Measles-
CNHN Community Pediatric Web Grand Rounds

May 24, 2017

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Division of Infectious Diseases

Learning Objectives

1. Recognize the clinical presentation and complications of measles

2. Describe the epidemiology of measles in the USA and the world

3. Appreciate the importance of vaccination and infection control measures in limiting the spread of measles

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Local Case – May 2017

- 2 year old boy recently emigrated from Afghanistan
- Developed fever 8 days after exposure to child with measles (in Afghanistan)

Children's National

Local Case – May 2017

- Illness course:
  - Day 1 : fever
  - Day 2: runny nose and emesis – taken to local ED (Day 2→3)
  - Day 3:cough, conjunctivitis, oral ulcers
  - Day 4: runny nose resolved - taken to local ED
  - Day 5: emesis resolved, rash in evening (4 days after fever onset)- taken to local ED (Day 5→6)
  - Day 6: transferred to CNMC, **h/o exposure obtained**, fever resolved
  - Day 7: rash resolving, conjunctivitis resolved
  - Day 8: discharged

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Local Case – May 2017

- Placed on airborne isolation shortly after admission
- Measles IgM and IgG obtained
- Specimens for PCR obtained
- History of 2 doses of MMR vaccine

- Subsequently: IgM positive; IgG negative
- Naso-oropharyngeal PCR positive

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Important point

Take a complete travel and exposure history!

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Measles – Clinical Features

- Incubation period is 7-21 days after exposure
- Symptoms typically begin 8-12 days after exposure
- Average interval between appearance of rash in index case and subsequent cases: 14 days

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Measles – Clinical Features

- Acute viral respiratory illness with a 2-4 day prodrome of fever, malaise, cough, coryza, and conjunctivitis
  - Pathognomonic Enanthema - Koplik spots
    - 48 hours prior to exanthem

- Exanthem 2-4 days after onset of fever
  - erythematous, maculopapular, blanching rash, which classically begins on the face and spreads cephalocaudally and centrifugally

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Measles – Clinical Features

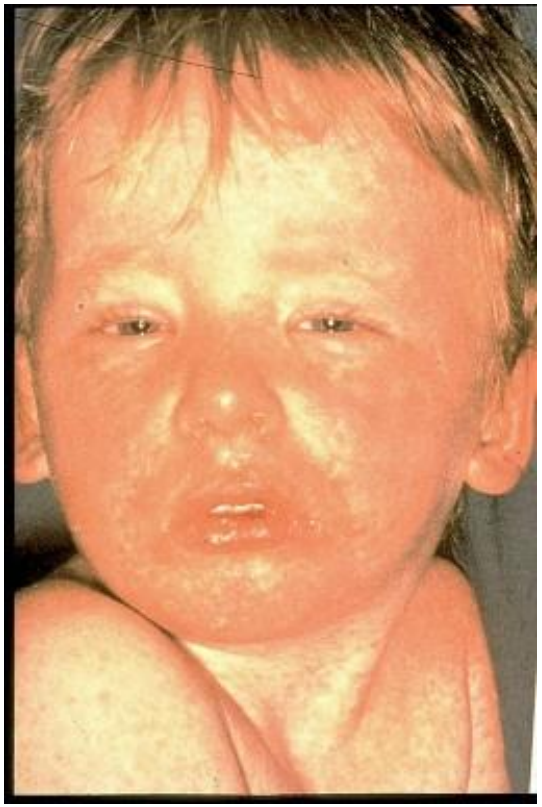
Figure Legend:

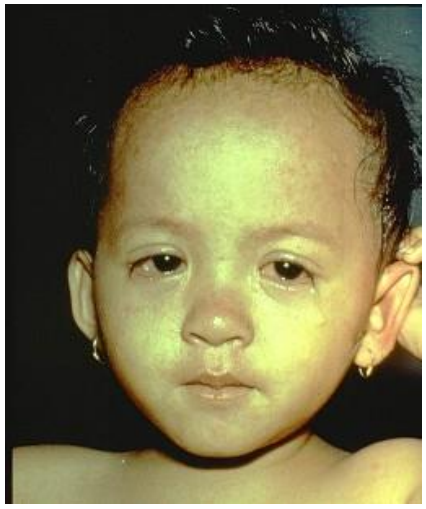
A 6-year-old white female with the early facial rash and conjunctivitis of measles. Courtesy of Larry Frenkel, MD

Figure Legend:

This child with measles is displaying the characteristic red blotchy pattern on his face and body during the third day of the rash. Courtesy of Centers for Disease Control and Prevention

