A Review of Flu Vaccine Recommendations for the 2021 – 2022 Season

This activity is supported by an educational grant from Seqirus.

Pharmacist Educational Objectives

After completion of this activity, participants will be able to:

- Examine data surrounding the 2021-2022 influenza season and identify patients at the highest risk of influenza-related complications
- Review the Advisory Committee on Immunization Practices (ACIP) recommendations for 2021-2022 influenza vaccination
- Analyze the safety and efficacy of the available and recommended influenza vaccines for the 2021-2022 season
- Identify the role of the pharmacist in influenza vaccinations and addressing barriers in obtaining the influenza vaccine

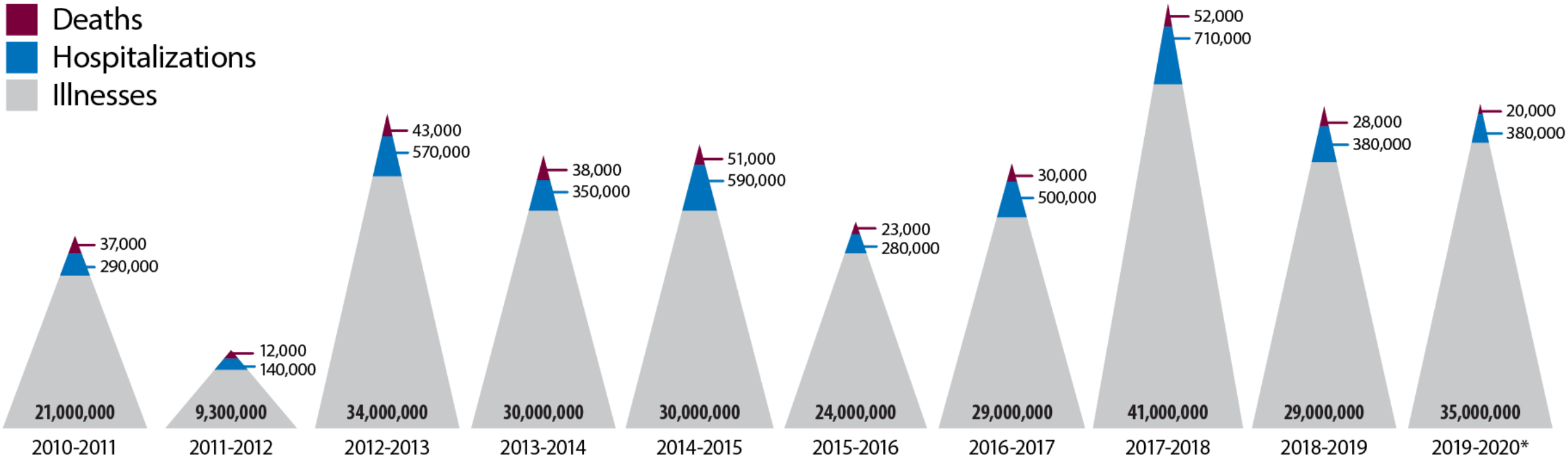
Pharmacy Technician Educational Objectives

After completion of this activity, participants will be able to:

- Recognize risk factors for patients at highest risk of influenza-related complications
- Recall the Advisory Committee on Immunization Practices (ACIP) vaccination recommendations for the 2021-2022 influenza season
- Articulate characteristics and composition of the available and recommended influenza vaccines for the 2021-2022 season
- Detail how pharmacy technicians can assist the pharmacist in providing education, administering, and ensuring patient access to the influenza vaccine

2021-2022 Influenza Season

Estimated US Influenza Burden



*Estimates for the 2019-2020 flu season are preliminary and subject to change as more data are collected.

Disease Burden of Flu. CDC. Accessed January 6, 2022. www.cdc.gov/flu/about/burden/index.html

What About 2020-2021 Data?

- Influenza activity, hospitalizations, and deaths were low
  - Mask requirements
  - Awareness of hand hygiene
  - Reduced contact outside of the home
- Cumulative hospitalization rate 0.8 per 100,000 (vs 2019-2020, 66.2 per 100,000)

Influenza Season	Specimens Tested by Clinical Labs	Total Positive Specimens
2020-2021	1,480,295	2265 (0.15%)
2019-2020	1,491,430	250,396 (16.8%)

Influenza: Frequently Asked Questions. CDC. Accessed January 6, 2022. ww.cdc.gov/flu/about/burden/faq.htm

High Risk for Influenza Complications

- Young children (6-59 months)
- Older adults (≥50 years)
- Chronic medical conditions
  - Pulmonary (eg, asthma)
  - Cardiovascular (excluding isolated hypertension)
  - Renal
  - Hepatic
  - Neurologic
  - Hematologic
  - Metabolic (eg, diabetes)
- Immunocompromised
- Women who are or will be pregnant
- Individuals (6 months-18 years) who take aspirin or salicylate therapy
- Long-term care facility residents
- American Indians/Alaska Natives
- Obese individuals (BMI ≥40 kg/m^2)

