Global Health Cast 45
August 9th, 2023

Every Week
12.00 noon - CET

Dr. Melvin Sanicas
@Vaccinologist

Prof. Dr. Joe Schmitt
@Prof_Schmitt
What we talk about today

- COVID-19 global epidemiology
- Your frequently asked questions on COVID-19
- Vaccination in Pregnancy (ViP) – 1: Basics
Figure 1. COVID-19 cases reported by WHO Region, and global deaths by 28-day intervals, as of 30 July 2023 (A); 16 January to 30 July 2023 (B)**
Weekly epidemiological update on COVID-19 - 3 August 2023 (who.int)
Figure 2. Percentage change in confirmed COVID-19 cases over the last 28 days relative to the previous 28 days, as of 30 July 2023**
Figure 2. Percentage change in confirmed COVID-19 cases over the last 28 days relative to the previous 28 days, as of 30 July 2023**
Your most frequently asked questions on COVID-19

• How long do COVID symptoms last?
• Who should take Paxlovid, and how do you get it?
• How long are you contagious with COVID?
• How long are you immune after having COVID?
• Is there any way to avoid or prevent long COVID?
Adaptation for fetal (i.e.: non-self) antigens result in increased susceptibility and more severe infections.

CDC endorsed the ACIP recommendation for vaccination in only the second and third trimesters (high-risk periods).

ACIP recommendation expanded to include the first trimester of pregnancy.

ACIP recommended that individuals who are or will become pregnant during influenza season should receive an inactivated influenza vaccine as soon as possible, which can be administered during any trimester of pregnancy.

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Whole-cell pertussis vaccine developed.

Acellular pertussis vaccine developed.

CDC encouraged all pregnant individuals to receive COVID-19 vaccination.

COVID-19 vaccines received EUA in the US.

Recommendations:
- Tdap
- Influenza
- COVID-19
## Infections with Increased Susceptibility/Severity in Pregnant Women, and Clinical Guidance

<table>
<thead>
<tr>
<th>Infection</th>
<th>Increased Susceptibility</th>
<th>Increased Severity</th>
<th>Prevention Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stronger evidence</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Influenza</td>
<td>No</td>
<td>Yes</td>
<td>Vaccination, antiviral prophylactic medication</td>
</tr>
<tr>
<td>COVID19</td>
<td>?</td>
<td>Yes</td>
<td>Vaccination, antivirals</td>
</tr>
<tr>
<td>HEV infection</td>
<td>No</td>
<td>Yes</td>
<td>Sanitation programs</td>
</tr>
<tr>
<td>HSV infection (Dissemination with primary infection)</td>
<td>No</td>
<td>Yes</td>
<td>Protection from STIs during pregnancy</td>
</tr>
<tr>
<td>Malaria (Mainly due to Plasmodium falciparum)</td>
<td>Yes</td>
<td>Yes</td>
<td>Intermittent preventive therapy, Bed nets, Travelers prophylaxis</td>
</tr>
<tr>
<td>Listeriosis</td>
<td>Yes</td>
<td>No</td>
<td>Dietary guidance</td>
</tr>
<tr>
<td><strong>More limited evidence</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measles</td>
<td>No</td>
<td>Yes</td>
<td>Vaccination</td>
</tr>
<tr>
<td>Smallpox</td>
<td>No</td>
<td>Yes</td>
<td>Vaccination</td>
</tr>
<tr>
<td>HIV type 1 infection</td>
<td>Yes</td>
<td>No</td>
<td>Consistent/correct condom use in pregnancy</td>
</tr>
<tr>
<td>Varicella</td>
<td>No</td>
<td>Yes</td>
<td>Vaccination</td>
</tr>
<tr>
<td>Coccidioidomycosis</td>
<td>No</td>
<td>Yes</td>
<td>No proven methods of prevention</td>
</tr>
</tbody>
</table>
### Prevalence of Major Malformations by Organ Categories: Mainz and EUROCAT

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Musculoskeletal system</td>
<td>239</td>
<td>74</td>
</tr>
<tr>
<td>Internal urogenital system</td>
<td>162</td>
<td>33</td>
</tr>
<tr>
<td>Cardiovascular system</td>
<td>113</td>
<td>59</td>
</tr>
<tr>
<td>Digestive system</td>
<td>71</td>
<td>27</td>
</tr>
<tr>
<td>Central nervous system</td>
<td>68</td>
<td>22</td>
</tr>
<tr>
<td>External urogenital system</td>
<td>58</td>
<td>15</td>
</tr>
<tr>
<td>Facial clefts</td>
<td>44</td>
<td>15</td>
</tr>
<tr>
<td>Chromosome aberrations</td>
<td>42</td>
<td>29</td>
</tr>
<tr>
<td>Ear</td>
<td>13</td>
<td>5</td>
</tr>
<tr>
<td>Eye</td>
<td>12</td>
<td>6</td>
</tr>
</tbody>
</table>

