Immunizations Across the Ages: What to DO?

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SupPorting ApROpriate ImmunizaTions Across the AgE SpeCTrum

Disclosures

Vaccine Research Grants

- GSK
- Merck
- Novartis
- MedImmune
- Pfizer
- Sanofi

Speaker's Bureau

- GSK
- Merck
- Novartis
- Sanofi

Consultant

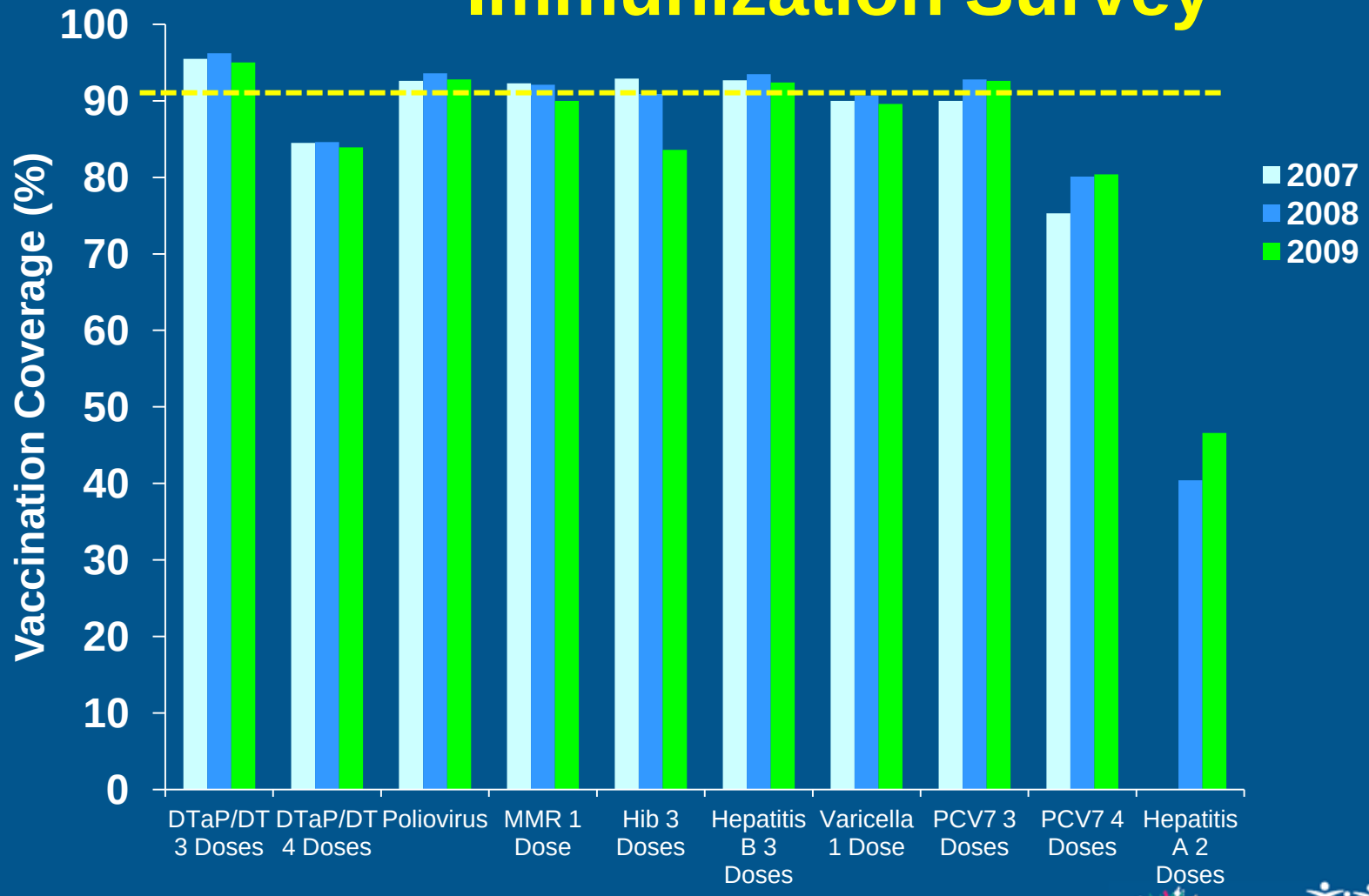
- Merck (HPV for males)
- Novartis (meningitis)

Educational Learning Objectives

At the conclusion of this presentation, the participant should be able to:

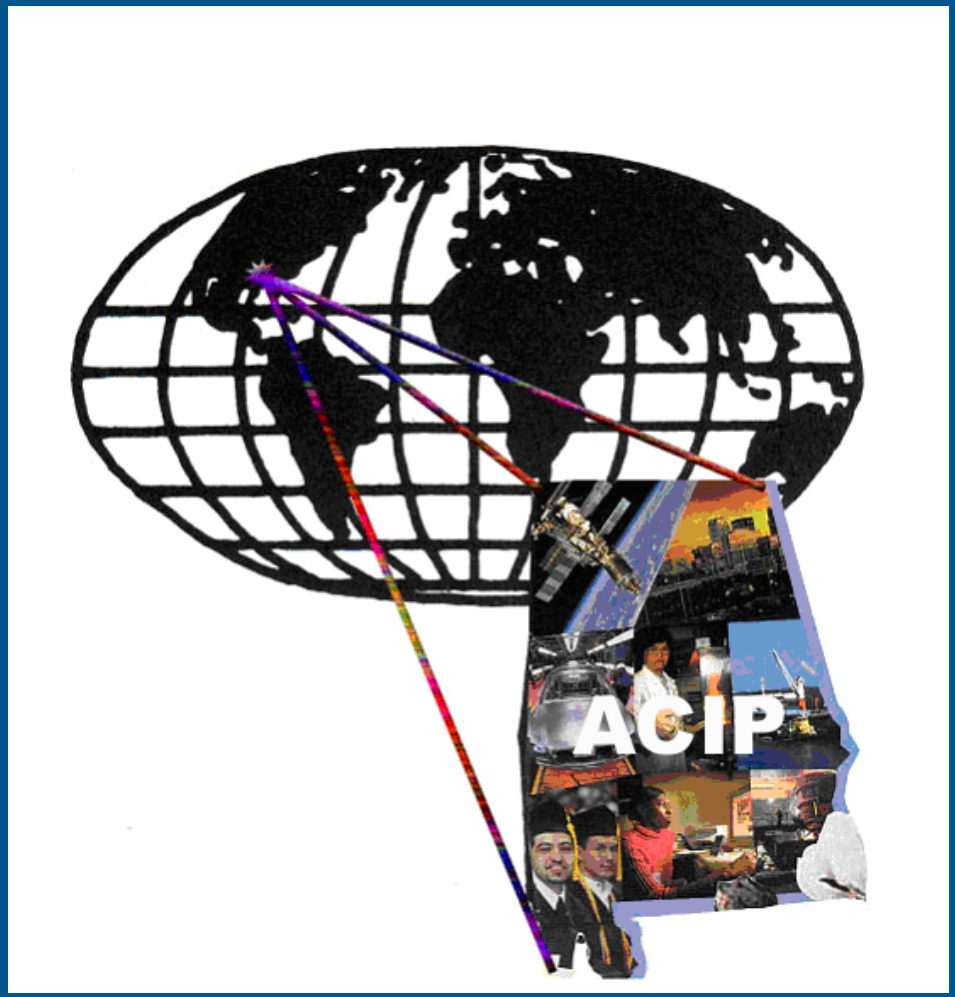
- Acknowledge the **indications and recommendations** for current vaccines and vaccine schedules across childhood, adolescent, and adult populations including HCP
- Address immunization **barriers** frequently encountered during patient/caregiver communications regarding safety, efficacy, and possible misinformation
- Implement strategies for **improving immunization rates** within one's clinical practice, taking into account current immunization schedules and guidelines

Vaccination Coverage Children 19–35 Months, United States, National Immunization Survey

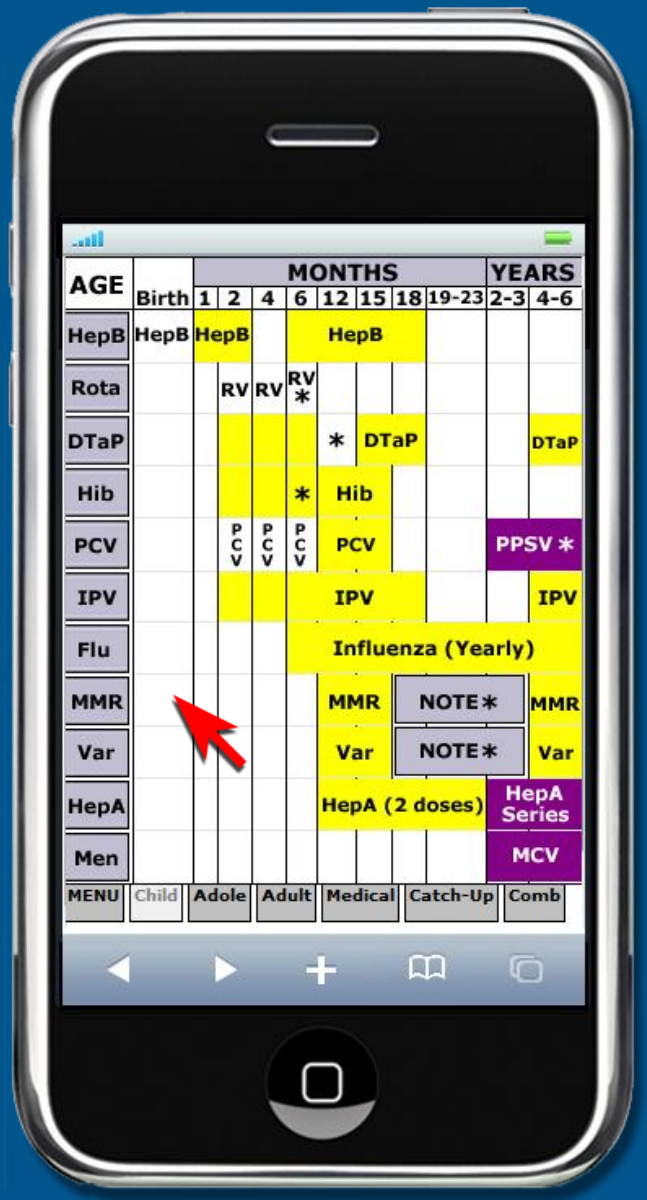


CDC. *MMWR Morb Mortal Wkly Rep*. 2010;59(36):1171-1177.

ACIP made a lot of "off-label" changes at February 23-24, 2011 meeting!



Shots Immunization App - Free



- **For iPhone/iPod, iPad, Android, Blackberry, and PC**
- **Select vaccine name for information on**
  - High risk indications
  - Adverse reactions
  - Contraindications
  - Catch-up
  - Administration
  - Risk communication
  - Epidemiology

Content includes Childhood, Adolescent, and Adult Immunization Schedules for the US

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Why Rotavirus Vaccine?

- > 400,000 physician visits
- > 200,000 ED visits
- > 50,000 hospitalizations
- > $1 billion in total health care costs

CDC. *MMWR Recomm Rep*. 2006;55(RR12):1-13.

