

Preparing for the Respiratory Virus Season

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Objectives

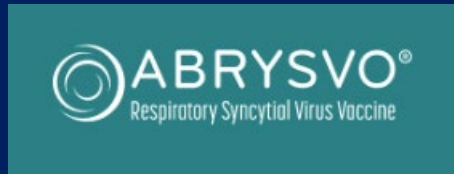


- Review the epidemiology of RSV, influenza, and COVID-19 infections in pediatric and adult patients
- Understand the pathophysiology of RSV, influenza, and COVID-19
- Discuss the vaccines available for RSV, influenza, and COVID-19 disease prevention in different age groups
- Analyze the gaps in coverage and areas for improvement for prevention of RSV, influenza, and COVID-19 disease

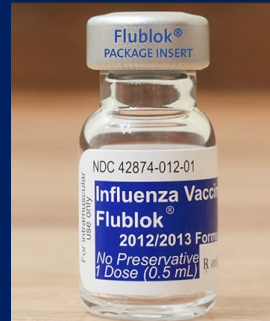
RSV, Influenza, and COVID-19 vaccines will all be available this season



- Respiratory Syncytial Virus (RSV)



- Influenza

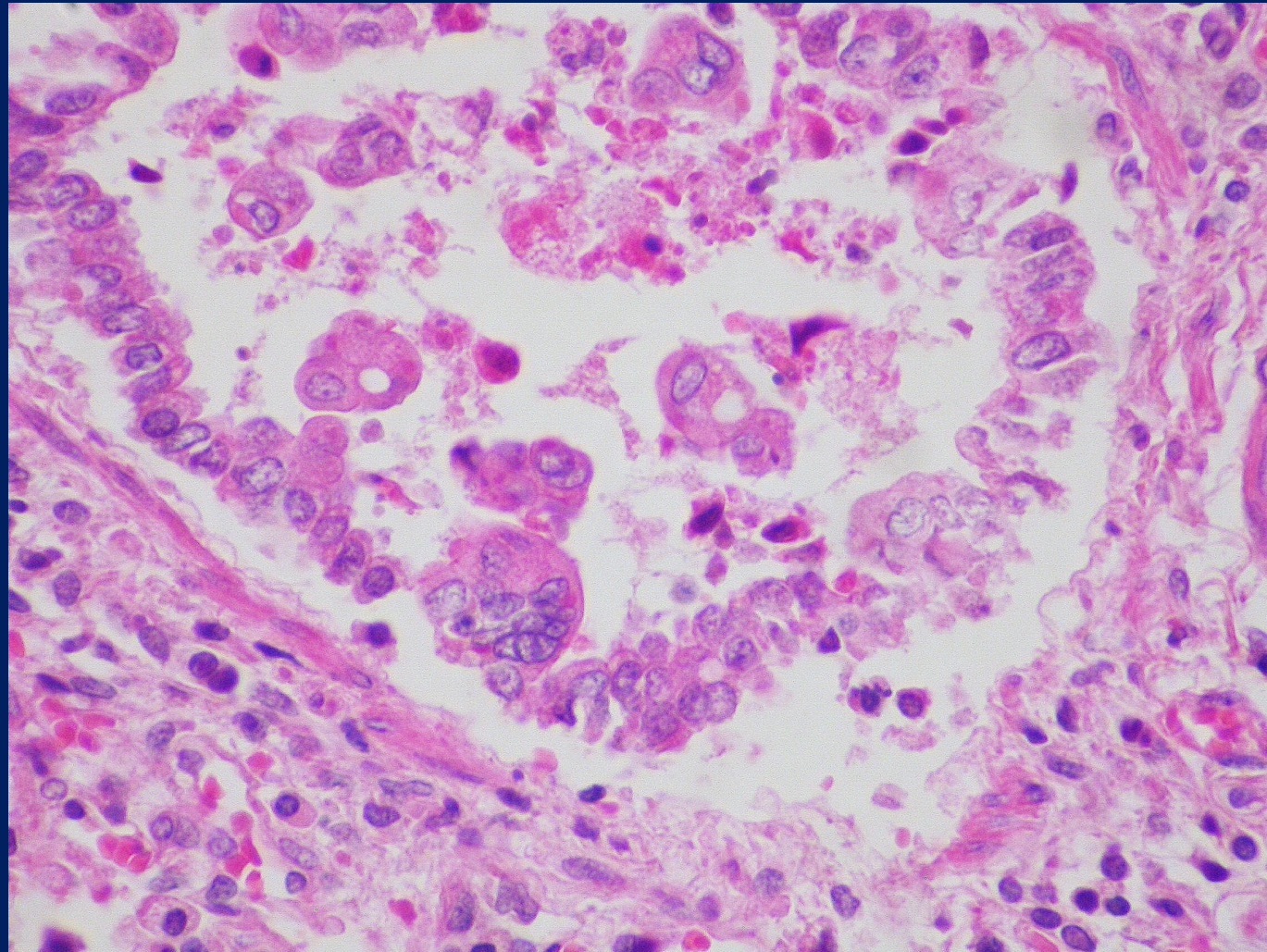


*pictured are only those preferred for 65 and older – there are many more!

- COVID-19



First up - RSV



Respiratory Syncytial Virus (RSV) is a Paramyxovirus named for the syncytia it forms in the airway epithelium.



- Has 2 subtypes, RSV A and RSV B
- Uses RSV F protein to fuse to host cell membrane and begin reproduction



https://health.hawaii.gov/docd/disease_listing/respiratory-syncytial-virus-rsv/

RSV is a common respiratory virus that usually causes mild disease.



- Most people have runny nose, congestion, and cough, and symptoms resolve in 1-2 weeks
- In infants and older adults, symptoms may be severe
 - Bronchiolitis or pneumonia in infants and young children
 - Pneumonia or exacerbation of chronic illnesses in older adults
- RSV is transmitted by droplets and by contact with contaminated surfaces



RSV Annual Burden Estimates

- **2.1 million outpatient visits** in children <5 years old
- **58,000-80,000 hospitalizations** in children <5 years old
- **100-300 deaths** in children <5 years old

- **60,000-160,000 hospitalizations** in adults ≥ 65 years old
- **6,000-10,000 deaths** among adults ≥ 65 years old

RSV in Children



<https://www.cdc.gov/rsv/infants-young-children/index.html>

RSV is the leading cause of hospitalization in infants <12 months of age.



- 2/3 of infants will be infected with RSV by age 1 year; about 2-3% require hospitalization
- Infants less than 1 year of age are about 16x more likely to be hospitalized due to RSV than due to influenza
- Most infants hospitalized with RSV were born at full term with no underlying conditions
- RSV season is usually September-February but during the COVID-19 pandemic all seasonality was disrupted and now is normalizing
 - Florida and the tropical US territories do not have routine seasonality of RSV

Comorbidities can increase risk for severe RSV illness and exacerbation in children.



Risk Factors for Severe Illness

- Prematurity
- Age less than 12 months, especially those less than 6 months
- Age less than 2 years with chronic lung disease or congenital heart disease
- Immunocompromising conditions
- Neuromuscular disorders, especially those with trouble swallowing or clearing secretions

Illnesses RSV May Be Associated With

- Infants with RSV who develop severe bronchiolitis may be at higher risk of developing asthma in childhood

One RSV immunization is approved for infants.



Nirsevimab (Beyfortous)

- Indicated for all infants during local RSV season (usually September-January but can be adjusted locally) to protect from RSV during their first year of life
 - Dosing: 50mg for infants <5kg and 100mg for infants \geq 5kg
 - May be given in the hospital prior to discharge at birth or at regularly scheduled 2-, 4-, or 6-month well-child visits
- Indicated for infants age 8-19 months with increased risk for severe disease including:
 - Chronic lung disease of prematurity who required medical support during the previous 6 month period
 - Severely immunocompromised children
 - American Indian or Alaska Native children
 - Children with Cystic Fibrosis with either 1. severe lung disease or 2. weight-for-length <10th %ile

Most side effects reported are mild.



Nirsevimab (Beyfortous)

- Recombinant IgG1 kappa monoclonal antibody that binds the F protein and blocks cell membrane fusion to prevent virus from entering cells
- Provides passive protection against RSV for ~5 months
- Most commonly reported adverse reactions are rash (0.9%) and injection site reaction (0.3%)

There are very few issues reported with nirsevimab at this time.



Contraindications

- Severe allergic reaction to any component of nirsevimab-alip.

