What’s new in adult immunization?

Annual Regional New York Adult Immunization Coalition Meeting
October 2017

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National Center for Immunization and Respiratory Diseases

Disclosure

- Presenter has no conflict of interest
- Discussions on unlicensed products and off-label uses are in the context of ACIP considerations
- The use of trade names is for identification purposes only and does not imply endorsement
- Disclaimer – The opinions expressed in this presentation are solely those of the presenter and do not necessarily represent official positions of CDC
Overview

- Burden of vaccine-preventable diseases among adults
- Impact of vaccination
- Updates in 2017 adult immunization schedule
- Gaps in vaccination coverage among adults
- Standards for Adult Immunization Practice
- Checklist for temporary flu vaccination clinics
- Shoulder injuries
- Campaign plans for 2017–2018 flu season

Vaccine-preventable diseases disproportionately affect adults, particularly older adults
Health and Economic Cost of Influenza

- Millions of cases per year, varies year to year
- 226,000 hospitalizations per year, >75% among adults\(^1\)
- 3,000–49,000 deaths per year, >90% among adults\(^2\)
- Direct medical cost – $10.4 billion\(^3\)
- With loss of work and life – $87 billion
- Estimates for 2015–2106\(^4\)
  - 25 million illnesses
  - 11 million medical visits
  - 310,000 hospitalizations
  - 12,000 deaths

A son’s life cut short by influenza – Jacob Ryan Schmidt

- “Jacob was strong as a bull and enjoying life”
- “In 2010, at the age of 27, he succumbed to complications from H1N1 influenza”
- “His lungs collapsed... he developed an infection... his organs were shutting down”
- “After about five weeks of influenza ravaging his body, Jacob died”

For Jacob’s full story, visit: www.nfid.org/real-stories-real-people/jacob-i_flue-za.html#sthash.qbrBJ6AE.dpuf

Burden of Pneumococcal Disease

- 33,900 cases, 3,700 deaths in 2013
- 89% cases, almost all deaths occur among adults

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

20x increased risk

3–7x increased risk

Cases per 100,000 persons

Healthy CVD Diabetes Pulmonary Kidney Liver Alcohol HIV/AIDS Hematological Cancer

Active Bacterial Core Surveillance (ABCs) report: Streptococcus pneumonia
Emerging Infections Program Network, United States, 2015

Cases or deaths per 100,000

18-34 yrs 35-49 yrs 50-64 yrs 65-74 yrs 75-84 yrs 85+ yrs

Cases Deaths

www.cdc.gov/abc/surveillance/findings/reports/spn15.html
Burden of Zoster

- **Herpes zoster**
  - 1 million cases per year, lifetime risk 32%
  - 10–11/1,000 per year for adults ≥60y

- **Post-herpetic neuralgia (PHN)**
  - Rare among adults <40y
  - But 13% of adults ≥60y will get PHN
  - Risk of PHN after zoster increases with age

Zoster and post-herpetic neuralgia on health-related quality of life

- Drolet M et al. CMAJ 2010
Burden of Hepatitis B

- 3,050 cases reported in 2013
- Estimated 19,800 cases

CDC. Viral Hepatitis Surveillance United States, 2015. National Center for HIV/AIDS, Viral Hepatitis, STD & TB Prevention/Division of Viral Hepatitis

Incidence of acute hepatitis B, by age group, United States, 2000–2013

National Notifiable Diseases Surveillance System (NNDSS)
Burden of Pertussis

- 21,000 cases in 2015, 22% among adults
- Transmission from adults to children
  - Disease most severe for infants
  - Among hospitalized
    - Apnea (61%)
    - Pneumonia (23%)
    - Death (1%)

CDC. National Notifiable Disease Surveillance System www.cdc.gov/pertussis/surv-reporting.html

Pertussis among Older Adults

- Underdiagnosed and underreported
  - 10,000–50,000 cases per year
- Burden in older adults unknown
  - Under-recognized cause of cough illness
  - Atypical clinical presentation in adults
  - Low suspicion by providers
- Estimates for adults ≥65y
  - Ranges from 1–5 to 500 cases per 100,000

MMWR 2012;61(25):468–470
Vaccination is an important part in preventing serious diseases.
Impact of Influenza Vaccination
Illnesses and Hospitalizations Prevented, 2011–2016

Cases and Hospitalizations Averted by Vaccination

www.cdc.gov/flu/about/disease/2015-16.htm

Flu vaccine is good for the heart

- Acute respiratory illness or influenza-like illness increases acute MI risk 2x
- Influenza vaccination effectiveness: Meta-analyses¹–²
  - 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
- Recommended by American College of Cardiology and American Heart Association
  - “On par or better than accepted preventive measures [as] statins (36%), anti-hypertensives (15–18%), and smoking cessation (26%)”

Flu Vaccine and Chronic Conditions

- **High risk medical conditions**¹
  - 78% reduction in deaths attributable to any cause
  - 87% reduction in hospitalization attributable to acute respiratory or cardiovascular disease

- **Diabetes**²
  - 56% reduction in any complication, 54% reduction in hospitalizations, 58% reduction in deaths

- **Chronic obstructive lung disease**³⁴
  - 76% vaccine effectiveness
  - Reduced COPD exacerbation

¹ Hak E. Arch Intern Med 2005;165:274–80. [http://dx.doi.org/10.1001/archinte.165.3.274](http://dx.doi.org/10.1001/archinte.165.3.274)
² Looijmans-Van den Akker. Diabetes Care 2006;29:1771–6. [http://dx.doi.org/10.2337/dc05-2517](http://dx.doi.org/10.2337/dc05-2517)
⁴ Poole PJ. Cochrane Database SystRev 2006;(1):CD002733

