Session 1

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Session 1

Why Adult Immunization Matters

Carlos M. Perez-Velez, MD
Deputy Chief Medical Officer, Pima County Health Department
Outline

• Review the burden of adult vaccine-preventable diseases in the United States
• Review adult vaccination coverage in the United States
• Discuss the changing environment for adult immunization
The Burden of Adult Vaccine-Preventable Diseases
Burden of Vaccine-preventable Disease Among U.S. Adults

• **Influenza**
  – 3,000 to 49,000 total influenza-related deaths per year\(^1\)
  – 80%–90% of deaths among adults 65 years and older\(^2\)

• **Invasive pneumococcal disease (IPD)**\(^3\)
  – 33,900 total cases/3,700 total deaths in 2013
  – 91% of IPD and nearly all IPD deaths among adults

• **Pertussis in 2014**\(^4\)
  – ~24,000 cases
  – >5,000 among adults 20 years of age and older

• **Hepatitis B**\(^5\)
  – 3,050 acute cases reported in 2013
  – ~19,800 estimated

• **Zoster**\(^6\)
  – ~1 million cases of zoster annually U.S.

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1. MMWR. 010;59(33): 1057-1062.
Burden of Other Diseases Among U.S. Adults

- Ebola: 4 cases
- Avian Influenza: None
- E. coli H7:O157 from eating at Chipotle: <100 cases
- Zika virus: 1 case
**Influenza:** Prevented fraction of cases, by age group, 2005/06–2010/11 influenza seasons


http://journals.plos.org/plosone/article?id=info:doi/10.1371/journal.pone.0066312
Influenza Costs Lives and Money

- Direct medical costs in U.S.: ~$10.4 billion
- Loss of work and life: ~$87 billion
- Vaccination (41% in 2013–14) prevented:
  - > 7 million illnesses
  - > 3 million medically-attended illnesses
  - > 90,000 hospitalizations


Estimated Human and Economic Burden Caused by 4 Major Adult VPDs in adults > 65 years of age in 2013, U.S.

<table>
<thead>
<tr>
<th>Disease</th>
<th>Cases</th>
<th>Cost (x $1,000,000)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Medical</td>
</tr>
<tr>
<td>Influenza</td>
<td>4,019,759</td>
<td>7,503</td>
</tr>
<tr>
<td>Pneumococcal disease</td>
<td>440,187</td>
<td>3,572</td>
</tr>
<tr>
<td>Herpes zoster</td>
<td>555,989</td>
<td>1,309</td>
</tr>
<tr>
<td>Pertussis</td>
<td>207,241</td>
<td>90</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5,223,176</strong></td>
<td><strong>$12,474</strong></td>
</tr>
</tbody>
</table>
Recommended Adult Vaccines

• Important for optimizing health, protecting persons vaccinated and others
  – Example: Vaccination against influenza and pertussis reduces the risk for the person vaccinated and also prevents the person from spreading these diseases
**Recommended Adult Immunization Schedule—United States - 2016**

Note: These recommendations must be read with the footnotes that follow containing number of doses, intervals between doses, and other important information.