Precautions

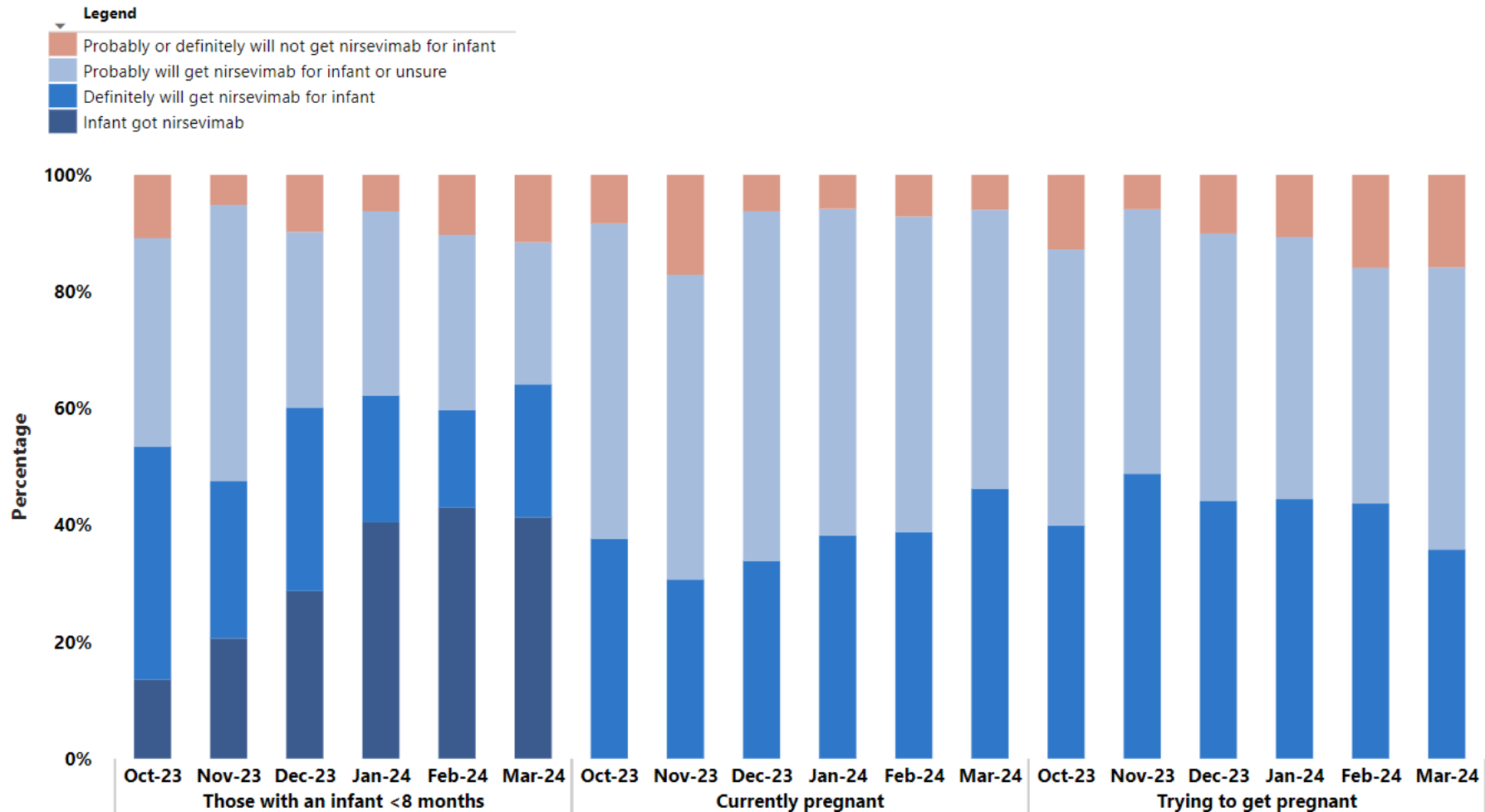
- Thrombocytopenia, coagulation disorders, or who are on anticoagulation therapy

There is limited experience with coadministration of nirsevimab with other vaccines, but in clinical trials it was administered with routine childhood vaccines with no added reactogenicity noted.

Pediatric RSV vaccine coverage estimates, 2023–2024



Figure 6. Monthly Nirsevimab Receipt and Intent Among Females Aged 18-49 Years Who Have an Infant <8 Months, Are Currently Pregnant, or Are Trying to Get Pregnant, United States^{*,†}
Data Source: National Immunization Survey–Adult COVID Module



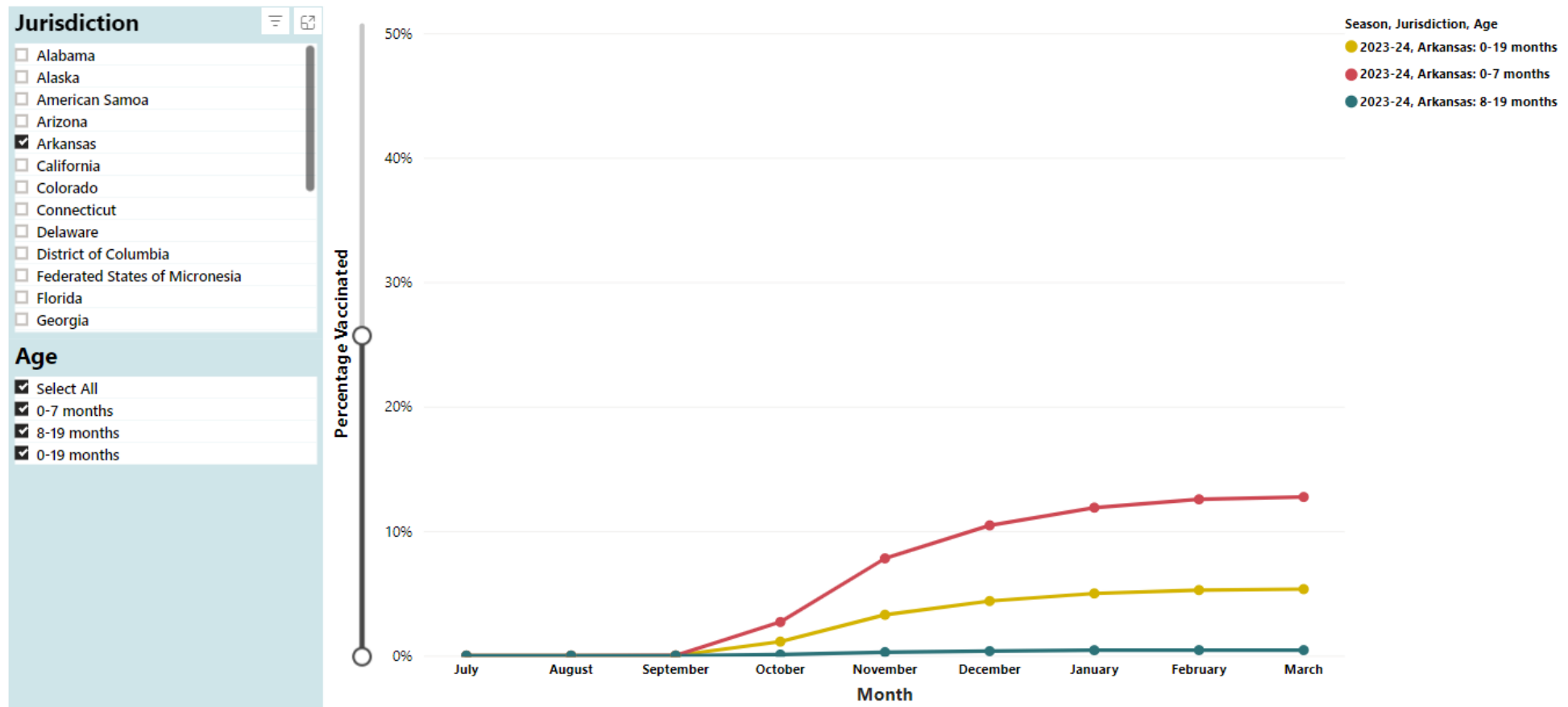
Pediatric RSV vaccine coverage estimates, 2023–2024



Figure 7A. Monthly Cumulative Number and Percent of Children <20 Months Who Received Nirsevimab^{*,†} by Age Group and Jurisdiction, United States

Data Source: U.S. Jurisdiction Immunization Information Systems (IIS)

Data are current through March 31, 2024



RSV in Adults



<https://www.cdc.gov/rsv/older-adults/index.html>

177,000 Adults ≥ 65 years are hospitalized annually in the US.



- Comorbidities that increase the risk of hospitalization with RSV
 - COPD
 - Asthma
 - Diabetes
 - Coronary artery disease
- RSV and influenza have comparable burden of illness with symptomatic illness, hospitalizations, and deaths annually in adults ≥ 65 years

Comorbidities can increase risk for severe RSV illness and exacerbation in adults.



