



Measles Update: A Primer for Health Care Providers

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Overview

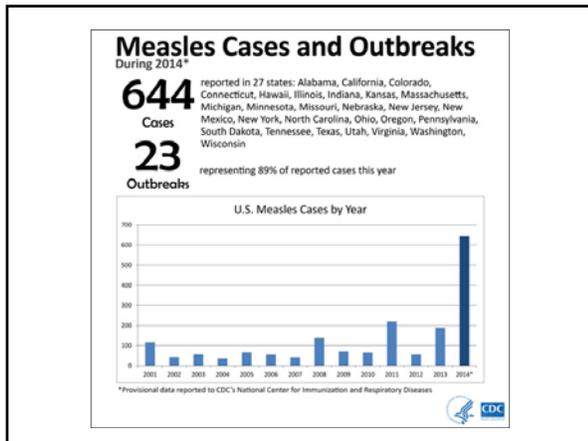
- Current outbreak & background
- Measles 101
 - Clinical presentation
 - Diagnosis
 - Treatment
- Preventing transmission
- Vaccine failure & modified measles
- Open discussion/Q&A



Measles Outbreak



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California Measles Outbreak

CALIFORNIA	Total number of confirmed cases
CALIFORNIA	113
ALAMEDA	6
CONTRA COSTA	1
LOS ANGELES	20
City of Long Beach*	2
City of Pasadena*	4
MARIN	2
ORANGE	35
RIVERSIDE	6
SAN BERNARDINO	6
SAN DIEGO	13
SAN MATEO	3
SANTA CLARA	2
SOLANO	1
VENTURA	12

*City health jurisdictions not included in county total

California Department of Public Health as of 2/13/15:
<http://www.cdph.ca.gov/HealthInfo/discord/Pages/MeaslesSurveillanceUpdates.aspx>

- ### Measles Background
- Highly contagious viral illness
 - First described in the 10th century
 - Near universal infection in childhood in pre-vaccination era
 - Common and often fatal in developing countries
 - As a result of a successful vaccination program, endemic circulation of measles was eliminated from the Americas in 2002

- ### Measles Pathogenesis
- Generalized infection
 - Replicates in many tissues
 - Respiratory airborne & droplet transmission
 - Airborne 1-2 hours
 - 90% attack rate
-
- CDC Public Health Image Library

Clinical Presentation of Measles

- ### Clinical Presentation-Prodrome
- Stepwise increase in fever usual to 103°F or higher
 - 3C's:
 - Cough
 - Coryza
 - Conjunctivitis
 - Koplik spots (lesions on mucous membranes)
-
- CDC Public Health Image Library



Clinical Presentation-Rash

- 2-4 days after prodrome (12 days after exposure)
- DESCENDING rash that starts on face & hairline/head/neck
 - Maculopapular, becomes confluent
 - Descends to cover trunk & whole body
- Persists 5-6 days
- Fades in order of appearance i.e. face/head clears first



CDC Public Health Image Library

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It is unlikely to be measles if:

- NO rash on face/head/neck
- Rash started on trunk or legs
- No concurrent fever with rash
 - *if report of fever first, then breaks, then rash develops-- it isn't measles*
- Child feels well
 - *(Children with measles feel miserable. Adults may be less miserable-especially if previously vaccinated)*

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Diseases/Conditions often Confused with Measles

- Kawasaki syndrome
- Drug eruption
- Other allergic rash
- Other viral exanthem including enteroviral syndromes





CDC Public Health Image Library






CDC Public Health Image Library
CDC Public Health Image Library





CDC Public Health Image Library



Measles Complications in US - Seen in 30% of Cases

Condition	Percent reported	(U.S. data prior to vaccines)
Diarrhea	8	
Otitis media	7	
Pneumonia	6	(but 60% of deaths)
Encephalitis	0.1	(case fatality 15%)
Hospitalization	18	
Death	0.2	