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Age Group</th>
<th>19-23 years</th>
<th>22-26 years</th>
<th>27-49 years</th>
<th>50-59 years</th>
<th>60-64 years</th>
<th>≥ 65 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza&lt;sup&gt;2&lt;/sup&gt;</td>
<td>1 dose annually</td>
<td>1 dose annually</td>
<td>1 dose annually</td>
<td>1 dose annually</td>
<td>1 dose annually</td>
<td>1 dose annually</td>
<td>1 dose annually</td>
</tr>
<tr>
<td>Tetanus, diphthera, pertussis (Td/Tdap)&lt;sup&gt;3&lt;/sup&gt;</td>
<td>Substitute Tdap for Td once, then Td booster every 10 yrs</td>
<td>Substitute Tdap for Td once, then Td booster every 10 yrs</td>
<td>Substitute Tdap for Td once, then Td booster every 10 yrs</td>
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<td>Substitute Tdap for Td once, then Td booster every 10 yrs</td>
</tr>
<tr>
<td>Varicella&lt;sup&gt;4&lt;/sup&gt;</td>
<td>2 doses</td>
<td>2 doses</td>
<td>2 doses</td>
<td>2 doses</td>
<td>2 doses</td>
<td>2 doses</td>
<td>2 doses</td>
</tr>
<tr>
<td>Human papillomavirus (HPV) Female&lt;sup&gt;5,6&lt;/sup&gt;</td>
<td>3 doses</td>
<td>3 doses</td>
<td>3 doses</td>
<td>3 doses</td>
<td>3 doses</td>
<td>3 doses</td>
<td>3 doses</td>
</tr>
<tr>
<td>Human papillomavirus (HPV) Male&lt;sup&gt;5,6&lt;/sup&gt;</td>
<td>3 doses</td>
<td>3 doses</td>
<td>3 doses</td>
<td>3 doses</td>
<td>3 doses</td>
<td>3 doses</td>
<td>3 doses</td>
</tr>
<tr>
<td>Zoster&lt;sup&gt;6&lt;/sup&gt;</td>
<td>1 dose</td>
<td>1 dose</td>
<td>1 dose</td>
<td>1 dose</td>
<td>1 dose</td>
<td>1 dose</td>
<td>1 dose</td>
</tr>
<tr>
<td>Measles, mumps, rubella (MMR)&lt;sup&gt;7&lt;/sup&gt;</td>
<td>1 or 2 doses depending on indication</td>
<td>1 or 2 doses depending on indication</td>
<td>1 or 2 doses depending on indication</td>
<td>1 or 2 doses depending on indication</td>
<td>1 or 2 doses depending on indication</td>
<td>1 or 2 doses depending on indication</td>
<td>1 or 2 doses depending on indication</td>
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<tr>
<td>Pneumococcal 13-valent conjugate (PCV13)&lt;sup&gt;8&lt;/sup&gt;</td>
<td>1 dose</td>
<td>1 dose</td>
<td>1 dose</td>
<td>1 dose</td>
<td>1 dose</td>
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<tr>
<td>Pneumococcal 23-valent polysaccharide (PPSV23)&lt;sup&gt;9&lt;/sup&gt;</td>
<td>1 or 2 doses depending on indication</td>
<td>1 or 2 doses depending on indication</td>
<td>1 or 2 doses depending on indication</td>
<td>1 or 2 doses depending on indication</td>
<td>1 or 2 doses depending on indication</td>
<td>1 or 2 doses depending on indication</td>
<td>1 or 2 doses depending on indication</td>
</tr>
<tr>
<td>Hepatitis A&lt;sup&gt;4&lt;/sup&gt;</td>
<td>2 or 3 doses depending on vaccine</td>
<td>2 or 3 doses depending on vaccine</td>
<td>2 or 3 doses depending on vaccine</td>
<td>2 or 3 doses depending on vaccine</td>
<td>2 or 3 doses depending on vaccine</td>
<td>2 or 3 doses depending on vaccine</td>
<td>2 or 3 doses depending on vaccine</td>
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<tr>
<td>Hepatitis B&lt;sup&gt;10&lt;/sup&gt;</td>
<td>3 doses</td>
<td>3 doses</td>
<td>3 doses</td>
<td>3 doses</td>
<td>3 doses</td>
<td>3 doses</td>
<td>3 doses</td>
</tr>
<tr>
<td>Meningococcal C 4-valent conjugate (MenACWY) or polysaccharide (MPSV4)&lt;sup&gt;10&lt;/sup&gt;</td>
<td>1 or more doses depending on indication</td>
<td>1 or more doses depending on indication</td>
<td>1 or more doses depending on indication</td>
<td>1 or more doses depending on indication</td>
<td>1 or more doses depending on indication</td>
<td>1 or more doses depending on indication</td>
<td>1 or more doses depending on indication</td>
</tr>
<tr>
<td>Meningococcal B (MenB)&lt;sup&gt;11&lt;/sup&gt;</td>
<td>2 or 3 doses depending on vaccine</td>
<td>2 or 3 doses depending on vaccine</td>
<td>2 or 3 doses depending on vaccine</td>
<td>2 or 3 doses depending on vaccine</td>
<td>2 or 3 doses depending on vaccine</td>
<td>2 or 3 doses depending on vaccine</td>
<td>2 or 3 doses depending on vaccine</td>
</tr>
<tr>
<td>Haemophilus influenzae type b (Hib)&lt;sup&gt;11&lt;/sup&gt;</td>
<td>1 or 3 doses depending on indication</td>
<td>1 or 3 doses depending on indication</td>
<td>1 or 3 doses depending on indication</td>
<td>1 or 3 doses depending on indication</td>
<td>1 or 3 doses depending on indication</td>
<td>1 or 3 doses depending on indication</td>
<td>1 or 3 doses depending on indication</td>
</tr>
</tbody>
</table>

