

# Vaccines for Adolescents and Young Adults

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# **Disclosure**

Neither I nor any member of my immediate family has a financial relationship or interest with any proprietary entity producing health care good or services related to the content of this presentation

# Agenda

- ✓ Impact of vaccinations on public health
- ✓ Adolescent recommended vaccinations
- ✓ Vaccination coverage in adolescents
- ✓ Public health consequences of non-compliance
- ✓ Measures to improve compliance

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# Top Public Health Achievement in the 20<sup>th</sup> Century: Vaccinations

Comparison of 20th century annual morbidity and current estimates vaccine-preventable diseases

Disease	20th Century annual morbidity (2)	2016 Reported cases (3)	Percent decrease (%)
Smallpox	29,005	0	100
Diphtheria	21,053	0	100
Measles	530,217	69	>99
Mumps	162,344	5,311	97
Pertussis	200,752	15,737	92
Polio (paralytic)	16,316	0	100
Rubella	47,745	5	>99
Congenital rubella syndrome	152	1	99
Tetanus	580	33	94
<i>Haemophilus influenzae</i>	20,000	22*	>99

\* *Haemophilus influenzae* type b (Hib) < 5 y of age.

# **Cost-Effectiveness**

- Vaccines are the most cost-effective clinical preventive service
- Provide a high return on investment each year by:
  - Saving 42,000 lives
  - Preventing 20 million cases of disease
  - Reducing direct health care costs by \$14 billion
  - Saving \$69 billion in indirect costs

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# Adolescent Recommended Vaccinations

- CDC's Advisory Committee on Immunization Practices (ACIP) issues annual recommendations for child and adolescent immunizations.
- Recommended vaccinations for adolescents (ages 11-18):
  - Flu influenza
  - TDaP
  - HPV
  - Meningococcal (MenACWY, MenB\*)
  - Hepatitis (A, B)
  - Inactivated Polio
  - MMR
  - Varicella

\*for those at increased risk or individual clinical decision-making

# CDC-ACIP Vaccination Schedule 2018

Vaccine	Birth	1 mo	2 mos	4 mos	6 mos	9 mos	12 mos	15 mos	18 mos	19-23 mos	2-3 yrs	4-6 yrs	7-10 yrs	11-12 yrs	13-15 yrs	16 yrs	17-18 yrs
Hepatitis B <sup>1</sup> (HepB)	1 <sup>st</sup> dose	←-----2 <sup>nd</sup> dose-----→			←-----3 <sup>rd</sup> dose-----→												
Rotavirus <sup>2</sup> (RV) RV1 (2-dose series); RV5 (3-dose series)			1 <sup>st</sup> dose	2 <sup>nd</sup> dose	See footnote 2												
Diphtheria, tetanus, & acellular pertussis <sup>3</sup> (DTaP: <7 yrs)			1 <sup>st</sup> dose	2 <sup>nd</sup> dose	3 <sup>rd</sup> dose		←-----4 <sup>th</sup> dose-----→				5 <sup>th</sup> dose						
<i>Haemophilus influenzae</i> type b <sup>4</sup> (Hib)			1 <sup>st</sup> dose	2 <sup>nd</sup> dose	See footnote 4		←---3 <sup>rd</sup> or 4 <sup>th</sup> dose, See footnote 4---→										
Pneumococcal conjugate <sup>5</sup> (PCV13)			1 <sup>st</sup> dose	2 <sup>nd</sup> dose	3 <sup>rd</sup> dose		←-----4 <sup>th</sup> dose-----→										
Inactivated poliovirus <sup>6</sup> (IPV: <18 yrs)			1 <sup>st</sup> dose	2 <sup>nd</sup> dose	←-----3 <sup>rd</sup> dose-----→					4 <sup>th</sup> dose							
Influenza <sup>7</sup> (IIV)						Annual vaccination (IIV) 1 or 2 doses					Annual vaccination (IIV) 1 dose only						
Measles, mumps, rubella <sup>8</sup> (MMR)					See footnote 8	←-----1 <sup>st</sup> dose-----→				2 <sup>nd</sup> dose							
Varicella <sup>9</sup> (VAR)						←-----1 <sup>st</sup> dose-----→				2 <sup>nd</sup> dose							
Hepatitis A <sup>10</sup> (HepA)						←-----2-dose series, See footnote 10-----→											
Meningococcal <sup>11</sup> (MenACWY-D ≥9 mos; MenACWY-CRM ≥2 mos)					See footnote 11						1 <sup>st</sup> dose		2 <sup>nd</sup> dose				
Tetanus, diphtheria, & acellular pertussis <sup>13</sup> (Tdap: ≥7 yrs)												Tdap					
Human papillomavirus <sup>14</sup> (HPV)												See footnote 14					
Meningococcal B <sup>12</sup>													See footnote 12				
Pneumococcal polysaccharide <sup>5</sup> (PPSV23)											See footnote 5						
<span style="background-color: yellow;">█</span> Range of recommended ages for all children		<span style="background-color: #669999;">█</span> Range of recommended ages for catch-up immunization		<span style="background-color: #9999CC;">█</span> Range of recommended ages for certain high-risk groups		<span style="background-color: #ADD8E6;">█</span> Range of recommended ages for non-high-risk groups that may receive vaccine, subject to individual clinical decision making		<span style="background-color: white;">█</span> No recommendation									

