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Significant vaccination delay can occur even in a community with very high vaccination coverage: evidence from Ballabgarh, INDIA

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Presentation strategy...

1. Introduction
2. Objectives
3. Methods
4. Results
5. Discussion
6. Conclusions
7. Recommendations
INTRODUCTION

- Vaccination coverage is one of the 3 indicators to monitor the progress towards achieving Millennium Development Goal 4 (MDG 4)

- While the focus in the country currently is appropriately on increasing vaccination coverage, vaccination coverage surveys may mask underlying delays in vaccination
INTRODUCTION …2

- Vaccination delay can affect the protective effect of vaccines during infancy and early childhood when the disease incidence and mortality are highest\(^1,2\)
- Altered sequence of vaccination, by interactions in immune stimulant effect of vaccines, may have implications for vaccine effectiveness\(^3,4\)

INTRODUCTION ...

- Significant delay in vaccination would expose the children to risk of acquiring infection due to vaccine preventable diseases for a greater period of time.
- The current record based analysis of vaccination data from Ballabgarh Health and Demographic Surveillance Site (HDSS) was undertaken to estimate the delay in vaccination for National Immunization Schedule (NIS) vaccines in under-five children and to explore the causes for this delay.
METHODS
Ballabgarh HDSS (2009)
Rural community with total population of 87008
CBR: 23.3
CDR: 7.1
NMR: 27.1
IMR: 53.7
Under five Mortality: 72

HARYANA

CRHSP, BALLABGARH

FARIDABAD DISTRICT

PRIMARY HEALTH CENTRE, DAYALPUR

PRIMARY HEALTH CENTRE, CHHAINSA
Vaccination at CRHSP, Ballabgarh

Health workers administer the vaccine

Vaccination data including vaccination dates are recorded by health workers

Computer generates monthly house to house visit work plan for HW

Monthly entry of all the births & Vaccination into the HMIS, hence updating of individual based temporal relational database
Methodology

Study population:
- Children born after 1st January, 1991 and before 31st December 2004

Study design: Record based retrospective study supplemented by Qualitative component

Data collection:
- Vaccination data was accessed for the under-five HDSS population from period of 1991-2004
- To ascertain cause of Delay: Focus group Discussions and interviews
Data analysis

- Vaccination coverage for individual vaccines was computed at different ages.
- Median age at vaccination with interquartile range.

- Survival curve for age at vaccination with vaccination defined as outcome event, were plotted for individual vaccines using Stata 9 & median delay in vaccination and percentage with delayed vaccination were computed.
Vaccination Delay Definition

Delay in vaccination was defined for each individual vaccine
(No std. definition was available for delay, hence NIS was used for the reference)

<table>
<thead>
<tr>
<th>S No</th>
<th>Vaccine</th>
<th>NIS</th>
<th>Delay-1</th>
<th>Delay-2 (alt.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BCG/OPV0</td>
<td>At birth (Instit. Del.)</td>
<td>&gt;6 weeks</td>
<td>&gt;8 weeks</td>
</tr>
<tr>
<td>2</td>
<td>OPV1/DPT1</td>
<td>6 weeks</td>
<td>&gt;6 weeks</td>
<td>&gt;8 weeks</td>
</tr>
<tr>
<td>3</td>
<td>OPV2/DPT2</td>
<td>10 weeks</td>
<td>&gt;10 weeks</td>
<td>&gt;12 weeks</td>
</tr>
<tr>
<td>4</td>
<td>OPV3/BCG3</td>
<td>14 weeks</td>
<td>&gt;14 weeks</td>
<td>&gt;16 weeks</td>
</tr>
<tr>
<td>5</td>
<td>Measles</td>
<td>9-12 months</td>
<td>&gt;9 months</td>
<td>&gt;12 months</td>
</tr>
<tr>
<td>6</td>
<td>OPVb/DPTb</td>
<td>16 to 24 months</td>
<td>&gt;24 months</td>
<td></td>
</tr>
</tbody>
</table>

