Objectives

- To describe the current immunization schedule, the timing of immunizations, and the diseases prevented by immunization
- To explain the side effects of the current immunizations
- To be competent to design a plan to provide a child with the required immunizations

### 2007 Additions

- **Rotavirus vaccine** 3 doses 2, 4, 6 months
  - First dose 6 weeks to 12 weeks
  - Second and third at 4-10 week intervals
  - Not initiated if > 12 weeks of age
  - Not given after 32 weeks
- **Influenza** all children 6 to 59 months
- **Varicella** at 12-15 months and boosted at 4-6 years
- **Human papillomavirus vaccine** age 11-12 but as young as 9 years
  - 3 doses second and third dose 2 and 6 months after first dose
- **Catch up females** 13-26 years
Who should receive immunization?
- Proper age
- Adequate intervals
- Free of systemic disease
- No prior adverse reaction
- No progressive neurological disease
- Inactivated vaccine if immunocompromised care givers

Parent’s Concern Over Immunization (23%)
- Parents concern over the number of “shots” before age 2 which has risen from 8 in 1960 to 5 in 1980 to 20 in 2000
- Number of protein antigens 3,217 in 1960 to 3,041 in 1980 to 123-126 in 2000

<table>
<thead>
<tr>
<th>Disease</th>
<th>20th cen</th>
<th>2001</th>
<th>Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smallpox</td>
<td>48,164</td>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>Diphtheria</td>
<td>175,885</td>
<td>2</td>
<td>100%</td>
</tr>
<tr>
<td>Tetanus</td>
<td>1,314</td>
<td>2</td>
<td>97.9%</td>
</tr>
<tr>
<td>Pertussis</td>
<td>147,271</td>
<td>5,396</td>
<td>96.3%</td>
</tr>
<tr>
<td>Polio</td>
<td>16,316</td>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>Measles</td>
<td>503,282</td>
<td>108</td>
<td>100%</td>
</tr>
<tr>
<td>Mumps</td>
<td>152,209</td>
<td>108</td>
<td>100%</td>
</tr>
<tr>
<td>Rubella</td>
<td>47,745</td>
<td>19</td>
<td>100%</td>
</tr>
<tr>
<td>Conv. Rubella</td>
<td>823</td>
<td>2</td>
<td>99.1%</td>
</tr>
<tr>
<td>H. Influenza</td>
<td>20,000</td>
<td>183</td>
<td>99.1%</td>
</tr>
<tr>
<td>Hepatitis</td>
<td>200,000</td>
<td>80,000</td>
<td>60%</td>
</tr>
</tbody>
</table>

Ultimate Goal of Immunization is Eradication of Disease
- Last naturally occurring smallpox case in the world 1977
- Rash, high fever, tiredness, severe headache, backache, and blindness
- Smallpox killed up to 30% of people infected

Smallpox Vaccine
- Non-emergency (no outbreak)
  - Laboratory workers
  - Public health, hospital and other personnel, 18-65 years of age who may need to respond
- Emergency Use (outbreak)
  - Anyone directly exposed
  - Anyone at risk for exposure
- Revaccinate every 3-10 years depending on risk

Smallpox Vaccine
- Blister will form and scab
- When the scab falls off, a semi permeable bandage needs to be applied to site and change 1-3 days to prevent spread. Lymph node tenderness 2-4 weeks
- Contraindicated in pregnancy, immune and autoimmune disorders, immunosuppressive therapy, eczema, skin disorders, eye diseases, contacts to other contraindications allergy to polymyxin, streptomycin, chlorotetracycline, neomycin, and phenol
Smallpox Vaccine Site

DTaP - Diphtheria, Tetanus, and Pertussis
- DTaP is given at 2, 4, 6, 15 months & 4 years
- Side effects: fever, shock-like syndrome, temperature within 2 days, allergic reactions, granuloma at the injection site, and crying
- Contraindicated in children with progressive neurological disease
- Allergic reactions as mouth swelling or wheezing within a few hours of immunization
- Neurological problems within 7 days of a DTP

Diphtheria
- Membranous nasopharyngitis
- Obstructive laryngopharyngitis
- Corynebacterium
- Respiratory failure
- Myocarditis
- 0 cases USA 1999
- 1 case Oregon 1998
- 2,700 cases in world