# Immunization Recommendations

## Meningococcal vaccine

Vaccine	Helps protect you from...	Dose(s) you need at this age
<b>MenACWY</b>	<p>The most serious types of meningitis that can cause:</p> <ul style="list-style-type: none"><li>• Dangerous infection of the brain and spinal cord</li><li>• Blood infections</li><li>• Brain injury, amputations, deafness, kidney damage ✓ if risk factors</li></ul>	<p>Dose #1 at age 11-12</p> <p>Dose #2 at age 16</p>
<b>MenB* (approved- 2015)</b>		<p>Dose #1 at age 16</p> <p>Dose #2 is given 1 or 6 months after dose #1, depending on the vaccine brand used</p>

\*for those at increased risk or individual clinical decision-making

# Immunization Recommendations

## Flu vaccine

Vaccine	Helps protect you from...	Dose(s) you need at this age
Influenza	A virus that can cause: <ul style="list-style-type: none"><li>• High fevers</li><li>• Severe body aches</li><li>• Serious complications, including pneumonia, hospitalization, and death</li></ul>	1 dose every year

# Immunization Recommendations

## Tetanus, diphtheria, and pertussis (TDaP) vaccine

Vaccine	Helps protect you from...	Dose(s) you need at this age
TDaP	<p>Diseases that can cause:</p> <ul style="list-style-type: none"><li>• Painful muscle tightness in head and neck</li><li>• Breathing problems, heart failure, paralysis, and death</li><li>• Severe coughing, difficulty breathing, vomiting and disturbed sleep</li></ul>	<p>1 dose at age 11 or 12</p> <p>Catch-up immunization from ages 13+ if not already vaccinated</p>