Rotavirus

- Rotavirus vaccines (RV5 and RV1) have been shown to be safe and effective at preventing severe diarrhea
- In March 2010, it was learned that a virus (or parts of a virus) called **porcine circovirus (PCV)** is present in both rotavirus vaccines
  - No evidence that porcine circovirus is a safety risk or causes illness in humans

FDA. http://www.fda.gov/BiologicsBloodVaccines/Vaccines/ApprovedProducts/ucm205539.htm. Accessed Dec 2010.

Meningococcal Conjugate Vaccine, Quadrivalent (MCV4*) - NEW

- **Booster dose** at age 16 years
  - Continue **Routine vaccination** of adolescents with MCV4 beginning at age 11 through 12 years at the pre-adolescent vaccination visit
- For those vaccinated at age 13–15 years
  - Booster dose at age 16 through 18 years
- No booster needed if primary dose on or after age 16 years
- Approved for VFC

*Menactra® or Menveo®

CDC. *MMWR Morb Mortal Wkly Rep*. 2011;60(3):72-76.

Recommendation for MCV4* in Immunocompromised

- Persons with persistent **complement component deficiency** (C3, properidin, factor D, and late component), and **asplenia**
  - **Two dose primary** series of MCV4 (0, 2 months) starting at age two
- Persons with **HIV**
  - 11-18 years should receive a two-dose primary series (0, 2 months)

*MCV4 (Both Menactra® and now Menveo® approved or 2-55 yrs

CDC. *MMWR Morb Mortal Wkly Rep*. 2011;60(3):72-76.

Pertussis:
California Experience
10 Known Deaths

PKIDs' Audio PSAs:
Whooping Cough (Pertussis)

PKIDs shares one family's struggles with whooping cough (pertussis) in this 60-second public service announcement.

For more audio and video PSAs, please visit us at www.pkids.org.

Important disclaimer: This information is for educational purposes only and should not be considered to be medical advice. It is not meant to replace the advice of the physician who cares for your child. All medical advice and information should be considered to be incomplete without a physical exam, which is not possible without a visit to your doctor.

Case DTaP, Td or Tdap

- A 7 y/o comes to your office with his mother and wants to start immunizations (was home-schooled) including the diphtheria, tetanus and pertussis if possible. What should you recommend for the first vaccine?
    1. DTaP
    2. Td
    3. Tdap
    4. None

New: Tdap Children 7-10 Years of Age (cont)

- **Undervaccinated children ages 7 to 10 years**
  - Should receive a **single-dose of Tdap**
  - If additional doses of tetanus and diphtheria are needed, vaccinate according to catch-up schedule
- **Never been vaccinated**
  - Tdap today, followed by a dose of Td > 4 weeks, another dose of Td 6-13 months later
    - Note: If not administered as the first dose, Tdap can be substituted for any of the other Td doses in the series

CDC. *MMWR Morb Mortal Wkly Rep*. 2011;60:13-15.

Time interval between Td, DTaP and Tdap?

- If an 8 y/o child had received a Td one month ago, how long do you have to wait to give the Tdap?
    1. Give today
    2. 2 month
    3. 6 month
    4. 1 year
    5. 5 years

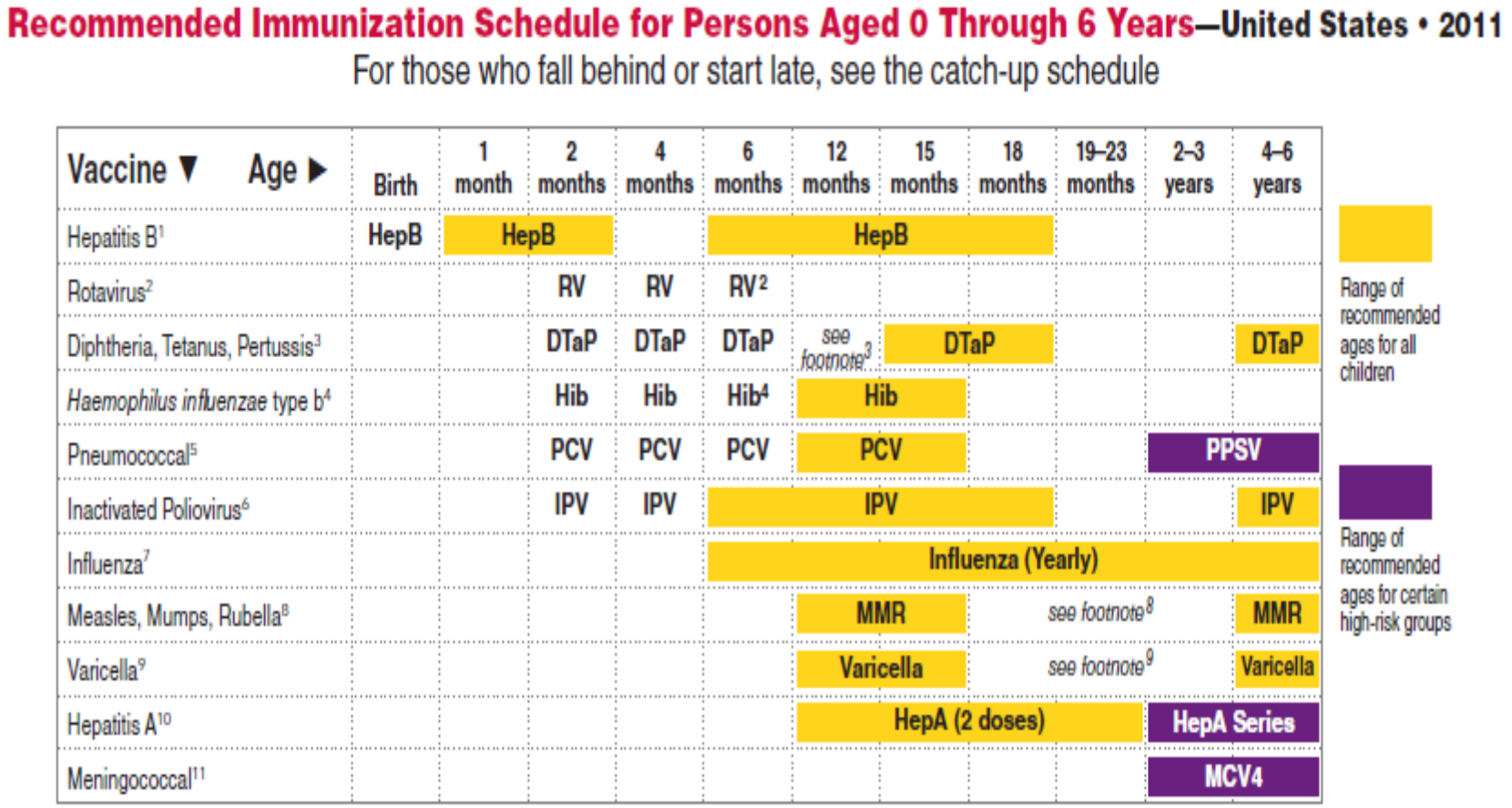
Removal of interval since the last tetanus or diphtheria containing vaccine

