Updates from the October 2024 ACIP Meeting

Melinda Wharton, MD, MP
Executive Secretary, ACIP

Pneumococcal Vaccines

ACIP Partners Webinar

Currently Recommended Adult Pneumococcal Vaccines

	1	3	4	5	6A	6B	7F	9V	14	18C	19A	19F	23F	22F	33F	8	10A	11A	12F	15B	2	9N	17F	20	15A	15C	16F	23A	23B	24F	31	35B
PCV15																																
PCV20																																
PPSV23																																
PCV21																																

21-valent pneumococcal conjugate vaccine (CAPVAXIVE™, Merck):

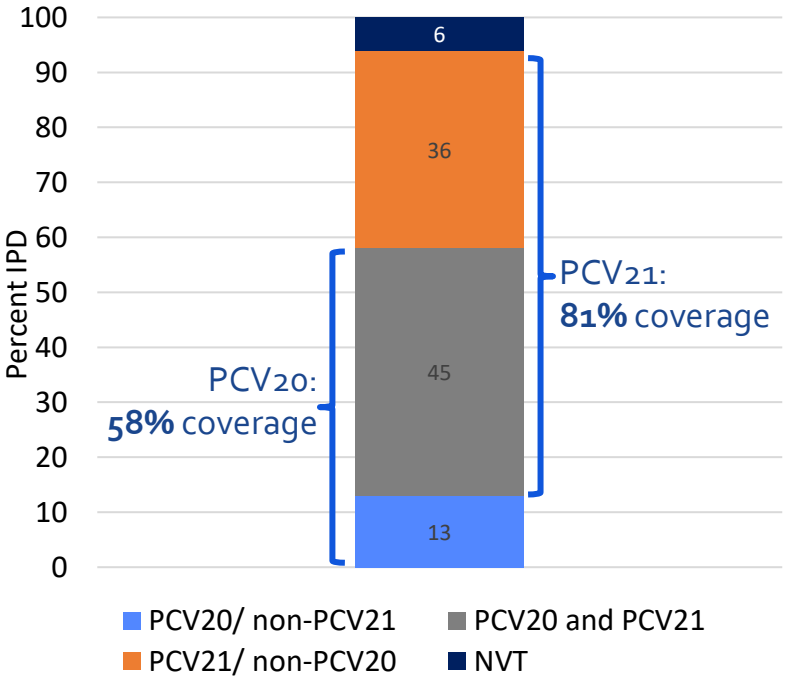
- Approved by the FDA for adults aged ≥18 years on June 17, 2024[1]

PCV15=15-valent pneumococcal conjugate vaccine
PCV20=20-valent pneumococcal conjugate vaccine
PCV21=21-valent pneumococcal conjugate vaccine
PPSV23=23-valent pneumococcal polysaccharide vaccine

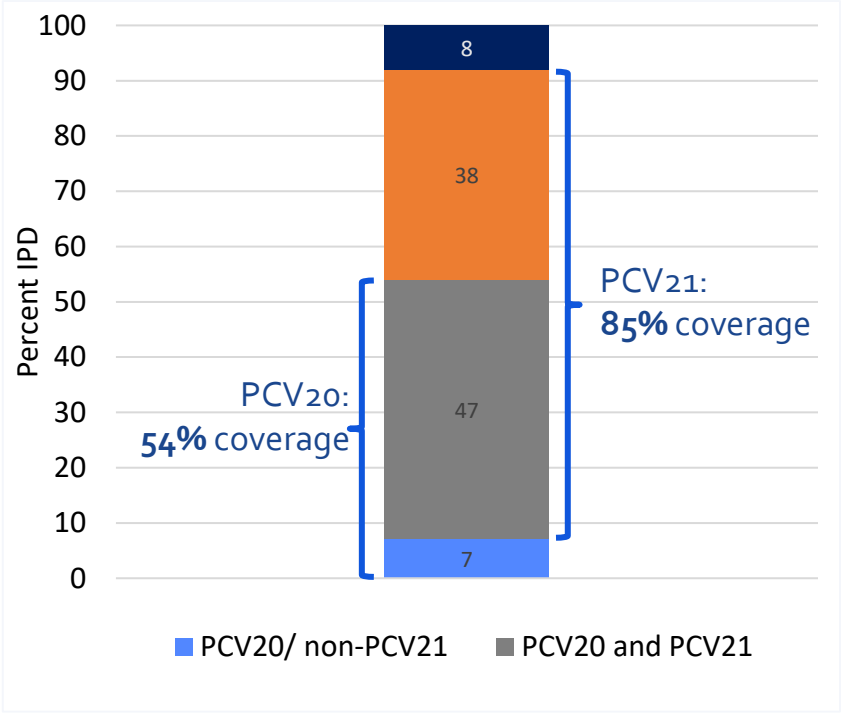
1. U.S. FDA Approves CAPVAXIVE™ (Pneumococcal 21-valent Conjugate Vaccine) for Prevention of Invasive Pneumococcal Disease and Pneumococcal Pneumonia in Adults - Merck.com

Proportion of IPD by vaccine-type among adults with a pneumococcal vaccine indication, 2018–2022

19-64 years old (*with a risk-based indication*)



≥65 years old



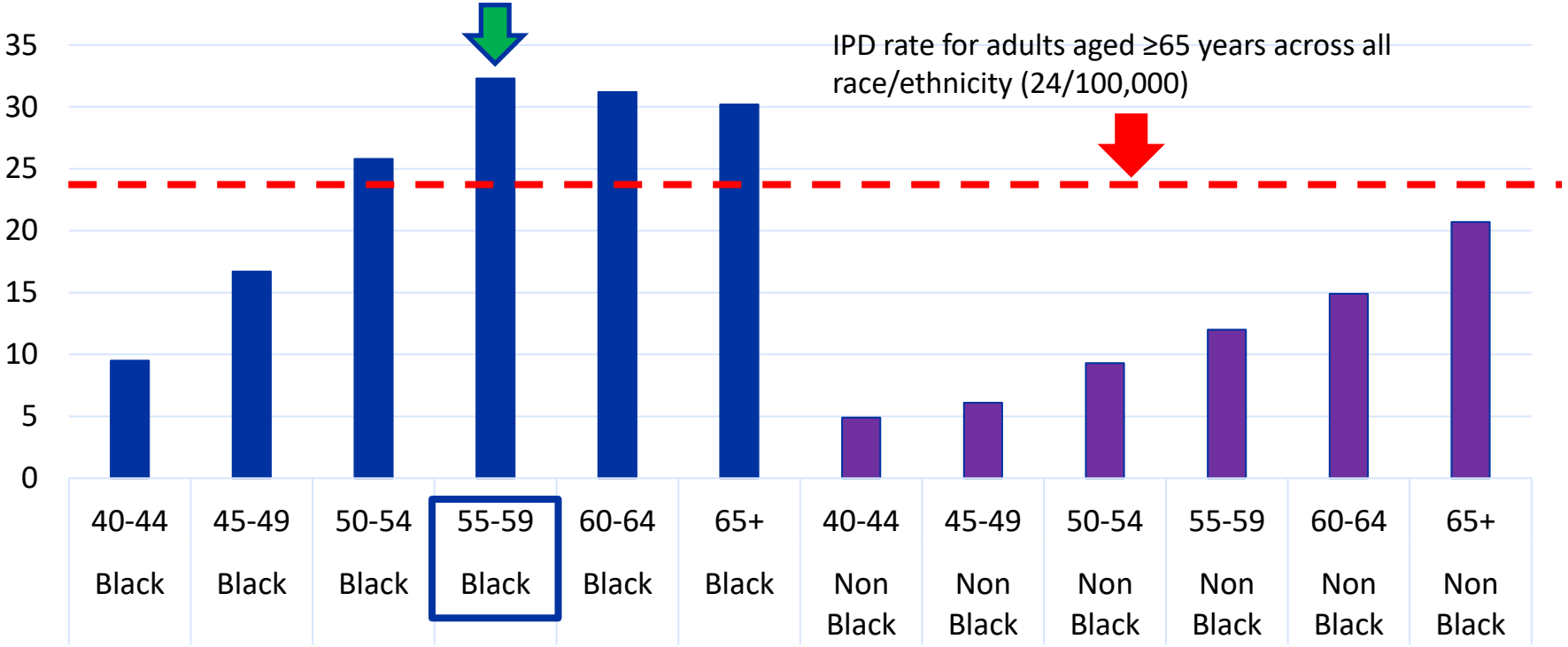
PCV20/ non-PCV21 serotype: 1, 4, 5, 6B, 9V, 14, 18C, 19F, 23F, 15B
PCV20/ in-PCV21 serotypes: 3, 6A, 7F, 19A, 22F, 33F, 8, 10A, 11A, 12F, +6C
PCV21/ non-PCV20 serotypes: 9N, 17F ,20, 15A, 15C, 16F, 23A, 23B, 24F, 31, 35B

Gierke February 2024 ACIP meeting presentation

Summary of Work Group discussion presented at the June 2024 ACIP meeting

- **The Work Group agreed that available evidence supports PCV21 use for adults currently recommended to receive a PCV.**
- **The Work Group could not reach a consensus on whether the age-based recommendation for PCV21 should be lowered from ≥65 years to ≥50 years.**
- **The majority of Work Group members believed there was insufficient evidence presented to support lowering the age-based recommendation for other recommended PCVs (i.e., PCV15, PCV20).**

IPD rates (any pneumococcal serotype) in Black adults peak at a younger age compared with Non-Black adults



ABCs 2018 –2019 unpublished data

Some Work Group considerations on lowering the PCV age-based recommendation to age ≥50 years

