

Vaccine-Preventable Diseases

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Disclosure Statement

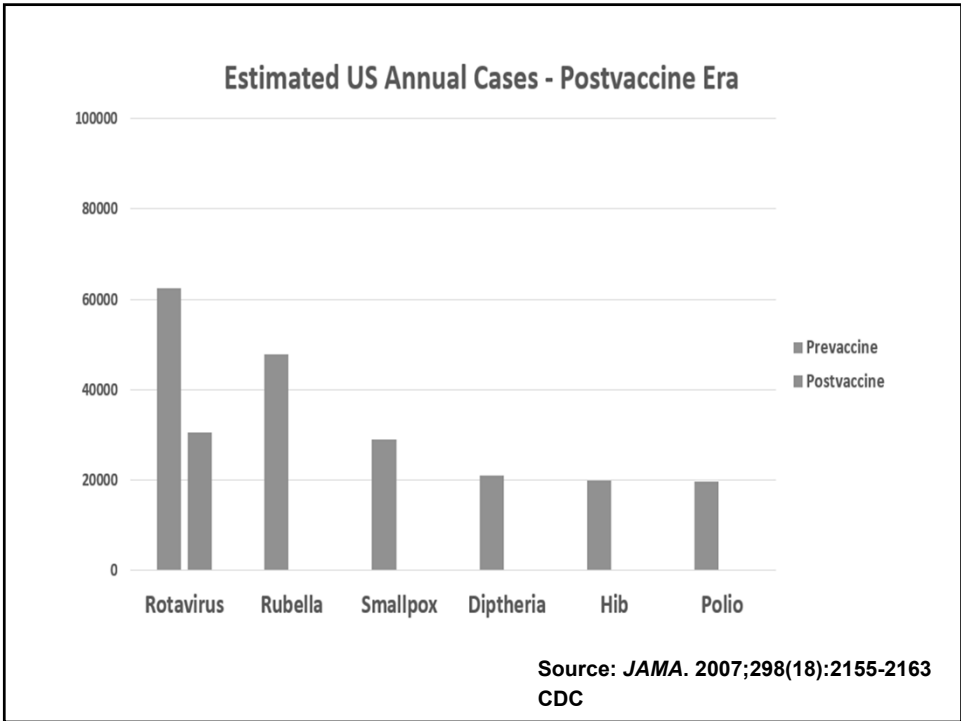
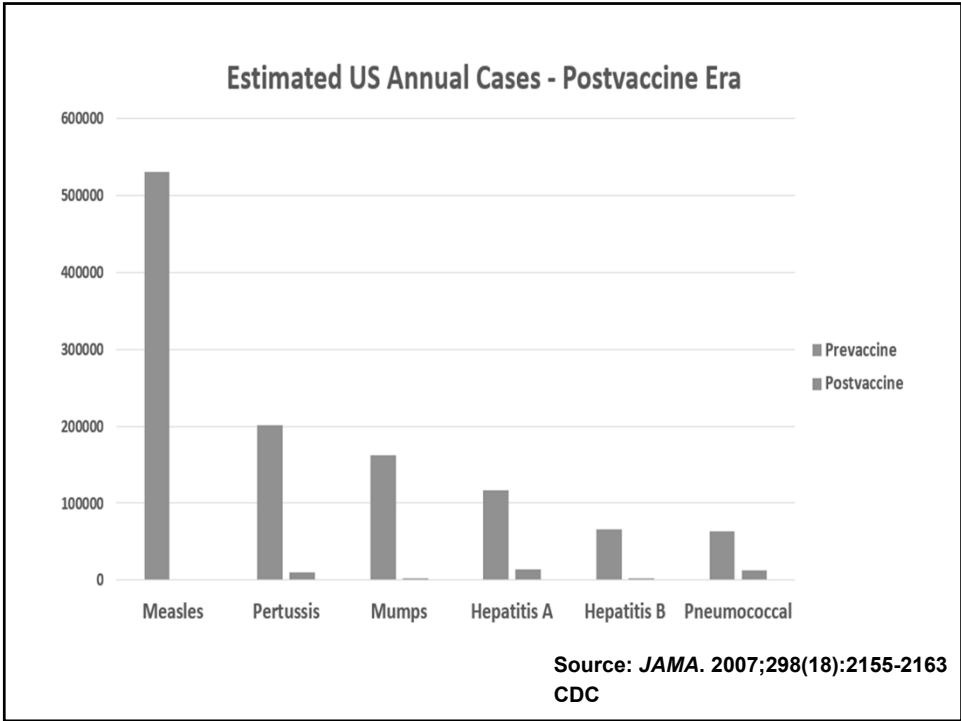
- **I have no conflicts of interest to disclose relevant to today's presentation**