- **Covered by the Vaccine Injury Compensation Program**: Recommended for all persons who meet the age requirement, lack documentation of vaccination, or lack evidence of past infection; zoster vaccine is recommended regardless of past episode of zoster.
- **Recommended for persons with a risk factor (medical, occupational, lifestyle, or other indication)**
- **No recommendation**

Visit [www.cdc.gov/vaccines/schedules/hcp/adult.html](http://www.cdc.gov/vaccines/schedules/hcp/adult.html) for more information.
Recommended Adult Vaccines (cont.)

<table>
<thead>
<tr>
<th>VACCINE</th>
<th>INDICATION</th>
<th>Pregnancy</th>
<th>Immune-compromising conditions (excluding HIV infection)</th>
<th>HIV infection CD4 + count (cells/µL)</th>
<th>Men who have sex with men (MSM)</th>
<th>Kidney failure, end-stage renal disease, on hemodialysis</th>
<th>Heart disease, chronic lung disease, chronic alcoholism</th>
<th>Asplenia and persistent complement component deficiencies</th>
<th>Chronic liver disease</th>
<th>Diabetes</th>
<th>Healthcare personnel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza</td>
<td></td>
<td></td>
<td>A 1 dose annually</td>
<td>1 dose Tdap once pregnancy</td>
<td>Substitute Tdap for Td once, then Td booster every 10 yrs</td>
<td>2 doses</td>
<td>3 doses through age 26 yrs</td>
<td>3 doses through age 26 yrs</td>
<td>1 or 2 doses depending on indication</td>
<td>1 dose</td>
<td></td>
</tr>
<tr>
<td>Tetanus, diphtheria, pertussis (Td/Tdap)</td>
<td></td>
<td></td>
<td>Contraindicated</td>
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<tr>
<td>Varicella</td>
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<td></td>
<td>Contraindicated</td>
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<tr>
<td>Human papillomavirus (HPV) Female</td>
<td></td>
<td></td>
<td>Contraindicated</td>
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<tr>
<td>Human papillomavirus (HPV) Male</td>
<td></td>
<td></td>
<td>Contraindicated</td>
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<tr>
<td>Zoster</td>
<td></td>
<td></td>
<td>Contraindicated</td>
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</tr>
<tr>
<td>Measles, mumps, rubella (MMR)</td>
<td></td>
<td></td>
<td>Contraindicated</td>
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<td>Pneumococcal 13-valent conjugate (PCV13)</td>
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<td></td>
<td>1 dose</td>
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<td></td>
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<tr>
<td>Pneumococcal polysaccharide (PPSV23)</td>
<td></td>
<td></td>
<td>1, 2, or 3 doses depending on indication</td>
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<td></td>
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<td></td>
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<tr>
<td>Hepatitis A</td>
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<td></td>
<td>2 or 3 doses depending on vaccine</td>
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<tr>
<td>Hepatitis B</td>
<td></td>
<td></td>
<td>3 doses</td>
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<tr>
<td>Meningococcal B (MenB)</td>
<td></td>
<td></td>
<td>Contraindicated</td>
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</tr>
<tr>
<td>Haemophilus influenza type b (Hib)</td>
<td></td>
<td></td>
<td>3 doses post-HSCT recipients only</td>
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</tr>
</tbody>
</table>