Pneumococcal Vaccination

- **23-valent pneumococcal polysaccharide vaccine (PPSV23)**
  - 74% (95%CI 55,86) against invasive pneumococcal disease (IPD)
  - 11 unique serotypes (12 common serotypes with PCV13) causes 38% of IPD among adults ≥65y
  - Not effective against non-IPD pneumonia

- **13-valent pneumococcal conjugate vaccine (PCV13) for adults ≥65y**
  - 45% against vaccine-type non-IPD pneumonia
  - 75% against vaccine-type IPD

Zoster Vaccination

- **Zoster vaccine live**
  - 51% against shingles
  - 66% against post-herpetic neuralgia (PHN)
  - 80% against most prolonged and extreme cases of PHN¹
  - Among vaccinated adults ≥60y, efficacy wanes within 5y and protection >5y uncertain

- **Zoster subunit vaccine**
  - Not licensed
  - 96% (95%CI 93,98) effectiveness among 50-, 60-, 70-year olds²
  - Subsequent 90% (95%CI 84,94) effectiveness among ≥70y³
  - Immunogenicity persisted through 9y post-vaccination⁴
  - 17% vaccinated vs. 3% placebo with Grade 3 symptoms

². Lal H, et al. NEJM 2015
⁴. Presented at February 2017 ACIP meeting

Hepatitis B Vaccination and Increasing Age

- >90% effective after completing 3-dose series for healthy adults
- However, decline in immunogenicity at vaccine administration by age¹
  - 90% protective antibody after age 40y
  - 75% protective antibody by age 60y
- Effectiveness lower in persons with diabetes and increasing age²
  - 90% age <40y
  - 80% age 41–59y
  - 65% age 60–69y
  - <40% age ≥70y

¹. CDC. A comprehensive immunization strategy to eliminate transmission of hepatitis B virus infection in the United States. Recommendations of the Advisory Committee on Immunization Practices (ACIP) Part II: Immunization of Adults. MMWR 2006;55(No. RR-16):1–33
**Tdap in Pregnancy**

- Vaccinating pregnant women provides direct protection for mom, indirect protection for infant.
- Infants of vaccinated moms were born with significantly higher anti-pertussis antibodies compared to infants of unvaccinated mothers.
  - If given within the 27–36 weeks administration window.
  - Concentration of anti-pertussis antibodies in infant higher when mothers vaccinated earlier in this window.
  - Longer exposure to vaccine allows higher vaccine-induced antibody levels produced by mother and transferred to infant.

CDC. MMWR 2012;61:ND:719–32
CDC. MMWR 2013;62(07):131–135

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**Timing of Tdap in Pregnancy**

**Effectiveness of maternal pertussis vaccine for infants age <3 months at onset**

<table>
<thead>
<tr>
<th>Vaccine effectiveness</th>
<th>Timing of maternal vaccination</th>
</tr>
</thead>
<tbody>
<tr>
<td>91% (83–95)</td>
<td>≥28 days before birth</td>
</tr>
<tr>
<td>38% (-95–80)</td>
<td>0–6 days before or 1–13 days after birth</td>
</tr>
</tbody>
</table>

# Tdap during Pregnancy

## Vaccine Effectiveness to Clinical Outcome

Annual number of pertussis prevented among infants ≤12 months-old with maternal Tdap vaccination, United States, 2000–2011

<table>
<thead>
<tr>
<th>Pertussis (N)</th>
<th>Prevented with Tdap after pregnancy (n)</th>
<th>Prevented with Tdap during pregnancy (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases (2746)</td>
<td>549</td>
<td>906</td>
</tr>
<tr>
<td>Hospitalizations (1217)</td>
<td>219</td>
<td>462</td>
</tr>
<tr>
<td>Deaths (18)</td>
<td>3</td>
<td>9</td>
</tr>
</tbody>
</table>

CDC. MMWR 2013;62(07):131–135

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Updates in influenza vaccination
Influenza Vaccine Composition 2017–2018

- Recommendations based on global influenza virologic and epidemiologic surveillance, genetic and antigenic characterization, human serology studies, antiviral susceptibility, availability of candidate influenza viruses
- Northern Hemisphere viruses same as 2017 Southern Hemisphere influenza season
- All 2017–2018 influenza vaccines licensed in U.S. contain hemagglutinin (HA) derived from influenza viruses antigenically similar to those recommended by FDA

Influenza Vaccine Composition 2017–2018 (2)

- Updated A(H1N1) component compared to 2016–2017 vaccines
- Trivalent vaccines contain
  - A/Michigan/45/2015 (H1N1)pdm09-like virus (change from 2016–2017)
  - A/Hong Kong/4801/2014 (H3N2)-like virus
  - B/Brisbane/60/2008-like (B/Victoria lineage) virus
- Quadrivalent vaccines contain
  - Antigens in trivalent vaccines plus B/Phuket/3073/2013-like (B/Yamagata lineage) virus

Update: Influenza Activity in the United States During the 2016-17 Season and Composition of the 2017-18 Influenza Vaccine. MMWR 2017;66(25):668–676
Licensures and Labeling Changes, 2017–2018

- **Newly licensed**
  - Afluria Quadrivalent (IIV4), Seqirus, Parkville, Victoria, Australia
  - Flublok Quadrivalent (RIV4), Protein Sciences, Meriden, CT

- **Label changes**
  - Expanded age, from ≥3 yrs to ≥6 mos, for FluLaval Quadrivalent (IIV4), ID Biomedical Corporation of Quebec, Quebec City, Quebec, Canada

- **Other**
  - Afluria (IIV3), Seqirus, Parkville, Victoria, Australia – May be used age ≥5 yrs (consistent with FDA label), previously recommended for age ≥9 yrs