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

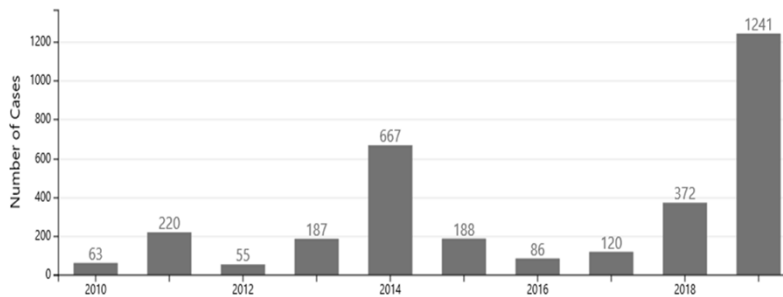
- Diphtheria and smallpox outbreaks
- Summer infantile paralysis epidemics
- Near universal infection with measles and pertussis during childhood
- Congenital rubella syndrome
- Invasive *Haemophilus influenzae* type B disease
- The list goes on...



Re-emergence of Vaccine Preventable Diseases

Number of Measles Cases Reported by Year

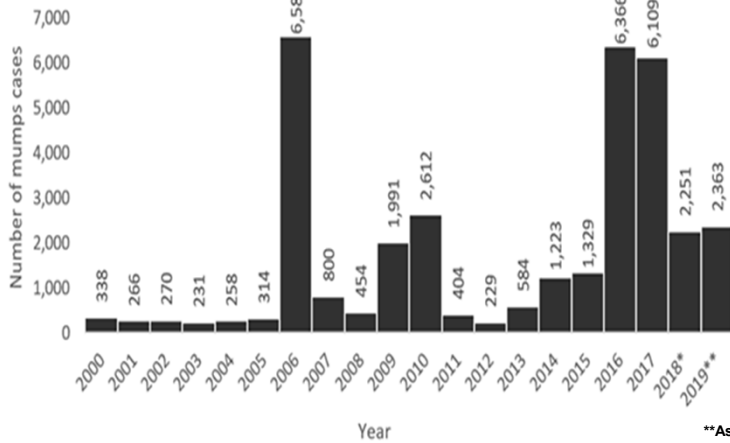
2010-2019**(as of September 12, 2019)