Initial Facial Rash, Conjunctivitis, Coryza in Measles





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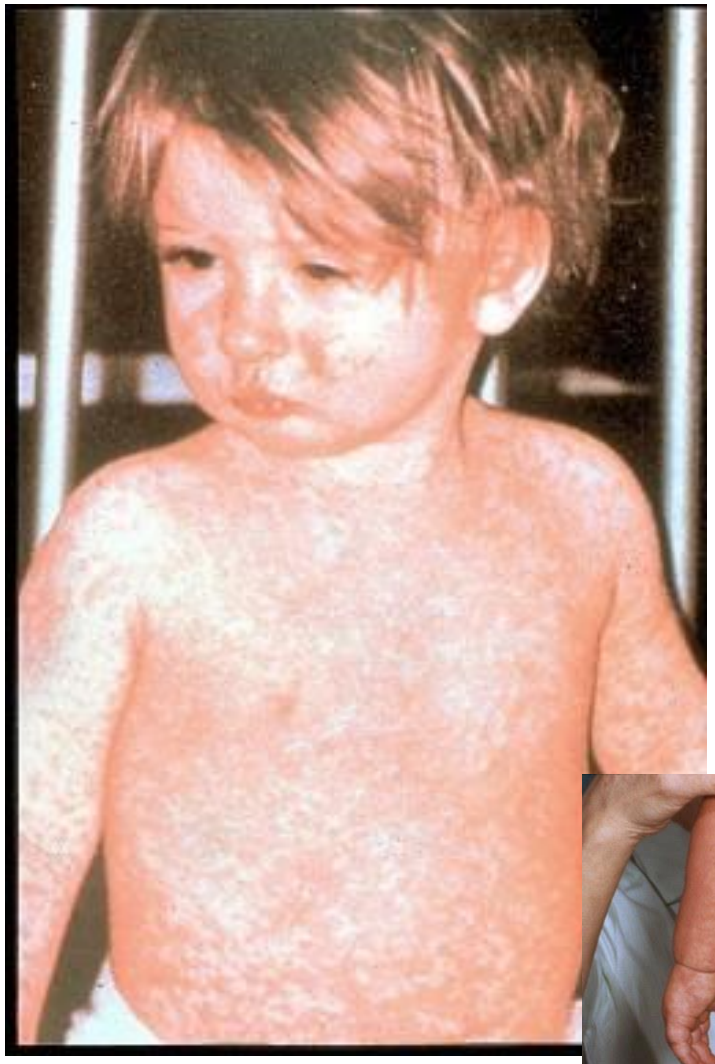
Morbilliform Rash of Measles



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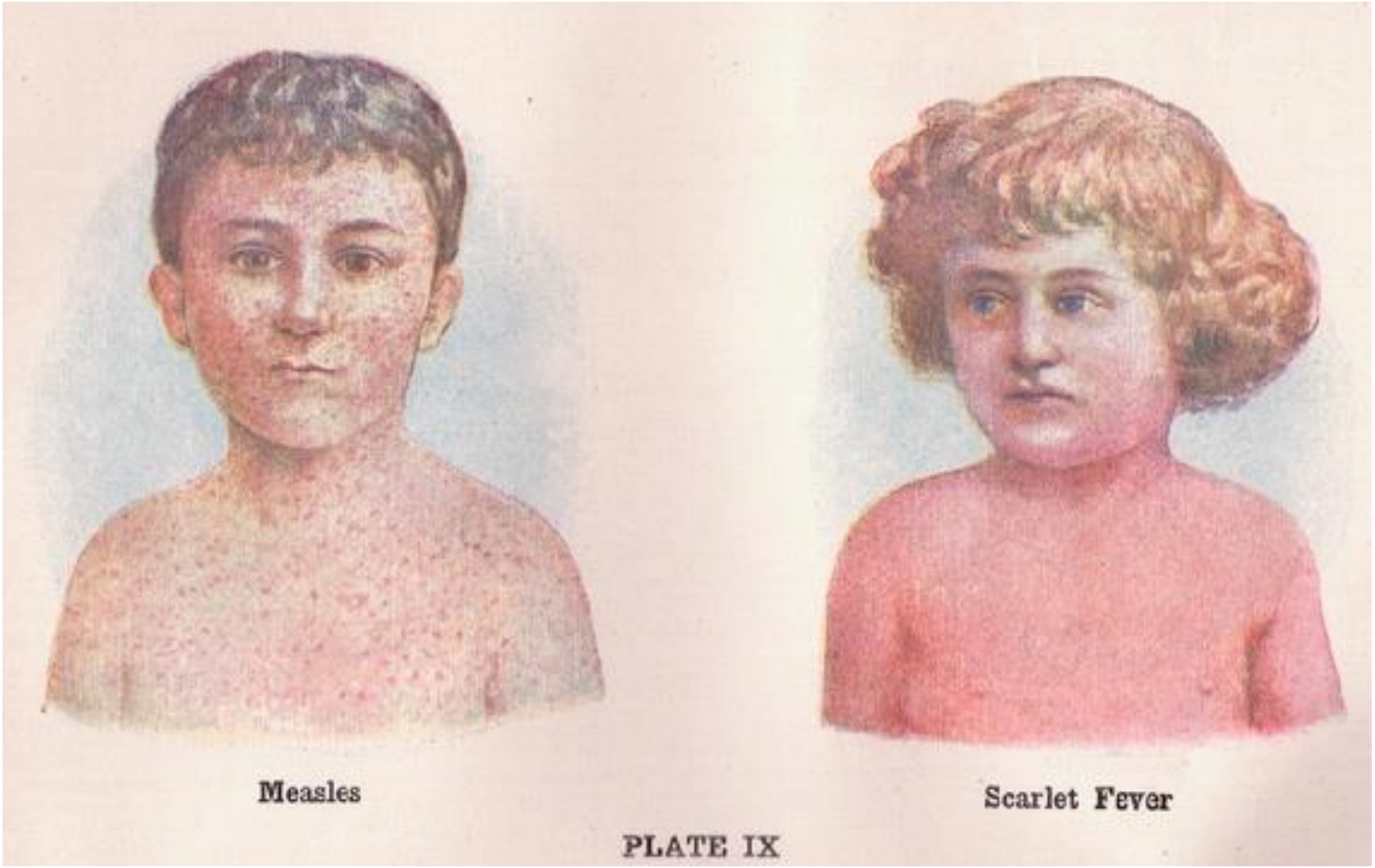
Differential diagnosis: Scarlet Fever, Kawasaki disease, RMSF, Dengue



