2010 Immunization Update: Part One: Children and Adolescents

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National Center for Immunization and Respiratory Diseases

WNY Pediatric & Adolescent, and Adult Immunization Coalitions’
4th Annual Immunization Conference
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Disclosures

No financial conflict or interest with the manufacturer of any product named during this course.
Disclosures

I will not discuss the use of vaccines in a manner that differs from the product insert, with the exception of PCV13 vaccine and HPV vaccines.

I will not discuss unlicensed vaccines.
Objectives

After this presentation the provider should be able to

1. Schedule the routinely recommended vaccines for their patient population
2. Share the most recent ACIP recommendations with their colleagues
3. Decide whether to use combination vaccines
Overview

2010 Harmonized Schedule
Combination vaccines
Rotavirus vaccines
Influenza vaccination
Pneumococcal conjugate vaccine (PCV13)
New human papillomavirus vaccine (Cervarix)
# Recommended Immunization Schedule for Persons Aged 0 Through 6 Years—United States • 2010

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

<table>
<thead>
<tr>
<th>Vaccine ▼</th>
<th>Age ▲</th>
<th>Birth</th>
<th>1 month</th>
<th>2 months</th>
<th>4 months</th>
<th>6 months</th>
<th>12 months</th>
<th>15 months</th>
<th>18 months</th>
<th>19–23 months</th>
<th>2–3 years</th>
<th>4–6 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hepatitis B¹</td>
<td></td>
<td>HepB</td>
<td>HepB</td>
<td>HepB</td>
<td></td>
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</tr>
<tr>
<td>Rotavirus²</td>
<td></td>
<td>RV</td>
<td>RV</td>
<td>RV²</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diphtheria, Tetanus, Pertussis³</td>
<td></td>
<td>DTaP</td>
<td>DTaP</td>
<td>DTaP</td>
<td>DTaP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haemophilus influenza type b⁴</td>
<td></td>
<td>Hib</td>
<td>Hib</td>
<td>Hib⁴</td>
<td>Hib</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumococcal⁵</td>
<td></td>
<td>PCV</td>
<td>PCV</td>
<td>PCV</td>
<td>PCV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inactivated Poliovirus⁶</td>
<td></td>
<td>IPV</td>
<td>IPV</td>
<td>IPV</td>
<td>IPV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Influenza⁷</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Influenza (Yearly)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measles, Mumps, Rubella⁸</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>MMR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Varicella⁹</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Varicella</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatitis A¹⁰</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>HepA (2 doses)</td>
<td></td>
<td></td>
<td>HepA Series</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meningococcal¹¹</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>MCV</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Range of recommended ages for all children except certain high-risk groups

Range of recommended ages for certain high-risk groups

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This schedule includes recommendations in effect as of December 15, 2009. 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](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](http://www.vaers.hhs.gov) or by telephone, 800-822-7967.
## Recommended Immunization Schedule for Persons Aged 7 Through 18 Years—United States • 2010

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

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Age ▷</th>
<th>7–10 years</th>
<th>11–12 years</th>
<th>13–18 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetanus, Diphtheria, Pertussis</td>
<td>arrow</td>
<td></td>
<td>Tdap</td>
<td>Tdap</td>
</tr>
<tr>
<td>Human Papillomavirus</td>
<td>see foot note 2</td>
<td></td>
<td>HPV (3 doses)</td>
<td>HPV series</td>
</tr>
<tr>
<td>Meningococcal</td>
<td></td>
<td>MCV</td>
<td>MCV</td>
<td>MCV</td>
</tr>
<tr>
<td>Influenza</td>
<td></td>
<td>Influenza (Yearly)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumococcal</td>
<td></td>
<td>PPSV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatitis A</td>
<td></td>
<td>HepA Series</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatitis B</td>
<td></td>
<td>Hep B Series</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inactivated Poliovirus</td>
<td></td>
<td>IPV Series</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measles, Mumps, Rubella</td>
<td></td>
<td>MMR Series</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Varicella</td>
<td></td>
<td>Varicella Series</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Range of recommended ages for all children except certain high-risk groups**
- **Range of recommended ages for catch-up immunization**
- **Range of recommended ages for certain high-risk groups**

This schedule includes recommendations in effect as of December 15, 2009. 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](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](http://www.vaers.hhs.gov) or by telephone, 800-822-7967.
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 • 2010