Risk Factors for Severe Illness

- Increasing age
- Chronic lung disease
- Chronic heart disease
- Immunosuppression

Illnesses RSV May Exacerbate

- Asthma
- COPD
- Congestive heart failure

	Abrysvo <i>Pfizer</i>	Arexvy <i>GSK</i>	mRESVIA <i>Moderna</i>	Beyfortus (nirsevimab) <i>Sanofi and AstraZeneca</i>
FDA approved for: • Ages 60 and older	✓	✓	✓	✗
ACIP/CDC recommended for: • Ages 60-74 with risk factors • Everyone ages 75 and older	✓	✓	✓	✗
FDA approved for: • Ages 50-59 with increased risk of severe RSV	✗	✓	✗	✗
ACIP/CDC recommended for: • Ages 50-59 with increased risk of severe RSV	✗	✗	✗	✗
Use in pregnancy				
FDA approved for: • Use in pregnancy	✓	✗	✗	✗
ACIP/CDC recommended for: • Use in pregnancy	✓	✗	✗	✗
Use in infants				
FDA approved for: • Use in infants	✗	✗	✗	✓
ACIP/CDC recommended for: • Use in infants	✗	✗	✗	✓

Three RSV vaccines are approved for adults.



1. Bivalent RSVpreF vaccine (Abrysvo)

- For **pregnant women** 32-36 weeks pregnant during September-January for protection of infants **AND adults ≥ 60 years** with risk factors and all adults ≥ 75 years of age
- Covered by VFC for pregnant girls under 19 years of age
- **57% efficacy of preventing hospitalization with RSV in the first 6 months of life when administered to pregnant women and 86% efficacy against RSV lower respiratory illness in adults ≥ 60 years of age with ≥ 3 symptoms**

Most side effects reported are mild.



1. Bivalent RSVpreF vaccine (Abrysvo)

- Contains recombinant RSV F protein derived from the RSV A and B sub-types
- Most commonly reported side effects: fatigue, myalgias, and injection site pain
- Only 1% reported symptoms that interfered with daily activities

Three RSV vaccines are approved for adults.



2. RSVpreF vaccine (Arexvy)

- **For adults 60 years and older**
 - Recommended for 1 dose in adults ≥ 60 years with risk factors and all adults ≥ 75 years of age
- **82.6% efficacy against RSV lower respiratory disease overall and 94.6% efficacy against lower respiratory disease in those with ≥ 1 comorbidity**

Most side effects reported are mild.



2. RSVpreF vaccine (Arexvy)

- Contains recombinant RSV F protein derived from the RSV A subtype
- Uses same adjuvant as Shingrix zoster vaccine but at lower dose
- Most commonly reported pain at injection site, fatigue, myalgia, and headache
- Only 4% reported symptoms that interfered with daily activities

Three RSV vaccines are approved for adults.



3. RSVpreF mRNA vaccine (mRESVIA)

- **For adults 60 years and older**
 - Recommended for 1 dose in adults ≥ 60 years with risk factors and all adults ≥ 75 years of age
- **78.7% efficacy against RSV lower respiratory disease with ≥ 2 signs/symptoms overall at median 3.4 months follow-up and 67.4% efficacy against lower respiratory disease in those with ≥ 1 comorbidity**

Three RSV vaccines are approved for adults.



3. RSVpreF mRNA vaccine (mRESVIA)

- Contains recombinant mRNA for RSV F glycoprotein derived from the RSV A sub-type
- Most commonly reported ($\geq 10\%$) pain at injection site, headache, myalgia, arthralgia, axillary tenderness/swelling, and chills

Current guidance for adults ≥ 60 years old:

<https://www.cdc.gov/mmwr/volumes/73/wr/mm7332e1.htm>

There are very few issues reported with the adult vaccines at this time.



Contraindications

- Severe allergic reaction to any component of the RSV vaccine.

Precautions

- Administration should be delayed for persons with moderate or severe acute illness with or without fever.

There are no issues with coadministration of RSV vaccine with influenza vaccine at this time, but there is very little data for vaccines other than influenza. Results are mixed with some studies showing increased local or systemic reactogenicity.

As of March 2024, 11.2% of adults ≥ 60 years have received 1 dose of RSV vaccines in Arkansas.



Figure 2A. Monthly Cumulative Number and Percent of Adults 60 Years and Older Who Received 1+ RSV Vaccination Doses^{*,†} by Jurisdiction, United States

Data Source: U.S. Jurisdiction Immunization Information Systems (IIS)
Data are current through March 31, 2024