Note: SSPE exceedingly rare 1/100,000

Diagnosis of Measles

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- Measles Diagnosis**
- Obtain a history: "when did it start and how did it spread?"
 - Clinical diagnosis:
 - Cough, coryza, conjunctivitis
 - Fever ($\geq 101^\circ\text{F}$ or 38.3°C)
 - Followed by rash that starts AT HEAD/neck and descends
 - Obtain vaccination history
 - Laboratory confirmation (important—but report suspect case without waiting for results)
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- Measles Laboratory Diagnosis**
- Isolation of measles virus RNA from clinical specimen (PCR)
 - Nasopharynx or throat
 - Urine
 - Serology
 - Positive measles IgM
 - Significant rise in measles IgG
-
- CDC Public Health Image Library



Requested Laboratory Specimens-PCR*

- If within 7 days of rash onset, collect:
 - Throat swab (NP also, acceptable) and
 - Urine specimen for PCR
- If after 7 days but within 10 days of rash onset, collect:
 - Urine specimen for PCR

PCR specimen collection:

- Throat/NP: use viral transport media (Dacron swab; same kit as for influenza)
- Urine: 50-100 mL of urine in a **sterile centrifuge tube or urine specimen container**

* Specific to LAC DPH—other HD may have different testing



PCR-Examples of Transport Media



Swabs should not be cotton or calcium alginate

Photos: A. Stirland 25



Requested Lab Specimens-Serology*

- Draw blood for both measles IgM and IgG antibodies
 - Draw 7-10 mL of blood in a red top or serum separator tube; spin down serum if possible
- No special processing needed-use regular laboratory



*Specific to LAC DPH—other HD may have different testing

Photos: A. Stirland 26



Submitting PCR Specimens

- Notify your local health department
 - In LAC: contact Los Angeles County Immunization Program (LACIP) 213-351-7800
 - LACIP will assist with coordination of specimen pick-up and submission to public health lab.
- NOTE: for suspect cases residing outside LAC please consult your local HD for coordination of PCR submission

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Treatment of Measles



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Treatment of Measles

- Treatment is primarily supportive
- Vitamin A has been demonstrated to decrease complications such as diarrhea and pneumonia in persons with vitamin A deficiency
- No prophylactic antibiotics
- Bacterial superinfections should be treated with the appropriate antibiotic.

Report Suspect Measles Cases Immediately

- To your facility's infection control practitioner
- To local health department by phone IMMEDIATELY
 - Reporting suspect cases in Los Angeles County:
 - Weekdays 7:30 am-5:00 pm call 888-397-3993
 - Non-business hours (before 7:30 am, after 5:00 pm, or weekends) call 213-974-1234
 - Reporting suspect cases in the city of Long Beach:
 - 562-570-4302
 - Reporting suspect cases in the city of Pasadena:
 - 626-744-6403
- DO NOT WAIT FOR LABORATORY CONFIRMATION

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Who is a Contact?

- Anyone who was "around" the measles case four days before the measles case developed rash, through 4 days after the rash first began

Photo: CDC Public Health Image Library

Post Exposure Prophylaxis for Susceptible Contacts

- Susceptible contacts have <2 doses of MMR or lack evidence of immunity on testing.
- If within 72 hours of exposure → VACCINATE (MMR) all unvaccinated persons ≥6* months of age for whom a live vaccine is not contraindicated
 - If AFTER 72 hours from time of exposure, do not vaccinate. It will not protect against this measles exposure AND it can complicate the diagnosis of measles if post vaccination rash and fever occur
- Give second dose MMR to children who have received the first dose (if >28 days since first dose)

* IG preferred for infants age 6 months to 12 months (see next slide)

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Who should receive immune globulin (IG)?

