Like, Adolescent Immunizations—

*What-ehh-ver*

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Objectives

After completion of this activity, participants should be able to...

- Explain the rationale for a late adolescence immunization platform
- Identify barriers to immunizing adolescents
- Improve adolescent immunization rates

Disclosures

Ad hoc consultant
- GlaxoSmithKline
- Merck
- Novartis
- Pfizer
- Sanofi Pasteur
- Seqirus

Principal investigator

Infant-Toddler Platform (Birth–23 Months)

- Primary series
- Childhood diseases
- Comprehensive health screening
- Anticipatory guidance
- Establishing the medical home

School-Aged Platform (4–6 Years)

- Boosters
- School issues
Adolescent Platform (11–12 Years)

- Boosters
- Primary series for adolescent vaccines
- Pre-teen stuff

Annual Influenza Immunization

Pertussis

Pertussis in the U.S.

Waning Effectiveness of DTaP

Pertussis Deaths in the U.S.


Misegades. JAMA 2012;308:2126

Case-control study in 15 California counties in 2010; N=682 cases, 2016 controls

Primary analysis

Mangabey. JAMA 2012;308:2126

Reported cases x 10,000

http://www.cdc.gov/pertussis/surv-reporting/cases-by-year.html
Source of Infection for Infants

Median age, 6 yr
Range, 1–19 yr

Source of Infection

Pertussis in the U.S.

Reported cases x 1000

http://www.cdc.gov/pertussis/surveillance/cases-by-year.html

HPV Causes Cancer

Annual attributable cancers in the US, 2008–2012

Human Papillomavirus

(10 things to know)

Necessary But Not Sufficient for Cancer

Infection Rates Rise After Sexual Debut
Younger Age = Higher Risk of Neoplasia

La Vecchia. Cancer 1986;58:935

<table>
<thead>
<tr>
<th>Age at first intercourse (yr)</th>
<th>Relative risk of Neoplasia</th>
</tr>
</thead>
<tbody>
<tr>
<td>223 or never</td>
<td>1.00</td>
</tr>
<tr>
<td>16-22</td>
<td>1.52</td>
</tr>
<tr>
<td>517</td>
<td>2.23</td>
</tr>
</tbody>
</table>

CIN (n=206) vs Invasive cervical cancer (n=327)

The Vaccine Works

Relative risk estimates

- CIN
- Invasive cervical cancer

The Vaccine is Cost-Effective

<table>
<thead>
<tr>
<th>Vaccine Scenario</th>
<th>HPV4 Cross-Protection</th>
<th>Cost per QALY Saved</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPV4 vs none</td>
<td>No</td>
<td>$6,400</td>
</tr>
<tr>
<td>HPV4 vs none</td>
<td>Yes</td>
<td>$4,800</td>
</tr>
<tr>
<td>HPV9 vs HPV4</td>
<td>No</td>
<td>Cost-saving</td>
</tr>
<tr>
<td>HPV9 vs HPV4</td>
<td>Yes</td>
<td>Cost-saving</td>
</tr>
</tbody>
</table>

HPV4 prevents 1 HPV-related cancer for every 250 persons vaccinated instead of not vaccinated.

1 additional HPV-related cancer prevented for every 1000 persons vaccinated with HPV9 instead of HPV4.

The Vaccine is Safe

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Doses</th>
<th>Observed events</th>
<th>Expected events</th>
<th>Relative risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>GBS</td>
<td>416,942</td>
<td>0</td>
<td>0.06</td>
<td>0</td>
</tr>
<tr>
<td>Appendicitis</td>
<td>203,890</td>
<td>50</td>
<td>32.5</td>
<td>1.52†</td>
</tr>
<tr>
<td>Stroke</td>
<td>416,942</td>
<td>0</td>
<td>1.35</td>
<td>0</td>
</tr>
<tr>
<td>VTE</td>
<td>292,302</td>
<td>8†</td>
<td>4.04</td>
<td>1.98†</td>
</tr>
</tbody>
</table>

†Background rates were artificially low due to a change in coding
†† Only 5 confirmed upon medical record review; all had risk factors

Vaccination Does Not Lead to Promiscuity
Be a Strong Recommender

“My child does not need a vaccine against a sexually transmitted disease.”
—This vaccine will protect your child from cancer.

“My child is too young to be getting this vaccine.”
—The vaccine works best at younger ages, and I want your child protected long before there is any exposure.

“Being vaccinated will open the door to sexual activity.”
—That’s like saying, “Good thing I’ve had the typhoid vaccine. Now I can drink the sewer water in Mumbai!”

(Bill Maher)

Modified from Immunization Action Coalition. Needle Tips; Nov 2013

Meningococcus
(7 things to know)

IMD Increases in Adolescence

Predominant Serogroups are B, C, and Y
Serogroup B Proportion is Increasing

Protein-Polysaccharide Conjugate Vaccines

Conjugate Vaccines Don't Work for B

MenB Vaccines are Based on OMPs

IMD Incidence Has Waned

Why Not Category A for MenB?