Tetanus
- Lockjaw
- Neurotoxin from Clostridium tetani in a contaminated wound
- Incidence 0.095/million
- 2 deaths in 2005 – 94 yo and 73 yo
- 85% > 25 years old – 1 infant in Montana 1998 mother used clay on the umbilicus 12 days ventilated

Pertussis
- Whooping cough
- URI with severe paroxysms of cough and inspiratory whoop followed by vomiting
- Bordetella pertussis
- < 6 months no whoop
- Duration 6-10 weeks

Complications of Pertussis
- Apnea
- Pneumonia 16/100
- Seizures 2/100
- Neurologic defects 1/200
- Death 1/200
- Incidence 8.7/100,00 in 2005 – 160/100,00< 6 months of age
Pertussis in the U.S. 1922-2004

DTP Preparations
- DTaP Acellular to avoid fever, convulsions, crying, and shock-like syndrome-age 6 weeks until 6 years
- Tdap for children greater than 11 years and five years after last DTaP

Side Effects Of DTaP within 1-3 days
- Fussiness 1 in 3 children
- Redness 1 in 4 children especially at 4 or 5 immunization
- Fever 1 in 4 children
- Non stop crying for 3 hours 1 in 1,000 children
- Seizure 1 in 14,000 children
- High fever > 105°F 1 in 16,000 children

Pneumococcal Conjugate Vaccine
- Pneumococcal disease
  - 200 deaths/year < 5 yo
  - 700 cases of meningitis
  - 13,000 blood infections
  - About 5 million ear infections
- Prevnar heptavalent
  - Protection at least 3 years
  - Schedule depends on the age and risk of the child

Schedule of Prevnar Children Less than 2 Years
- 4 doses of vaccine
- One dose at
  - 2 months
  - 4 months
  - 6 months
  - 12-15 months
- Contraindications to vaccine
  - Severe allergic reaction to previous dose
  - Systemic disease
- Side Effect Risks
  - 3 of 10 children have redness, swelling or tenderness at sight
  - 1 of 10 children have fever
  - Monitor for allergic reaction, fever, and unusual behavior

Recommended Schedule for Heptavalent Conjugate Vaccine

<table>
<thead>
<tr>
<th>Age at First Dose</th>
<th>Primary Series</th>
<th>Booster Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-6 months</td>
<td>3 doses</td>
<td>1 dose at 12-15 months</td>
</tr>
<tr>
<td>7-11 months</td>
<td>2 doses</td>
<td>1 dose at 12-15 months</td>
</tr>
<tr>
<td>12-23 months</td>
<td>2 doses</td>
<td>6-8 weeks apart</td>
</tr>
</tbody>
</table>

**VCU**
High Risk for Invasive Pneumococcal Disease

- >150,000 cases/year
- Sickle Cell Disease, congenital or acquired asplenia, or splenic dysfunction
- Infection with human immunodeficiency virus

Presumed High Risk

- Congenital immune deficiencies, T-lymphocyte, complement or phagocytic deficiencies
- Chronic Cardiac
- Chronic Pulmonary (asthma-high dose steroids)
- Cerebrospinal fluid leaks
- Chronic renal insufficiency
- Immunosuppressive therapy, radiation, or transplant
- Diabetes mellitus

Pneumococcal Vaccine Schedule for High Risk Children >24 mo

<table>
<thead>
<tr>
<th>Age</th>
<th>Previous Dose</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>24-59 months</td>
<td>4 doses of PCV7</td>
<td>23 PS at 24 mo 6 weeks p PCV7 23 PS 3-5 years</td>
</tr>
<tr>
<td>24-59 months</td>
<td>1-3 doses of PCV7</td>
<td>PCV7 23 PS 3-5 years</td>
</tr>
<tr>
<td>24-59 months</td>
<td>1 dose of 23 PS</td>
<td>2 doses of PCV7 23PS 3-5 years</td>
</tr>
<tr>
<td>24-59 months</td>
<td>None</td>
<td>2 doses of PCV7 23 PS 6-8 weeks 23 PS 3-5 years</td>
</tr>
</tbody>
</table>

Bottom Line for High Risk Children

- Primary series under 23 months
- At 24 months with no PCV7
  - 2 doses of PCV7 6-8 weeks apart
  - 23PS 6-8 months after last PCV7
  - 23PS after 3-5 years
- After 24 months with 1-3 doses of PCV7
  - 1 dose of PCV7
  - 1 dose 23PS followed by booster 3-5 years

Moderate Risk >20 cases/100,00/year

- All children 24-35 months
- Children 36-59 months attending out of home day care
- Children 36-59 months Native Americans, Alaskan Native, or African American descent
- Vaccine is not recommended for universal immunization of these groups as yet

Which pneumococcal vaccine?

