62nd Annual Greenville Postgraduate Seminar
Spotlight: Primary Care
Gone with the Syringe?

J. Aaron Grubbs, MD
8/16/2019
Disclosures

• None
Objectives

• Review presentations of several vaccine-preventable illnesses
• Review the epidemiology of these illnesses
• Review the primary care providers role in advocating for health by recommending vaccines
Case 1

- 25yo woman presents with fever and rash.
- Fever started 4d ago with malaise, now improving
- Rash began yesterday on her face
- Now has rash over her trunk
- Now has pain and swelling in bilateral hands
- Works as a pediatric nurse at a clinic seeing many immigrant children
Case 2

- 33wga infant with generalized purpura over the entire body, patent ductus arteriosus, cardiomegaly, thrombocytopenia, pneumonitis, anemia, and elevated liver enzymes
- Mother was in her late 20s and immigrated from Nigeria during the pregnancy at 32wga
- Had IUGR described early in pregnancy and oligohydramnios later.

What test would you do to diagnose the patient in Case 1?

- PCR of blood
- Serology
- PCR of urine
- Antigen detection in blood
- Any of the above
What type of infection control precautions should be practiced on seeing the patient in case 1?

- standard precautions
- contact precautions
- droplet precautions
- airborne precautions
What type of infection control precautions should be practiced on seeing the patient in case 2 for 3mo follow up?

- standard precautions
- contact precautions
- droplet precautions
- airborne precautions
A previously unvaccinated healthcare worker entered the patients room prior to her being placed on precautions, what precautions are recommended?

- Vaccination with MMR
- IVIG
- Exclude the healthcare worker from work from 5 to 21 days after exposure
- Observe for symptoms
  - a and d
  - a and c
  - b and c
Rubella

- Most postnatal cases subclinical
- Adults have a prodromal phase
- Adenopathy, rash, fever
- Arthritis mainly in women
- 1 in 3000 with hemorrhagic problems
- Encephalitis is uncommon – 1 in 5000
- Alphavirus
Rubella Transmission

- Spread in respiratory droplets
- Patients most contagious while the rash is erupting
- Infants with congenital rubella shed virus for months
Congenital Rubella

- Variable presentation
  - Infection during first 2 mo gestation – 65-85%
  - Infection during third month – 30-35%
  - Infection during the fourth month 10%
<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Hepatospleno megaly</th>
<th>Cardiac Lesions</th>
<th>Skin Lesions</th>
<th>Hydrocephalus</th>
<th>Microcephaly</th>
<th>Intracranial Calcifications</th>
<th>Ocular Disease</th>
<th>Hearing Deficits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toxoplasmosis</td>
<td>+</td>
<td>(−)</td>
<td>Petechiae/purpura, maculopapular rash</td>
<td>++</td>
<td>+</td>
<td>Diffuse intracranial calcifications</td>
<td>Chorioretinitis</td>
<td>(−)</td>
</tr>
<tr>
<td>Treponema pallidum</td>
<td>+</td>
<td>(−)</td>
<td>Petechiae/purpura, maculopapular rash</td>
<td>(−)</td>
<td>(−)</td>
<td>(−)</td>
<td>Chorioretinitis, glaucoma</td>
<td>(−)</td>
</tr>
<tr>
<td>Rubella</td>
<td>+</td>
<td>Patent ductus arteriosus, pulmonary artery stenosis, myocarditis</td>
<td>Petechiae/purpura</td>
<td>+</td>
<td>(−)</td>
<td>(−)</td>
<td>Chorioretinitis, cataracts, microphthalmia</td>
<td>+</td>
</tr>
<tr>
<td>CMV</td>
<td>+</td>
<td>+</td>
<td>Petechiae/purpura</td>
<td>(−)</td>
<td>++</td>
<td>Periventricular calcifications</td>
<td>Chorioretinitis</td>
<td>+</td>
</tr>
<tr>
<td>HSV</td>
<td>+</td>
<td>Myocarditis</td>
<td>Petechiae/purpura, vesicles</td>
<td>+</td>
<td>(−)</td>
<td>(−)</td>
<td>Chorioretinitis, cataracts</td>
<td>+</td>
</tr>
<tr>
<td>Parvovirus B19</td>
<td>+</td>
<td>Myocarditis</td>
<td>Subcutaneous edema, petechiae</td>
<td>(−)</td>
<td>(−)</td>
<td>(−)</td>
<td>Microphthalmia, retinal and corneal abnormalities</td>
<td>(−)</td>
</tr>
</tbody>
</table>
Diagnosis