Measles – Clinical Features

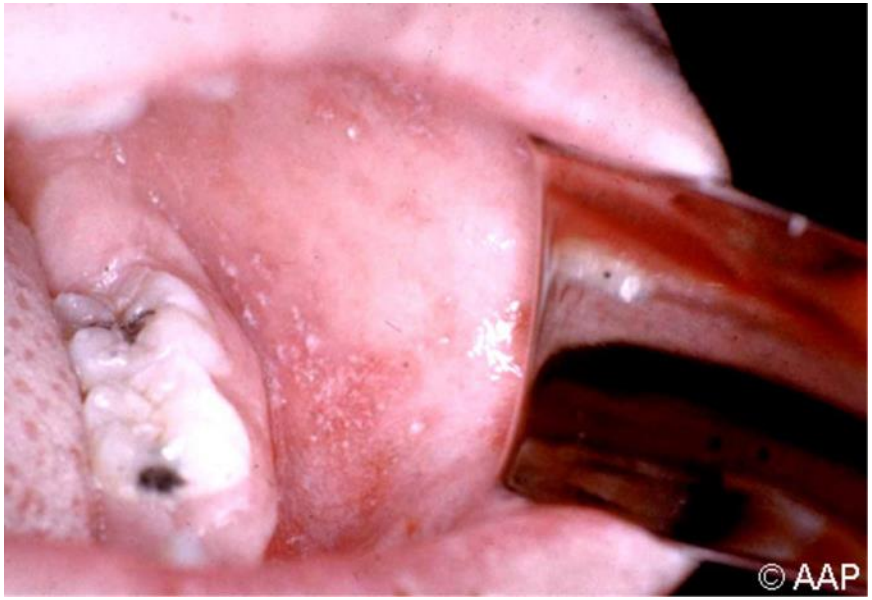


Figure Legend:

Koplik spots. Note characteristic white lesion with erythematous margin.

Figure Legend:

Koplik spots of measles in a 7-year-old white male. Courtesy of Larry Frenkel, MD

CDC- Video of Child with Measles

- http://www.cdc.gov/measles/about/photos.html
- See also - Suspect Measles and Act Fast: http://www.medscape.com/viewarticle/828508

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Atypical Measles Syndrome

- High fever, cough, and coryza versus coryza and conjunctivitis absent
  - clinical symptomatology mild
- Rash different
  - Vesicular rash
  - Predominately petechial with some purpra
  - Erythematous, maculopapular rash with prominence on trunk and groin (similar to scarlet fever)
- Prominent pulmonary involvement
- Teenagers and young adults affected most commonly

Hall WJ, Hall CB. Atypical measles in adolescents: evaluation of clinical and pulmonary function. Ann Intern Med. 1979 Jun;90(6):882-6.

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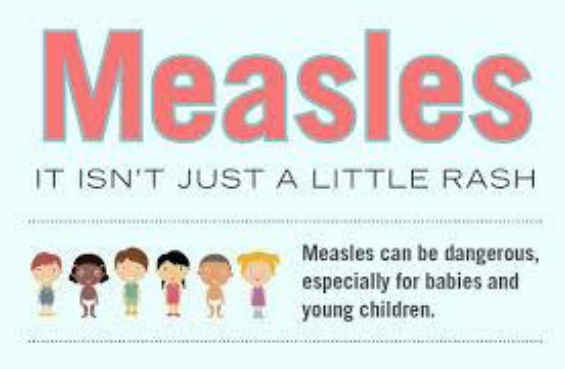
Measles can be serious

- About 1 in 4 people who get measles will be hospitalized
- 1 in every 1,000 people with measles will develop encephalitis
    - ~ 25 % of children have neurodevelopmental sequelae
- Subacute sclerosing panencephalitis — fatal, progressive degenerative CNS disease that usually occurs 7 to 10 years after measles virus infection
- 1 or 2 in every 1,000 people with measles will die



Measles – Diagnosis

- Serum measles IgM antibody
- Significant increase in measles IgG antibody concentration in paired acute and convalescent serum specimens (collected at least 10 days apart)
- Measles RT-PCR (throat or NP specimens) DOH or CDC
- throat or nasopharyngeal or urine sample for viral culture
- Measles Lab Tools(http://www.cdc.gov/measles/lab-tools/index.html)

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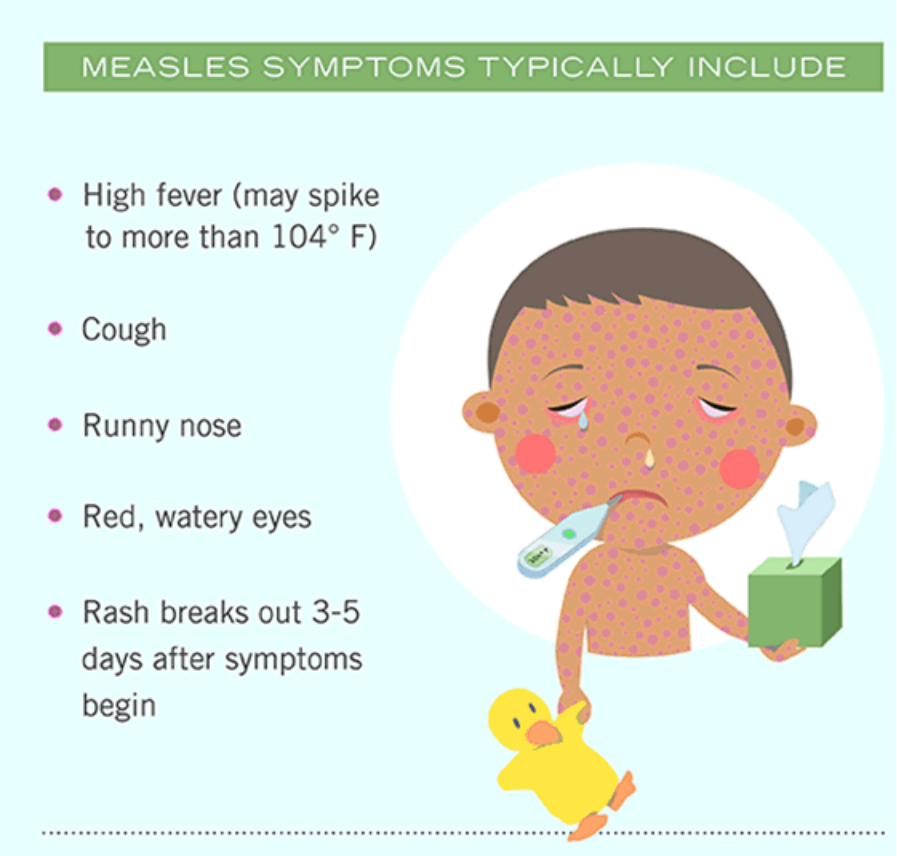
Important point

Think about measles!



