children 6-35 mo and elderly 65 year+, season 2017/18

Children 6 – 35 months

Elderly 65+ years
ROKOTekKOOLEMISTA VAIETTU

PUSKAN PIikki

NANOTeKNOLOGIASTA NARKOLEPSIAA?!
Countries recommending seasonal influenza vaccine for children and adolescents (n=29)

Data refers to **2017-18 influenza season**

In Malta vaccine is recommended for those ≥6 months – <5 years
Funding mechanism for seasonal influenza vaccine and vaccine administration in children in 6 EU MSs

Data refers to **2017-18 influenza season**

Some countries have several funding mechanisms
Reported seasonal influenza vaccination coverage in children in 6 EU/EEA MSs
Study design for children
Register-based nationwide cohort

- Study setting: Finland
- Study population: Birth cohort, i.e. two-year-olds, excluding children not covered by NVR or MBR
- Outcome: Influenza A and B, laboratory-confirmed and recorded in NIDR
- Exposure: First influenza vaccination in 2017/18, either IIV or LAIV, recorded in NVR, time-dependent
- Individual follow-up: from week 40 until outcome occurred, death, or week 17, whatever came first
- Statistical analysis: Cox regression, adjusted for month of birth, sex, socio-economic factors, underlying chronic conditions, etc. through propensity score quintiles and for ≥1 influenza vaccination in previous seasons (yes/no), excluding days 1-14 after vaccination

Effect measure: VE = 1 – adjusted HR

For methods, see Nohynek et al. EuroSurveillance 2016
Alternative to TND = Utilizing person identifier and register linkage approach

Example Finland

DOI: http://dx.doi.org/10.2807/1560-7917.ES.2017.22.17.30520
# Influenza vaccine effectiveness

## Children 6 – 35 months
- N = 128,051
- Coverage = 35%

<table>
<thead>
<tr>
<th></th>
<th>Cases*</th>
<th>VE** and 95%CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza</td>
<td>765/ 312</td>
<td><strong>20.7</strong> (9.5; 30.6)</td>
</tr>
<tr>
<td>... type A</td>
<td>366/ 164</td>
<td><strong>13.2</strong> (-4.5; 27.9)</td>
</tr>
<tr>
<td>... type B</td>
<td>409/ 154</td>
<td><strong>26.4</strong> (11.3; 38.9)</td>
</tr>
<tr>
<td>‘ILI’</td>
<td>338/ 110</td>
<td><strong>34.4</strong> (18.6; 47.2)</td>
</tr>
</tbody>
</table>

* Not vaccinated/ vaccinated ** in %, adjusted for age and sex

## Elderly 65+ years
- N = 1,146,276
- Coverage = 47%

<table>
<thead>
<tr>
<th></th>
<th>Cases*</th>
<th>VE** and 95%CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza</td>
<td>6910/ 5253</td>
<td><strong>20.7</strong> (17.8; 23.5)</td>
</tr>
<tr>
<td>... type A</td>
<td>3430/ 3013</td>
<td><strong>8.8</strong> (4.2; 13.2)</td>
</tr>
<tr>
<td>... type B</td>
<td>3544/ 2274</td>
<td><strong>32.7</strong> (29.0; 36.1)</td>
</tr>
<tr>
<td>‘ILI’</td>
<td>1358/ 1145</td>
<td><strong>7.0</strong> (-0.7; 14.2)</td>
</tr>
</tbody>
</table>

* Not vaccinated/ vaccinated ** in %, adjusted for age, sex, presence of chronic underlying conditions, and number of hospitalisations in 2016
Influenza vaccine effectiveness
Seasons 2016/17 (gray) vs. 2017/18 (green)

Children 6 – 35 months

Elderly 65+ years
IVE estimates Real-time VE vs. In retrospect

- Crude 2016/17 estimates:

Real-time vaccine effectiveness against LC1 type A in the elderly (65+)

Retrospective vaccine effectiveness against LC1 type A in the elderly (65+)
The exposure: seasonal influenza vaccination

- (Non-differential) misclassification of exposure
  - Presumably <5% not fully covered by National Vaccination Register and therefore excluded from analysis

- Time since vaccination

<table>
<thead>
<tr>
<th>days after vaccination:</th>
<th>1</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>not vaccinated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>intermediate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>vaccinated</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The exposure: seasonal influenza vaccination