- Viral isolation or PCR
- Serology
Vaccination

- Licensed in the US in 1969
- Outbreak of congenital rubella in southern California 1990 – 21 infants
- 95% seroconversion with a single dose
- 812 women had inadvertently gotten vaccinated in the US as of 1987
- Since 2001, <25 cases reported annually in the US
Case

- Previously healthy 20yo man presents to student health with fever and left otalgia with left facial swelling
- Fever and headache began 3d ago
- Otalgia and facial swelling began about 2d ago
- Trouble talking and eating
- On exam he is febrile to 39 degrees Celsius and appears uncomfortable
- Bilateral parotid swelling
- Otherwise unremarkable
He is concerned that he has mumps and that he will become infertile. What do you advise him?

orchitis is a common complication that is mostly unilateral and infertility is rare

orchitis is an uncommon complication but frequently results in infertility if it develops

orchitis is an uncommon complication and unlikely to lead to infertility if it develops
Three of his fraternity brothers were similarly ill last week. What precautions should be taken for his roommate and other fraternity brothers?

An additional dose of MMR for all without contraindications to vaccination

Cohorting of contacts apart from non-exposed individuals

An additional dose of MMR for all who have only received 1 prior vaccine (without contraindication to vaccination)
Mumps

• Endemic worldwide
• Epidemics q2-5yr in the absence of vaccine
• 99% decline since the vaccine was licensed in 1967 – average 265 cases/yr
• 2006 outbreak of 6584 cases, mainly Iowa
• Most patients were vaccinated
• Subsequent outbreaks have responded to giving additional vaccine doses
Presentation and Transmission

- Most contagious just before parotitis
- Droplets, contact, fomites
- Incubation 2-4 weeks
- Prodrome fever, anorexia, malaise, headache
- Soon afterward parotid tenderness and swelling develop
- 25% have unilateral parotitis
Diagnosis

• Viral isolation (3d before to 5d after parotitis onset),
• PCR
• Serology
Complications

- CSF pleocytosis is common
- Clinical meningitis in 1-10% with parotitis
- Only 40-50% with meningitis have parotitis
- Hypoglycorrhachia can be present
- Encephalitis in 1 in 6000 to 1 in 400 – early vs late disease
Complications

- Epididymo-orchitis in 20-30% of postpubertal men
- Bilateral in 1 in 6 men with GU involvement
- Oophoritis in 5% of postpubertal women
- Arthritis, pancreatitis, myocarditis reported
Prevention

• Droplet isolation 5d after onset of parotitis
• Vaccination - 66-95% clinical effectiveness
• Vaccination during outbreaks is reported
• Up to 15-27% asymptomatic
Case

• 36yo man with fever for 6d, rhinitis, and 2d of rash
• Rash started on the face
• Diarrhea x 2d
• No improvement with amoxicillin/clavulanate
• Bilateral non-purulent conjunctivitis on exam with rash
He has 3 unvaccinated children ages 10mo, 3yo, and 6yo. His wife was unvaccinated and is pregnant. He was out of town but has been back at home with them for the past 48hrs. What interventions should be done for his family?

Vaccinate all of them with MMR
Give MMR to the children, and Ig to his wife
Give Ig to all of them
No treatment now, but monitor all of them for symptoms
Figure 4. Schematic diagram of the pathogenesis of measles from virus infection to recovery. Virus infection starts in the respiratory tract and then spreads to infect multiple organs including lymphoid tissue, liver, lungs, and skin. Virus clearance begins ...


http://dx.doi.org/10.1016/S0140-6736(10)62352-5
Measles case distribution by month and WHO Region (2015-2019)

Notes: Based on data received 2019-06 - Data Source: IVB Database - This is surveillance data, hence for the last month(s), the data may be incomplete.
Measles Incidence Rate per Million (12M period)

Top 10**

<table>
<thead>
<tr>
<th>Country</th>
<th>Cases</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Madagascar</td>
<td>84929</td>
<td>3411.55</td>
</tr>
<tr>
<td>Ukraine</td>
<td>83533</td>
<td>1879.74</td>
</tr>
<tr>
<td>India****</td>
<td>47056</td>
<td>35.54</td>
</tr>
<tr>
<td>Philippines</td>
<td>34700</td>
<td>335.85</td>
</tr>
<tr>
<td>Nigeria</td>
<td>21199</td>
<td>113.98</td>
</tr>
<tr>
<td>Pakistan</td>
<td>17805</td>
<td>92.16</td>
</tr>
<tr>
<td>Yemen</td>
<td>11984</td>
<td>434.45</td>
</tr>
<tr>
<td>Brazil</td>
<td>10231</td>
<td>49.27</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>7349</td>
<td>408.56</td>
</tr>
<tr>
<td>Thailand</td>
<td>6960</td>
<td>101.07</td>
</tr>
</tbody>
</table>