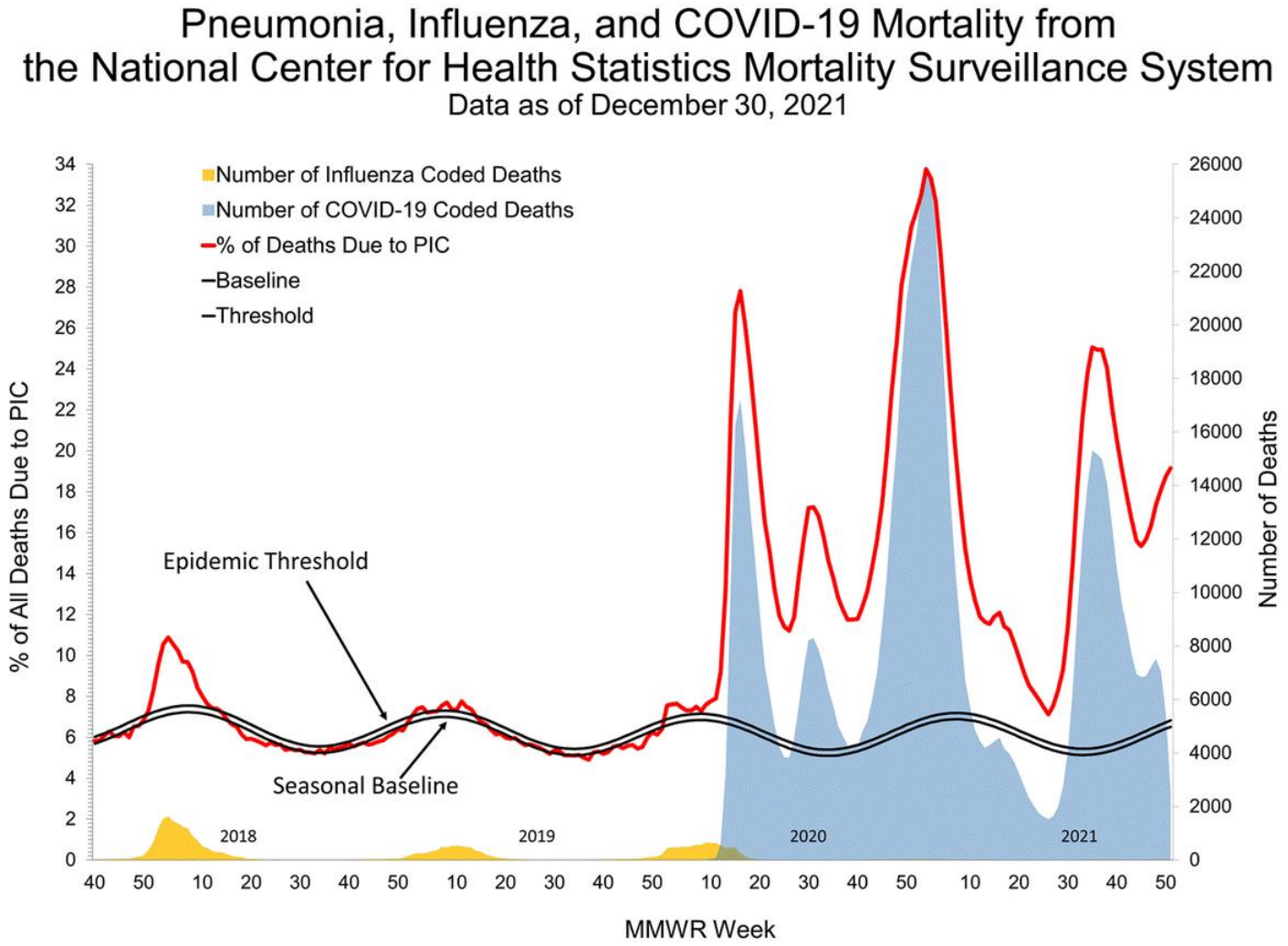
Grohskopf LA, et al. *MMWR Recomm Rep*. 2021;70(5):1-28.

Influenza Disparities Among Minority Groups

Rate ratios compared to Non-Hispanic White people	Non-Hispanic American Indian or Alaska Native	Non-Hispanic Asian or Pacific Islander	Non-Hispanic Black	Hispanic or Latino
Hospitalization	1.3x	0.8x	1.8x	1.2x
ICU admission	1.4x	0.9x	1.7x	1.1x
In-hospital death	0.9x	1.0x	1.1x	0.9x

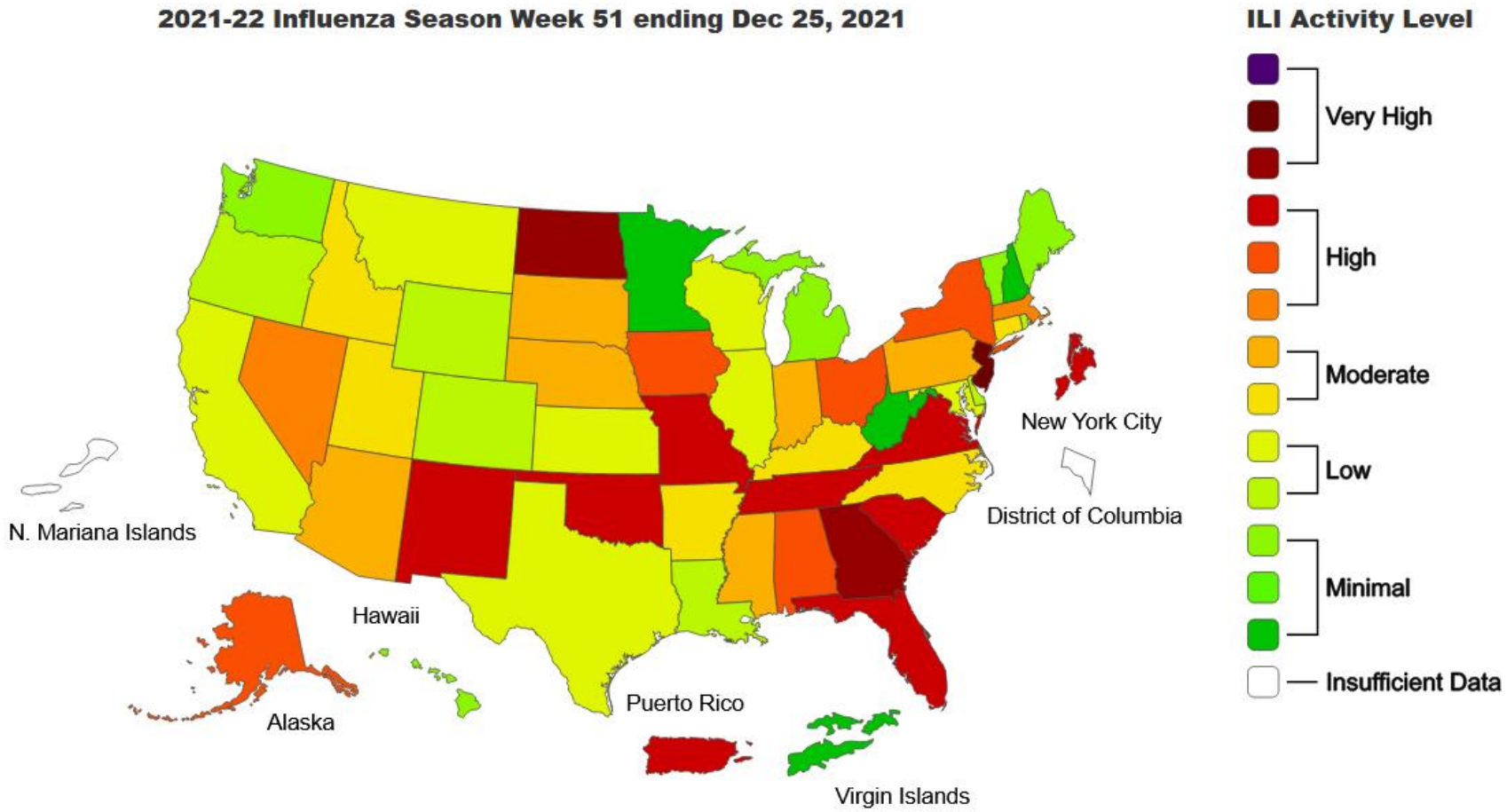
Racial and Ethnic Minority Groups. CDC. Accessed January 6, 2022. www.cdc.gov/flu/highrisk/disparities-racial-ethnic-minority-groups.html

