Early Connections: Improving immunisation coverage & timeliness

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What we already knew

Children at greater risk of vaccine-preventable diseases if immunisations either missed or delayed

Getting 1st dose in schedule on time strongly predicts subsequent complete immunisation

Developing relationship between general practice & baby’s parents can reduce number of delayed 1st immunisations
Aim
To assess whether simple pre-call letter improves coverage & timeliness of infant-scheduled immunisations

Question
Will parents bring their baby to the practice for the 6 week vaccines on time if they are actively invited to do so when their baby is 4 weeks old?
Method: Randomised controlled trial

**EITHER** send parents simple pre-call letter when baby turns 4 weeks old OR

Send parents recall letter after they have failed to bring their baby for immunisation at 6 weeks.

To test this, randomly allocated baby’s nominated practice to **EITHER**:
- pre-call babies **OR**
- continue usual care
Setting:
Practices in Auckland District Health Board (ADHB) catchment area
1 Nov 2008 - 20 Apr 2010
Our Intervention

“Pre-call” letter & simple information about vaccination sent by practice nurse at 4 weeks

If no response, the practice nurse called family at 5 weeks, 7 weeks

Practice nurses recorded all babies who received the intervention, whether or not baby was subsequently immunised
### PMS & NIR definitions of delayed immunisations

<table>
<thead>
<tr>
<th>Schedule</th>
<th>Age of child for PMS recall</th>
<th>Age of child for NIR recall</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 weeks</td>
<td>8 weeks</td>
<td>10 weeks</td>
</tr>
<tr>
<td>3 months</td>
<td>4 months</td>
<td>4.5 months</td>
</tr>
<tr>
<td>5 months</td>
<td>6 months</td>
<td>6.5 months</td>
</tr>
</tbody>
</table>
Outcome measures

- Receipt of 6 week, 3 mth & 5 mth immunisations
- Age when these were delivered

as recorded in National Immunisation Register (NIR) for babies born in ADHB catchment area
Analysis

Extensive data cleaning, coding & management required to produce single dataset with accurate details of practices & immunisation events for all babies born in ADHB region during study period

Survival analysis to measure delay in immunisation
Results

Practices in ADHB

All general practices in the ADHB
148

Eligible general practices
128

Non-eligible general practices
20

Recruited Practices
63

Intervention practices
31

Control practices
32

Non-recruited practices
65
Results

Babies born during study period by practice
Additional complexities

Planned to use NIR data from ADHB but:

- some babies nominated ADHB-located practice but resided in another DHB (practice near boundary)
- Babies who moved out of ADHB catchment disappeared from ADHB dataset

Therefore needed to use national NIR data matching NHI numbers
Additional complexities

National NIR had duplicate records for primary series for some babies delivered at different dates.

Established these were BCGs (identified by specific clinic locations) – removed from dataset.
Additional complexities

2842 (24.6%) babies in intervention practices, only 1198 (42%) actually received interventions:

- Consented to take part then staff or system problems meant unable to continue
- 1 intervention practice failed to deliver any interventions
- Some nurses did not clear in-boxes hence unaware of babies for whom they were nominated practice (so no pre-call)
- Messaging to NIR bounced back if incomplete fields (eg no next of kin) & not actioned hence immunisation event not recorded on NIR
Coverage in babies born in ADHB with nominated practices

The overall coverage rate for all ADHB practices delivered at 8 weeks for both 6 week vaccine 1 (Infanrix®-hexa) & vaccine 2 (Prevenar®) 98%

Children born in study period who had received no vaccinations by aged 6 months 1%
Differences in timing between vaccines 1 & 2 for six week vaccination event
Importance of NIR

88% of babies attend their nominated practice, but 12% are vaccinated or decline vaccination at different practice for v1 at 6 weeks

Indicates importance of NIR track vaccination events
## Overall vaccination rate for 6 week event for v1 by practice type