Source: CDC

Re-emergence of Vaccine Preventable Diseases

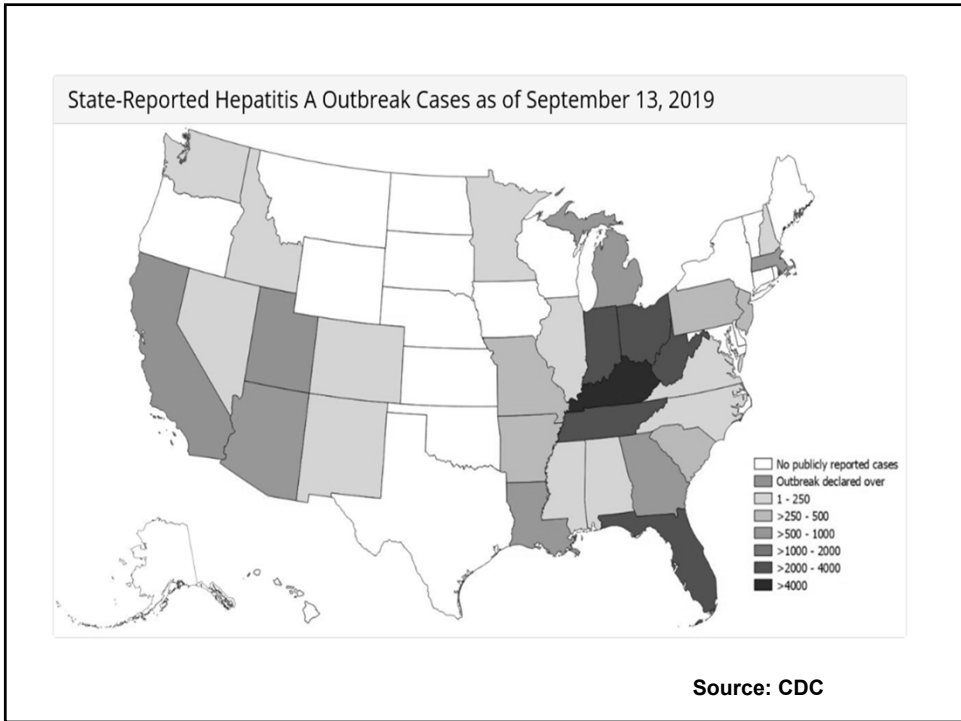
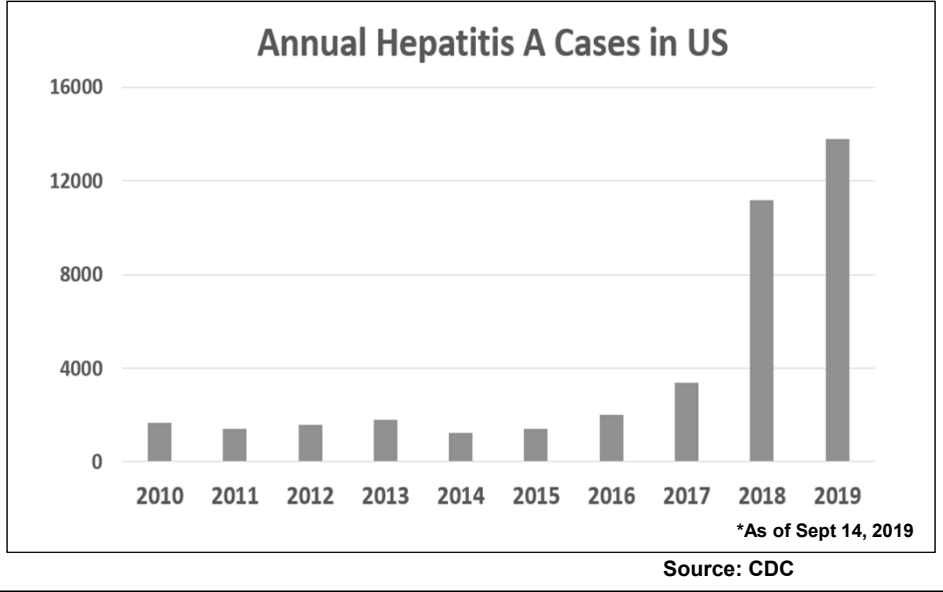
Reported mumps cases — United States, 2000–2019*



