# National Adult Immunization Update and Latest Recommendations

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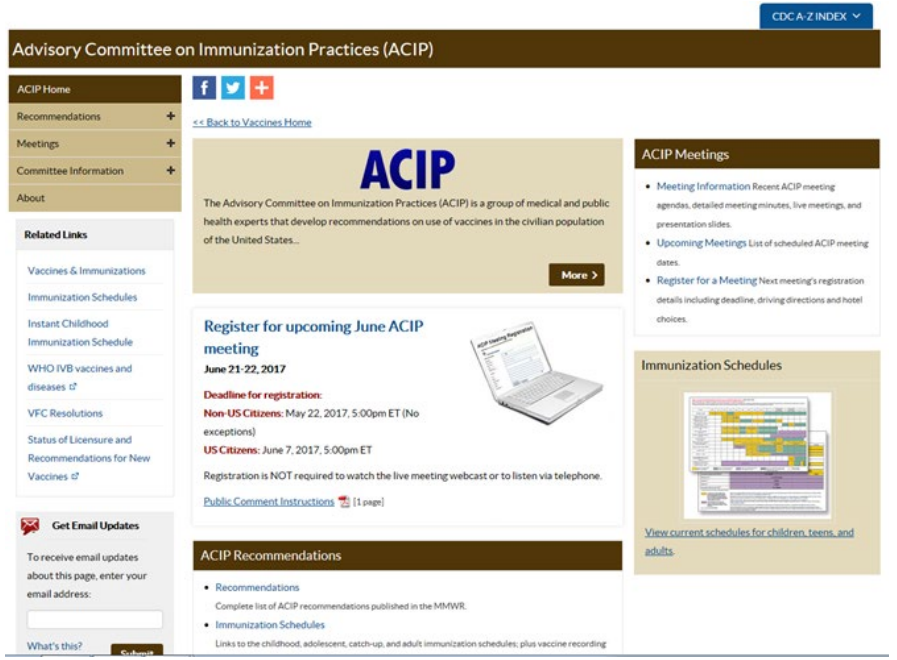
# Disclosures

- Andrew Kroger is a federal government employee with no financial interest or conflict with the manufacturer of any product named in this presentation.
- I will not discuss any off-label uses for vaccines.
- I will not discuss any vaccines not approved by FDA.
- The use of trade names is for identification purposes

only and does not imply endorsement by the ACIP or CDC.

# Disclosures

- The recommendations to be discussed are primarily those of the Advisory Committee on Immunization Practices (ACIP).
  - composed of 15 experts in clinical medicine and public health
  - provides guidance on use of vaccines and other biologic products to DHHS, CDC, and the U.S. Public Health Service




Next ACIP Meeting

June 22 and 23, 2022

http://www.cdc.gov/vaccines/acip/meetings/upcoming-dates.html

# Overview

- Schedule overview
- Zoster vaccine
- Hepatitis B vaccine
- Pneumococcal vaccines
- Influenza vaccine
- Ebola vaccine
- Smallpox/Monkeypox vaccine

# 2022 ACIP Schedules

# Recommended Adult Immunization Schedule
## for ages 19 years or older

UNITED STATES
**2022**

## How to use the adult immunization schedule

**1** Determine recommended vaccinations by age **(Table 1)**

**2** Assess need for additional recommended vaccinations by medical condition or other indication **(Table 2)**

**3** Review vaccine types, frequencies, intervals, and considerations for special situations **(Notes)**

**4** Review contraindications and precautions for vaccine types **(Appendix)**

### Vaccines in the Adult Immunization Schedule*

| Vaccine | Abbreviation(s) | Trade name(s) |
|---|---|---|
| *Haemophilus influenzae* type b vaccine | Hib | ActHIB®<br>Hiberix®<br>PedvaxHIB® |
| Hepatitis A vaccine | HepA | Havrix®<br>Vaqta® |
| Hepatitis A and hepatitis B vaccine | HepA-HepB | Twinrix® |
| Hepatitis B vaccine | HepB | Engerix-B®<br>Recombivax HB®<br>Heplisav-B® |
| Human papillomavirus vaccine | HPV | Gardasil 9® |
| Influenza vaccine (inactivated) | IIV4 | Many brands |
| Influenza vaccine (live, attenuated) | LAIV4 | FluMist® Quadrivalent |
| Influenza vaccine (recombinant) | RIV4 | Flublok® Quadrivalent |
| Measles, mumps, and rubella vaccine | MMR | M-M-R II® |
| Meningococcal serogroups A, C, W, Y vaccine | MenACWY-D<br>MenACWY-CRM<br>MenACWY-TT | Menactra®<br>Menveo®<br>MenQuadfi® |
| Meningococcal serogroup B vaccine | MenB-4C<br>MenB-FHbp | Bexsero®<br>Trumenba® |
| Pneumococcal 15-valent conjugate vaccine | PCV15 | Vaxneuvance™ |
| Pneumococcal 20-valent conjugate vaccine | PCV20 | Prevnar 20™ |
| Pneumococcal 23-valent polysaccharide vaccine | PPSV23 | Pneumovax 23® |
| Tetanus and diphtheria toxoids | Td | Tenivac®<br>Tdvax™ |
| Tetanus and diphtheria toxoids and acellular pertussis vaccine | Tdap | Adacel®<br>Boostrix® |
| Varicella vaccine | VAR | Varivax® |
| Zoster vaccine, recombinant | RZV | Shingrix |

*Administer recommended vaccines if vaccination history is incomplete or unknown. Do not restart or add doses to vaccine series if there are extended intervals between doses. The use of trade names is for identification purposes only and does not imply endorsement by the ACIP or CDC.

Recommended by the Advisory Committee on Immunization Practices (www.cdc.gov/vaccines/acip) and approved by the Centers for Disease Control and Prevention (www.cdc.gov), American College of Physicians (www.acponline.org), American Academy of Family Physicians (www.aafp.org), American College of Obstetricians and Gynecologists (www.acog.org), American College of Nurse-Midwives (www.midwife.org), and American Academy of Physician Associates (www.aapa.org), and Society for Healthcare Epidemiology of America (www.shea-online.org).

### Report

- Suspected cases of reportable vaccine-preventable diseases or outbreaks to the local or state health department
- Clinically significant postvaccination reactions to the Vaccine Adverse Event Reporting System at www.vaers.hhs.gov or 800-822-7967

### Injury claims

All vaccines included in the adult immunization schedule except pneumococcal 23-valent polysaccharide (PPSV23) and zoster (RZV) vaccines are covered by the Vaccine Injury Compensation Program. Information on how to file a vaccine injury claim is available at www.hrsa.gov/vaccinecompensation.

### Questions or comments

Contact www.cdc.gov/cdc-info or 800-CDC-INFO (800-232-4636), in English or Spanish, 8 a.m.–8 p.m. ET, Monday through Friday, excluding holidays.