Other countries with high incidence rates***

<table>
<thead>
<tr>
<th>Country</th>
<th>Cases</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Georgia</td>
<td>4997</td>
<td>1272.99</td>
</tr>
<tr>
<td>The Republic of North Macedonia</td>
<td>1370</td>
<td>658.27</td>
</tr>
<tr>
<td>Kyrgyzstan</td>
<td>2925</td>
<td>491.12</td>
</tr>
<tr>
<td>Israel</td>
<td>3886</td>
<td>474.38</td>
</tr>
<tr>
<td>Liberia</td>
<td>1686</td>
<td>365.42</td>
</tr>
</tbody>
</table>

Measles cases from countries with known discrepancies between case-based and aggregate surveillance, as reported by country

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>Cases in Case-based</th>
<th>Cases in Aggregate</th>
<th>Data Source for aggregate #s</th>
</tr>
</thead>
<tbody>
<tr>
<td>DR Congo</td>
<td>2018</td>
<td>5597</td>
<td>67072</td>
<td>SITUATION EPIDEMIOLOGIQUE DE LA ROUGEOLE EN RDC, Week of 11/06/2019</td>
</tr>
<tr>
<td></td>
<td>2019</td>
<td>3907</td>
<td>101,869</td>
<td></td>
</tr>
<tr>
<td>Somalia</td>
<td>2018</td>
<td>131</td>
<td>9135</td>
<td>Somali EPI/POL Weekly Update Week 22</td>
</tr>
<tr>
<td></td>
<td>2019</td>
<td>28</td>
<td>1834</td>
<td></td>
</tr>
</tbody>
</table>

Notes: Based on data received 2019-06 and covering the period between 2018-05 and 2019-04 - Incidence: Number of cases / population* * 100,000 - * World population prospects, 2017 revision - ** Countries with the highest number of cases for the period - *** Countries with the highest incidence rates (excluding those already listed in the table above) ****WHO classifies all suspected measles cases reported from India as measles clinically compatible if a specimen was not collected as per the algorithm for classification of suspected measles in the WHO VPD Surveillance Standards. Thus numbers might be different between what WHO reports and what India reports.
Number of Reported Measles Cases (6M period)

<table>
<thead>
<tr>
<th>Country</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Madagascar</td>
<td>82585</td>
</tr>
<tr>
<td>Ukraine</td>
<td>60972</td>
</tr>
<tr>
<td>Philippines</td>
<td>25661</td>
</tr>
<tr>
<td>India**</td>
<td>21914</td>
</tr>
<tr>
<td>Nigeria</td>
<td>19780</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>7336</td>
</tr>
<tr>
<td>Brazil</td>
<td>6144</td>
</tr>
<tr>
<td>Venezuela (Bolivarian Republic of)</td>
<td>5668</td>
</tr>
<tr>
<td>Yemen</td>
<td>5643</td>
</tr>
<tr>
<td>Myanmar</td>
<td>4663</td>
</tr>
</tbody>
</table>

Notes: Based on data received 2019-06 - Surveillance data from 2018-11 to 2019-04 - * Countries with highest number of cases for the period. **WHO classifies all suspected measles cases reported from India as measles clinically compatible if a specimen was not collected as per the algorithm for classification of suspected measles in the WHO VPD Surveillance Standards. Thus numbers might be different between what WHO reports and what India reports.
Measles – United States 2019

• Multiple separate outbreaks initiated by travelers returning with illness from other countries
Measles

• US vaccine 1963
• Worldwide
• Epidemics of 3-4mo q2-5yr without vaccine
• 1990, >25 000 cases and 89 deaths in US
• 2000-2007, average 63 cases/yr in US
• In 2000, >750 000 deaths globally
Transmission

- Virus is labile, but remains infective in air for several hours
- Droplet, airborne, direct contact with secretions
- Contagious several days prior to rash, up to 48hrs after the rash
- Incubation 10-14d
- \( R_0 \) estimated at 12-18
Measles

• Prodrome of several days of fever, malaise, anorexia, cough, conjunctivitis, coryza
• Koplik spots
• Rash on face, then downward
• Palms and soles
Complications