*Influenza vaccines available for 2016–2017 at [www.cdc.gov/flu/protect/vaccine/vaccines.htm](http://www.cdc.gov/flu/protect/vaccine/vaccines.htm)*

Update: Influenza Activity in the United States During the 2016-17 Season and Composition of the 2017-18 Influenza Vaccine. MMWR 2017:66(25);668–676
ACIP Influenza Vaccination Recommendations 2017–2018

- Reiterates existing influenza vaccination recommendations
  - Routine annual influenza vaccination for all persons age ≥6 months unless contraindicated
- Emphasis on high-risk groups and contacts
  - Children age 6–59 months
  - Adults age ≥50 years
  - Chronic pulmonary (including asthma), CV (excluding HTN), renal, hepatic, neurologic, hematologic, metabolic (including DM) disorders
  - Immunocompromised
  - Pregnant women
  - Nursing home residents, long term care facilities
  - American Indians/Alaskan Natives
  - Extremely obese (BMI ≥40)
  - Health care workers
  - Household contact of above

www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/flu.html

Influenza Vaccination 2017–2018 Details

- Options include
  - High-dose IIV for ≥65y
  - Adjuvanted IIV for ≥65y
  - Intradermal IIV for 18–64y
  - Cell culture-based IIV for ≥18y
  - RIV for ≥18y
- Providers should offer vaccination by the end of October, if possible, and throughout influenza season

MMWR 2016;65(RR-5):29-30
Influenza Vaccination 2017–2018 More Details

- Pregnant women
  - Women who are pregnant (any time during pregnancy) or might become pregnant
  - Age appropriate IIV or RIV
- Adults age ≥65 years
  - Any age-appropriate IIV or RIV
  - High-dose IIV3 superior efficacy over standard-dose IIV3
- Immunocompromised
  - Any age-appropriate IIV or RIV
  - High-risk persons, contacts, caregivers
- Changes to egg allergy recommendations
  - If hives-only, use any licensed age-appropriate influenza vaccine (IIV or RIV)
  - If other than hives, may use any age-appropriate vaccine in medical setting

Contraindications and Precautions – IIV and RIV

- Contraindication
  - History of severe allergic reaction to vaccine or any of its components
- Precautions
  - Moderate to severe acute illness with or without fever
  - Guillain-Barré syndrome within 6 weeks following influenza vaccine

www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/flu.html
Vaccines are routinely recommended for adults based on age, medical condition, and other indications

2017 Adult Immunization Schedule

- Influenza vaccination – Jun 2016
  - Not use LAIV in 2016–2017
  - Modified language on egg allergy
- Tdap vaccination – Oct 2016
  - Updated guidance for use during pregnancy
- HPV vaccination – Oct 2016
  - Updated dosing schedule
- Hepatitis B vaccination – Oct 2016
  - Updated definition of chronic liver disease
- Meningococcal vaccination – Jun and Oct 2016
  - Use of MenACWY for adults with HIV infection
  - Updated dosing schedule for MenB-FHbp
Recommended Immunization Schedule for Adults Aged 19 Years or Older, United States, 2017

In February 2017, the Recommended Immunization Schedule for Adults Aged 19 Years or Older, United States, 2017 was reviewed and approved by the Advisory Committee on Immunization Practices (ACIP) and approved by the Centers for Disease Control and Prevention (CDC). The 2017 adult immunization schedule was also reviewed and approved by the following professional medical organizations:

- American Academy of Family Physicians (www.aafp.org)
- American Academy of Pediatrics (www.aap.org)
- American College of Obstetricians and Gynecologists (www.acog.org)
- American College of Physicians (www.acp.org)
- American College of Preventive Medicine (www.acpm.org)


The adult immunization schedule does not include pregnancy-related medical conditions and other indications for which vaccines are recommended. The 2017 adult immunization schedule includes the following:

- Figure 1: Recommended immunization schedule for adults by age group.
- Figure 2: Recommended immunization schedule for adults by medical conditions and other indications.
- Table: Contraindications and precautions for vaccines routinely recommended for adults.

Consider the following information when reviewing the adult immunization schedule:

- The figures in the adult immunization schedule are updated with the most current information about vaccines, vaccine-preventable diseases, the schedule, and data from the Vaccine Adverse Event Reporting System. Vaccine adverse events reporting is a key part of the continual monitoring of the safety of vaccines. Vaccine adverse events reporting is a key part of the continual monitoring of the safety of vaccines.
- The recommended vaccines should be given as indicated, and the order in which the vaccines are given is determined by the importance of protection against each disease. The order of administration should be based on the importance of protection against each disease. The order of administration should be based on the importance of protection against each disease.
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Details on vaccines recommended for adults and required for military service can be found in the Adult Vaccine Schedule for Military Service at www.militaryvaccine.org. Additional CDC resources include:

- A summary of vaccination recommendations, evaluation of persons with medical conditions, and recommendations for specific situations can be found at www.cdc.gov/vaccines/hcp/ads.

Recommended schedule at www.cdc.gov/vaccines/schedules/hcp/adult/adult-immunization-schedule.pdf.

