Vaccination laws and surveillance

Discussion
Wednesday, May 20th
Holly Stessman
0-18 years vaccination schedule (U.S.)

http://www.cdc.gov/vaccines/schedules/hcp/imz/child-adolescent.html
Immunization surveillance

• **Kindergarten** – school nurses, school personnel, or health department personnel check vaccinations/exemptions
  – Data are reported to the health department
  – Aggregate data are reported to the CDC
• **Middle school** (grade 6-8)
• **College freshman** – entering college (dorm life)
• *Considerations*: All children may be reported or only a “random” sampling
• *Exceptions*: home schooling
How are vaccine requirements set?

• Requirements and exemptions are set at the **STATE** level
  – 46 states allow religious exemptions
  – 18 states allow philosophical exemptions
  – 2 states (Mississippi and West Virginia) DO NOT allow exemptions for religious or philosophical reasons
# Washington state immunization requirements

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Grade</th>
<th>Doses</th>
<th>Details</th>
<th>Effective Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>DTaP-Diphtheria, Tetanus, acellular Pertussis</td>
<td>Childcare</td>
<td>4</td>
<td>1 dose ages 1-4 months; 2 doses ages 5-6 months; 3 doses ages 7-18 months; 4 doses at or after age 19 months</td>
<td>PRIOR to 2008-09</td>
</tr>
<tr>
<td>DTaP-Diphtheria, Tetanus, acellular Pertussis</td>
<td>Kindergarten</td>
<td>4</td>
<td>Final dose after age 4 years</td>
<td>PRIOR to 2008-09</td>
</tr>
<tr>
<td>Flu-Influenza (seasonal)</td>
<td>Childcare</td>
<td>0</td>
<td>No state requirement</td>
<td></td>
</tr>
<tr>
<td>Flu-Influenza (seasonal)</td>
<td>Kindergarten</td>
<td>0</td>
<td>No state requirement</td>
<td></td>
</tr>
<tr>
<td>Flu-Influenza (seasonal)</td>
<td>Middle School</td>
<td>0</td>
<td>No state requirement</td>
<td></td>
</tr>
<tr>
<td>Hep A-Hepatitis A</td>
<td>Childcare</td>
<td>0</td>
<td>No state requirement</td>
<td></td>
</tr>
<tr>
<td>Hep A-Hepatitis A</td>
<td>Kindergarten</td>
<td>0</td>
<td>No state requirement</td>
<td></td>
</tr>
<tr>
<td>Hep A-Hepatitis A</td>
<td>Middle School</td>
<td>0</td>
<td>No state requirement</td>
<td></td>
</tr>
<tr>
<td>Hep B-Hepatitis B</td>
<td>Childcare</td>
<td>3</td>
<td>2 doses (by age 5 months); 3 doses (by age 19 months)</td>
<td>PRIOR to 2008-09</td>
</tr>
<tr>
<td>Hep B-Hepatitis B</td>
<td>Kindergarten</td>
<td>3</td>
<td>Age appropriate dosing</td>
<td>PRIOR to 2008-09</td>
</tr>
<tr>
<td>Hep B-Hepatitis B</td>
<td>Middle School</td>
<td>3</td>
<td>Through age 12</td>
<td>PRIOR to 2008-09</td>
</tr>
<tr>
<td>Hep B-Hepatitis B</td>
<td>University/College</td>
<td>0</td>
<td>No State mandates or requirements, check with individual institutions for specific requirements</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Hib-Haemophilus Influenza Type B</td>
<td>Childcare</td>
<td>4</td>
<td>1 dose by age 3 months; 2 doses by age 5 months; 3 doses by age 7 months; 4 doses by age 16 months</td>
<td>PRIOR to 2008-09</td>
</tr>
<tr>
<td>HPV-Human Papillomavirus</td>
<td>Middle School</td>
<td>0</td>