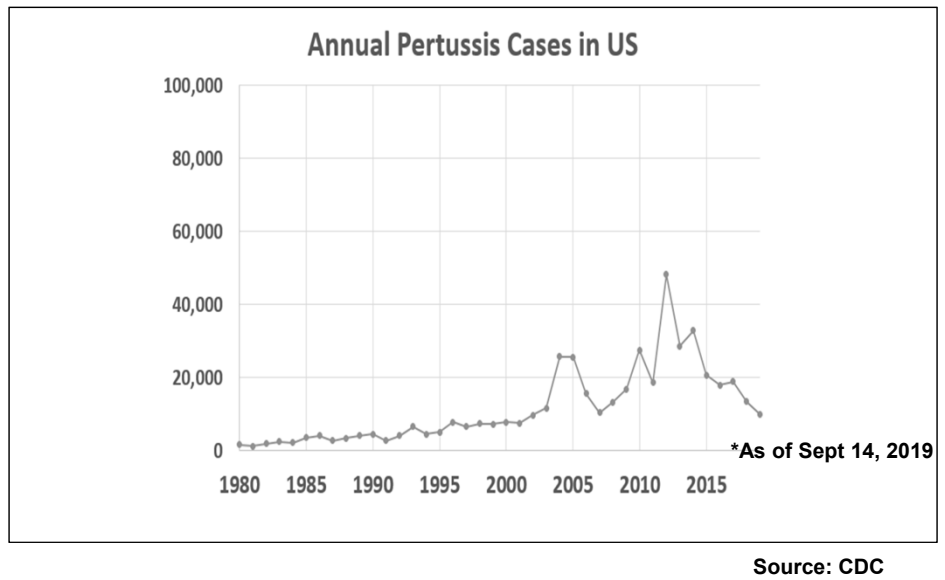
**As of Sept 13, 2019

Source: CDC

Re-emergence of Vaccine Preventable Diseases



Re-emergence of Vaccine Preventable Diseases



Re-emergence of Vaccine Preventable Diseases

- **Contributing 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

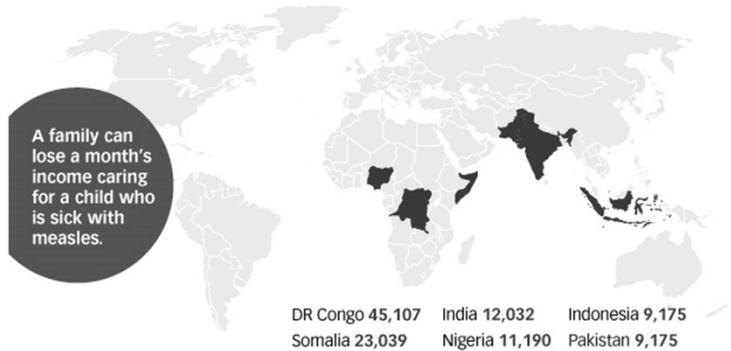


is **highly contagious** and spreads through the air when an infected person **coughs or sneezes**.



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.

In 2017, over 173,000 measles cases were reported globally.
Countries with the largest number of measles cases were:



Measles is one of the leading causes of death among children around the world.



246 children die every day, 10 every hour

– despite the fact that a safe and effective vaccine has been available for over 50 years.

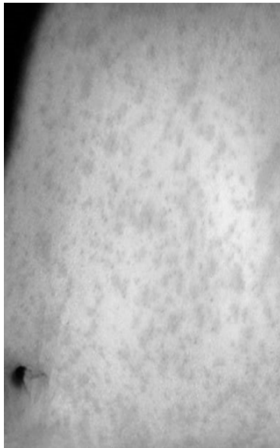
Source: CDC

Measles Clinical Features

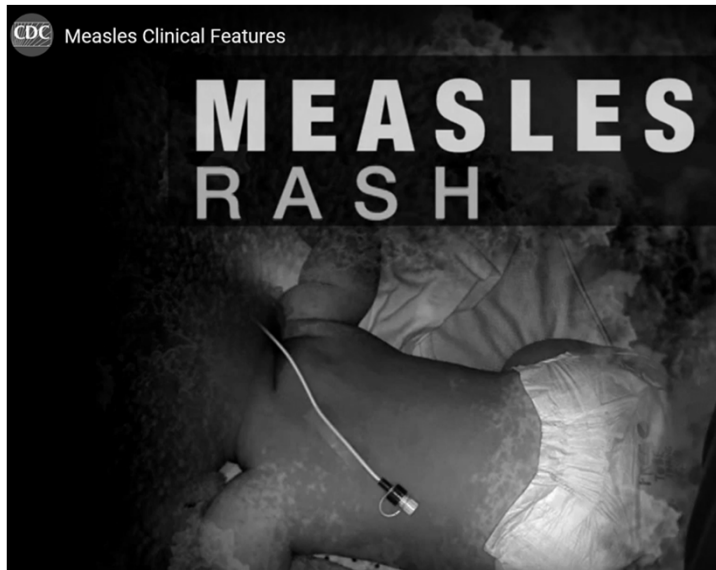
- Incubation Period: 8-12 days (range: 7-21 days)
- Symptoms arise as two distinct phases:
 - Prodrome
 - 2-4 days prior to rash onset
 - Fever & “the 3 C’s”
 - Koplik spots
 - Rash
 - Cephalocaudal progression
 - Confluence
 - Fading with desquamation
- Infectious 4 days prior to 4 days after rash onset

MEASLES PRODROME

Koplik spots



Source: CDC



Measles Complications

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

Measles Can Be Serious



About 1 out of 5 people who get measles will be hospitalized.