- **Public health problem:** There is a relatively high burden of pneumococcal disease in adults aged 50–64 years, particularly among those with risk conditions
- **Implementation:** The Work Group agreed that having different age-based recommendations by vaccine would be challenging to implement
- **Resource use:** While our models showed health benefits, there were significant concerns about the cost of lowering the age recommendation for both PCV20 and PCV21 when considering overall health benefits to society
- **Health equity:** Potential to reduce pneumococcal disease incidence in demographic groups experiencing the highest burden

ACIP Recommendation

ACIP recommends a pneumococcal conjugate vaccine (PCV) for all PCV-naïve adults aged ≥50 years

Influenza Vaccines

ACIP Partners Webinar

Approval of FluMist for self or caregiver administration

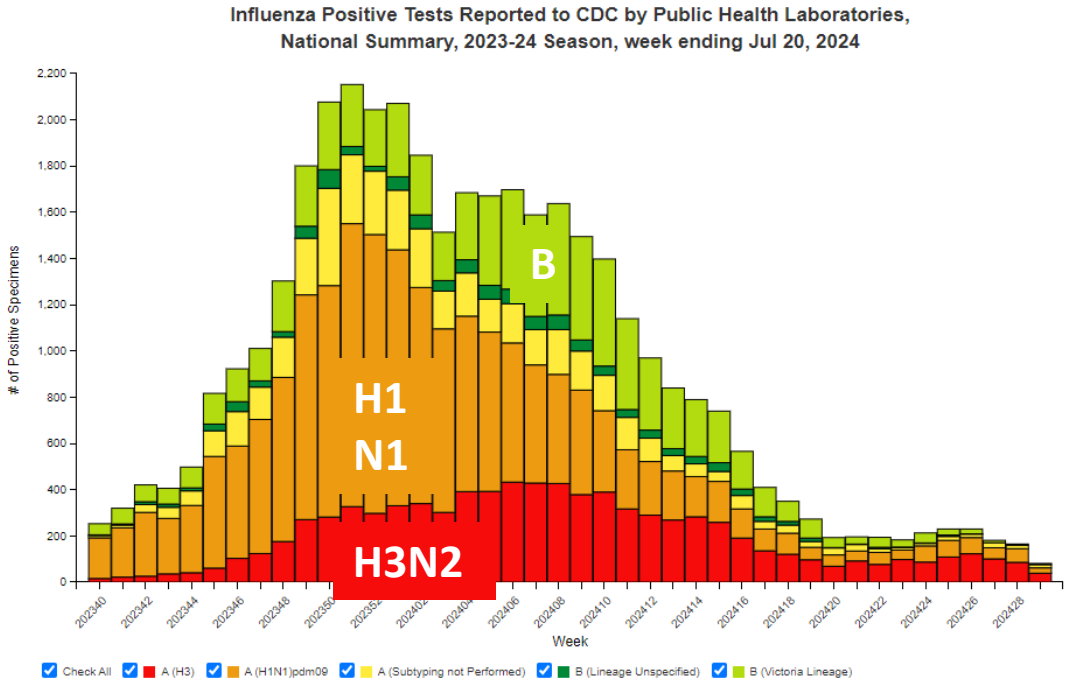
Update concerning FluMist (Live Attenuated Influenza Vaccine, Trivalent; LAIV3)

- On September 20, 2024, FDA approved FluMist for self or caregiver administration.
- For the current 2024-25 influenza season, FluMist is available for administration by a healthcare provider only.
- It is anticipated that FluMist will be available for self or caregiver administration for the 2025-26 influenza season.

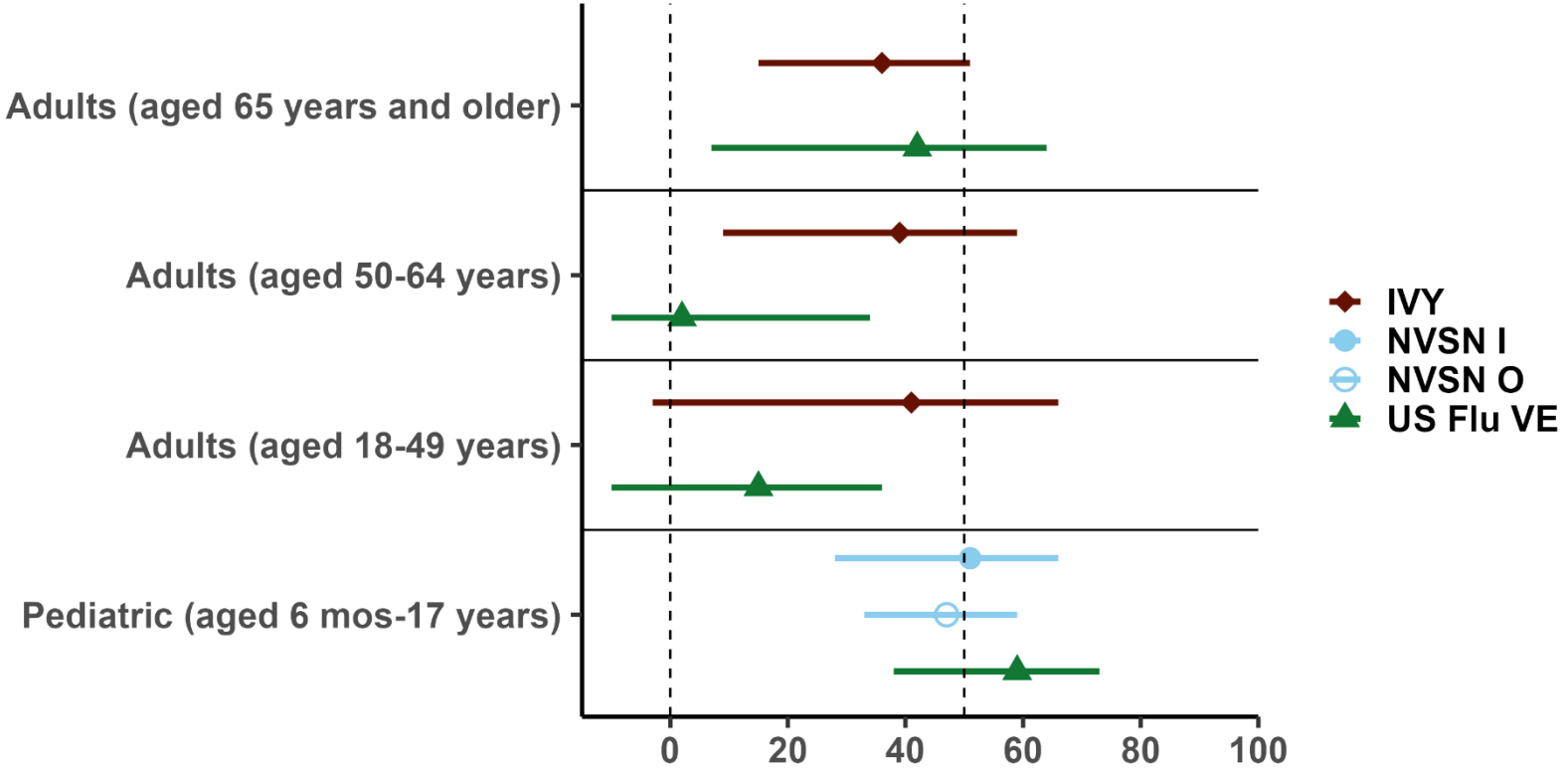
https://www.fda.gov/vaccines-blood-biologics/vaccines/flumist

2023–2024 Influenza Season

- A(H1N1)pdm09 predominant
- Lower levels of A(H3N2) and B/Victoria circulation
- Peak activity 2023 week 52
- Vaccines were quadrivalent and included A(H1N1)pdm09, A(H3N2), and B components



VE against influenza A(H1N1)pdm09

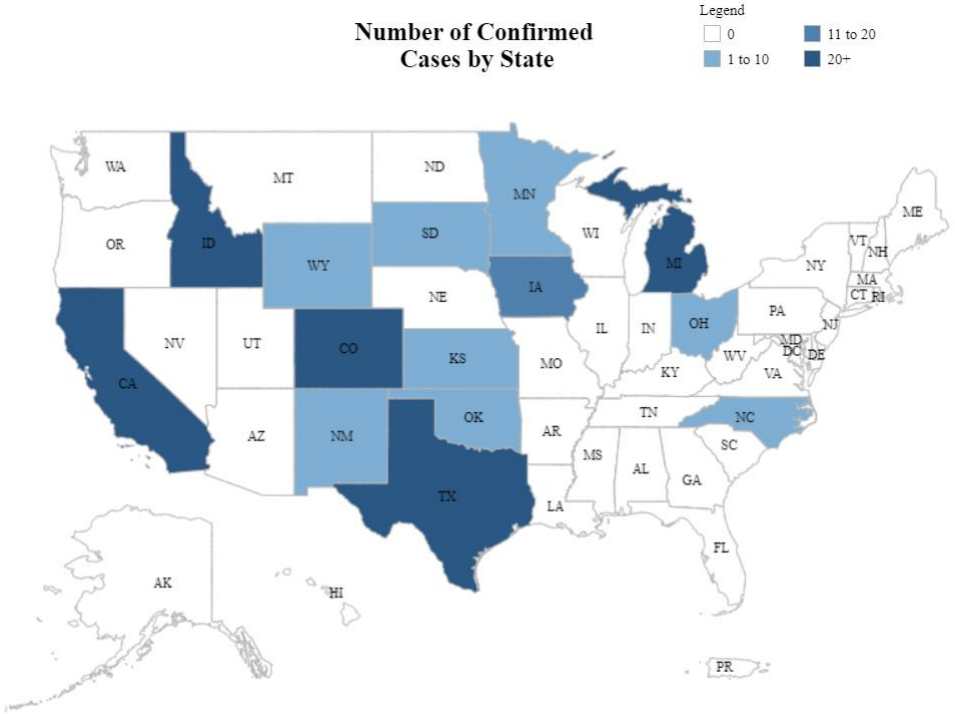


Summary of four CDC influenza VE networks

- Vaccination with a 2023–2024 influenza vaccine **reduced the risk** of medically attended influenza **outpatient visits** and **hospitalizations** among **children, adolescents, adults,** and the **elderly**.
- Results were **consistent** across **4 networks** in 23 states.
- Preliminary **end-of-season** estimates are **similar to interim** estimates from February.

