Record High US Measles Cases: Patient Vaccination, Clinical Assessment and Management

Clinician Outreach and Communication Activity (COCA) Webinar

July 1, 2014

Office of Public Health Preparedness and Response
Division of Strategic National Stockpile

Objectives

At the conclusion of this session, the participant will be able to accomplish the following:

- Discuss the current status of measles outbreaks in the U.S.
- Describe the clinical presentation of measles and the guidelines for patient assessment and management
- Outline CDC vaccination recommendations for the general public, international travelers, and healthcare professionals
- Identify CDC measles resources and training materials for clinicians

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TODAY'S PRESENTER

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Record High US Measles Cases: Patient Vaccination, Clinical Assessment and Management

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Centers for Disease Control and Prevention (CDC)

COCA Call

July 1, 2014

What is Measles

- Febrile rash illness caused by measles virus
- Among the most contagious of infectious diseases
- Preventable with a highly effective vaccine that is recommended in routine immunization schedules

Measles Transmission

- **Transmitted via respiratory droplets and aerosol**
  - spread by coughing and sneezing, close personal contact or direct contact with infected nasal or throat secretions
- **Contagious from 4 days before to 4 days after rash onset**
- **R_0 = 12-16 with secondary attack rates in susceptible household contacts ~ 90%**

Clinical Presentation

- **Prodrome (2-4 days)**
  - Fever (up to 105°F)
  - Cough, Coryza, and/or Conjunctivitis (the three "C's)
  - Enanthem (on mucous membranes) (Koplik spots)

- **Rash ~14 days after exposure (range 7-21 days)**

Measles Rash

- **Erythematous maculopapular rash**
  - Spreads from head to trunk to extremities
  - May become confluent
- **Rash lasts for 5-6 days and fades in order of appearance**

Measles Complications

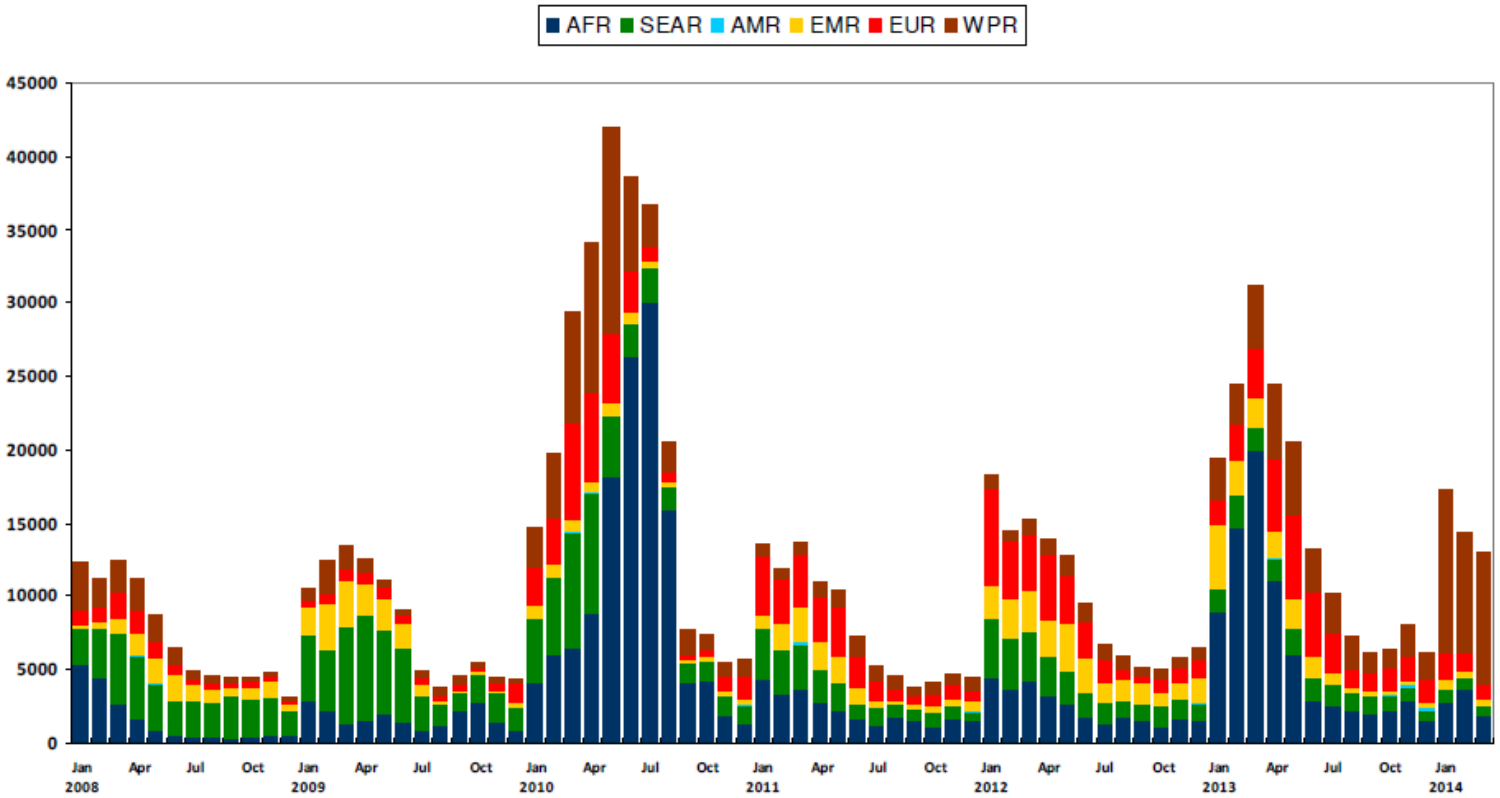
More common in children < 5 years and adults

Diarrhea	8%
Otitis media	7-9%
Pneumonia	1-6%
Encephalitis	1 per 1,000 cases
Death	1 -3 per 1,000 cases
Subacute Sclerosing Panencephalitis (SSPE)	1 per 100,000 cases 7-10 years after measles

Global Burden of Measles

- **Deaths**
  - Estimated 2.6 million deaths/year in 1980
  - 78% decrease in estimated deaths from 2000 to 2012
    - 122,000 deaths in 2012 (~14 deaths/hour)
  - Remains a leading cause of vaccine preventable deaths in children < 5 years old
- **Complications with sequelae include blindness**
- **Cases**
  - Estimated 20 million per year
  - 77% decrease in reported measles incidence from 2000 to 2012