1 out of every 1,000 people with measles will develop brain swelling due to infection (encephalitis), which may lead to brain damage.



1 to 3 out of 1,000 people with measles will die, even with the best care.

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

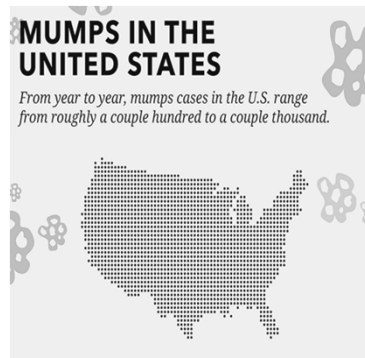
Measles Prevention

- **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**



Mumps

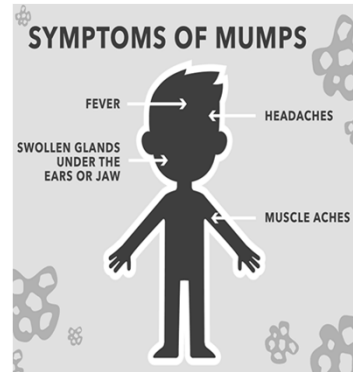
- **Highly contagious - Spread via respiratory droplets**
- **Endemic transmission ongoing in US**



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**



Source: CDC

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** and
- **MENINGITIS** (infection of the brain and spinal cord covering) in childhood.

Mumps can also lead to

- **ENCEPHALITIS** (swelling of the brain) in some children.

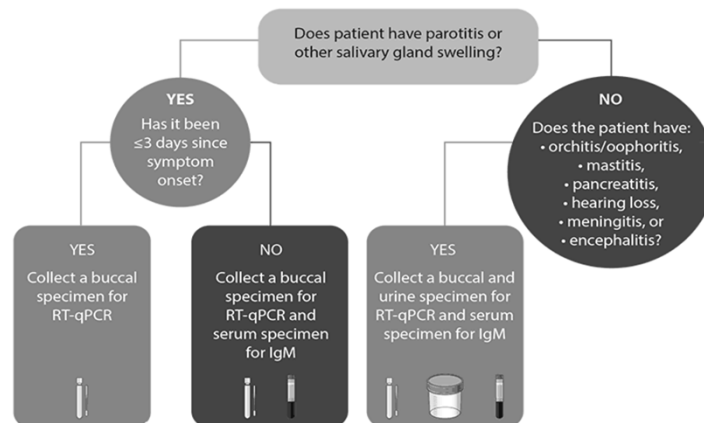


Source: CDC



Suspect MUMPS?

Wait! This patient might not need to be tested if they are linked to another mumps patient or outbreak. Refer to outbreak guidance from Health Department Name