- PCV7 has enhanced immune response and reduction in nasopharyngeal carriage which makes it first choice followed by 23 PS
Pneumococcal Vaccine

- Indicated for all sickle cell patients after age 2

Inactivated Polio Vaccine

- Enterovirus 1,2,3
- Abortive polio
- Aseptic meningitis
- Paralytic polio
- Since 1980, all cases are vaccine related therefore switch to injectable
- 2000 all IVP

IPV/OPV

- 2,4,15 months and 4 years
- Travel to endemic areas 6-8 weeks before a trip
- Provides seroconversion in 95% of recipients
- Oral polio provides IgA levels and boosts community immunity
- Oral polio related to spread of disease but is avoided by IPV

Measles, Mumps, and Rubella

MMR 1977

- Live vaccine grown in chick egg embryos with neomycin – Alert egg allergies
- Given at 12 months and at 4 years
- Old schedule at 15 months but lack of natural immunity in mothers with blocking antibodies allows earlier immunization at 12 months
- In epidemics, monovalent measles vaccine can be given to infants at 6 months of age
- Miniepidemics of measles 1971, 1976, & 1986
- 2005 66 cases most imported Indiana imported from Romania

Measles

- 3 C’s: cough, conjunctivitis, & coryza
- Confluent macularpapular rash
- Paramyxovirus
- Encephalitis 1/1000
- 1989 41 deaths 1/500
- 66 cases 2005
- 1/2 cases age 5-19 years

Identifying Markers of Measles

- Koplick spots which are white salt-like particles seen on the cheek across from the second molar
Measles Outbreak

- Age and vaccination status of measles cases, United States, 1990.

History of Measles in the USA

- Reported cases by year, United States, 1850 to 1987.

Mumps

- Parotid enlargement
- Orchitis 30-38% post pubertal males - atrophy & sterility
- Meningeal signs 15%
- Encephalitis 0.5%
- Arthritis, renal impairment, thyroiditis, mastitis, and hearing impairment
- 2005 314 cases

Rubella

- Febrile macular papular rash without rhinitis
- 5-9 year olds
- 80% females are immune by adolescence
- 13% arthritis 10-28 days after vaccine and resolves in 5-30 days
- Vaccine not related to congenital disease 273 vaccinated mothers
- 2005 11 cases

MMR Produces Transient Immunosuppression

- Administer the PPD at the same time because it could be falsely negative due to the anergy
- Administer the Varicella vaccine with the MMR or wait 4 weeks until the suppression has resolved
Congenital Rubella Syndrome

- Association made 1964 – 1% births
- Sensorineural deafness
- Mental retardation
- Cataracts
- Heart defects
- Retinopathy
- Spastic diplegia
- 1 case 2005

Hemophilus Influenza Vaccine 1985

- Meningitis
- Otitis media
- Sinusitis
- Epiglottitis
- Septic arthritis
- Occult bacteremia
- Pneumonia
- Empyema

Epidemiology of Hemophilus Influenza type B

- Peak incidence of type b is 3 months to 3 years
- October to November
- February to April
- More common in boys, urban dwellers, blacks, Alaskan Eskimos, Apache and Navajo Indians, and daycare attendees
- Rifampin to all contacts
- Schedule depends on vaccine type
- Hib titer HbOC
- Diphtheria
- October to November
- February to April
- More common in boys, urban dwellers, blacks, Alaskan Eskimos, Apache and Navajo Indians, and daycare attendees
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- Rifampin to all contacts
- Schedule depends on vaccine type
- Hib titer HbOC
- Diphtheria
**Hepatitis B Vaccine**