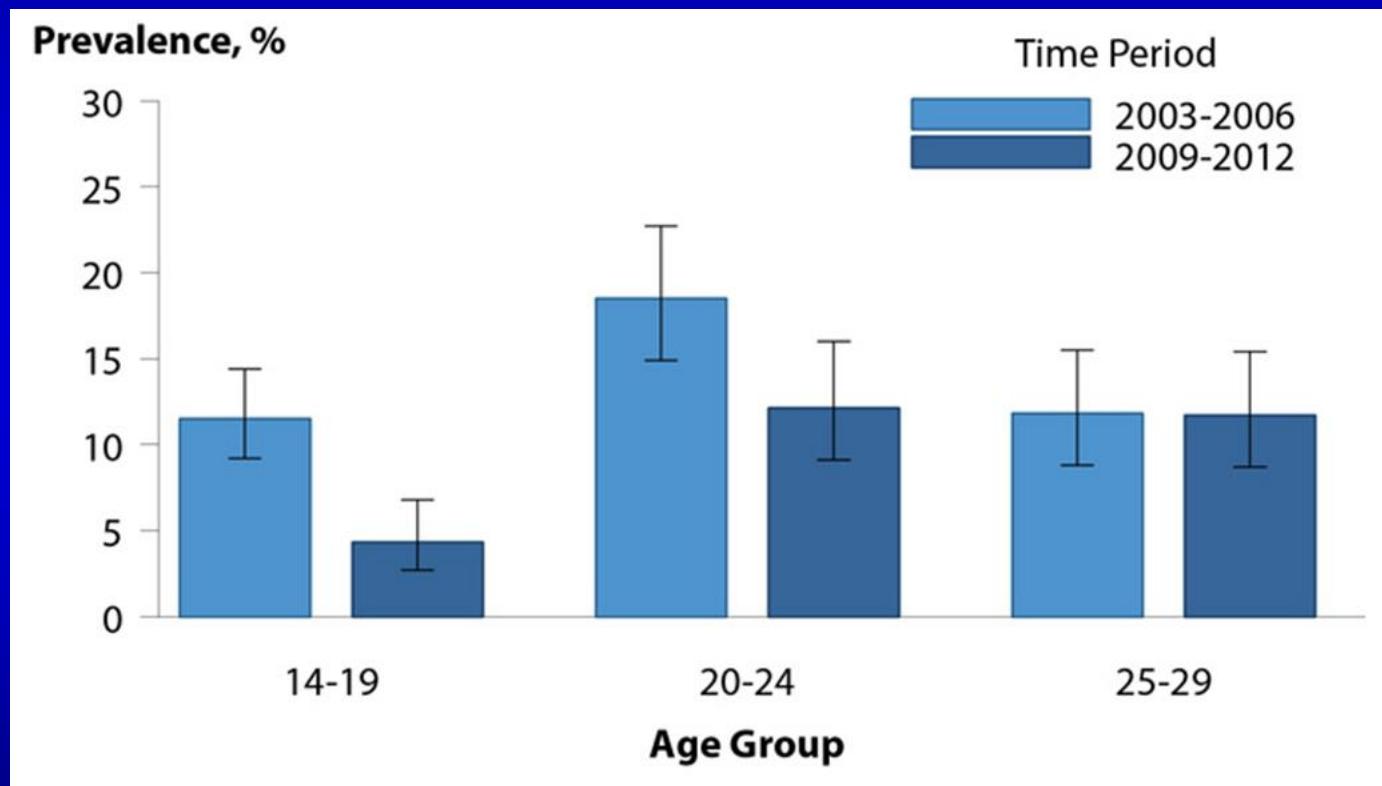
# Immunization Recommendations

## Human Papillomavirus (HPV) vaccine

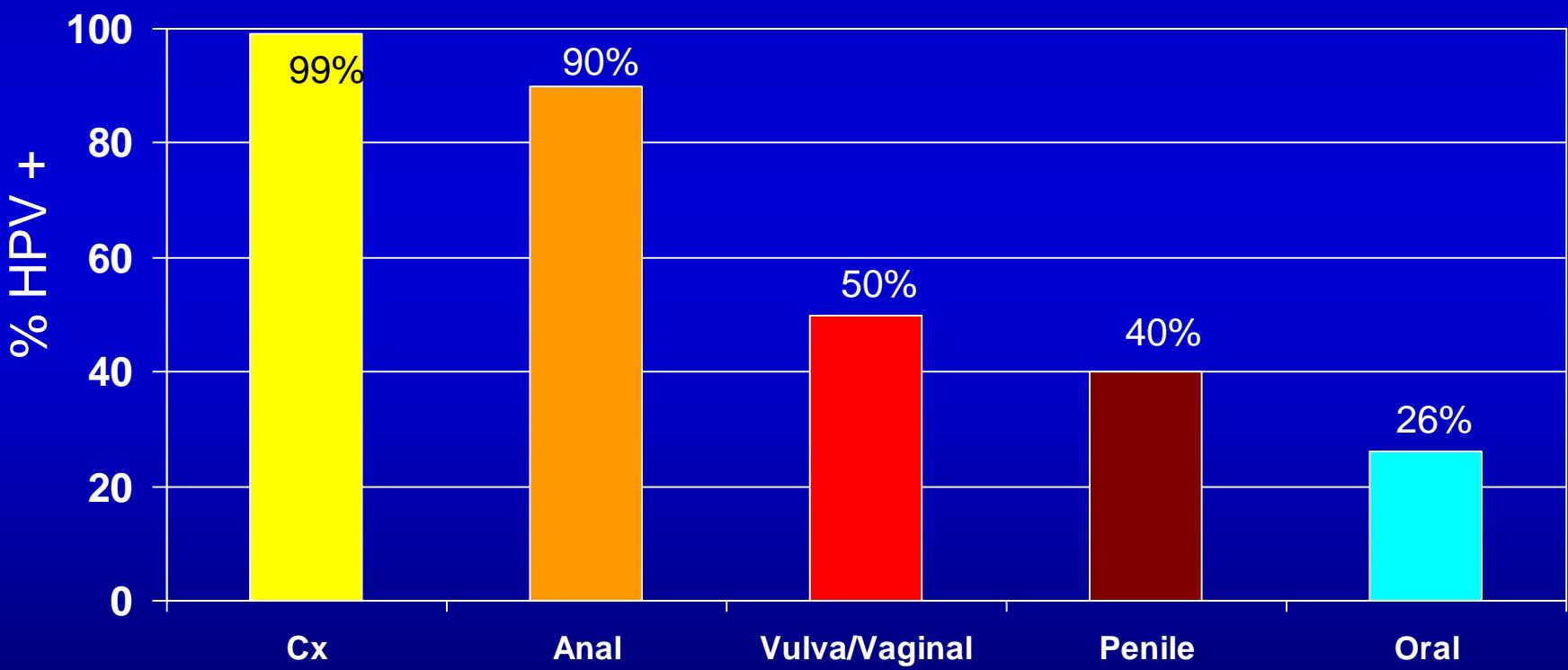
Vaccine	Helps protect you from...	Dose(s) you need at this age
<b>HPV</b>  (bivalent & quadrivalent approved in 2006 for females/2011 for males; 9-valent approved in 2015)	Viruses that can cause: <ul style="list-style-type: none"><li>• Cancers of the cervix</li><li>• Cancers of the penis, vagina, vulva, and anus</li><li>• Cancers of the throat</li><li>• Genital warts</li></ul>	The vaccine series is given as 2 or 3 doses, beginning at age 11-12.

