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Session 1

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Session 1
Why Adult Immunization Matters

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Professor of Clinical Pediatrics
UCSD School of Medicine/Rady Children's Hospital San Diego
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
  – 80%–90% of deaths among adults 65 years and older

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

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

• **Hepatitis B**
  – 3,050 acute cases reported in 2013
  – ~19,800 estimated

• **Zoster**
  – ~1 million cases of zoster annually U.S.

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
VPDs Among U.S. Adults

**Influenza**

- 3,000–49,000 deaths per year
- 80%–90% of deaths occur in adults ≥65 years of age

CDC. MMWR. 2010;59:1057 (data from 1976-2007)

Influenza Costs Lives and Money

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

  • Reed, et al. Estimated Influenza Illnesses and Hospitalizations Averted by Vaccination — United States, 2013–14 Influenza Season. MMWR 2014:63(49);1151-1154.
### Estimated Human and Economic Burden Caused by 4 Major Adult VPDs in 2013, U.S. (includes only adults > 65 years of age)

<table>
<thead>
<tr>
<th>Disease</th>
<th>Cases</th>
<th>Cost (x $1,000,000)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Medical</td>
<td>Indirect</td>
<td>TOTAL</td>
<td></td>
</tr>
<tr>
<td>Influenza</td>
<td>4,019,759</td>
<td>7,503</td>
<td>810</td>
<td>8,313</td>
<td></td>
</tr>
<tr>
<td>Pneumococcal disease</td>
<td>440,187</td>
<td>3,572</td>
<td>215</td>
<td>3,787</td>
<td></td>
</tr>
<tr>
<td>Herpes zoster</td>
<td>555,989</td>
<td>1,309</td>
<td>1,709</td>
<td>3,017</td>
<td></td>
</tr>
<tr>
<td>Pertussis</td>
<td>207,241</td>
<td>90</td>
<td>123</td>
<td>213</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>5,223,176</td>
<td>$12,474</td>
<td>$2,856</td>
<td>$15,330</td>
<td></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 Vaccines (cont.)

www.cdc.gov/vaccines/schedules/hcp/adult.html
Recommended Adult Vaccines (cont.)

Figure 2. Vaccines that might be indicated for adults based on medical and other indications

| VACCINE | INDICATION | Pregnancy | Immuno-compromising conditions (existing human immunodeficiency virus [HIV])¹⁴,¹⁵,¹⁶,¹⁷,¹⁸ | HIV infection CD4+ T lymphocyte count²²,²³,²⁴ | Men who have sex with men (MSM) | Kidney failure, end-stage renal disease, receipt of hemodialysis | Heart disease, chronic lung disease, chronic obstructive pulmonary disease, and persistent complement component deficiencies¹⁴,¹⁵,¹⁶,¹⁷,¹⁸ | Asplenia (including elective splenectomy)¹⁴,¹⁵,¹⁶,¹⁷,¹⁸ | Chronic liver disease | Diabetes | Healthcare personnel |
|---------|-----------|-----------|-------------------------------------------------|-----------------------------------------------|-------------------------------|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|
| Influenza¹² | 1 dose IIV annually | 1 dose IIV annually | 1 dose IIV annually | 1 dose IIV annually | 1 dose IIV annually | 1 dose IIV annually | 1 dose IIV annually | 1 dose IIV annually | 1 dose IIV annually | 1 dose IIV annually | 1 dose IIV annually | 1 dose IIV annually |
| Tetanus, diphtheria, pertussis (Tdap)¹⁹ | 1 dose Tap and P every 10 yrs | Substitute 1-time dose of Tdap for Td booster; then boost with Td every 10 yrs | | | | | | | | | | |
| Varicella¹⁰ | Contraindicated | | | | | | | | | | | |
| Human papillomavirus (HPV) Female*¹⁰ | 3 doses through age 26 yrs | | | | | | | | | | | |
| Human papillomavirus (HPV) Male*¹⁰ | 3 doses through age 26 yrs | | | | | | | | | | | |
| Zoster²⁵ | Contraindicated | | | | | | | | | | | |
| Measles, mumps, rubella (MMR)²⁶ | Contraindicated | | | | | | | | | | | |
| Pneumococcal 13-valent conjugate (PCV13)²⁷ | 1 dose | | | | | | | | | | | |
| Pneumococcal polysaccharide (PPSV23)²⁸ | 1 or 2 doses | | | | | | | | | | | |
| Meningooccal²⁹ | 1 or more doses | | | | | | | | | | | |
| Hepatitis A¹⁰ | 2 doses | | | | | | | | | | | |
| Hepatitis B¹¹ | 3 doses | | | | | | | | | | | |
| Haemophilus influenzae type b (Hib)¹²,¹³ | post-HCT recipients only | | | | | | | | | | | |

For all persons in this category who meet the age requirements and who lack documentation of vaccination or have no evidence of previous infection, a booster vaccine recommended regardless of prior episode of zoster.