Download the CDC Vaccine Schedules app for providers at www.cdc.gov/vaccines/schedules/hcp/schedule-app.html.

### Helpful information

- Complete Advisory Committee on Immunization Practices (ACIP) recommendations: www.cdc.gov/vaccines/hcp/acip-recs/index.html
- *General Best Practice Guidelines for Immunization* (including contraindications and precautions): www.cdc.gov/vaccines/hcp/acip-recs/general-recs/index.html
- Vaccine information statements: www.cdc.gov/vaccines/hcp/vis/index.html
- Manual for the Surveillance of Vaccine-Preventable Diseases (including case identification and outbreak response): www.cdc.gov/vaccines/pubs/surv-manual
- Travel vaccine recommendations: www.cdc.gov/travel
- Recommended Child and Adolescent Immunization Schedule, United States, 2022: www.cdc.gov/vaccines/schedules/hcp/child-adolescent.html
- ACIP Shared Clinical Decision-Making Recommendations: www.cdc.gov/vaccines/acip/acip-scdm-faqs.html

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

Scan QR code for access to online schedule

CS310021-A

## Table 1 Recommended Adult Immunization Schedule by Age Group, United States, 2022

| Vaccine | 19–26 years | 27–49 years | 50–64 years | ≥65 years |
|---|---|---|---|---|
| **Influenza inactivated** (IIV4) or **Influenza recombinant** (RIV4) | 1 dose annually | | | |
| or | or | | | |
| **Influenza live, attenuated** (LAIV4) | 1 dose annually | | | |
| **Tetanus, diphtheria, pertussis** (Tdap or Td) | 1 dose Tdap each pregnancy; 1 dose Td/Tdap for wound management (see notes) | | | |
| | 1 dose Tdap, then Td or Tdap booster every 10 years | | | |
| **Measles, mumps, rubella** (MMR) | 1 or 2 doses depending on indication (if born in 1957 or later) | | | |
| **Varicella** (VAR) | 2 doses (if born in 1980 or later) | | 2 doses | |
| **Zoster recombinant** (RZV) | 2 doses for immunocompromising conditions (see notes) | | 2 doses | |
| **Human papillomavirus** (HPV) | 2 or 3 doses depending on age at initial vaccination or condition | 27 through 45 years | | |
| **Pneumococcal** (PCV15, PCV20, PPSV23) | 1 dose PCV15 followed by PPSV23 OR 1 dose PCV20 (see notes) | | | 1 dose PCV15 followed by PPSV23 OR 1 dose PCV20 |
| **Hepatitis A** (HepA) | 2 or 3 doses depending on vaccine | | | |
| **Hepatitis B** (HepB) | 2, 3, or 4 doses depending on vaccine or condition | | | |
| **Meningococcal A, C, W, Y** (MenACWY) | 1 or 2 doses depending on indication, see notes for booster recommendations | | | |
| **Meningococcal B** (MenB) | 2 or 3 doses depending on vaccine and indication, see notes for booster recommendations | | | |
| | 19 through 23 years | | | |
| ***Haemophilus influenzae* type b** (Hib) | 1 or 3 doses depending on indication | | | |

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

Recommended vaccination for adults with an additional risk factor or another indication

Recommended vaccination based on shared clinical decision-making

No recommendation/ Not applicable

## Table 2 Recommended Adult Immunization Schedule by Medical Condition or Other Indication, United States, 2022

| Vaccine | Pregnancy | Immuno-compromised (excluding HIV infection) | HIV infection CD4 percentage and count | | Asplenia, complement deficiencies | End-stage renal disease, or on hemodialysis | Heart or lung disease; alcoholism[1] | Chronic liver disease | Diabetes | Health care personnel[2] | Men who have sex with men |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | <15% or <200 mm³ | ≥15% and ≥200 mm³ | | | | | | | |
| IIV4 or RIV4 | 1 dose annually | | | | | | | | | | |
| or | | | | | | | | | | or | |
| LAIV4 | Contraindicated | | | | | Precaution | | | | 1 dose annually | |
| Tdap or Td | 1 dose Tdap each pregnancy | 1 dose Tdap, then Td or Tdap booster every 10 years | | | | | | | | | |
| MMR | Contraindicated* | Contraindicated | 1 or 2 doses depending on indication | | | | | | | | |
| VAR | Contraindicated* | Contraindicated | | | 2 doses | | | | | | |
| RZV | | 2 doses at age ≥19 years | | | 2 doses at age ≥50 years | | | | | | |
| HPV | Not Recommended* | 3 doses through age 26 years | | | 2 or 3 doses through age 26 years depending on age at initial vaccination or condition | | | | | | |
| Pneumococcal (PCV15, PCV20, PPSV23) | | 1 dose PCV15 followed by PPSV23 OR 1 dose PCV20 (see notes) | | | | | | | | | |
| HepA | | | | | 2 or 3 doses depending on vaccine | | | | | | |
| HepB | 3 doses (see notes) | 2, 3, or 4 doses depending on vaccine or condition | | | | | | | | | |
| MenACWY | 1 or 2 doses depending on indication, see notes for booster recommendations | | | | | | | | | | |
| MenB | Precaution | 2 or 3 doses depending on vaccine and indication, see notes for booster recommendations | | | | | | | | | |
| Hib | | 3 doses HSCT[3] recipients only | | | 1 dose | | | | | | |

- Recommended vaccination for adults who meet age requirement, lack documentation of vaccination, or lack evidence of past infection
- Recommended vaccination for adults with an additional risk factor or another indication
- Recommended vaccination based on shared clinical decision-making
- Precaution—vaccination might be indicated if benefit of protection outweighs risk of adverse reaction
- Contraindicated or not recommended—vaccine should not be administered.
  *Vaccinate after pregnancy.
- No recommendation/ Not applicable

**1.** Precaution for LAIV4 does not apply to alcoholism. **2.** See notes for influenza; hepatitis B; measles, mumps, and rubella; and varicella vaccinations. **3.** Hematopoietic stem cell transplant.

