Transmission of influenza virus in mother-infant pairs in rural Nepal

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INTRODUCTION

> Influenza virus can cause severe respiratory illness in young infants, however vaccination is not recommended for infants <6m
> Maternal influenza vaccination can prevent infant infection through maternal antibodies and preventing maternal illness
> We aim to describe transmission of influenza virus in mothers and their infants in rural Nepal

METHODS

> Pregnant mothers were enrolled in a randomized control trial of influenza immunization from 4/2011 to 4/2013 in rural Nepal
> From 4/25/2011 to 11/15/2012, vaccine contained A H3N2 Perth, A H1N1 California, and B Brisbane (Y) between 11/16/2012, to 9/9/2013, vaccine contained A H3N2 Victoria, A H1N1 California, and B Wisconsin (Y)
> Mothers and infants were monitored for respiratory illness from enrollment through 180 days postpartum
> A nasal swab was collected if mother had fever + cough, sore throat, rhinorrhea, nasal congestion or myalgias and if infant had subjective fever, cough, draining ear, wheeze, or difficulty breathing in last seven days
> We defined transmission episodes as mother/infant pairs with influenza-positive illness within 14 days of each other
> Nasal swabs were collected at time of illness and tested for influenza virus by RT-PCR
> Influenza was subtyped using RT-PCR & mass spectrometry

RESULTS

Figure 1. Total study respiratory samples collected from May 2011 to March 2014 in blue (left axis). Percent of respiratory samples positive for influenza by RT-PCR in red (right axis).
> Influenza transmission occurred in 17 (0.2%) of 3,646 mother-infant pairs

Figure 2. Influenza transmission events in 17 mother-infant pairs. Symbols represent the first day of respiratory symptoms associated with influenza-positive illness. Asterisk indicates the mother received study influenza vaccine. Influenza A subtypes determined by RT-PCR, Influenza B lineages were determined by RT-PCR/mass spectrometry.
> Influenza transmission occurred in 17 (0.2%) of 3,646 mother-infant pairs

Figure 3. Other household members with influenza-positive illness during mother-infant influenza transmission episodes.
> Influenza transmission in 17 (0.2%) of 3,646 mother-infant pairs

Table 1. Characteristics of mother-infant influenza transmission episodes

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>N (%) or median (IQR)</th>
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<tbody>
<tr>
<td>Maternal index case*</td>
<td>12 (70.6)</td>
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<tr>
<td>Serial interval (days)**</td>
<td>3 (1, 4)</td>
</tr>
<tr>
<td>Received influenza vaccination***</td>
<td>5 (29.4)</td>
</tr>
<tr>
<td>Influenza A</td>
<td>5 (29.4)</td>
</tr>
<tr>
<td>Synonymous strains****</td>
<td>10 (90.9)</td>
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**Mother and infant illness started on the same day in one of 17 pairs
***Number of days between start of index case illness and start of secondary case illness
****Two mothers infected with Flu B (Yamagata) received vaccine containing Flu B (Victoria) strain
*****Out of 11 pairs fully evaluated by subtyping assays

CONCLUSIONS

MOTHER-INFANT INFLUENZA TRANSMISSION

> In the majority of mother-infant pairs, mothers were the first to acquire influenza virus and may be an important source of influenza transmission to infants
> Multiple subtypes circulated simultaneously, though the same subtype was documented in both mother and infant in almost all cases
> Vaccination during pregnancy may have the additional benefit of preventing influenza transmission to infant after birth

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