<td>No state requirement</td>
<td>Not applicable</td>
</tr>
<tr>
<td>HPV-Human Papillomavirus</td>
<td>University/College</td>
<td>0</td>
<td>No state mandates or requirements, check with individual institutions for specific requirements</td>
<td>Not applicable</td>
</tr>
<tr>
<td>MCV4-Meningococcal Conjugate Vaccine</td>
<td>Middle School</td>
<td>0</td>
<td>No state requirement</td>
<td>Not applicable</td>
</tr>
<tr>
<td>MCV4-Meningococcal Conjugate Vaccine</td>
<td>University/College</td>
<td>0</td>
<td>No State mandates or requirements, check with individual institutions for specific requirements</td>
<td>Not applicable</td>
</tr>
<tr>
<td>MMR-Measles, Mumps, Rubella</td>
<td>Childcare</td>
<td>1</td>
<td>After age 1 year</td>
<td>PRIOR to 2008-09</td>
</tr>
<tr>
<td>MMR-Measles, Mumps, Rubella</td>
<td>Kindergarten</td>
<td>2</td>
<td>After age 1 year</td>
<td>PRIOR to 2008-09</td>
</tr>
<tr>
<td>MMR-Measles, Mumps, Rubella</td>
<td>Middle School</td>
<td>2</td>
<td>Through age 12</td>
<td>PRIOR to 2008-09</td>
</tr>
<tr>
<td>MMR-Measles, Mumps, Rubella</td>
<td>University/College</td>
<td>0</td>
<td>No State mandates or requirements, check with individual institutions for specific requirements</td>
<td>Not applicable</td>
</tr>
<tr>
<td>PCV-Pneumococcal Conjugate Vaccine</td>
<td>Childcare</td>
<td>4</td>
<td>Age appropriate dosing</td>
<td>PRIOR to 2008-09</td>
</tr>
<tr>
<td>Polio</td>
<td>Childcare</td>
<td>3</td>
<td>1 dose at ages 3-4 months; 2 doses at ages 5-18 months; 3 doses at or after age 19 months</td>
<td>PRIOR to 2008-09</td>
</tr>
<tr>
<td>Polio</td>
<td>Kindergarten</td>
<td>3</td>
<td>Final dose after age 4 years</td>
<td>PRIOR to 2008-09</td>
</tr>
<tr>
<td>Td/P-Tetanus, diphtheria, acellular pertussis</td>
<td>Middle School</td>
<td>1</td>
<td>Grades 6 and 7 if age 11 years; if 5 years since last DT/Td</td>
<td>2008-2009</td>
</tr>
<tr>
<td>Td/P-Tetanus, diphtheria, acellular pertussis</td>
<td>University/College</td>
<td>0</td>
<td>No state mandates or requirements, check with individual institutions for specific requirements</td>
<td>Not applicable</td>
</tr>
<tr>
<td>VAR-Varicella</td>
<td>Childcare</td>
<td>1</td>
<td>Documented disease history acceptable</td>
<td>PRIOR to 2008-09</td>
</tr>
<tr>
<td>VAR-Varicella</td>
<td>Kindergarten</td>
<td>2</td>
<td>Parent-documented disease history is not acceptable</td>
<td>2008-2009</td>
</tr>
<tr>
<td>VAR-Varicella</td>
<td>Middle School</td>
<td>1</td>
<td>Before age 13 years or documented disease history</td>
<td>2008-2009</td>
</tr>
<tr>
<td>VAR-Varicella</td>
<td>University/College</td>
<td>0</td>
<td>No State mandates or requirements, check with individual institutions for specific requirements</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

School Vaccination Requirements, Exemptions & Web links: [http://www2a.cdc.gov/nip/schoolsurv/schImmRqmt.asp](http://www2a.cdc.gov/nip/schoolsurv/schImmRqmt.asp)
Types of exemptions

• Medical
  – Immunocompromised, serious allergies to a vaccine components, child has had a prior serious adverse event related to vaccination

