Adolescent Immunization Update

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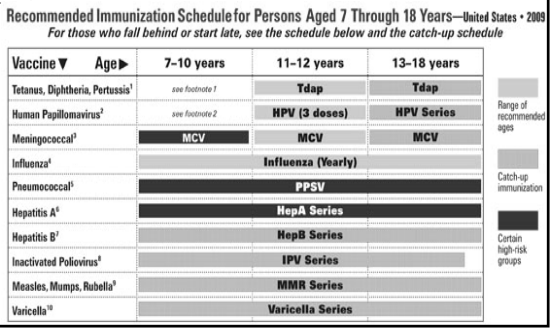
Adolescent Immunizations

1. Review adolescent vaccine recommendations
2. Vaccine Safety/Errors
3. Communicating with parents about adolescent vaccines

Adolescence

- Transitional phase of mental and physical development between childhood and adulthood
- Variety of definitions used
  - CDC: 10-24 years
  - Department of Health and Human Services: 11-21 years
  - Society for Adolescent Medicine: 10-19 years

Use CDC Immunization Schedules



Recommended Immunization Schedule for Persons Aged 7 Through 18 Years—United States • 2009

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

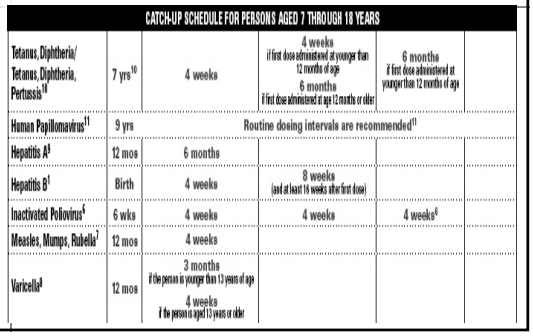
Vaccine ▼ Age ▶	7–10 years	11–12 years	13–18 years
Tetanus, Diphtheria, Pertussis[1]	see footnote 1	Tdap	Tdap
Human Papillomavirus[2]	see footnote 2	HPV (3 doses)	HPV Series
Meningococcal[3]	MCV	MCV	MCV
Influenza[4]	Influenza (Yearly)		
Pneumococcal[5]	PPSV		
Hepatitis A[6]	HepA Series		
Hepatitis B[7]	HepB Series		
Inactivated Poliovirus[8]	IPV Series		
Measles, Mumps, Rubella[9]	MMR Series		
Varicella[10]	Varicella Series		

Range of recommended ages

Catch-up immunization

Certain high-risk groups

Use CDC Immunization Schedules



CATCH-UP SCHEDULE FOR 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 12 months of age; 6 months if first dose administered at age 12 months or older	6 months if first dose administered at younger than 12 months of age
Human Papillomavirus[11]	9 yrs	Routine dosing intervals are recommended[11]		
Hepatitis A[3]	12 mos	6 months		
Hepatitis B[1]	Birth	4 weeks	8 weeks (and at least 16 weeks after first dose)	
Inactivated Poliovirus[4]	6 wks	4 weeks	4 weeks	4 weeks[6]
Measles, Mumps, Rubella[7]	12 mos	4 weeks		
Varicella[8]	12 mos	3 months if the person is younger than 13 years of age; 4 weeks if the person is aged 13 years or older		

Use CDC Immunization Schedules

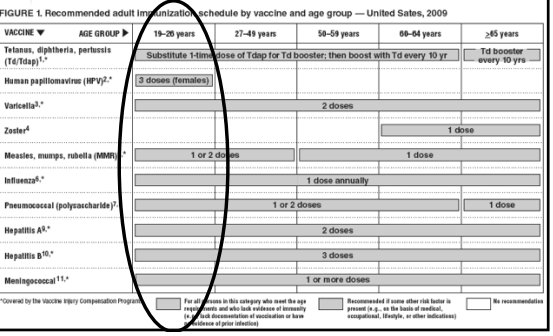


FIGURE 1. Recommended adult immunization schedule by vaccine and age group — United States, 2009

VACCINE ▼ AGE GROUP ▶	19–26 years	27–49 years	50–59 years	60–64 years	≥65 years
Tetanus, diphtheria, pertussis (Td/Tdap)[1,*]	Substitute 1-time dose of Tdap for Td booster; then boost with Td every 10 yr				Td booster every 10 yrs
Human papillomavirus (HPV)[2,*]	3 doses (females)				
Varicella[3,*]	2 doses				
Zoster[4]				1 dose	
Measles, mumps, rubella (MMR)[5,*]	1 or 2 doses		1 dose		
Influenza[6,*]	1 dose annually				
Pneumococcal (polysaccharide)[7,*]	1 or 2 doses				1 dose
Hepatitis A[8,*]	2 doses				
Hepatitis B[9,*]	3 doses				
Meningococcal[11,*]	1 or more doses				