Recommendations Tdap for Adolescents

- ***Routine***
  - Adolescents should receive **Tdap** at a preventive care visit at 10 to12 years of age (if the recommended childhood DTP/DTaP vaccination series completed)

CDC. *MMWR Morb Mortal Wkly Rep*. 2011;60:13-15.

Childhood 2011 Immunization Schedule



ACIP Schedules. http://www.cdc.gov/vaccines/recs/schedules/default.htm. Accessed Feb 2011.

0-6 Years Primary Footnote Changes

- **Hep B**
  - Final dose administered no earlier than age 24 weeks
- **PCV 13**
  - Complete series with 13-valent (PCV-13)
  - Single dose of PCV13 is recommended for all children aged **14-59 months**
  - **Supplemental doses** of PCV13 should be administered at **least 8 weeks** after the previous dose of PCV7

ACIP Schedules. http://www.cdc.gov/vaccines/recs/schedules/default.htm. Accessed Feb 2011.

PPSV23 After PCV13 for Children ≥ 2 Years of Age with Underlying Medical Conditions

Group	Schedule for PPSV23	Revaccination with PPSV23
Children who have sickle cell disease, functional or anatomic asplenia, HIV-infection, or other immunocompromising condition	1 dose of PPSV23 administered at age ≥ 2 yrs and ≥ 8 weeks after last indicated dose of PCV13	1 dose 5 years after the first dose of PPSV23
Immunocompetent children with chronic illness	1 dose of PPSV23 administered at age ≥ 2 yrs and ≥ 8 weeks after last indicated dose of PCV13	Not recommended

Doses of PCV13 should be completed before PPSV23 is given. No more than 2 PPSV23 doses are recommended.

CDC. *MMWR Recomm Rep*. 2010;59(RR11):1-19.

Influenza: 0-6 Years Footnote Changes

- Children aged 6 months through 8 years who received no doses of monovalent 2009 H1N1 vaccine should receive 2 doses of 2010-2011 vaccine

ACIP Schedules. http://www.cdc.gov/vaccines/recs/schedules/default.htm. Accessed Feb 2011.

Trivalent Inactivated Influenza Vaccine (TIV) and Live Attenuated Influenza Vaccine (LAIV)

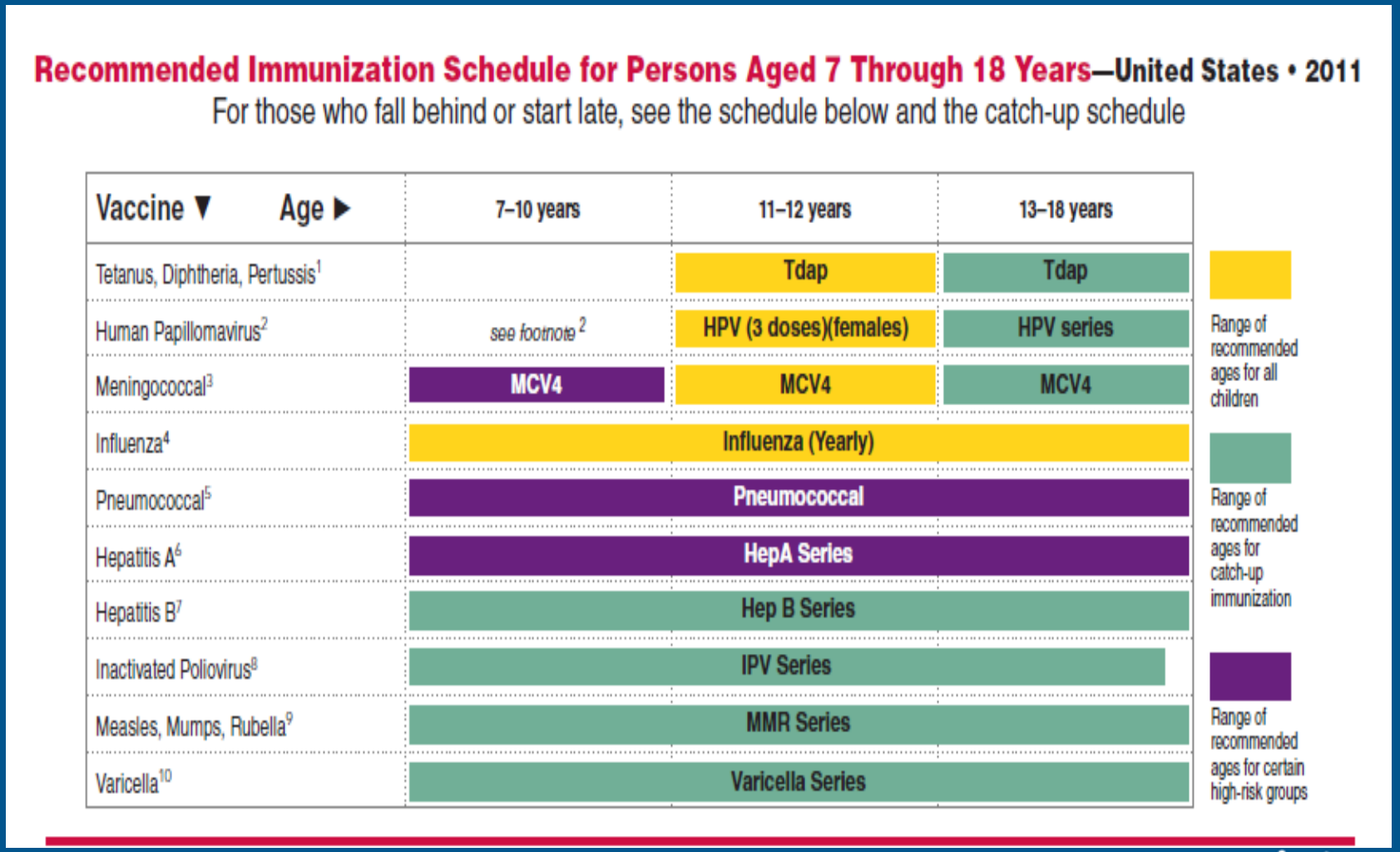
Category	TIV	LAIV
Administration	IM	Intranasal
Primary immune response	Serum antibodies	Serum & mucosal antibodies
Formulation	Inactivated	Live attenuated
Approved age and risk groups	≥ 6 mo (healthy & high risk)	2–49 yrs (healthy)
Storage	Refrigerated	Refrigerated