*Covered by the Vaccine Injury Compensation Program

Recommended for all persons who meet the age requirement, lack documentation of vaccination, or lack evidence of past infection; zoster vaccine is recommended regardless of past episode of zoster

Recommended for persons with a risk factor (medical, occupational, lifestyle, or other indication)

No recommendation

Contraindicated

These schedules indicate the recommended ages groups and medical indications for which administration of currently licensed vaccines is commonly recommended for adults aged ≥19 years, as of February 2016. For all vaccines being recommended on the Adult Immunization Schedule, a vaccine series does not need to be restarted, regardless of the time that has elapsed between doses. Licensed combination vaccines may be used whenever any components of the combination are indicated and when the vaccine other components are not contraindicated. For detailed recommendations on all vaccines, including those used primarily for travelers or that are issued during the year, consult the manufacturer's package inserts and the complete statements from the Advisory Committee on Immunization Practices (www.cdc.gov/vaccines/hcp/acip-recs/index.html). Use of trade names and commercial sources is for identification only and does not imply endorsement by the U.S. Department of Health and Human Services.

www.cdc.gov/vaccines/schedules/hcp/adult.html
The vaccines are effective!
Influenza vaccine effectiveness depends on:

• How you determine if someone has influenza

• What population you study
  – Most vaccines work less well in the very young and very old

• How you define effectiveness
  – Prevents death
  – Prevents hospitalization
  – Prevents a visit to the doctor or emergency room
  – Prevents any symptoms
Effectiveness

*Influenza vaccine*

CDC. MMWR 2013;62(RR-7):1
Medically-attended disease with good vaccine match
http://www.mynycdoctor.com/tests-for-influenza-a-b/
Effectiveness

**PCV13**

Pneumococcal Pneumonia and invasive disease (bacteremia and meningitis)

Bonten. NEJM 2015;372:1114

PCV13, vaccine-type infection

www.wisegeek.net/what-is-pneumococcal-pneumonia.htm
Effectiveness

Zoster vaccine

Shingles and Post-Herpetic Neuralgia (PHN)

Oxman. NEJM 2005;352:2271

PHN, post-herpetic neuralgia
Effectiveness

Hepatitis B vaccine

CDC. MMWR 2011;60:1709

www.mcemcourses.org/caseoftheweek/case-9/
Pertussis & influenza vaccines

Effectiveness

Pregnant women & infants

“Two-for-one” vaccination!

www.porticostory.org/content/BLOG/BLOG.asp
Yet, we are failing to vaccinate our adult population!
Adult Immunization Coverage Rates
National Health Interview Surveys (2010–2013)

- Tetanus past 10y, age ≥65
- Tetanus past 10y, age 19-64
- Pneumococcal, age ≥65
- Pneumococcal, age 19-64 at high risk
- Zoster, age ≥60

Percent

Take a STAND! Use Standing Orders to Vaccinate Adults

Healthy People 2020 target
Hepatitis B Vaccine Coverage (≥3 Doses) in Adults with Diabetes
National Health Interview Surveys (2010–2013)

<table>
<thead>
<tr>
<th>Year</th>
<th>19-59 yrs</th>
<th>≥60 yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>26.9</td>
<td>13.9</td>
</tr>
<tr>
<td>2012</td>
<td>28.6</td>
<td>15.1</td>
</tr>
<tr>
<td>2011</td>
<td>26.9</td>
<td>12.4</td>
</tr>
<tr>
<td>2010</td>
<td>22.8</td>
<td>10.9</td>
</tr>
</tbody>
</table>
Adult Immunization Rates: Most are still low

- **HPV (≥1 dose), Women 19-26 yrs**
- **HPV (≥1 dose), Men 19-26 yrs**
- **Tdap, HCP 19-64 yrs**
- **Hep B ≥3 doses, HCP ≥19 yrs**

**Source:** National Health Interview Surveys

HCP: Health-Care Personnel
Influenza Vaccination Coverage Among U.S. Adults, Past Four Seasons*