*Covered by the Vaccine Injury Compensation Program

For all persons in this category who meet the age requirements and who lack evidence of immunity (e.g., lack documentation of vaccination or have no evidence of prior infection)

Recommended if some other risk factor is present (e.g., on the basis of medical, occupational, lifestyle, or other indications)

No recommendation

(The presentation may not include all slides listed and the order may be changed.)

Adolescents Need a Variety of Vaccines

Routine Use	Catch Up if Not Previously Given
• Pertussis (Tdap)	• Hepatitis B
• Human Papillomavirus (HPV4; females only)	• Polio (IPV)
• Meningoccocal (MCV4)	• Measles-mumps-rubella (MMR)
• Influenza	• Varicella
	• Hepatitis A

Special Circumstances

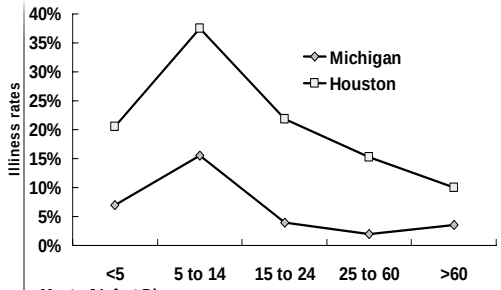
- **Pneumococcal**
  - Functional asplenia
  - Immunosuprresssion
  - Cochlear implant
- **Hib**
  - Immunosupression/asplenia

What's New for 2009?

- Influenza vaccine
  - now recommended routinely for all adolescents through 18 years
- Clarification of HPV4 catch up schedule
- Discussion of minimum interval between Td and Tdap
- Discussion of Hib vaccination for children 5 years of age and older

Influenza

Average Influenza-Associated Illness Rates by Age Group*



Sources: Monto J Infect Dis Glezen N Engl J Med

Summary of Influenza Burden in School Aged Children

- Few deaths and hospitalizations compared to younger children, elderly, or chronically ill
- 5-7 outpatient visits per 100 children annually, frequently receive antibiotics
- 10-30 illnesses per 100 children – frequently associated with school absenteeism

Source: B. Atkinson, Immunization Update MDCH, 2008

(The presentation may not include all slides listed and the order may be changed.)

Influenza Vaccine – Evolution of Recommendations

- 2007-2008: Children 24-59 months included for routine vaccination
- 2008-2009: Routine vaccination expanded to include all children age 6 mo - 18 years
- In 2-4 years annual influenza vaccination will be recommended for the entire U.S. population

Two Influenza Vaccine Products Available

- Inactivated vaccine (TIV)
  - Injectable vaccine
  - Available for those 6 months of age and older, even those with high risk condition
- Live attenuated vaccine (LAIV)
  - Approved for non-pregnant, healthy persons 2 through 49 years of age
  - Persons in close contact with high-risk groups
  - Healthcare personnel

MMWR 2007;56 (RR-6)

LAIV Contraindications

- Pregnancy (breastfeeding allowed)
- Contacts of those with severe immunosupression (i.e. HSCT)
  - does not include contacts of individuals with HIV, DM, asthma taking steroids
- Those with medical conditions placing them at high risk of flu complications (chronic heart/lung dz, asthma, DM, kidney failure, immunosupression)
- Adolescents on aspirin therapy

Human papillomavirus (HPV4)

Human Papillomavirus (HPV)

- Genital HPV is the most prevalent sexually transmitted infection in the US
  - ~20 million currently infected
  - 6 million new infections/year
  - Estimated 80% of sexually active persons will have been infected by age 50

Cates, STD 26:Supp 1-7 (1999); Meyers et al. Am J Epidemiol 151: 1158-1171 (2000)

HPV-Associated Disease

- Most infections asymptomatic and resolve.
- However, persistent HPV infection can lead to a variety of anogenital cancers
  - Virtually all cervical cancers
  - Substantial proportion of vaginal, penile and anal cancers
  - Some head a neck cancers
- Non-cancerous HPV-related conditions
  - Almost all genital warts
  - Almost all respiratory papillomatosis

(The presentation may not include all slides listed and the order may be changed.)