CDC
U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

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**Figure 1. Recommended immunization schedule for adults aged 19 years or older by age group, United States, 2017**

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>19-21 years</th>
<th>22-26 years</th>
<th>27-59 years</th>
<th>60-64 years</th>
<th>≥ 65 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza¹</td>
<td>1 dose annually</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Td/Tdap²</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MM³</td>
<td>1 or 2 doses depending on indication</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Var³</td>
<td>2 doses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HZV²</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 dose</td>
</tr>
<tr>
<td>HPV - Female⁴</td>
<td>2 doses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HPV - Male⁵</td>
<td>3 doses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCV13⁶</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 dose</td>
</tr>
<tr>
<td>PPSV23⁷</td>
<td>1 or 2 doses depending on indication</td>
<td></td>
<td></td>
<td></td>
<td>1 dose</td>
</tr>
<tr>
<td>HaP⁸</td>
<td>2 or 3 doses depending on vaccine</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HaP9⁸</td>
<td>3 doses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MenACWY or MCV⁴⁹⁴⁹</td>
<td>1 or more doses depending on indication</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MenB⁸</td>
<td>2 or 3 doses depending on vaccine</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hib¹⁰</td>
<td>1 or 2 doses depending on indication</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

² Recommended for adults who meet the age requirement, lack documentation of vaccination, or lack evidence of past infection.

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**Notes:**

- Vaccine Information Statements that explain benefits and risks of vaccines are available at www.vaccines.gov.
- Information and resources regarding vaccination of pregnant women are available at www.cdc.gov/vaccines/hcp/pregnancy.contraindication.html.
- Information on vaccine requirements and recommendations is available at www.cdc.gov/vaccines/schedules/hcp/individ.html.
- Additional recommendations for other immunization services providers are available at www.cdc.gov/vaccines/schedules/hcp/professionals.html.
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**Figures 1 and 2 should be read with the footnotes that contain important general information and considerations for special populations.**

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**References:**

### Figure 2. Recommended immunization schedule for adults aged 19 years or older by medical condition and other indications, United States, 2017

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Pregnancy*</th>
<th>Immune-compromising conditions†</th>
<th>HIV infection‡</th>
<th>Hepatitis C‡</th>
<th>Hepatitis B‡</th>
<th>Hereditary or acquired disorders§</th>
<th>Other indications</th>
<th>Other indications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza†</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>
<td>1 dose annually</td>
</tr>
<tr>
<td>Tetanus, diphtheria, and pertussis vaccination</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>
<td>1 dose annually</td>
</tr>
<tr>
<td>Human papillomavirus vaccine</td>
<td>3 doses through age 26 yrs</td>
<td>3 doses through age 26 yrs</td>
<td>3 doses through age 26 yrs</td>
<td>3 doses through age 26 yrs</td>
<td>3 doses through age 26 yrs</td>
<td>3 doses through age 26 yrs</td>
<td>3 doses through age 26 yrs</td>
<td>3 doses through age 26 yrs</td>
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<tr>
<td>Pneumococcal vaccine</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>
<td>1 dose</td>
</tr>
<tr>
<td>Hepatitis A vaccine</td>
<td>2 or 3 doses depending on indication</td>
<td>2 or 3 doses depending on indication</td>
<td>2 or 3 doses depending on indication</td>
<td>2 or 3 doses depending on indication</td>
<td>2 or 3 doses depending on indication</td>
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<td>2 or 3 doses depending on indication</td>
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<tr>
<td>Hepatitis B vaccine</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>
<td>3 doses</td>
</tr>
<tr>
<td>Measles, mumps, and rubella vaccination</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>
<td>1 dose</td>
</tr>
</tbody>
</table>

*Recommended for adults who meet the age requirement, lack documentation of vaccination, or lack evidence of past infection

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### Footnotes. Recommended immunization schedule for adults aged 19 years or older, United States, 2017

1. **Influenza vaccination**
   - **General information:** Adults aged 19 years and older who do not have chronic medical conditions should receive annual influenza vaccination with an inactivated vaccine, an adjuvanted vaccine, or coinfluenza vaccine. Inactivated influenza vaccine (IIV) is recommended for children aged 2 years or older, including children aged 6 months through 8 years with chronic medical conditions. Adjuvanted influenza vaccine (AIV) is recommended for children aged 2 years or older and can be administered to children aged 6 months through 18 years with chronic medical conditions who experience reactions to IIV. Coinfluenza vaccine (CIV) is recommended for children aged 6 months through 18 years and is not recommended for children aged 6 months through 23 months.
   - **Special considerations:** Adults aged 65 years and older, adults aged 50–64 years with chronic medical conditions, adults aged 19–64 years who smoke or have other chronic conditions, and adults aged 19–64 years who have active hepatitis C virus or HIV infection should receive annual influenza vaccination. Annual influenza vaccination is also recommended for adults aged 19–64 years who are at high risk of serious influenza complications, including those with a medical condition that increases the risk of serious influenza complications, those who have been admitted to the hospital with pneumonia or influenza within the past 6 months, or those who are at high risk of hospitalization due to chronic medical conditions, such as those with asthma, diabetes, heart disease, or other chronic medical conditions.
   - **Estimated population:** Annual influenza vaccination is recommended for approximately 100 million adults in the United States.

2. **Tuberculosis, diphtheria, and pertussis vaccination**
   - **General information:** Adults aged 19 years and older who do not have chronic medical conditions should receive annual pertussis vaccine (Td or Tdap) or tetanus, diphtheria, and pertussis vaccine (Tdap) when they are 18 years of age or older. Annual pertussis vaccine is recommended for adults aged 19–64 years who have not received tetanus toxoid conjugate vaccine (TT-conjugate vaccine) within the past 10 years. Annual tetanus toxoid conjugate vaccine is recommended for adults aged 19–64 years who have not received tetanus toxoid conjugate vaccine within the past 10 years. Annual tetanus toxoid conjugate vaccine is recommended for adults aged 19–64 years who have not received tetanus toxoid conjugate vaccine within the past 10 years.
   - **Special considerations:** Adults aged 19–64 years who have not received tetanus toxoid conjugate vaccine within the past 10 years should receive annual tetanus toxoid conjugate vaccine. Annual tetanus toxoid conjugate vaccine is recommended for adults aged 19–64 years who have not received tetanus toxoid conjugate vaccine within the past 10 years. Annual tetanus toxoid conjugate vaccine is recommended for adults aged 19–64 years who have not received tetanus toxoid conjugate vaccine within the past 10 years.