**Study population:** 30,940 infants, Mainz, 1990–1998; 2,144 (6.9%) infants with major malformations

The Safety of ViP Is Continuously Monitored, as Seen in Select Monitoring Programs Within the US and Elsewhere

General Population, Including Pregnant Individuals

VAERS (Vaccine Adverse Event Reporting System)
An early warning system that helps the CDC and FDA monitor new safety concerns

VSD (Vaccine Safety Datalink)
A collaboration between the CDC and several health care organizations that allows for ongoing monitoring and proactive searches of vaccine-related data

Specific to Pregnancy

VAMPSS (Vaccines and Medications in Pregnancy Surveillance System)
Prospective surveillance system in which participants are enrolled in the first trimester, including a case-control surveillance

Vaccine Registries
Established to monitor vaccine safety after introduction (eg, industry-led vaccine pregnancy exposure registries or active surveillance programs such as the CDC's V-safe COVID-19 Vaccine Pregnancy Registry)

Examples for Organizations Recommending ViP as a Method to Protect Pregnant Individuals and/or Their Infants

Currently, there is no evidence of any increased risk of adverse pregnancy, fetal, or infant outcomes following vaccination of pregnant individuals with inactivated influenza vaccines, pertussis-containing vaccines, or COVID-19 vaccines\(^1-3\)

**Detail to follow in the review of each of the 4 vaccines mentioned here**

Maternal Antibody Transfer Increases with GA

Jennewein et al., 2019, Cell 178, 202–215
Active and passive immunity before birth and during infancy

- **Maternal IgG**
- **Neonatal IgG**
- **Total Ab**
- **IgG in children**

**Immunglobulin [mg/100 ml]**

- **Birth**
- **Adult Ig [%]**
- **IgM**
- **IgA**

**Month**

- **0**
- **2**
- **4**
- **6**
- **8**
- **10**
- **12**

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**Active and passive immunity before birth and during infancy**

<table>
<thead>
<tr>
<th>Immunglobulin [mg/100 ml]</th>
<th>Birth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal IgG</td>
<td><strong>Total Ab</strong></td>
</tr>
<tr>
<td>Neonatal IgG</td>
<td><strong>Adult Ig [%]</strong></td>
</tr>
</tbody>
</table>

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**Diagram:**

- **Maternal IgG**
- **Neonatal IgG**
- **Total Ab**
- **IgG in children**

- **IgM**
- **IgA**

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**Table:**

<table>
<thead>
<tr>
<th>Month</th>
<th>Maternal IgG</th>
<th>Neonatal IgG</th>
<th>Total Ab</th>
<th>Adult Ig [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1200</td>
<td>1000</td>
<td>800</td>
<td>60%</td>
</tr>
<tr>
<td>2</td>
<td>600</td>
<td>400</td>
<td>200</td>
<td>60%</td>
</tr>
<tr>
<td>4</td>
<td>400</td>
<td>200</td>
<td>100</td>
<td>75%</td>
</tr>
<tr>
<td>6</td>
<td>200</td>
<td>100</td>
<td>50</td>
<td>75%</td>
</tr>
<tr>
<td>8</td>
<td>100</td>
<td>50</td>
<td>0</td>
<td>20%</td>
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<td>10</td>
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<tr>
<td>12</td>
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</tbody>
</table>
Study Design

- An observational study in England evaluated vaccine effectiveness of pertussis vaccine in pregnant individuals from 2008 to 2013\(^1\)
- In September 2012, the UK Department of Health recommended a temporary program to offer all pregnant individuals (between 28 to 38 weeks of gestation) the dTaP/IPV vaccine\(^1\)

Results

- **Observed vaccine effectiveness was 91%** (95% CI, 84%-95%) in infants born from October 1, 2012, and <3 months of age at onset\(^1\)

![Laboratory-confirmed pertussis cases per quarter in England from 2011 to 2022\(^2\)](plot.png)

While the total number of pertussis cases fluctuates per year, the number of cases in infants <3 months of age has declined over time\(^2\)

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What we talked about today

➢ COVID-19 global epidemiology
➢ Your frequently asked questions on COVID-19
➢ Vaccination in Pregnancy (ViP) – 1: Basics
Conceptualized in PI's mind

Described in grant proposal

Actual goal after funded

Understood by RA

Observed in first experiment

Observed in repeat experiment

Presented in conference

Submitted to journal

Actual publication after addressing reviewer comments