Measles Case Distribution by Month and WHO Regions, 2008-2014



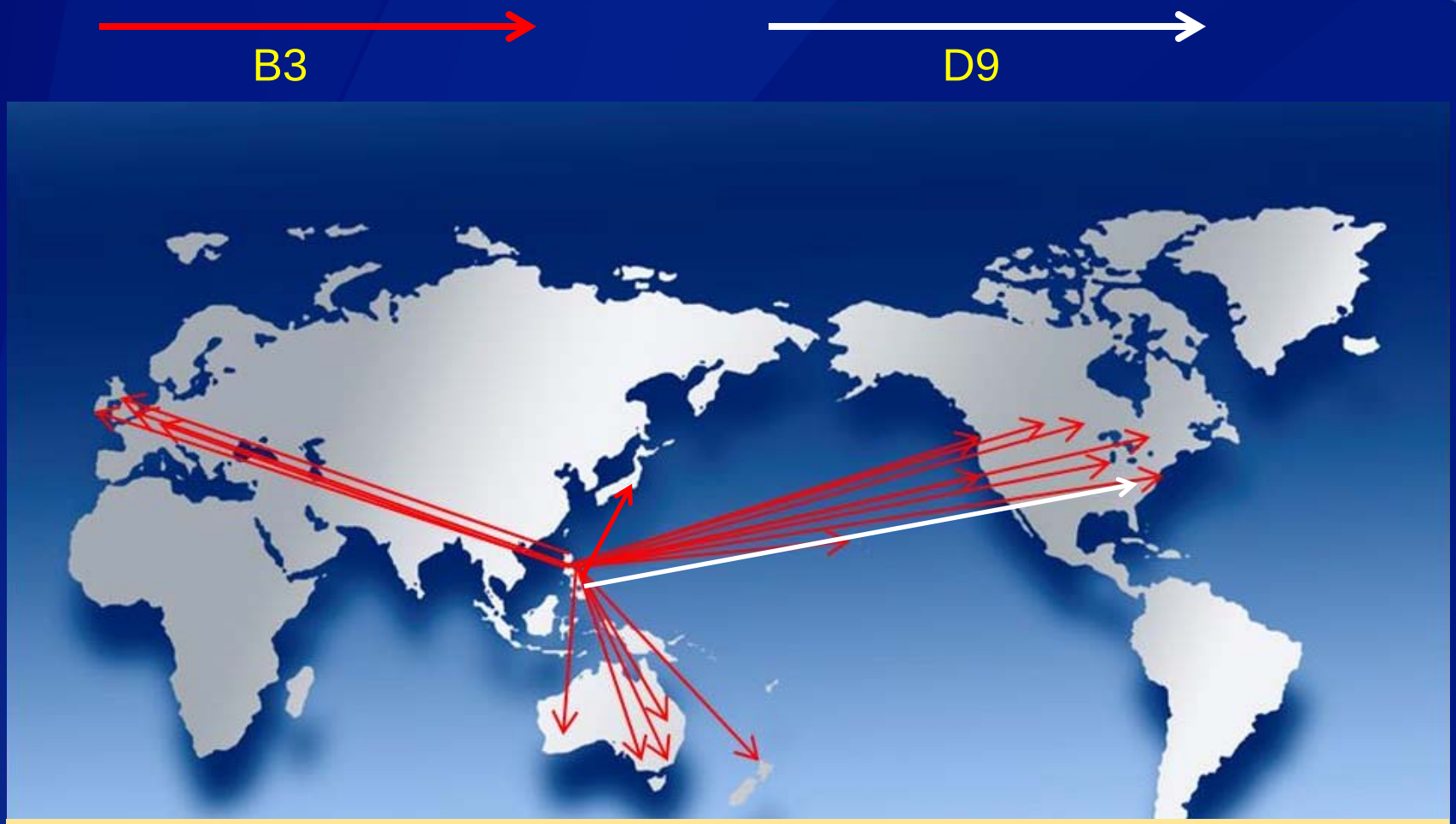
This is surveillance data, hence for the last month, the data may be incomplete.

SEAR India is not included in this graph.

As of 27 May 2013, South Sudan has reassigned to the Africa region (AFR) from the Eastern Mediterranean region (EMR).

Data source: surveillance DEF file
Data in HQ as of 5 May 2014

WHO



Global transmission patterns of measles viruses from the Philippines, 2014

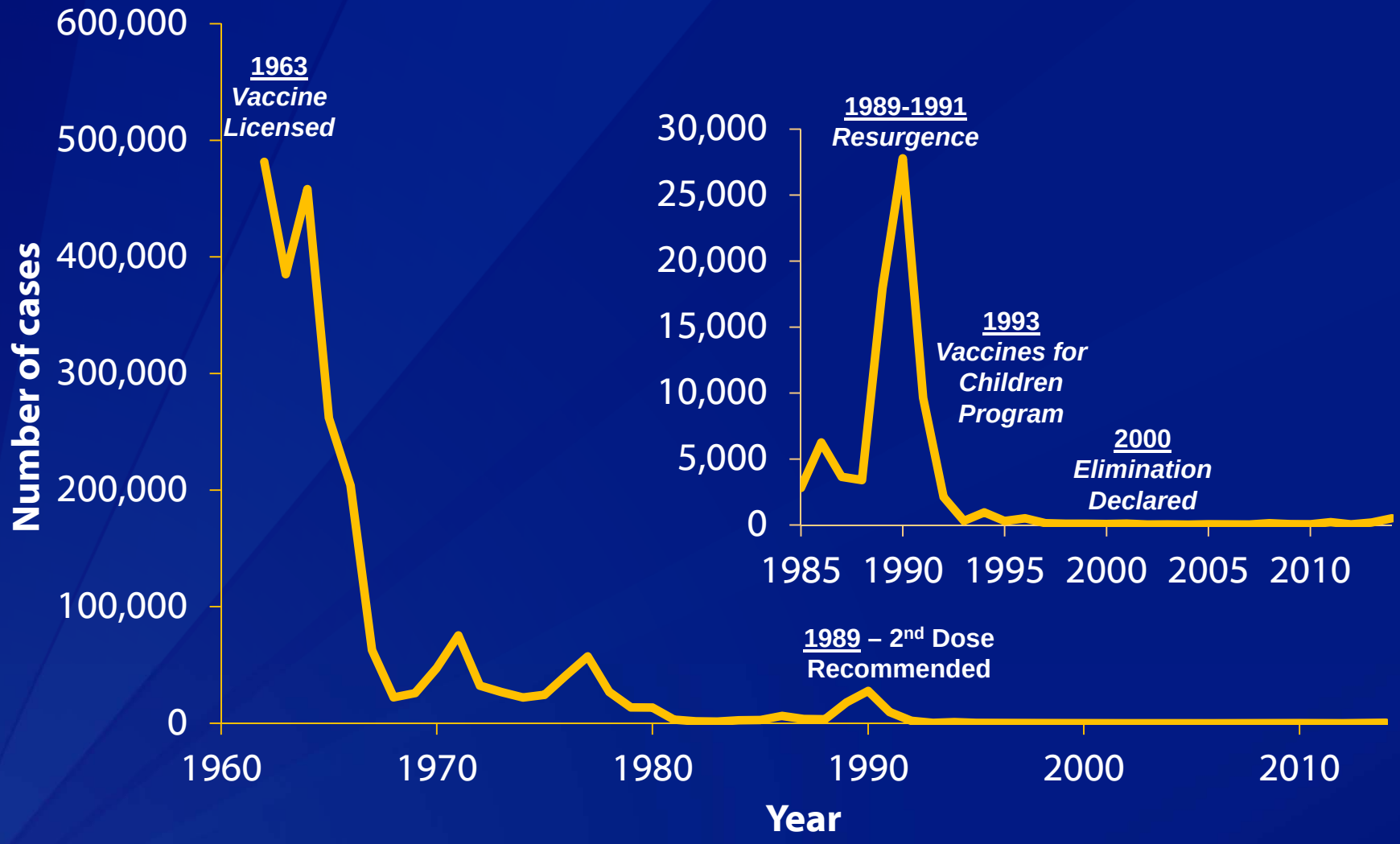
Measles Annual Disease Burden U.S. Decade Prior to Vaccine (1950s)