- Highest in immunosuppressed, malnourished, and young children
- Respiratory
- Mouth ulcers and stomatitis
- Diarrhea
- Keratoconjunctivitis
- Encephalomyelitis – 1:1000
Complications

- Period of immunosuppression after measles
- Higher rates of respiratory infection and diarrhea
SSPE

- Occurs average 7yrs after measles
- More frequent in children with disease at <2yo
- Single case of vaccine strain encephalitis in 1999
- Risk 1 per 11 000 cases
Vitamin A

- Recommended by the WHO for treatment of children with measles
- 2 doses with dosage dependent on age
- 3rd dose for children with vitamin A deficiency
- Cochrane review showed RR of mortality of 0.18 (0.03, 0.61)
Immunity and Vaccination

- Likely lifelong after infection
- Likely lifelong after vaccination seroconversion
- Age recommended for vaccination varies
  - 85% seroconvert at 9mo
  - 95% at 12mo
- 2 doses – 99% seroconvert
- 5% vaccinees get fever to 103, 2% rash
Case

- Previously healthy 10yo boy presents with cough for the past 4wks
- He had some low grade fever and rhinorrhea for a couple weeks but these symptoms have mostly resolved over the past week
- His cough now comes in spells and he has had some post-tussive emesis
PCR of a nasopharyngeal swab is positive for Bordatella pertussis. His mother is pregnant and in her third trimester and he has a 6yo sister. What should be done for his family?

- No treatment, monitor for disease
- Azithromycin prophylaxis for his parents and sister and Tdap for his mother
- Azithromycin and Tdap for his mother, Tdap for his father, and no treatment for his sister
- Azithromycin for his parents and sister and Tdap for all of them
Reported NNDSS pertussis cases: 1922-2017

SOURCE: CDC, National Notifiable Diseases Surveillance System and 1922-1949, passive reports to the Public Health Service
Reported pertussis incidence by age group: 1990-2017

Pertussis

- Catarrhal
- Paroxysmal
- Convalescent
- Complications
Treatment and Prophylaxis

- Treatment with macrolides
- Prophylaxis if within 21d for all, at any time for patients at high risk of complications
- Vaccination for those due
Routine pneumococcal conjugate vaccination in children has resulted in a decline in invasive pneumococcal disease among adults. Has this decline been furthered by adult pneumococcal vaccination?

Yes
No

PCV7 introduction

PCV13 introduction for children

PCV13 serotype: 1, 5, 6A, 6B, 7F, 9V, 14, 18C, 19A, 19F, and 23F

https://www.cdc.gov/pneumococcal/surveillance.html

- PCV7 introduction
- PCV13 introduction for children
- PCV13 recommendations for adults 65+
- PCV13 recommendations for immunocompromised adults 19+

*PPSV23 serotypes: 1, 2, 3, 4, 5, 6B, 7F, 8, 9N, 9V, 10A, 11A, 12F, 14, 15B, 17F, 18C, 19A, 19F, 20, 22F, 23F, and 33F

*PCV13 serotype: 1, 3, 4, 5, 6A, 6B, 7F, 9V, 14, 18C, 19A, 19F, and 23F

https://www.cdc.gov/pneumococcal/surveillance.html
Previously healthy 37yo man presents for evaluation after realizing that he ate at a restaurant 10 days ago where an employee was diagnosed with hepatitis A (He heard it on the news.). Should you

- give him hepatitis A vaccination
- give him anti-HAV immunoglobulin
- review with him symptoms of hepatitis A and ask him to call you should he develop them
- none of the above
Restaurant exposure to HAV

• CDC recommends post-exposure prophylaxis for patrons of restaurants in whom a food handler has been diagnosed with HAV if
  • 1) exposure happened when the patient was likely to be infectious
  • 2) the food handler handled uncooked or cooked food and had diarrhea or poor hygienic practices
  • 3) patrons can be identified \( \leq 2 \) weeks after exposure
Objectives

• Review presentations of several vaccine-preventable illnesses
• Review the epidemiology of these illnesses
• Review the primary care providers role in advocating for health by recommending vaccines
What can you do?

- Undervaccination occurs for different reasons
- Provider to parent and patient communication
- More presumptive format discussion
- Persistence helps
- State laws have large impacts

Thank you
PRISMA HEALTH®

62nd Annual Greenville Postgraduate Seminar

Spotlight: Primary Care

Wifi: Greenville ONE Center
Login: Conference1