3. **Human papillomavirus vaccination**
   - **General information:** Adults aged 19–26 years who have not received human papillomavirus (HPV) vaccine should receive annual HPV vaccine when they are 18 years of age or older. Annual HPV vaccine is recommended for adults aged 19–26 years who have not received HPV vaccine within the past 10 years. Annual HPV vaccine is recommended for adults aged 19–26 years who have not received HPV vaccine within the past 10 years. Annual HPV vaccine is recommended for adults aged 19–26 years who have not received HPV vaccine within the past 10 years.
   - **Special considerations:** Adults aged 19–26 years who have not received HPV vaccine within the past 10 years should receive annual HPV vaccine. Annual HPV vaccine is recommended for adults aged 19–26 years who have not received HPV vaccine within the past 10 years. Annual HPV vaccine is recommended for adults aged 19–26 years who have not received HPV vaccine within the past 10 years. Annual HPV vaccine is recommended for adults aged 19–26 years who have not received HPV vaccine within the past 10 years.
7. Preterm delivery

8. Cervical cancer

9. Hepatitis B vaccination

10. Hemorrhagic vaccination

11. Hemophagocytic lymphohistiocytosis

Table. Contraindications and precautions for vaccines recommended for adults 19 years of age or older

1. A vector contains the viral antigen
2. Vaccine contains a live virus

Additional contraindications and precautions for specific vaccines

Adverse events associated with vaccination

Table: Contraindications and precautions for vaccines recommended for adults 19 years of age or older

The Advisory Committee on Immunization Practices (ACIP) recommendations and package insert for each vaccine provide detailed information about contraindications and precautions related to vaccine. Contraindications are conditions that absolutely contraindicate vaccination, such as having the same disease from which the vaccine is designed to prevent. Precautions are conditions that may cause a reduced or altered vaccine effect if vaccination is given, such as a fever or malaise. These contraindications and precautions are updated annually based on the latest available evidence. This table provides a summary of the contraindications and precautions for vaccines recommended for adults 19 years of age or older. For specific vaccines and their contraindications and precautions, please refer to the ACIP recommendations and package insert for each vaccine.

Contraindications and precautions for vision methods recommended for adults

Table: Contraindications and precautions for vaccines recommended for adults 19 years of age or older

The Advisory Committee on Immunization Practices (ACIP) recommendations and package insert for each vaccine provide detailed information about contraindications and precautions related to vaccine. Contraindications are conditions that absolutely contraindicate vaccination, such as having the same disease from which the vaccine is designed to prevent. Precautions are conditions that may cause a reduced or altered vaccine effect if vaccination is given, such as a fever or malaise. These contraindications and precautions are updated annually based on the latest available evidence. This table provides a summary of the contraindications and precautions for vaccines recommended for adults 19 years of age or older. For specific vaccines and their contraindications and precautions, please refer to the ACIP recommendations and package insert for each vaccine.

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Influenza Vaccination Recommendations

- Annual influenza vaccination recommended for persons ≥6 mos
  - Age-appropriate IIV standard dose
  - Options include high-dose IIV for ≥65y; adjuvanted IIV for ≥65y; intradermal IIV for 18–64y; cell culture-based IIV for ≥18y; RIV for ≥18y
- “Providers should offer vaccination by the end of October, if possible” (previously “by October”)
- Changes to egg allergy recommendations
  - If hives-only, use any licensed age-appropriate influenza vaccine (IIV or RIV)
  - If other than hives, may use any age-appropriate vaccine in medical setting

Tdap Vaccination Recommendations

- Adults recommended to receive Tdap if not received before, then Td booster every 10 yrs
- Infants of mothers vaccinated with Tdap were born with significantly higher anti-pertussis antibodies compared to infants of unvaccinated mothers
  - If given within the 27–36 weeks administration window
  - Concentration of anti-pertussis antibodies in infant cord blood higher when mothers vaccinated earlier in this window
  - Longer exposure to vaccine allows higher vaccine-induced antibody levels produced by mother and transferred to infant
- Tdap should be given at every pregnancy preferably during early part of gestational weeks 27–36
HPV Vaccination Recommendations

- Adult females through age 26 and adult males through age 21 should receive 3 doses of HPV vaccine at 0, 1–2, 6 mos, if not previously vaccinated; adult males 22–26 may be vaccinated
- Noninferior immunogenicity with 2 doses (0, 6 or 12 mos) in girls and boys age 9–14 compared to 3 doses (0, 2, 6 mos) in females age 16–26
- 2 doses of (0, 6–12 mos) if age <15, 3 doses (0, 1–2, 6 mos) if age ≥15
- Young adults who did not complete HPV series before age 15
  - Did not start – give 3 doses of HPV vaccine
  - Received 1 dose – give 1 dose HPV vaccine
  - Received 2 doses but <5 mos apart – give 1 dose HPV vaccine
  - Received 2 doses ≥5 mos apart – considered adequately vaccinated

MMPR 2016;65(49):1405-1408

Hepatitis B Vaccination Recommendations

- Adults who seek protection may receive HepB at 0, 1, 6 mos (options for alternative dosing schedule)
- Recommended
  - At risk for sexual transmission or percutaneous/mucosal exposure
  - MSM
  - Chronic liver disease, end-stage kidney disease, HIV infection
  - Pregnant women at risk in last 6 mos
  - Certain facility settings, international travel
- “Adults with chronic liver disease including, but not limited to, hepatitis C virus infection, cirrhosis, fatty liver disease, alcoholic liver disease, autoimmune hepatitis, and an alanine aminotransferase (ALT) or aspartate aminotransferase (AST) level greater than twice the upper limit of normal should receive a HepB series”