Impact of COVID-19 on Influenza



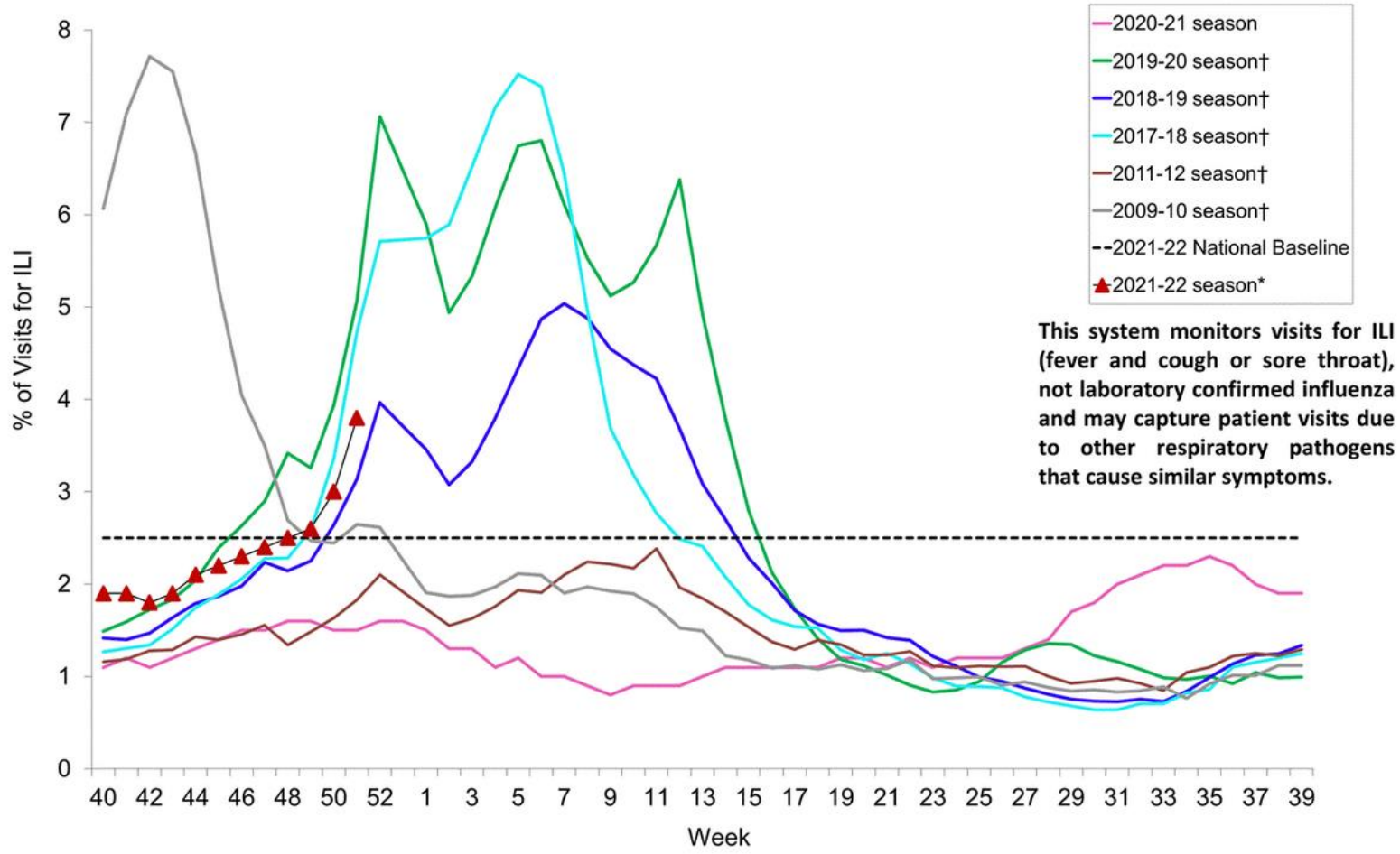
Weekly US Influenza Surveillance Report (FluView). CDC. Accessed January 6, 2022. www.cdc.gov/flu/weekly/index.htm#ILIMap

Influenza-like Illness Activity



Weekly US Influenza Surveillance Report (FluView). CDC. Accessed January 6, 2022. www.cdc.gov/flu/weekly/index.htm#ILIMap