HPAI A(H5N1) Situation Update – Dairy Herds

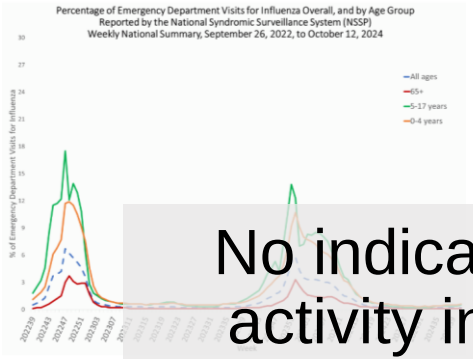
- As of October 18, 2024, USDA has confirmed HPAI A(H5N1) in U.S. dairy herds in **324 farms across 14 states**
  - Dairy cow illness was observed in early 2024
  - Significant decrease in milk production and quality
  - **March 25, 2024**: USDA reported HPAI A(H5N1) confirmed in cows from Texas and Kansas

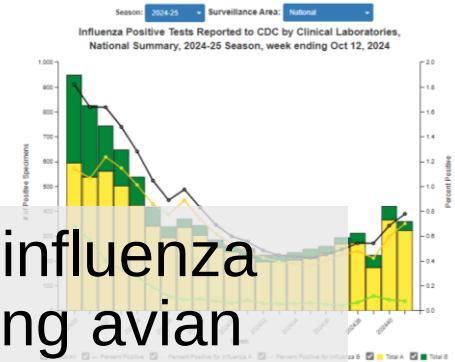


[Highly Pathogenic Avian Influenza (HPAI) Detections in Livestock | Animal and Plant Health Inspection Service (usda.gov)]

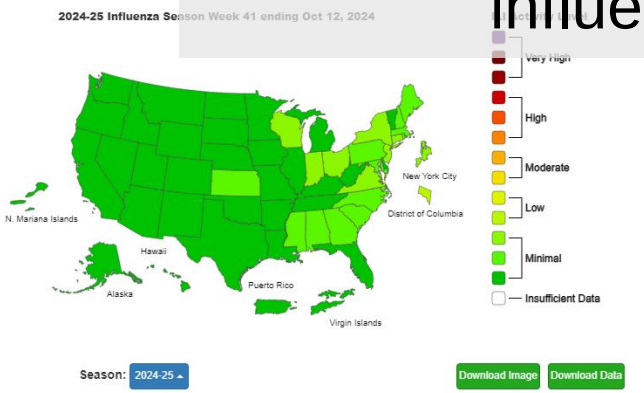
Surveillance, Human Monitoring, and Testing

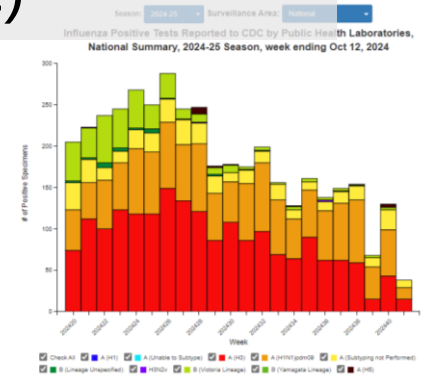
Since Feb 2024, public health laboratory monitoring includes testing of over **54,360 specimens** using a protocol that would have detected influenza A(H5) or other novel influenza viruses, **1 person** has tested positive (the Missouri case)





No indicators of unusual influenza activity in people, including avian influenza A(H5N1)





[How CDC is monitoring influenza data among people to better understand the current avian influenza A (H5N1) situation | Bird Flu | CDC](), [Weekly U.S. Influenza Surveillance Report | CDC]()

Vaccines for Children (VFC) Vote

Issue:

- **High-dose inactivated (HD-IIV3) and adjuvanted inactivated (aIIV3) influenza vaccines are approved in the United States for ages ≥65 years.**
- **An evidence review of HD-IIV3 and aIIV3 for solid organ transplant (SOT) recipients ages ≥6 months was presented at the June 2024 ACIP meeting.**
- **ACIP voted to recommend that HD-IIV3 and aIIV3 are acceptable options for SOT recipients aged 18 through 64 years who are receiving immunosuppressive medication regimens, without a preference over other age-appropriate inactivated or recombinant vaccines.**

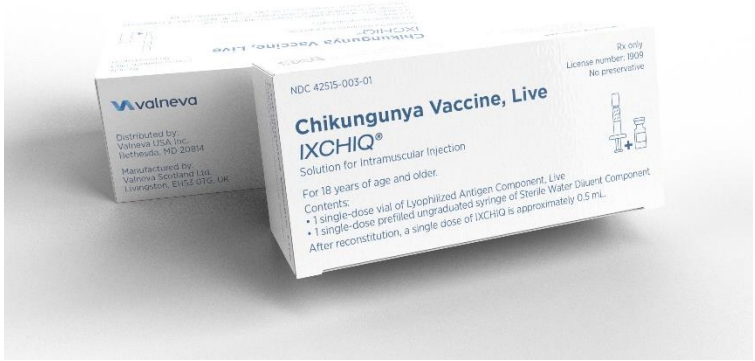
Vote:

- **Approve the Vaccines for Children (VFC) resolution for vaccines to prevent influenza**

Chikungunya Vaccines

ACIP Partners Webinar

Live attenuated chikungunya vaccine



- Manufactured by Valneva as IXCHIQ
- Licensed November 9, 2023
- Age group currently adults ≥18 years
- Single dose schedule

ACIP recommendations for use of chikungunya vaccines

Population	Live attenuated vaccine
Travelers	Completed*
Laboratory workers	Completed
Residents of U.S. territories with transmission risk	*Pending*
Residents of U.S. states with transmission risk	*Pending*

*Adults aged ≥18 years

Virus-like particle chikungunya vaccine

- Manufactured by Bavarian Nordic
- Licensure possible February 2025
- Intended age group is adolescents and adults aged ≥12 years
- Single dose schedule

Work Group summary for chikungunya virus-like particle vaccine

- Will provide option, in addition to the licensed live attenuated vaccine, for vaccination of adults aged ≥18 years
- Will provide option for adolescents aged 12–17 years
- Immunogenic vaccine but no vaccine effectiveness data which will be gathered post-licensure, and need for booster dose currently unknown
- No apparent safety concerns but safety data only from ~3,000 people so insufficient to detect rare events, and post-marketing surveillance important
- Work Group to conduct comprehensive data review and present GRADE assessment as part of Evidence to Recommendations framework at future meeting

ACIP recommendations for use of chikungunya vaccines

Population	Live attenuated vaccine	Virus-like particle vaccine
Travelers	Completed*	***Pending***†
Laboratory workers	Completed	***Pending***
Residents of U.S. territories with transmission risk	*Pending*	***Pending***
Residents of U.S. states with transmission risk	*Pending*	***Pending***

*Adults aged ≥18 years

†Adolescents and adults aged ≥12 years

COVID-19 Vaccines

ACIP Partners Webinar

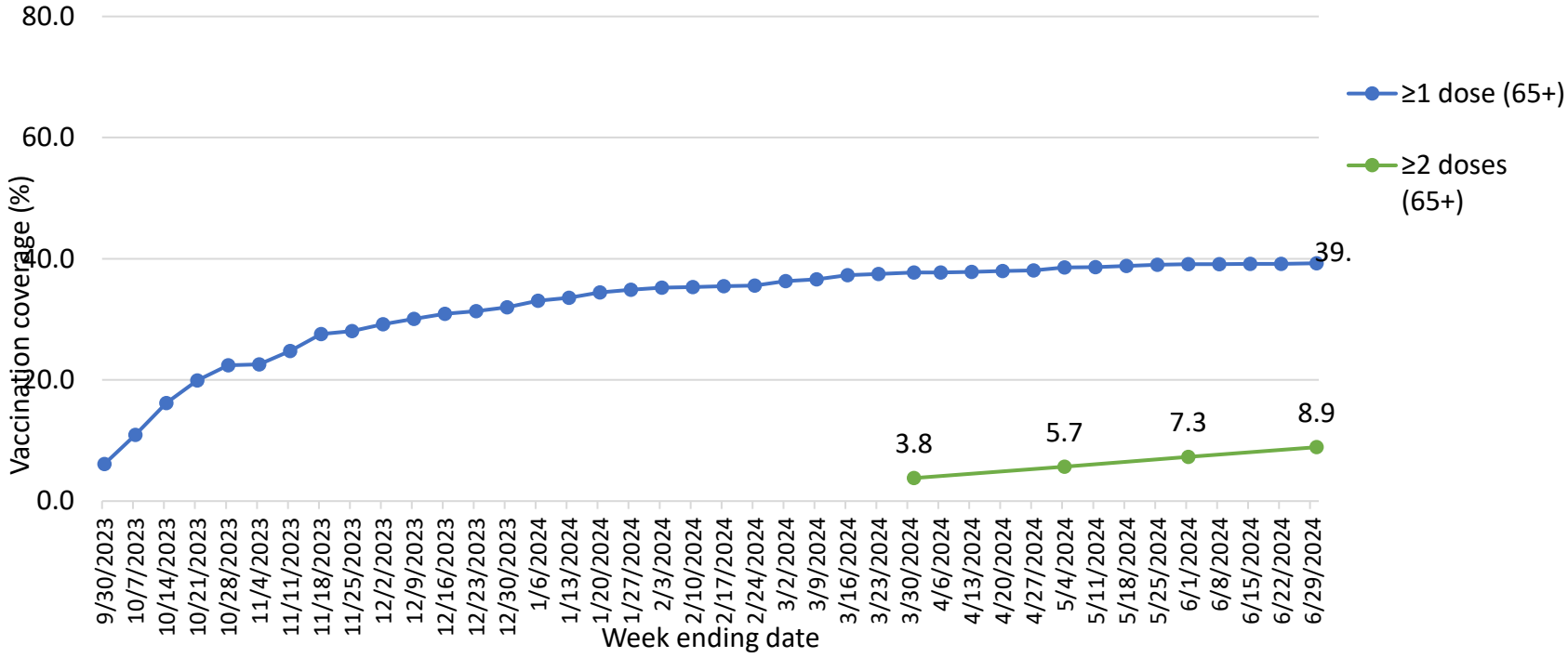
Current 2024-2025 COVID-19 vaccine recommendations