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Measles Elimination

- In the decade before live measles vaccine licensed in 1963, EVERY YEAR in US:
  - **3 to 4 million people infected with measles**
  - **Of reported cases - EVERY YEAR:**
    - **48,000 people hospitalized (1 in 10 overall)**
    - **4,000 encephalitis (1 in 100)**
    - **1,000 people developed chronic disability from acute encephalitis**
    - **500 deaths (1-3 per 1000)**
- Since 2000: Measles no longer endemic in the US

- Worldwide :
  - Pre vaccine era: 2.6 million DEATHS per year
  - 2015 - 134 200 measles deaths globally – about 367 deaths every day /15 deaths every hour (WHO)

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Measles Resurgence

- Measles declared eliminated in the United States in 2000

- Since then, concerning and rising number of cases in our country

- WHY?
  - Declining immunization rates (pockets)
  - Increased travel
  - Return of endemicity to some countries (UK)

- Measles is still common around the world
  - 20 million cases and 150,000 deaths each year.

- Measles can enter our country easily
  - From visitors or when Americans travel abroad and bring it back
    - Europe: - Common travel destinations - **England, France, Germany**
    - Africa
    - Asia and the Pacific: India, **Philippines** and Vietnam

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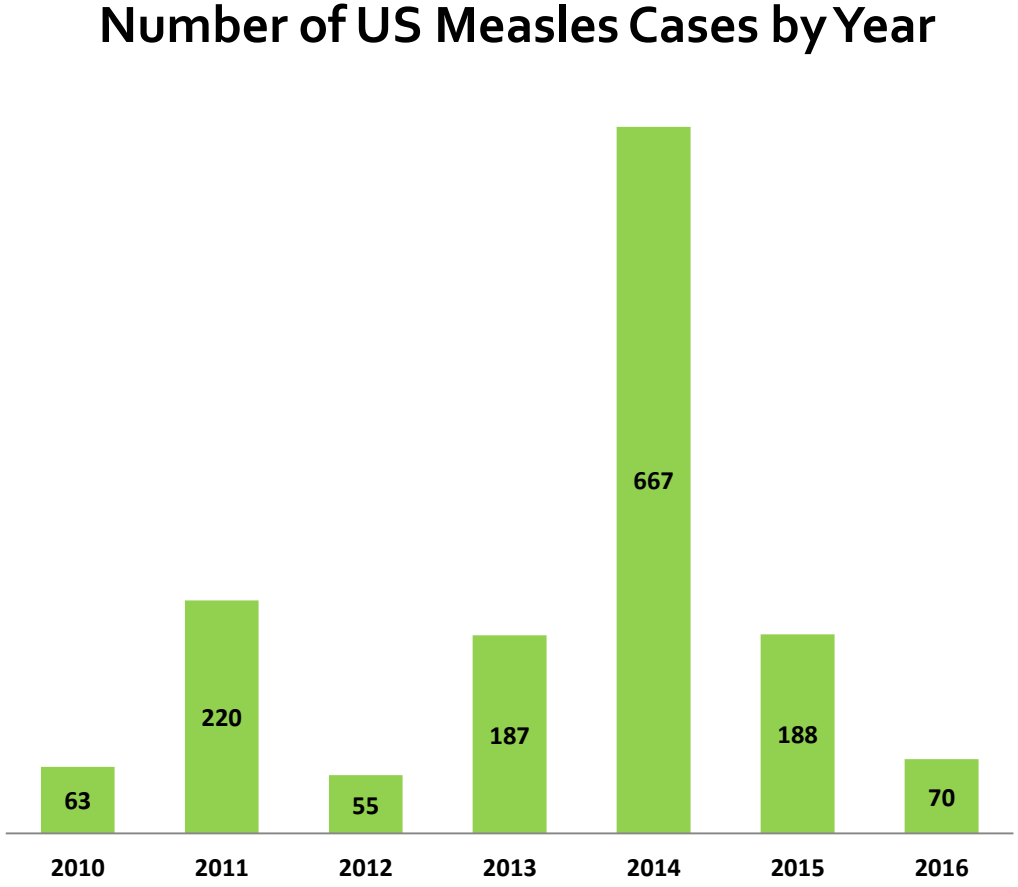
2015 - Multi-state measles outbreak

The outbreak likely started from a traveler who became infected overseas with measles, then visited the park while infectious; however, no source was identified.

The measles virus type in this outbreak (B3) was identical to the type that caused a large measles outbreak in the Philippines in 2014.