<table>
<thead>
<tr>
<th></th>
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<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Persons ≥ 18 yrs</td>
<td>38.8</td>
<td>41.5</td>
<td>42.4</td>
<td>43.6</td>
</tr>
<tr>
<td>Persons 18-49 yrs, all</td>
<td>28.6</td>
<td>31.1</td>
<td>32.3</td>
<td>33.5</td>
</tr>
<tr>
<td>Persons 18-49 yrs, high risk</td>
<td>36.8</td>
<td>39.8</td>
<td>38.7</td>
<td>39.3</td>
</tr>
<tr>
<td>Persons 50-64 yrs</td>
<td>42.7</td>
<td>45.1</td>
<td>45.3</td>
<td>47.0</td>
</tr>
<tr>
<td>Persons ≥ 65 yrs</td>
<td>64.9</td>
<td>66.2</td>
<td>65.0</td>
<td>66.7</td>
</tr>
</tbody>
</table>

* Flu vaccination coverage estimates from the BRFSS survey were calculated using Kaplan-Meier survival analysis to determine the cumulative flu vaccination coverage (≥1 dose) July 2014 through May 2015 using monthly interview data collected September 2014 through June 2015. Only BRFSS data were used to estimate coverage for adults ≥18 years.

www.cdc.gov/flu/fluvaxview/index.htm
“By failing to prepare, we are preparing to fail”

—Benjamin Franklin
Ramifications of Failure to Vaccinate Adults

- Increases morbidity and mortality from VPDs
- Creates disincentive for manufacturers of vaccines
- Leaves the chronically ill vulnerable
- Exacerbates already existing disparities in access to immunization for lower socio-economic groups, including racial and ethnic minorities
- Predicts probability of failure to immunize adults during times of crisis when it is critical to reach 250 million adults.
### US Adult Coverage

#### Disparities by race

<table>
<thead>
<tr>
<th>Vaccination, Age Group (years of age)</th>
<th>Whites</th>
<th>Percent Disparity in Coverage Compared to Whites</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Blacks</td>
</tr>
<tr>
<td>Tetanus, ≥65</td>
<td>59.6</td>
<td>-19.3</td>
</tr>
<tr>
<td>Tetanus, 19–49</td>
<td>69.0</td>
<td>-14.9</td>
</tr>
<tr>
<td>Pneumo, ≥65</td>
<td>63.6</td>
<td>-14.9</td>
</tr>
<tr>
<td>Zoster, ≥60</td>
<td>27.4</td>
<td>-16.7</td>
</tr>
<tr>
<td>HPV, females 19–26</td>
<td>41.7</td>
<td>-11.1</td>
</tr>
</tbody>
</table>

Williams WW et al; CDC. MMWR. 2015 Feb 6;64(4):95.
What factors lead to low adult immunization coverage?

- Patient Factors
- Office Factors
- System Factors
Factors Associated with Low Vaccination Among Adults

• **Patient factors**
  – May not have regular health-care provider or only see specialists
  – Inconvenient access, competing social and economic demands
  – Many adults 18–64 years of age still unaware of ACA vaccination coverage, and many still remain uninsured

• **Provider factors**
  – Many other health issues compete with preventive services
  – Lack of provider recommendation
  – Lack of effective reminders to offer vaccinations

• **System factors**
  – Fewer requirements for vaccination (e.g., by employers)
  – State regulations differ on who can vaccinate and what vaccines are allowed (e.g., pharmacists, visiting nurse associations)

• **Complex adult vaccine schedule**
## Risk Perception Does Not Mirror Actual Risk

<table>
<thead>
<tr>
<th>What We’re Afraid Of</th>
<th>What The Real Risk Is</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shark attacks (28)</td>
<td>Dog bites (4.5 million)</td>
</tr>
<tr>
<td>Murder (14,180)</td>
<td>Suicide (33,289)</td>
</tr>
<tr>
<td>Death by peanut allergy (50)</td>
<td>Death by poisoning (27,531)</td>
</tr>
<tr>
<td>Death by plane crash (321)</td>
<td>Death by car crash (34,017)</td>
</tr>
</tbody>
</table>