- ACIP met June 2024 and recommended 2024-2025 COVID-19 vaccines as authorized or approved by FDA in persons aged ≥6 months
  - Moderna COVID-19 vaccine in persons ≥6 months
  - Pfizer-BioNTech COVID-19 vaccine in persons ≥6 months
  - Novavax COVID-19 vaccine in persons ≥ 12 years*
- Everyone aged 5 years and older should get 1 dose of a 2024-2025 COVID-19 vaccine to protect against serious illness from COVID-19
- Children aged 6 months–4 years need multiple doses of COVID-19 vaccines to be up to date, including at least 1 dose of 2024-2025 COVID-19 vaccine
- People who are moderately or severely immune compromised may receive additional doses of 2024-2025 COVID-19 vaccines
- No recommendation for additional dose of 2024-2025 COVID-19 vaccine for older adults

*People aged 12 years and older who have not previously received any COVID-19 vaccine doses and choose to get Novavax should get 2 doses of updated Novavax vaccine to be up to date.

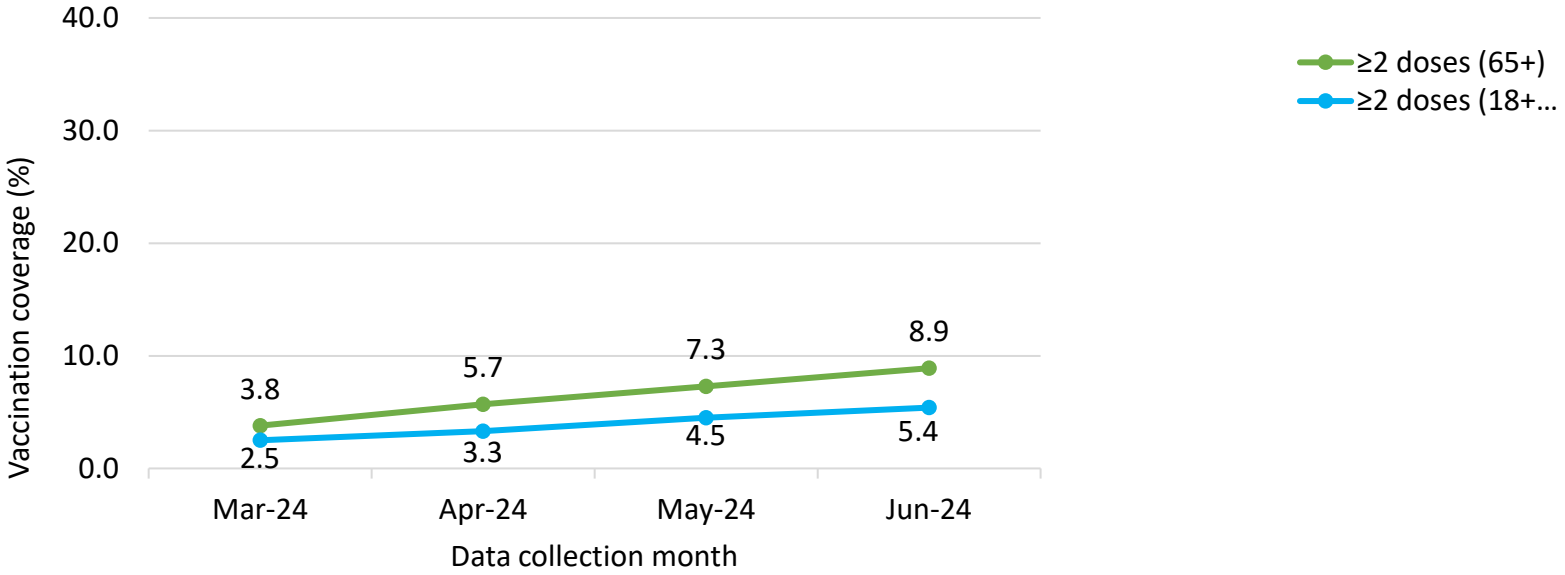
COVID-19 vaccination coverage (≥1 dose and ≥2 doses) among adults 65 years and older, 2023–2024

National Immunization Survey-Adult COVID Module (NIS-ACM)



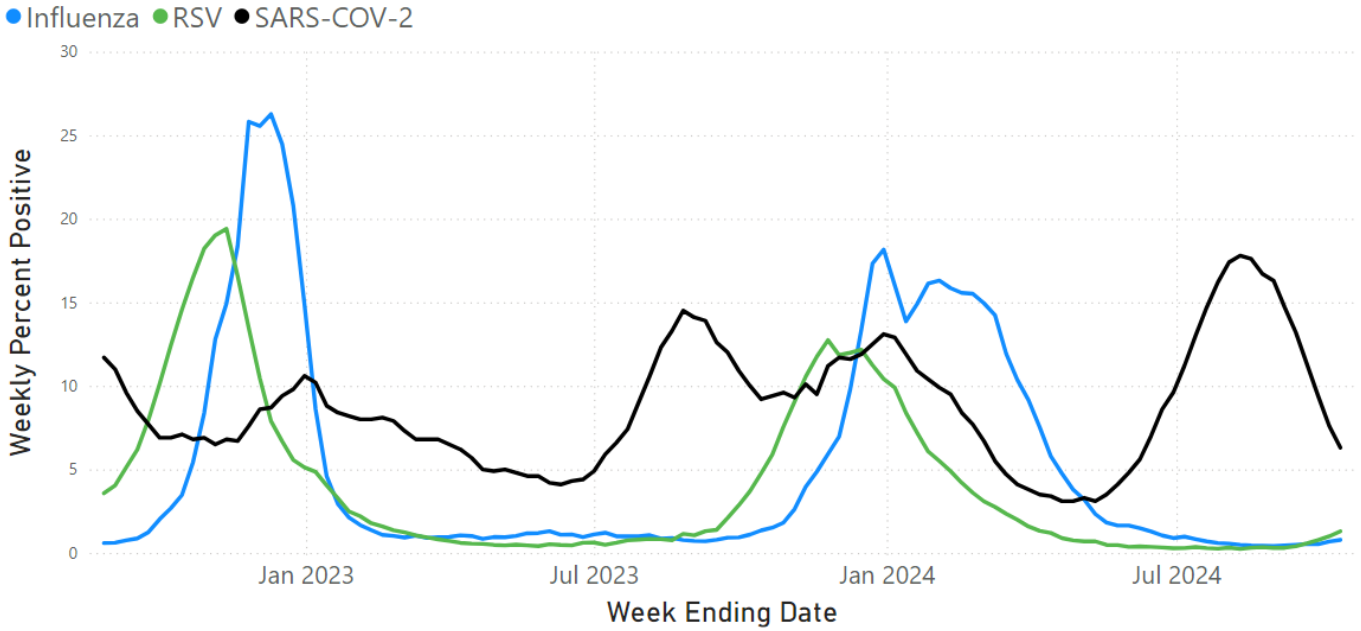
COVID-19 Vaccination Coverage (≥2 Doses) Among Adults 65 Years and Older and Adults 18 Years and Older Who Are Immunocompromised, 2024

National Immunization Survey-Adult COVID Module (NIS-ACM)