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

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Minimum Age for Dose 1</th>
<th>Dose 1 to Dose 2</th>
<th>Minimum Interval Between Doses</th>
<th>Dose 2 to Dose 3</th>
<th>Dose 3 to Dose 4</th>
<th>Dose 4 to Dose 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hepatitis B</td>
<td>Birth</td>
<td>4 weeks</td>
<td>8 weeks (and at least 16 weeks after first dose)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotavirus</td>
<td>6 wks</td>
<td>4 weeks</td>
<td>8 weeks (as final dose)</td>
<td>6 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diphtheria, Tetanus, Pertussis</td>
<td>6 wks</td>
<td>4 weeks</td>
<td>8 weeks (as final dose)</td>
<td></td>
<td>6 months</td>
<td></td>
</tr>
<tr>
<td>Haemophilus influenza type b</td>
<td>6 wks</td>
<td>No further doses needed</td>
<td>8 weeks if first dose administered at younger than age 12 months</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumococcal</td>
<td>6 wks</td>
<td>4 weeks</td>
<td>8 weeks (as final dose) for healthy children</td>
<td>8 weeks (as final dose)</td>
<td>6 months</td>
<td></td>
</tr>
<tr>
<td>Inactivated Poliovirus</td>
<td>6 wks</td>
<td>4 weeks</td>
<td>8 weeks (as final dose) for healthy children</td>
<td>6 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measles, Mumps, Rubella</td>
<td>12 mos</td>
<td>4 weeks</td>
<td>8 weeks (as final dose)</td>
<td>6 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Varicella</td>
<td>12 mos</td>
<td>3 months</td>
<td>8 weeks (as final dose)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatitis A</td>
<td>12 mos</td>
<td>6 months</td>
<td>8 weeks (as final dose)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Persons Aged 7 Through 18 Years

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Minimum Age</th>
<th>Dose 1 to Dose 2</th>
<th>Minimum Interval Between Doses</th>
<th>Dose 2 to Dose 3</th>
<th>Dose 3 to Dose 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetanus, Diphtheria/Tetanus, Diphtheria, Pertussis</td>
<td>7 yrs</td>
<td>4 weeks</td>
<td>6 months if first dose administered at younger than age 12 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human Papillomavirus</td>
<td>9 yrs</td>
<td>Routine dosing intervals are recommended</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatitis A</td>
<td>12 mos</td>
<td>6 months</td>
<td>8 weeks (and at least 16 weeks after first dose)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>Birth</td>
<td>4 weeks</td>
<td>6 months if first dose administered at younger than age 12 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inactivated Poliovirus</td>
<td>6 wks</td>
<td>4 weeks</td>
<td>8 weeks (as final dose)</td>
<td></td>
<td>6 months</td>
</tr>
<tr>
<td>Measles, Mumps, Rubella</td>
<td>12 mos</td>
<td>4 weeks</td>
<td>8 weeks (as final dose)</td>
<td></td>
<td>6 months</td>
</tr>
<tr>
<td>Varicella</td>
<td>12 mos</td>
<td>3 months</td>
<td>4 weeks</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If person is younger than age 13 years

If person is aged 13 years or older
Rotavirus Vaccine

Live Vaccine

Altered Immunocompetence is generally a precaution for vaccination
Recommendation to Temporarily Suspend Usage of GlaxoSmithKline Rotarix (Rotavirus) Vaccine

Summary: The U.S. Food and Drug Administration (FDA) has learned that DNA from porcine circovirus type 1 (PCV1), a virus not known to cause disease in humans, is present in the Rotarix vaccine. All available evidence indicates that there has been no increased risk to patients who have received this vaccine. PCV1 is not known to cause any disease in animals or humans; therefore, it has not been routinely tested for in vaccine development. Rotarix has been extensively studied, before and after approval, and found to have an excellent safety record (i.e., no unusual adverse events). However, FDA is recommending that healthcare practitioners temporarily suspend usage of the Rotarix vaccine for rotavirus immunization in the United States while the agency learns more about the detection of components of the vaccine that have been cross-reacting with porcine circovirus type 1 (PCV1).
On March 22, 2010 the FDA recommended temporary suspension of usage of Rotarix rotavirus vaccine. DNA from porcine circovirus type 1 (PCV1) virus was identified in both finished Rotarix and in the cell bank and seed virus. FDA has since analyzed the findings in light of extensive safety record of Rotarix and RotaTeq. On May 14, FDA announced that providers should resume use of Rotarix and/or continue using RotaTeq.
1 What is rotavirus?

Rotavirus is a virus that causes severe diarrhea, mostly in babies and young children. It is often accompanied by vomiting and fever.

Rotavirus is not the only cause of severe diarrhea, but it is one of the most serious. Before rotavirus vaccine was used, rotavirus was responsible for:

• more than 400,000 doctor visits,
• more than 200,000 emergency room visits,
• 55,000 to 70,000 hospitalizations, and
• thousands of deaths.

3 Who should get rotavirus vaccine and when?

There are two brands of rotavirus vaccine. A baby should get either 2 or 3 doses, depending on which brand is used.