- 3-4 million estimated and ~ 500,000 reported cases
- 48,000 hospitalizations
- 4,000 encephalitis cases
- 450-500 deaths

Measles and MMR Vaccines

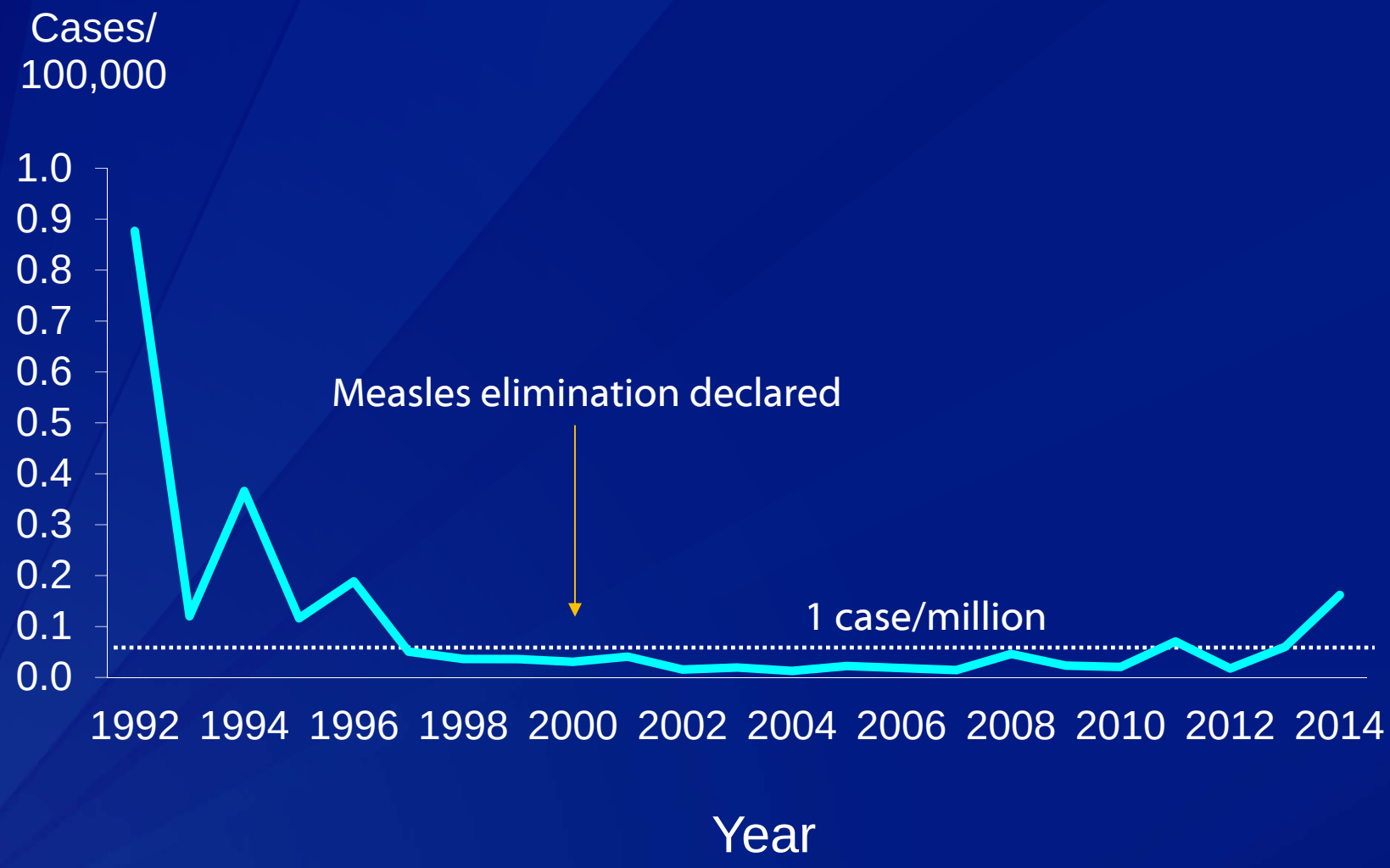
- **Live, viral vaccines**
  - Measles vaccine licensed in 1963
  - Combination MMR vaccine licensed in 1971
    - Only MMR vaccine is available now in the US
- **Excellent safety profile with 50+ years use**
  - Low risk of febrile seizures in children 12-23 months (1 in 3,000 doses)
  - Temporary pain/stiffness in joints, mostly in teenage or adult women
  - Temporary low platelet count – ITP (~ 1 out of 30,000 doses)
- **Vaccine Effectiveness**
  - 1-dose: ~93%
  - 2-dose: ~97%

Measles Cases, United States, 1962-2014*



*2014 case count preliminary as of June 20

Reported Measles Incidence United States, 1992-2014*



*2014 case count preliminary as of June 20

Measles Elimination* in the U.S.

- Declared in 2000 and achieved due to:
  - High two-dose vaccine coverage
  - High quality measles surveillance and response
  - Improved measles control in the World Health Organization Region of the Americas
- Elimination does not mean "gone forever" - imported cases and limited spread occur every year

* Defined as interruption of continuous measles transmission for lasting > 12 months

Measles Cases and Incidence by Age and Vaccination Status, U.S. 2001-2008

	US residents				
Age group	Unvaccinated	Vaccinated	Unknown vaccination status	All	Incidence[a]
<6 months	4 (100)	0	0	4 (1)	0.2
6–11 months	58 (98)	1 (2)	0	59 (13)	3.5
12–15 months	24 (80)	3 (10)	3 (10)	30 (7)	2.6
16 months to 4 years	30 (79)	6 (16)	2 (5)	38 (9)	0.3
5–9 years	35 (90)	3 (8)	1 (3)	39 (9)	0.3
10–19 years	71 (78)	18 (20)	2 (2)	91 (21)	0.3
20–39 years	35 (30)	43 (37)	38 (33)	116 (26)	0.13
40–59 years	26 (47)	6 (11)	23 (42)	55 (13)	0.08
≥60 years	4 (67)	0	2 (33)	6 (1)	0.01
Total	287 (66)	80 (18)	71 (16)	438	0.14