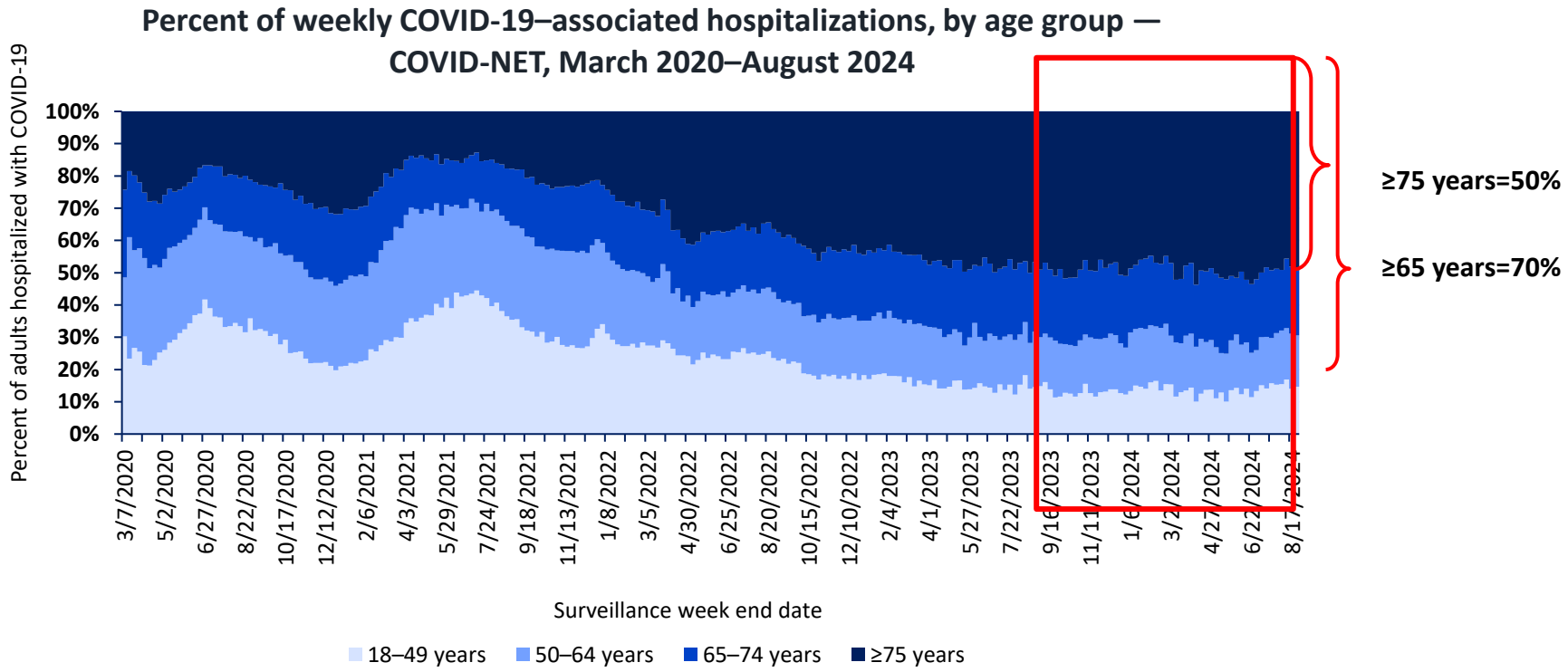
COVID-19 circulates year-round

National weekly percent positive for SARS-COV-2, RSV and influenza reported to NREVSS, August 27, 2022 through October 12, 2024



Reported was last updated on October 16, 2024.
All results presented from nucleic acid amplification tests which represent >90% of the diagnostic tests reported to NREVSS. The last three weeks of data may be less complete. NREVSS is an abbreviation for the National Respiratory and Enteric Virus Surveillance System. For more information on NREVSS, please visit www.cdc.gov/surveillance/nrevss.
SARS-COV-2: Severe acute respiratory syndromic coronavirus type 2
Flu: Influenza viruses types are combined but reported by type and subtype depending on the testing capabilities of each contributing laboratory.
RSV: Respiratory Syncytial Virus. Types A and B are reported but not shown separately in this report.
https://www.cdc.gov/nrevss/php/dashboard/index.html

Adults ages ≥65 years comprise 2/3 of all COVID-19–associated hospitalizations among adults



during this same period of October 2023 through August 2024, children and adolescents ages 17 years and younger comprised 4% of all COVID-19-associated hospitalizations.

Excerpts from the Work Group Interpretation

- **A harmonized recommendation for older adults and immunocompromised persons would ease implementation and help simplify an already complicated immunization schedule**
- **Despite hesitations about a shared clinical decision-making recommendation, many Work Group members acknowledged the benefit for people with moderate or severe immunocompromise**
  - Allowing for flexibility in additional doses may allow these patients to time around travel, life events, chemotherapy, etc.
- **There was low uptake of more than one dose of 2023–2024 vaccine**
  - Complexity of existing schedule has led to reduced adherence by clinicians
- **Provider recommendations directly impact uptake, and as part of this recommendation, provider education and ensuring providers are on board is critical to improving adherence**

ACIP Recommendations

In addition to previously recommended 2024–2025 vaccination:

- ACIP recommends **a second dose*** of 2024–2025 COVID-19 vaccine for adults ages 65 years and older
- ACIP recommends **a second dose**** of 2024–2025 COVID-19 vaccine for people ages 6 months–64 years who are moderately or severely immunocompromised
- ACIP recommends **additional doses (i.e., 3 or more doses)** of 2024–2025 COVID-19 vaccine for people ages 6 months and older who are moderately or severely immunocompromised under ***shared clinical decision-making***

*If previously unvaccinated and receiving Novavax, 2 doses are recommended as initial vaccination series followed by a third dose of any age-appropriate 2024-2025 COVID-19 vaccine 6 months (minimum interval 2 months) after second dose.

**If previously unvaccinated or receiving initial vaccination series, at least 2 doses of 2024–2025 vaccine are recommended, and depending on vaccination history more may be needed. This additional 2024–2025 vaccine dose is recommended 6 months (minimum interval 2 months) after completion of initial vaccination series.

RSV Vaccines – Maternal/Pediatric

ACIP Partners Webinar

All infants should be protected against severe RSV disease with either maternal RSV vaccine or nirsevimab

Maternal vaccine

Abrysvo, Pfizer

Pregnant persons 32 through 36 weeks' gestation

Administer September through January in most of the continental United States†

Nirsevimab

Beyfortus, Sanofi & AstraZeneca

All infants <8 months*

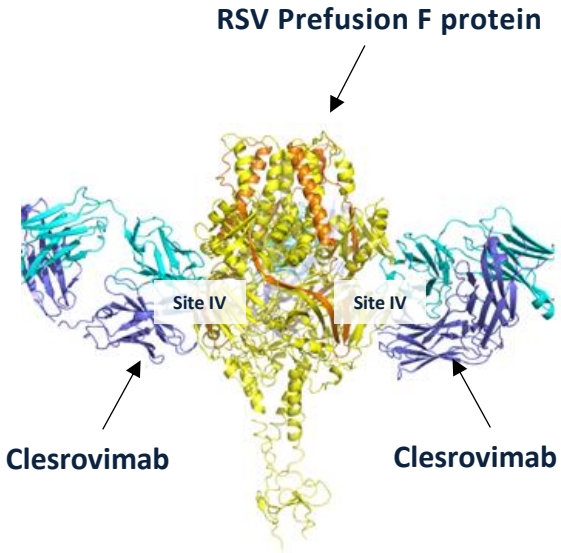
Second season dose for children ages 8–19 months at increased risk of severe RSV disease

Administer October through March in most of the continental United States† (earlier the better)

*__Either__ maternal RSV vaccine or nirsevimab is given to protect infants against severe RSV disease – only one is needed in most instances

† Timing of administration for RSV immunization may differ in jurisdictions with RSV seasonality that differs from most of the continental United States

Clesrovimab is a human monoclonal antibody with four unique molecular characteristics that enable robust and durable protection from RSV



1. Binds with **high affinity** to **site IV** of RSV F protein, prevents fusion of virus to host cells and blocks entry to provide **direct protection**[1]
   - Binding epitope on site IV is **highly conserved**, with 99.8% identity among >15,000 reported RSV-A and RSV-B sequences[2]
2. **High potency** *in vitro* and **equipotent against RSV-A and RSV-B**[a]
3. YTE substitutions enable **extended half-life (~44 days)**
4. Achieves **high nasal tissue distribution** and concentrations at sites of RSV infection[3]

Notes: a. Clesrovimab is ~50-fold more potent in vitro than palivizumab; **Abbreviations**: F=Fusion; RSV=Respiratory Syncytial Virus; **Sources**: 1. Tang A et al. *Nat Commun.* 2019; 2. RSV GeneBank sequences as of April 1, 2024; 3. Phuah JY et al. *Biomed Pharmacother.* 2023.

Proposed Indication and Dosing

Proposed Indication

- Prevention of respiratory syncytial virus (RSV) lower respiratory tract disease in neonates and infants who are born during or entering their first RSV season

Proposed Dosing and Administration

- 105 mg/0.7 mL administered as a single intramuscular (IM) injection
- Clesrovimab **dosing is the same for all infants regardless of weight**

Work group interpretation of clesrovimab efficacy data

- **Phase 2b/3 trial demonstrated high efficacy for prevention of severe RSV disease through 150 days**

Outcome	n/N, clesrovimab	n/N, placebo	Efficacy % (95% CI)
Hospitalization for RSV-associated lower respiratory tract infection*	5/2,398	27/1,201	90.9 (76.2, 96.5)
Medically-attended RSV-associated lower respiratory tract infection ≥ 1 indicator of lower respiratory infection or severity**	60/2,398	74/1,201	60.4 (44.1, 71.9)

*Defined by the presence of the following: cough or difficulty breathing; AND ≥ 1 indicator of LRI (lower respiratory infection) or severity (wheezing, chest wall in-drawing/retractions, rales/crackles, hypoxemia, tachypnea, dehydration due to respiratory symptoms); AND hospital admission for respiratory illness; AND RSV positive reverse transcriptase-polymerase chain reaction (RT-PCR) nasopharyngeal (NP) sample.
**Defined by the presence of the following seen in an outpatient or inpatient clinical setting: cough or difficulty breathing and ≥ 1 indicator of (lower respiratory infection) or severity (wheezing, chest wall in-drawing/retractions, rales/crackles, hypoxemia, tachypnea, dehydration due to respiratory symptoms); and RSV positive reverse transcriptase-polymerase chain reaction (RT-PCR) nasopharyngeal (NP) sample.