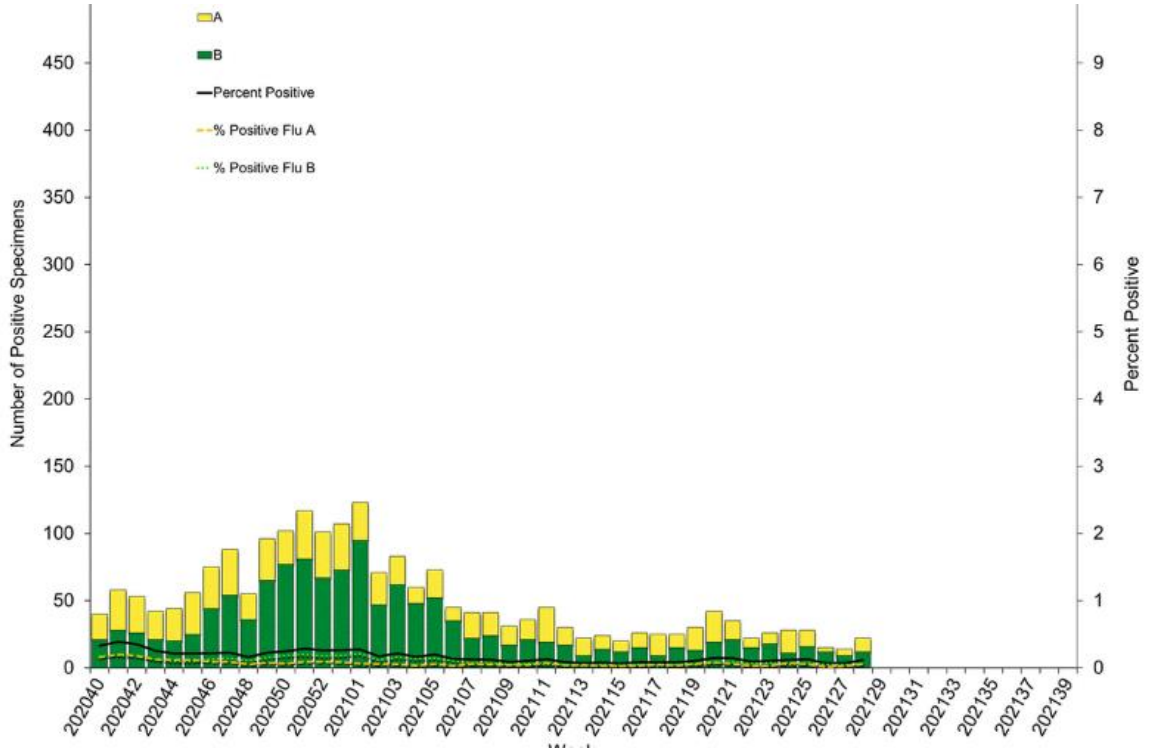
Visits for Influenza-like Illness



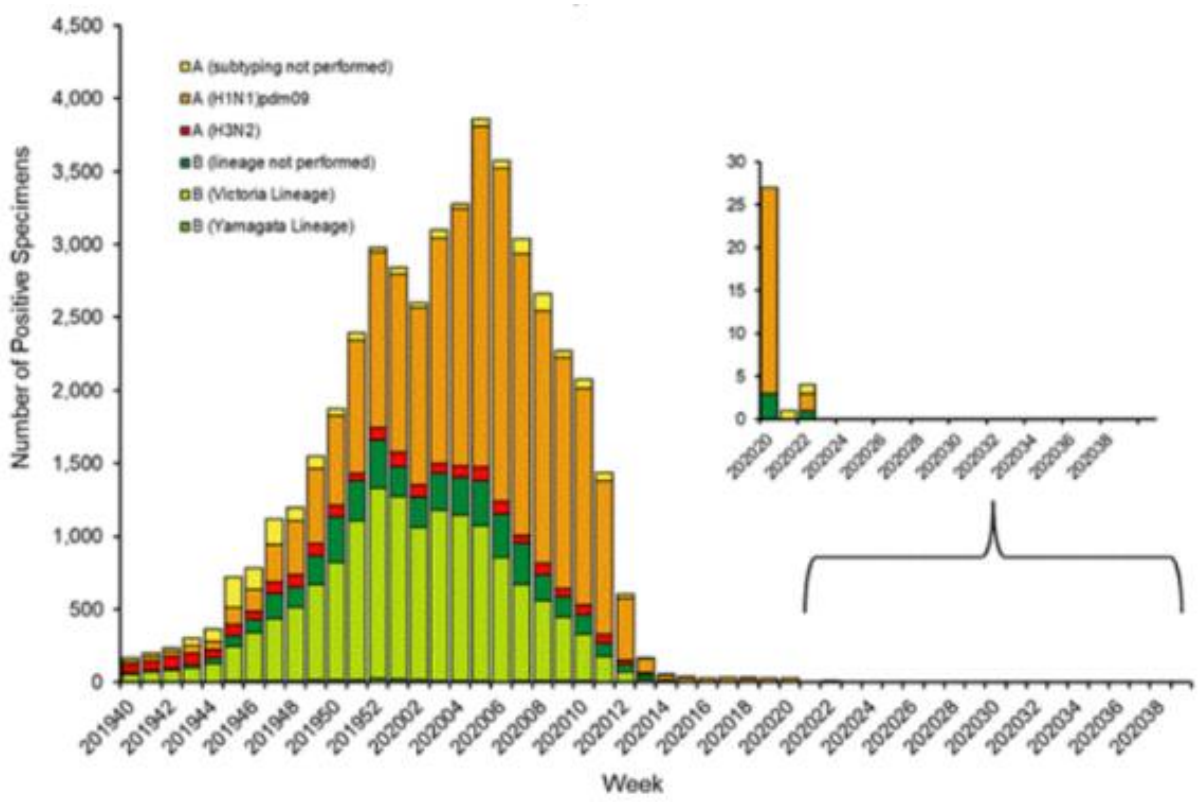
Weekly US Influenza Surveillance Report (FluView). CDC. Accessed January 6, 2022. www.cdc.gov/flu/weekly/index.htm#ILIMap

