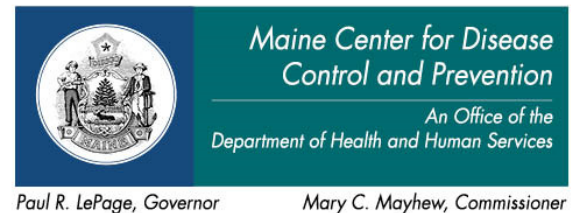


# Immunization Updates

Monique Petrofsky, BSN, MPH  
Maine Immunization Program  
Maine CDC

16<sup>th</sup> Annual Spring Conference for  
Nurse Practitioners

April 28, 2011



# Objectives

- Present recent changes to ACIP recommendations
- Discuss rationale for changes to recommendations
- Preventing Perinatal Hep B transmission
- Key messages for parents
- VAERS reporting



Maine Center for Disease  
Control and Prevention  
An Office of the  
Department of Health and Human Services

Paul R. LePage, Governor

Mary C. Mayhew, Commissioner

# Immunization Schedule for Persons Aged 0 through 6 Years - 2011

## Recommended Immunization Schedule for Persons Aged 0 Through 6 Years—United States • 2011

For those who fall behind or start late, see the catch-up schedule

Vaccine ▼	Age ►	Birth	1 month	2 months	4 months	6 months	12 months	15 months	18 months	19–23 months	2–3 years	4–6 years
Hepatitis B <sup>1</sup>	HepB	HepB	HepB			HepB						
Rotavirus <sup>2</sup>			RV	RV	RV <sup>2</sup>							
Diphtheria, Tetanus, Pertussis <sup>3</sup>			DTaP	DTaP	DTaP	<i>see footnote<sup>3</sup></i>	DTaP					DTaP
<i>Haemophilus influenzae</i> type b <sup>4</sup>			Hib	Hib	Hib <sup>4</sup>		Hib					
Pneumococcal <sup>5</sup>			PCV	PCV	PCV		PCV				PPSV	
Inactivated Poliovirus <sup>6</sup>			IPV	IPV			IPV					IPV
Influenza <sup>7</sup>							Influenza (Yearly)					
Measles, Mumps, Rubella <sup>8</sup>							MMR		<i>see footnote<sup>8</sup></i>			MMR
Varicella <sup>9</sup>							Varicella		<i>see footnote<sup>9</sup></i>			Varicella
Hepatitis A <sup>10</sup>							HepA (2 doses)					HepA Series
Meningococcal <sup>11</sup>												MCV4

Range of recommended ages for all children

Range of recommended ages for certain high-risk groups

This schedule includes recommendations in effect as of December 21, 2010. Any dose not administered at the recommended age should be administered at a subsequent visit, when indicated and feasible. The use of a combination vaccine generally is preferred over separate injections of its equivalent component vaccines. Considerations should include provider assessment, patient preference, and the potential for adverse events. Providers should consult the relevant Advisory Committee on Immunization Practices statement for detailed recommendations: <http://www.cdc.gov/vaccines/pubs/acip-list.htm>. Clinically significant adverse events that follow immunization should be reported to the Vaccine Adverse Event Reporting System (VAERS) at <http://www.vaers.hhs.gov> or by telephone, 800-822-7967.

# Immunization Schedule for Persons Aged 7 through 18 Years - 2011

## Recommended Immunization Schedule for Persons Aged 7 Through 18 Years—United States • 2011

For those who fall behind or start late, see the schedule below and the catch-up schedule

Vaccine ▼	Age ►	7–10 years	11–12 years	13–18 years	
Tetanus, Diphtheria, Pertussis <sup>1</sup>			Tdap	Tdap	Range of recommended ages for all children
Human Papillomavirus <sup>2</sup>	<i>see footnote 2</i>		HPV (3 doses)(females)	HPV series	
Meningococcal <sup>3</sup>		MCV4	MCV4	MCV4	Range of recommended ages for catch-up immunization
Influenza <sup>4</sup>		Influenza (Yearly)			
Pneumococcal <sup>5</sup>		Pneumococcal			Range of recommended ages for certain high-risk groups
Hepatitis A <sup>6</sup>		HepA Series			
Hepatitis B <sup>7</sup>		Hep B Series			
Inactivated Poliovirus <sup>8</sup>		IPV Series			
Measles, Mumps, Rubella <sup>9</sup>		MMR Series			
Varicella <sup>10</sup>		Varicella Series			

This schedule includes recommendations in effect as of December 21, 2010. Any dose not administered at the recommended age should be administered at a subsequent visit, when indicated and feasible. The use of a combination vaccine generally is preferred over separate injections of its equivalent component vaccines. Considerations should include provider assessment, patient preference, and the potential for adverse events. Providers should consult the relevant Advisory Committee on Immunization Practices statement for detailed recommendations: <http://www.cdc.gov/vaccines/pubs/acip-list.htm>. Clinically significant adverse events that follow immunization should be reported to the Vaccine Adverse Event Reporting System (VAERS) at <http://www.vaers.hhs.gov> or by telephone, 800-822-7967.