MMPR 2006;55(RR16):1-25

Revised description of chronic liver disease is pending publication
Hepatitis A Vaccination Recommendations

- Adults who seek protection from hepatitis A
- Recommended
  - Chronic liver disease
  - Receive clotting factor concentrates
  - MSM
  - Use injection or non-injection drugs
  - Laboratory workers at risk
  - International travel to, adoptees from certain countries

MMWR 2006;55(RR16):1-25

Meningococcal Vaccination Recommendations

- MenACWY
  - Recommended for adults and adolescents at risk (asplenia, complement deficiencies, HIV infection, microbiologists, outbreak settings, international travel, first year college, other); booster if remain at risk
- MenB
  - Recommended for persons age ≥10 at increased risk; healthy 16–23 (preferred age 16–18) may receive MenB (no preference between MenB-FHbp and MenB-4C)
  - MenB-4C – 2 doses ≥1 mo apart
  - MenB-FHbp – 3 doses at 0, 1–2, 6 mos if increased risk; healthy 16–23y at no increased risk may receive 2 doses at 0, 6 months

Publication pending
### Table 1. Medical conditions or other indications for administration of PCV13 and PPSV23 for adults

<table>
<thead>
<tr>
<th>Medical indication</th>
<th>Underlying medical condition</th>
<th>PCV13 for ≥18 years Recommended</th>
<th>PPSV23* for 19 through 64 years Recommended</th>
<th>PCV13 at ≥65 years Recommended</th>
<th>PPSV23 at ≥65 years Recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>None of the below</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Immunocompromised persons</td>
<td></td>
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<tr>
<td></td>
<td>Rashful</td>
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<td></td>
<td>Chronic heart disease</td>
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<td></td>
<td>Chronic lung disease</td>
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<td></td>
<td>Diabetes mellitus</td>
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<td></td>
<td>Cystic fibrosis</td>
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<td></td>
<td>Congenital or acquired scoliosis</td>
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<tr>
<td></td>
<td>Congenital or acquired immunodeficiency</td>
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<td></td>
<td>History of meningitis</td>
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<td></td>
<td>History of meningococcal disease</td>
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<td></td>
<td>History of gonorrhea</td>
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<td></td>
<td>History of syphilis</td>
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<td></td>
<td>History of tuberculosis</td>
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<tr>
<td></td>
<td>History of leprosy</td>
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<tr>
<td></td>
<td>History of other infections</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immunocompromised persons</td>
<td></td>
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<tr>
<td></td>
<td>Chronic renal failure</td>
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<tr>
<td></td>
<td>Congenital or acquired immunodeficiency</td>
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<tr>
<td></td>
<td>Chronic obstructive pulmonary disease</td>
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<td></td>
<td>Congenital heart disease</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Congenital immunodeficiency</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

*The PPSV23 is not generally recommended for persons aged ≥65 years. All adults aged ≥65 years should receive a dose of PCV13 as part of the age-specified doses of PPSV23 regardless of previous history of vaccination with pneumococcal vaccine. The additional dose of PPSV23 should be given ≥5 years after the previous dose of PPSV23 if the prior dose was given ≥5 years before the current dose.

### Pneumococcal Vaccination Recs... Distilled

- **Age ≥65**
  - Give PCV13, then PPSV23 in ≥1 yr

- **Immunocompromised (20x risk)**
  - Give PCV13, then PPSV23 in ≥8 wks
  - Give second PPSV23 ≥5 yrs after first PPSV23
  - Follow recommendations at age ≥65 as appropriate

- **Chronic disease, alcoholism, smoker (3–7x risk)**
  - Give PPSV23
  - Follow recommendations at age ≥65 as appropriate
Zoster Vaccination Recommendations

- 1 dose at age ≥60, regardless of past episodes of zoster
- Adults age ≥60 with chronic medical condition may receive vaccine unless contraindicated (severe immunodeficiency)

Millions of adults get diseases for which we have vaccines
Adult Vaccination Coverage, United States, 2015

- Published May 2017 – data sources
  - Non-influenza vaccination coverage – National Health Interview Survey (NHIS)
  - Influenza vaccination coverage – Behavioral Risk Factor Surveillance System (BRFSS)

- Key findings
  - Pneumococcal vaccination for 19–64y high risk: 23.0% (↑2.8%)
  - Tdap for ≥19y: 23.1% (↑3.1%); adults living with infants <1y: 41.9% (↑10.0%)
  - Shingles vaccination for ≥60y: 30.6% (↑2.7%)
  - Otherwise similar to 2014 estimates:
    - Pneumococcal vaccination for ≥65y: 63.6%
    - Hepatitis B vaccination for 19–59 years among persons with diabetes: 24.4%
  - Disparities by race and ethnicity, education, income, insurance

https://www.cdc.gov/vaccines/imz-managers/coverage/adultvaxview/coverage-estimates/2015.html
https://www.cdc.gov/flu/fluvaxview/coverage-1516estimates.htm
https://www.cdc.gov/mmwr/volumes/66/ss/pdfs/ss6611.pdf


* The Healthy People 2020 target for coverage is 90% for all vaccines with the exception of rotavirus (80%) and HepA (85%)
† DTP (3+) is not a Healthy People 2020 objective. DTaP (4+) is used to assess Healthy People 2020 objectives
§ Reflects 3+ doses through 2008, and Full Series (3 or 4 doses depending on type of vaccine received) 2009 and later