# Recombinant Zoster Vaccine (RZV)

Morbidity and Mortality Weekly Report

## Use of Recombinant Zoster Vaccine in Immunocompromised Adults Aged ≥19 Years: Recommendations of the Advisory Committee on Immunization Practices — United States, 2022

Tara C. Anderson, DVM, PhD[1]; Nina B. Masters, PhD[1,2]; Angela Guo, MPH, MBA[1]; Leah Shepersky, MPH[1]; Andrew J. Leidner, PhD[1]; Grace M. Lee, MD[4]; Camille N. Kotton, MD[5]; Kathleen L. Dooling, MD[1]

Zoster Vaccine Recombinant, Adjuvanted (Shingrix, GlaxoSmithKline [GSK]) is a 2-dose (0.5 mL each) subunit vaccine containing recombinant glycoprotein E in combination with adjuvant ($AS01_B$) that was licensed in the United States for prevention of herpes zoster for adults aged ≥50 years by the Food and Drug Administration (FDA) and recommended for immunocompetent adults aged ≥50 years by the Advisory Committee on Immunization Practices (ACIP) in 2017* (*1*). On July 23, 2021, the FDA expanded the indication for recombinant zoster vaccine (RZV) to include adults aged ≥18 years who are or will be at increased risk for herpes zoster because of immunodeficiency or immunosuppression caused by known disease or therapy (*2*). On October 20, 2021, ACIP recommended 2 doses of RZV for the prevention of herpes zoster and related complications in adults aged ≥19 years† who are or will be immunodeficient or immunosuppressed because of disease or therapy. RZV is the first herpes zoster vaccine approved for use in immunocompromised persons. With moderate to high vaccine efficacy and an acceptable safety profile, RZV has the potential to prevent considerable herpes zoster incidence and related complications. This report updates previous ACIP recommendations for the prevention of herpes zoster (*1,3*).

Herpes zoster is a painful, cutaneous eruption, usually involving one to three adjacent dermatomes,§ resulting from reactivation of latent varicella-zoster virus. The incidence of herpes zoster and related complications (including the most common complication of postherpetic neuralgia) increase with age (*3–5*). The risk for herpes zoster and related complications is generally higher in immunocompromised compared with immunocompetent adults, although there is heterogeneity within and across immunocompromised groups (*6,7*). The risk for herpes zoster among younger adults with certain immunocompromising conditions can be comparable to or higher than that in the general adult population aged >50 years (*6,7*). Because immunosuppression and immunodeficiency were contraindications for the previously available vaccine, zoster vaccine live,¶ and RZV was originally recommended for immunocompetent adults aged ≥50 years, there has been an unmet need for vaccination against herpes zoster in immunocompromised adults.

During December 2017–October 2021, the ACIP Herpes Zoster Work Group participated in monthly or bimonthly teleconferences to review herpes zoster epidemiology and evidence for the efficacy and safety of RZV in immunocompromised adults. These topics were discussed during four ACIP meetings in 2021. To guide its deliberations, ACIP used the Evidence to Recommendations Framework and the Grading of Recommendations, Assessment, Development and Evaluation (GRADE) approach (*8*) to evaluate possible benefits (prevention of herpes zoster, postherpetic neuralgia, and herpes zoster-related hospitalizations) and harms (serious adverse events [SAEs],** immune-mediated disease, graft-versus-host-disease, graft rejection, and reactogenicity) associated with RZV.††

Prevention of herpes zoster and occurrence of SAEs were deemed critical outcomes by the work group. Five studies in four immunocompromised groups§§ evaluated herpes zoster as an outcome (*9–13*). Estimates of vaccine efficacy (VE) came from three studies, with VE of 68.2% (95% CI = 55.6%–77.5%) for autologous hematopoietic cell transplant recipients (*11*), and 87.2% (44.3%–98.6%) and 90.5% (73.5%–97.5%) in post hoc efficacy analyses for patients with hematologic malignancies (*12*) and potential immune-mediated diseases (*13*), respectively. SAEs were evaluated in seven studies (*9–15*) in six immunocompromised groups (2,541 RZV recipients).¶¶ Overall, rates of SAEs were

* This recommendation became official CDC policy in January 2018.
† On October 20, 2021 ACIP voted 15–0 in favor of the recommendation for use of RZV for the prevention of herpes zoster and related complications in adults aged ≥19 years (to align with the age range in the adult immunization schedule) who are or will be immunodeficient or immunosuppressed because of disease or therapy.
§ A dermatome is a cutaneous area of skin supplied by one spinal nerve.
¶ Zoster vaccine live is no longer available for use in the United States, as of November 18, 2020.
** Serious adverse event is defined as an undesirable experience associated with the vaccine that results in death, hospitalization, disability or requires medical or surgical intervention to prevent a serious outcome.
†† https://www.cdc.gov/vaccines/acip/recs/grade/recombinant-zoster-immunocompromised.html
§§ Autologous hematopoietic cell transplant recipients, patients with hematologic malignancies, patients living with HIV aged ≥18 years, and patients with potential immune-mediated diseases aged ≥50 years.
¶¶ Autologous hematopoietic cell transplant recipients, patients living with HIV, patients with hematologic malignancies, patients with solid tumors, renal transplant recipients aged ≥18 years, and patients with potential immune-mediated diseases aged ≥50 years.

# Recombinant Zoster Vaccine (RZV, Shingrix)

| Product (ACIP Abbreviation) | Type | ACIP Age Recommendations |
|---|---|---|
| **Shingrix® (RZV)** | Non-live, adjuvanted | 50 years of age and older |

# Recombinant Zoster Vaccine: Altered Immunocompetence

- Persons with altered immunocompetence at higher risk of severe disease from zoster
- RZV safety similar to vaccine in immunocompetent individuals
  - serious adverse events (0-1.6%)
  - grade 3 adverse reactions (9.9 – 22.3%)
  - no increase in graft versus host diseases in HSCT recipients
- RZV effective in persons with altered immunocompetence
  - zoster efficacy: 68.2-87.2%
  - PHN effectiveness: 85-89%

# Recombinant Zoster Vaccine, New Recommendation

- Previous recommendation: immunocompetent persons 50 years old and older

- Addition: now recommended for all adults with altered immunocompetence
  continues to be recommended for immunocompetent persons 50 years old and older

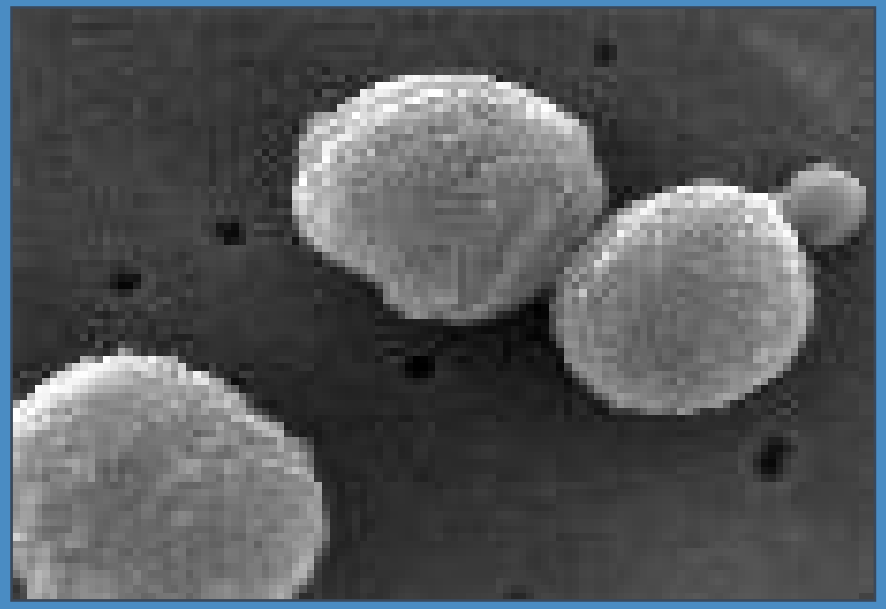
ACIP Influenza Vaccine Recommendations | CDC