# Catch-up Immunization Schedules

## Catch-up Immunization Schedule for Persons Aged 4 Months Through 18 Years Who Start Late or Who Are More Than 1 Month Behind—United States • 2011

The table below provides catch-up schedules and minimum intervals between doses for children whose vaccinations have been delayed. A vaccine series does not need to be restarted, regardless of the time that has elapsed between doses. Use the section appropriate for the child's age

PERSONS AGED 4 MONTHS THROUGH 6 YEARS					
Vaccine	Minimum Age for Dose 1	Minimum Interval Between Doses			
		Dose 1 to Dose 2	Dose 2 to Dose 3	Dose 3 to Dose 4	Dose 4 to Dose 5
Hepatitis B <sup>1</sup>	Birth	4 weeks	8 weeks (and at least 16 weeks after first dose)		
Rotavirus <sup>2</sup>	6 wks	4 weeks	4 weeks <sup>2</sup>		
Diphtheria, Tetanus, Pertussis <sup>3</sup>	6 wks	4 weeks	4 weeks	6 months	6 months <sup>3</sup>
Haemophilus influenzae type b <sup>4</sup>	6 wks	4 weeks If first dose administered at younger than age 12 months 8 weeks (as final dose) If first dose administered at age 12–14 months No further doses needed If first dose administered at age 15 months or older	4 weeks <sup>4</sup> If current age is younger than 12 months 8 weeks (as final dose) <sup>4</sup> If current age is 12 months or older and first dose administered at younger than age 12 months and second dose administered at younger than 15 months No further doses needed If previous dose administered at age 15 months or older	8 weeks (as final dose) This dose only necessary for children aged 12 months through 59 months who received 3 doses before age 12 months	
Pneumococcal <sup>5</sup>	6 wks	4 weeks If first dose administered at younger than age 12 months 8 weeks (as final dose for healthy children) If first dose administered at age 12 months or older or current age 24 through 59 months No further doses needed for healthy children if first dose administered at age 24 months or older	4 weeks If current age is younger than 12 months 8 weeks (as final dose for healthy children) If current age is 12 months or older No further doses needed for healthy children if previous dose administered at age 24 months or older	8 weeks (as final dose) This dose only necessary for children aged 12 months through 59 months who received 3 doses before age 12 months or for children at high risk who received 3 doses at any age	
Inactivated Poliovirus <sup>6</sup>	6 wks	4 weeks	4 weeks	6 months <sup>6</sup>	
Measles, Mumps, Rubella <sup>7</sup>	12 mos	4 weeks			
Varicella <sup>8</sup>	12 mos	3 months			
Hepatitis A <sup>9</sup>	12 mos	6 months			
PERSONS AGED 7 THROUGH 18 YEARS					
Tetanus, Diphtheria/ Tetanus, Diphtheria, Pertussis <sup>10</sup>	7 yrs <sup>10</sup>	4 weeks	4 weeks If first dose administered at younger than age 12 months 6 months If first dose administered at 12 months or older	6 months If first dose administered at younger than age 12 months	
Human Papillomavirus <sup>11</sup>	9 yrs	Routine dosing intervals are recommended (females) <sup>11</sup>			
Hepatitis A <sup>9</sup>	12 mos	6 months			
Hepatitis B <sup>1</sup>	Birth	4 weeks	8 weeks (and at least 16 weeks after first dose)		
Inactivated Poliovirus <sup>6</sup>	6 wks	4 weeks	4 weeks <sup>6</sup>	6 months <sup>6</sup>	
Measles, Mumps, Rubella <sup>7</sup>	12 mos	4 weeks			
Varicella <sup>8</sup>	12 mos	3 months If person is younger than age 13 years 4 weeks If person is aged 13 years or older			

**PCV13**

# Pneumococcal Conjugate Vaccine, 13-valent (PCV13)

- Contains the same serotypes of *Streptococcus pneumoniae* as PCV7 plus 6 additional serotypes (including 19A)
- Same 4-dose schedule as PCV7
- Series started with the PCV7 should be completed with PCV13 if possible

# **ACIP Recommendations for PCV13 Supplemental Dose - Aged 0 through 6 years**

A single supplemental dose of PCV13 is recommended for all :

- Children 14 through 59 months who have received an age-appropriate series of PCV7
- Healthy children aged 24 through 59 months who are not completely vaccinated for their age.
- Children aged 60 through 71 months of age with underlying medical conditions who have received an age-appropriate series of PCV7
- Administer at least 8 weeks after the previous dose of PCV7