Quadrivalent HPV Vaccine

- Among uninfected females, nearly 100% effective in preventing infection and genital lesions from HPV types 6/11/16/18
- No evidence of efficacy against existing disease or infection (i.e., the vaccine is not therapeutic)
- Prior infection with one HPV type did not diminish efficacy of the vaccine against other HPV vaccine types

HPV4 Vaccine Recommendations

- Routine vaccination of females 11-12 years of age with "catch-up" vaccination through age 26 years
  - May complete series at age 27 if began before 26 years of age
- Series initiation as young as 9 years of age at the clinician's discretion
- Prior abnormal Pap smear, genital warts, or HPV infection is NOT a contraindication to vaccination

***MMWR* 2007;56(No. RR-2)**

Recommended HPV4 Vaccination Schedule

- Use the same schedule for "routine" and "catch up" vaccination
  - 0, 2, 6 months
  - 3rd dose at least 24 weeks after first dose
- Intramuscular injection in the deltoid

***MMWR* 2006;56(No. RR-2):1-23**

HPV4 Minimum Intervals

- Minimum intervals between doses should not be used for routine vaccination
  - 1st - 2nd dose: 4 weeks
  - 2nd - 3rd dose: 12 weeks
  - 1st - 3rd dose: 24 weeks
- There are few data on efficacy of alternative HPV4 vaccination schedules

HPV4 Vaccine Contraindications

- Males
- Women older than 26 years
  - Studies of clinical efficacy in progress now
  - The manufacturer has applied to FDA for extension of age through 45 years (females only)

HPV4 Vaccination During Pregnancy

- Series initiation should be delayed until after completion of pregnancy
- If a woman is found to be pregnant after initiating the vaccination series, remaining doses should be delayed until after the pregnancy
- If a vaccine dose has been administered during pregnancy, there is no indication for intervention
- Women vaccinated during pregnancy should be reported to manufacturer's registry at 800.986.8999

***MMWR* 2006;56(No. RR-2):1-23. March 23, 2007**

(The presentation may not include all slides listed and the order may be changed.)

HPV4 Vaccine and Syncope

- **Reports of syncope received by the VAERS has been detected**
- **Most reported are from adolescent females, many of which received HPV4 vaccine**
- **Clinicians who vaccinate adolescents are advised to have patient seated, and a 15 minute observation period after vaccination is recommended**

Cervical Cancer Screening

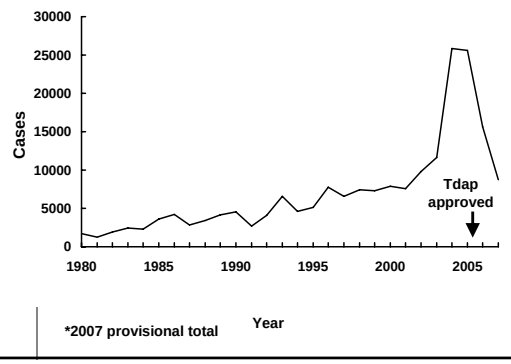
- Cervical cancer screening – no change
  - 30% of cervical cancers caused by HPV types not prevented by the quadrivalent HPV vaccine
  - Vaccinated females could subsequently be infected with non-vaccine HPV types
  - Sexually active females could have been infected prior to vaccination
- Providers should educate women about the importance of cervical cancer screening

HPV4 Vaccine Duration of Immunity

- The duration of immunity after a complete 3-dose schedule is not known
  - Available evidence indicates protection for at least 6.5 years
  - Similarities in vaccine structure suggest long-term immunity
  - Multiple cohort studies are in progress to monitor the duration of immunity

Pertussis

Pertussis—United States, 1980-2007*



Pertussis in the United States

- >15,000 cases reported in 2006
- Highest proportion, 34%, of reported cases occur in adolescents 11-18 years
- Most severe disease and deaths occur among children 6 months and younger

MMWR 2006;55(RR-3):1-34.

(The presentation may not include all slides listed and the order may be changed.)