# Recombinant Zoster Vaccine (Shingrix)

- Recommended for persons currently immunocompromised and expecting to be immunocompromised
- Preferable administered prior to altered immunocompetence
- Can be administered during breastfeeding
- While pregnancy is not a contraindication, it is recommended to delay vaccine while pregnant
- Not recommended for immunocompromised persons who do not have a history of varicella, zoster, and varicella vaccination

ACIP Influenza Vaccine Recommendations | CDC

# Pneumococcal Vaccines



# Pneumococcal Vaccines

- **1983**
  - 23-valent polysaccharide vaccine licensed (PPSV23)
- **2010**
  - 13-valent polysaccharide conjugate vaccine licensed (PCV13)
- **2021**
  - 15-valent polysaccharide conjugate vaccine licensed (PCV15) – VAXNEUVANCE – Merck
- **2021**
  - 20-valent polysaccharide conjugate vaccine licensed (PCV20) – PREVNAR20

# Serotypes Contained in New and Current Pneumococcal Vaccines

| | 1 | 3 | 4 | 5 | 6A | 6B | 7 F | 9V | 14 | 18 C | 19 A | 19 F | 23 F | 22 F | 33 F | 8 | 10 A | 11 A | 12 F | 15 B | 2 | 9N | 17 F | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PCV13 | | | | | | | | | | | | | | | | | | | | | | | | |
| PCV15 | | | | | | | | | | | | | | | | | | | | | | | | |
| PCV20 | | | | | | | | | | | | | | | | | | | | | | | | |
| PPSV23 | | | | | | | | | | | | | | | | | | | | | | | | |

PCV13: 13-valent pneumococcal conjugate vaccine

PPSV23: 23-valent pneumococcal polysaccharide vaccine

# Pneumococcal Vaccines

- PCV13 routinely recommended in children for prevention of invasive pneumococcal disease
- PPSV23 recommended for high-risk persons (invasive disease)
- PCV15
  - newly recommended in combination with PPSV23 for high-risk adults 19 through 64 years of age, and for adults 65 years of age and older interval between PCV15 and PPSV23
    - 1 year by routine
- PCV20
  - newly recommended for high-risk adults 19 through 64 years of age, and for adults 65 years of age and older
- No preference for PCV20 versus PCV15+PPSV23

ACIP Influenza Vaccine Recommendations | CDC

# Pneumococcal Vaccines – High-risk Conditions

- Functional or anatomic asplenia (including sickle cell disease)
- Immunosuppression (including HIV infection)
- Transplant
- Chronic renal failure
- Nephrotic syndrome
- Generalized malignancy
- Hematologic malignancy
- CSF leak
- Cochlear implant
- Pulmonary disease (including asthma)
- Cardiac disease (excluding hypertension)
- Liver disease (including cirrhosis)
- Diabetes
- Alcoholism
- Smokers
- Residents of a long-term care facility

# Pneumococcal Vaccines – Intervals

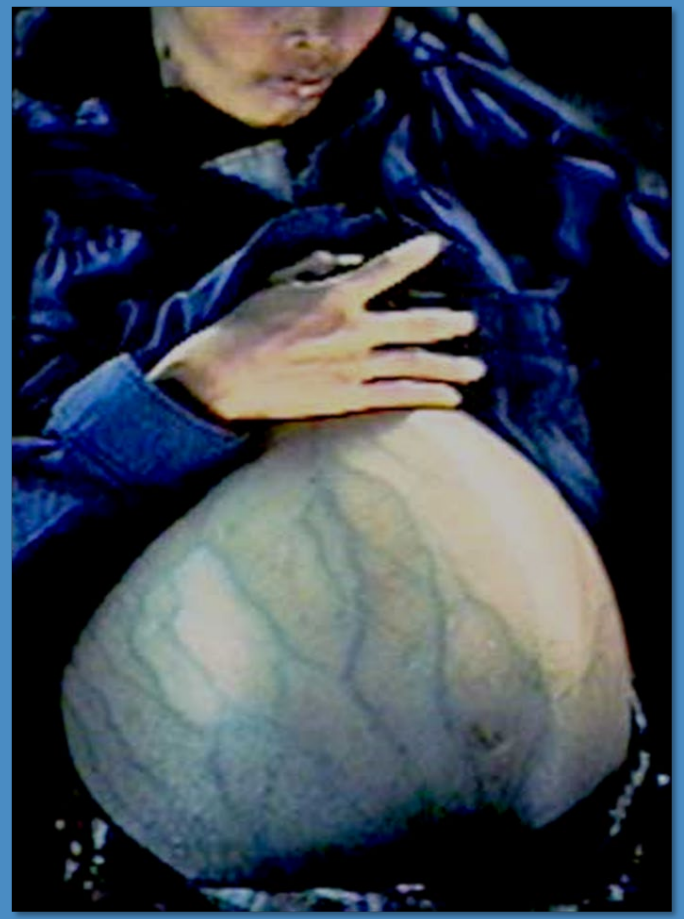
- The routine interval between PCV15 and PPSV23 is one year

- For certain patients, providers can consider an 8 week interval instead of one year
  - functional and anatomic asplenia, immunosuppression, chronic renal disease, CSF leak, cochlear implant

ACIP Influenza Vaccine Recommendations | CDC

# Adults Who Have Already Received PCV13

- Any adult who has received PCV13, and is recommended for PPSV23, may receive PCV20 as a substitute for PPSV23 if PPSV23 is not available.
- If PPSV23 is available, it should be administered
  - intervals – PCV13 to PPSV23 = 8 weeks if  Functional and anatomic asplenia, immunosuppression, chronic renal disease, CSF leak, cochlear implant
  - otherwise, the interval from PCV13 to PPSV23 should be one year



# Hepatitis B Vaccine

# Hepatitis B Virus Infection

**257 million**
chronic infections worldwide

**850,000–2.2 million**
US chronic infections

Causes
**50%**
of hepatocellular carcinomas

**786,000**
deaths worldwide

https://www.cdc.gov/hepatitis/hbv/bfaq.htm#bFAQb04

# Available Adult Hepatitis B Vaccines

- Single component
  - Engerix-B
  - Recombivax HB
  - Heplisav
- Combination Vaccine
  - Twinrix (Combination HepA-HepB vaccine)