# **ACIP Recommendations for PCV13 Supplemental Dose – Aged 7 through 18 years**

A single dose of PCV13:

- May be administered to children aged 6 through 18 years who have functional or anatomic asplenia, HIV infection or other immunocompromising conditions, cochlear implant or CSF leak
- Administer at least 8 weeks after the previous dose of PCV7

# **Tdap and Pertussis Prevention**

# Pertussis

- Commonly known as whooping cough
- Caused by *Bordetella pertussis*
- Very contagious: 80-90% of susceptible close contacts become infected
- Person-to-person spread by infected person coughing or sneezing in close contact with others

# Tdap

- Tdap reduces the risk of pertussis by 60% - 80%
- Tdap approved ages
  - 10 - 64 years for Boostrix
  - 11 - 64 years for Adacel
- Tdap not approved by the FDA for children 7 through 9 years

**HOWEVER.....**

# Updated Tdap ACIP Recommendations\* Ages 7 through 10 years

Those who are “not fully immunized” against pertussis and for whom no contraindication to pertussis vaccine exists, should receive a single dose of Tdap

\*off-label recommendation. *MMWR* 2011; 60 (No. 1):13-15

# Updated Tdap ACIP Recommendations\* Ages 7 through 10 years

## “Not fully immunized”

- fewer than 4 doses of DTaP
- 4 doses of DTaP and last dose was prior to age 4 years

# Updated Tdap ACIP Recommendations\* Ages 7 through 10 years

Those never vaccinated against tetanus, Diphtheria, or pertussis or who have unknown vaccination status should receive a series of three vaccinations containing tetanus and diphtheria toxoids. The first of these three should be Tdap.

*\*off-label recommendation. MMWR 2011;60 (No 1):13-15.*

# Updated Tdap ACIP Recommendations\*

- Tdap can be administered regardless of the interval since the last tetanus and diphtheria toxoid-containing vaccine
- While longer intervals between Td and Tdap vaccination could decrease the occurrence of local reactions, the benefits of protection against pertussis outweigh the potential risk for adverse events

\*MMWR 2011; 60 (No. 1):13-15

# Updated Tdap ACIP Recommendations for Adolescents

- Persons 11-18 years of age who have not received Tdap should receive a single dose followed by Td booster doses every 10 years
- Adolescents should preferably receive Tdap at the 11 -12 year-old preventive healthcare visit

# California Pertussis Outbreak, 2010

- 9,477 confirmed, probable and suspect cases of pertussis (rate = 24.2 cases/100,000); 514 in 2011
- 663 were hospitalized (63% were infants <6 months of age)
- Ten deaths reported of infants < 3 months of age
  - 9 (90%) were unvaccinated infants <2 months

Source: CDPH, available at <http://www.cdph.ca.gov/HealthInfo/discond/Pages/Pertussis.aspx>

Data as of 3/9/11.

# **ACIP Provisional Recommendations**

## **Use of Tdap - Health Care Professionals**

**(April 4, 2011)**

- HCP regardless of age should receive a single dose of Tdap as soon as feasible regardless of time of last Td dose
- Tdap is not currently licensed for multiple administrations
- Hospitals & ambulatory care facilities should provide Tdap for HCP

# Pertussis Protection HCP

- 12 - 14 million HCP in the US
- Protecting HCP from acquiring and transmitting infectious disease is a public health goal

Wright, SW, Decker, MD, Edwards, KM. 1999. Incidence of pertussis infection in healthcare workers. *Infect. Control Hosp. Epidemiol.* 20:120-121.