Influenza Positive Tests

- 2020-2021 Season

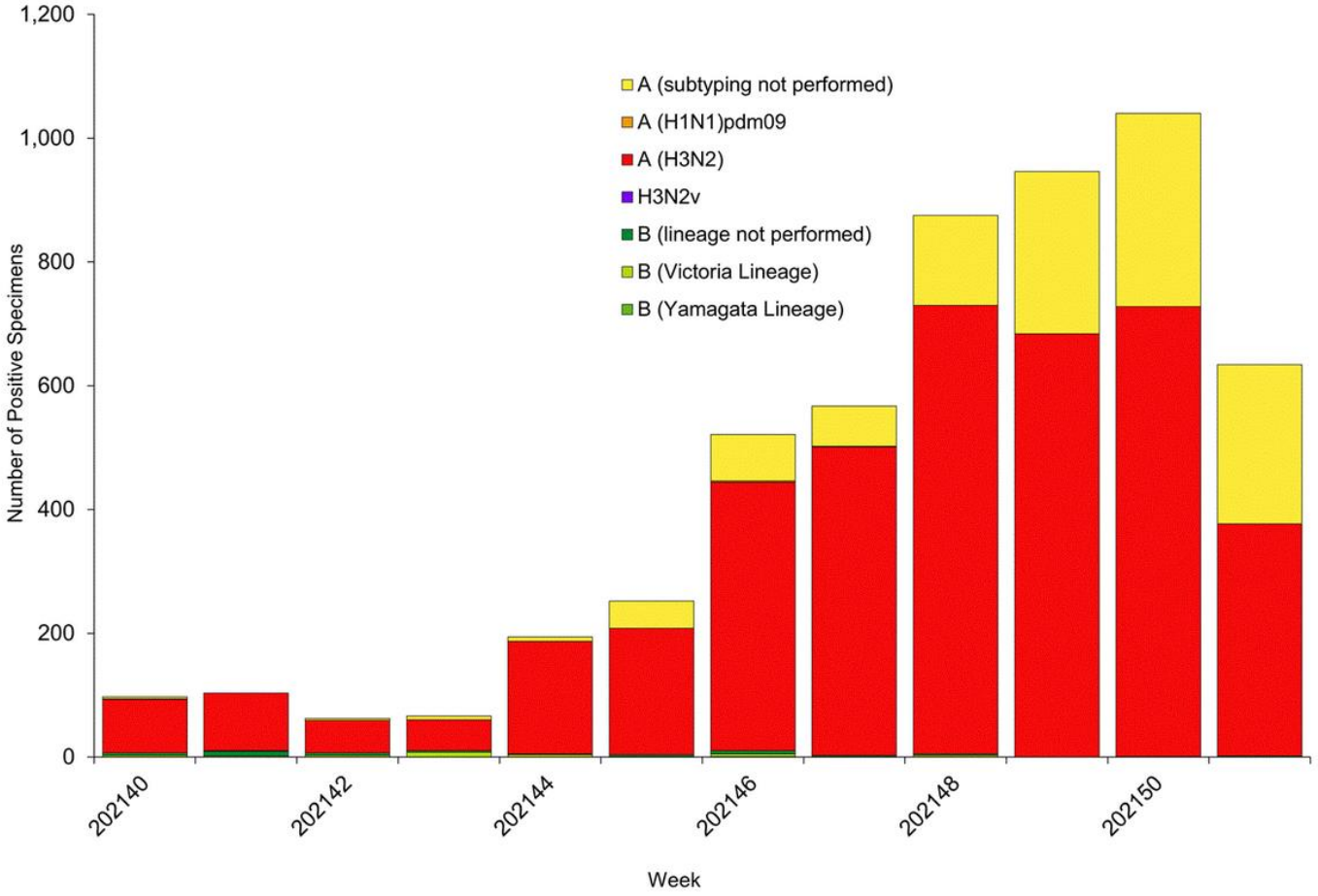


- 2019-2020 Season



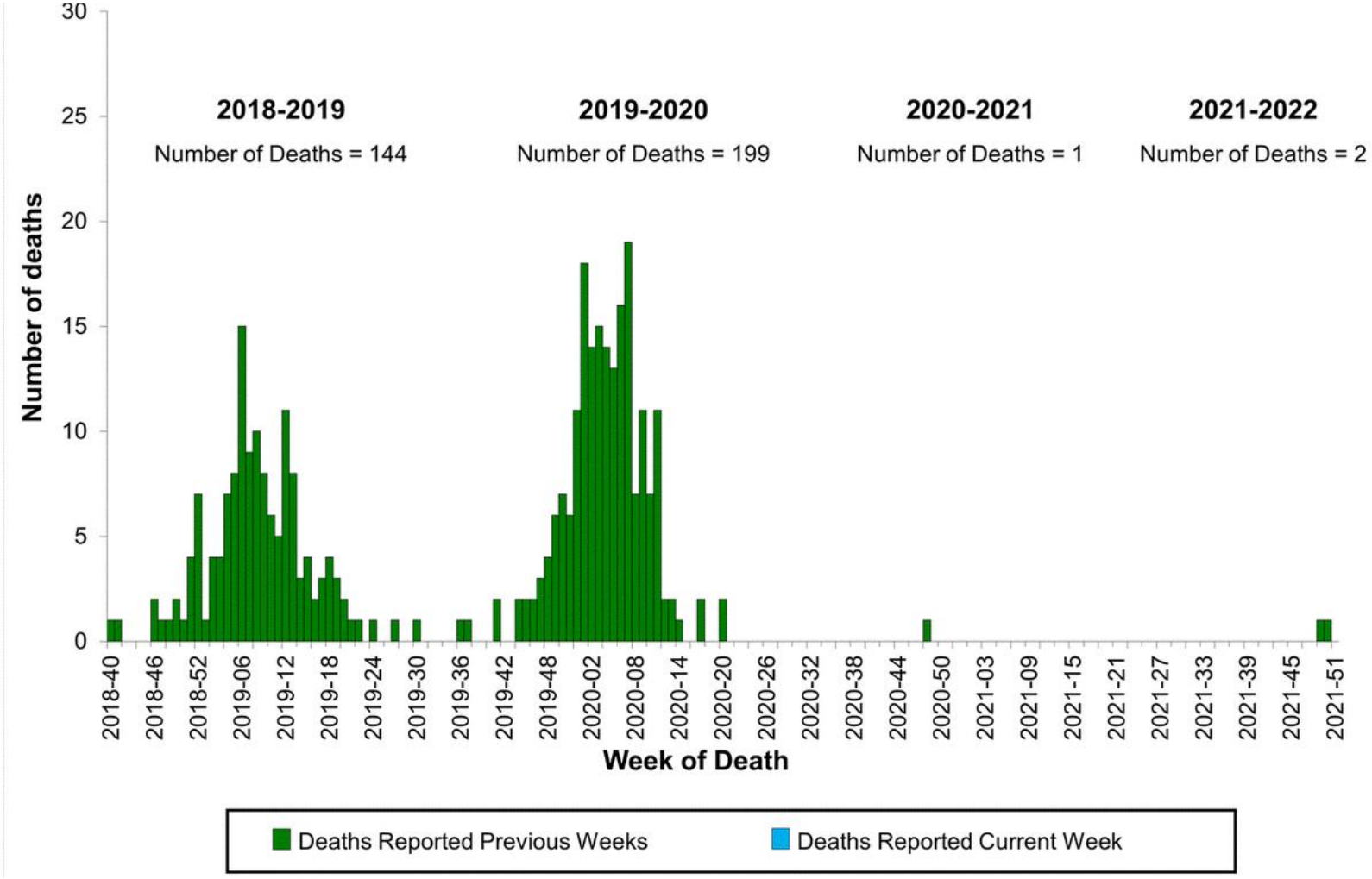
Weekly US Influenza Surveillance Report (FluView). CDC. Accessed December 1, 2021. www.cdc.gov/flu/weekly/index.htm#ILIMap