- Against
  - Low disease burden
  - Possibility of waning immunity
  - Unknown effect on carriage
  - Unknown herd effects
  - Unknown strain coverage
  - High cost per QALY saved

- For
  - Existing universal 2-dose MCV4 program only prevents 50% of disease in persons 17–22 years of age

Note: The table refers to the state of knowledge at the time the recommendation was made. It is expected that more data will become available over time (for example, data on strain coverage). In addition, the epidemiology of the disease could change.
Estimated Program Impact and Cost

<table>
<thead>
<tr>
<th>Program</th>
<th>Age(s) at vaccination</th>
<th>Cases averted</th>
<th>Deaths averted</th>
<th>Cost per QALY saved</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCV4</td>
<td>11–12, 16 yr</td>
<td>184</td>
<td>22</td>
<td>$212,000‡</td>
</tr>
<tr>
<td>MenB</td>
<td>16 yr</td>
<td>28</td>
<td>5</td>
<td>$4,100,000</td>
</tr>
</tbody>
</table>

†These figures were estimated by the ACIP at the time of policy consideration, based upon available data.
‡Estimate based on pre-2000 epidemiology, when the incidence of IMD was higher.

Influenza (two things to know)

Vaccine-Preventable Deaths ≤24 yr of Age

<table>
<thead>
<tr>
<th>Disease</th>
<th>U.S., 2006–2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza</td>
<td></td>
</tr>
<tr>
<td>Meningococcus</td>
<td></td>
</tr>
<tr>
<td>Pertussis</td>
<td></td>
</tr>
<tr>
<td>Hepatitis</td>
<td></td>
</tr>
<tr>
<td>Measles</td>
<td></td>
</tr>
<tr>
<td>Polio</td>
<td></td>
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</table>

Immunization of School Kids Works

Effect of Childhood Influenza Immunization

Evolution of Flu Vaccine Recommendations
**Current Recommendations**

Everyone ≥6 mo of age who does not have a contraindication should be immunized every year

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**Coverage Rates: 13–17 Years of Age**

- %Tdap
- %MCV4
- 2x MCV4
- 2x HPV (female)
- 2x HPV (male)

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**Late Adolescent Platform**

- MCV4 booster
- Catch-up
- Option for MenB
- Teenager stuff
- Lay foundation for preventive health into young adulthood

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**Annual Procedures During Adolescence**

- History
- Height and weight
- Body mass index
- Blood pressure
- Developmental surveillance
- Psychosocial/behavioral assessment
- Depression screening
- Physical examination
- Immunization
- Anticipatory guidance

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**Intermittent Screening During Adolescence**

- Vision (12 yr, 15 yr)
- Dislipidemia (9–11 yr, 18–21 yr)
- Sexually transmitted diseases/HIV (16–18 yr)
- Cervical dysplasia (21 yr)
Preventive Care in Adolescence

Vaccinations Can Drive Preventive Care Visits

Developmental Aspects

Developmental Barriers

Public Concerns

Provider Concerns

Is this shot going to hurt?

Concrete operations

None of my friends have gotten the shot!

Preoccupation with peer group

I don’t want the flu before the AP exams!

Why does an 11-yr old need the HPV vaccine?

Controversy

Can he get his flu shot on the way home from school?

Consent

What if he’s 19 and still goes to the pediatrician?

Financing and medical home

Knowledge gap

Negative attitudes (lack of perceived benefit)

Safety concerns

Insufficient knowledge or ambivalence

Insufficient access to or use of healthcare

Vaccines not part of routine care

Consent issues

Costs and financing

Lack of coordination

Preventive care visits before and after transition period for MCV4, Tdap and HPV transitions.

MarketScan Commercial Claims and Encounters database, 2003-2010 Ages 11-21 yr (N=519,851-1,385,226 per year)

Girls

Boys

30% of preventive care visits driven by vacc

100%

80%

60%

40%

20%

0%

2003

2004

2005

2006

2007

2008

2009

2010

Before

Transition period for MCV4, Tdap and HPV

After

Age (yr)

Age (yr)

Preventive care visits before and after transition period for MCV4, Tdap and HPV transitions.

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Before

Transition period for MCV4, Tdap and HPV

After

Age (yr)

Age (yr)
Increasing Adolescent Immunization Rates

Create and value a culture of well-adolescent care
Require certain vaccines for school entry
Strengthen immunization registries
Clarify consent issues
Create educational tools
Use reminder-recall notices and technology
Capitalize on missed opportunities
Use alternative venues

NFID Call to Action

- Establish a late adolescent immunization platform
- Encourage communication between HCPs, parents, and adolescents about vaccines
- Provide timely education and support to HCPs regarding current recommendations
- Implement systems to make adolescent immunization routine and to avoid missed opportunities
- Involve all HCPs in vaccine delivery

Gowda. BMC Publ Health 2012;12:509