Merck, presented at IDWeek in Los Angeles, California from October 16-19, 2024

Imbalance of preterm birth was observed in clinical trials for the Pfizer maternal RSV vaccine (Abrysvo)

- In clinical trials, maternal RSV vaccine was administered at 24–36 weeks' gestation, and more preterm births and hypertensive disorders of pregnancy were observed among pregnant people who received maternal RSV vaccine (Abrysvo) vs. placebo, but the **differences were not statistically significant**
  - Data were insufficient to establish or exclude a causal relationship

- FDA approved maternal RSV vaccine (Abrysvo) for use in pregnant persons at 32–36 weeks' gestation to avoid the potential risk for preterm birth at <32 weeks' gestation

- ACIP judged the benefits of maternal RSV vaccine (Abrysvo) at 32–36 weeks' gestation to outweigh the potential risks for preterm birth and hypertensive disorders of pregnancy

Maternal RSV vaccine safety: first season analysis of preterm birth and small for gestational age

- **Preliminary findings from the first season of maternal RSV vaccine in a Vaccine Safety Datalink (VSD) study found that maternal RSV vaccine during 32–36 weeks' gestation was not associated with an increased risk of preterm birth or small for gestational age[1]**
  - **The work group felt that these data were very reassuring.**

	Matched pairs, N	RSV vaccinated		Unvaccinated match		Risk Ratio (95% CI)
		N events*	Percent %	N events*	Percent %	
Preterm birth[a]	13,965	563	4.0	628	4.5	0.90 (0.80–1.00)
Small for gestational age[b]	11,819	799	6.8	774	6.5	1.03 (0.94–1.14)

[a]Preterm birth = birth <37 weeks gestational age [b]SGA at birth = "Small for Gestational Age"; birthweight <10th percentile for gestational age compared with a U.S. reference population[2]

*Events only included through date of censoring when unvaccinated pair crosses over to vaccinated

1. DeSilva, M. *RSVpreF Vaccine, Preterm Birth, and Small for Gestational Age at Birth Preliminary Results from The Vaccine Safety Datalink.* Presented at ACIP October 23, 2024 2. Talge NM, Mudd LM, Sikorskii A, Basso O. United States birth weight reference corrected for implausible gestational age estimates. Pediatrics 2014;133:84453. PMID:24777216

Meningococcal Vaccines

ACIP Partners Webinar

Pentavalent MenABCWY Vaccines

- **Two new MenABCWY vaccines:**
  - Pfizer (Penbraya, ACIP vote October 2023)
  - GSK (ACIP vote anticipated February 2025)

- **Each vaccine is a combination of an existing:**
  - MenACWY vaccine
  - MenB vaccine

and

Next Steps

- **An interim recommendation for the GSK vaccine could mirror the recommendation made for the Pfizer vaccine last year**
  - an option for MenACWY/MenB vaccination in people currently recommended to receive both vaccines at the same visit
- **Recommendations for use of both pentavalent vaccines could then be revisited as part of future adolescent schedule deliberations if desired**

MenB-4C (Bexsero) Interval Changes

- **Initially licensed by FDA under an accelerated approval process**
- **New immunogenicity data support changes to dosing schedule**
  - No safety concerns
- **Full FDA approval: August 19, 2024**
- **New dosing schedule aligned with MenB-FHbp (Trumenba)**

https://www.fda.gov/media/90996/download?attachment
https://wayback.archive-it.org/7993/20190423064853/https://www.fda.gov/downloads/BiologicsBloodVaccines/Vaccines/ApprovedProducts/UCM431447.pdf

New MenB-4C (Bexsero) Label

- **Two-dose schedule: Administer a dose (0.5 mL) at 0 and 6 months. If the second dose is administered earlier than 6 months after the first dose, a third dose should be administered at least 4 months after the second dose.**
- **Three-dose schedule: Administer a dose (0.5 mL) at 0, 1–2, and 6 months.**
- **The choice of dosing schedule may depend on the risk of exposure and the individual's susceptibility to meningococcal serogroup B disease.**

ACIP Recommendations

- **ACIP recommends MenB-4C (Bexsero) be administered as a 2-dose series at 0 and 6 months when given to healthy adolescents and young adults aged 16–23 years based on shared clinical decision-making for the prevention of serogroup B meningococcal disease**
- **ACIP recommends MenB-4C (Bexsero) be administered as a 3-dose series at 0, 1–2, and 6 months when given to persons aged ≥10 years at increased risk for serogroup B meningococcal disease (i.e., persons with anatomic or functional asplenia, complement component deficiencies, or complement inhibitor use; microbiologists routinely exposed to *N. meningitidis* isolates; and persons at increased risk during an outbreak)**

Proposed CDC Clinical Considerations

- **The 3-dose series (doses administered at 0, 1–2, 6 months) may be used to optimize rapid protection for those who initiate the vaccine series less than 6 months prior to period of increased risk**
  - e.g., when series initiation occurs within 6 months of college matriculation
- **Would apply to MenB-4C (Bexsero) and MenB-FHbp (Trumenba)**

RSV Vaccines – Adult

ACIP Partners Webinar

Current FDA-approved RSV vaccines

- **Protein subunit (based on RSV F protein in prefusion conformation)**
  - **GSK Arexvy**[1]: monovalent RSV-A, $AS01_E$ adjuvant
  - **Pfizer Abrysvo**[2]: bivalent RSV-A/RSV-B, no adjuvant

- **Messenger RNA (mRNA, encoding RSV F protein in prefusion conformation)**
  - **Moderna mResvia**[3]: monovalent RSV-A, no adjuvant

1. https://www.fda.gov/media/167805/download
2. https://www.fda.gov/media/168889/download
3. https://www.fda.gov/media/179005/download

Current FDA-approved RSV vaccines

- **Protein subunit**
  - **GSK Arexvy**[1]: monovalent RSV-A, $AS01_E$ adjuvant
  - **Pfizer Abrysvo**[2]: bivalent RSV-A/RSV-B, no adjuvant

- **mRNA**
  - **Moderna mResvia**[3]: monovalent RSV-A, no adjuvant

Also approved for prevention of LRTD caused by RSV in **adults aged 50–59 years who are at increased risk for LRTD caused by RSV***

As of 10/22/24[4]: also approved for prevention of LRTD caused by RSV in **adults aged 18–59 years who are at increased risk for LRTD caused by RSV***

*There is no current ACIP recommendation for RSV vaccination in **non-pregnant** adults aged <60 years.

1. https://www.fda.gov/media/167805/download
2. https://www.fda.gov/media/168889/download
3. https://www.fda.gov/media/179005/download

Conclusions

- Our findings suggest an increased GBS risk following RSVPreF3+AS01 and RSVPreF among adults aged 65 years and older
- These results are consistent with pre-licensure clinical trials and surveillance systems such as VAERS
- End-of-season SCCS analyses results are largely chart-confirmed from MRR and include approximately three times more vaccine doses and GBS cases compared to the early season SCCS results
- GBS risk following vaccination with RSVPreF3+AS01 and RSVPreF is rare, with less than 10 cases per 1 million vaccinations
- There is no difference in GBS risk among persons with and without same day concomitant vaccination with RSV vaccines

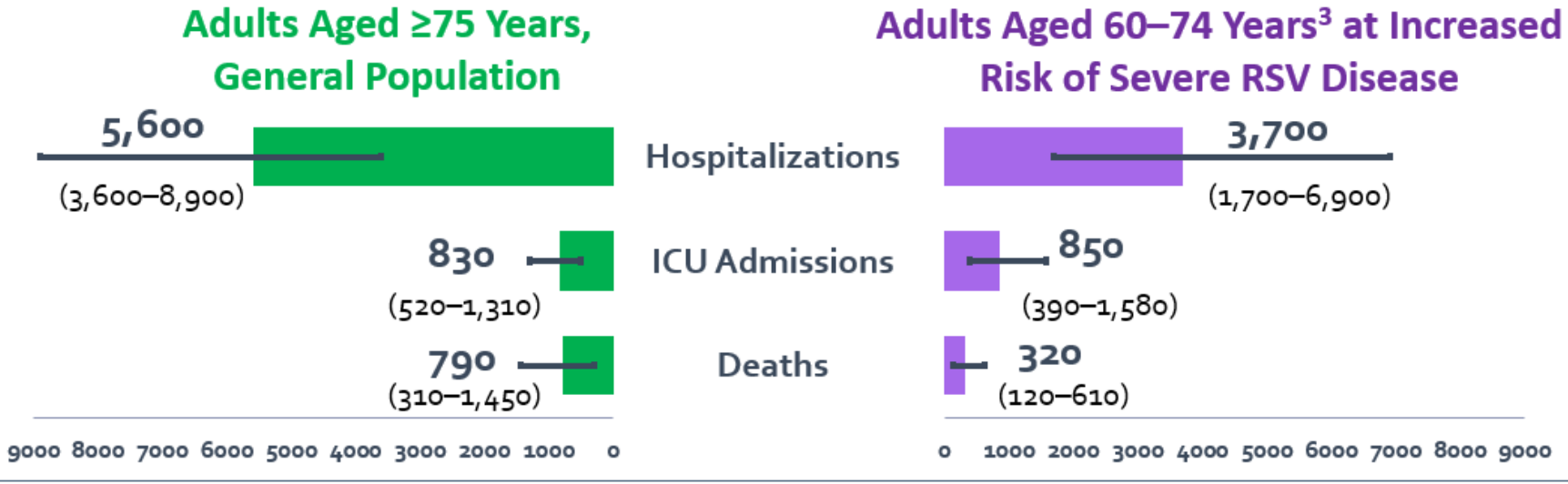
The Work Group concluded that available data support existence of increased risk of GBS after protein subunit RSV vaccination[1]

- Available data suggest that risk is comparable to, and potentially greater than, that of other currently licensed and recommended adult vaccines.
- No evidence of a difference in risk between protein subunit vaccines[1] (GSK, Pfizer).
- The Work Group emphasized that risk of GBS associated with protein subunit RSV vaccines[1] should be considered in the context of the public health benefits of RSV vaccination.
- In June 2024, ACIP reviewed results of a mathematical modeling analysis comparing the numbers of RSV-associated hospitalizations, intensive care unit (ICU) admissions, and deaths avertable per 1 million persons vaccinated vs. the numbers of potential vaccine-attributable GBS cases.[2]
- This analysis has been updated to account for the most up to date information on protein subunit RSV vaccine effectiveness, duration of protection, and GBS risk[1].