A virus (or parts of the virus) called porcine circovirus is in both rotavirus vaccines. This virus is not known to infect people and there is no known safety risk. For more information, see www.fda.gov.
ROTAVIRUS VACCINE
WHAT YOU NEED TO KNOW

Many Vaccine Information Statements are available in Spanish and other languages. See www.immunize.org/vis.

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Combination Vaccines Definition

A product whose components can be equally divided into independently available routine vaccines.
Combination Vaccines – Definition - INCLUDES

Hib-HepB
DTaP/Hib
HepA-HepB
DTaP-HepB-IPV
MMRV
DTaP-IPV
DTaP-IPV/Hib
### Use of Combination Vaccines

<table>
<thead>
<tr>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>↓ number of injections</td>
<td>Higher costs</td>
</tr>
<tr>
<td>↑ timely coverage</td>
<td>Unnecessary doses</td>
</tr>
<tr>
<td>↓ costs of stocking &amp; administering separate vaccines</td>
<td>Adverse events</td>
</tr>
<tr>
<td>↓ costs of extra healthcare visits</td>
<td></td>
</tr>
<tr>
<td>Facilitate introduction of new vaccines &amp; recommendations</td>
<td></td>
</tr>
</tbody>
</table>
Combination Vaccines

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.

Provider assessment should include the number of injections, vaccine availability, likelihood of improved coverage, likelihood of patient return, and storage and cost consideration.
On February 24, 2010, ACIP unanimously approved a revision for the 2010-2011 influenza season.

Influenza vaccination recommendations for adults were expanded to include all adults beginning in the 2010-11 influenza season.

All people age 6 months and older are now recommended to receive annual influenza vaccination.

ACIP provisional recommendation, February 24, 2010
(Posted May 14, 2010, 7:00 PM ET, for Week Ending May 8, 2010)

FLUVIEW
A Weekly Influenza Surveillance Report Prepared by the Influenza Division
Weekly Influenza Activity Estimates Reported by State and Territorial Epidemiologists*
Week Ending May 08, 2010 - Week 18

*This map indicates geographic spread and does not measure the severity of influenza activity.
Influenza 2010

Influenza virus continues to circulate in the United States

Influenza activity has increased in several areas of the U.S.

Almost all virus circulating now is the 2009 H1N1 (pandemic) strain

Continue to vaccinate

Check expiration date of vaccine before administration (some expire earlier than usual)

www.cdc.gov/flu/weekly
### 2009 H1N1 Influenza Vaccines Available in 2009-2010

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Package</th>
<th>Dose</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>sanofi Pasteur</strong></td>
<td><strong>Multidose vial</strong>*</td>
<td>Age-dependent</td>
<td>≥6 mos</td>
</tr>
<tr>
<td></td>
<td><strong>Single dose vial</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Single dose vial</strong></td>
<td>0.25 mL</td>
<td>6–35 mos</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.5 mL</td>
<td>≥36 mos</td>
</tr>
<tr>
<td><strong>Novartis</strong></td>
<td><strong>Multidose vial</strong></td>
<td>0.5 mL</td>
<td>≥4 yrs</td>
</tr>
<tr>
<td><strong>CSL</strong></td>
<td><strong>Multidose vial</strong>*</td>
<td>Age-dependent</td>
<td>≥6 mos</td>
</tr>
<tr>
<td></td>
<td><strong>Single dose syringe</strong>*</td>
<td>0.25 mL</td>
<td>6–35 mos</td>
</tr>
<tr>
<td></td>
<td><strong>Single dose syringe</strong>*</td>
<td>0.5 mL</td>
<td>≥36 mos</td>
</tr>
<tr>
<td><strong>GSK</strong></td>
<td><strong>Multidose vial</strong></td>
<td>0.5 mL</td>
<td>≥18 yrs</td>
</tr>
<tr>
<td><strong>Medimmune</strong></td>
<td>Sprayer</td>
<td>0.2 mL</td>
<td>2–49 yrs</td>
</tr>
</tbody>
</table>

**SAFER • HEALTHIER • PEOPLE™**
Live Attenuated Influenza Vaccine

Intranasal
Trivalent: same strains as TIV
Attenuated: produce mild or no signs or symptoms of influenza

Temperature-sensitive: do not replicate efficiently at 38°-39° C (temperature of the lower airways)

Cold-adapted: replicate efficiently at 25° C (temperature of the upper airway)
Streptococcus pneumoniae

Second most common cause of vaccine-preventable death in the U.S. (after influenza)

Major clinical syndromes include pneumonia, bacteremia, and meningitis
Pneumococcal Conjugate Vaccines

PCV7 – Protein conjugated to polysaccharide from strains 4, 6B, 9V, 14, 18C, 19F, 23F
Pneumococcal Conjugate Vaccines

PCV13 – Protein conjugated to polysaccharide from strains 1, 3, 4, 5, 6A, 6B, 7F, 9V, 14, 18C, 19A, 19F, 23F
PCV13