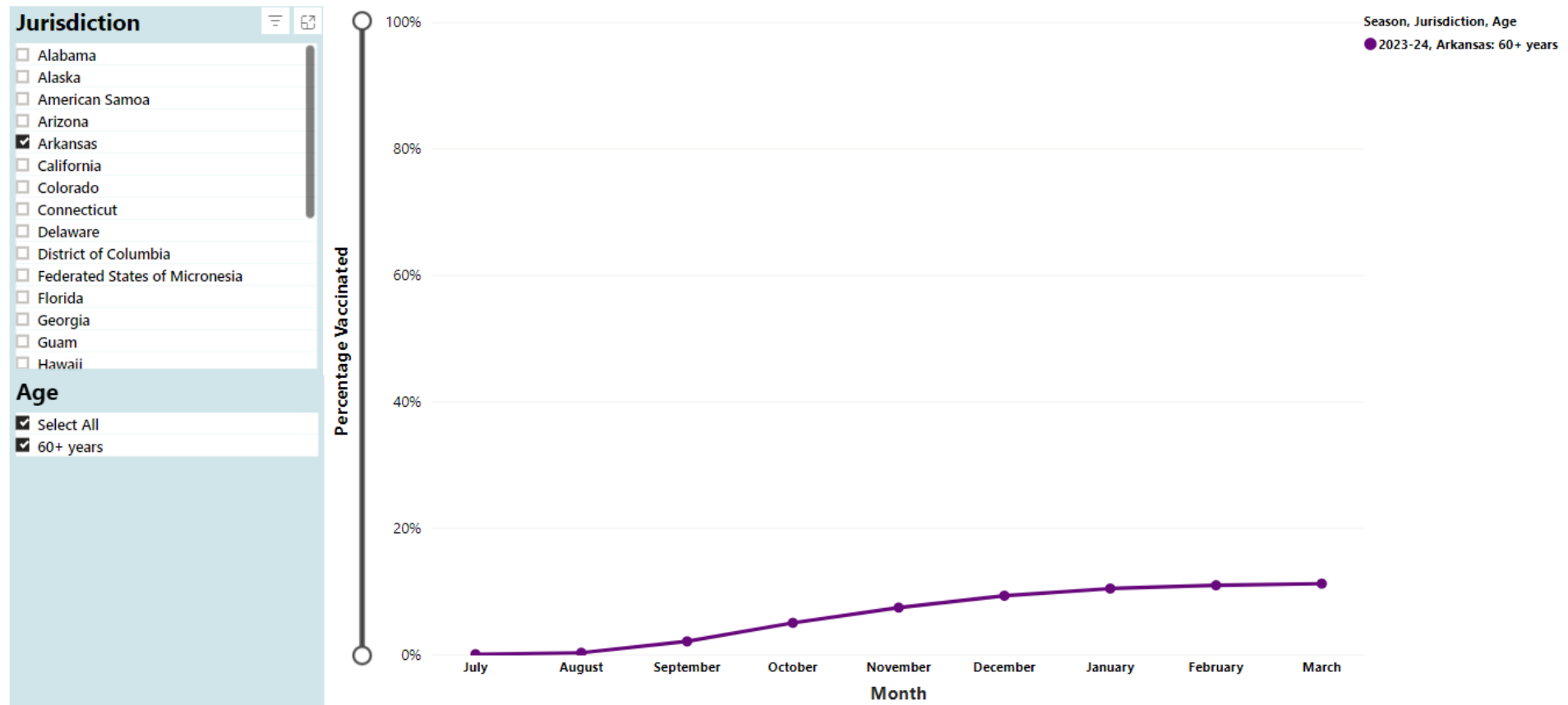


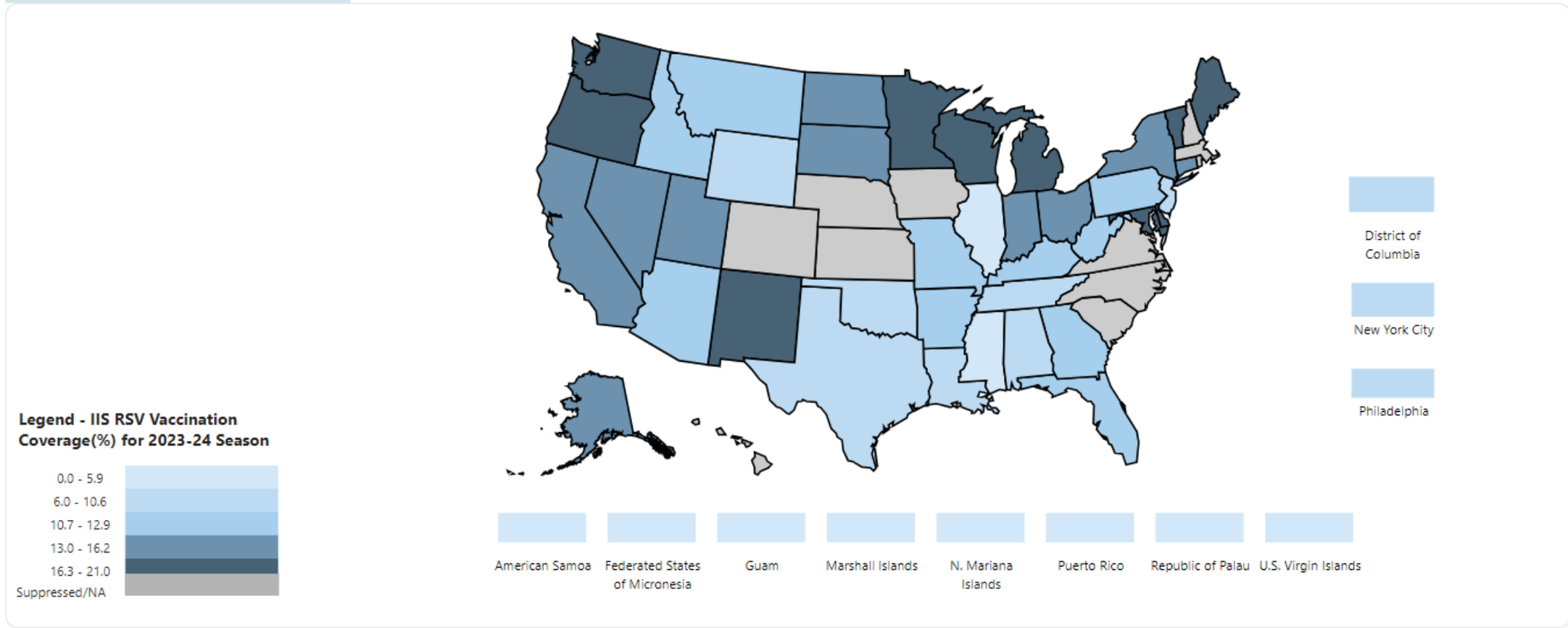
Figure 2B. Monthly Cumulative Number and Percent of Adults 60 Years and Older Who Received 1+ RSV Vaccination Doses^{*,†} by Jurisdiction, United States

Data Source: U.S. Jurisdiction Immunization Information Systems (IIS)

Data are current through March 31, 2024

Current Season Month (2023-24)

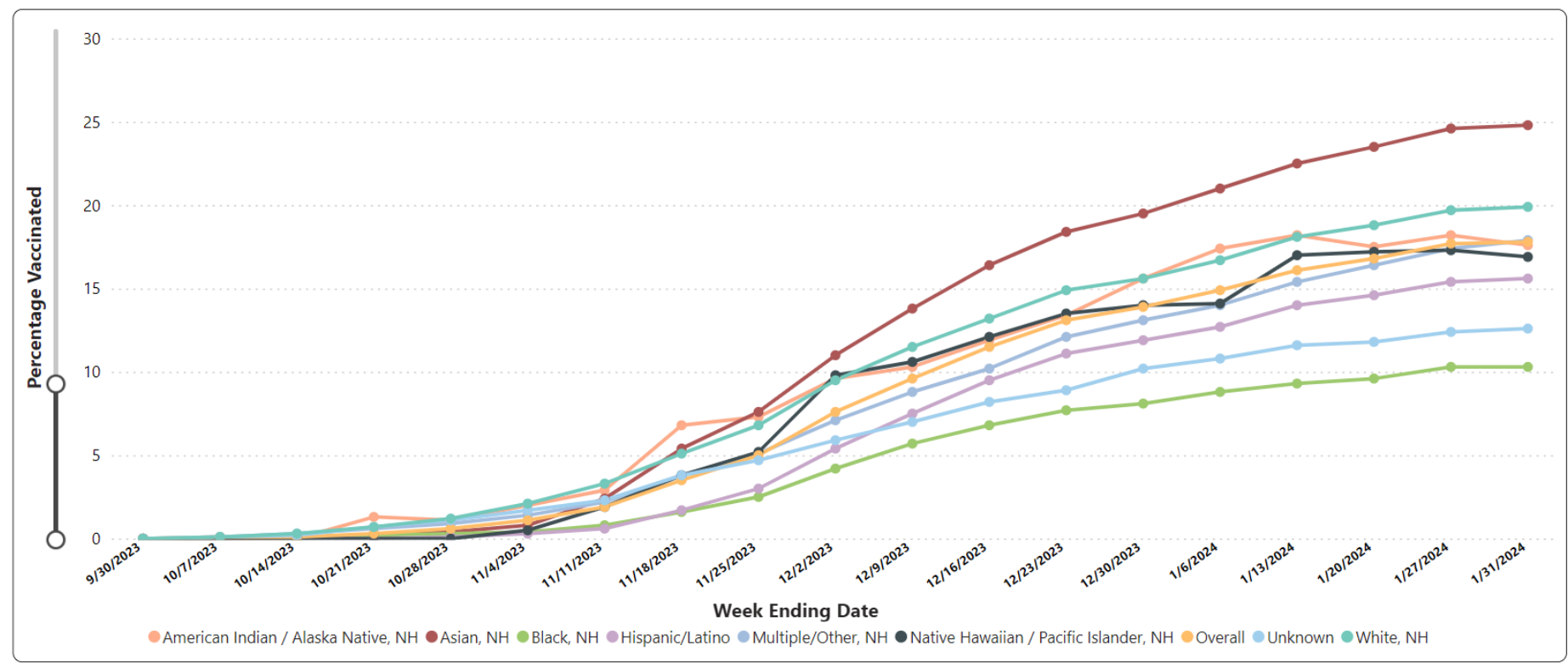
March



Overall, 17.8% of pregnant women 18-49 years of age in the U.S. received a dose of RSV vaccine as of January 2024.



Figure 5. Percent of pregnant persons ages 18–49 years vaccinated† with RSV vaccine overall and by race and ethnicity — Vaccine Safety Datalink



NH=Non-Hispanic

94,782 Doses of RSV Vaccine Have Been Administered to Date in Arkansas



- Arexvy – 50,481
- Abrysvo – 37,164
- Nirsevimab – 6,990
- RSV vaccine not specified – 147

RSV vaccination in pregnancy is important for the health of infants.



- Since RSV is the top cause of hospitalization in U.S. infants, this vaccine has the potential to have a huge impact on child health.
- Pediatric vaccines are routine so adult vaccine programs often struggle to implement new vaccines when there is not a strong history of adult vaccines.
- RSV vaccines are available for eligible adults at pharmacies.

We don't yet know the real-life impact but post-marketing surveillance will continue.



- There is no data for recommending more than one dose of RSV vaccine in adults at this time. It may be possible that there will be a demonstrated need for annual boosters or for repeat doses in each subsequent pregnancy but we don't know yet.
- The annual burden of disease and hospitalizations will continue to be monitored.