1. GSK's Arexvy and Pfizer's Abrysvo are protein subunit RSV vaccines. Moderna's mResvia is an mRNA RSV vaccine, NOT a protein subunit vaccine. To date, Moderna's mResvia vaccine has NOT been associated with increased risk of Guillain-Barré syndrome. Post-licensure safety surveillance for mResvia began recently in June 2024.
2. https://www.cdc.gov/acip/downloads/slides-2024-06-26-28/09-RSV-Adult-Hutton-508.pdf

Estimated RSV-Associated Outcomes[1] Preventable over 3 RSV Seasons vs. attributable risk of GBS estimated from self-controlled case series analysis through FDA-CMS partnership, 42-day risk interval[2]

Per 1 Million Persons Vaccinated with Protein Subunit RSV Vaccine:



0–18[4] attributable cases of GBS

1. Range of outcomes avertable was calculated using published 95% confidence intervals (outpatient only) and adjusted 95% confidence interval of RSV-associated incidence of the outcome observed in RSV-NET
2. FDA self-controlled case series analysis, among CMS Medicare beneficiaries ≥65 years with Parts A, B, and D coverage who did not have a GBS claim in the 365 days before vaccination. Analysis based on diagnoses of GBS in inpatient claims data in risk interval (1–42 days after RSV vaccination) compared to control interval (43–90 days after RSV vaccination). GBS cases identified using ICD-10 diagnosis of GBS in primary position of inpatient claims coding with chart verification requiring Brighton Collaboration Level 1–3 certainty. Estimates adjusted for outcome-dependent observation time, seasonality, and (when chart review could not be performed) the positive predictive value of diagnostic codes in identifying chart-confirmed GBS cases. Analysis includes patients with RSV vaccinations only through January 28, 2024 to allow for 90-day post-vaccination observation and 90% or greater claims data completeness. Claims data through July 13, 2024.
3. Although CMS data were limited to Medicare beneficiaries aged ≥65 years, results are extrapolated here to include adults aged 60-64 years.
4. Credible range spans the lowest lower bound and highest upper bound of attributable risk estimates for the GSK and Pfizer RSV vaccines.

Credit: Dr. David Hutton, U. Michigan

Summary of RSV coadministration data with influenza and/or COVID-19 mRNA vaccines in which non-inferiority of humoral immune response was assessed in older adults

	GSK RSV vaccine	Pfizer RSV vaccine	Moderna RSV vaccine
Standard dose influenza vaccine	Coadministration non-inferior	*No data available*	Coadministration non-inferior
Adjuvanted influenza vaccine	Coadministration non-inferiority criteria not met • RSV titers: non-inferior • Influenza titers: H3N2 HAI[1] titers inferior w/ coadministration	Coadministration non-inferior	*No data available*
High-dose influenza vaccine	Coadministration non-inferior	Coadministration non-inferior[2]	Coadministration non-inferiority criteria not met • RSV titers: RSV-A and B neutralizing antibody titers inferior w/ coadministration • Influenza titers: non-inferior
mRNA COVID-19 vaccine	*No data available*	Coadministration non-inferior	Coadministration non-inferior

1. HAI: hemagglutination inhibition. Humoral immune response against influenza A/Darwin H3N2 was also assessed post-hoc via microneutralization, which resulted in a geometric mean titer (GMT) ratio similar to the HAI GMT ratio, with a slightly narrower confidence interval: 1.23 (95% CI: 1.06–1.42). Non-inferiority criteria were not specified for post-hoc analyses. Prespecified non-inferiority criteria for the HAI GMT ratio required that the 95% CI upper bound was <1.50.
2. When given as 3-way coadministration (high-dose influenza vaccine + COVID-19 vaccine + Pfizer RSV vaccine)

First RSV vaccine trials in immunocompromised persons

- GSK and Pfizer presented clinical trial data on use of their RSV vaccines in adults aged ≥18 years with immune compromise.
- These are the first clinical trial results in these populations at high risk of severe RSV disease.
- Notably, these trials studied the safety of and the immune response to RSV vaccination, but did not estimate efficacy against clinical endpoints.

The Work Group affirms that the current older adult RSV vaccine recommendations are appropriate

- **Adults aged ≥75 years should receive a single dose of RSV vaccine**
- **Adults aged 60–74 years who are at increased risk of severe RSV disease should receive a single dose of RSV vaccine**

- While uncertainty remains regarding the magnitude of GBS risk associated with protein subunit RSV vaccination*, the Work Group believes that the benefits of RSV vaccination outweigh risks among the populations for whom RSV vaccination is currently recommended.

*GSK's Arexvy and Pfizer's Abrysvo are protein subunit RSV vaccines. Moderna's mResvia is an mRNA RSV vaccine, NOT a protein subunit vaccine. To date, Moderna's mResvia vaccine has NOT been associated with increased risk of Guillain-Barré syndrome. Post-licensure safety surveillance for mResvia began recently in June 2024.

Immunization Schedules

ACIP Partners Webinar

Table 1 Recommended Child and Adolescent Immunization Schedule for Ages 18 Years or Younger, United States, 2025

These recommendations must be read with the notes that follow. For those who fall behind or start late, provide catch-up vaccination at the earliest opportunity as indicated by the green bars.
To determine minimum intervals between doses, see the catch-up schedule (Table 2).

Vaccine and other immunizing agents	Birth	1 mo	2 mos	4 mos	6 mos	9 mos	12 mos	15 mos	18 mos	19–23 mos	2–3 yrs	4–6 yrs	7–10 yrs	11–12 yrs	13–15 yrs	16 yrs	17–18 yrs
Respiratory syncytial virus (RSV-mAb [Nirsevimab])	1 dose depending on maternal RSV vaccination status (See Notes)																
Hepatitis B (HepB)	1st dose	◄— 2nd dose —►			◄—												
Rotavirus (RV): RV1 (2-dose series), RV5 (3-dose series)			1st dose	2nd dose	See No												
Diphtheria, tetanus, acellular pertussis (DTaP <7 yrs)			1st dose	2nd dose	3rd do												
Haemophilus influenzae type b (Hib)			1st dose	2nd dose	See No												
Pneumococcal conjugate (PCV15, PCV20)			1st dose	2nd dose	3rd do												
Inactivated poliovirus			1st dose	2nd dose	◄—												
COVID-19 (1vCOV-mRNA, 1vCOV-aPS)																	
Influenza (IIV3, ccIIV3)																	
or																	
Influenza (LAIV3)																	
Measles, mumps, rubella (MMR)																	
Varicella (VAR)																	
Hepatitis A (HepA)																	
Tetanus, diphtheria, acellular pertussis (Tdap ≥7 yrs)																	
Human papillomavirus (HPV)																	
Meningococcal (MenACWY-CRM ≥2 mos, MenACWY-TT ≥2years)																	
Meningococcal B (MenB-4C, MenB-FHbp)																	
Respiratory syncytial virus vaccine (RSV [Abrysvo])																	
Dengue (DEN4CYD; 9-16 yrs)																	
Mpox																	

Range of recommended ages for all children | Range of recommended ages for catch-up vaccination | Range of re for certain population

Table 1 Recommended Adult Immunization Schedule by Age Group, United States, 2025

Vaccine	19–26 years	27–49 years	50–64 years	≥65 years
COVID-19	1 or more doses of 2024–2025 vaccine (See Notes)			2 or more doses 2024-2025(See Notes)
Influenza inactivated (IIV3, ccIIV3) or Influenza recombinant (RIV3)	1 dose annually			1 dose annually (HD–IIV3, RIV3, or aIIV3 preferred)
Influenza inactivated (aIIV3; HD–IIV3) or Influenza recombinant (RIV3)	Solid organ transplant (See Notes)			
Influenza live, attenuated (LAIV3)	1 dose annually			
Respiratory Syncytial Virus (RSV)	Seasonal administration during pregnancy (See Notes)		60 through 74 years (See Notes)	≥75 years
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)			For healthcare personnel (See Notes)
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, PCV21, PPSV23)			See Notes	
				See Notes
Hepatitis A (HepA)	2, 3, or 4 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)	19 through 23 years	2 or 3 doses depending on vaccine and indication (See Notes for booster recommendations)		
Haemophilus influenzae type b (Hib)	1 or 3 doses depending on indication			
Mpox	2 doses			

ACIP Recommendation

Approve the *Recommended Child and Adolescent Immunization Schedule, United States, 2025* and the *Recommended Adult Immunization Schedule, United States, 2025*.