These schedules indicate the recommended age groups and medical indications for which administration of currently licensed vaccines is commonly recommended for adults ages 19 years and older, as of February 1, 2015. 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 and 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 manufacturers' package inserts and the complete statements from the Advisory Committee on Immunization Practices (www.cdc.gov/vaccines/patients/doses/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 Services.

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

• How you decide if someone has influenza

• What population you study—most vaccines work less well in the very young and very old

• What you mean by effective:
  – 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

Bonten. NEJM 2015;372:1114
PCV13, vaccine-type infection
www.wisegeek.net/what-is-pneumococcal-pneumonia.htm
Effectiveness

Zoster vaccine

Oxman. NEJM 2005;352:2271

PHN, post-herpetic neuralgia
Effectiveness

**Hepatitis B vaccine**

![Bar chart showing effectiveness of Hepatitis B vaccine by diabetic age group.](chart.png)

- **Overall**
- **<40**
- **41-59**
- **60-69**
- **≥70**

CDC. MMWR 2011;60:1709
www.mcemcourses.org/caseoftheweek/case-9/
Pregnant Women

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

Healthy People 2020 target

Colors:
- 2013
- 2012
- 2011
- 2010
Adults with Diabetes Who Received ≥3 Doses Hepatitis B Vaccine by Age, National Health Interview Surveys, 2010–2013

<table>
<thead>
<tr>
<th>Age Group</th>
<th>2013</th>
<th>2012</th>
<th>2011</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥60 yrs</td>
<td>13.9</td>
<td>15.1</td>
<td>12.4</td>
<td>10.9</td>
</tr>
<tr>
<td>19-59 yrs</td>
<td>26.3</td>
<td>28.6</td>
<td>26.9</td>
<td>22.8</td>
</tr>
</tbody>
</table>

Percent
But Most Adult Immunization Rates 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
## Influenza Vaccination Coverage Among U.S. Adults, Past Four Seasons*

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</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](http://www.cdc.gov/flu/fluvaxview/index.htm)
Ramifications of Failure to Vaccinate Adults...

• Beyond the impact to the health of the public, our ineffectiveness in immunizing adults:
  – Creates disincentive for manufacturers to enter the market
  – Leaves the chronically ill vulnerable
  – Creates disparities in access to care
    o Absence of commitment exacerbates existing barriers to immunization for those in the lower socio-economic strata and for racial and ethnic minorities
### US Adult Coverage

#### Disparities by race

<table>
<thead>
<tr>
<th>Vaccination, Group (yrs)</th>
<th>Whites</th>
<th>Disparity from Coverage in Whites</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Blacks</td>
</tr>
<tr>
<td><strong>Tetanus, ≥65</strong></td>
<td>59.6</td>
<td>-19.3</td>
</tr>
<tr>
<td><strong>Tetanus, 19–49</strong></td>
<td>69.0</td>
<td>-14.9</td>
</tr>
<tr>
<td><strong>Pneumo, ≥65</strong></td>
<td>63.6</td>
<td>-14.9</td>
</tr>
<tr>
<td><strong>Zoster, ≥60</strong></td>
<td>27.4</td>
<td>-16.7</td>
</tr>
<tr>
<td><strong>HPV, females 19–26</strong></td>
<td>41.7</td>
<td>-11.1</td>
</tr>
</tbody>
</table>
Other Ramifications...

“By failing to prepare, we are preparing to fail”
- Benjamin Franklin

• Leaves us vulnerable during times of crisis when the ability to reach 250 million adults with vaccines/medications is crucial
  – Pandemic influenza

• Our failure to successfully immunize adults in healthy times predicts our failure to immunize them in times of crisis
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](http://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
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!