CDC. *MMWR Recomm Rep*. 2009;58(RR8):1-52.

Influenza USA 2011

- Serotypes (Vaccine is well matched)
  - 13% A-H1N1
  - 54% A-H3N2
  - 33% B
- High level resistance A to adamantanes persists
- A and B remain susceptible to neuraminidase inhibitors
- Next year vaccine will be same composition

2011 Adolescent Schedule



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[1]		Tdap	Tdap
Human Papillomavirus[2]	*see footnote* [2]	HPV (3 doses)(females)	HPV series
Meningococcal[3]	MCV4	MCV4	MCV4
Influenza[4]	Influenza (Yearly)		
Pneumococcal[5]	Pneumococcal		
Hepatitis A[6]	HepA Series		
Hepatitis B[7]	Hep B Series		
Inactivated Poliovirus[8]	IPV Series		
Measles, Mumps, Rubella[9]	MMR Series		
Varicella[10]	Varicella Series		

Range of recommended ages for all children

Range of recommended ages for catch-up immunization

Range of recommended ages for certain high-risk groups

ACIP Schedules. www.cdc.gov/vaccines/recs/schedules/default.htm. Accessed Feb 2011.

Adolescent Vaccines Schedule Primary Changes

- **HPV**
  - In 33 million doses, no new adverse event identified
  - Uptake remains < 40% (financial primary barrier)
  - HPV4 efficacious in males
  - HPV4 approved for prevention of anal cancer
- **MCV4**
  - Added **booster dose at 16 years**
  - For those vaccinated at age 13–15 years
    - ➢ Booster dose at age 16 through 18 years

ACIP Schedules. www.cdc.gov/vaccines/recs/schedules/default.htm. Accessed Feb 2011.

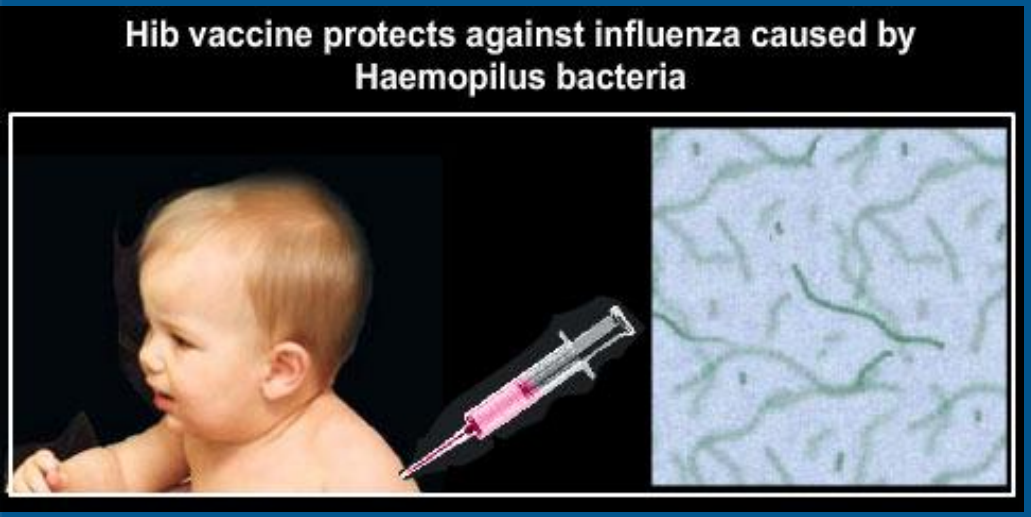
Catch-up Immunization Schedule for Persons Aged 4 Months Through 18 Years Who Start Late or Who Are More Than 1 Month Behind—United States • 2011