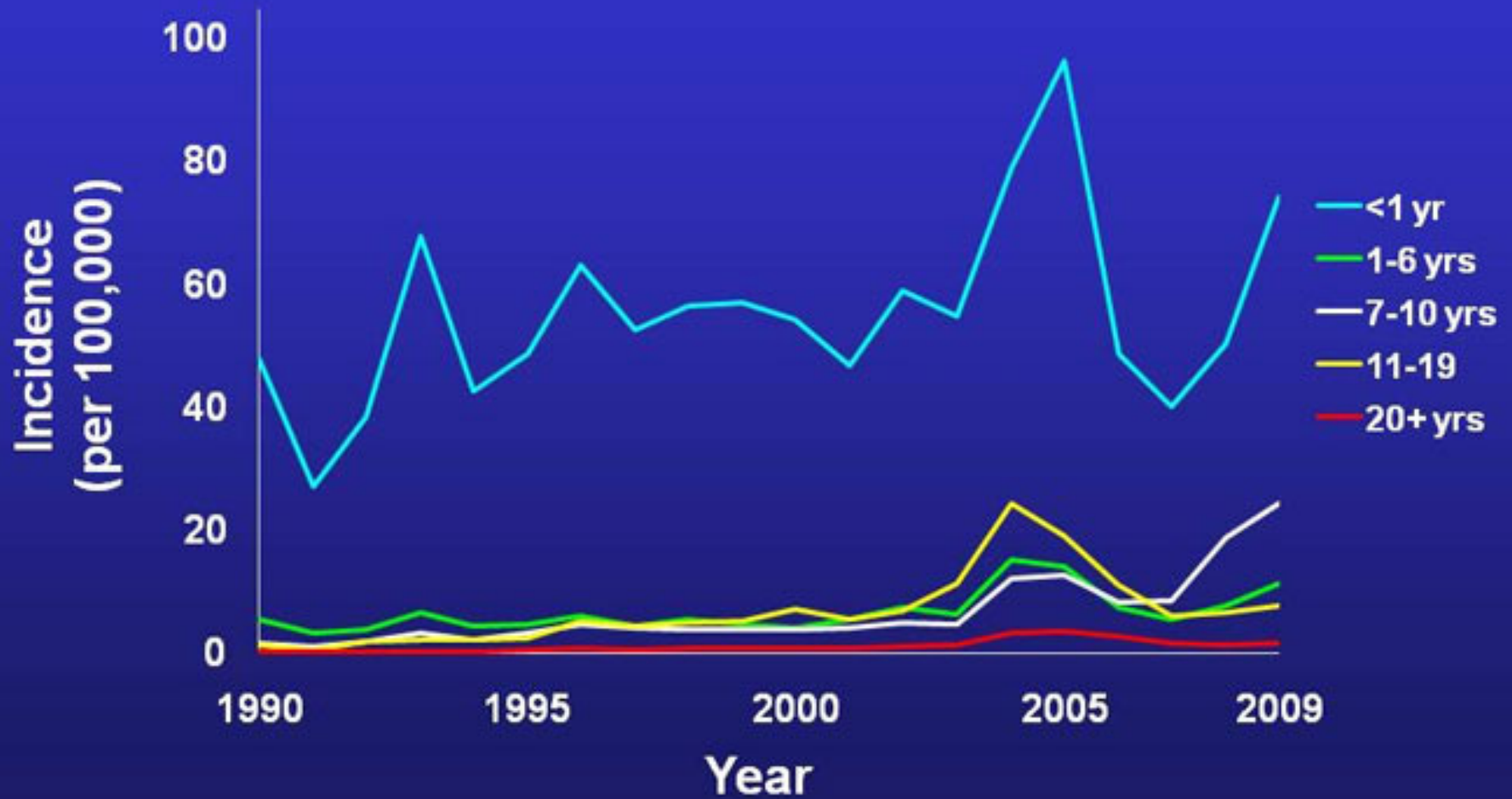
# Pertussis Cases by Age, Maine, 2009

Age Range	No.	%
< 6 months	7	8.8
6-11 months	2	2.5
1-4 years	8	10.0
5-9 years	10	12.5
10-15 years	24	30.0
16-20 years	11	13.8
21-40 years	4	5.0
>40 years	14	17.5
<b>Total</b>	<b>80</b>	<b>100</b>

## **Pertussis Cases by Age, Maine, 2010**

<b>Age Range</b>	<b>No.</b>	<b>%</b>
<b>&lt; 6 months</b>	<b>0</b>	<b>0</b>
<b>6-11 months</b>	<b>1</b>	<b>1.9</b>
<b>1-4 years</b>	<b>10</b>	<b>18.9</b>
<b>5-9 years</b>	<b>12</b>	<b>22.6</b>
<b>10-15 years</b>	<b>12</b>	<b>22.6</b>
<b>16-20 years</b>	<b>2</b>	<b>3.8</b>
<b>21-40 years</b>	<b>8</b>	<b>15.1</b>
<b>&gt;40 years</b>	<b>8</b>	<b>15.1</b>
<b>Total</b>	<b>53</b>	<b>100</b>