\*In 2012, a California law expanded the legal authority of minors ages 12+ to consent for HPV vaccinations without parental consent

## HPV prevalence among females aged 14-24, by age group and time period, NHANES, 2003-06 & 2009-12



# ROLE OF HPV IN ANOGENITAL & ORAL CANCERS



# Why is the HPV vaccine important?

- Prevents cancer!
  - Every year, 14 million people (*including teens*) become infected with HPV
  - Amount of HPV infections in teen girls decreased by 56% since it was recommended in 2006
- Long-lasting (*effective for 10 years*)!
- Safe!
  - Numerous studies have found no safety concerns (*incl. side effects on fertility*)
  - Only 6% of the 100 million doses distributed have reported serious adverse side effects (*incl. dizziness, headaches, nausea, fever, and injection site discomfort*)

## SEXUAL INTERCOURSE AMONG YOUNG PEOPLE IN THE U.S.

**The proportion of young people who have had sexual intercourse increases rapidly with age.**

% of adolescents who have had sex

100

80

60

40

20

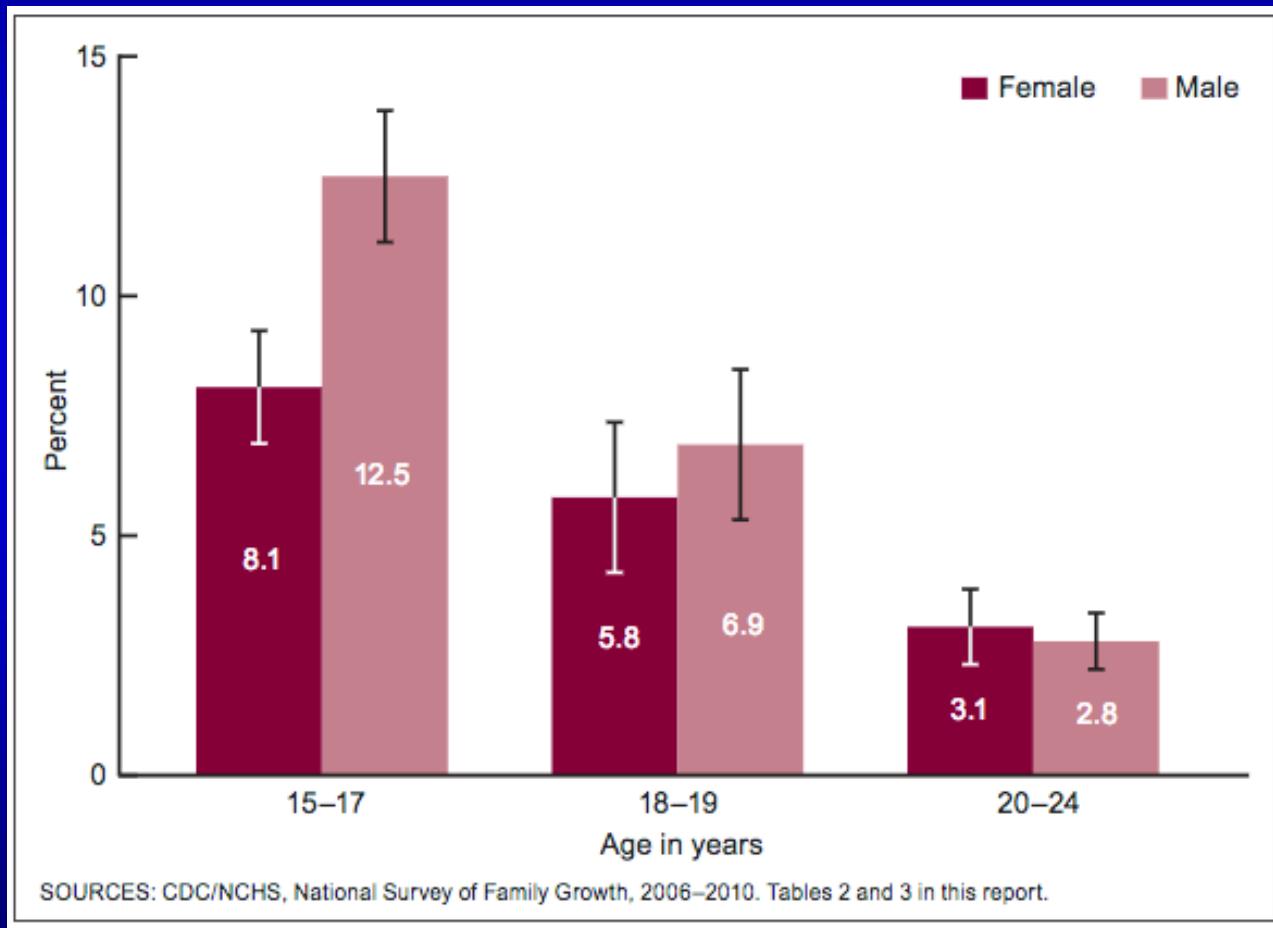
0

Female  
Male

10 11 12 13 14 15 16 17 18 19 20

Age

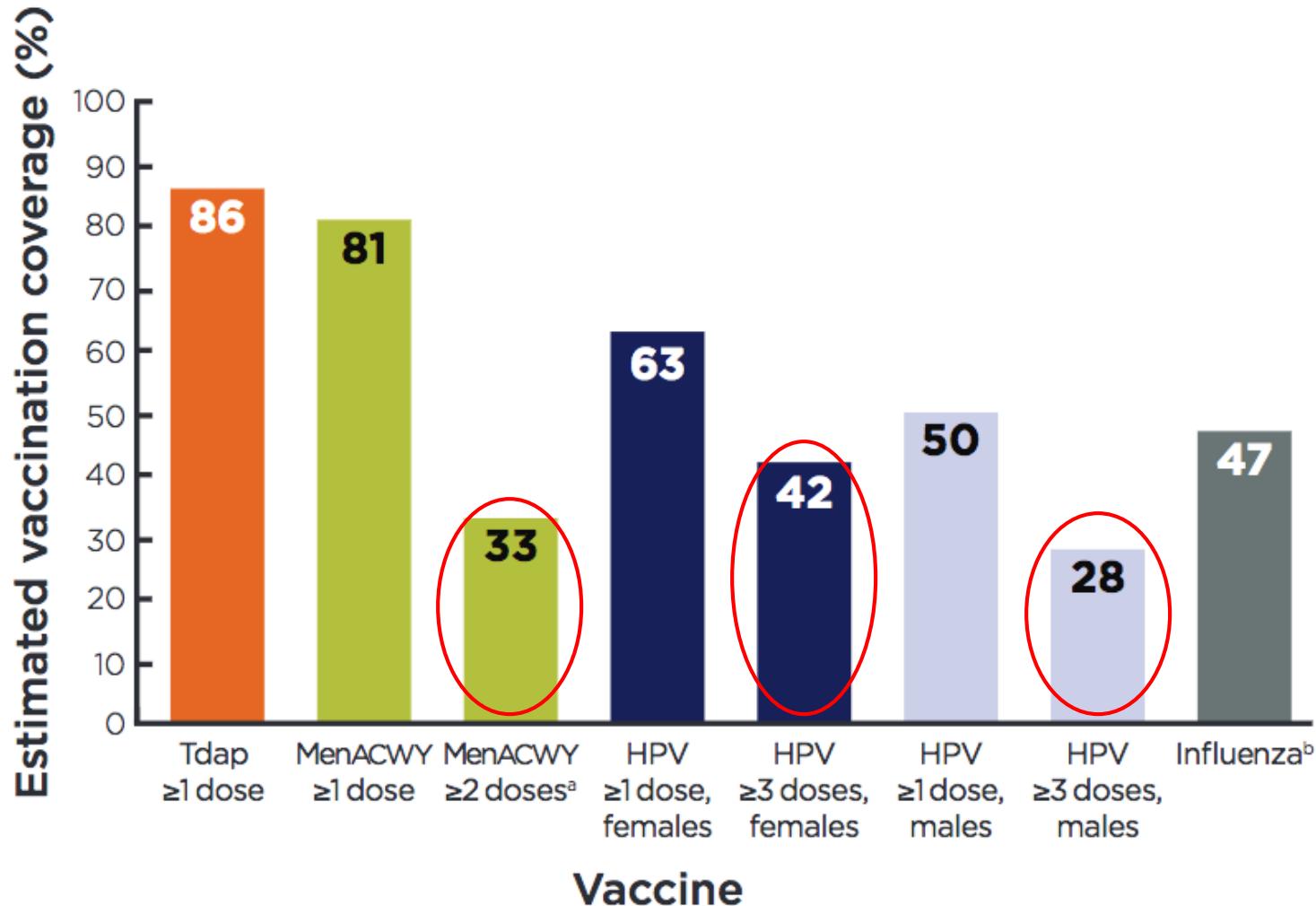
# Percentage of females and males who had oral sex, but no vaginal intercourse with opposite-sex partner, by age, NSFG, 2006-2010



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## 2015 Immunization Rates in Adolescents 13-17 Years of Age