Next - Influenza

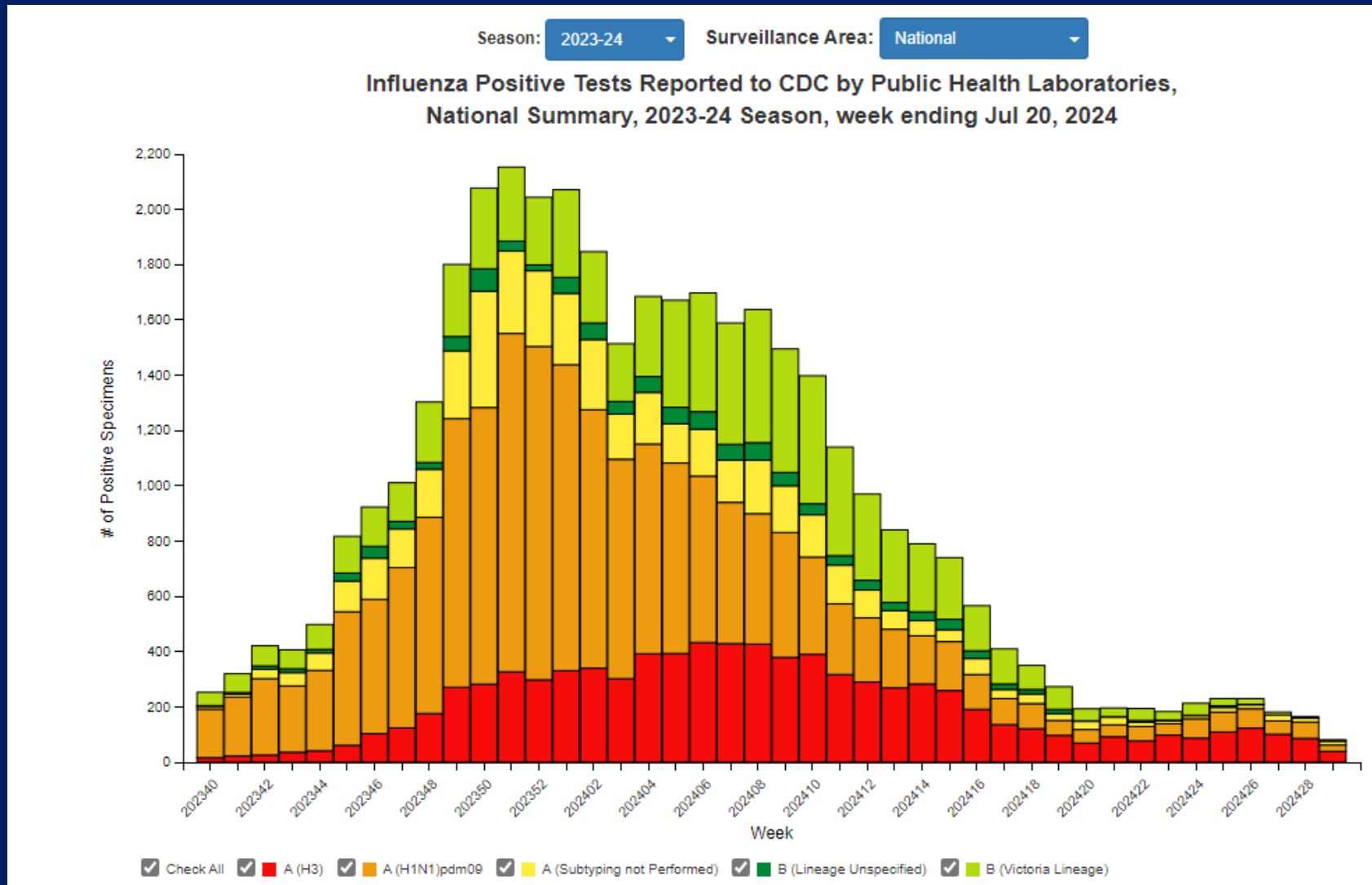


Influenza Pathophysiology



- Respiratory illness that infects nose, throat, and lungs
- Young children, older adults 65 years and older, pregnant women, and people with asthma, heart disease/stroke, diabetes, chronic kidney disease, HIV/AIDS, cancer, and other conditions are at higher risk of severe disease complications
- Usual symptoms: fever, cough, sore throat, runny/stuffy nose, muscle/body aches, headaches, fatigue, GI symptoms (more in children)
- Complications: sinus infection, ear infection, myocarditis, encephalitis, myositis, rhabdomyolysis, multi-organ failure, exacerbation of underlying conditions

Influenza Epidemiology and Burden of Illness



Pneumonia, Influenza and COVID-19 (PIC) Mortality from the National Center for Health Statistics Mortality Surveillance System, Arkansas Data

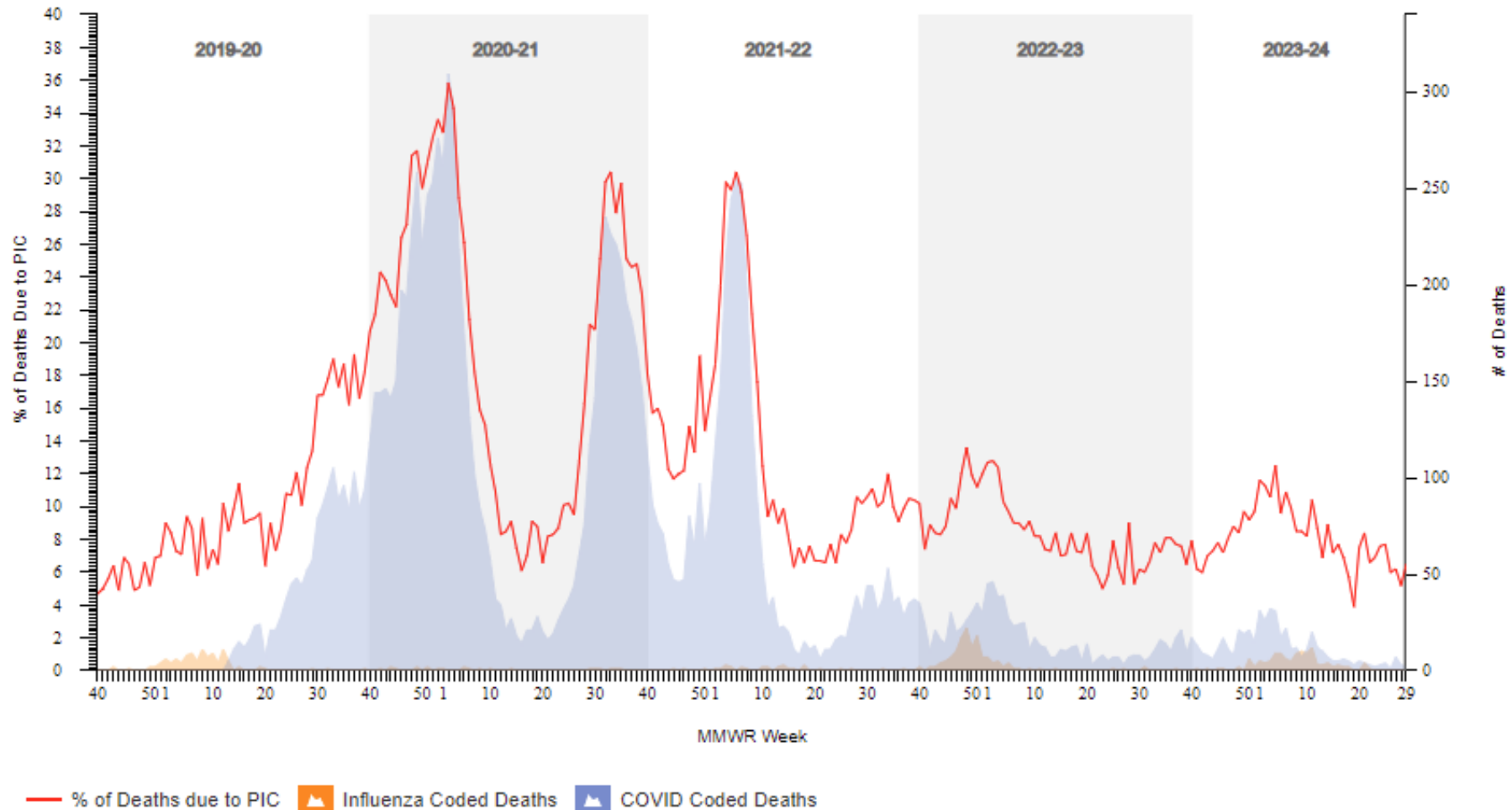


Percentage of all deaths due to pneumonia, influenza, and COVID-19, Arkansas

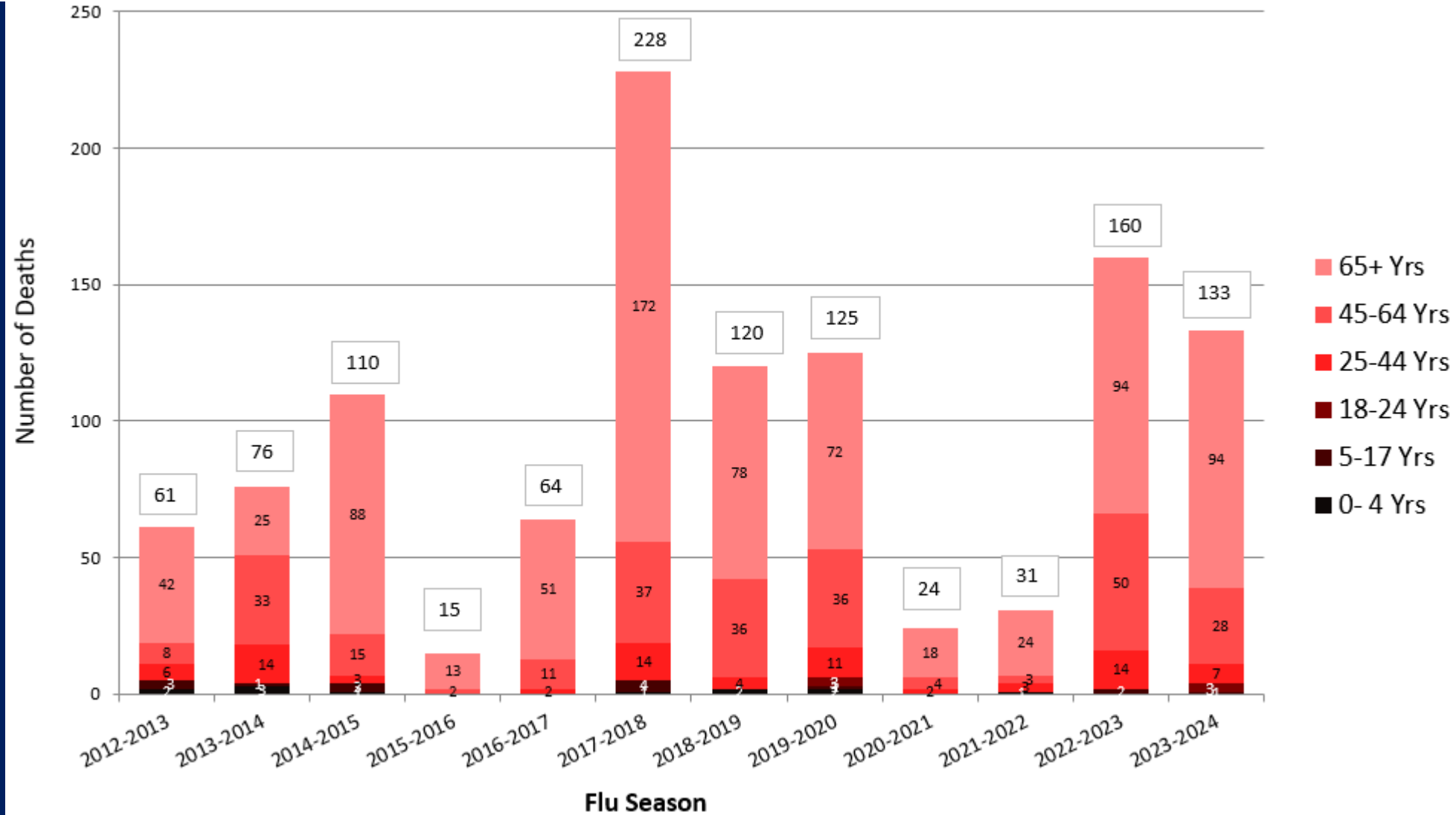
[Download Image](#)