<table>
<thead>
<tr>
<th>Type of practice</th>
<th>6 wk v1 received by aged 8 wks</th>
<th>Opted off / Declined</th>
<th>Total</th>
<th>% completed by practice type</th>
<th>% by nominated practices only</th>
<th>% overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention</td>
<td>2743</td>
<td>53</td>
<td>2842</td>
<td>97</td>
<td>97</td>
<td>98%</td>
</tr>
<tr>
<td>Control</td>
<td>2388</td>
<td>26</td>
<td>2414</td>
<td>99</td>
<td>99</td>
<td>98%</td>
</tr>
<tr>
<td>Non-participating</td>
<td>5744</td>
<td>83</td>
<td>5827</td>
<td>99</td>
<td>99</td>
<td>98%</td>
</tr>
<tr>
<td>None nominated*</td>
<td>32</td>
<td>16</td>
<td>48</td>
<td>67</td>
<td>67</td>
<td>94%</td>
</tr>
<tr>
<td>None nominated¥</td>
<td>0</td>
<td>0</td>
<td>424</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>10907</strong></td>
<td><strong>177</strong></td>
<td><strong>11555</strong></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

* Data available  ¥ Incomplete data
Average age of receipt of v1 at 6 wks, 3 mths & 5 months by practice type

<table>
<thead>
<tr>
<th>Type of practice</th>
<th>Average age in wks of receiving 6 wk v1</th>
<th>Average age in mths of receiving 3 mth v1</th>
<th>Average age in mths of receiving 5 mth v1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention</td>
<td>7.06</td>
<td>3.40</td>
<td>5.64</td>
</tr>
<tr>
<td>Control</td>
<td>7.09</td>
<td>3.43</td>
<td>5.65</td>
</tr>
<tr>
<td>Non-participating</td>
<td>7.26</td>
<td>3.48</td>
<td>5.70</td>
</tr>
<tr>
<td>None nominated</td>
<td>8.92</td>
<td>4.49</td>
<td>6.32</td>
</tr>
</tbody>
</table>
Timeliness
Days to 6 weeks vaccination in intervention practices by actual delivery of intervention

Mean days to 6 week (42 day) vaccination
49.6 days for babies receiving pre-call letter compared with 51.2 days for babies not receiving pre-call letter (median number of days 44 & 45 respectively)
Recruited practices
5256 babies born (45.5%)

Intervention practices
2,842 babies born (24.6%)
Pre-call delivered
1198 babies born (10.4%)

Pre-call not delivered
1644 babies born (14.2%)

Control practices
2414 babies born (20.9%)

NS
p < 0.001
Timeliness of vaccination

Pre-call letter
Statistically significant effect in reducing delay of
6 wk (p < 0.001)
3 mth (p< 0.001) &
5 mth vaccination events (p=0.001)

Clinically insignificant (1-4 days) because usual
care rates much higher than anticipated
(median for all practices 45 days)
Results
Babies born during study period by practice

ADHB 11,555

- Intervention practices: 2842 (24.6%)
- Control practices: 2414 (20.9%)
- Non-participating practices: 5827 (50.4%)
- No nominated practice: 472 (4.1%)
Enrolment with practice

33% of these babies were not vaccinated

When these were added to total, overall coverage rate **dropped from 98% to 94%**

Babies with no nominated practice much less likely to get immunised, & if they do, much more likely to be delayed
Practice surveys

13 intervention & 12 control practices reported using some form of pre-call prior to trial

Majority of intervention practices indicated they intended to continue with pre-call intervention we had provided
Discussion: 1 Excellent coverage

Immunisation coverage in Auckland is significantly higher than indicated by NIR data.

In 2008, NZ immunisation rates estimated to be 88% for 6 week vaccine.

The coverage rate in study much higher, at 98% for 6 week vaccine at 8 weeks.
Discussion: 2 Precall works

Pre-call intervention improves immunisation timeliness

While coverage & timeliness already high in ADHB area, this is effective low-cost strategy
Discussion: 3 Enrolment increases coverage & timeliness

Early enrolment with PHO & registration of baby in general practice greatly increases rate of immunisation uptake & timeliness

Babies with no nominated practice much less likely to get immunised, & if they do, much more likely to be delayed
Babies fall through the cracks

No nominated practice reduces the overall coverage rate significantly (makes practices look like they are performing less well than they are)

Attention could be given to targeting outreach services to these children & assisting them to be enrolled with a practice
Recommendations

1. Ensure all children enrolled with general practice from birth
2. General practices need to be aware of infants under their care before four weeks of age
3. Focus outreach services on children with no nominated practice
4. Improve messaging between general practices & NIR
5. National roll-out of a pre-call letter