- Immune globulin should be given to:
 - All non-immune persons who are at risk of having severe measles complications (infants, pregnant women)
 - Severely immunocompromised vaccinated persons
- Immune globulin, 0.5 ml/kg (max dose 15 ml) IM, within 6 days of exposure (best if within 3 days)
 - Non-immune pregnant women:
 - 400mg/kg of IG given intravenously
 - Severely immunocompromised persons:
 - 400mg/kg of IG given intravenously

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CDC
December 26, 1997 / Vol. 46 / No. RR-18

MMWR Recommendations and Reports
MORBIDITY AND MORTALITY WEEKLY REPORT

All persons who work in medical facilities should be immune to measles

Immunization of Health-Care Workers

Recommendations of the Advisory Committee on Immunization Practices (ACIP) and the Hospital Infection Control Practices Advisory Committee (HICPAC)

Reprinted January 1998

Ensure all health care personnel are immune

- All persons who work in healthcare facilities should be immune to measles*
- Cal/OSHA requires that measles immunity be assessed in employees covered by the Aerosol Transmissible Diseases standard
 - Non-immune employees must be offered MMR
 - If MMR is refused, a declination must be signed

*CDC. Immunization of Health-Care Personnel. Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2011;60(No.7)





Modified Measles & Vaccine Failure

Dr. James Cherry

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Measles Epidemic in Saint Louis: 1971-1972

- We described primary vaccine failure
- We described secondary vaccine failure and mild modified measles
- We presented evidence that a two dose schedule would be necessary



May, 1972
 802 The Journal of PEDIATRICS

A clinical and serologic study of 103 children with measles vaccine failure

James D. Cherry, M.D.,* Ralph D. Feigin, M.D.,** Penelope G. Shackelford, M.D., Daniel R. Hinthorn, M.D.,*** and Rose Rita Schmidt, M.A., St. Louis, Mo.



August, 1972
 The Journal of PEDIATRICS 217

Urban measles in the vaccine era: A clinical, epidemiologic, and serologic study

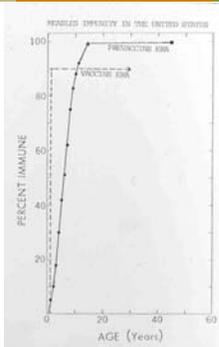
James D. Cherry, M.D.,* Ralph D. Feigin, M.D.,** Louis A. Lobes, Jr., M.D.,*** Daniel R. Hinthorn, M.D.,*** Penelope G. Shackelford, M.D., Richard H. Shirley, B.S., Robert D. Lim, M.D., and Sung C. Choi, Ph.D., St. Louis, Mo.



Primary Vaccine Failure

- Results in typical measles
- With one dose of vaccine the primary vaccine failure rate is 5%
- With two doses of vaccine the primary vaccine failure rate is <1%





Modified from Cherry J.D. et al. Journal of Pediatrics. 1972; 81: 217-230



Secondary Vaccine Failure and Mild Modified Illness

- In 1971-1972 it had multiple causes relating to vaccines and their use
- Today it is due to waning vaccine induced antibody titers
- In the present epidemic in California there are 8 probable secondary vaccine failure cases





Photo: James Cherry, MD





Photo: James Cherry, MD



Important Aspects in the Diagnosis of Exanthematous Illness

1. Exposure	8. Type of rash
2. Season	9. Distribution of rash
3. Incubation period	10. Progression of rash
4. Age	11. Enanthem
5. Previous exanthems	12. Other associated symptoms
6. Relation of rash to fever	13. Laboratory tests
7. Adenopathy	



Laboratory Diagnosis of Modified Measles

- PCR throat/NP and urine
- IgM serum antibody test may be negative



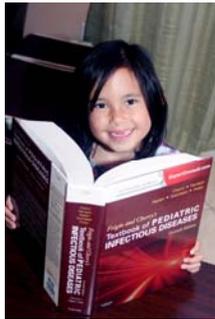


Photo: David Bronstein, MD





Type your questions into the "Question Pane"

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Acknowledgments

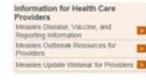
- CA DPH Immunization Program
 - Kathleen Harriman
 - Jill Hacker
- Alameda County Public Health Department
 - Erica Pan

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Measles Resources

- **California DPH measles webpage**
 - Health professional section, FAQs, posters
 - <http://www.cdph.ca.gov/HealthInfo/discord/Pages/Measles.aspx>
- **LAC DPH**
 - Measles webpage
 - <http://publichealth.lacounty.gov/media/measles/index.htm>
 - Immunization program: 213-351-7800
- **Centers for Disease Control (CDC) measles webpage**
 - <http://www.cdc.gov/measles/index.html>




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