2019-24

Show Number of Influenza Deaths and COVID Deaths



Influenza Mortality by Age Group, Arkansas 2012-2024



Influenza Vaccine Formulation 2024-2025



- All formulations will be trivalent containing Influenza A(H1N1), Influenza A(H3N2), and Influenza B/Victoria this season
 - No Influenza B/Yamagata lineage virus has been detected globally since March 2020
- Recommended to administer in September or October for optimal protection
 - July or August are acceptable for: pregnant people in their third trimester in July or August, children who need 2 doses of vaccine for their first year getting influenza vaccine, and for children or adults who have health care visits in July or August who might not return for vaccine in September or October
- **REMINDER:** egg allergy is not a contraindication or precaution for receiving influenza vaccine

Influenza Vaccine Administration



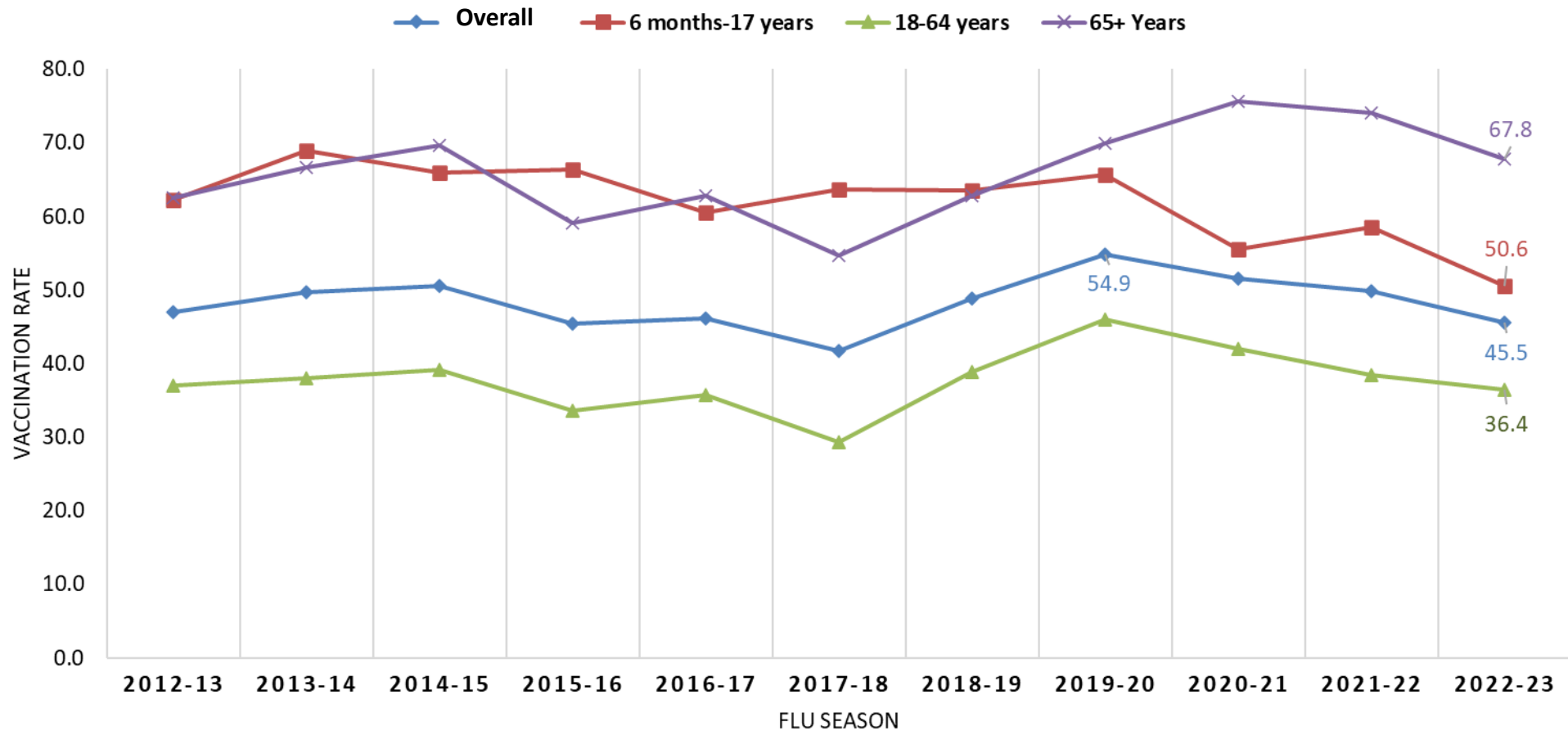
- For people 65 years of age and older
 - Fluzone High-Dose**, Flublok, and Fluad are recommended
- No preference for those under 65 years of age
 - Standard-dose vaccines (Afluria, Fluarix, FluLaval**, Fluzone**)
 - Cell-based vaccine (Flucelvax)
 - Egg-based high dose vaccine (Fluzone High-Dose)
 - Egg-based adjuvanted vaccine (Fluad)
 - Egg-based live attenuated nasal spray vaccine (FluMist)
 - ONLY for people 2-49 years of age
 - NOT for pregnant women, immunocompromised people, or those with asthma or other lung conditions

Those marked with ** will be available in ADH local health units

Arkansas Flu Vaccine Coverage, Pediatrics



INFLUENZA VACCINATION RATE BY AGE GROUPS, NIS, BRFS
ARKANSAS, 2012-2023



Influenza vaccine CPT codes



Administration & Diagnosis Codes	Vaccine Codes & Descriptors (from: https://www.cms.gov/flu-provider)
90654	Influenza virus vaccine, trivalent (IIV3), split virus, preservative-free, for intradermal use
90655	Influenza virus vaccine, trivalent (IIV3), split virus, preservative free, 0.25 mL dosage, for intramuscular use
90656	Influenza virus vaccine, trivalent (IIV3), split virus, preservative free, 0.5 mL dosage, for intramuscular use
90657	Influenza virus vaccine, trivalent (IIV3), split virus, 0.25 mL dosage, for intramuscular use
90658	Influenza virus vaccine, trivalent (IIV3), split virus, 0.5 mL dosage, for intramuscular use
90660	Influenza virus vaccine, trivalent, live (LAIV3), for intranasal use
90673	Influenza virus vaccine, trivalent (RIV3), derived from recombinant DNA, hemagglutinin (HA) protein only, preservative and antibiotic free, for intramuscular use
Q2034	Influenza virus vaccine, split virus, for intramuscular use (agriflu)
Q2035	Influenza virus vaccine, split virus, when administered to individuals 3 years of age and older, for intramuscular use (afluria)
Q2036	Influenza virus vaccine, split virus, when administered to individuals 3 years of age and older, for intramuscular use (flulaval)
Q2037	Influenza virus vaccine, split virus, when administered to individuals 3 years of age and older, for intramuscular use (fluvirin)
Q2038	Influenza virus vaccine, split virus, when administered to individuals 3 years of age and older, for intramuscular use (fluzone)
Q2039	Influenza virus vaccine, not otherwise specified
G0008	Administration of influenza virus vaccine