<sup>a</sup>Second dose rate based on 17-year-olds; <sup>b</sup>2015-2016 influenza season.

# Gaps in Adolescent Immunization Rates

- Vaccination rates for TDaP and the 1<sup>st</sup> dose of MenACWY surpass *HealthyPeople2020* goals
- However, rates for the 2<sup>nd</sup> dose of MenACWY, HPV, and influenza occur far less frequently
- 67% of eligible adolescents are not fully immunized during a critical risk period for meningococcal disease
- AYAs (ages 15-24) made up 20% of the nearly 2,000 deaths that occurred from meningococcal disease between 1999-2014

# Gaps in Adolescent Immunization Rates, cont.

- Adolescents (ages 12-17) made up **25%** of the pediatric deaths from influenza between 2014-2016.
- Half of the 14 millions new HPV infections that occur each year in the US occur among 15- to 24-year olds
- More than half (**58%**) of parents of boys and one-third (**36%**) of parents of girls reported they had **not received** HPV vaccine recommendation from their child's provider

# Why Aren't Adolescent Rates Higher?

- Parents may not understand the importance of preventive care for their adolescents
  - 48% of adolescents (ages 12-17) had a well-visit in 2012-14
  - 31% of young adults (ages 18-25) had a well-visit in 2013-15
- Parents, adolescents, and providers may view immunizations as less of a priority than other AYA health issues (e.g., sexual activity, alcohol and other drugs)
- Immunizations for older adolescents are not routinized like childhood immunizations