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

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
PERSONS AGED 4 MONTHS THROUGH 6 YEARS					
Hepatitis B[1]	Birth	4 weeks	8 weeks (and at least 16 weeks after first dose)		
Rotavirus[2]	6 wks	4 weeks	4 weeks[2]		
Diphtheria, Tetanus, Pertussis[3]	6 wks	4 weeks	4 weeks	6 months	6 months[3]
Haemophilus influenzae type b[4]	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[4] if current age is younger than 12 months 8 weeks (as final dose)[4] 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[5]	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[6]	6 wks	4 weeks	4 weeks	6 months[6]	
Measles, Mumps, Rubella[7]	12 mos	4 weeks			
Varicella[8]	12 mos	3 months			
Hepatitis A[9]	12 mos	6 months			
PERSONS AGED 7 THROUGH 18 YEARS					
Tetanus, Diphtheria/ Tetanus, Diphtheria, Pertussis[10]	7 yrs[10]	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[11]	9 yrs	Routine dosing intervals are recommended (females)[11]			
Hepatitis A[9]	12 mos	6 months			
Hepatitis B[1]	Birth	4 weeks	8 weeks (and at least 16 weeks after first dose)		
Inactivated Poliovirus[6]	6 wks	4 weeks	4 weeks[6]	6 months[6]	
Measles, Mumps, Rubella[7]	12 mos	4 weeks			
Varicella[8]	12 mos	3 months if person is younger than age 13 years 4 weeks if person is aged 13 years or older			

Catch-up Hib

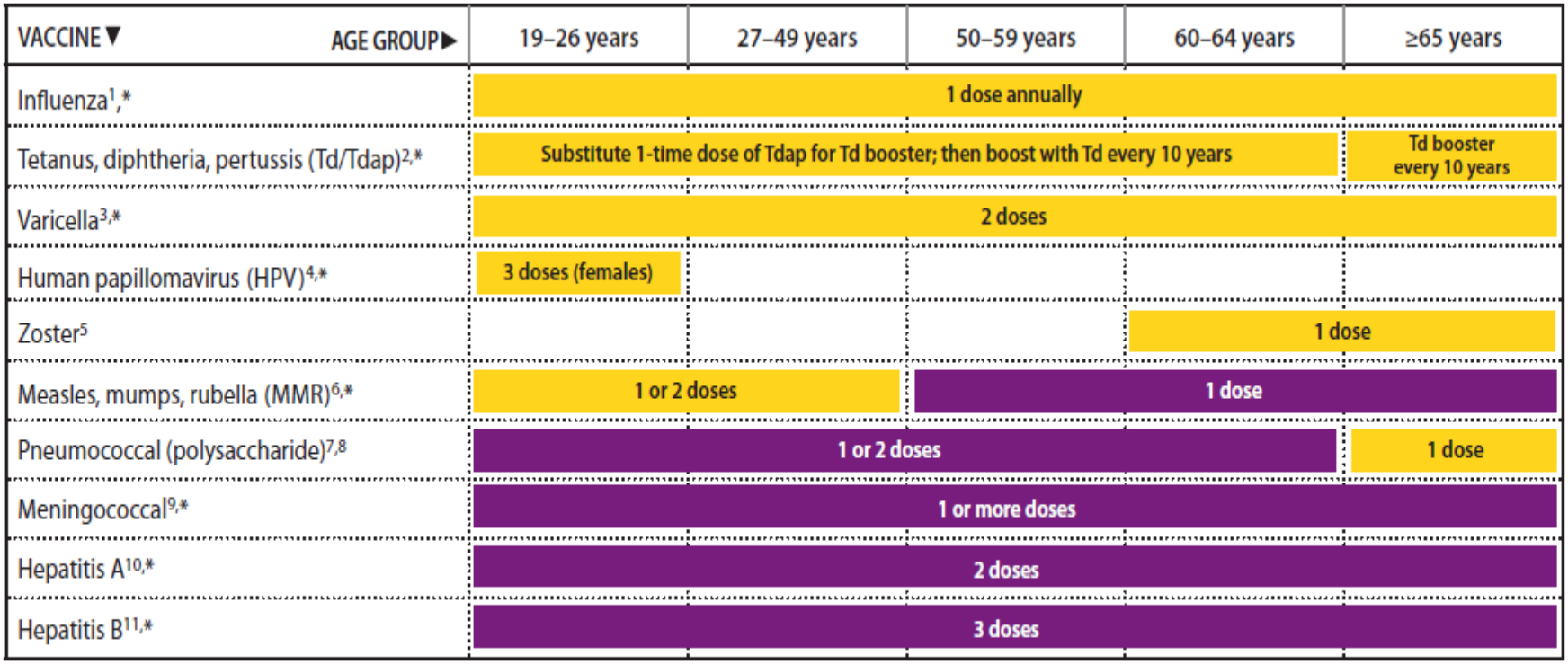
- 1 dose of Hib-vaccine should be considered for persons aged 5 years or older for:
  - Sickle cell disease
  - HIV infection
  - Leukemia
  - Had a splenectomy



ACIP. http://www.cdc.gov/vaccines/recs/acip/slides-oct10.htm#child. Accessed Dec 2010.

2011 Adult Schedule Additional Language to Include Use of Tdap

FIGURE 1. Recommended adult immunization schedule, by vaccine and age group — United States, 2011



CDC. *MMWR Morb Mortal Wkly Rep*. 2011;60(4).

Tdap-Adult with some "off-label"

- **Adults ages 18 through 64** years
  - Should receive a single dose of **Tdap** in place of one tetanus and diphtheria toxoids (Td) vaccine dose
- **Adults ages 65 years and older**
  - Who have close contact with an infant ages less than 12 months (eg, grandparents, child-care providers, and HCP) should receive a single dose of Tdap
- **Adults any age**
  - A single dose of Tdap vaccine may be given in place of a tetanus and diphtheria toxoids, (Td) vaccine, in persons who have not previously received Tdap

CDC. *MMWR Morb Mortal Wkly Rep*. 2011;60(4).