← 20/58

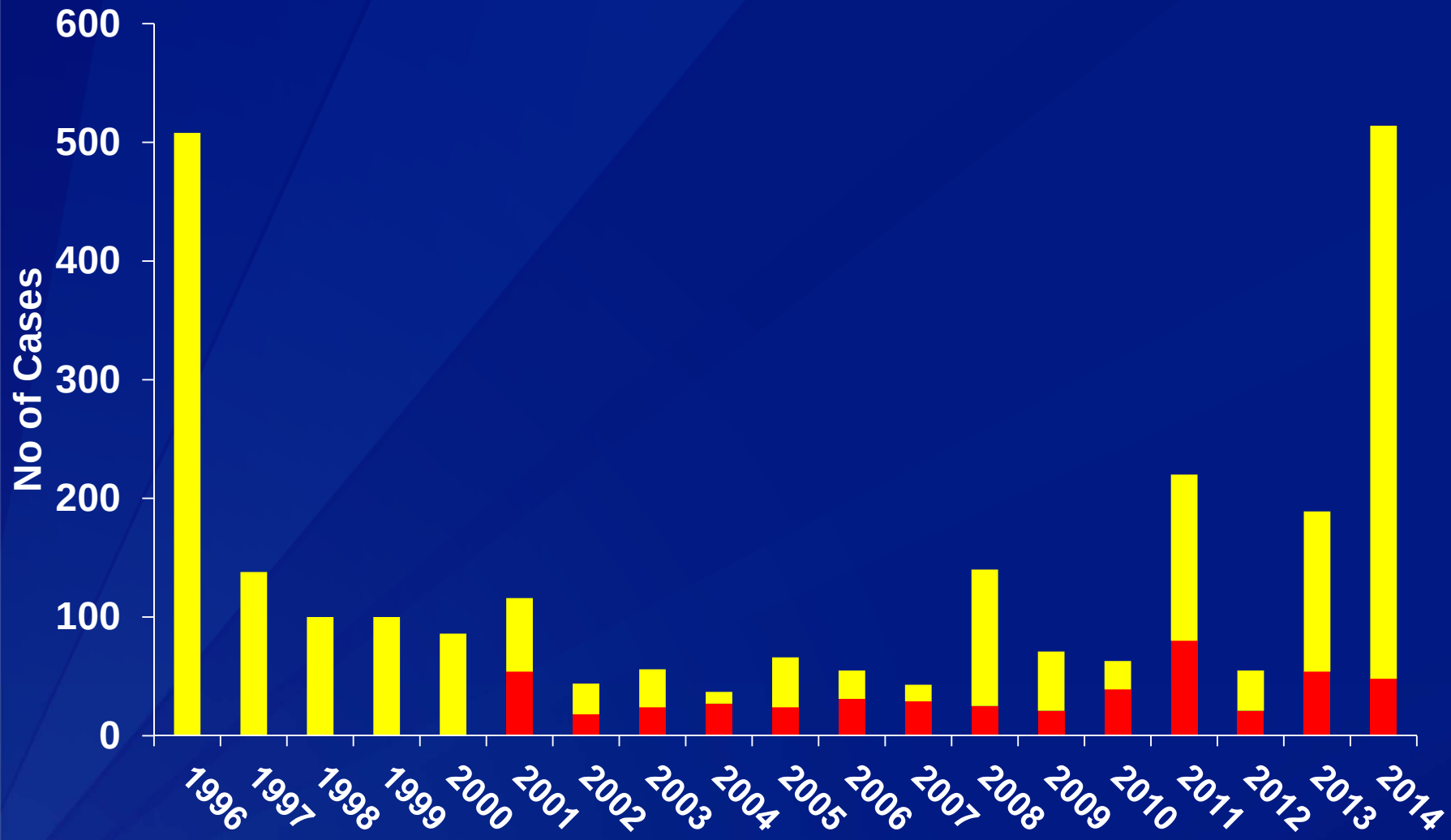
← 11/24

Unvaccinated and traveled abroad

Parker Fiebelkorn et al, JID, 2010;202:1520-1528

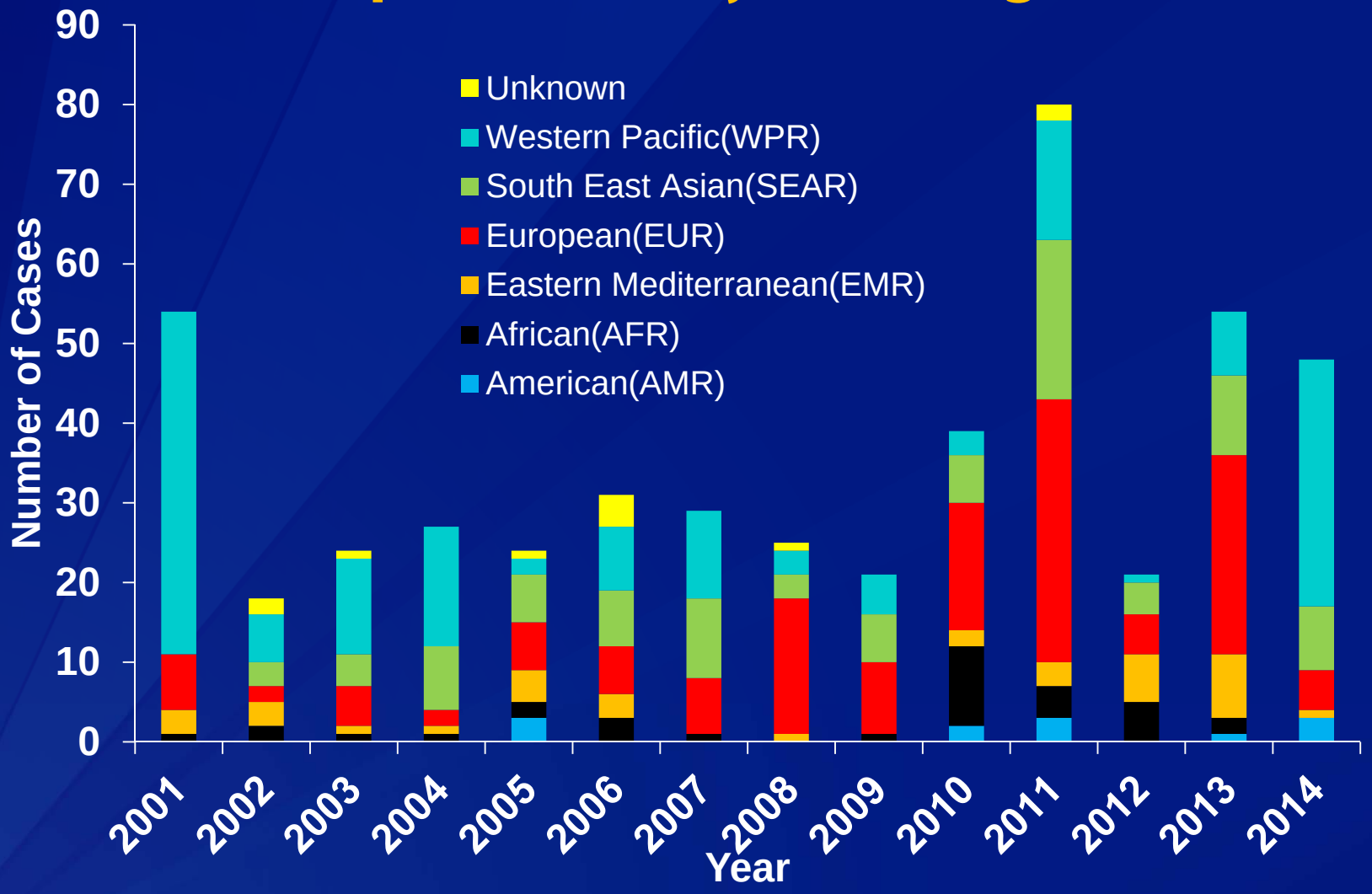
Measles, United States, 2001-Present*

(Importations indicated by red bar, available since 2001)



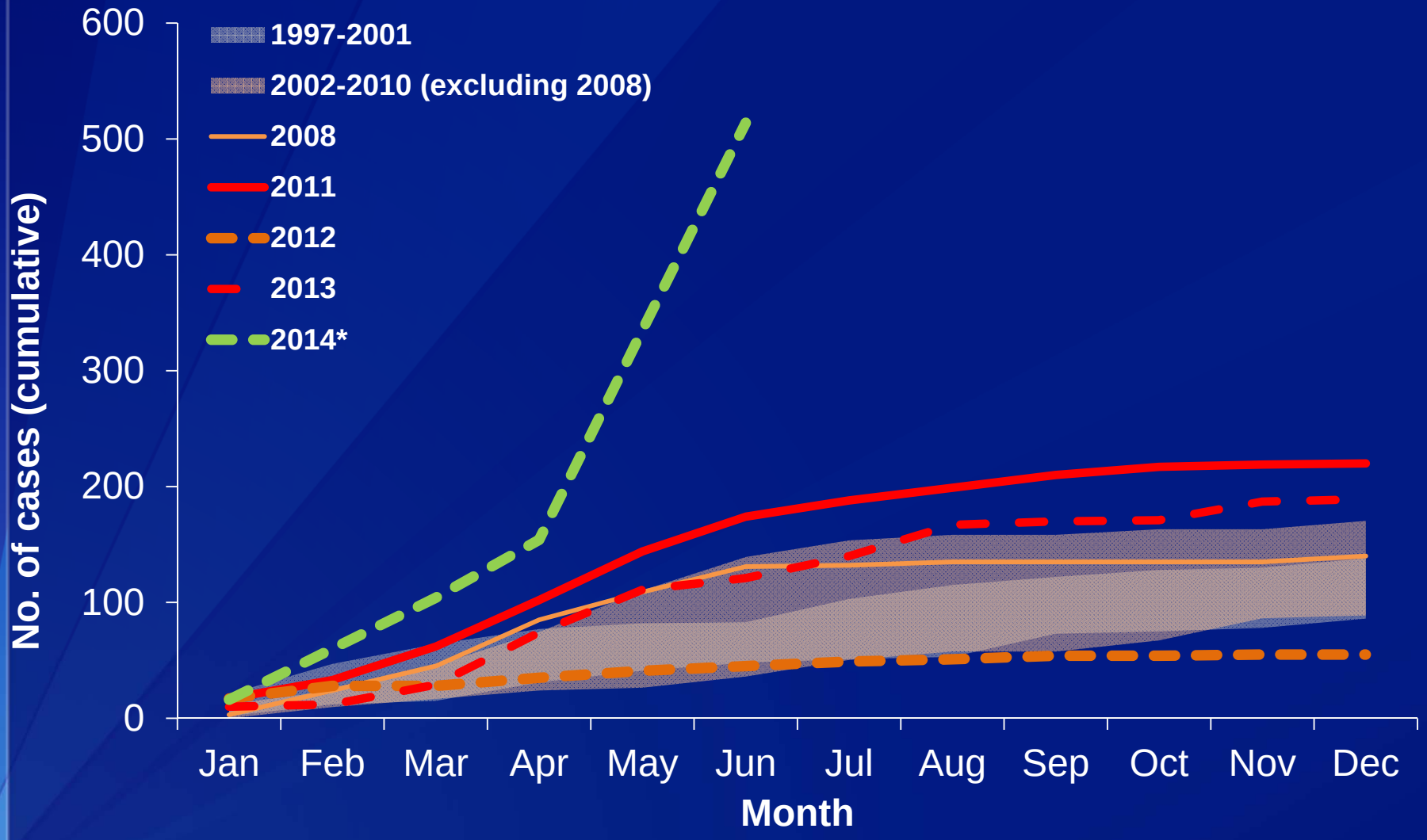
*2014 case count preliminary as of June 20

Measles, United States, 2001-2014*
Importations by WHO Region



*2014 case count preliminary as of June 20

Measles, U.S., 1997-2014*
Cumulative Number by Month of Rash Onset



* As of June 20, 2014 (data incomplete for June)

Measles U.S. 2014*

- **514 cases reported from 20 states including 16 outbreaks**
  - 48 importations
    - 23 from the Philippines
    - 43 (90%) US residents
  - 98% cases import-associated
  - 56 cases (11%) hospitalized
- **Cases in US residents (N=506)**
  - 81% unvaccinated
  - 12% unknown vaccination status (most are adults)
  - 7% vaccinated
  - Among unvaccinated
    - 87% were personal belief exemptors
    - 3% travelers age 6 months to 2 years
    - 7% were too young to be vaccinated
    - 3% unknown/misc

* Provisional reports to CDC through June 20, 2014

Measles, United States, Jan – June 20, 2014
Source of Importations (N=48)

WHO Region	# of cases	Countries of travel
African	0	
Eastern Mediterranean	1	Pakistan
European	5	Dubai/Germany/London (1), Republic of Georgia (1), Netherlands (1), France/Belgium
Americas	3	Brazil (1), Canada (1), Chile (1)
South-East Asia	8	India (6), Indonesia (1), Thailand/South Korea (1)
Western Pacific	31	China (3), Philippines (23), Singapore (1), Saipan (1), Vietnam (1), SE Asia/Philippines (1) , FSM (1)

*Reflects travel patterns to and from the US for residents and visitors as well as measles activity at regional and country level