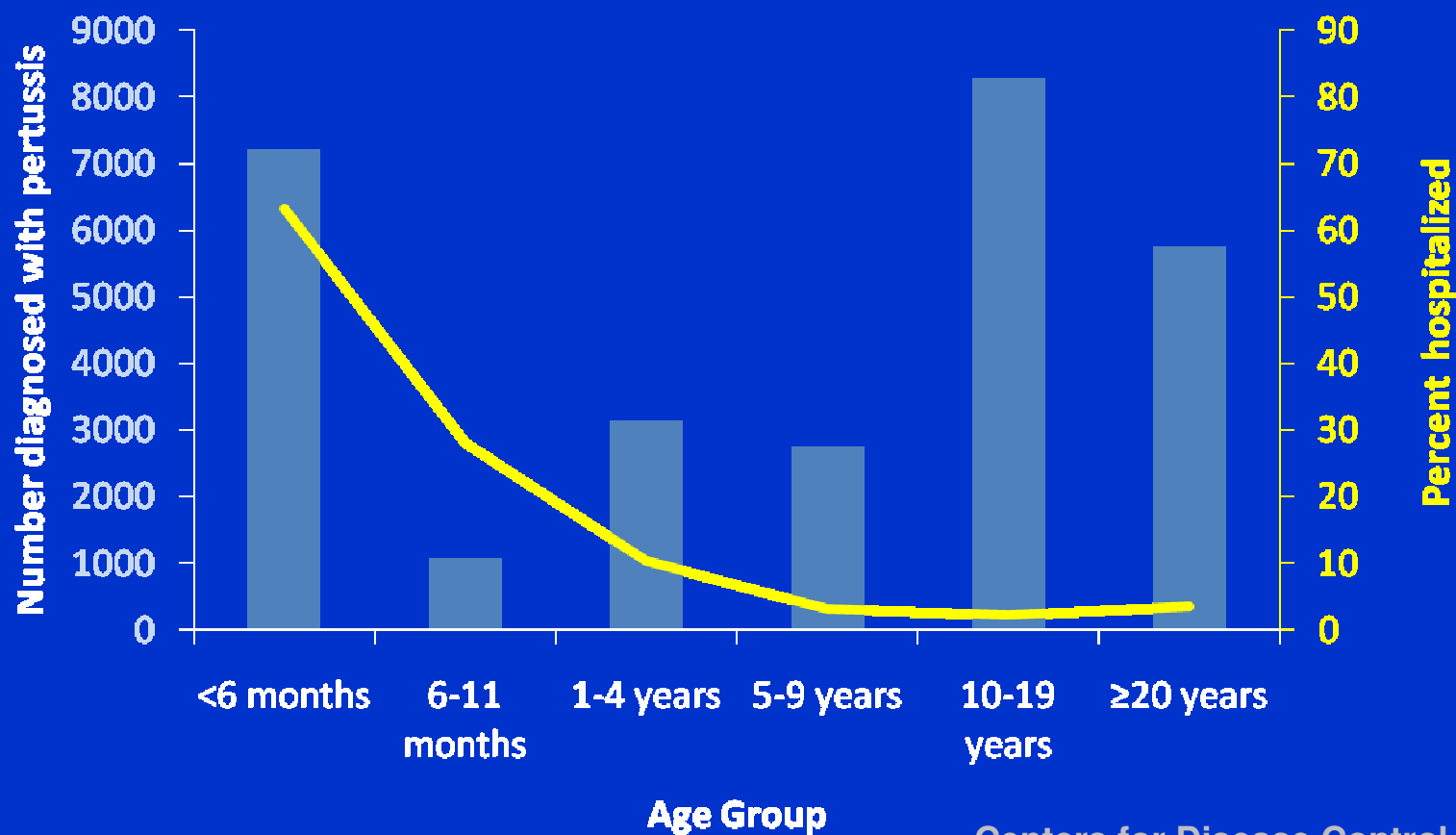
## Reported pertussis incidence by age group 1990-2009



SOURCE: CDC, National Notifiable Diseases Surveillance System, 2009

**National Data**

# Hospitalizations due to Pertussis by age group, United States 1997-2000



Centers for Disease Control and Prevention. Pertussis – United States, 1997-2000. MMWR 2002; 51: 73-76.

# Cocooning

## to protect infants from pertussis

- Vaccinate **anyone** in close contact with infants <12 months age
- Women of childbearing age (before or postpartum - even if breastfeeding)
- Tdap is not contraindicated during pregnancy, however, if there is no risk of acquiring or transmitting pertussis during pregnancy ACIP recommends deferring until postpartum
- Anyone over  $\geq 65$  years of age with close contact with infants <12 months

# Source of Pertussis Transmission to Infants

- Household members responsible for 75 - 83 %
- Parents and siblings were common sources
  - Parents (53%)
  - Siblings (16-20%)
  - Aunts/uncles (10%)
  - Friends/cousins/others (10-24%)
  - Grandparents (2%)
  - Caretakers (2%)