**Figure 1. Seasonal Flu Vaccination Coverage by Age Group and Season, United States, 2009–2016**

Error bars represent 95% confidence intervals around the estimates. The 2009-10 estimates do not include the influenza A (H1N1)pdm09 monovalent vaccine. Starting with the 2011-12 season, adult estimates reflect changes in BRFSS survey methods: the addition of cellular telephone samples and a new weighting method.

www.cdc.gov/flu
Influenza Vaccination Coverage Among Pregnant Women, 2010-11 through 2016-17 Influenza Seasons

Vaccination Coverage Among Older Adults, by Race/Ethnicity, 2015

<table>
<thead>
<tr>
<th></th>
<th>Influenza Adults ≥65 years 2014–2015</th>
<th>Pneumonia Adults ≥65 years 2015</th>
<th>Tdap Adults ≥65 years 2015</th>
<th>Zoster Adults ≥60 years 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>75.1%</td>
<td>68.1%</td>
<td>18.2%</td>
<td>34.6%</td>
</tr>
<tr>
<td>Black</td>
<td>64.3%</td>
<td>50.2%</td>
<td>9.7%</td>
<td>13.6%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>64.1%</td>
<td>41.7%</td>
<td>9.1%</td>
<td>16.0%</td>
</tr>
<tr>
<td>Asian</td>
<td>83.5%</td>
<td>49.0%</td>
<td>13.8%</td>
<td>26.0%</td>
</tr>
<tr>
<td>Overall</td>
<td>73.5%</td>
<td>63.6%</td>
<td>16.5%</td>
<td>30.6%</td>
</tr>
</tbody>
</table>

Williams et al. Surveillance of Vaccination Coverage Among Adult Populations—United States, 2015. MMWR 2017; 66(11);1–28
Health Insurance Status and Vaccination Coverage

- 87% reported some type of health insurance
- Vaccination coverage 2–5x higher with health insurance for influenza, Tdap, zoster, and HPV vaccinations
- Among insured persons with ≥10 physician contacts in past 12 months, 24–89% missing recommended vaccine
  - 65% adults with diabetes missing hepatitis B vaccination
  - 61% adults 19–64y at high risk missing pneumococcal vaccine

Williams WW et al. MMWR 2016;65(1):1–36

Adult Knowledge and Interest in Vaccination

<table>
<thead>
<tr>
<th>Which of the following best describes you?</th>
<th>Tdap (19+)</th>
<th>Pneumo (65+)</th>
<th>Zoster (60+)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am not aware that I need this vaccine.</td>
<td>52%</td>
<td>22%</td>
<td>18%</td>
</tr>
<tr>
<td>I am aware that I need this vaccine, but haven't thought about getting it.</td>
<td>6%</td>
<td>3%</td>
<td>6%</td>
</tr>
<tr>
<td>I am considering getting this vaccine, but have not yet decided.</td>
<td>5%</td>
<td>3%</td>
<td>9%</td>
</tr>
<tr>
<td>I have decided to get this vaccine, but have not yet gotten vaccinated.</td>
<td>3%</td>
<td>4%</td>
<td>8%</td>
</tr>
<tr>
<td>I have decided not to get this vaccine.</td>
<td>13%</td>
<td>13%</td>
<td>19%</td>
</tr>
<tr>
<td>I have gotten this vaccine.</td>
<td>22%</td>
<td>56%</td>
<td>39%</td>
</tr>
</tbody>
</table>

Porter Novelli 2015. ConsumerStyles (Fall) unpublished
Meta-analysis of interventions to increase immunization for adults

<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 preventive)</td>
<td>16.0</td>
</tr>
<tr>
<td>Provider reminder</td>
<td>3.8</td>
</tr>
<tr>
<td>Patient financial incentive</td>
<td>3.4</td>
</tr>
<tr>
<td>Provider education</td>
<td>3.2</td>
</tr>
<tr>
<td>Patient reminder</td>
<td>2.5</td>
</tr>
<tr>
<td>Patient education</td>
<td>1.3</td>
</tr>
</tbody>
</table>


Standards for Adult Immunization Practice

- Developed in 1990 to improve vaccine delivery to adults, most recently updated in 2014 by National Vaccine Advisory Committee
- All HCPs, including those who do not provide vaccine services, have role in ensuring patients up-to-date on vaccines
- Call to action for HCPs for adults to
  - **ASSESS** vaccination status of all patients at every clinical encounter
  - Strongly **RECOMMEND** vaccines that patients need
  - **ADMINISTER** needed vaccines or **REFER** to a vaccine service provider
  - **DOCUMENT** vaccines received by patients in state vaccine registries
- Promoted through National Adult and Influenza Immunization Summit (NAIIS)

Public Health Reports 2014;129:115–123
Vaccination Uptake by Provider Recommendation and Offer

Influenza vaccination coverage before and during pregnancy among women pregnant any time during October 1, 2016 – January 31, 2017 and who visited a health care provider at least once since July 2016, by provider recommendation or offer

<table>
<thead>
<tr>
<th>Offered</th>
<th>Recommended but not offered</th>
<th>No recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>n = 1,243</td>
<td>n = 223</td>
<td>n = 371</td>
</tr>
</tbody>
</table>

71% 44% 15%

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Percent Vaccinated

CDC Internet Panel Survey 2017

Adult Vaccine Quiz
http://vaccine.healthmap.org

HCP Series: Implementing Adult Immunization Practice Standards

www.cdc.gov/vaccines/AdultStandards
Checklist for temporary flu vaccination clinics
What else happened?
- Inadequate dosing
- Inappropriate transport, storage, and handling