**Recombivax 1986**
- Asymptomatic disease, jaundice, anorexia, nausea, malaise, or fulminate hepatitis
- High risk groups: sexually active, IV drug abusers, institutionalized children, infants of infected mothers, and African & Asian immigrants
- 1.8/100,000 in 2005

**Hepatitis B Vaccine**
- Mother positive 90% transmission to infant
  - HBIG and vaccine at birth, 1 & 6 months
- Mother negative Hbsa
  - Birth, 1 month and 6-9 months
  - Convax (HBV & HIB) at 2, 4, and 9 months which is mercury free
  - Pediatrix 2, 4 & 6 months

**Combination Vaccines**
- **Comvax**
  - Haemophilus b conjugate (meningoccal protein)
  - Hepatitis B recombinant
- **Pediarix**
  - Dtap
  - IPV
  - Hepatitis B
- MMRV at one year and 4 years

**Influenza Vaccine**

**Yearly Contents by Surveillance**
- Sudden onset of fever, rigors, headache, malaise, dry cough, myalgia, rhinitis, and sore throat
- Orthomyxovirus A, B and C
- Many animal hosts
- 314,000 hospitalizations
- 153 pediatric deaths 2005

**Influenza Vaccine Indications**
- Chronic pulmonary disease (BPD, asthma)
- Cardiac or cancer
- Metabolic diseases, diabetes, renal dysfunction, immunosuppression hemoglobinopathies
- Children on chronic aspirin therapy
- Family members of high risk individuals
- Vaccine in the Fall
- 70% effective preventive influenza
- 1976 swine influenza Guillain-Barre
Influenza Recommendations

<table>
<thead>
<tr>
<th>Age</th>
<th>Dose</th>
<th>#</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-35 m</td>
<td>0.25ml</td>
<td>2</td>
</tr>
<tr>
<td>3-12 y</td>
<td>0.50ml</td>
<td>2</td>
</tr>
<tr>
<td>&gt; 12 y</td>
<td>0.50ml</td>
<td>1</td>
</tr>
</tbody>
</table>

Influenza Prophylaxis

- **Influenza A**
  - Amantadine
    - Adults 100mg bid
    - Child 5mg/kg/day divided bid
  - Rimantadine > 1 yo
    - Prophylaxis 5 mg/kg qd or bid
- **Influenza A or B**
  - Relenza (Zanamivir) inhaled twice daily for 5 days > 7 years old
  - Neurominidase blocker which enables it to work on all types
  - Oseltamivir > 1 yo treatment and prophylaxis > 13 yo
    - <15 kg 30 mg bid
    - 15-23 kg 45 mg bid
    - 23-40 kg 60 mg bid
    - > 40 kg 75 mg bid

Influenza Vaccine

- Efficiency 70-90%
- Side effects-redness, fatigue, rash, fever, malaise, and poxs usually 5 lesions 5-26 days after immunization
- Contraindications-chemo, high steroids, AIDS, immunosuppressed, febrile illness, or pregnancy

Varicella Vaccine 1995

- Fever and pox marks 7-21 days after exposure
- Vaccine 1 dose 0.50 SQ 12 months - 12 years
- Vaccine 2 doses 0.50 > 13 years SQ 4 weeks apart
- 2005 32,342 cases

Varicella Vaccine

- Efficiency 70-90%
- Side effects-redness, fatigue, rash, fever, malaise, and poxs usually 5 lesions 5-26 days after immunization
- Contraindications-chemo, high steroids, AIDS, immunosuppressed, febrile illness, or pregnancy

Tuberculosis PPD

- Cough, weight loss, bloody sputum, and anorexia
- 13,767 cases in 2006 9.5 times more common in foreign born Americans
- PPD screen
  - Induration in 48-72 hrs of > 10 mm is +
  - Followed by chest x-ray looking for Ghon complex or infiltrate
Tuberculosis Questionnaire
Who Receives a PPD?
Was your child born outside the USA in Africa, Asia, Eastern Europe or Latin America?
Has your child traveled outside the USA for one or more weeks and stayed with family or friends in Africa, Asia, Eastern Europe, or Latin America?
Does your child have a household member who was born outside the USA in Africa, Asia, Eastern Europe or Latin America?