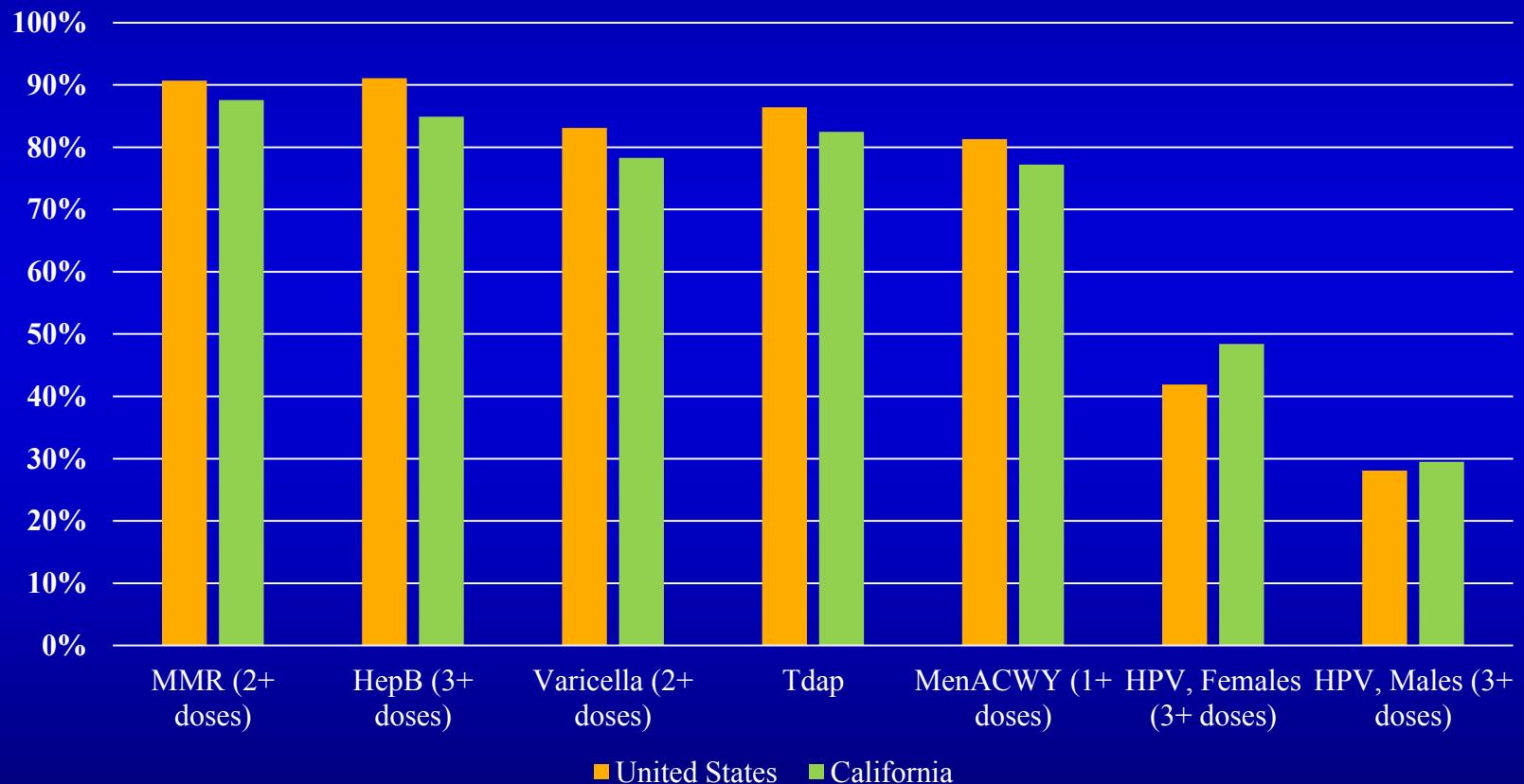
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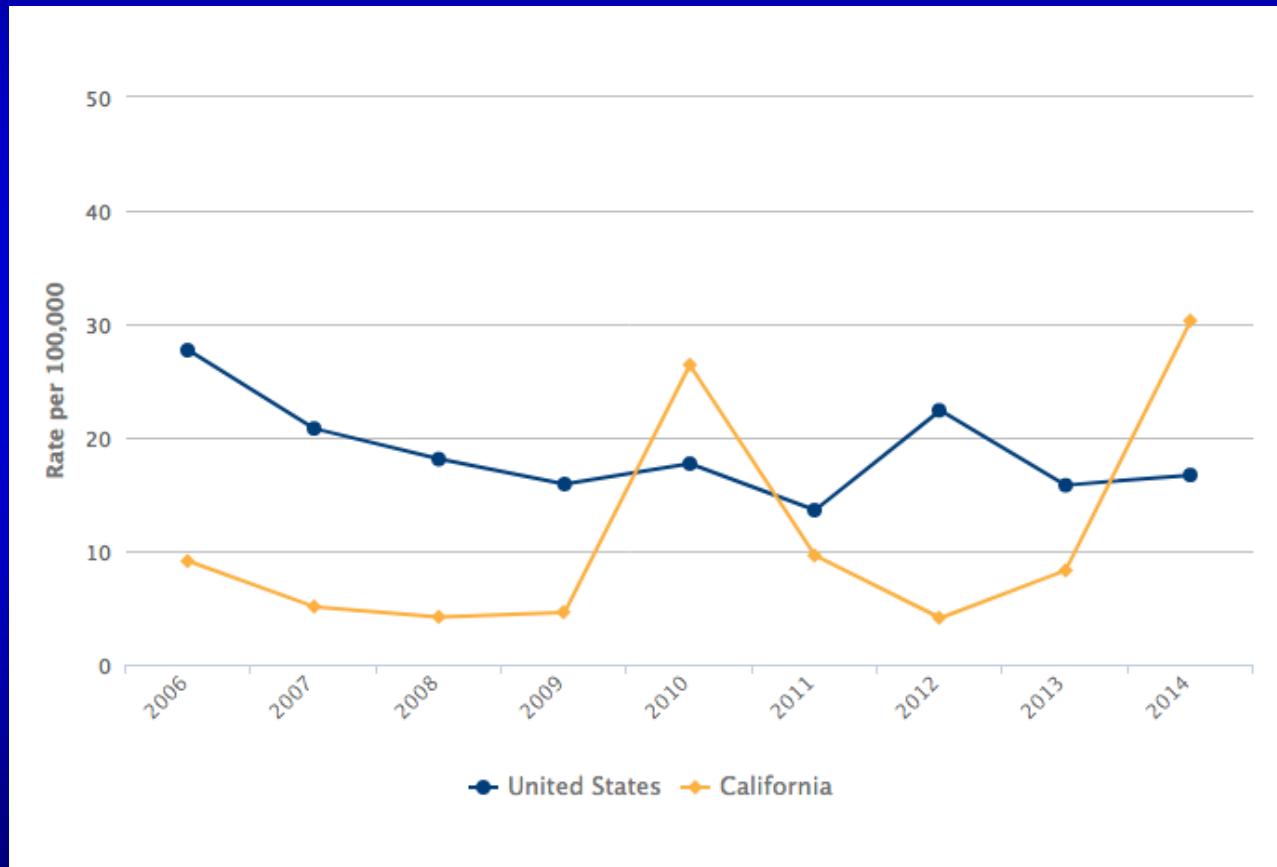
# Public Health Consequences of Non-Compliance