Alternate definition
1. Gap between different doses of vaccination
2. Other studies, Clark et al

Ascertained the causes of Delay

Leading causes of delay in vaccination were identified from:

1. Questionnaire based interview of the program managers
2. Two Focus group discussion (FGD) with health workers (Male and Female)
RESULTS

25,517 underfives (53% males and 47% Females)
Vaccination Coverage...2

Graphs showing the vaccination coverage for OPV-2, DPT-2, OPV-3, and DPT-3 over different time periods: 10 weeks, 14 weeks, 6 months, 1 year, >1 year, 14 weeks, 18 weeks, 6 months, 1 year, 2 years, >2 years.
Vaccination Coverage...3

- **Measles**
  - At 2 years: 99.3%
  - Coverage at 2 years:
    - OPV-booster: 87.3%
    - DPT-booster: 89.3%
Median age of vaccination

<table>
<thead>
<tr>
<th>Vaccination</th>
<th>Median Age (weeks)</th>
<th>IQ Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCG</td>
<td>4.8</td>
<td>(2.8-10.4)</td>
</tr>
<tr>
<td>DPT-1</td>
<td>8.4</td>
<td>(6.5-11.5)</td>
</tr>
<tr>
<td>OPV-1</td>
<td>8.2</td>
<td>(6.4-12.0)</td>
</tr>
<tr>
<td>DPT-2</td>
<td>14.1</td>
<td>(11.7-19.0)</td>
</tr>
<tr>
<td>OPV-2</td>
<td>14.1</td>
<td>(11.1-19.8)</td>
</tr>
<tr>
<td>DPT-3</td>
<td>20.1</td>
<td>(16.7-26.7)</td>
</tr>
<tr>
<td>OPV-3</td>
<td>20.5</td>
<td>(16.2-27.8)</td>
</tr>
<tr>
<td>Measles</td>
<td>44.2</td>
<td>(40.2-50.0)</td>
</tr>
<tr>
<td>DPTb</td>
<td>80.0</td>
<td>(73.0-88.1)</td>
</tr>
<tr>
<td>OPVb</td>
<td>80.2</td>
<td>(72.5-88.2)</td>
</tr>
</tbody>
</table>
## Delay in vaccination

<table>
<thead>
<tr>
<th></th>
<th>Delay – 1 (%) (95% CI)</th>
<th>Median delay (weeks) (IQ range)</th>
<th>Delay – 2 (Alternate) (%) (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BCG</strong></td>
<td><strong>44.5</strong> (43.9 - 45.2)</td>
<td>7.0 (2.28 - 14.6)</td>
<td><strong>34.8</strong> (34.2-35.4)</td>
</tr>
<tr>
<td><strong>DPT-1</strong></td>
<td><strong>92.6</strong> (92.2 - 92.9)</td>
<td>3.0 (1.1 - 6.42)</td>
<td><strong>57.7</strong> (57.1-58.3)</td>
</tr>
<tr>
<td><strong>OPV-1</strong></td>
<td><strong>84.1</strong> (84.0 - 84.5)</td>
<td>3.4 (1.2 - 7.71)</td>
<td><strong>58.8</strong> (55.2-56.4)</td>
</tr>
<tr>
<td><strong>DPT-2</strong></td>
<td><strong>98.2</strong> (98.1 - 98.4)</td>
<td>4.6 (2.1 - 9.6)</td>
<td><strong>73.4</strong> (72.8-73.9)</td>
</tr>
<tr>
<td><strong>OPV-2</strong></td>
<td><strong>91.7</strong> (91.4 - 92.1)</td>
<td>5.1 (2.1 - 11.1)</td>
<td><strong>69.2</strong> (68.6-69.7)</td>
</tr>
<tr>
<td><strong>DPT-3</strong></td>
<td><strong>97.5</strong> (97.3 - 97.7)</td>
<td>6.9 (3.3 - 13.6)</td>
<td><strong>83.4</strong> (83.6-83.9)</td>
</tr>
<tr>
<td><strong>OPV-3</strong></td>
<td><strong>92.1</strong> (91.7 - 92.4)</td>
<td>7.9 (3.6 - 15.1)</td>
<td><strong>83.5</strong> (83.1-83.9)</td>
</tr>
<tr>
<td><strong>Measles</strong></td>
<td><strong>95.7</strong> (95.5 - 96.0)</td>
<td>6.4 (3.0 - 12.8)</td>
<td><strong>25.2</strong> (24.7-25.7)</td>
</tr>
<tr>
<td><strong>DPTb</strong></td>
<td><strong>15.9</strong> (15.4-16.3)</td>
<td>16.1 (6.2-32)</td>
<td></td>
</tr>
<tr>
<td><strong>OPVb</strong></td>
<td><strong>18.6</strong> (18.1-19.1)</td>
<td>18.5 (7.2-36.1)</td>
<td></td>
</tr>
</tbody>
</table>
Gap between DPT doses