Tuberculosis Questionnaire 2
- Does your child have a household member who has traveled outside the USA, staying for one or more weeks with a family or friends in Africa, Asia, Eastern Europe or Latin America?
- Has your child been exposed to anyone with suspected or known TB disease?
- Does your child have close contact with a person who has a positive TB skin test?
- Does your child spend time with anyone who has been in jail (or prison) or a shelter, uses illegal drugs, or has HIV?
- Has your child drank raw milk or eaten unpasteurized cheese?

PPD Screening
- All exposed to active TB in the house
- 12-15 months in high risk areas
- School or work entrance
- Health care providers
- BCG recipients after 10 years

Hepatitis A Vaccine
- Food borne
- Jaundice and malaise
- Given to travelers
- Routine childhood at 1 year with 6-12 month booster
  Incidence 1.5/100,000 in 2005

Rotavirus
- 1973 Reovirus RNA identified as cause of diarrhea USA 5 strains 90% of infections
  - G1 strain > 73% infections
  - Almost universal infection by age 5
  - Responsible for 500,000 deaths per year worldwide

Rotavirus
- Incubation 2 to 4 days
- Most common age 4 to 24 months of age
  - 2.5% of hospitalizations
- Lives well on fomites
- May be found in stool as long as 21 days in immunocompromised patients
Rotavirus Infection

- Portal of entry mouth and remains in intestine
- Incubation 1-3 days
- Isotonic diarrhea
- Reinfection common but milder than initial disease

Rotavirus Vaccine

- Created by genetic reassortment
- Nonhuman bovine rotavirus expresses human antigens on its surface
- Reproduction does not lead to disease
- Vaccine leads to antibody productions
- Monkey had a high Intussusception rate and was removed from the market 1999. It was replaced by a bovine preparation called RotaTeq 2006 pentavalent

Rotavirus Vaccine Side Effects

- Vomiting 15%
- Diarrhea 24%
- Nasopharyngitis 7%
- Fever 43%
- No serious adverse reactions reported

Rotavirus Vaccine Schedule

- 3 oral doses, at 2, 4 and 6 months
- First dose age 6 weeks to 12 weeks
- Subsequent doses at 4-10 week intervals
- Do not initiate greater than 12 weeks of age and do not administer after age 32 weeks
- MMWR Vol 55/ Nos 51 & 52, Jan 5, 2007

Human Papillomavirus HPV

- 3 doses
- Second and third dose 2 and 6 months after the first dose
- May begin as young as age 9 years and catch up for females 13-26 years
**HPV VLP Vaccines**

- HPV L1 major capsid protein of the virus is antigen used for immunization
- Expression of L1 protein uses recombinant technology
- L1 proteins self-assemble into virus-like particles (VLP)

**Quadrivalent HPV Vaccine**

*FDA Licensure – June 8, 2006*

- Indicated in girls and women 9-26 years of age for the prevention of the following diseases caused by HPV types 6, 11, 16, and 18:
  - Cervical cancer
  - Genital warts (condyloma acuminata)
  - Cervical, vaginal and vulvar precancerous or dysplastic lesions

**Anti-HPV 16 GMTs Through 5 Years**

*Protocol 007*

- **VACCINATION**
  - GARDASIL®
- **Placebo** (Sero (+) and PCR (-) to HPV 16 at Day 1)

**Immunogenicity Bridge**

Anti-HPV 6 GMTs (Quadrivalent HPV vaccine)

**Efficacy Program**

- **Immunogenicity Bridge**
- **Efficacy Program**

**Injection-Site Adverse Events, Days 1 to 5 Following Any Vaccination**

<table>
<thead>
<tr>
<th>Adverse Event</th>
<th>Quadrivalent HPV Vaccine (%)</th>
<th>Aluminum-Containing Placebo (%)</th>
<th>Saline Placebo (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>84</td>
<td>75</td>
<td>49</td>
</tr>
<tr>
<td>Swelling</td>
<td>25</td>
<td>16</td>
<td>7</td>
</tr>
<tr>
<td>Erythema</td>
<td>25</td>
<td>18</td>
<td>12</td>
</tr>
</tbody>
</table>