Manufactured by Wyeth (vaccine subsidiary of Pfizer)

Trade name Prevnar-13

Licensed February 25, 2010

Approved for children 6 weeks through 5 years
PCV13 - Schedule

Routine recommended ages the same as PCV7
2, 4, 6 months, booster 12-15 months
Catch-up through 4 years for healthy children
Catch-up through 5 years for high-risk children
If the series is begun with PCV7, should finish the series with PCV13
Do not discard PCV7 before expiration date!
A supplemental dose of PCV13 is recommended 8 weeks after the last dose of PCV7. Extends to 5th birthday for healthy children (to 6th birthday for high risk).
Permissive Recommendation

Providers may vaccinate children 6 years through 18 years with one dose of PCV13 if they are high risk:

- Asplenia
- Immunosuppression
- CSF leak
- Cochlear implant
Human Papillomavirus
Human Papillomavirus (HPV)

Common sexually transmitted infection
More than 100 types
Established cause of cervical and other anogenital cancers
Worldwide cervical cancer causes 233,000 deaths per year
4000 deaths in U.S.
Anogenital HPV is the most common sexually transmitted infection in the U.S.:

- ~20 million infected with HPV
- 6.2 million new HPV infections/year

Transmission and Risk Factors

- 24% of females in US sexually active by age 15 years, 40% by 16 and 70% by 18 years. Increased number of sex partners, increased predictor of infection
- Transmission of HPV through other types of genital contact in absence of penetration described, but less common

-(2002 National Survey Family Growth)
Human Papillomavirus
Vaccines

HPV Strains
16, 18, (70% cervical other anogenital cancers)
6, 11 (90% genital warts)

HPV4 (Gardasil)

16, 18 (70% cervical cancers)

HPV2 (Cervarix)
ACIP recommends routine vaccination of females aged 11 or 12 years with 3 doses of HPV vaccine. The vaccination series can be started as young as 9 years of age.

HPV vaccination is also recommended for females aged 13 through 26 years who have not been previously vaccinated or who have not completed the full vaccination series. Ideally, vaccine should be administered before potential exposure to HPV through sexual contact.
Provisional Recommendations for Vaccination of Females

- ACIP recommends vaccination with either the bivalent HPV vaccine or the quadrivalent HPV vaccine for prevention of cervical cancers and precancers.

- ACIP recommends vaccination with the quadrivalent HPV vaccine for prevention of cervical cancers and precancers, vulvar and vaginal cancers and precancers, and genital warts.
ACIP recommends that the HPV vaccine series be completed with the same HPV vaccine product whenever possible.

However, if vaccination providers do not know or have available the HPV vaccine product previously administered, either HPV vaccine product can be used to continue or complete the series to provide protection against HPV 16 and 18.

*final recommendations pending CDC/HHS review and approval
## Quadrivalent HPV Vaccine Efficacy Prevention of HPV 6, 11-related Genital Warts, Males 16-26 years

<table>
<thead>
<tr>
<th>Endpoint</th>
<th>Vaccine n/N</th>
<th>Placebo n/N</th>
<th>% Efficacy (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genital warts</td>
<td>3/1245</td>
<td>28/1244</td>
<td>89 (66, 98)</td>
</tr>
</tbody>
</table>

Interim Analysis; per-protocol efficacy population, mean follow-Up 2.2 yrs, received all three doses of vaccine; naïve to vaccine type at baseline

Ref: BLA, Presentation for VRBPAC Meeting, Sept 9, 2009
Prevention genital warts due to HPV types 6 and 11

Approved for use in males aged 9 through 26 years

http://www.fda.gov/BiologicsBloodVaccines/Vaccines/ApprovedProducts/ucm094042.htm
Recommendations:

Quadrivalent HPV vaccine may be given to males aged 9 through 26 years to reduce their likelihood of acquiring genital warts. Quadrivalent HPV vaccine would be most effective when given before exposure to HPV through sexual contact.

Vaccines for Children (VFC):

Quadrivalent HPV vaccine for males approved to be included in VFC enabling health care providers to obtain and provide vaccine but not actively promoting vaccination.

*final recommendations pending CDC/HHS review and approval
High efficacy **without evidence of infection with vaccine HPV types**

No evidence that the vaccine had 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 vaccine HPV types
HPV Vaccine Special Situations*

Vaccine can be administered with:

- Equivocal or abnormal Pap test
- Positive HPV DNA test
- Genital warts
- Immunosuppression
- Breastfeeding
Cervical Cancer Screening

Cervical cancer screening – no change

- 30% of cervical cancers caused by HPV types not prevented by the 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
Thank You

Hotline: 800.CDC.INFO

Email: nipinfo@cdc.gov

Website: www.cdc.gov/vaccines