In 2016, measles was reported in 70 people from 16 states

- Alabama
- Arizona
- California
- Colorado
- Connecticut
- Florida
- Georgia
- Hawaii
- Illinois
- Massachusetts
- Minnesota
- New York
- North Carolina
- Tennessee
- Texas
- Utah



CBS NEWS / *May 5, 2017, 11:28 PM*

CBS NEWS

Doctors warn Minnesota measles outbreak still "early" as cases increase

Minnesota issued new guidelines after a measles outbreak sickened dozens. / **CBS MINNESOTA**

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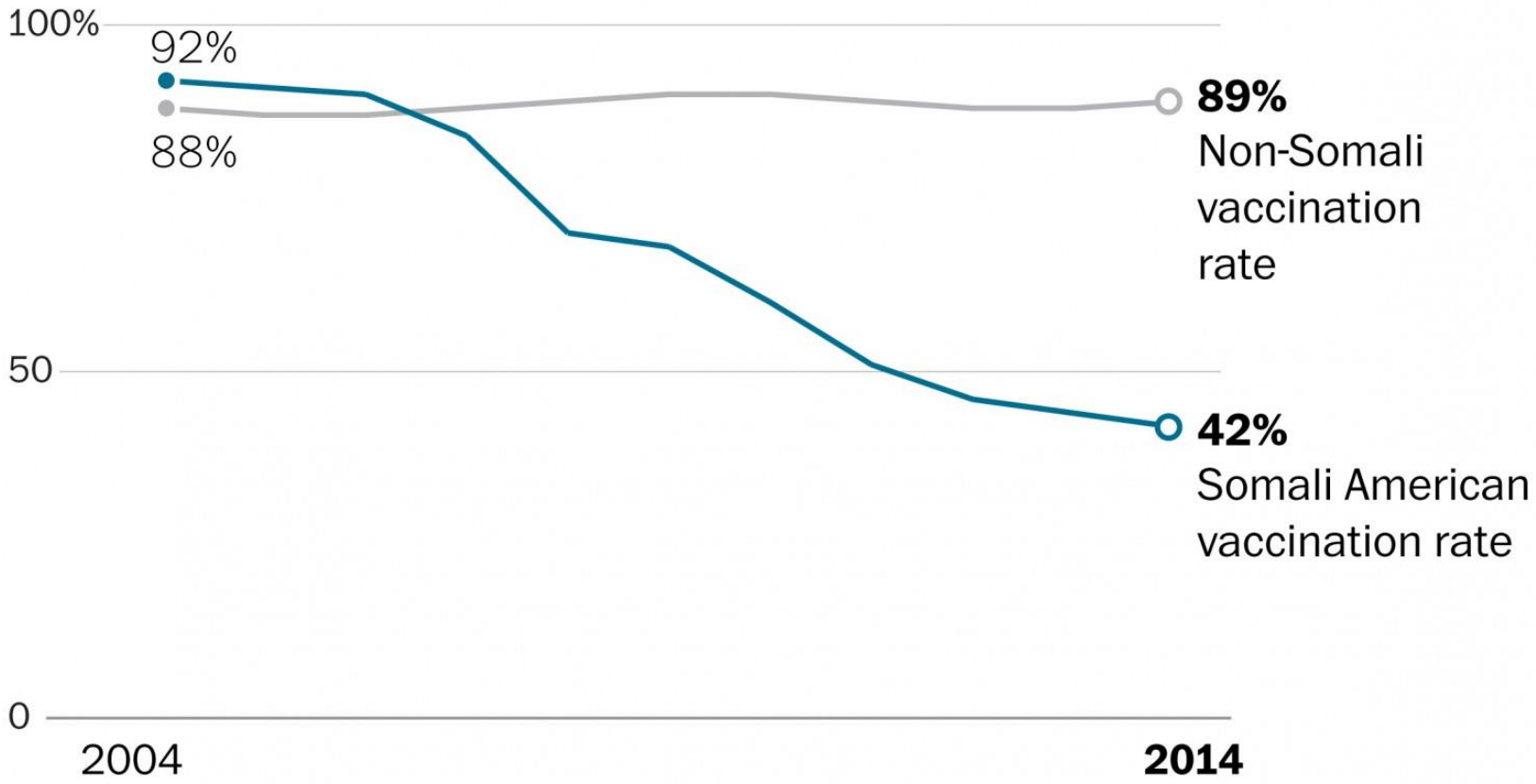
A plummeting vaccination rate in Minnesota

The vaccination rate for measles, mumps and rubella began falling sharply a decade ago among children of Somali descent who live in Minnesota. That drop is now being blamed for a major measles outbreak within the Somali American community there.