Measles Outbreaks with 20 or more Cases, United States, 2001-2014*

Year	Outbreak Name	State	Cases #	Import Status	Genotype	Setting	1st & last rash onsets	Duration	Median Age	Age Range
2014	**Knox County**	**OH**	**340***	**Imported (Philippines)**	**D9**	**Community**	**3/24/2014 – 5/7/2014**	**12 weeks +**	**22 y**	**0 mos – 52 y**
2013	Brooklyn	NYC	58	Imported (UK)	D8	Household/ community	3/13/2013 – 6/9/2013	13 weeks	10 y (early) 19 mos (late)	0 mos – 32 y
2005	Tippecanoe County	IN	34	Imported (Romania)	D4	Church/ household	5/16/2005 - 6/24/2005	6 weeks	12 y	9 mo - 49 y
2008	DuPage/Cook County	IL	30	Imported-virus	D4	Homeschool	5/17/2008 - 7/3/2008	7 weeks	10 y	8 mo - 43 y
2013	Stokes/Orange County	NC	23	Imported (India)	D8	Community	4/5/2013 – 5/7/2013	5 weeks	14 y	12 mo -59 y
2013	Tarrant/Denton County	TX	21	Imported (Indonesia)	D9	Church	7/21/2013 – 8/21/2013	5 weeks	11 y	4 mos – 44 y
2011	Hennepin County	MN	21	Imported (Kenya)	B3	Shelter	2/15/2011 - 4/24/2011	10 weeks	23 m	3 mo - 51 y
2008	Brooklyn/ Kings County	NYC	21	Imported (Israel, Belgium)	D4	Community	2/17/2008 - 4/25/2008	10 weeks	15 m	5 mo - 11 y
2014	Manhattan	NYC	20	Imported-virus	B3	Community	2/16/2014 – 3/24/2014	5 weeks	23 y	3 mo – 36 y

*as of June 20, 2014

Measles outbreak response has a high economic burden in the U.S.

Year	Location	Number of cases (outbreaks)	Estimated public health cost*
2011	US	107 (16)	$2.7-5.3M
2011	Utah	13 (2)	>$330,000
2008	California	12 (1)	$125,000
2008	Arizona	14 (1)	$800,000 (limited to cost for 2 hospitals to respond to 7 cases in their facilities)
2005	Indiana	34 (1)	$168,000
2004	Iowa	1	$142,000

*Public health and health care costs expended to control the spread of measles

Keys to Measles Prevention Diagnosis, & Response

- **Vaccine**
  - Vaccine coverage to maintain high population immunity
- **Measles diagnosis**
  - Clinical history and examination
  - Specimen collection and lab testing
- **Case Response**
  - Reporting
  - Contact Investigation
  - Presumptive evidence of immunity
  - Isolation and Quarantine
  - Post Exposure Prophylaxis

MMR Vaccine Routine Recommendations*

- **Children and adolescents**
  - Two doses at 12-15 months and 4-6 years or at least 28 days after the first dose
  - Catch up vaccination as needed

- **Adults without evidence of measles immunity**
  - Two doses (healthcare personnel, post high school students, travelers)
  - One dose (others)

2013 ACIP Recommendations at http://www.cdc.gov/mmwr/pdf/rr/rr6204.pdf
*ACIP, AAP/COID, AAFP, ACOG, ACP, ACNM available at
http://www.cdc.gov/vaccines/schedules/hcp/adult.html

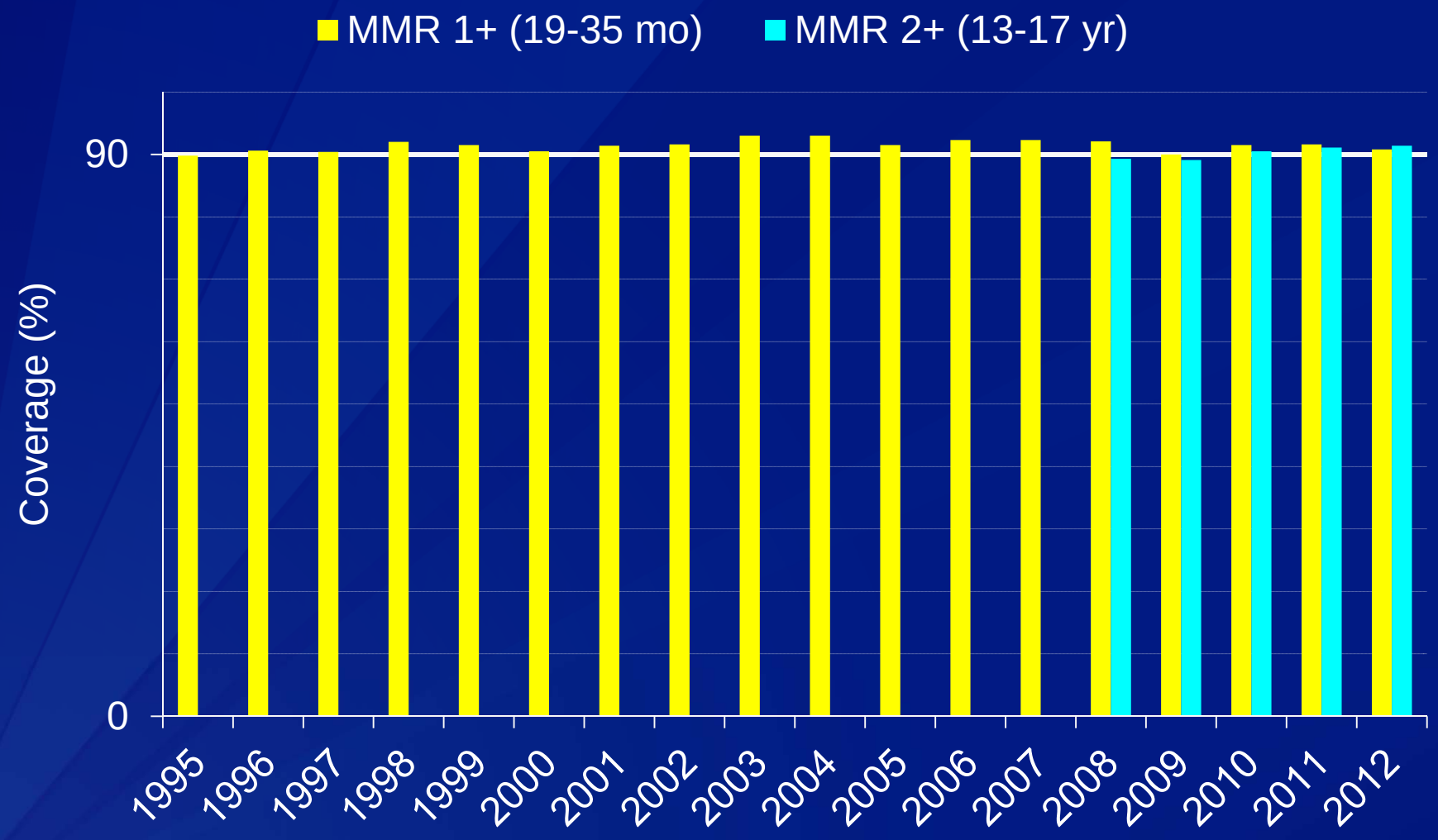
MMR Vaccine Travel Recommendations

- **Persons aged ≥12 months without other evidence of immunity should receive 2 doses***
  - Includes providing a 2nd dose to children prior to age 4-6 yrs
  - Includes adults** who have only received one routine dose in the past