Influenza Positive Tests
2021-2022



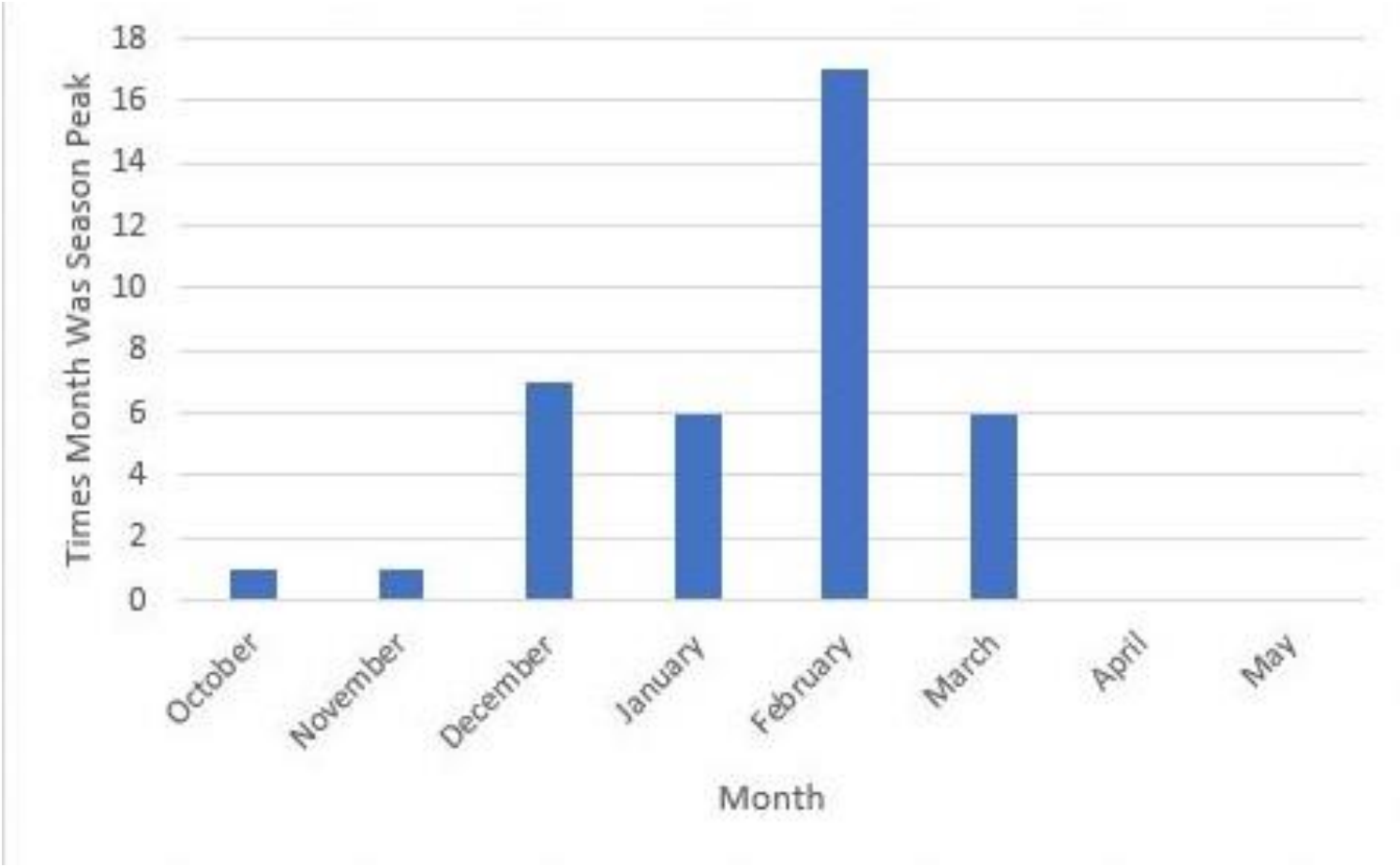
Weekly US Influenza Surveillance Report (FluView). CDC. Accessed January 6, 2022. www.cdc.gov/flu/weekly/index.htm#ILIMap

