Immunization Across the Lifespan: Vaccinating Adults in the United States

Litjen (L.J) Tan, MS, PhD
Chief Strategy Officer, Immunization Action Coalition
Co-Chair, National Adult and Influenza Immunization Summit

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Disclosures

• I have received honoraria from Pfizer and Sanofi Pasteur for service as a scientific consultant.
  ▪ My honoraria is donated to the IAC

• I do NOT intend to discuss an unapproved or investigative use of a commercial product/device in my presentation.
Disclaimer

The opinions expressed in this presentation are solely those of the presenter and do not necessarily represent the official positions of the Immunization Action Coalition, or the National Adult and Influenza Immunization Summit

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
• Describe recommended strategies for improving coverage rates
Burden of Adult Vaccine-preventable Disease Among U.S. Adults

- **Invasive pneumococcal disease (IPD)**
  - 29,500 total cases and 3,350 total deaths in 2015
  - 91% of IPD and nearly all IPD deaths among adults

- **Influenza**
  - 3,000 to 49,000 total related deaths per year
  - ~90% among adults 65 years and older

- **Pertussis**
  - 20,762 total reported cases 2015
  - 4,650 among adults 20 years of age & older

- **Hepatitis B**
  - 2,791 acute cases reported 2014
  - 18,100 estimated new infections in 2014

- **Zoster**
  - about 1 million cases of zoster annually U.S.

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Incidence of invasive pneumococcal disease among adults aged 18-64 years with select underlying conditions, United States, 2009

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Kyaw. JID 2005;192:377–86
Impact of influenza on pregnant women

- Up to 4X increased risk of hospitalization, especially in third trimester, and for those with co-morbid conditions*
- Up to 8X increased risk for influenza-associated complications, including death, particularly for those with co-morbid conditions**
- Increased risk for influenza-associated complications among postpartum women
- Risk highest during the first postpartum week

* Chronic cardiac disease, chronic pulmonary disease, diabetes mellitus, chronic renal disease, malignancies, and immunosuppressive disorders
** Preexisting diabetes mellitus, pulmonary disease that included asthma, heart disease, renal disease, and anemia


Cost Burden of 4 Adult Vaccine-Preventable Diseases in Persons Age 65 Years and Older, United States, 2013

<table>
<thead>
<tr>
<th>Vaccine-Preventable Disease</th>
<th>Estimated # of CASES</th>
<th>Estimated COSTS (Medical &amp; Indirect) (in millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza</td>
<td>4,019,759</td>
<td>8,312.8</td>
</tr>
<tr>
<td>Pneumococcal</td>
<td>440,187</td>
<td>3,787.1</td>
</tr>
<tr>
<td>Zoster</td>
<td>555,989</td>
<td>3,017.4</td>
</tr>
<tr>
<td>Pertussis</td>
<td>207,241</td>
<td>212.5</td>
</tr>
</tbody>
</table>

$15,329.8

Additional $11.2 billion in costs if ages 50 – 64 years included

Recent Burden of Other Diseases Among U.S. Adults

- Ebola: 4 cases\(^1\)
- H5N1 Avian Influenza: None\(^2\)
- E. coli O26 (STEC O26) from eating at Chipotle: 60 cases (no deaths)\(^3\)
- Zika virus (2015-2017): 5,559 cases (through November 1, 2017, most travel-associated)\(^4\)


There are Evidence-Based Adult Vaccination Recommendations
Recommended Adult Vaccines

CDC, NCIRD. 2017 Combined Recommended Immunization Schedule for Adults.  
www.cdc.gov/vaccines/schedules/hcp/adult.html  
www.cdc.gov/travel

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### Table: Recommended Adult Vaccines

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Recommended If:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza</td>
<td>Yearly</td>
</tr>
<tr>
<td>Tdap*</td>
<td>1 dose annually</td>
</tr>
<tr>
<td>IPV*</td>
<td>1 dose</td>
</tr>
<tr>
<td>MMR*</td>
<td>1 dose</td>
</tr>
<tr>
<td>MV*</td>
<td>1 dose</td>
</tr>
<tr>
<td>HIB*</td>
<td>1 dose</td>
</tr>
<tr>
<td>PPSV23</td>
<td>1 dose</td>
</tr>
<tr>
<td>PCV13</td>
<td>1 dose</td>
</tr>
<tr>
<td>HepA</td>
<td>1 dose</td>
</tr>
<tr>
<td>HepB*</td>
<td>1 dose</td>
</tr>
<tr>
<td>HPV*</td>
<td>3 doses depending on indication</td>
</tr>
</tbody>
</table>

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### Diagram: Recommended Adult Vaccines

[Diagram showing recommended adult vaccines]

CDC, NCIRD. 2017 Combined Recommended Immunization Schedule for Adults.  
www.cdc.gov/vaccines/schedules/hcp/adult.html  
www.cdc.gov/travel
There are Effective Vaccines!