Pertussis-containing Vaccines for Adolescents

- Tdap (adolescent and adult)
  - Boostrix®: 10-64 years
  - Adacel®: 11-64 years
  - Both have a smaller amount of diphtheria toxoid and acellular pertussis antigen than DTaP (for kids 6 weeks to 6 years)

Adolescent Tdap Recommendations

- Routinely to all 11-12 year olds
- To all adolescents (and adults) who have not received it already
  - Particularly important for those who have contact with infants younger than 12 months of age (parents, healthcare providers)

MMWR 2006;55(RR-17):1-37

Other Tetanus-containing Vaccines for Adolescents

- Td = Tetanus and diphtheria toxoids, adult formulation (7 years and older)
  - Used as tetanus booster when:
    - Previous dose of Tdap was given and patient needs another tetanus booster
    - Previous dose of Tdap was NOT given, but Tdap is not currently available and patient needs a tetanus booster

******Tdap should be the first choice for tetanus booster******

Td and Tdap Minimum Intervals

- There is no absolute minimum interval between Td booster and Tdap
- In "routine" circumstances separate Td and Tdap by 5 years to reduce the chance of a local reaction
- If pertussis immunity is imperative (HCP, infant in household) then administer Tdap regardless of interval since last Td

Meningococcal Disease

Rates of Meningococcal Disease* by Age, 11-30 yrs, United States, 1991-2002

Gardener et al. NEJM 2006: 355 (14): 1466.

(The presentation may not include all slides listed and the order may be changed.)

Meningococcal Vaccines

- MCV4 (Menacta®)
  - Quadrivalent (serogroups A, C, Y, W-135) conjugated to diphtheria toxoid
  - Approved for persons 2-55 years of age
  - Schedule: 1 IM dose, no revaccination
- MPSV4 (Menomune®)
  - Quadrivalent (serogroups A, C, Y, W-135)
  - Approved for persons >2 years of age
  - Schedule: 1 SQ dose, selective revaccination

Adolescent Meningococcal Vaccine Recommendations

- Routine vaccination of 11-12 year olds with one dose of MCV4
- Catch up vaccination for 13-18 year olds
- Previously unvaccinated college freshmen living in dorms
- 2-10 year olds who are at increased risk

MMWR 2007;56(No. 31):794-5

Meningococcal Vaccine Revaccination

- Revaccination may be indicated for persons at high risk for infection* who received MPSV4 at least 5 years ago
- Once a person has received MCV4 no further meningococcal vaccination is recommended (at this time)

***e.g., asplenic persons and those who reside in or travel to areas in which disease is endemic (does not include college settings)**

MCV4 and Guillain-Barré Syndrome (GBS)

- 15 confirmed case reports of GBS in persons 15-19 years of age within 6 weeks after receipt of MCV4 vaccine
- Available data cannot determine if MCV4 increases the risk of GBS
- Those with a history of GBS who are in a high risk group for invasive meningococcal disease should receive MPSV4

MMWR 2006: 55(41); 1120

Other Vaccines for Adolescents

Hepatitis B

- 3-dose series needed for those not previously vaccinated
- A 2-dose series (Recombivax HB®) licensed for children 11-15 years old

(The presentation may not include all slides listed and the order may be changed.)

MMR

- 2-doses for those previously unvaccinated
- If only 1 dose was administered previously, a second dose is required, after a minimum interval of 28 days
- Serologic testing to confirm measles or mumps immunity not recommended

Polio

- For adolescents who received 3 doses of either all OPV or all IPV, a 4th dose is not needed
- However, if the 3 previous doses were combined OPV/IPV then a 4th dose of vaccine recommended regardless of age

Varicella

- 10%-20% who do not respond to the first dose
- Routine second dose recommended for children and adolescents who have received only one dose
- Minimum interval between doses is
  - 3 months for children 12 months through 12 years
  - 4 weeks for persons 13 years and older

Hepatitis A

- Given IM, 2 doses
  - Minimal interval between doses is 6 months
- Catch up vaccination recommended for all adolescents who have not previously received the vaccine
  - Especially important if living in household with Hep A+ family member
  - Traveling to endemic areas (i.e. Mexico)

PPSV23

- Pneumococcal polysaccharide vaccine
- Recommended for individuals with high-risk conditions including:
  - Adolescents with asplenia, cochlear implants, immunosuppression, chronic heart and lung disease
  - Adults 19 year of age and older with asthma or who currently smoke

Hib

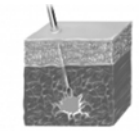
- Though no efficacy data available in older children/adults, studies suggest good immune response in high risk groups.
  - Sickle cell, leukemia, HIV, asplenia
- Though not generally recommended to those older than 5 years, vaccinating individuals at high risk “is not contraindicated”

(The presentation may not include all slides listed and the order may be changed.)