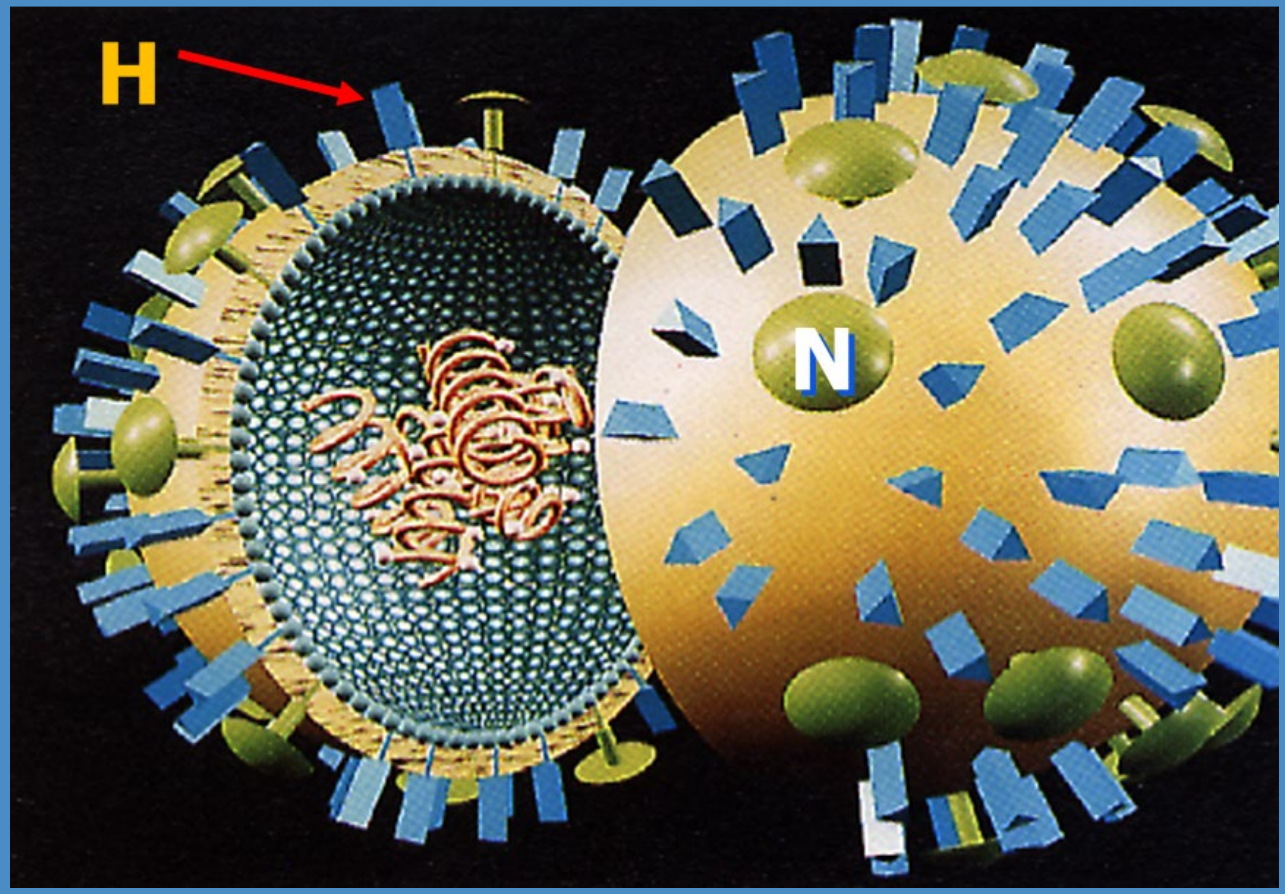
# Hepatitis B Recommendations: New

- Universal vaccination through 59 years of age
- Persons high-risk 60 years old and older should be vaccinated
- Persons not high-risk 60 years old and older may be vaccinated

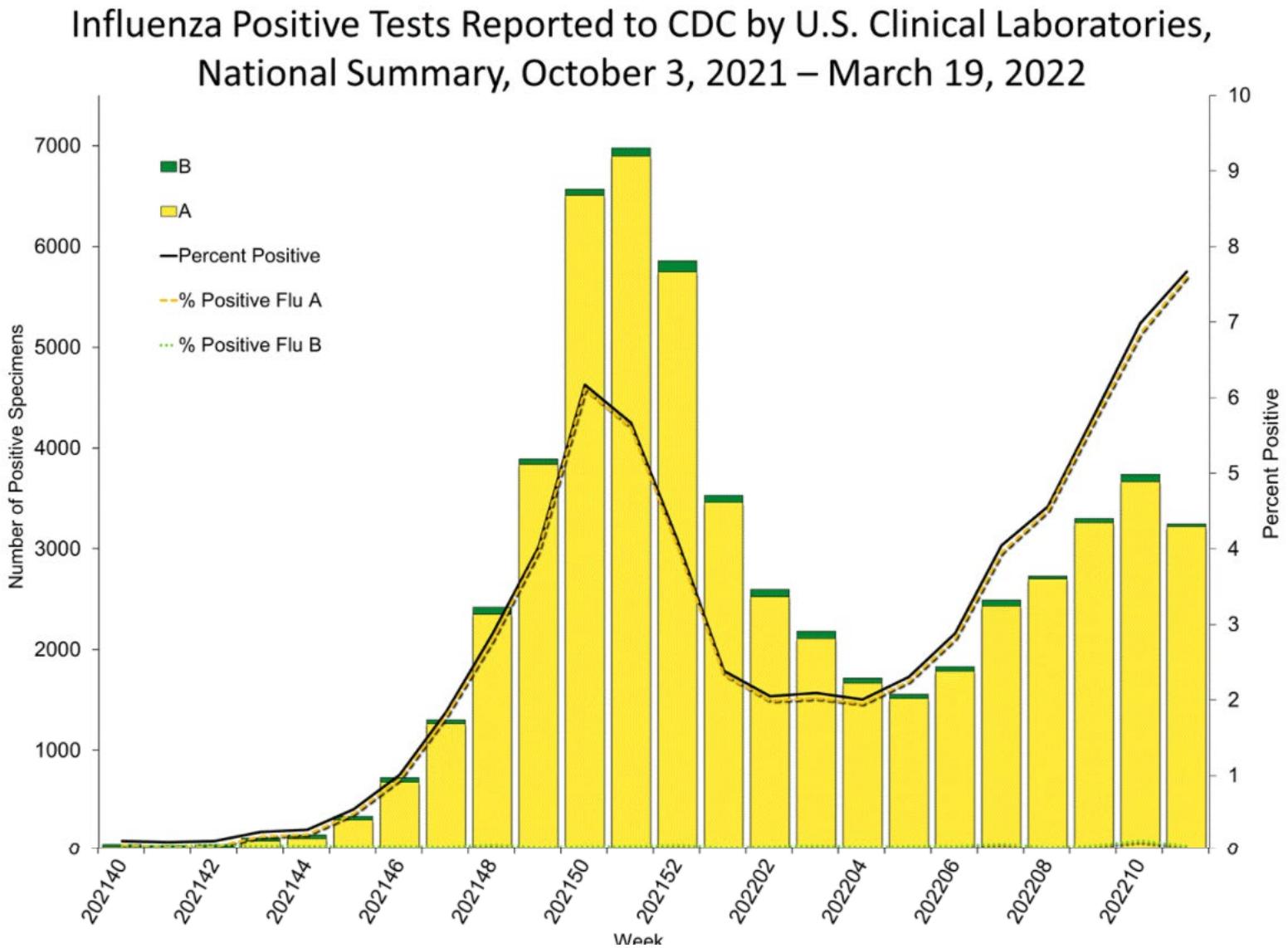
ACIP Vaccine Recommendations and Schedules | CDC