HPV Vaccines

ACIP Partners Webinar

Current HPV vaccination recommendations, United States

- **Routine vaccination**
  - Age 11 or 12 years
  - Can be started at age 9 years
- **Catch-up vaccination**
  - Through age 26 years
- **Shared clinical decision-making**
  - Age 27–45 years

Number of doses

2 doses (0, 6-12 months)
if starting series before 15th birthday

3 doses (0,1-2, 6 months)
if starting series on or after 15th birthday or if immunocompromising condition

Recommendations of the Centers for Disease Control and Prevention and the Advisory Committee on Immunization Practices
https://www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/hpv.html

Work Group Terms of Reference

- **Wording of the age for routine HPV vaccination**
  - Some stakeholders interested in starting vaccination at age 9 years
  - Current ACIP recommendations are consistent with vaccination at age 9 years
  - Work Group is considering modification of wording to "*HPV vaccination is routinely recommended at age 9 to 12 years*" to allow more flexibility

HPV vaccination at age 9 or 10 years to increase coverage – a systematic review and narrative review of the literature

- **Data from 30 studies published 2014-2024 were summarized in a narrative review**
- **Three general types of studies**
  - Within retrospective cohort studies, HPV vaccine initiation at ages 9-10 years was associated with higher completion by age 13; this was a small proportion of initiators in all studies
    - There could have been meaningful differences between children initiating at ages 9-10 vs 11-12 or providers vaccinating at ages 9-10 vs those vaccinating at the routine age
  - Within QI/intervention studies, findings show vaccination at age 9 was feasible, but not necessarily better
    - Due to the multifaceted approaches, the contribution of the recommendation for initiation at age 9-10 year on increases in coverage is unclear
  - Vaccination at ages 9-10 years may be acceptable to caregivers and providers

Single-dose HPV vaccination

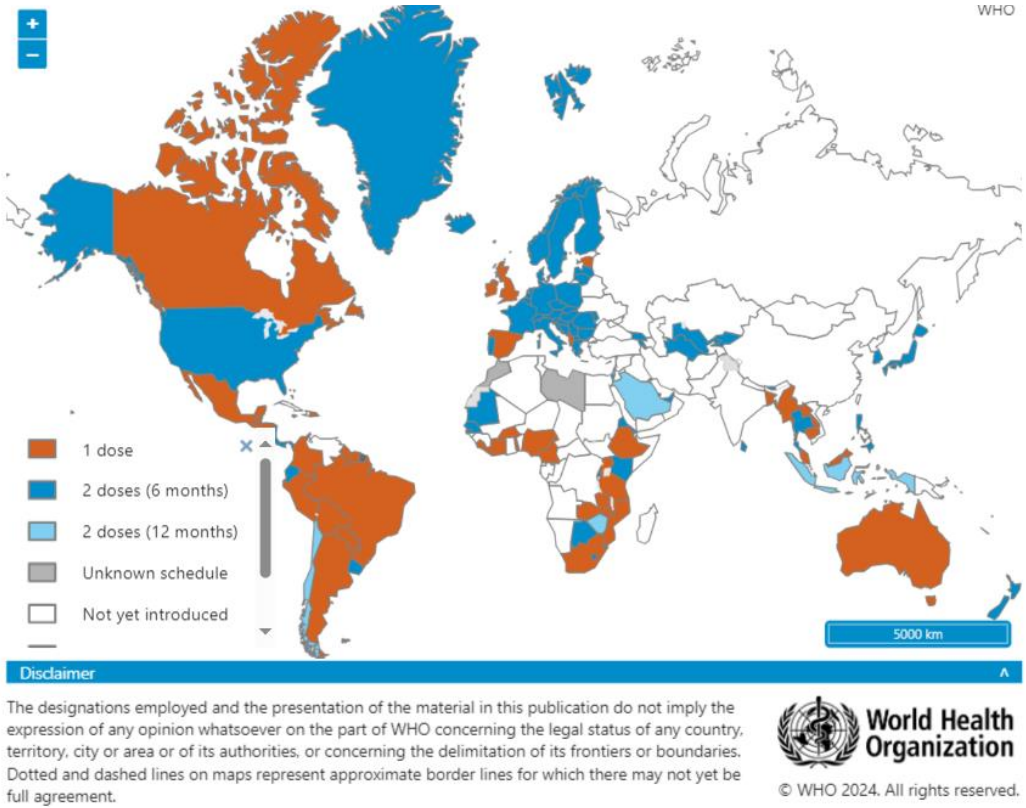
- **Stimulated by same study that led to 2-dose schedules**
- **Immunobridging trials not possible for single-dose**
  - Single dose results in lower antibody titers than 2 or 3 doses
  - Basis of protection after HPV vaccination thought to be neutralizing antibody
  - No established minimum antibody threshold for protection
- **WHO (December 2022)**

  Evidence supports a 2-dose schedule from age 9 years and for all older age groups for which HPV vaccines are licensed.

  As an off-label option, a single-dose schedule can be used in girls and boys aged 9–20 years.

Recommended HPV vaccine schedules in 9–14-year-olds, by country

Doses-interval	No. of countries
1 dose	58
2 doses (12 months)	5
2 doses (6 months	76
Not yet introduced	50
Unknown schedule	5



Date: October 2024

CMV Vaccine

ACIP Partners Webinar

Public Health Problem – Cytomegalovirus (CMV)

- **Congenital CMV**
  - Most common infectious cause of neurodevelopmental disabilities in U.S. children
  - ~4,000 children with congenital CMV disease each year
- **Persons with immunosuppression**
  - Substantial morbidity and mortality
- **Identified as highest priority for vaccine development in the 21st century**

CMV Vaccine Development

1970s **Towne and AD169 (live attenuated vaccine strains)**

Phase 1: solid organ transplant recipients, CMV-seronegative females

1990s **Glycoprotein B (gB)/MF59 vaccine**

Phase 2: CMV-seronegative females 14-40 years

2010s **V160 vaccine (AD169 + Pentameric Complex)**

Phase 2b: CMV-seronegative females 16-35 years

Earlier vaccine candidates did not progress to phase 3 trials

2020s **ASP0113 (DNA-based, gB + pp65)**

Phase 3: CMV-seropositive allogeneic hematopoietic cell transplant recipients

Failed to achieve efficacy for primary endpoints

mRNA-1647 CMV vaccine (gB + Pentameric Complex)

Phase 3: Females 16-40 years

Ongoing trial with results expected soon

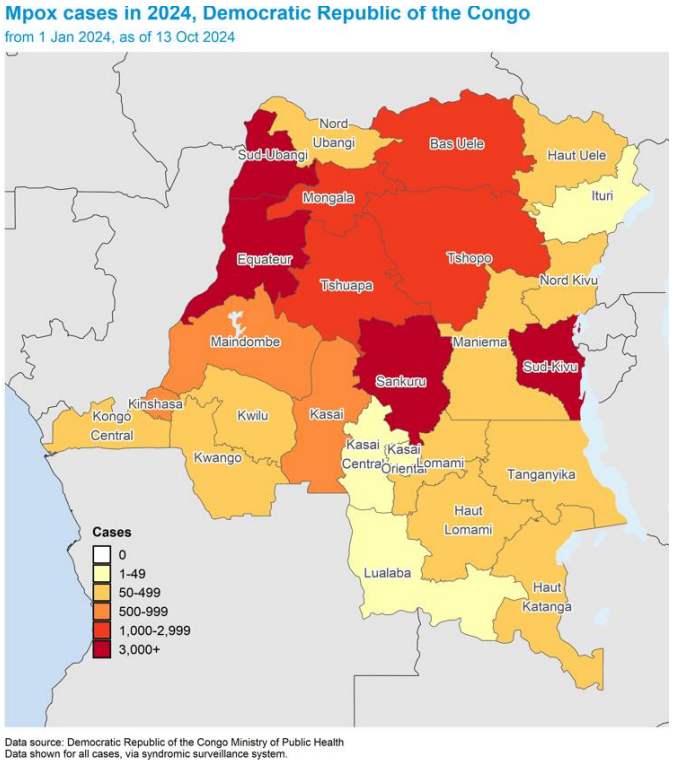
Mpox

ACIP Partners Webinar

Clade I MPXV: Countries known for decades to be endemic

Democratic Republic of the Congo (DRC), Central African Republic, Republic of Congo, Cameroon, Gabon

Clade I Outbreak in DRC, 2023-present



- Reason for concern
  - High number of suspected cases
  - Laboratory confirmed cases identified in provinces previously without cases
- At least two concurrent outbreaks
  - Clade Ia (e.g., Equateur Provence in western DRC): Mortality rate historically reported as 1.4-11%; however, NIH trial in DRC indicates routine supportive care led to mortality rate of ~1.7%*
  - Clade Ib (e.g., Sud Kivu in eastern DRC): Seems to cause less severe disease than clade Ia; mortality rate <1% in DRC

https://www.who.int/emergencies/disease-outbreak-news/item/2024-DON522

*https://www.nih.gov/news-events/news-releases/antiviral-tecovirimat-safe-did-not-improve-clade-i-mpox-resolution-democratic-republic-congo

How Clade I Mpox is Spreading to Non-Endemic Countries*

- Primarily via sex (e.g., transactional sex) while visiting countries with sustained transmission
- Secondary spread
  - Limited (if any) in several non-endemic countries (e.g., Thailand, Sweden, India)
  - In some countries, believed to be associated with close household contact to an adult with mpox

*Based on what is known at this time

Risk Considered Low for U.S. Travelers

- Pre-travel counseling about risk reduction strategies
  - Avoid close contact with people sick with signs and symptoms of mpox, including skin or genital lesions
  - Avoid contact with contaminated materials used by people who are sick (e.g., clothing, bedding)
- Vaccination, irrespective of sexual orientation and gender identity, for travelers to certain countries* who anticipate any of the following during travel
  - Sex with a new partner
  - Sex at a commercial sex venue (such as a sex club or bathhouse)
  - Sex in exchange for money, goods, or other trade
  - Sex in association with a large public event (such as a rave, party, or festival)

*List of countries maintained here: https://www.cdc.gov/mpox/outbreaks/2023/index.html

https://emergency.cdc.gov/han/2024/han00516.asp

Next Meeting: February 26-27, 2025

Thank you

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 cdc.gov
Follow us on X (Twitter) @CDCgov & @CDCEnvironment