Vaccine Effectiveness in the Adult Population

- Vaccine effectiveness (VE) varies by vaccine type, the disease outcome, and the age or health of the person vaccinated
  - Zoster (shingles) VE:
    - ZVL: 51% against shingles, and 66% against post-herpetic neuralgia (PHN)\(^1\)
    - HZ/su: 97% against shingles, and 91% against PHN\(^2\)
  - PCV13 (pneumococcal conjugate vaccine) VE: 45% against vaccine-type pneumococcal pneumonia, and 75% against vaccine-type invasive pneumococcal disease among adults age ≥65 years\(^3\)

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2 Cunningham, et al. NEJM 2016;1019-1032
**Vaccine Effectiveness (cont.)**

- Influenza vaccine: varies annually based on antigenic match and also age and health of person being vaccinated – about 60–70% in younger adults and about 30% in adults 65 years and older against medically-attended influenza with a good match[^1]
  - Vaccine Preventable Disability[^2]!
- Hepatitis B vaccine: 90% effectiveness after completing a 3-dose series, though lower in persons with diabetes (e.g., 90% with diabetes and age <40 years, 80% with diabetes and 41–59 years, 65% if 60–69 years and <40% if 70 years or older[^3])

[^1]: CDC. MMWR 2013; 62(RR07);1-43.
[^3]: CDC. Use of hepatitis B vaccine for adults with diabetes mellitus. MMWR 2011;60:1709-1711.

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**Another way to look at vaccine effectiveness – negative outcomes averted**

**The benefits of flu vaccination 2015-2016**

- The estimated number of flu illnesses prevented by flu vaccination during the 2015-2016 season: 5 million
- The estimated number of flu medical visits prevented by vaccination during the 2015-2016 season: 2.5 million
- The estimated number of flu hospitalizations prevented by vaccination during the 2015-2016 season: 71,000

[Image of vaccination benefits]
Vaccine Effectiveness – Influenza

- Acute respiratory illness or influenza-like illness increases acute MI risk 2x; 5x is those with history of MI
- Influenza vaccination effectiveness: Meta-analyses\(^1\)\(^-\)\(^2\)
  - 29% (95%CI 9,44) against acute MI in persons with existing CVD
  - 36% (95%CI 14,53) against major cardiac events with existing CVD
- Vaccine effectiveness 29% in acute MI prevention
  - “On par or better than accepted preventive measures [as] statins (36%), anti-hypertensives (15–18%), and smoking cessation (26%)”
  - Influenza vaccination recommended as secondary prevention by American College of Cardiology and American Heart Association

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Vaccination of Pregnant Women: Two-For-One

- Influenza vaccination of pregnant women
  - Reduce risk of influenza illness in pregnant women
  - Reduce risk of influenza illness, fevers and influenza hospitalizations in infants during first 6 months of life
  - Vaccinate with inactivated flu vaccine (not live vaccine) during pregnancy\(^1\)
- Tdap vaccination of pregnant women
  - Vaccinate in 3\(^{rd}\) trimester to transfer antibody to infant prior to birth
  - Prevents pertussis in mom and protects infant
    - Tdap vaccination during pregnancy estimated to be 93% effective in preventing pertussis in infants <2 months old\(^2\)
- Pregnant women should NOT routinely receive any live vaccines (e.g., live influenza vaccine, MMR, varicella or shingles vaccines)
Yet, We are Failing to Vaccinate our Adult Population!

Adult Immunization Coverage Rates, National Health Interview Surveys, 2012–2015

Adults with Diabetes Who Received ≥3 doses Hepatitis B Vaccine by Age, National Health Interview Surveys, 2012–2015

Influenza Vaccination Coverage Among U.S. Adults, Past Four Seasons

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Persons ≥ 18 yrs</td>
<td>42.4</td>
<td>43.6</td>
<td>41.7*</td>
<td>43.3 ± 0.6*</td>
</tr>
<tr>
<td>Persons 18-49 yrs, all</td>
<td>32.3</td>
<td>33.5</td>
<td>32.7</td>
<td>33.6 ± 0.8</td>
</tr>
<tr>
<td>Persons 18-49 yrs, high risk</td>
<td>38.7</td>
<td>39.3</td>
<td>39.5</td>
<td>39.3 ± 1.8</td>
</tr>
<tr>
<td>Persons 50-64 yrs</td>
<td>45.3</td>
<td>47.0</td>
<td>43.6*</td>
<td>45.4 ± 1.0*</td>
</tr>
<tr>
<td>Persons ≥ 65 yrs</td>
<td>65.0</td>
<td>66.7</td>
<td>63.4*</td>
<td>65.3 ± 1.0*</td>
</tr>
</tbody>
</table>

* Statistically significant declines/increases from the previous season.