# Hepatitis B: High-Risk Conditions

- Conditions that place one at high-risk for acquisition of hepatitis B virus infection
  - health care worker
  - staff in centers for developmentally disabled
  - history of STDs
  - intravenous drug use
  - travelers to a region of high or intermediate endemicity for hepatitis B
  - having a household contact positive for hepatitis B surface antigen
  - having a sexual partner positive for hepatitis B surface antigen
  - more than one sexual partner in the past 6 months
  - chronic renal disease
  - men who have sex with men
- Conditions that place one at high-risk for complications from hepatitis B disease
  - diabetes in persons younger than 60 years
  - chronic liver disease
  - history of HIV




# Influenza Vaccine


Influenza Positive Tests Reported to CDC by U.S. Clinical Laboratories, National Summary, October 3, 2021 – March 19, 2022
B
A
Percent Positive
% Positive Flu A
% Positive Flu B
Number of Positive Specimens
Percent Positive
Week
0
1000
2000
3000
4000
5000
6000
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202140
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202202
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202208
202210

# Influenza Vaccine Effectiveness – 2021-2022

Table. Adjusted vaccine effectiveness estimates for influenza seasons from 2004–2022

CDC calculates vaccine effectiveness estimates through the U.S. Flu VE Network

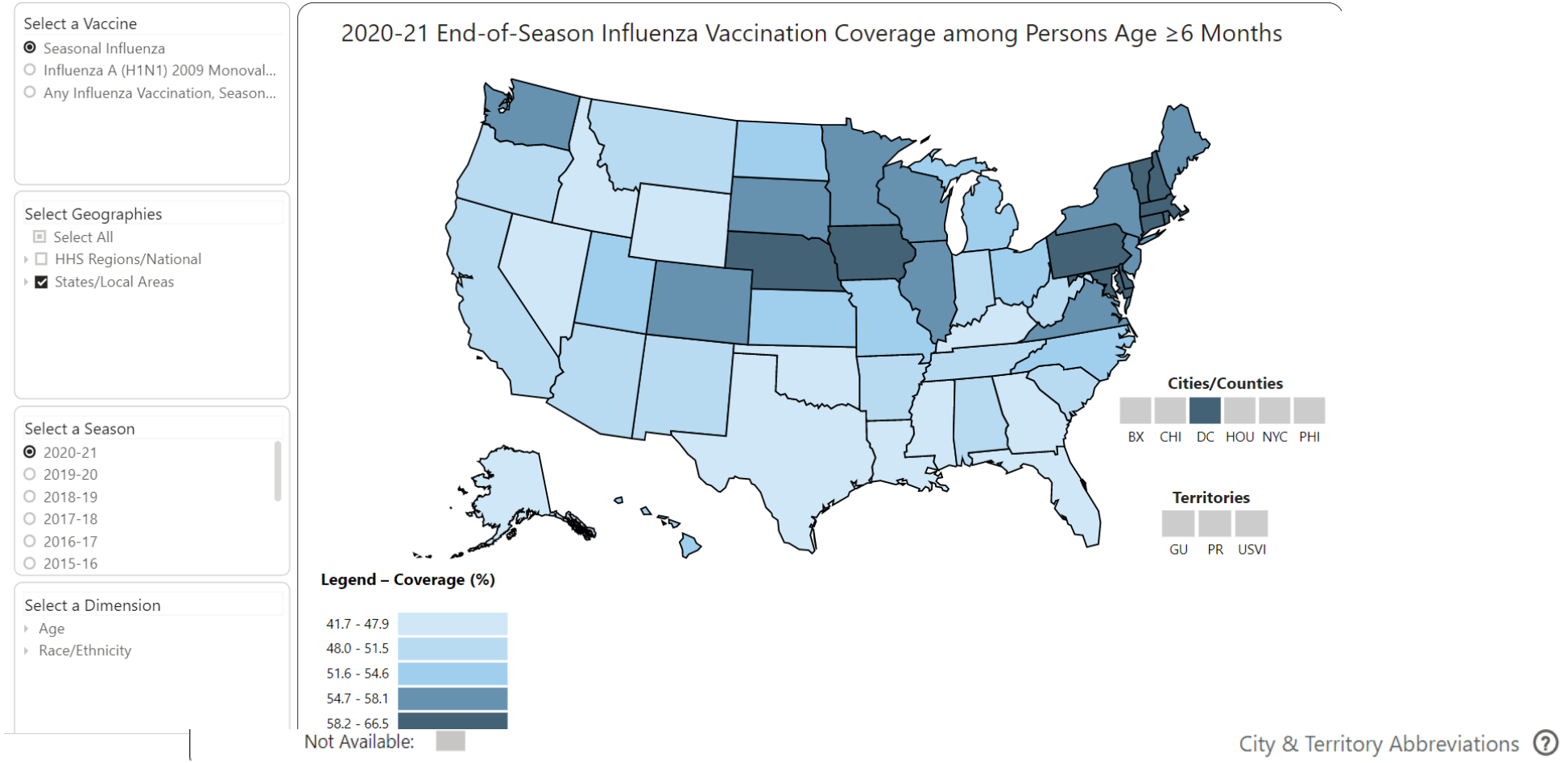
| Influenza Season† | Reference | Study Site(s) | No. of Patients‡ | Adjusted Overall VE (%) | 95% CI |
|---|---|---|---|---|---|
| 2017-18 | Rolfes 2019 | WI, MI, PA, TX, WA | 8,436 | 38 | 31, 43 |
| 2018-19 | Flannery 2019 | WI, MI, PA, TX, WA | 10,041 | 29 | 21, 35 |
| 2019-20 | Flannery, 2020 | WI, MI, PA, TX, WA | 8,845 | 39 | 32, 44 |
| 2020-21* | n/a | n/a | n/a | n/a | |
| 2021-22*** | Chung, 2022 | CA, MI, PA, TN, TX, WA, WI | 3.636 | 14 | -17, 37 |

CDC Seasonal Flu Vaccine Effectiveness Studies | CDC

# Influenza Vaccine Recommendation

- Vaccinate all persons 6 months and older without contraindications to vaccinations
- Vaccination is to prevent the complications of influenza
  - pneumonia
  - exacerbation of existing heart and lung disease
  - myocarditis
  - otitis media
  - Guillain-Barré syndrome