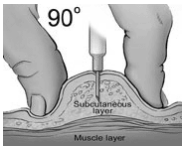
Vaccine Safety & Minimizing Errors

Ensure Proper Route of Administration

IM (deltoid)
- Tdap
- HPV4
- MCV4
- Influenza
- PPSV23
- Hepatitis A or B



SC (triceps)
- IPV
- MMR
- Varicella



Minimize Post-Injection Problems

- Adolescents may be at increased risk for syncope after vaccination
- Always have patient seated
- A 15 minute observation period is recommended after vaccination

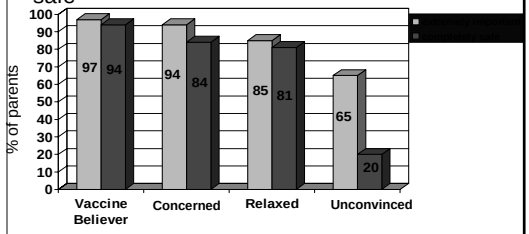
Optimize Vaccine Management

- Ensure proper transport and storage
- Minimize vaccine loss and wastage through appropriate inventory management, including an emergency plan for storage
- Accurately document vaccine administration
- Toolkits available:
  - http://www2a.cdc.gov/vaccines/ed/shtoolkit/
  - http://www.aimtoolkit.org/

Communicating with Parents About Adolescent Vaccines

Parents attitudes about Adolescent Vaccination

- Most parents believe vaccination is important and safe



Adapted from Keane et al. *Vaccine* (2005), 23:2486-2493

(The presentation may not include all slides listed and the order may be changed.)

Parents attitudes – sometimes a challenge

- Low perceived risk of disease
  - Most vaccine preventable diseases are rare
  - Adolescents are generally healthy (and busy!)
  - Diseases began decreasing before vaccines used
- Low perceived benefits of vaccination
  - Herd immunity
  - Children exempted from vaccines 22x more likely to acquire measles, 6x more likely, mumps1
- Adolescent vaccination not expected
- High perceived risk to vaccination→ FEAR

1. Feikin et al., JAMA (2000), 284:3145-3150

Vaccine Related Fears

- Too many "overwhelm the system"
- Vaccination not "natural"
- Vaccines cause the disease they are supposed to prevent
- Vaccines cause other health problems

Some Resources

Trusted Sources

American Academy of Pediatrics
www.aap.org

Centers for Disease Control and Prevention
www.cdc.gov

Group on Immunization Education
www.immunizationed.org

Vaccine Information Center at CHOP
www.chop.edu/consumer/jsp/division/generic.jsp?id=75697Immunization

Action Coalition
www.vaccineinformation.org

Allied Vaccine Group
www.vaccine.org

Anti-Vaccine Sites

Vaccination Liberation
www.vaclib.org

National Vaccine Information Center
www.nvic.org

Global Vaccine Awareness League
www.gval.com

Vaccine Dangers
www.educate-yourself.org/vcd/

Judicial Watch
www.judicialwatch.org

What do adolescents think about vaccination in general?

- Most studies related to Hepatitis B and HPV
- Generally, adolescents have very limited knowledge about VPDs
- Heavy reliance on perceived parental opinions
- Perceptions of societal norms important

Adolescent Attitudes – another potential barrier

- Patient opinions matter – you can't hold down an adolescent for vaccines!!
  - Social stigma – outweighs perceived risk
  - Convenience – the "softball game" effect
- Self-consent & confidentiality
- Self-efficacy

How to impart knowledge

- Have a list of reputable websites to give to patients and parents
- Become familiar with content on anti-vaccine websites
- Provide VIS to patients pre-emptively
- Community outreach to improve "societal knowledge"

(The presentation may not include all slides listed and the order may be changed.)

Take Home Messages

- Challenges to communicating about adolescent immunization exist on multiple levels – there is no easy fix or "one-size-fits-all" strategy
- Try to make your message decisive and compelling – in whatever way means the most to your patients and their parents
  - Facts and figure
  - "Emotional" arguments
- Set up expectations pre-emptively – over time this may change societal "norms" about adolescent immunization

Thank You!

March of Dimes 1956 – Elvis receives polio vaccine

Immunization Resources

- Local
  - Local Health Department
  - Michigan Department of Community Health www.michigan.gov/immunize
  - Alliance for Immunization in Michigan www.aimtoolkit.org
- National
  - CDC www.cdc.gov/vaccines

  www.cdc.gov/vaccines/vacgen/safety/default.htm

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