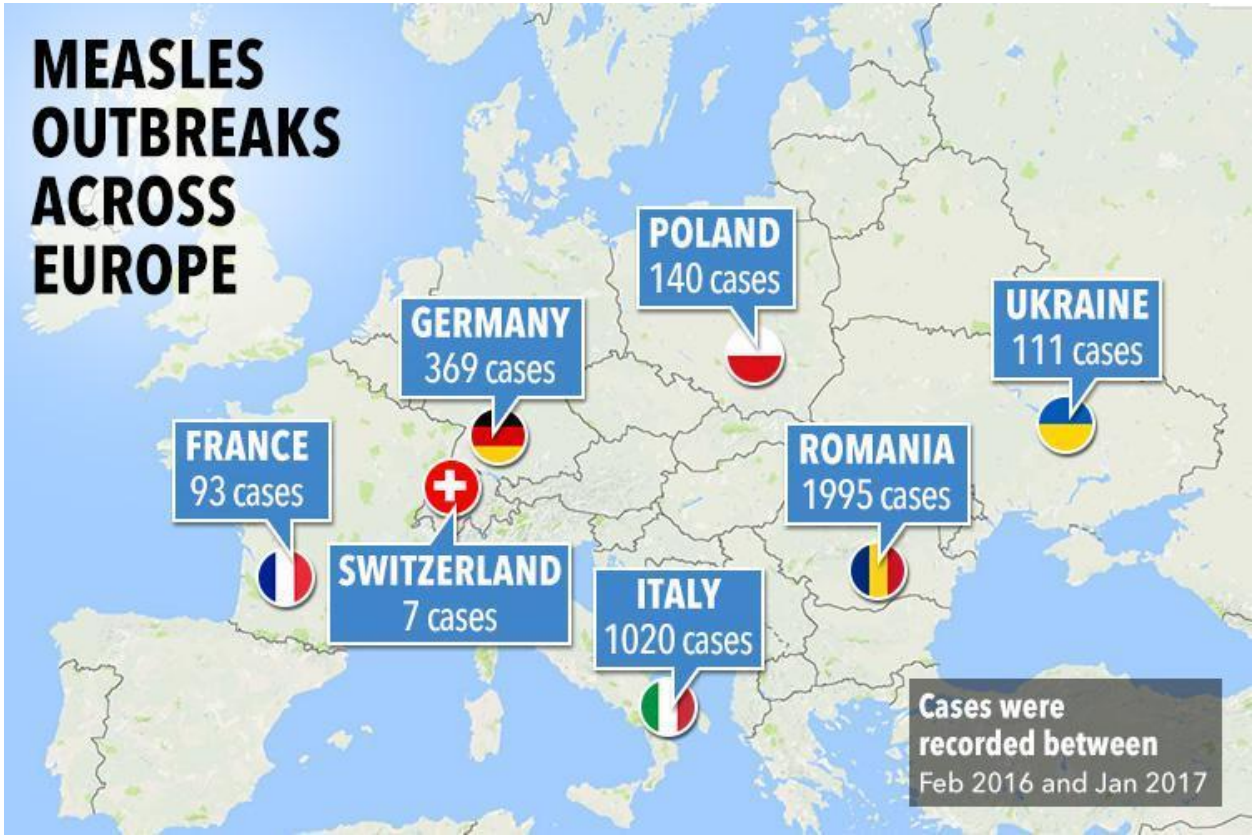
Rates at 24 months in Minnesota-born children

Source: Minnesota Department of Health

THE WASHINGTON POST

Important point

Think about measles!



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Measles Vaccine Efficacy

- Available preparations:
  - MMR ($\geq$ 12 months)
  - MMRV combination measles-mumps-rubella-varicella vaccine (12 months through 12 years)
  - Single-antigen measles vaccine not available

- One dose of MMR vaccine is ~ **93% effective** at preventing measles
- Two doses of MMR (second dose given at least 28 days after the first dose) ~ **97% effective**

- Almost everyone who does not respond to the measles component of the first dose of MMR vaccine at age 12 months or older will respond to the second dose.
  - The second dose of MMR is administered to address primary vaccine failure
  - 1% will still remain susceptible to measles despite 2 vaccines – milder disease, less likely to spread

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Evidence of Presumptive Immunity to Measles

At least one of the following:

1. Written documentation of adequate vaccination:
    a. One or more doses of a measles-containing vaccine administered on or after the first birthday for preschool-age children and adults not at high risk
    b. Two doses of measles-containing vaccine for school-age children and adults at high risk: post-secondary students, healthcare personnel, international travelers*

        * International traveler 6 mos-11 mos of age should get one dose prior to travel

2. Laboratory evidence of immunity (serology)
3. Laboratory confirmation of measles
4. Birth in the United States before 1957*

    * Does not apply to HCW

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Herd Immunity

- When vaccination rates decline, it's not just those individuals who are at risk, it's the whole community

- Why? Vaccinated people act as a barrier to disease for their communities, reducing the risk of infection for people who can't be immunized, such as very young children or those with compromised immune systems

- Overall, national vaccination rates against measles have been very stable since the Vaccines for Children program was introduced in 1994

- In 2015, the overall national coverage for MMR vaccine among children aged 19—35 months was **94%**
  - BUT: Highly variable by state
    - Range – 86.9%-99.2%
  - At county or lower levels, vaccine coverage rates may vary considerably.
    - Pockets of unvaccinated people exist in states with high vaccination coverage