# Influenza Vaccine Coverage – 2020-2021 Season



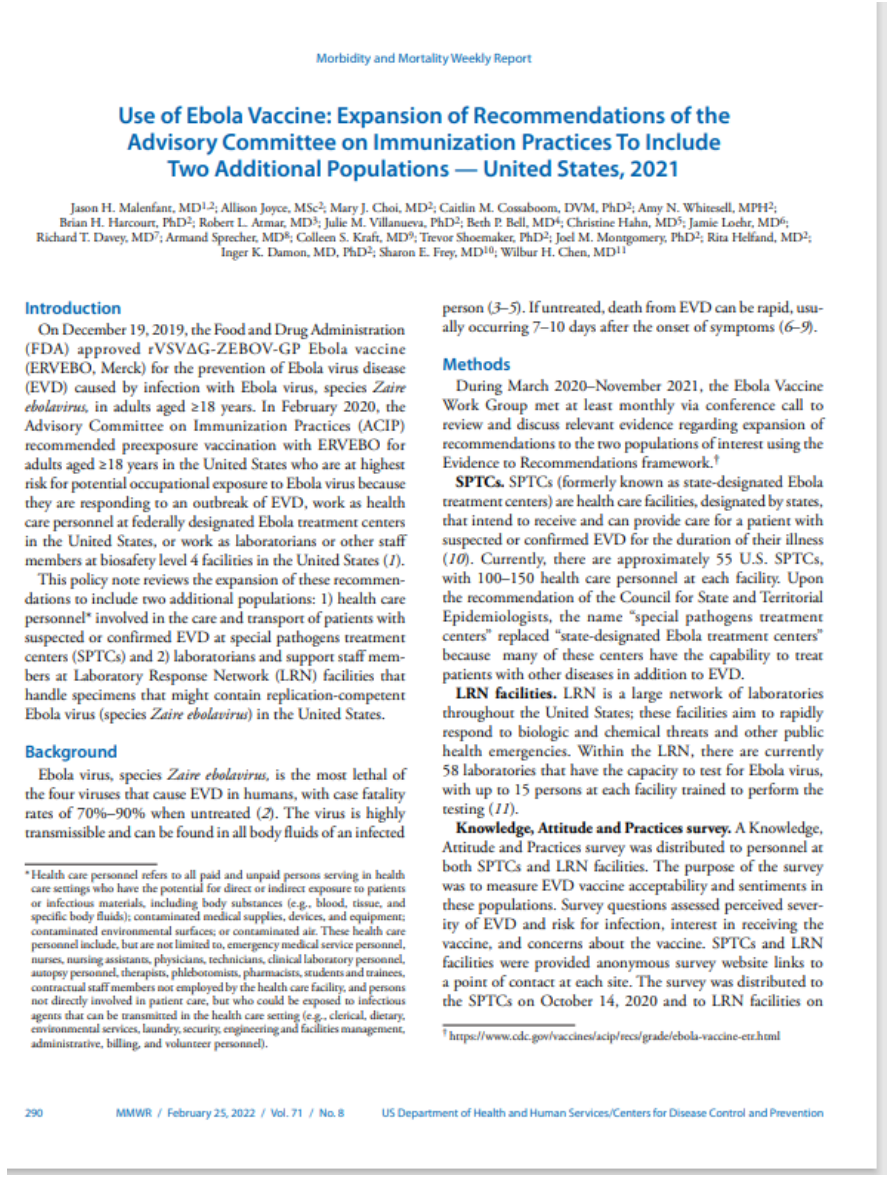
# Ebola Vaccine

# Ebola Vaccine

- Live vector vaccine
- Vector (vesicular stomatitis virus)
- Antigen – Ebola glycoprotein

# Ebola Vaccine Recommendations

- Published February 25, 2022
- Adds to the January 8th recommendation for use of this vaccine



Morbidity and Mortality Weekly Report

## Use of Ebola Vaccine: Expansion of Recommendations of the Advisory Committee on Immunization Practices To Include Two Additional Populations — United States, 2021

Jason H. Malenfant, MD[1,2]; Allison Joyce, MSc[2]; Mary J. Choi, MD[2]; Caitlin M. Cossaboom, DVM, PhD[2]; Amy N. Whitesell, MPH[2]; Brian H. Harcourt, PhD[2]; Robert L. Atmar, MD[3]; Julie M. Villanueva, PhD[2]; Beth P. Bell, MD[4]; Christine Hahn, MD[5]; Jamie Loehr, MD[6]; Richard T. Davey, MD[7]; Armand Sprecher, MD[8]; Colleen S. Kraft, MD[9]; Trevor Shoemaker, PhD[2]; Joel M. Montgomery, PhD[2]; Rita Helfand, MD[2]; Inger K. Damon, MD, PhD[2]; Sharon E. Frey, MD[10]; Wilbur H. Chen, MD[11]

### Introduction

On December 19, 2019, the Food and Drug Administration (FDA) approved rVSVΔG-ZEBOV-GP Ebola vaccine (ERVEBO, Merck) for the prevention of Ebola virus disease (EVD) caused by infection with Ebola virus, species *Zaire ebolavirus*, in adults aged ≥18 years. In February 2020, the Advisory Committee on Immunization Practices (ACIP) recommended preexposure vaccination with ERVEBO for adults aged ≥18 years in the United States who are at highest risk for potential occupational exposure to Ebola virus because they are responding to an outbreak of EVD, work as health care personnel at federally designated Ebola treatment centers in the United States, or work as laboratorians or other staff members at biosafety level 4 facilities in the United States (*1*).

This policy note reviews the expansion of these recommendations to include two additional populations: 1) health care personnel* involved in the care and transport of patients with suspected or confirmed EVD at special pathogens treatment centers (SPTCs) and 2) laboratorians and support staff members at Laboratory Response Network (LRN) facilities that handle specimens that might contain replication-competent Ebola virus (species *Zaire ebolavirus*) in the United States.

### Background

Ebola virus, species *Zaire ebolavirus*, is the most lethal of the four viruses that cause EVD in humans, with case fatality rates of 70%–90% when untreated (*2*). The virus is highly transmissible and can be found in all body fluids of an infected person (*3–5*). If untreated, death from EVD can be rapid, usually occurring 7–10 days after the onset of symptoms (*6–9*).

### Methods

During March 2020–November 2021, the Ebola Vaccine Work Group met at least monthly via conference call to review and discuss relevant evidence regarding expansion of recommendations to the two populations of interest using the Evidence to Recommendations framework.†

**SPTCs.** SPTCs (formerly known as state-designated Ebola treatment centers) are health care facilities, designated by states, that intend to receive and can provide care for a patient with suspected or confirmed EVD for the duration of their illness (*10*). Currently, there are approximately 55 U.S. SPTCs, with 100–150 health care personnel at each facility. Upon the recommendation of the Council for State and Territorial Epidemiologists, the name "special pathogens treatment centers" replaced "state-designated Ebola treatment centers" because many of these centers have the capability to treat patients with other diseases in addition to EVD.