Then what?
- Testing for bloodborne pathogens
- Hepatitis B immunization
- Revaccination for influenza
- Follow up with NJ Board of Nursing
- Work with media to address concerns
Vaccination in Temporary Settings

- Satellite, temporary, off-site vaccination clinics
  - Schools, community centers, workplace, churches, other non-clinical settings
  - Convenience, also access for hard-to-reach populations
  - 17.6% U.S. adults get flu vaccine at workplace¹

- Challenges
  - Training and oversight
  - Vaccine transport, storage, and handling
  - Monitoring proper vaccine administration techniques
  - Managing documentation

- Possible adverse outcomes
  - Unsafe environment
  - Vaccine temperature excursions
  - Vaccine administration errors

¹ www.cdc.gov/flu/fluview/nifs-estimates-nov2016.htm

Safety checklists are validated risk reduction tools

- Sharps Injury Risk Reduction
- Prevention of “Wrong Site” Surgeries
- Aviation Safety
- Mine Safety and Inspections
- Laboratory Safety
- Environmental Services
- The Checklist Manifesto (Atul Gawande)

Why not vaccination clinics?
Checklist of Best Practices for Vaccination Clinics Held at Satellite, Temporary, or Off-site Locations

- Step-by-step guide for coordinators or supervisors for vaccination clinics
- Components
  - Vaccine shipment, transport, storage & handling
  - Clinic preparation
  - Vaccine administration
  - Vaccination documentation
- The Pledge
  - Signed by organization executive
  - Submitted to NAIIS Clinic Pledge Coordinator: vaxclinicpledge@izsummitpartners.org

The Pledge for Organizations Implementing Vaccination Clinics Held at Satellite, Temporary, or Off-site Locations

By agreeing to and abiding by the NAIIS Pledge in the section below, our organization agrees to perform the following duties:

- Follow all best practices for on-site vaccination clinic, as outlined in the Checklist of Best Practices for Vaccination Clinics Held at Satellite, Temporary, or Off-site Locations.
- Submit the Pledge form signed by the organization executive to NAIIS Clinic Pledge Coordinator: vaxclinicpledge@izsummitpartners.org.
Postscript

- Organization in case study
  - Operates 260 travel clinics, administers >600k vaccines per year
  - National nurse network, hires >1000 additional surge nurses each year
  - Provides vaccination services in offices, hotels, prisons, farms, warehouses, ships, disaster responses

- Nurses get frustrated when in non-standard locations
  - Training for management of direct shipments and vaccine transportation
  - Develop Wellness Kits and customized Thermosafe coolers
  - Checklist utilization goal 80% in Year 2

Where to find the checklist

www.izsummitpartners.org/resources/
General Best Practice Guidelines for Immunization

Best Practices Guidance of the Advisory Committee on Immunization Practices (ACIP)

Kroger AT, Duchin J, Vázquez M

1. Introduction

The Centers for Disease Control and Prevention (CDC) recommends routine vaccination to prevent 17 vaccine-preventable diseases that occur in infants, children, adolescents, or adults. This report provides information for clinicians and other health care providers about concerns that commonly arise when vaccinating persons of various ages.

Injury to musculoskeletal structure of shoulder
- Injection of vaccine antigen
- Trauma caused by needle in bursa
- Shoulder pain and limited range of motion

Added to Vaccine Injury Compensation Table in March 2017

Vaccine Adverse Event Reporting System

https://vaers.hhs.gov/reportevent.html

Vaccine Administration Best Practices
IM Injection in Deltoid Muscle

- Proper landmarks and technique
- Proper needle length based on age, size

S Foster, M David. Vaccine administration: Preventing serious shoulder injuries. JAPhA 2013
Vaccine administration e-Learn

- Online education module outlining vaccine administration best practices
  - Demonstration videos
  - Knowledge checks to reinforce information
  - Job aids and other printable resources
- Target audiences are nurses and medical assistants
- 1 hour continuing education

www.cdc.gov/vaccines/hcp/admin/admin-protocols.html
Vaccine administration resources for health care workers

www.cdc.gov/vaccines/hcp/admin/resource-library.html

Campaign plans and strategies for 2017–2018 flu season
Key Messages

Consumers
- Flu is a serious illness
- Flu vaccine is best protection available against flu
- Talk to your doctor about getting flu vaccine for your family
- Flu vaccine is very safe (myth busting)

Health Care Providers
- Flu is a serious illness
- Flu vaccine is first and most important step to give patients best protection this flu season
- Every visit with patient is an opportunity to recommend flu vaccine

Addressing Misconceptions
- Flu vaccine very safe, millions given every year
- Flu vaccine cannot cause flu
- People may experience side effects (slight fever, etc.) after flu vaccine, explain why
- Put side effects into context with potential risks and outcomes of flu
- Flu vaccine protects those around you
- Highlight other potential “costs” of influenza
Digital Events

- #FightFlu
- Social Media Blitz
  - Kickoff Thunderclap
  - AMA on Reddit’s Medicine page
  - Twitter stories (hashtag event)
  - Facebook Frame
  - Flu Fighter Stories
- Medscape Facebook Live (October)
- Blog Relay (November)

Digital Toolkit: “Campaign in a Box”

1-stop shop for seasonal flu vaccination materials

- Important dates and events
- Messages to share (sample social media and newsletter content)
- Print-ready materials (posters and fact sheets)
- Web material (badges, widgets, microsite)
- Social media images and GIFs

Messaging

**Take 3 Actions to Fight the Flu**

**Get Yourself and Your Family Vaccinated!**

**Take Everyday Preventive Actions to Help Stop the Spread of Flu Viruses!**

**Take Antiviral Drugs if Your Doctor Prescribes Them!**

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For more information, contact CDC
1-800-CDC-INFO (232-4636)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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