Hepatitis A: Families of International Adoptees

- All previously unvaccinated persons who anticipate close personal contact with an international adoptee from countries of high or intermediate endemicity during the first 60 days following arrival in the US
  - First dose of Hep A vaccine
    - As soon as adoption is planned
    - Ideally at least two weeks prior to the arrival of the adoptee

CDC. *MMWR Morb Mortal Wkly Rep*. 2009;58(36):1006-1007.

Hepatitis B for HCP

- **Hepatitis B**
  - Give 3-dose series (dose #1 now, #2 in 1 month, #3 approximately 5 months after #2). Give IM
  - Obtain anti-HBs serologic testing 1–2 months after dose #3

IAC. http://www.immunize.org/catg.d/p2017.pdf. Accessed March 2011.

MMR For HCP Born Prior to 1957

- Although birth before 1957 generally is considered acceptable evidence of measles, mumps, and rubella immunity
  - Health care facilities should consider recommending 2 doses of MMR vaccine routinely to unvaccinated HCP born before 1957 who do not have laboratory evidence of disease or immunity to MMR
  - If no evidence of immunity, recommend 2 doses of MMR vaccine during an outbreak of measles or mumps and 1 dose during an outbreak of rubella

CDC. *MMWR Morb Mortal Wkly Rep*. 2011;60(4).

MMR for HCP Born after 1957

- For health care personnel (HCP) born in 1957 or later without serologic evidence of immunity or prior vaccination, give 2 doses of MMR, 4 weeks apart

IAC. http://www.immunize.org/catg.d/p2017.pdf. Accessed March 2011.

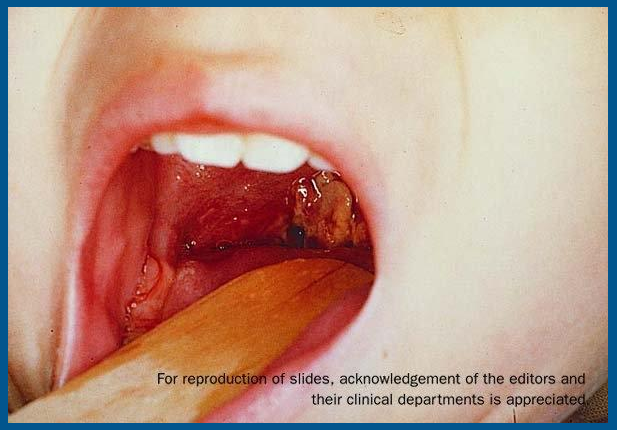
Varicella for HCP

- If no serologic proof of immunity, prior vaccination, or history of varicella disease (chickenpox)
  - Give 2 doses of varicella vaccine, 4 weeks apart

IAC. http://www.immunize.org/catg.d/p2017.pdf. Accessed March 2011.

Tdap for HCP

- Give a 1-time dose of Tdap to HCP of all ages with direct patient contact



IAC. http://www.immunize.org/catg.d/p2017.pdf. Accessed March 2011.

Other Vaccines for HCP

- *Hepatitis A, typhoid, and polio vaccines are not routinely recommended for HCP; only if have on-the-job exposure to fecal material*
- *Herpes Zoster is not routinely recommended*
  - ***FDA recently approved down 50 years***

IAC. http://www.immunize.org/catg.d/p2017.pdf. Accessed March 2011.

Public Confidence in Vaccines

- **Public confidence in vaccines** is affected by:
  - Product safety and efficacy
  - Anecdotal experience/information
  - Prevalence of disease
  - Recommendations by governmental committees and professional societies
  - Physician recommendations
  - Media coverage
  - Vaccine monitoring and surveillance systems

Nailed: Dr Andrew Wakefield and the MMR – Autism Fraud

- Trigger for what would become a worldwide controversy
  - Single scientific research paper, published in *Lancet* (February 1998)
  - Written by a Dr Andrew Wakefield, and co-authored by a dozen other doctors
  - Report of 12 anonymous children with developmental disorders, who were admitted to a pediatric bowel unit at the Royal Free hospital in Hampstead, north London, between July 1996 and February 1997