Influenza-associated Pediatric Deaths

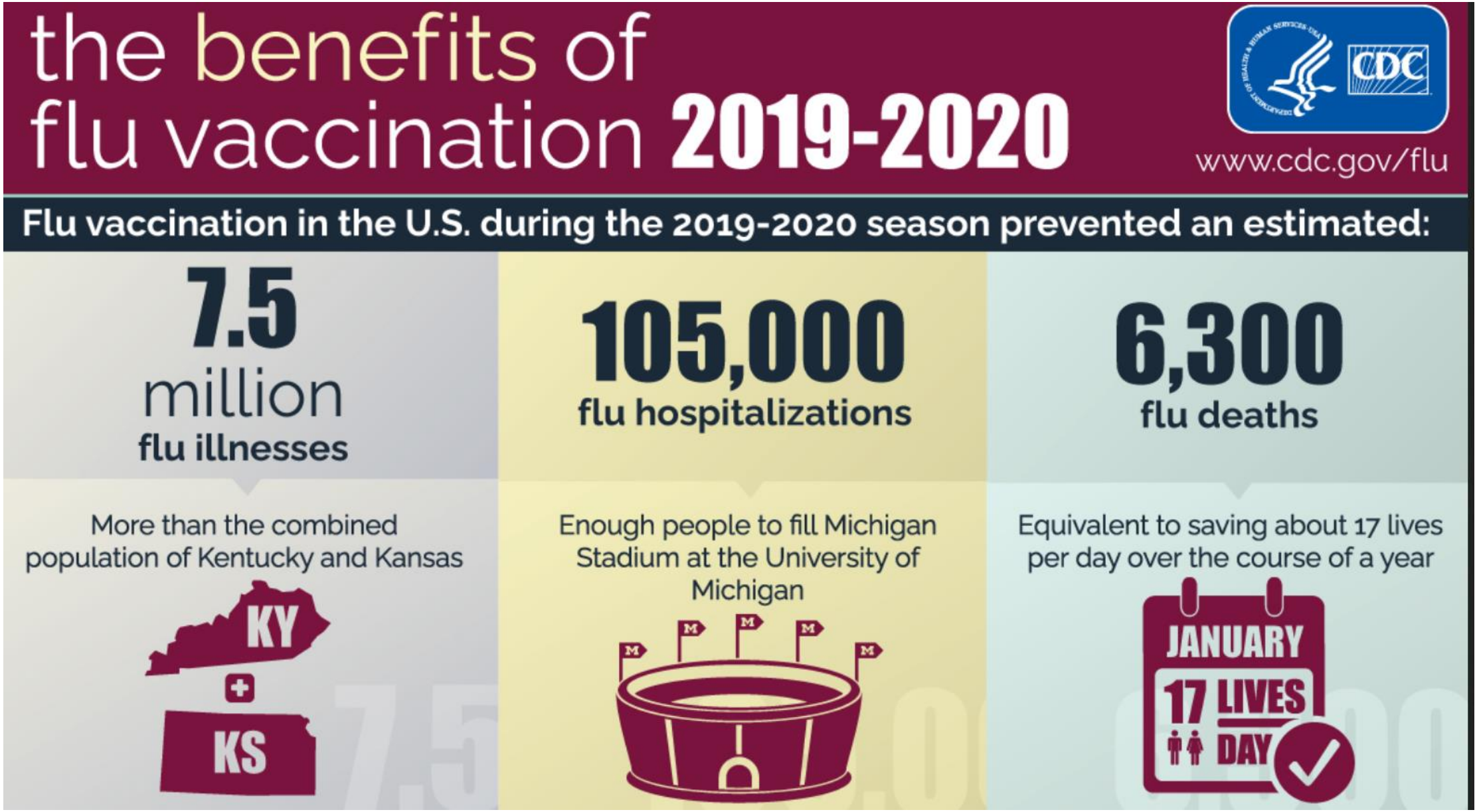


Weekly US Influenza Surveillance Report (FluView). CDC. Accessed January 6, 2022. www.cdc.gov/flu/weekly/index.htm#ILIMap

Peak Influenza Season



When is flu season. CDC. Accessed January 6, 2022. www.cdc.gov/flu/about/season/flu-season.htm



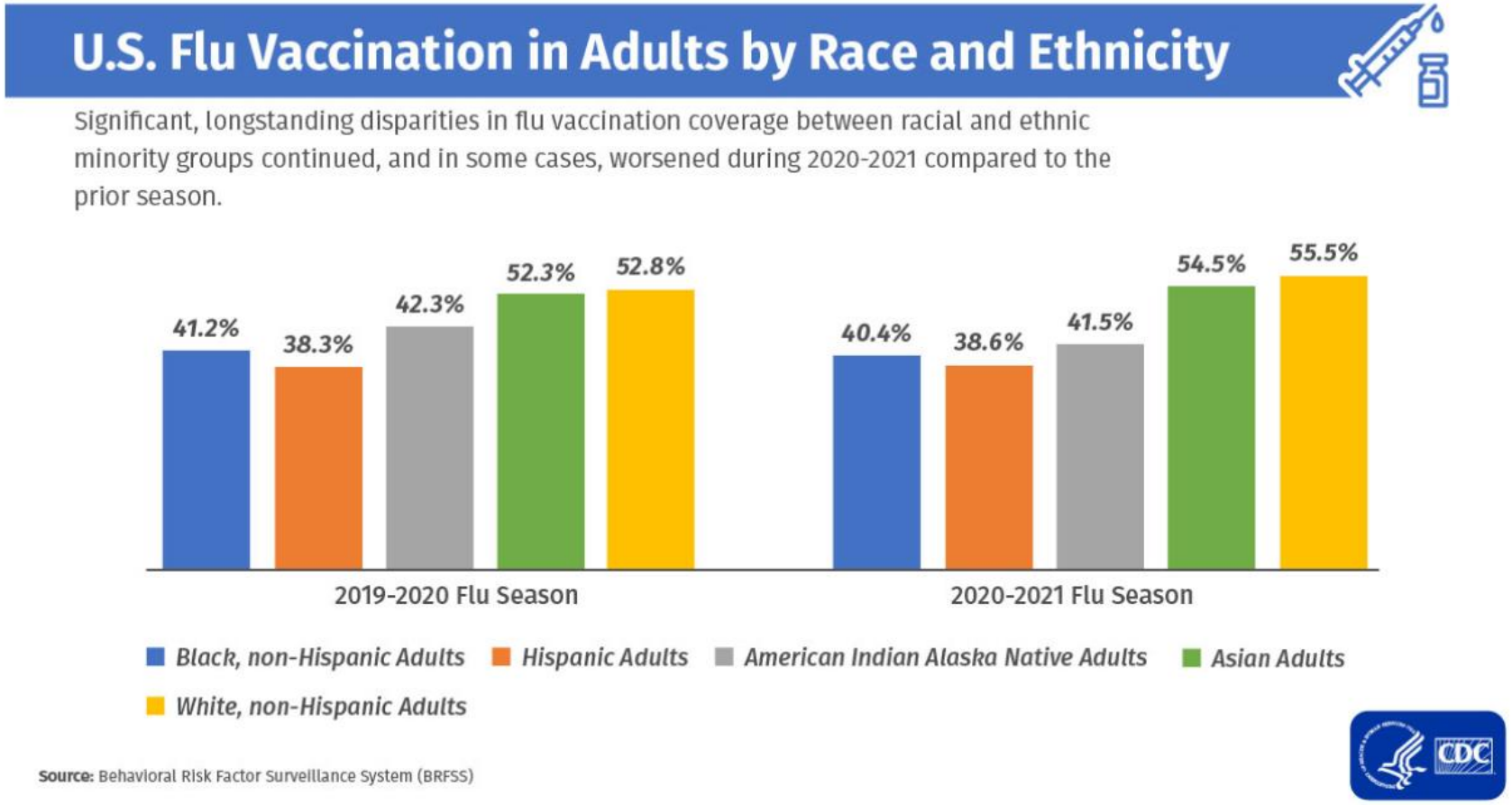
The Benefits of Flu Vaccination 2019-2020 Infographic. CDC. Accessed December 1, 2021. www.cdc.gov/flu/resource-center/freeresources/graphics/flu-vaccine-protected-infographic.htm