- Despite widespread availability of vaccinations, there has been multiple resurgences in vaccine-preventable diseases since the 1980s.
- Resurgences attributed to various causes, including:
  - Refusal to vaccinate
  - Incomplete vaccination series
  - Waning immunity
  - Vaccine hesitancy

# Immunization Rates for Adolescents, Ages 13-17, CDC 2015



# Vaccine-Preventable Childhood Disease, by Disease, United States & California, 2006-14



# Recent Outbreaks: Measles

- Declared eliminated in 2000, there was a record number of measles outbreak cases in 2014 with 23 outbreaks and 644 cases across 27 states.
- In 2015, the U.S. saw the largest multistate measles outbreak that was thought to originate with an overseas traveler who visited Disneyland in California.
- The majority of people contract measles during such outbreaks because they are unvaccinated.

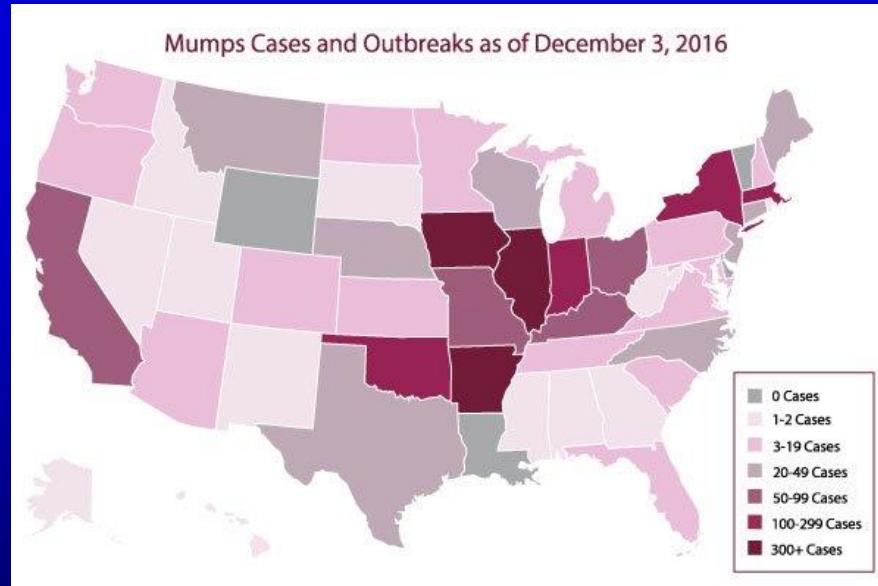
**EXIT ➤**  
MEASLES  
OUTBREAK  
AT  
DISNEYLAND



