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

Source: CDC

**As of Sept 13, 2019**

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

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

Source: CDC

*As of Sept 14, 2019
Outline

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

MEASLES

is highly contagious and spreads through the air when an infected person coughs or sneezes.

It is so contagious that if one person has it, 9 out of 10 people of all ages around him or her will also become infected if they are not protected.
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
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

Source: CDC
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 covering in childhood)
Mumps can also lead to:
- ENCEPHALITIS (swelling of the brain) in some children.

Source: CDC

Suspect MUMPS?

Does patient have parotitis or other salivary gland swellings?

YES
Has it been 5-6 days since symptom onset?

YES
Collect a buccal specimen for RT-qPCR

NO
Collect a buccal specimen for RT-qPCR and serum specimen for IgM

NO
Does the patient have:
- orchitis/ophthamons,
- meninitis,
- pancreatitis,
- hearing loss,
- meningitis, or
- encephalitis?

YES
Collect a buccal and urine specimen for RT-qPCR and serum specimen for IgM

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 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

1,000,000,000,000 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
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
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