• Religious
  – Differences by state – some simply sign a blanket form, other states only allow families of certain religious groups with bona fide objections to opt out
  – List of groups that reject vaccines outright: Christian Science, Congregation of Universal Wisdom, Universal Intelligence
  – Family Research Council opposes mandatory HPV vaccination
  – Some pockets of Nigeria, Pakistan and Afghanistan rejected oral polio vaccine perceived as a plot to decrease Muslim fertility
  – Some Orthodox Jews
  – Aceh Province (Indonesia; Islam Sharia Law) refuse all vaccines due to pig derivatives

• Philosophical
  – This is the most common type of exemption
  – 2011 – WA state passes a law that parents seeking vaccination exemptions must discuss the benefits and risks with a health care provider
Contents and production of vaccines may lead to some exemptions

• Thimerosal
• Eggs and the flu vaccine
• Porcine gelatin
• Human-derived (and animal-derived) cell lines

Christian, Jewish, and Muslim governing bodies all state that, these issues aside, vaccines are still supported.
What is thimerosal?

• A mercury-containing organic compound
• Used as a preservative to kill potential microbes in vaccines
• Thimerosal has been removed from all childhood vaccines except for the flu vaccine
• Present in concentrations of 0.001-0.01% giving 25-50 µg per 0.5 mL dose
• Local allergic responses have been reported
• Studies have reported thimerosal toxicity; HOWEVER, these studies reported MUCH higher doses than those used in vaccines (ex. 3-100 mg/kg)
U.S. estimates of MMR exemptions

http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6341a1.htm
WA State Kindergarten Immunization Exemption Rates by School District
School Year 2013-2014

Data Source: The average percentage of Kindergarteners who have one or more exemptions to school-entry required vaccines as reported by public and private schools in each county.
WA State Department of Health Office of Immunization Child Profile. Created with ArcMap 10.0

For people with disabilities, this document is available on request in other formats. To submit a request, please call 1-800-525-0127 (TDD/TTY call 711).

DOH 348-448
June 2014
Anti-vaccination movements are nothing new

**Britain**

- **1880s** – early smallpox vaccination
  - Fear about the procedure
  - Religious – some clergy called the practice “unchristian” because the pox were derived from animals
  - Violation of personal liberty
- **1853** – mandatory vaccination in Britain
  - Anti-Vaccination League
  - Anti-Compulsory Vaccination League
  - Number anti-vaccination journals
  - Parents who refuse vaccination may be imprisoned (Leicester Demonstration March of 1885)
- **1898** – Vaccination Act removed penalties for not vaccinating and included a “conscientious objector” clause to file exemptions
Anti-vaccination movements are nothing new

United States

• 1879-1885 – Anti Vaccination Society of America, New England Anti Compulsory Vaccination League, Anti-vaccination League of NYC founded

• 1902 – Smallpox outbreak in Cambridge, MA, leads to mandatory vaccination for residents
  – Jacobson v. Massachusetts, 197 U.S. 11 (1905)
  – Supreme Court ruled that the state COULD enact compulsory laws to protect the public**
“Modern” anti-vax movements: DTP

• 1970s – Great Ormond Street Hospital for Sick Children (UK) reports 36 children suffered neurological conditions following DTP vaccine
  – Physicians appear divided on the safety of DTP
  – Dr. Gordon Stewart publishes a series of case reports linking neurological disorders to DTP
  – Joint Commission on Vaccination and Immunization (JCVI) launches the National Childhood Encephalopathy Study (NCES)
    • Conclusion: Attributable risk -> 1 in 110,000 (95% CI 44K-360K)
    • Risk of long-term effect -> 1 in 310,000 (95% CI 54K-5.3M)

• 1986 – National Childhood Vaccine Injury Act (NCVIA) passed by U.S. Congress in response to the DTP scare
• 1988 – National Vaccine Injury Compensation Program (“Vaccine Court”) established
• 1982 – DPT: Vaccination Roulette airs
• 1991 – A Shot in the Dark published
“Modern” anti-vax movements: MMR

