Vaccine-Preventable Diseases

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Disclosure Statement

- I have no conflicts of interest to disclose relevant to today’s presentation
### Vaccine-Preventable Diseases

- Anthrax
- Cholera
- Diphtheria
- Hepatitis A
- Hepatitis B
- *H. influenzae* type B
- HPV
- Seasonal influenza
- Japanese encephalitis
- Meningococcus
- Mumps
- Pertussis
- Pneumococcus
- Polio
- Rabies
- Rotavirus
- Rubella
- Shingles
- Smallpox
- Tetanus
- Typhoid fever
- Varicella
- Yellow fever

### Life Before Vaccines

- Diphtheria and smallpox outbreaks
- Summer infantile paralysis epidemics
- Near universal infection with measles and pertussis during childhood
- Congential rubella syndrome
- Invasive *Haemophilus influenzae* type B disease
- The list goes on...
Re-emergence of Vaccine Preventable Diseases

Number of Measles Cases Reported by Year

2010-2019** (as of September 12, 2019)

Source: CDC

Re-emergence of Vaccine Preventable Diseases

Reported mumps cases — United States, 2000-2019*

**As of Sept 13, 2019

Source: CDC
Re-emergence of Vaccine Preventable Diseases

Annual Hepatitis A Cases in US

*As of Sept 14, 2019

Source: CDC

State-Reported Hepatitis A Outbreak Cases as of September 13, 2019

Source: CDC
Re-emergence of Vaccine Preventable Diseases

Source: CDC

*As of Sept 14, 2019

Contribution Factors:
- Decreased vaccination rates
- Endemic transmission
- Increased international travel
- Waning vaccine-mediated immunity
Outline

• Notable VPDs in the clinic setting:
  • Measles
  • Mumps
  • Hepatitis A
  • Influenza – addressed in separate webcast
• Common vaccine questions from patients
Measles Clinical Features

- Incubation Period: 8-12 days (range: 7-21 days)
- Symptoms arise as two distinct phases:
  - Prodrome
    - 2-4 days prior to rash onset
    - Fever & “the 3 C’s”
    - Koplik spots
  - Rash
    - Cephalocaudal progression
    - Confluence
    - Fading with desquamation
- Infectious 4 days prior to 4 days after rash onset
Koplik spots

Source: CDC
Measles Complications

- Acute Otitis Media
- Diarrhea
- Febrile Seizures
- Pneumonia
- Encephalitis
- Post-infectious encephalomyelitis
- Subacute sclerosing panencephalitis

Source: CDC
Measles Diagnosis

- **RT-PCR**
  - Nasopharyngeal or throat swab specimen
  - Highest sensitivity during first 3 days of rash
- **Serology**
  - IgM
    - Acute specimens may have false negative results
    - False positives may occur with other viral infections
  - IgG
    - Usually positive by 1-2 weeks after rash onset

Measles Treatment and Prophylaxis

- **Treatment**
  - Supportive
  - Vitamin A for hospitalized children
- **Post-Exposure Prophylaxis**
  - MMR Vaccine within 72 hours
  - Immunoglobulin within 6 days
    - Intramuscular immune globulin
      - Infants
    - Intravenous immune globulin
      - Immunocompromised children and adults
      - Pregnant women without evidence of immunity
Measles Prevention

- Prevention
  - 2 dose MMR series in childhood
  - Other indications:
    - Students at post-high school educational institutions
    - Adults born during or after 1957
    - Prior to international travel
    - Healthcare personnel

You have the power to protect your child.

Provide your children with safe and long-lasting protection against measles by making sure they get the measles-mumps-rubella (MMR) vaccine according to CDC’s recommended immunization schedule.

WWW.CDC.GOV/MEASLES

Mumps

- Highly contagious - Spread via respiratory droplets
- Endemic transmission ongoing in US

MUMPS IS CONTAGIOUS
Here’s how it’s spread...

COUGHING & SNEEZING
TOUCHING OBJECTS OR SURFACES WITH UNWASHED HANDS

MUMPS IN THE UNITED STATES
From year to year, mumps cases in the U.S. range from roughly a couple hundred to a couple thousand.