**MCV4**

## Updated MVC4 Recommendations\*

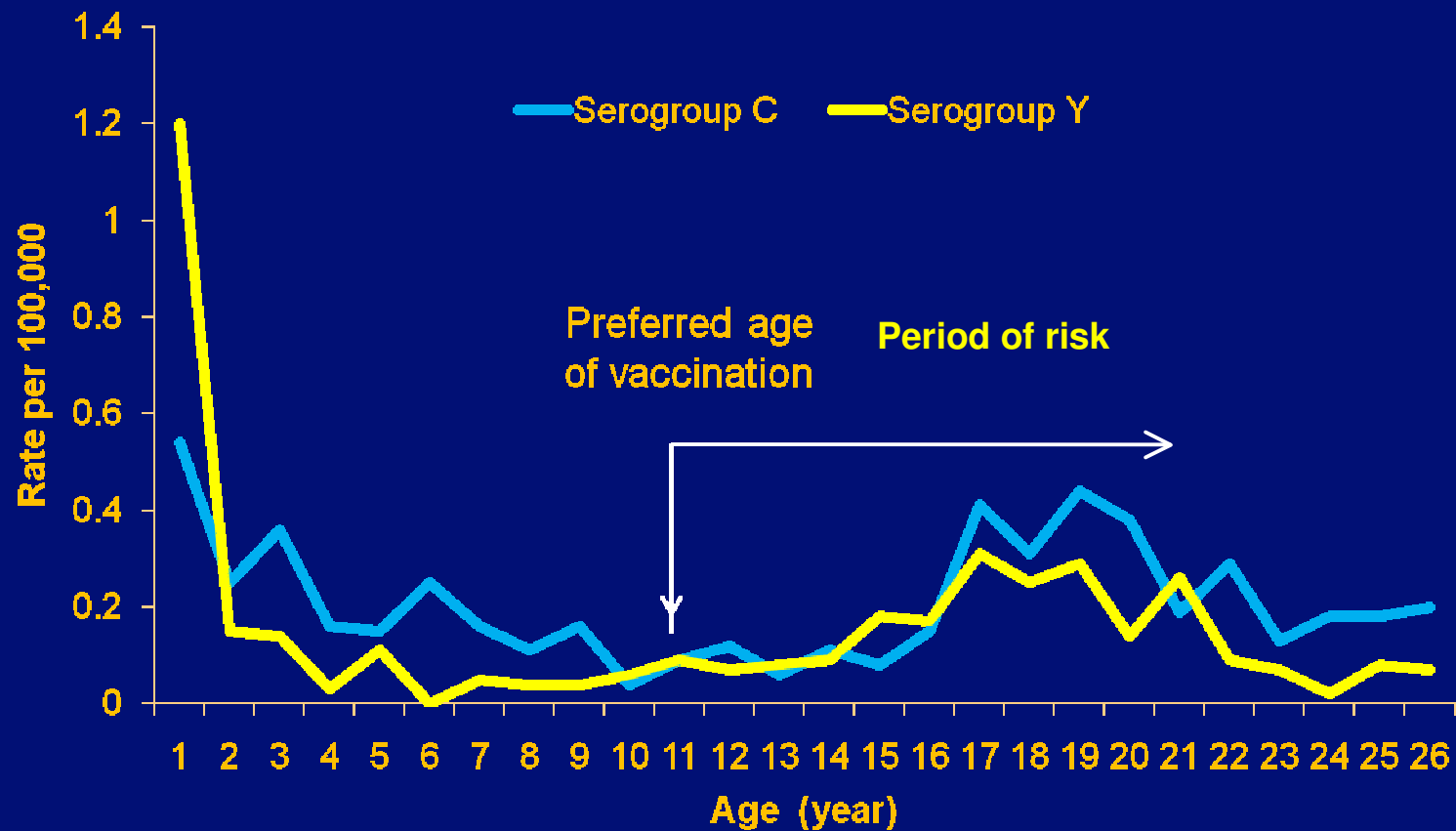
- Administer MCV4 at age 11 through 12 years with a booster dose at age 16 years, or
- Administer 1 dose at age 13 through 18 years if not previously vaccinated
- For persons vaccinated at age 13 through 15 years, administer a 1-time booster dose at 16 through 18 years of age

\* MMWR 2011;60(No.2):72-6.

# Updated MCV4 Adolescent Vaccination Recommendations

- Vaccinate previously unvaccinated college freshman living in a dorm (one dose)
- A booster dose is not recommended for healthy persons if the first dose is administered at 16-21 years of age
- A booster dose is not recommended for healthy persons 22 years or older even if the first dose is administered at 11-15 years of age

# Rates of Meningococcal Disease (C and Y) by Age, 1999-2008



\*Active Bacterial Core surveillance (ABCs), estimated to the US population

# What's Going On?

- **Immunologic memory not enough**
  - Boost response takes 5-7 days after exposure, incubation period of *N. meningitidis* is 1-4 days.
  - Need circulating antibody at time of exposure
- **Circulating antibody wanes after conjugate vaccine**
  - Approximately 50-60% of persons vaccinated had titers above level required for licensure 5 years after vaccination
- **Unlikely getting the additional benefits of herd immunity with the current U.S. program**
  - Coverage increasing slowly, only now over 60%
  - Adolescent immunity at population level lower than 60%

## Interchangeability of MVC4 Brands

- No data available
- Whenever feasible, use the same brand for the vaccination series
- If vaccination providers do not know or have available the brand previously administered, either vaccine can be used to continue or complete the series.