**LRN facilities.** LRN is a large network of laboratories throughout the United States; these facilities aim to rapidly respond to biologic and chemical threats and other public health emergencies. Within the LRN, there are currently 58 laboratories that have the capacity to test for Ebola virus, with up to 15 persons at each facility trained to perform the testing (*11*).

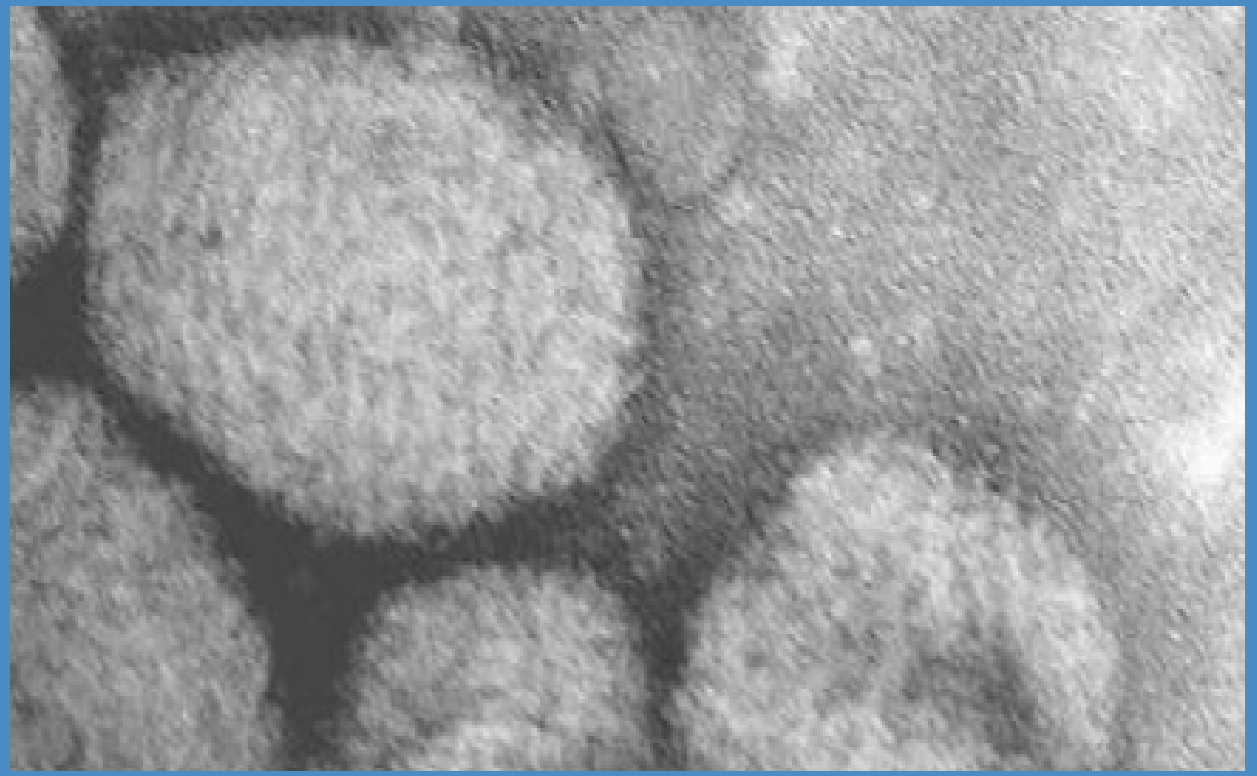
**Knowledge, Attitude and Practices survey.** A Knowledge, Attitude and Practices survey was distributed to personnel at both SPTCs and LRN facilities. The purpose of the survey was to measure EVD vaccine acceptability and sentiments in these populations. Survey questions assessed perceived severity of EVD and risk for infection, interest in receiving the vaccine, and concerns about the vaccine. SPTCs and LRN facilities were provided anonymous survey website links to a point of contact at each site. The survey was distributed to the SPTCs on October 14, 2020 and to LRN facilities on

*Health care personnel refers to all paid and unpaid persons serving in health care settings who have the potential for direct or indirect exposure to patients or infectious materials, including body substances (e.g., blood, tissue, and specific body fluids); contaminated medical supplies, devices, and equipment; contaminated environmental surfaces; or contaminated air. These health care personnel include, but are not limited to, emergency medical service personnel, nurses, nursing assistants, physicians, technicians, clinical laboratory personnel, autopsy personnel, therapists, phlebotomists, pharmacists, students and trainees, contractual staff members not employed by the health care facility, and persons not directly involved in patient care, but who could be exposed to infectious agents that can be transmitted in the health care setting (e.g., clerical, dietary, environmental services, laundry, security, engineering and facilities management, administrative, billing, and volunteer personnel).

†https://www.cdc.gov/vaccines/acip/recs/grade/ebola-vaccine-etr.html

# Ebola Vaccine Recommendations

- January 8, 2022
  - persons responding to an outbreak of ebola
  - health care personnel working in federally designated ebola treatment centers in the United States
  - laboratorian or other staff working in biosafety level 4 facilities in the United States
- February 25, 2022
  - health care personnel involved in the care and transport of suspect or confirmed Ebola virus disease patients at Special Pathogens Treatment Centers
  - laboratorians and support staff at Laboratory Response Network (LRN) facilities that handle specimens that may contain replication-competent ebola virus (species *Zaire ebolavirus*) in the United States



# Smallpox/Monkeypox Vaccine

# Two Smallpox Vaccines

- Live vaccinia virus – ACAM2000

- Live non-replicating vaccinia virus vector vaccine – JYNNEOS
  - primary series of JYNNEOS – 2 doses, Subcut, 4 weeks apart

# New ACIP Recommendations, JYNNEOS

- JYNNEOS can be used as an alternative to ACAM2000 for research laboratory personnel, clinical laboratory personnel performing diagnostic testing for orthopoxviruses, and for designated response team members at risk for occupational exposure to orthopoxviruses.
- JYNNEOS, based on shared clinical decision-making, can be used as an alternative to ACAM2000 for health care personnel who administer ACAM2000 or care for patients infected with replication competent orthopoxviruses.
- Persons who are at continued risk for occupational exposure to more virulent orthopoxviruses like variola virus or monkeypox virus should receive booster doses of JYNNEOS every 2 years after the primary JYNNEOS series.
- Persons who are at continued risk for occupational exposure to replication-competent orthopoxviruses like vaccinia virus or cowpox virus should receive booster doses of JYNNEOS at least every 10 years after the primary JYNNEOS series.
- Persons who are at continued risk for occupational exposure to orthopoxviruses, and who received an ACAM2000 primary vaccination, should receive a booster dose of JYNNEOS as an alternative to a booster dose of ACAM2000.

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