Source: CDC
Mumps Clinical Features

- Incubation period 16-18 days (range: 12-25 days)
- Non-specific prodromal symptoms
- Tender unilateral or bilateral parotitis
  - Symptoms peak in 1-3 days
  - Resolve over 1 week
- Clinical presentation may vary
  - Asymptomatic
  - Non-specific respiratory symptoms
- Infectious 2 days before to 5 days after parotitis onset

Source: CDC
Ear Protrusion & Obscuring of the angle of the jaw common

Mumps Complications

- Occur less commonly in vaccinated patients
- Complications are more common in adults
- Orchitis
- Oophoritis
- Mastitis
Mumps Complications

MUMPS
More than just swollen glands

MUMPS CAN BE DANGEROUS
Before there was a vaccine, mumps was one of the most common causes of:
• DEAFNESS
• MENINGITIS
Infection of the brain and spinal cord (rarely occurring in childhood).
• ENCEPHALITIS
Swelling of the brain in some children.

Source: CDC

Suspect MUMPS?

Modified from CDC Mumps Job-Aid Template
### Mumps Testing Considerations

- Previously vaccinated patients:
  - Obtain PCR specimens within 1-3 days after onset
  - May have transient or undetectable IgM
  - IgG during acute phase usually very high

### Mumps Treatment and Prophylaxis

- Treatment
  - Supportive
- Post-exposure prophylaxis
  - None
Mumps Prevention

- **Prevention**
  - 2 dose MMR series in childhood
  - Other indications:
    - Students at post-high school educational institutions
    - Adults born during or after 1957
    - Prior to international travel
    - Healthcare personnel
  - 3rd dose for high risk groups during outbreak

Source: CDC

Hepatitis A

- **Transmission routes:**
  - Fecal-oral
  - Contaminated food or water

- **Risk factors:**
  - Contact with infected person
  - International travel
  - Men who have sex with men
  - Users of injection and non-injection drugs
  - Persons with clotting factor disorders
  - Working with NHP
Hepatitis A Clinical Features

- Incubation period: 28 days (range: 15-50 days)
- Most children < 6 years asymptomatic
- Older children and adults:
  - Fever
  - Fatigue
  - Abdominal pain
  - Nausea and vomiting
  - Diarrhea
  - Jaundice

Symptoms resolve in < 2 months
Prolonged or relapsing disease may occur
Does not cause chronic infection
Infectious from 2 weeks before to 1 week after jaundice onset
Hepatitis A Diagnosis

Source: CDC
Hepatitis A Treatment and Prophylaxis

- Treatment
  - Supportive
- Post-Exposure Prophylaxis – within 14 days of exposure
  - Hepatitis A vaccine
    - Healthy persons aged ≥ 12 months
  - Immune globulin & hepatitis A vaccine
    - Immunocompromised persons aged ≥ 12 months
    - Chronic liver disease
    - Healthy persons aged > 40
  - Immune globulin alone
    - Infants < 12 months

Hepatitis A Prevention

WASH YOUR HANDS after using the toilet

1,000,000,000 germs can live in one gram of poop...
Hepatitis A vaccination is recommended for:

- All children at age 1 year
- Travelers to countries where hepatitis A is common
- Family and caregivers of adoptees from countries where hepatitis A is common
- Men who have sexual encounters with other men
- People who use or inject drugs
- People with chronic or long-term liver disease, including hepatitis B or hepatitis C
- People with clotting factor disorders
- People with direct contact with others who have hepatitis A
- People experiencing homelessness

Source: CDC

**Hepatitis A Prevention**

- Other patient populations to vaccinate:
  - Persons at increased risk of complications
    - Congenital or acquired immunodeficiency
    - HIV infection
    - Hemodialysis
    - Transplant recipients
    - Iatrogenic immune suppression
  - Occupational risks
    - Nonhuman primates
    - Working with HAV in research laboratory
Parent and Patient Vaccine Questions

1. Assume parents will vaccinate
   - Parents not ready to vaccinate?

2. Give your strong recommendation
   - Parents accept your recommendations?
   - Parents have specific questions or concerns?

3. Listen to and respond to parent’s questions
   - Parents respond positively to your answers?

Administer recommended vaccine doses

Common Questions and Concerns

- Too many vaccines
  - Contrast vaccine antigens with every day exposures
- Vaccines make me sick
  - Educate on immune response
- Vaccines contain aluminum or other metals
  - No known safety risks with amount in vaccines
  - Ingested in food and water daily
- Delayed vaccine schedule
  - No data that delayed schedule is more safe
  - Any time delay places at risk

Source: CDC
Common Questions and Concerns

• Delay for mild illness
  • Mild febrile illnesses are not contraindications
• VPDs don’t exist anymore
  • Educate on international and US outbreaks
  • “One plane ride away”

Summary

• One of greatest public health achievements
• VPDs still exist in US and internationally
• Maintain high level of clinical suspicion
• Encourage families and patients to vaccinate