Kalb. Newsweek. 2010;155(22)
Some Adult Immunization Facts

• **Challenges**
  - Vaccine coverage among adults is unacceptably low
  - Limited patient awareness about need for vaccines among adults
  - Adult vaccinations less integrated into clinical practice

• **Opportunities**
  - Most patients willing to get vaccinated when recommended by medical providers
  - Primary care providers believe that immunizations are an important part of the services they provide to patients
  - Systematic offering (e.g., through standing orders) and recommendations from clinicians result in higher uptake
# US Community Services Task Force: Healthcare Provider- or System-Based Strategies

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Status of Task Force Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provider reminder systems when used alone</td>
<td>Recommended (Strong evidence)</td>
</tr>
<tr>
<td>Provider assessment and feedback</td>
<td>Recommended (Strong evidence)</td>
</tr>
<tr>
<td>Standing orders</td>
<td>Recommended (Strong evidence)</td>
</tr>
<tr>
<td>Provider education when used alone</td>
<td>Insufficient evidence</td>
</tr>
<tr>
<td>Health care-based interventions when implemented in combination</td>
<td>Recommended (Strong evidence)</td>
</tr>
</tbody>
</table>

www.thecommunityguide.org/vaccines/universally/index.html
Office Factors (examples)

- Other health issues compete with preventive services
- Practice culture ("Vaccines are for kids!")
- Hours are inconvenient for working adults
- Lack of effective vaccination prompts to providers
- Lack of provider recommendation to patients
How can my office vaccinate more adults?
## Meta-Analysis of Interventions to Increase Use of Adult Immunization

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Odds Ratio*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational change (e.g., standing orders, separate clinics devoted to prevention)</td>
<td>16.0</td>
</tr>
<tr>
<td>Provider reminder</td>
<td>3.8</td>
</tr>
<tr>
<td>Provider education</td>
<td>3.2</td>
</tr>
<tr>
<td>Patient financial incentive</td>
<td>3.4</td>
</tr>
<tr>
<td>Patient reminder</td>
<td>2.5</td>
</tr>
<tr>
<td>Patient education</td>
<td>1.3</td>
</tr>
</tbody>
</table>

*Compared to usual care or control group, adjusted for all remaining interventions

New Standards for Adult Immunization Practice*

• Stresses that all providers, including those who don’t provide vaccine services, have a role in ensuring patients are up to date on vaccines

• Acknowledges that:
  – Adult patients may see many different health care providers, some of whom do not stock some or all vaccines
  – Adults may get vaccinated in a medical home, at work, or retail setting

• Aim is to avoid missed opportunities and keep adult patients protected from vaccine-preventable diseases

* [www.izsummitpartners.org/adult-immunization-standards](http://www.izsummitpartners.org/adult-immunization-standards)
New Standards for Adult Immunization Practice (cont.)

• Calls to action for health care professionals
  – **Assess** immunization status of all patients in every clinical encounter.
  – **Strongly recommend** vaccines that patients need.
  – **Administer** needed vaccines **or refer** to a provider who can immunize.
  – **Document** vaccines given to patients, including entering them into immunization registries when available.

www.publichealthreports.org/issueopen.cfm?articleID=3145
Conclusions

• Substantial burden of disease in adults for which vaccines are available

• Vaccination rates low among adults in U.S.

• New *Standards for Adult Immunization Practice* emphasize the importance of assessing need for vaccines and providing vaccinations
Conclusions (cont.)

• U.S. Community Services Task Force highlights the use of systems-based interventions to improve immunization rates, including the implementation of standing orders

• Many tools and resources available to:
  – Educate patients on the importance of vaccination
  – *Take A Stand™*: first of its kind national initiative to assist practices to implement vaccination standing orders
Resources

• Take A Stand™
  – www.standingorders.org

• Read IAC publications
  – www.immunize.org/publications

• Visit IAC websites
  – www.immunize.org
  – www.vaccineinformation.org
  – www.izsummitpartners.org

• Stay ahead of the game!
  Subscribe to IAC weekly updates
  – www.immunize.org/subscribe
THANK YOU!