# **Influenza vaccine**

# Influenza Vaccine

- Children 6 months through 8 years should receive 2 doses if they:
  - are receiving seasonal influenza vaccine for the first time, or
  - were vaccinated for the first time during the previous influenza season but only received 1 dose, or
  - received no doses of monovalent 2009 H1N1 vaccine
- All other children 6 months through 8 years should receive 1 dose

**HPV quadrivalent**

# HPV Vaccine (quadrivalent)

- Types 6 & 11 - 90% of genital warts
- Types 16 & 18 - 70% of cervical cancer
  
- Oct, 2009 FDA licensed quadrivalent HPV for use in males aged 9 through 26 years for prevention of genital warts caused by types 6 & 11

## HPV Vaccine (quadrivalent)

- 3 doses spaced at 0, 2 & 6 months
- ♀ & ♂      Dec 1, 2009 ACIP  
    female - recommended  
    male    - **permitted**

HPV4 was approved by the Vaccines for Children (VFC) program for males ages 9 through 18 years.

**Prevention (not treatment)**

# ACIP recommendations for HPV vaccine in the United States

## Quadrivalent vaccine

Routine, females 11 or 12 yrs\*  
Catch-up, 13-26 yrs

## Quadrivalent or Bivalent vaccine

Routine, females 11 or 12 yrs\*  
Catch-up, 13-26 yrs

## Quadrivalent vaccine

May be given, males 9-26 yrs



Quadrivalent (HPV 6,11,16,18) vaccine; Bivalent (HPV 16,18) vaccine

ACIP – Advisory Committee on Immunization Practices

\* Can be given starting at 9 years of age

# **Preventing Perinatal HepB Transmission**

# Prevention of Perinatal HepB transmission

- Do not focus only on high risk behaviors
- Mothers birth of origin may be high risk factor (e.g., Asia (10 – 15 %), Pacific Islanders)
- 90% infants who acquire perinatally will become chronically infected
- 25 - 50% of those will die of cirrhosis or liver cancer

**Give BIRTH DOSE TO ALL INFANTS**

# Prevention of Perinatal HepB transmission

- Maine birth dose coverage rate 66.8%  $\pm$  6.1
- # expected infants born to HBsAg+ mothers - 32
- # identified infants born to HBsAg+ mothers - 11

## Based on data - important to:

- Screen mothers
- Immunize all infants with birth dose within 12 hours of birth
- Do not associate HepB only with high risk behaviors - consider mothers birth of origin

**Who are parents' most important  
source of information on  
immunizations?**

**YOU are their most trusted advisor**

# Recent Survey of U.S parents with children <6 years age

- 79% parents are confident in vaccine safety
- 79.8% believe vaccines are important to children's health
- 81.7% HCP are parents most important source of information for decision

**Myth – “it is not in my backyard”**



# Measles is just a plane ride away!

- 79/84 (94%) measles cases reported to date (2011) are **import-associated**
- Of those, 36 are direct imported cases, 42% from European countries.
- If travelling – be sure you are up to date.

**In Africa there is a saying:  
“Do not give your child a name until measles has  
passed through your village”.**



## Immunity Against Measles at Different Levels of Vaccination Coverage

<b>Seroconversion</b>			
<b>Coverage</b>	<b>85% 1<sup>st</sup> Dose</b>	<b>95% 2<sup>nd</sup> Dose *</b>	<b>95% 2<sup>nd</sup> Dose**</b>
85%	72%	83%	95%
90%	77%	88%	97%
95%	81%	93%	98%
100%	85%	98%	99%

**\* Same children get vaccinated with 1<sup>st</sup> and 2<sup>nd</sup> doses**

**\*\* Independent probability for receipt of 1<sup>st</sup> and 2<sup>nd</sup> dose**

- Both vaccinating and not vaccinating carry risks
- By choosing not to vaccinate one takes on the risk of disease
- Children unvaccinated against measles are 35 times more likely than immunized children to catch the disease

(Salmon D.A. Health Consequences of religious and philosophical exemptions from immunization laws. JAMA 1999)

# Myth – “too many shots at once”

## Immunize on time!

- Decreases number of office visits
- Decreases lost to follow-up
- *Decreases time during which children are most susceptible to VPDs*

**Fewer immunologic components  
are in vaccines today than  
30 years ago**

# Number of antigens in vaccines

Year	Vaccines	# of antigens
1980	Diphtheria	1
	Tetanus	1
	Pertussis (whole cell)	~3,000
	Polio (OPV)	15
	Measles	10
	Mumps	9
	Rubella	<u>5</u>
	<b>Total</b>	<b>~3,041</b>
2009	Diphtheria	1
	Tetanus	1
	Pertussis (acellular)	2-5
	Polio (IPV)	15
	MMR	24
	Hib	2
	Varicella	69
	Hep A & B	5
	Rotavirus	15
	Influenza	8
	Pneumococcus	<u>8</u>
<b>Total</b>	<b>150-153</b>	