Viikoittaiset influenssakäynnit, 2013-2018

- epidemiakynnys ylitettiin joulukuun puolivälissä
- huippu helmikuun lopulla
- epidemikynnys alitettiin huhti-toukokuun vaihteessa

- kestoltaan pitkä
- influenssa-aktiivisuus runsasta useamman viikon ajan (vkot 6-12)
TTR:n ilmoitetut influenssalöydökset, 2013-2018

- influenssa B -virus poikkeuksellisesti aloitti kauden
- lähes koko kauden ajan influenssa B -löydöksiä raportoitiin enemmän kuin influenssa A -löydöksi (lähes 2x määrä)
- maaliskuun alusta lähtien influenssa A -löydösmäärät ylittivät influenssa B -löydökset
! Call for Tenders is out until June 25!
Total 1,7 mi TIV doses purchased in 2017
Vaccine uptake from 2013 on
Influenza vaccine coverage among children 6-35 mo and elderly 65 year+, season 2017/18

Children 6 – 35 months

Elderly 65+ years
Influenza seasons since 2013 monitored by ILI visits to GPs
Vaccine uptake vs. A(H3N2) epidemic curve season 2016/17
How does $\text{VE}_{2016-17}$ compare to $\text{VE}$ in previous year?
Influenza season 2015-16
Dominant virus A(H1N1)
Nasal spray and injectable vaccine as efficacious

**Table 2**

Influenza vaccine effectiveness against laboratory-confirmed influenza in two-year-old children, stratified by influenza type, Finland, influenza season 2015/16 (n=55,258)\(^a\)

<table>
<thead>
<tr>
<th>Laboratory-confirmed influenza</th>
<th>Cases</th>
<th>Person-years</th>
<th>Crude effectiveness (95% confidence intervals)</th>
<th>Adjusted effectiveness (95% confidence intervals)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not vaccinated</td>
<td>LAIV</td>
<td>TIV</td>
<td>Not vaccinated</td>
</tr>
<tr>
<td>A and B</td>
<td>317</td>
<td>31</td>
<td>12</td>
<td>29,984</td>
</tr>
<tr>
<td>A</td>
<td>260</td>
<td>26</td>
<td>5</td>
<td>29,994</td>
</tr>
<tr>
<td>B</td>
<td>62</td>
<td>6</td>
<td>7</td>
<td>30,063</td>
</tr>
</tbody>
</table>

LAIV: live attenuated influenza vaccine; TIV: trivalent inactivated influenza vaccine.

\(^a\) Crude and adjusted for propensity score quintiles.

When stratified by previous exposure to influenza vaccinations, there was a tendency towards higher effectiveness among those previously vaccinated (Table 3), although due to a small number of cases in each stratum, these differences were not statistically significant.
Background of Finland

5,4 mi people
GNP 38 959 €/person (2016e)
311 communities in charge of health and social services
21 central hospital districts
National immunization programme decisions and funding by government
THL advisory role + NITAG + vaccine purchase centrally by public tenders
Communities deliver vaccines

National Infectious Disease Register since 1992-
National Vaccine Register since 2009-
### SIV coverage in children season 2015-16 according to National Vaccine Register data

<table>
<thead>
<tr>
<th>Age group</th>
<th>n eligible</th>
<th>n included</th>
<th>% included</th>
<th>n vaccinated (TIV)</th>
<th>% vaccinated (TIV)</th>
<th>n vaccinated (LAIV)</th>
<th>% vaccinated (LAIV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-11m</td>
<td>27637</td>
<td>27129</td>
<td>98.2</td>
<td>7763</td>
<td>28.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12-23m</td>
<td>58094</td>
<td>56987</td>
<td>98.1</td>
<td>13778</td>
<td>24.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24-35m</td>
<td>59098</td>
<td>58858</td>
<td>99.6</td>
<td>4415</td>
<td>7.5</td>
<td>8323</td>
<td>14.1</td>
</tr>
<tr>
<td>3-6y</td>
<td>246413</td>
<td>245642</td>
<td>99.7</td>
<td>28452</td>
<td>11.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**KAP: why parents with positive attitude for SIV did not have their child SIV vaccinated?**

1. Practical / logistics reason (20%)
2. Influenza is not severe enough disease for a child (16%)