1. www.cdc.gov/flu/fluaxview/index.htm
# Influenza Vaccination Coverage Among Texas Adults, Past Four Seasons*

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Persons ≥ 18 yrs</td>
<td>39.3</td>
<td>45.3</td>
<td>43.2</td>
<td>37.9</td>
</tr>
<tr>
<td>Persons 18-49 yrs, all</td>
<td>30.4</td>
<td>34.1</td>
<td>36.0</td>
<td>29.2</td>
</tr>
<tr>
<td>Persons 18-49 yrs, high risk</td>
<td>40.6</td>
<td>38.0</td>
<td>58.2</td>
<td>36.8</td>
</tr>
<tr>
<td>Persons 50-64 yrs</td>
<td>44.8</td>
<td>53.1</td>
<td>44.9</td>
<td>41.9</td>
</tr>
<tr>
<td>Persons ≥ 65 yrs</td>
<td>63.4</td>
<td>72.3</td>
<td>65.1</td>
<td>62.1</td>
</tr>
</tbody>
</table>

*www.cdc.gov/flu/fluvaxview/index.htm

## Why is it so hard to vaccinate adults?
Barriers to Adult Immunization

• Competing social and economic demands among adults
• Competing demands for providers’ time and vaccines often not integrated into adult medical care practice
• Adult vaccine schedule, while evidence-based, is complex
  • Especially for certain occupational and medical target groups
• Fewer public health resources for adult immunization
  • Delivery infrastructure is poor compared to pediatrics
• Limited patient awareness and demand for adult vaccinations except perhaps for influenza vaccine
Barriers to Adult Immunization

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• Competing demands for providers’ time and vaccines often not integrated into adult medical care practice
• Adult vaccine schedule, while evidence-based, is complex
  • Especially for certain occupational and medical target groups
• Fewer public health resources for adult immunization
  • Delivery infrastructure is poor compared to pediatrics
• Limited patient awareness and demand for adult vaccinations except perhaps for influenza vaccine
Are any of the following vaccines recommended for you as an adult?

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Yes (%)</th>
<th>No (%)</th>
<th>Don’t Know (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza</td>
<td>71.8</td>
<td>15.1</td>
<td>13.0</td>
</tr>
<tr>
<td>Hepatitis A</td>
<td>14.3</td>
<td>42.4</td>
<td>43.3</td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>20.1</td>
<td>39.9</td>
<td>40.0</td>
</tr>
<tr>
<td>Pneumococcal</td>
<td>26.4</td>
<td>34.9</td>
<td>38.7</td>
</tr>
<tr>
<td>Tdap</td>
<td>11.9</td>
<td>39.0</td>
<td>49.0</td>
</tr>
</tbody>
</table>

Summary: 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 underinsured adults 18-64 years of age

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 types of vaccine allowed (e.g. pharmacists, visiting nurse associations)

Complex adult vaccine schedule
The new National Vaccine Advisory Committee Standards for Adult Immunization Practice (the “Standards”)

Fundamental Paradigm Shift in Adult IZ

- Adult immunization standards should be applied to all providers of care to adults, those who do and do not vaccinate
- New standards recognize the importance of the healthcare provider recommendation for patients to receive needed vaccines
- Highlights the current low vaccination rates among U.S. adults
- Reflects the changed environment within which adult vaccines are now given

Fundamental Paradigm Shift in Adult IZ

ALL providers of health care to adults are to:

1. **ASSESS** patient’s status for all recommended vaccines at each clinical encounter;
2. Educate and counsel the patient on the recommended vaccines and strongly **RECOMMEND** needed vaccines; and,
3. **VACCINATE** at the same visit, **OR** for providers that do not stock the recommended vaccine, **REFER** the patient to a vaccinating provider.
4. **DOCUMENT** the receipt of vaccine by the patient

Even if you don’t vaccinate, you still need to recommend vaccines to your patients

Proven Strategies for Improving Adult Immunizations Rates
## Group 1: Strategies to Enhance Access to Vaccines

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Status of Task Force Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home visits to increase vaccinations</td>
<td>Recommended (Strong evidence)</td>
</tr>
<tr>
<td>Reducing client out-of-pocket costs for vaccinations</td>
<td>Recommended (Strong evidence)</td>
</tr>
</tbody>
</table>

http://www.thecommunityguide.org/vaccines/index.html

## Group 2: Strategies to Increase Community Demand for Vaccines

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Status of Task Force Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Client or family incentives</td>
<td>Recommended (Sufficient evidence)</td>
</tr>
<tr>
<td>Client reminder/recall systems</td>
<td>Recommended (Strong evidence)</td>
</tr>
<tr>
<td>Client-held paper immunization records</td>
<td>Insufficient evidence</td>
</tr>
<tr>
<td>Clinic-based client education when used alone</td>
<td>Insufficient evidence</td>
</tr>
<tr>
<td>Community-wide education when used alone</td>
<td>Insufficient evidence</td>
</tr>
<tr>
<td>Community-based interventions when implemented in combination</td>
<td>Recommended (Strong evidence)</td>
</tr>
</tbody>
</table>

http://www.thecommunityguide.org/vaccines/index.html
## Group 3: 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>