- **Children aged 6-11 months should receive 1 dose**
  - If vaccinated at age 6-11 months, still need 2 subsequent doses at age ≥12 months

* 2nd dose of MMR vaccine should be administered at least 28 days after the 1st dose
** Born in 1957 or later

MMR Vaccination Coverage
National Immunization Survey, U.S., 1995-2012



NIS data available at http://www.cdc.gov/vaccines/imz-managers/coverage/imz-coverage.html

Suspected Measles: Diagnosis and Response

- **Many U.S healthcare professionals have never seen a case of measles**
- **Delay in diagnosis contributes to transmission**
- **Consider measles in differential diagnosis of febrile rash illness**
  - e.g. Kawasaki's, Scarlet fever, Dengue
  - Travel History or Exposure to Recent Travelers or measles in the local community
  - Documented Vaccine History

CDC guidance available at http://www.cdc.gov/vaccines/pubs/surv-manual/chpt07-measles.html

Suspected Measles: Diagnosis and Response

- **Lab testing**
  - Serology for IgM
  - Viral specimen (nasopharyngeal, oropharyngeal, or nasal swab) for PCR (and genotyping)
  - Acute and convalescent specimens for IgG may be useful, especially in vaccinated cases
- **Report immediately to local health department**
- **Offer vaccine or immune globulin immediately to household members without evidence of immunity**

CDC guidance available at http://www.cdc.gov/vaccines/pubs/surv-manual/chpt07-measles.html

Public Health Response (for confirmed and suspect cases)

- **Isolation of cases**
  - Infectious period 4 days prior through 4 days after date of rash onset
- **Notification and Surveillance**
  - Immediately notifiable to CDC (within 24 hours)
  - Contact CDC Quarantine Station if relevant travel
  - Alert physicians statewide
  - Enhanced measles surveillance
- **Contact investigations and response efforts**

CDC guidance available at http://www.cdc.gov/vaccines/pubs/surv-manual/chpt07-measles.html

Measles Isolation Guidance

- If measles is suspected in a clinic, ER or hospital setting, isolate immediately
- Airborne isolation room or private room with the door closed, mask patient if feasible
- Ensure healthcare personnel have evidence of immunity
- In hospital setting, respiratory precautions including N95 masks or PAPR, even for those with evidence of immunity

CDC guidance available at http://www.cdc.gov/vaccines/pubs/surv-manual/chpt07-measles.html and http://www.cdc.gov/hicpac/pdf/isolation/Isolation2007.pdf

Contact Investigation for Exposure to Measles

- **Persons exposed during cases infectious period**
  - Includes exposure to area 2 hours after case left
- **Establish presumptive evidence of immunity for contacts**
- **Quarantine of contacts without presumptive evidence of immunity (through 21 days after exposure)**
- **Postexposure prophylaxis (PEP)**
  - Vaccine or Immune globulin (IG)

CDC guidance available at http://www.cdc.gov/vaccines/pubs/surv-manual/chpt07-measles.html

Presumptive Evidence of Immunity for Measles

Routine	Students at post-high school educational institutions	Health-care personnel	International travelers
(1) Documentation of age-appropriate vaccination with a live measles virus-containing vaccine: –preschool-aged children: 1 dose –school-aged children (grades K-12): 2 doses –adults not at high risk: 1 dose, or (2) Laboratory evidence of immunity, or (3) Laboratory confirmation of disease, or (4) Born before 1957	(1) Documentation of vaccination with 2 doses of live measles virus-containing vaccine, or (2) Laboratory evidence of immunity, or (3) Laboratory confirmation of disease, or (4) Born before 1957	(1) Documentation of vaccination with 2 doses of live measles virus-containing vaccine, or (2) Laboratory evidence of immunity, or (3) Laboratory confirmation of disease, or (4) Born before 1957 - should consider 2 doses - must provide 2 doses during outbreak response unless serologic evidence of immunity	(1) Documentation of age-appropriate vaccination with a live measles virus-containing vaccine: –infants aged 6–11 months: 1 dose –persons aged ≥12 months: 2 doses, or (2) Laboratory evidence of immunity, or (3) Laboratory confirmation of disease, or (4) Born before 1957

2013 ACIP Recommendations at http://www.cdc.gov/mmwr/pdf/rr/rr6204.pdf

Postexposure Prophylaxis (PEP)
MMR Vaccine

- **Administer within 72 hours of exposure**
  - May return to normal activities (except health care settings)
  - Still monitor for symptoms
  - Can be given down to age 6 months
  - Be aware of possibility of vaccine rash

2013 ACIP Recommendations at http://www.cdc.gov/mmwr/pdf/rr/rr6204.pdf

Postexposure Prophylaxis (PEP) Immune Globulin

- **Administer within 6 days of exposure**
- **Recommended Dose**
  - Intramuscular (IGIM): 0.5 mL/kg (max = 15 mL)
  - Intravenous (IGIV): 400 mg/kg
- **Recommended for the following groups (risk of severe disease and complications)**
    - Infants aged <12 months (IGIM)
    - Pregnant women without evidence of immunity (IGIV)
    - Severely immunocompromised patients (IGIV)