DAVE GRANLUND © [www.davegranlund.com](http://www.davegranlund.com)

# Recent Outbreaks: Mumps

- 6,584 cases reported in 2006 (*largest U.S. outbreak in two decades!*)
- Occurred mostly in eight Midwestern states and colleges



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# Measures to Improve Compliance

- CDC's Task Force on Community Prevention Services has identified three categories for interventions to overcome vaccine noncompliance:
  - Increasing community demand for vaccinations
  - Enhancing access to vaccination services
  - Provider-based interventions

# Immunization Platform at 16 Years of Age

- Recent professional endorsement to establish a second adolescent immunization platform at age 16 (*first occurs at age 11-12*)
- Provides opportunity for providers to complete any outstanding immunizations before eligible adolescents age out of VFC coverage at 19 years of age
- Creates expectation among parents, patients, and providers that vaccinations and preventive care are important

# Immunization Platform at Age 16: What It Would Look Like

- Vaccines specifically recommended at 16 years of age:
  - 2<sup>nd</sup> dose of MenACWY, and 1<sup>st</sup> dose of MenB
  - Influenza vaccine
  - Any catch-up vaccines (e.g., TDaP, HPV, MMR, varicella)

# Immunization Platform at Age 16: What It Would Look Like

## Immunization Recommendations for the Healthy Adolescent

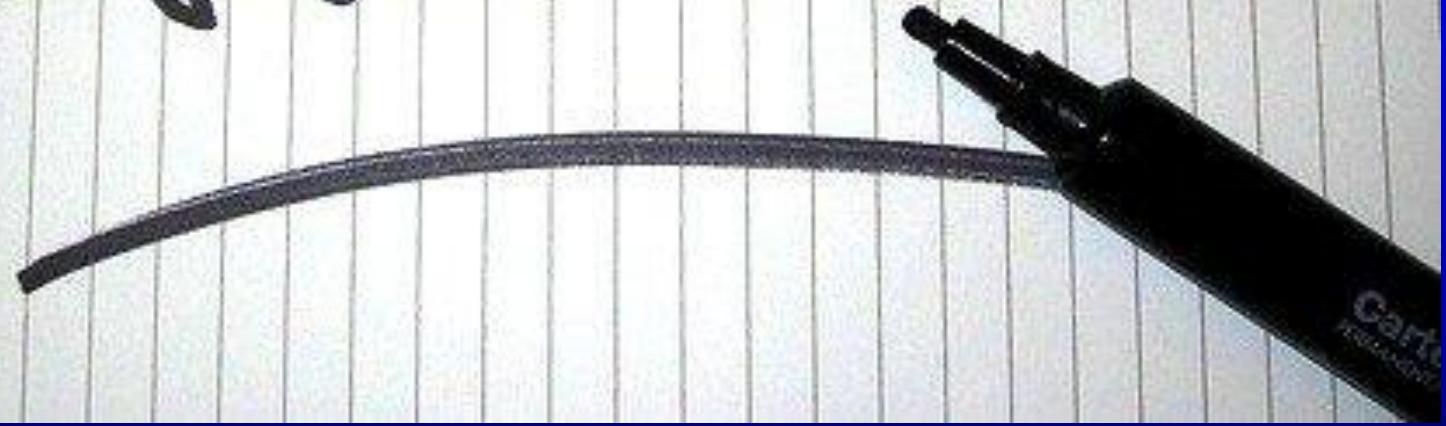
Vaccine	11-12 years	13-15 years	16 years	17-18 years
<b>Category A recommendation</b>				
MenACWY	1st dose	Catch-up immunization if not already vaccinated	2nd dose	Catch-up immunization if not already vaccinated
Tdap	1 dose	Catch-up immunization if not already vaccinated	Catch-up immunization if not already vaccinated	Catch-up immunization if not already vaccinated
HPV <sup>a</sup>	2- or 3-dose series	Catch-up immunization if not already vaccinated	Catch-up immunization if not already vaccinated	Catch-up immunization if not already vaccinated
Influenza	Annual (seasonally)	Annual (seasonally)	Annual (seasonally)	Annual (seasonally)
<b>Category B recommendation</b>				
Meningococcal B <sup>b</sup>			Based on individual clinical decision making for patients 16-23 years of age. Preferred age for vaccination is 16-18 years.	

<sup>a</sup> In October 2016, the ACIP approved a 2-dose HPV series for healthy persons who start the series before age 15 years and a 3-dose HPV series for those who start the series at age 15 years and older; 3 doses are still recommended for immunocompromised persons.<sup>14</sup>

<sup>b</sup> A 2-dose MenB series is recommended for healthy adolescents not at increased risk for meningococcal disease.<sup>15</sup>

**Table 1:** Category A recommendations apply to all persons in an age group—as with the 4 Category A recommendations for adolescents shown here—or in a risk group. Category B recommendations are for use at the clinician's discretion.<sup>16,17</sup>

Questions?



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