Influenza Vaccine Effectiveness Across the U.S., 2023-2024



Outpatient Settings

- Pediatric patients – 59%-67%
- Adult patients – 22%-49%

Inpatient Settings

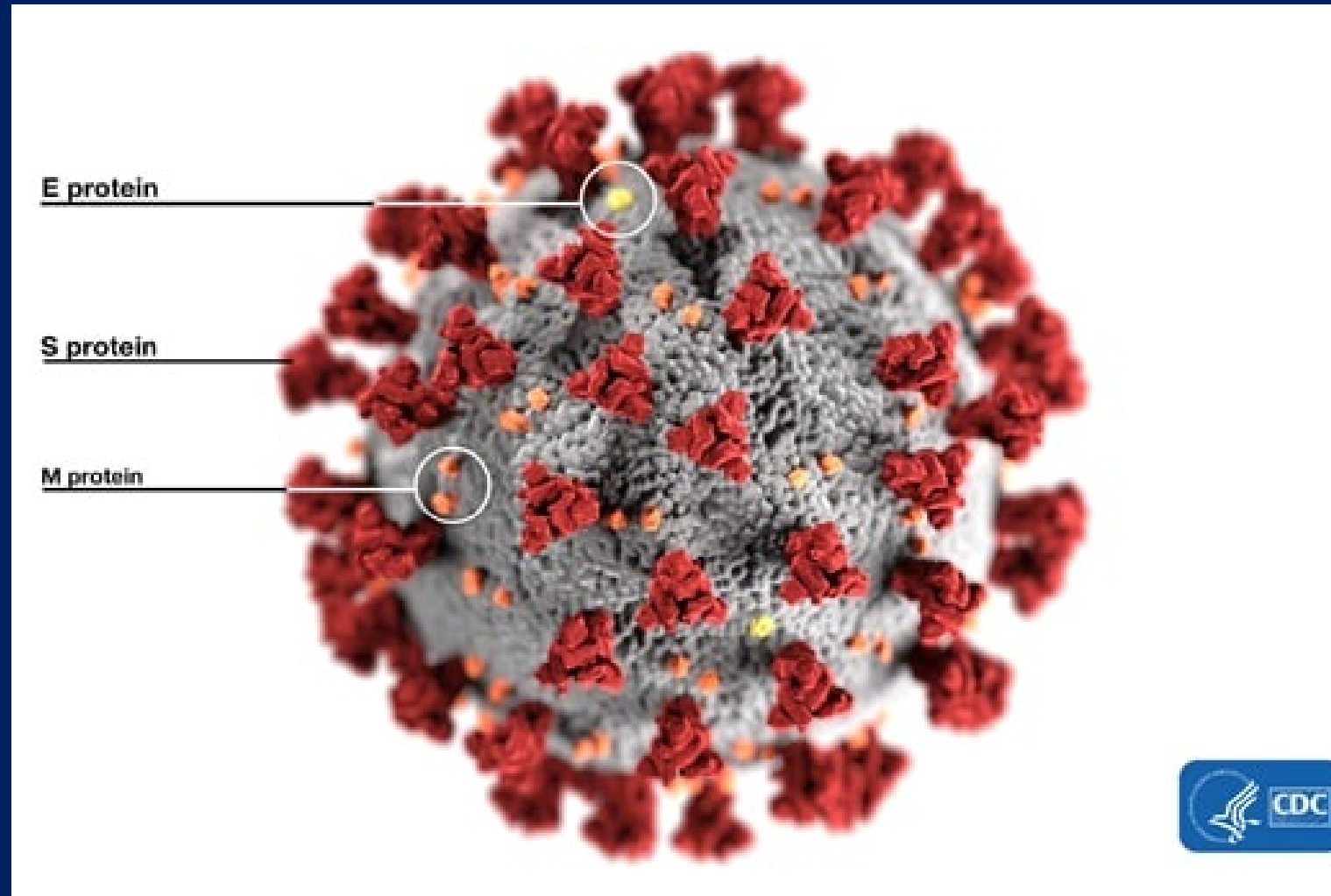
- Pediatric patients – 52%-61%
- Adult patients – 41%-44%

Influenza Vaccine Effectiveness in California, 2023-2024



- Estimated effectiveness for laboratory-confirmed influenza
 - <18 years old – 56%
 - 18-49 years old – 48%
 - 50-64 years old – 36%
 - \geq 65 years old – 30%

And finally – COVID-19

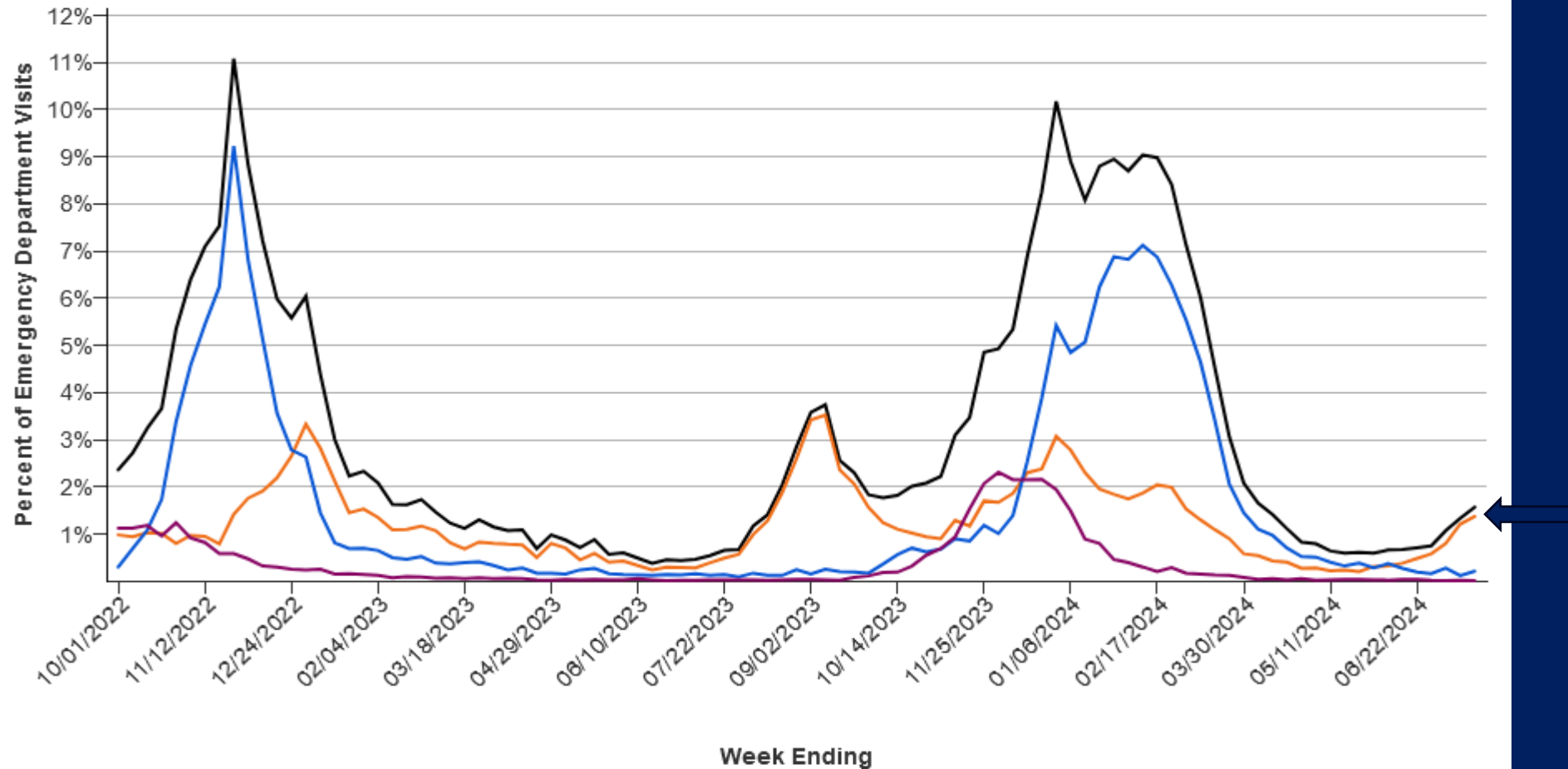


COVID-19 Epidemiology and Burden of Illness



- COVID-19 is caused by the SARS-CoV2 virus
- Usual symptoms are cold or flu-like, but may also cause pneumonia or severe disease
 - Risk factors for severe disease include: cancer, cardiovascular disease, kidney disease, liver disease, lung disease, neurologic disease, diabetes, immunocompromising conditions, overweight/obesity, pregnancy, smoking
- ~80% of COVID-19 associated deaths are in people ≥ 65 years of age

Emergency Department Visits for Viral Respiratory Illness — Arkansas, 2022–2024



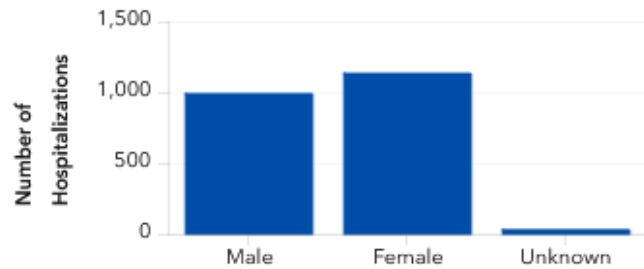
Select a virus to add or remove it from the graphic