Doctor discredited over 'flawed' autism claims

NEWS

Schoolboy, 13, dies as measles makes a comeback

BMJ

HOW THE CASE AGAINST THE MMR VACCINE WAS BUILT

Antigen Burden

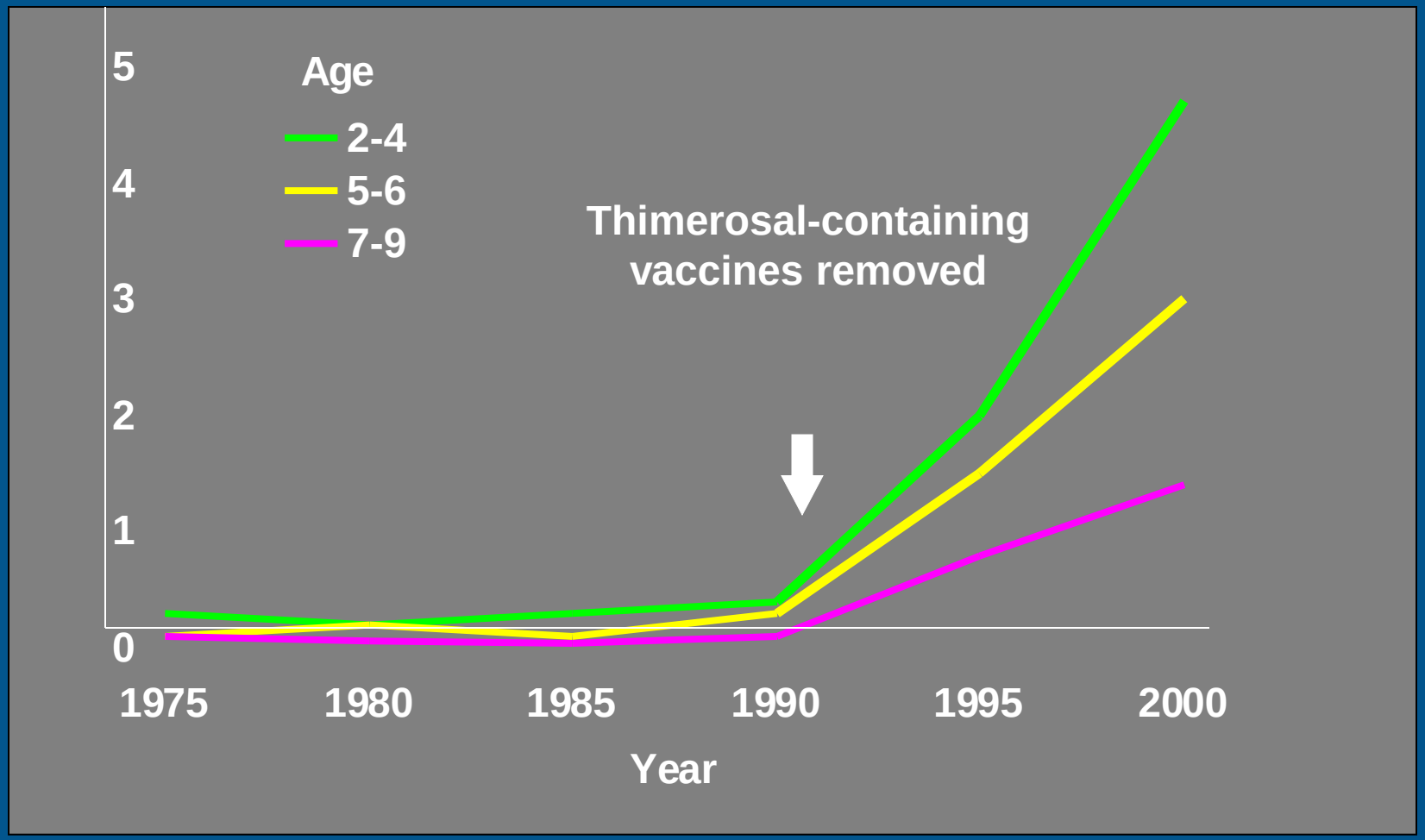
Vaccine	1960	1980	2000	2010
Smallpox	200			
Diphtheria	1	1	1	1
Tetanus	1	1	1	1
Pertussis	3000	3000	5	5
Polio	15	15	15	15
MMR		24	24	24
Hib			2	2
Varicella			69	69
PCV7/PCV13			8	14
HepB			1	1
HepA				4
HPV4				4
Rotavirus				20
MCV4				5
Influenza				12
Total	3217	3041	126	177

Marshall G. *The Vaccine Handbook*. PCI Books: 2010.

Omnibus Autism Proceedings

- Theories of general causation
  - MMR and thimerosal-containing vaccines combine to cause autism
  - Thimerosal-containing vaccines cause autism
  - MMR causes autism (dropped)
- Three test cases per theory
- ALL THREE REJECTED

Autism Incidence After Vaccine Formulation Changes



Madsen KM, et al. *Pediatrics.* 2003;112:604-606.

Refusal to Vaccinate (AAP form)

http://www.aap.org/immunization/pediatricians/pdf/RefusaltoVaccinate.pdf.

- I have read the Vaccine Information Statement from the Centers for Disease Control and Prevention explaining the vaccine(s) and the disease(s) it prevents. I have had the opportunity to discuss this with my child's doctor or nurse, who has answered all of my questions regarding the recommended vaccine(s), etc.
- Parent's initials _____ Date _____

Evidence-based Methods for Improving Immunization Rates

- Reducing client out-of-pocket costs
- Vaccination programs in schools
- Vaccination programs in WIC settings
- Client reminder and recall systems
- Vaccination requirements for child care and school
- Provider reminder systems when used alone
- Standing orders when used alone
- Provider assessment and feedback

The Community Guide. http://www.thecommunityguide.org/vaccines/universally/index.html. Accessed Nov 2010.
Briss PA, et al. *Am J Prev Med.* 2000;18(suppl 1):35-43.

Resources for Providers

www.cdc.gov

- **Immunization Schedules**
  www.cdc.gov/vaccines/recs/schedules/
- **ACIP Recommendations & Provisional Recommendations**
  www.cdc.gov/vaccines/pubs/ACIP-list.htm
  www.cdc.gov/vaccines/recs/provisional/default.htm
- **Immunization Action Coalition (IAC)**
  www.immunize.org
- **The Guide to Community Preventive Services. Vaccine recommendations**
  www.thecommunityguide.org/vaccines/index.html
- **Assessment, Feedback, Incentives, and Exchange (AFIX)**
  www.cdc.gov/vaccines/programs/afix/default.htm
- **National Foundation for Infectious Diseases**
  www.nfid.org
- **Centers for Medicare & Medicaid Services**
  www.cms.hhs.gov

Resources for Patients and Parents

- **Guide to Evaluating Information on the Web**
  - www.cdc.gov/vaccines/vac-gen/evalwebs.htm
- **CDC Vaccine Information Statements (VISs)**
  - http://www.cdc.gov/vaccines/pubs/vis/default.htm
- **Vaccine Safety**
  - www.cdc.gov/Features/VaccineSafety
- **National Network for Immunization Information (NNII)**
  - www.immunizationinfo.org
- **Allied Vaccine Group**
  - www.vaccine.org
- **The Immunization Action Coalition: Vaccine Information for the Public and Health Professionals**
  - www.vaccineinformation.org
- **Vaccine Education Center at CHOP**
  - www.vaccine.chop.edu