Andrew Wakefield (British)
• Former M.D. (surgeon of gastroenterology)
• Paper published in the Lancet (Feb. 1998)
• 12 case histories exploring incidences of chronic enterocolitis, inflammatory bowel disease and regressive developmental disorder with a history of MMR vaccine
• Conclusion: 8 of 12 children had “Autistic Enterocolitis” arising from MMR vaccination
The Wakefield Controversy

A Guide to Researcher Misconduct:

- 3 of 8 children with “Autistic Enterocolitis” did not meet autism qualifications
- Not all children were previously “normal”
- Some children had a significantly delayed onset of symptoms (6-18 months after MMR)
- All families in this study were recruited through an anti-MMR vaccine lawsuit and Wakefield was compensated for his “help”
- Patients were drastically skewed toward boys (11 boys, 1 girl)
- All children had been vaccinated (no controls)
- Patients were subjected to “unnecessary and unethical” medical procedures in order to conclude they had IBD
- Data that contradicted Wakefield’s hypothesis were ignored
- Filed a patent for a single-jab measles vaccine prior to this study without reporting this as a conflict of interest
- Wakefield was planning to launch a venture with one of the parents in this study to create a “litigation driven testing” kit for diagnosing patients with autism
Consequences for Wakefield

- 2004 – Wakefield’s financial conflicts come to light and the Royal Free Hospital dismisses him
- Wakefield moves to the U.S. to work for non-profits but has been banned from practicing as an MD in the U.S.
- 2010 – British General Medical Council charges Wakefield with 3 dozen counts including blatant dishonesty, falsification of data, violation of ethical practices, and abuse of children and his medical license was revoked
- \textit{Lancet} article is retracted as well as many of Wakefield’s other papers
Data negating Wakefield’s claims

- 2002 – Denmark group examines a cohort of 537,303 children receiving MMR seeing no association with autism (Madsen et al. (2002) *NEJM*)

- 2015 – U.S. researchers report on 95,727 children with an older autistic sibling showing no increased risk in vaccinating even with a potential familial “prior” (Jain et al. (2015) *JAMA*)

- 2005 – Japanese report from ~300,000 children that monovalent vaccines do not decrease rates of autism (Honda et al. (2005) *J Child Psychol Psyc*)
A bad study can do a lot of damage...

http://www.pbs.org/wgbh/nova/body/autism-vaccine-myth.html
Famous court cases involving vaccinations

- **2008** – Hannah Poling; received DTaP, Hib, MMR, varicella and polio (inactivated) in a single visit and was diagnosed with encephalopathy months later caused by a mitochondrial disorder; family awarded damages without proof of causation

- **2007-2009** – Omnibus Autism Proceedings; Michelle Cedillo’s parents claimed thimerosal weakened 15 m.o. immune system preventing her from clearing the measles virus; ruled that thimerosal-containing vaccine not to blame for autism (upheld when appealed to the U.S. Court of Appeals)

- **2011** – Bruesewitz v. Wyeth; questioned whether vaccine design defect arguments could circumvent “Vaccine Court”; Supreme Court ruled that vaccine manufacturers are NOT liable for vaccine-induced injury or death as long as proper directions and warnings are included with the vaccine
Influenza (a.k.a., the “flu”)
Setting the record straight...

• What is the “flu”? – Influenza virus
• Symptoms: high fever, runny nose, sore throat, muscle pains, headache, coughing, malaise
• The flu is more severe than the common cold taking 1-2 weeks for the average person to recover
• Spreads through the air or by touching contaminated surfaces
• Stomach “flu” is gastroenteritis, NOT THE FLU.
• Influenza vaccine formulations are quadrivalent and reformulated each season based on predictions
• Immunity takes approximately 2 weeks to become effective
• Antibiotics should not be used to treat the flu unless a secondary bacterial infection is suspected
Flu vaccination coverage

The herd immunity threshold (HIT) for influenza (calculated from influenza pandemic data) is 33-44%.