- **Median gap between DPT - 1 and DPT - 2**
  - 35 days (30 - 47)
  - 36% of Under fives had a gap of more than 35 days*

- **Median gap between DPT - 2 and DPT - 3**
  - 35 days (30 - 50)
  - 38% of Under fives had a gap of more than 35 days*

*Shankar Prinja, Madhu Gupta, Amarjeet Singh & Rajesh Kumara. Effectiveness of planning and management interventions for improving age-appropriate immunization in rural India. *Bull World Health Organ* 2010;88:97–103 | doi:10.2471/BLT.08.059543
Causes for Delay

- Family level determinants
  - Nonappearance of child at home on the due date of vaccination
    “……don’t find children at home, after birth child goes to the maternal house as a tradition and he doesn’t receive any vaccination…….”
  - Less priority to it in comparison to other commitments (family says)
    “…..if the vaccine is given then its fine if not then also its fine, there are many more work than this…….”
    “….what's the hurry for vaccination…….”

Major cause for the delay: Health workers and Program managers
Causes for Delay...2

- Community level determinants
  - Community perception
  - Health care access frequency

- Programmatic Delays
  - Fixed day for vaccination
  - Shortage of Vaccine and the other materials
  - Lack of manpower

Rare cause for the delay: Health workers and Program managers
Discussion

High Vaccination coverage

Significant Vaccination delay
Discussion

- Almost all underfives, exact vaccination dates were available, since they are administered by health workers under supervision with monthly updating of the database.
- Unlike other studies where only in 2/3rd cases the documented vaccination dates were available*
- Vaccination coverage was more than 90% for all vaccines in Ballabgarh.

Discussion...2

- Studies from other countries have also documented presence of significant delay in vaccination even with high vaccination coverage\(^1,2\)

- Vaccination delay is likely to be even more pronounced in population where the vaccination coverage is less as compared to Ballabgarh HDSS

- The results of our study may not be generalisable to other populations in India beyond Ballabgarh HDSS because of high vaccination coverage in Ballabgarh


Conclusions

- Significant vaccination delay was observed in Ballabgarh HDSS, a population with very high vaccination coverage.

- Quantity in vaccination (high vaccination coverage) may not necessarily ensure quality of vaccination (delay in vaccination).

- Family level determinants come out to be the major cause for the delay in vaccination.
Recommendations

- Delay in vaccination should be incorporated as a performance/monitoring indicator for vaccination program.
- Need to strengthen the health care delivery system with focus on age appropriate vaccination.
- Immunization programme needs to be strengthen at other places and vigorous IEC activities must be followed to aware community & HW.
Thank you

“Children are the living messages we send to a time we will not see”

John W. Whitehead
Fig 1 to 5: Survival curves for BCG, DPT1, DPT3, Measles, DPTb with vaccination taken as the event. The red lines represent the median age at vaccination.