## 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

# Worksite Interventions to Promote Seasonal Influenza Vaccinations among Healthcare Personnel (HCP)

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Status of Task Force Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interventions with on-site, free, actively promoted vaccinations</td>
<td>Recommended</td>
</tr>
<tr>
<td>Interventions with actively promoted, off-site vaccinations</td>
<td>Insufficient Evidence</td>
</tr>
</tbody>
</table>


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# Worksite Interventions to Promote Seasonal Influenza Vaccinations among Non-HCP

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Status of Task Force Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interventions with on-site, reduced-cost, actively promoted vaccinations</td>
<td>Recommended</td>
</tr>
<tr>
<td>Interventions with actively promoted, off-site vaccinations</td>
<td>Insufficient Evidence</td>
</tr>
</tbody>
</table>

Summary: Effective Strategies to Increase Adult Vaccination Coverage

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reducing client out-of-pocket costs for vaccinations</td>
<td>Adults</td>
</tr>
<tr>
<td>Client reminder/recall systems</td>
<td>Adults</td>
</tr>
<tr>
<td>Community-based interventions when implemented in combination</td>
<td>Adults</td>
</tr>
<tr>
<td>Provider reminder systems when used alone</td>
<td>Adults</td>
</tr>
<tr>
<td>Provider assessment and feedback</td>
<td>Adults</td>
</tr>
<tr>
<td>Standing orders</td>
<td>Adults</td>
</tr>
<tr>
<td>Health care-based interventions when implemented in combination</td>
<td>Adults</td>
</tr>
<tr>
<td>Worksite interventions with on-site, reduced-cost, actively promoted influenza vaccinations</td>
<td>Adults, healthcare personnel</td>
</tr>
</tbody>
</table>

Some Concluding Thoughts

- The landscape for adult immunizations is far better today than it was 5 years ago
  - In the US, adult vaccines for those under 65 years, are still predominantly a private sector enterprise
    - Innovation by states to procure and provide adult vaccines
    - Uninsured adults still exist and number may increase?
  - If cost to patients is not an issue due to insurance coverage, then we “just” need to develop a supporting delivery infrastructure
    - Political will? What data do we need?
That Delivery Infrastructure...

- Healthcare delivery is transforming with the transition to integrated delivery networks (IDNs) and clinically integrated networks (CINs)
  - Movement from volume to value
  - Increased assumption of risk by the systems
  - How do we ensure that value proposition to integrated delivery networks?
  - Patient Experience
  - Chronic Disease
  - Healthcare costs
  - Provider Burnout
  - ACO/Managed Care bundles

Working with healthcare systems


Webinar: [https://www.youtube.com/watch?v=BuhQmCVJ9Vs](https://www.youtube.com/watch?v=BuhQmCVJ9Vs)
MACRA also reflects current change in healthcare delivery

- MACRA (Medicare Access and CHIP Reauthorization Act of 2015)
  - Movement from traditional fee-for-service payment model to new risk-bearing, coordinated care models
  - Makes a new framework for rewarding health care providers for giving better care not just more care.
  - Combines existing quality reporting programs into one new system
  - How do we ensure that adult IZ are valued?

Some Concluding Thoughts

- How do we incentivize?
  - Drive adult IZ through quality measurement
    - What gets measured gets done
    - Need effort to develop, test and get measures for adult IZ endorsed
  - Increase access points for getting vaccinated
    - All providers of care for adults have a responsibility to assess, counsel, recommend, and if feasible, deliver the vaccine
    - Break down barriers that reduce access
      - In- versus out-of-network providers
      - Improve collaboration and understanding among all providers – health IT!
Support from Health IT necessary

• The U.S. must improve documentation of adult vaccinations
  – Diverse adult population with diverse providers
  – Lifespan immunization information systems are critical, yet they are under-utilized
  – Opt-out versus opt-in; facilitate the public benefit
  – Make IIS and EHRs integrated with practice management. Eg. Vaccine inventory

Summit NEW Coding and Billing Website

https://www.izsummithpartners.org/nailis-workgroups/access-provider-workgroup/coding-and-billing/
Brand NEW resource from IAC!

http://www.immunize.org/guide/

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  - www.vaccineinformation.org
  - www.standingorders.org
  - www.izcoalitions.org
  - www.izsummitpartners.org (Summit)
- Stay ahead of the game! Subscribe to our updates!
  - http://www.immunize.org/subscribe/
Thank You!