INFECTIONIOUS DISEASE UPDATE -2016

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Member, TPHA (1988 - present)
Potential Conflicts of Interest

Consultant: Merck, Pfizer, Sanofi-Pasteur, Dynavax, Novavax

Lecturer: Merck, Genentech
EMERGING AND RE-EMERGING INFECTIOUS DISEASES

Middle East Respiratory Syndrome – CoV
Enterovirus – D68
Measles
Chikungunya
Polio
Ebola
Zika
EMERGING AND RE-EMERGING INFECTIOUS DISEASES

Middle East Respiratory Syndrome – CoV
- Still occurs in Middle Eastern Countries
- Often hospital-associated
- Dromedary camels
- Occasional international introductions

Measles
- 2015: Disneyland outbreak – 147 cases
- Parents withholding children from vaccination
- 2016: 52 cases in 15 states (6 cases in TN)
Enterovirus D68

Previously rarely recovered virus

2014 Summer/Fall outbreak across US

An enterovirus that causes respiratory disease

Children with rash admitted to ICUs – recover quickly

Acute flaccid myelitis outbreak – residual paralysis

Has become rare again – fortunately!
EMERGING AND RE-EMERGING INFECTIOUS DISEASES

Chikungunya

2013 first time in Caribbean – large outbreak
Mosquito (Aedes aegypti) transmitted
Travelers import into US – little spread
EMERGING AND RE-EMERGING INFECTIOUS DISEASES

Ebola

2013-2015 epidemic in West Africa over 28,000 cases; over 11,000 deaths
Spread via contact with body fluids
Epidemic now ended
Few importations into US – little spread
Vaccine created
EMERGING AND RE-EMERGING INFECTIOUS DISEASES

Polio
Paralytic disease caused by 3 enteric viruses
World-wide use of tri-valent oral vaccine
Scheduled for eradication by 2000...but still struggling
Type 2 poliovirus eradicated in 2015
Type 3 not detected since 2012
Type 1 remains in Pakistan and Afghanistan

Problems:
2016: 3 cases in Nigeria! 😞
Switch from OPV to IPV
Zika

Obscure virus akin to dengue, chikungunya

Transmission: Mosquito (Aedes aegypti)
Sexual
How the Zika virus spread

- **Active transmission**
- **Known previous transmission**
- **Antibodies also detected**

**2014-16**
Zika appears in northern Brazil and spreads through the Americas

- **2013**
Epidemic on French Polynesia

- **1960**
First human cases in Nigeria

- **1947**
First documented in monkeys in Uganda

- **2007**
Epidemic on island of Yap, Micronesia

**Source:** WHO and Lancaster University, Feb. 1
Zika

2014  Appears in Brazil – widespread throughout Mexico, Central and South America, Caribbean
Puerto Rico

Feb, 2016 WHO: Public Health Emergency of International Concern
Zika

Clinical illness: Fever, rash, conjunctivitis, muscle and joint aches
Several days – a week

Illness during pregnancy ➔ microcephaly
Pathogenesis of Microcephaly

Zika injected by mosquito (or acquired sexually)
- Virus in bloodstream to placenta
  - Infects certain placental cells
- Virus crosses placenta, infects developing fetus
- Virus infects and destroys developing brain cells
- Results in small brain, small skull

Microcephaly
The more we learn about Zika, the more adverse effects are recognized

<table>
<thead>
<tr>
<th>Condition</th>
<th>Risk Information</th>
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<tbody>
<tr>
<td>Microcephaly</td>
<td>Risk greatest in first trimester (all 3)</td>
</tr>
<tr>
<td>Blindness</td>
<td>Symptoms not evident at birth</td>
</tr>
<tr>
<td>Deafness</td>
<td>Can develop later</td>
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<tr>
<td>Fetal loss</td>
<td>? Risk of infection in infancy, childhood</td>
</tr>
<tr>
<td>Prematurity</td>
<td>? Risk of infection in adults (Guillain-Barre Syndrome)</td>
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Zika

Over 2,900 cases imported into the continental US
15,800 cases in US territories, including Puerto Rico
Includes 671 pregnant women in continental US
1,080 in the territories

Only mosquito transmission in continental US
Miami-Dade county
Many control measures including case-finding
mosquito abatement, education, travel advisories
Zika

Continuing geographic expansion (none after Olympics!)

Research: Vaccines, Vector Control, Diagnostic tests, Therapeutics

Epidemiology: Natural history of disease in congenitally-infected infants, pregnant women, adults

Proportion of men chronically infected; duration

STAY TUNED – Constant new information
Previews of Coming Attractions

New Vaccines on the Horizon
HEPATITIS B

1991 ACIP Recommendations

• Routine for infants
• “Catch-up” for youngsters and adolescents
• Adults with risk factors
  -- HCW
  -- Sexual exposure
  -- Illicit drugs/needles
  -- Diabetes (2010)
HEPATITIS B

~20,000 new infections annually
95% in adults

Serious consequences:
- Acute hepatic necrosis
- Chronic active hepatitis
- Cirrhosis
- Liver cancer
Current Hepatitis B Vaccines

Two Hep B; one Hep B/HepA

3 doses: 0, 1, 6 months

Limitations:

- Reduced seroconversion with increasing age, obesity, smoking, diabetes

- Reduced adherence to 3-dose, 6-month regimen
- Prolonged time to seroconversion
Adjuvanted Hepatitis B vaccine
Two doses: 0, 1 month

Enhanced seroprotection in older persons, diabetics
Respiratory Syncytial Virus - RSV

• Originally reported as a cause of severe respiratory infections in young children

• Now recognized as causing severe disease in older adults: Community – dwelling
  Those with chronic obstructive pulmonary disease
  cardiopulmonary disease
  long-term care
  nursing homes

• Annual attack rates: 2-10%
RSV And Influenza Are Comparably Severe

4-years (1989 – 1992)
Hospitalized patients age 65+ with influenza-like or cardiopulmonary illness

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Deaths</th>
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<tr>
<td>Influenza</td>
<td>11%</td>
</tr>
<tr>
<td>RSV</td>
<td>10%</td>
</tr>
</tbody>
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Falsey, J Infect Dis, 1995
Respiratory Syncytial Virus - RSV

Several manufacturers working on vaccines and therapies

Sequential vaccine studies:
  Adults age 60+
  Pregnant women
  Infants
Previews

RSV vaccine in late-stage trials in adults 60+

Early data suggest ~60% protection
(comparable or better than influenza vaccine)

Will persons age 60+ accept 2 seasonal vaccines each year (influenza and RSV)?
Previews (at FDA)

Adjuvanted Shingles vaccine
(2 doses; 0, 2 months)

92% effective preventing shingles – all ages
However, 17% local sx substantial
INFLUENZA VACCINE

CDC RECOMMENDATION:

EVERYONE older than 6 months of age

Live, attenuated vaccine (LAIV) – nasal spray should not be used this year
When in doubt...
VACCINATE!