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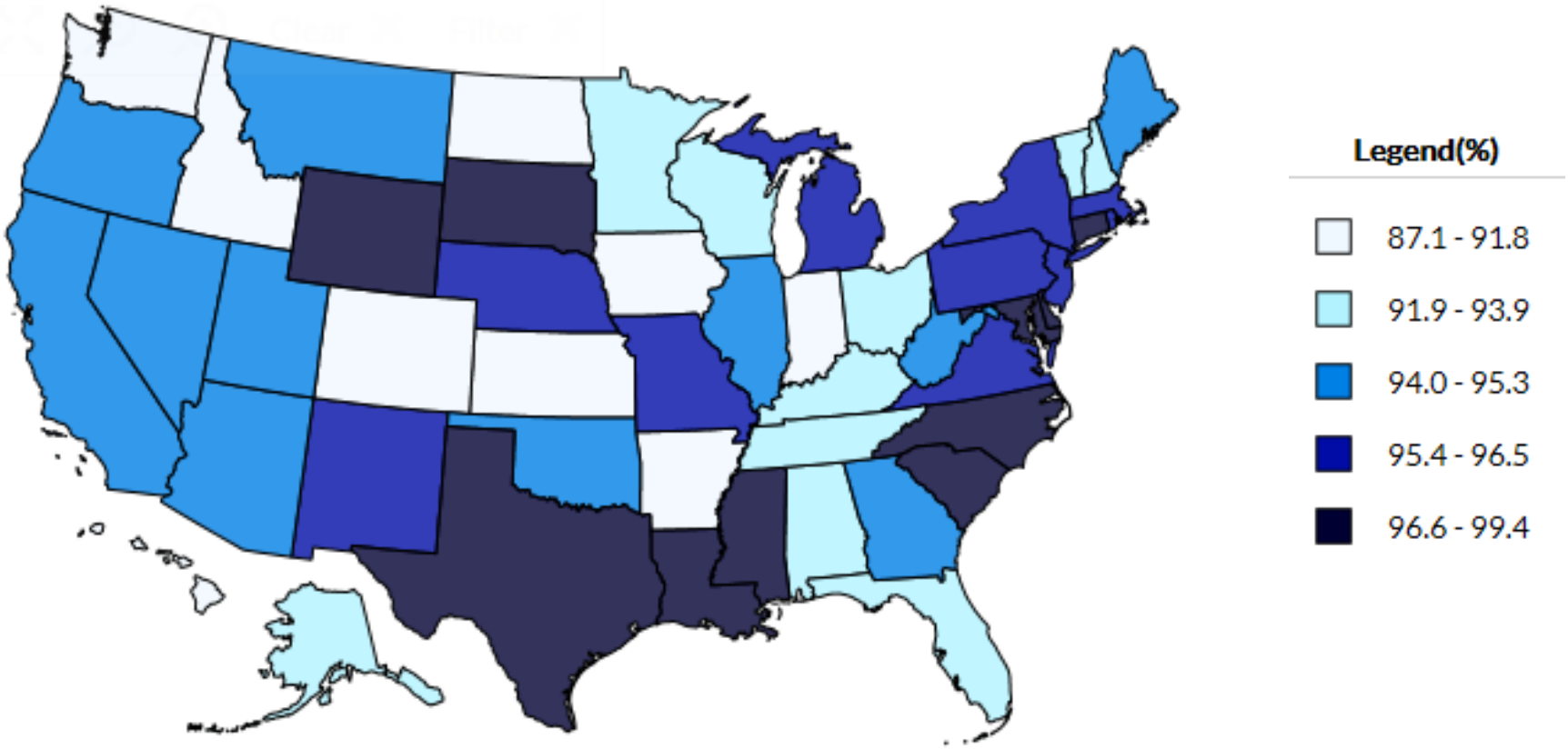
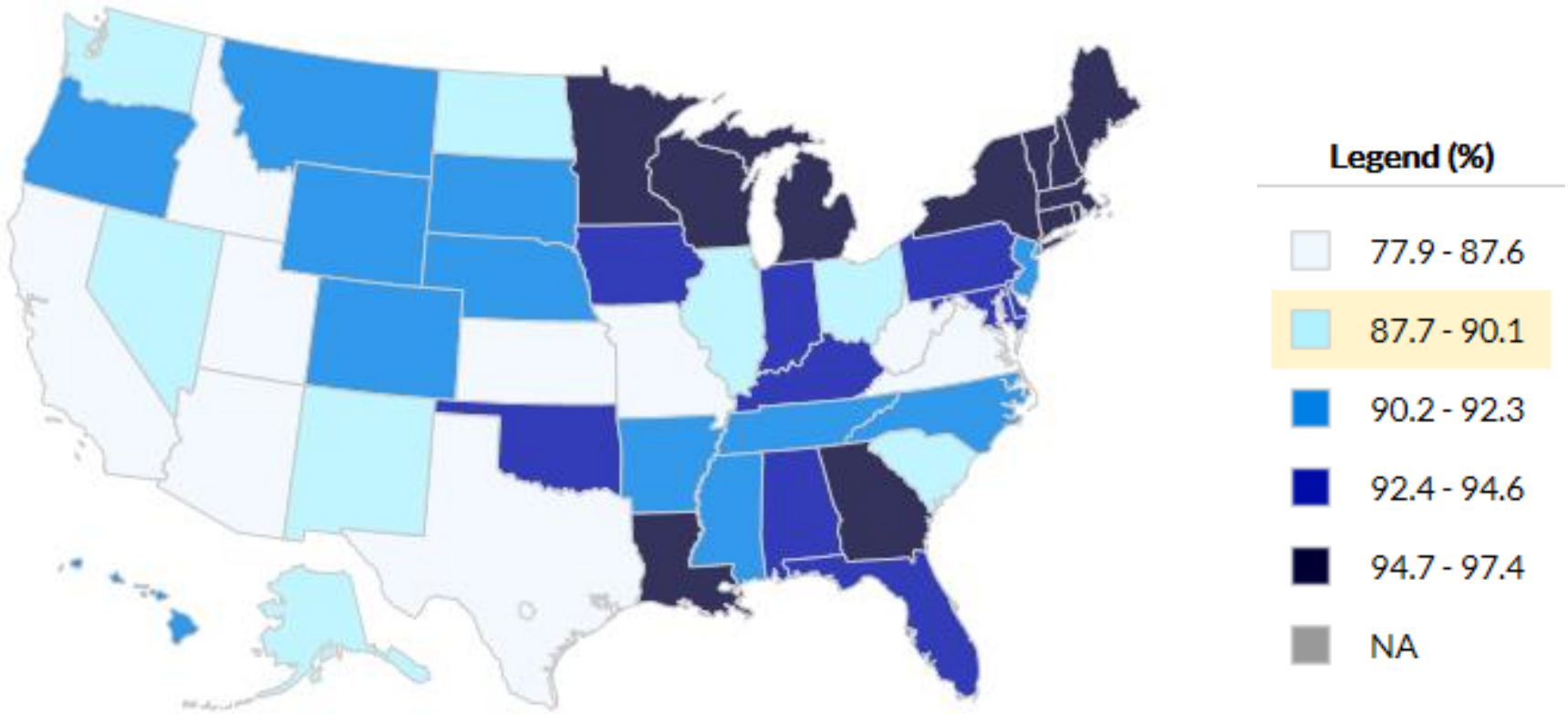
Estimated vaccination coverage among children enrolled in kindergarten by State and the United States, School Vaccination Assessment Report, 2009-10 through 2015-16 school years