- Combined
- COVID-19
- Influenza
- RSV

2024 COVID-19 Hospitalization Demographics

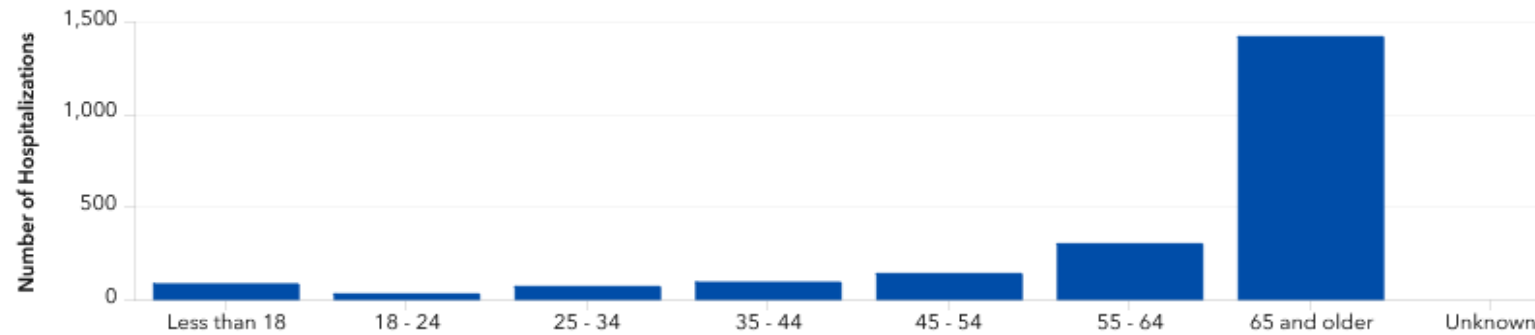


Hospitalizations by Gender



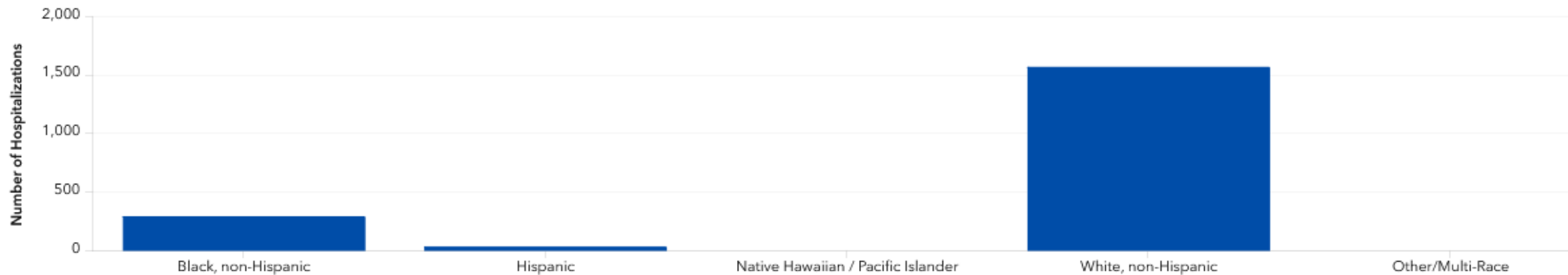
The figure above shows the number of COVID-19 Hospitalizations by gender. Hover over the bars to see the number in each category.

Hospitalizations by Age



The figure above shows the number of COVID-19 Hospitalizations by age. Hover over the bars to see the number in each category.

Hospitalizations by Race and Ethnicity



2024

2023

2022

2021

2020

2024 COVID-19 Associated Death Demographics



2024

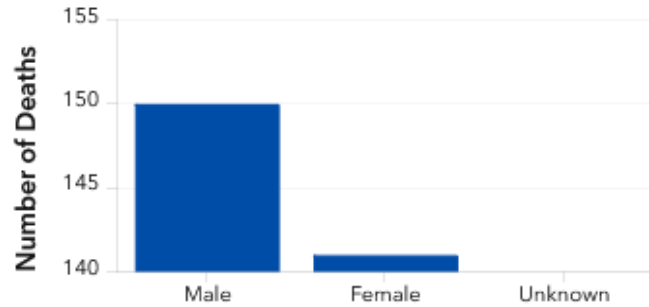
2023

2022

2021

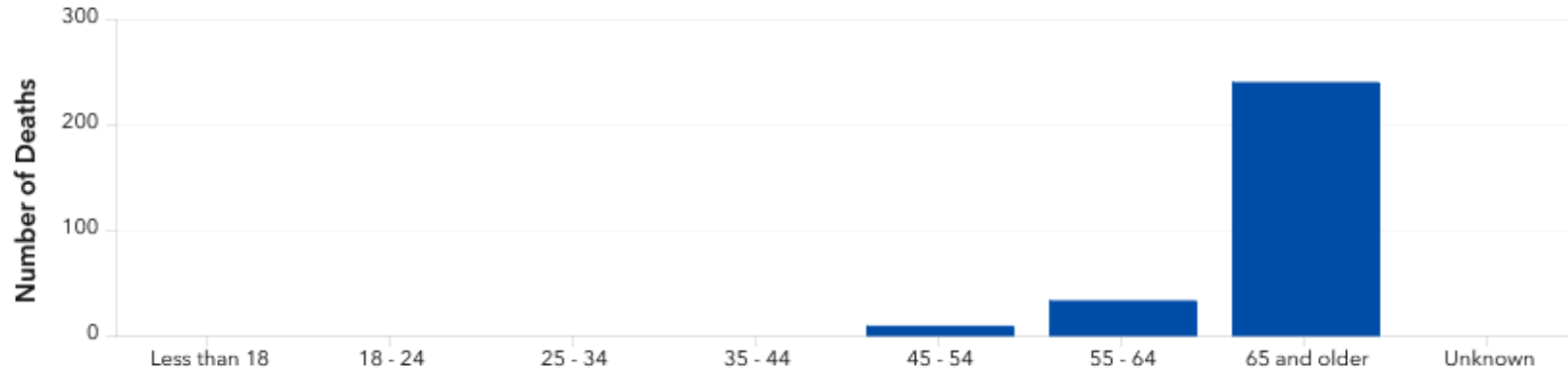
2020

Deaths by Gender



The figure above shows the number of COVID-19 Deaths by gender. Hover over the bars to see the number in each category.

Deaths by Age in Years



The figure above shows the number of COVID-19 Deaths by age in years. Hover over the bars to see the number in each category.

Deaths by Race and Ethnicity



COVID-19 Vaccine Formulation 2024–2025



- Monovalent JN.1 lineage with KP.2 variant if possible
- Children 6 months-4 years who are not previously vaccinated should get 3 doses of updated Pfizer or 2 doses of updated Moderna vaccine
 - Children 6 months-4 years who got a previous dose of vaccine should complete the series with the same vaccine
- All children aged 5-11 years should get 1 dose of updated Pfizer or Moderna vaccine
- People 12 years and older who are not previously vaccinated should get 1 dose of updated Pfizer or Moderna or 2 doses of updated Novavax vaccine
- People 12 years and older who are previously vaccinated should get 1 dose of updated Pfizer or Moderna or Novavax vaccine

COVID-19 Vaccine Effectiveness in Urgent Cares and Emergency Departments, 2023-2024



7-59 days after vaccine administration

- <18 years old – 51%
- 18-64 years old – 52%
- \geq 65 years old – 49%

60-120 days after administration

- <18 years old – 39%
- 18-64 years old – 45%
- \geq 65 years old – 37%

COVID-19 Vaccine Effectiveness against Hospitalization, 2023-2024



7-59 days after vaccine administration

- <18 years old – 53%
- 18-64 years old – 42%
- \geq 65 years old – 54%

60-120 days after administration

- <18 years old – 50%
- 18-64 years old – 45%
- \geq 65 years old – 50%

Conclusions



VACCINES CAUSE ADULTS



<https://www.bakerinstitute.org/vaccines-cause-adults>

There are now 3 viral respiratory illnesses with vaccines available to protect the population this season.



- RSV vaccine is available for:
 - All infants in their first RSV season
 - Infants in their second RSV season who are high risk
 - **This is the only group recommended to get a second dose of vaccine
 - All pregnant women
 - All adults 75 years of age and over
 - Adults 60 years of age and over at high risk

There are now 3 viral respiratory illnesses with vaccines available to protect the population this season.



- Trivalent influenza vaccine is available to all patients 6 months of age and over
 - CPT codes for clinics need attention as all vaccines will be trivalent this season
- Updated monovalent SARS-CoV-2 vaccines to protect against COVID-19 will be available this fall
 - Protection starts to wane after 60 days so timing of vaccine administration is important

Thanks for your attention!



- Questions?
- Sarah.Labuda@arkansas.gov
- Please pick up some of our laminated measles posters for your office!
- Further questions/needs about measles or other reportable infectious diseases? Email ADH Outbreak Response at ADH.ORSNurses@arkansas.gov