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

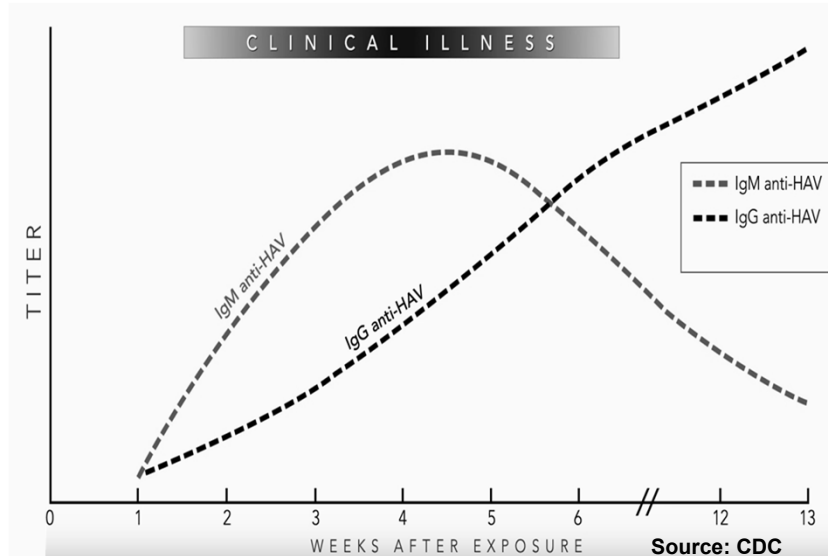
Hepatitis A Clinical Features

- **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**

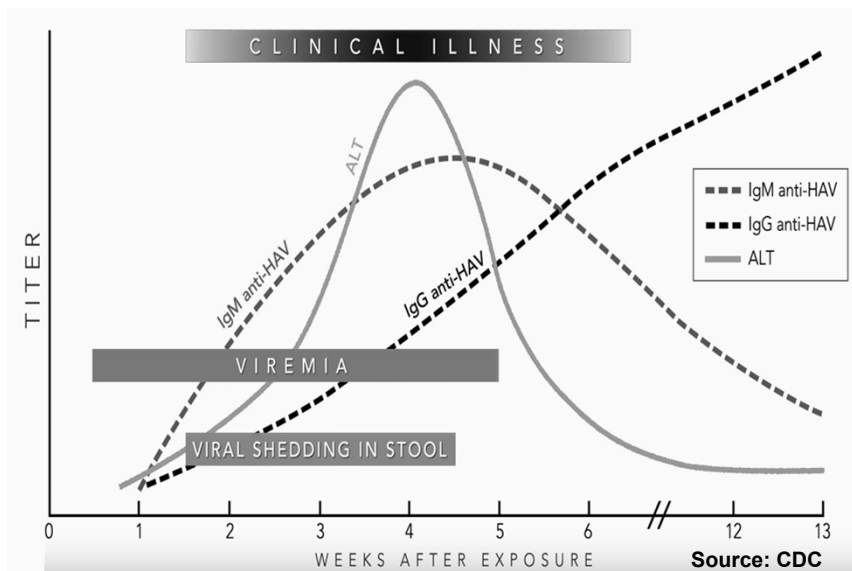
Hepatitis A Clinical Features

- **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



Hepatitis A Diagnosis



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

(That's the weight of a paper clip)



U.S. Department of
Health and Human Services
Center for Disease
Control and Prevention

CS48417

Hepatitis A vaccination is recommended for:

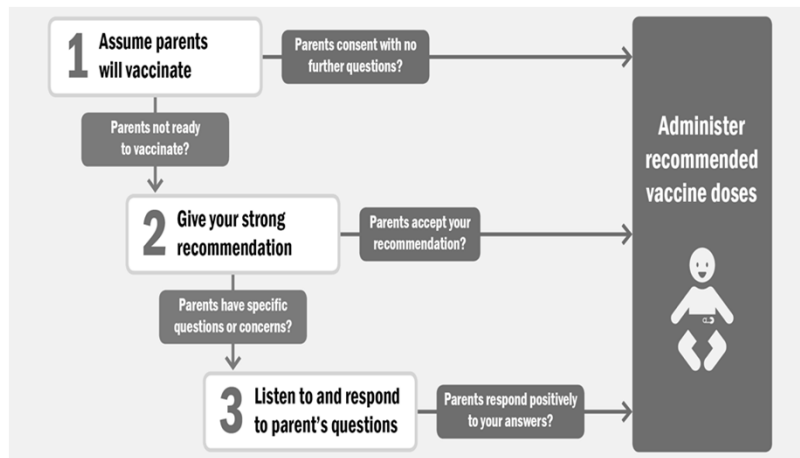
- All children at age 1 year
- Travelers to countries where hepatitis A is common
- Family and caregivers of adoptees from countries where hepatitis A is common
- Men who have sexual encounters with other men
- People who use or inject drugs
- People with chronic or long-term liver disease, including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



Source: CDC

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"**



Source: CDC

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**