Measles, mumps, and rubella (MMR) vaccination coverage among adolescents 13-17 years by State, HHS Region, and the United States, National Immunization Survey-Teen (NIS-Teen), 2008 through 2015



Important point

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Measles is very Contagious

- ~9 out of 10 susceptible persons with close contact to a measles patient will develop measles
- Transmitted by direct contact with infectious droplets or by airborne spread when an infected person breathes, coughs, or sneezes
- Measles virus can remain suspended in the air for up to two hours
- Patients are contagious from 4 days before the rash to 4 days after appearance of the rash

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Use Airborne Precaution before you examine a patient with possible measles

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Measles control measures

- Define exposure:
  - Individuals without proof of immunity, and
  - In a space that shares the same air handler system with the one where the index measles case is, and
  - Exposure duration includes up to 2 hours after the index case leave the space

- Care of exposed **susceptible** individuals
  - MMR vaccine with 72 hours or IG within 6 days of exposure
  - Health care personnel excluded from duty from day 5 to day 21 after last exposure, regardless of whether they received vaccine or IG

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Office Practice – Infection Control

- For any possible cases
  - Immediately place the patient in a negative pressure room (if available)
  - Or, if not available, a private patient room with closed door
  - Place standard isolation mask on patient
  - N95 Mask (or PAPR) should be worn by immune healthcare provider when interacting with patient
- Immediately notify Infection Control and Infectious Diseases
- Immediately notify the Department of Health

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Office Practice – Infection Control

- Only healthcare providers with evidence of immunity can enter room:
  - Documented 2 doses of MMR vaccine OR
  - Serologic evidence of immunity OR
  - Laboratory confirmed infection OR

- If you are not sure if you are immune, check with Occupational Health or your physician

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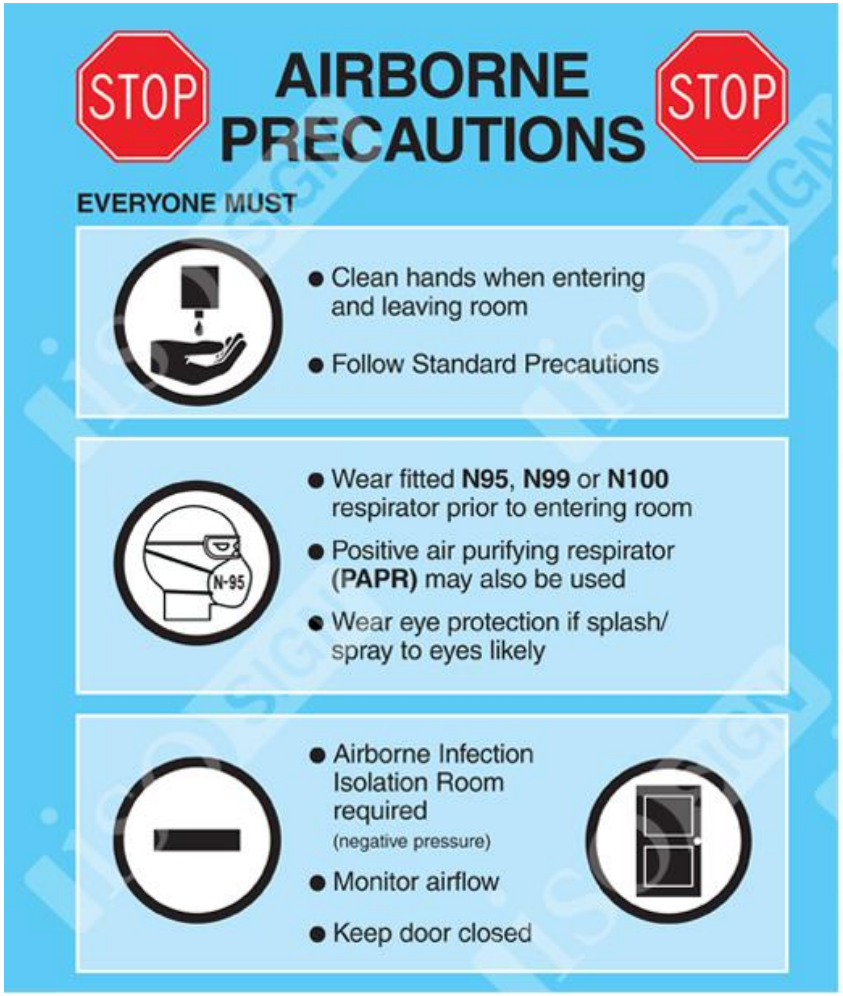
Important point

Airborne Precautions!



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What Can We Do?

- Be a vaccine advocate: Ensure all patients are up to date on MMR vaccine
- Screen at office entry for fever/rash illnesses. Isolate suspect measles case-patients immediately
- Consider measles as a diagnosis in anyone with a febrile rash illness and clinically compatible symptoms (cough, coryza, and/or conjunctivitis)
    - Especially if recent travel abroad or contact with someone else with a febrile rash illness
- Immediately contact local health department to report cases and obtain assistance with submitting specimens for testing

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Resources

CDC Measles Resource Page:

- http://www.cdc.gov/measles/
- http://www.cdc.gov/measles/resources/web-buttons.html

DC DOH:

https://doh.dc.gov/sites/default/files/dc/sites/doh/page_content/attachments/May%20HAN_Measles%202017-%20FINAL_v2.pdf

CNMC Internet:

http://childrensnational.org/primary-care/wellness-resources/measles?sc_lang=en

CNMC Intranet:

http://intranet.childrensnational.org/HomepageNewsRotator/Pages/the-importance-of-immunizations.aspx

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