# Recommended Vaccine Schedules

- Adhere as closely as possible to recommended schedules for optimal response
- Recommendations are based on age-specific responses to vaccination

## Spacing Live and Inactivated Vaccines

Combination	Minimum Interval
$\geq 2$ live vaccines*	Same day or 28 days
Inactivated	None

**\*applies to live injected or intranasal vaccines  
NOT oral vaccines**

**Recommended and Minimum Ages and Intervals Between Doses  
of Routinely Recommended Vaccines<sup>1</sup>**

Vaccine and dose number	Recommended age for this dose	Minimum age for this dose	Recommended interval to next dose	Minimum interval to next dose
Hepatitis B (HepB)-1 <sup>2</sup>	Birth	Birth	1-4 months	4 weeks
HepB-2	1-2 months	4 weeks	2-17 months	8 weeks
HepB-3 <sup>3</sup>	6-18 months	24 weeks	–	–
Diphtheria-tetanus-acellular pertussis (DTaP)-1 <sup>2</sup>	2 months	6 weeks	2 months	4 weeks
DTaP-2	4 months	10 weeks	2 months	4 weeks
DTaP-3	6 months	14 weeks	6-12 months <sup>4</sup>	6 months <sup>4,5</sup>
DTaP-4	15-18 months	12 months	3 years	6 months <sup>4</sup>
DTaP-5	4-6 years	4 years	–	–
<i>Haemophilus influenzae</i> type b (Hib)-1 <sup>2,6</sup>	2 months	6 weeks	2 months	4 weeks
Hib-2	4 months	10 weeks	2 months	4 weeks
Hib-3 <sup>7</sup>	6 months	14 weeks	6-9 months <sup>4</sup>	8 weeks
Hib-4	12-15 months	12 months	–	–

**1 month = 28 days**

**Reference :**  
**MMWR January 28,2011/60(RR02);1-60**

# Lapsed Vaccination Schedule

- Adhere as closely as possible to recommended schedules for optimal response


However,

- An interruption in the vaccination schedule does not require restarting the entire series or additional doses.

**Reference :**  
MMWR January 28,2011/60(RR02);1-60

# Vaccine Adverse Event Reporting System (VAERS)

<http://www.cdc.gov/vaccinesafety/Activities/VAERS.html>

- Provides a mechanism for the collection and analysis of adverse events associated with vaccines
- Database managed by CDC & FDA
- Who can report
  - provider
  - recipient
  - parent
  - anyone
- Should you report  YES



# Vaccine Websites

**CDC's Immunization Program**

[www.cdc.gov/vaccines](http://www.cdc.gov/vaccines)

**Immunization Action Coalition**

[www.immunize.org](http://www.immunize.org)

**Institute for Vaccine Safety**

[www.vaccinesafety.edu](http://www.vaccinesafety.edu)

**Food and Drug Administration**

[www.fda.gov/cber/vaers/vaers.htm](http://www.fda.gov/cber/vaers/vaers.htm)

**American Academy of Pediatrics**

[www.cispimmunize.org](http://www.cispimmunize.org)

**National Network for Immunization Information  
(Infectious Disease Society of America)**

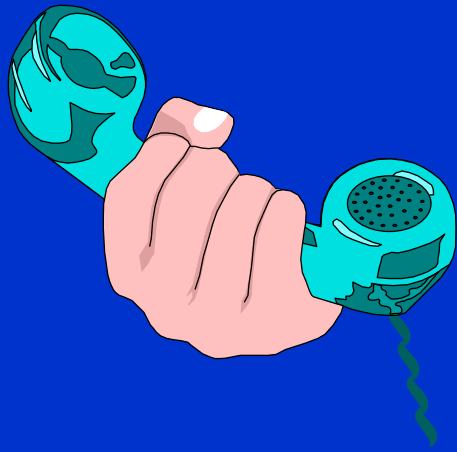
<http://www.immunizationinfo.org>



# Maine Immunization Program

<http://www.immunizeme.org>





# Just Call!

## Maine Immunization Program

(207) 287- 3746

(800) 867- 4775



Maine Center for Disease  
Control and Prevention

An Office of the  
Department of Health and Human Services

Paul R. LePage, Governor

Mary C. Mayhew, Commissioner



**Thank You**



Maine Center for Disease  
Control and Prevention  
An Office of the  
Department of Health and Human Services

Paul R. LePage, Governor

Mary C. Mayhew, Commissioner

# Questions?