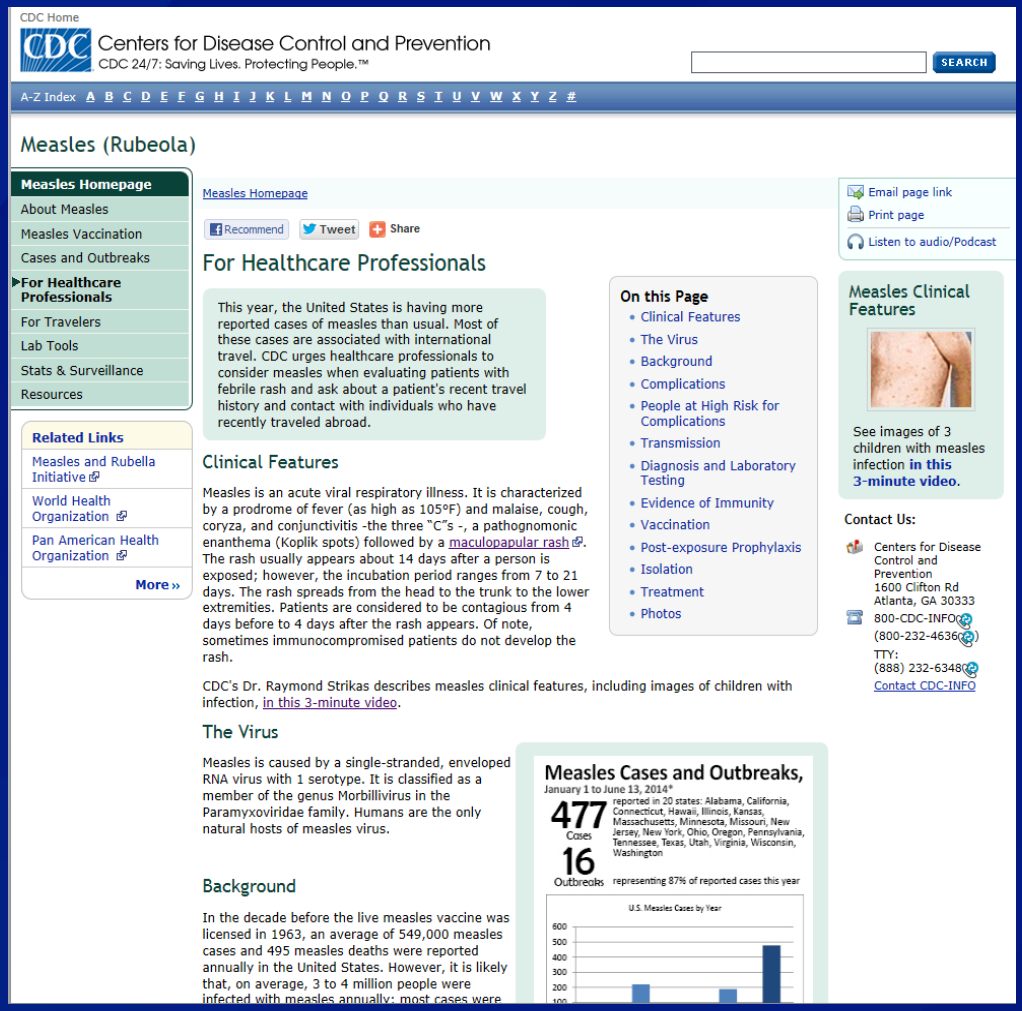
CDC guidance available at http://www.cdc.gov/vaccines/pubs/surv-manual/chpt07-measles.html and 2013 ACIP Recommendations at http://www.cdc.gov/mmwr/pdf/rr/rr6204.pdf

Measles In the Postelimination Era

- **Measles is due to Failure to Vaccinate**
- **Measles Elimination is a Global Problem**
  - Continued threat of importations
- **Measles occurs in the U.S.**
- **Maintenance of Elimination is Resource Intensive**
  - Maintaining vaccine coverage
  - Intensive case/contact investigations
  - Healthcare workers diagnostic skills
  - Advanced laboratory techniques

Resources for Healthcare Professionals

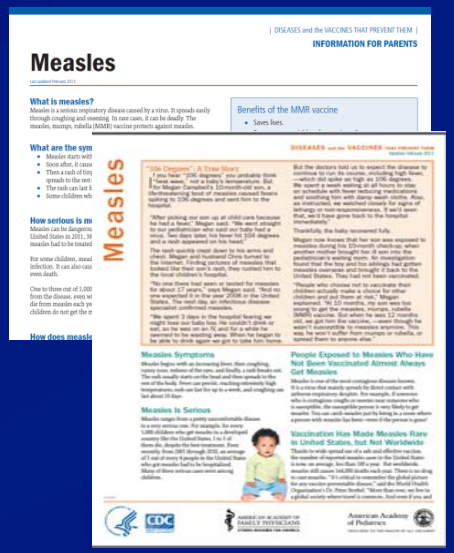
- Clinical Information
- Complications
- Transmission
- Practice Guidelines
  - Diagnosis
  - Lab testing
  - Isolation & Treatment
- Vaccination Recs
  - Children & Adults
  - International Travelers
- Measles Images
- Outbreak Statistics



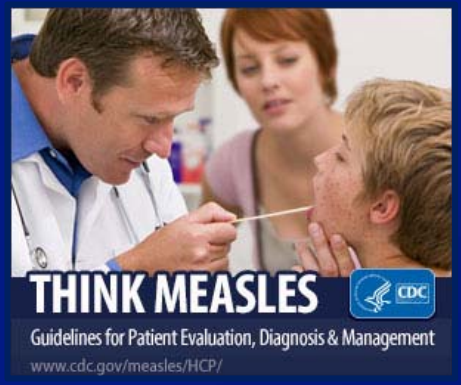
http://www.cdc.gov/measles/hcp/

Resources for Healthcare Professionals

- **Webinar: Measles 2014 Update-Clinical Presentation, Outbreaks, Vaccination Recommendations, & Patient Management**
  - http://www.vicnetwork.org/
- **NetConference: Why Measles Matters**
  - http://www.cdc.gov/vaccines/ed/ciinc/
- **Banners and Buttons Linking to CDC Clinician Site**
  - http://www.cdc.gov/measles/resources/web-buttons.html
- **CDC Fact Sheets and Resources**
  - Fact sheets on measles and vaccine safety to guide discussions with patients and parents
  - www.cdc.gov/vaccines/hcp/patient-ed/conversations/prevent-diseases/index.html



- **Put CDC's Measles Content for Clinicians on Your Website**
  - Easy steps to syndicate CDC's measles information to your website
  - https://tools.cdc.gov/syndication/pages.aspx?topicId=28032
  - http://www.cdc.gov/syndication/
- **Children with Measles Video**
  - http://www.cdc.gov/vaccines/ed/epivac/default.htm (Session 6)



Resources for the Public

- **Measles Website**
  - Disease Information
  - Vaccination Information and Recs
  - Travel Recommendations
  - Outbreak Statistics

- **Infographics, Videos, & Podcasts**

- **Measles Feature**
  - http://www.cdc.gov/features/measles/

- **Put CDC's Measles Content for the**
  - https://tools.cdc.gov/syndication/page

- **Resources in Spanish**

http://www.cdc.gov/measles/index.html
http://www.cdc.gov/measles/resources/index.html

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- State and local health departments
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  - Jessica Allen

Thank You

Questions?

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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  - "Click" the Q&A tab at the top left of the webinar tool bar
  - "Click" in the white space
  - "Type" your question
  - "Click" ask
- **On the Phone**
  - Press Star (*) 1 to enter in the queue to ask a question
  - State your name
  - Listen for the operator to call your name
  - State your organization and then ask your question

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AAVSB/RACE: This program was reviewed and approved by the AAVSB RACE program for 1.0 hours of continuing education in jurisdictions which recognize AAVSB RACE approval. Please contact the AAVSB RACE program if you have any comments/concerns regarding this program's validity or relevancy to the veterinary profession.

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Thank you for joining!
Please email us questions at coca@cdc.gov

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