**Quadrivalent HPV Vaccine Summary**

- **High efficacy in 16 to 26 year-old females who are naive to the HPV vaccine type**
  - HPV 16,18 related CIN 2/3
  - HPV 6,11,16,18 related CIN
  - HPV 6,11,16,18 related external genital lesions
- **No evidence of therapeutic efficacy**
- **Efficacy data available through 5 years; duration of protection and need for booster unknown**
- **Safe; side effects mainly local reactions**
Quadrivalent HPV Vaccine

Summary

• >99% seroconversion rates in 9-26 year-olds
• Antibody titers substantially higher than after natural infection; highest in those vaccinated at younger ages
• Antibody titers decline over time after 3rd injection, but plateau by 24 months

Rationale: Routine Vaccination

Females at 11-12 Years

• Prevalent infection, targeting ‘high risk’ groups not possible
• Vaccination prior to sexual debut
• Implementation advantages; consistent with young adolescent health care visit
• High antibody titers after vaccination at this age
• Data through 5 years show no evidence of waning immunity; ongoing studies will monitor duration of protection

Precautions and Contraindications

• Moderate or severe acute illnesses: should be deferred until after the illness improves
• History of immediate hypersensitivity or severe allergic reaction to yeast or to any vaccine component: contraindication

Meningococcal Disease

• Abrupt fever, chills, and rash macular, papular and petechial
• Purpura, DIC, and Waterhouse Friderichsen Syndrome
• Case mortality 10%
• Adolescents 30%
• 2005 1,245 cases
• A,C,Y & W135 297 cases

Meningococcal Vaccine 2

Types A,C,Y & W-135

• MPSV4- 1981 >2 years with terminal complement deficiencies or anatomic or functional asplenia
• MCV4 2005 at age 11-12 years for all especially college freshmen, travelers and during outbreaks
• Menactra

FIGURE 1. Rates* of meningococcal disease, by age — United States, 2001-2002

*Per 100,000 population.
Virginia Recommendations

- All students entering any public four year institution of higher learning
- Student’s parents or legal representative may sign a waiver after reading information on meningococcal disease
- Any student shall be exempt who objects on religious tents or practices unless an emergency or an epidemic has been declared by the Board of Health
- Licensed physicians may complete a statement that the vaccine would be detrimental to his health.

Contact Chemoprophylaxis for High Risk Contacts of Meningococcal Disease

- **Rifampin**
  - < 1 month 5mg/kg for 2 days
  - > 1 month 10 mg/kg for 2 days
- **Ceftriaxone**
  - < 15 years 125 mg IM one dose
  - ≥ 15 y 250 mg IM one dose
- **Ciprofloxacin**
  - > 18 y 500 mg one dose

Future Directions in Immunizations

- Lyme vaccine 1998 for geographic areas 16,273 cases in 1999
- B Strep Vaccine for pregnant mothers
- Cytomegalovirus vaccine Townes is only used as compassionate use or another new vaccine

Adverse Reaction Following Vaccination (VAERS)

- **Tetanus**
  - Anaphylaxis 7 days
  - Brachial neuritis 28 d
- **Pertussis**
  - Anaphylaxis 7 days
  - Encephalopathy 7 d
- **Measles**
  - Anaphylaxis 7 days
  - Encephalopathy 7 d
  - Measles type disease immunocompromised 6 m
- **MMR**
  - Anaphylaxis 7 days
  - Encephalopathy 7 d
- **Rubella**
  - Chronic arthritis 42 d
- **Measles**
  - Thrombocytopenia 30 d
  - Measles type disease immunocompromised 6 m
Passive Immunization-
Immunoglobin

- Primary immunodeficiencies
- Kawasaki disease
- Pediatric human immunodeficiency virus infection
- Chronic B-cell lymphocytic leukemia
- Recent bone marrow transplantation in adults
- Immune-mediated thrombocytopenia
- Chronic inflammatory demyelinating polyneuropathy

Web Sites on Immunizations

- CDC www.cdc.gov/nip
- National Vaccine Program www.cdc.gov/od/nvpo
- FDA www.fda.gov
- Vaccine Injury Compensation http://bhpr.hrsa.gov/vicp
- American Academy of Pediatrics www.aap.org
- American Academy of Family Physicians www.aafp.org
- National Network on Immunization Information www.idsociety.org
- Immunization Coalition www.immunize.org
- WHO www.who.int
- CHOPT www.vaccine.chop.edu

Childhood Immunizations

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