Influenza Vaccine Recommendation

- Annual influenza vaccination is recommended for all persons aged 6 months and older without contraindication
- ACIP has no preference for influenza vaccine

Grohskopf LA, et al. *MMWR Recomm Rep*. 2021;70(5):1-28.

Vaccination Rates Among Minority Groups



Racial and Ethnic Minority Groups. CDC. Accessed January 6, 2022. www.cdc.gov/flu/highrisk/disparities-racial-ethnic-minority-groups.html

Influenza Vaccines 2021-2022

Nomenclature for Influenza Vaccines

Inactivated Influenza Vaccine (IIV)

- Quadrivalent inactivated influenza vaccine (IIV4)
- Cell cultured inactivated influenza vaccine (ccIIV4)
- Quadrivalent high-dose inactivated influenza vaccine (HD-IIV4)
- Quadrivalent adjuvanted inactivated influenza vaccine (aIIV4)

Recombinant Hemagglutinin Influenza Vaccine (RIV)

- Quadrivalent recombinant hemagglutinin influenza vaccine (RIV4)

Live-attenuated Influenza Vaccine (LAIV)

- Quadrivalent live-attenuated influenza vaccine (LAIV4)

Grohskopf LA, et al. *MMWR Recomm Rep*. 2021;70(5):1-28.

Influenza Vaccine Composition 2021-2022

- Egg-based Formulation
  - A/Victoria/2570/2019 (H1N1)pdm09-like virus
  - A/Cambodia/e0826360/2020 (H3N2)-like virus
  - B/Washington/02/2019 (Victoria lineage)-like virus
  - B/Phuket/3073/2013 (Yamagata lineage)-like virus
- Cell or Recombinant-based Formulation
  - A/Wisconsin/588/2019 (H1N1)pdm09-like virus
  - A/Cambodia/e0826360/2020 (H3N2)-like virus
  - B/Washington/02/2019 (Victoria lineage)-like virus
  - B/Phuket/3073/2013 (Yamagata lineage)-like virus

Grohskopf LA, et al. *MMWR Recomm Rep*. 2021;70(5):1-28.

2021-2022 Influenza Vaccines

Vaccine Type	Vaccine	Age Indication
Inactivated Influenza Vaccine (IIV)	Afluria Quadrivalent	0.25 mL PFS = 6-35 months 0.5 mL PFS = ≥3 years 5 mL MDV = ≥6 months (needle/syringe) 18-64 years (jet injector)
	Fluarix Quadrivalent	0.5 mL PFS = ≥6 months
	FluLaval Quadrivalent	0.5 mL PFS = ≥6 months
	Fluzone Quadrivalent	All forms = ≥6 months
	Flucelvax Quadrivalent	All forms = **≥6 months***
	Fluzone High-Dose Quadrivalent	**0.7 mL** PFS = ≥65 years
	Fluad Quadrivalent	0.5 mL PFS = ≥65 years
Recombinant Hemagglutinin Influenza Vaccine (RIV)	Flublok Quadrivalent	0.5 mL PFS = ≥18 years
Live-attenuated Influenza Vaccine (LAIV)	FluMist Quadrivalent	0.2 mL PFS = 2-49 years

*As of October 2021, cell-cultured inactivated influenza vaccine (cc-IIV) is approved for children aged 6 months and older.

Grohskopf LA, et al. *MMWR Recomm Rep*. 2021;70(5):1-28. Flucelvax. Prescribing information. Seqirus Inc; 2021.

Influenza Vaccine Age Indications

	Vaccine type	0 through 6 months	6 through 23 months	2 through 17 years	18 through 49 years	50 through 64 years	≥65 years
IIV	Standard-dose (IIV4)						
	Cell culture-based (ccIIV4)						
	High-dose (HD-IIV4)						
	Adjuvanted (aIIV4)						
RIV	Recombinant (RIV4)						
LAIV	Live-attenuated (LAIV4)						

Grohskopf LA, et al. *MMWR Recomm Rep*. 2021;70(5):1-28.

Green = Indicated; Red = Not indicated.

Pediatric Influenza Vaccine Dosing

Trade name	Dose volume for children aged 6-35 months (µg HA per vaccine virus)
Afluria Quadrivalent	0.25 mL (7.5 µg)
Fluarix Quadrivalent	0.5 mL (15 µg)
FluLaval Quadrivalent	0.5 mL (15 µg)
Fluzone Quadrivalent	0.25 mL (7.5 µg) or 0.5 mL (15 µg)
Flucelvax Quadrivalent	0.5 mL (15 µg)

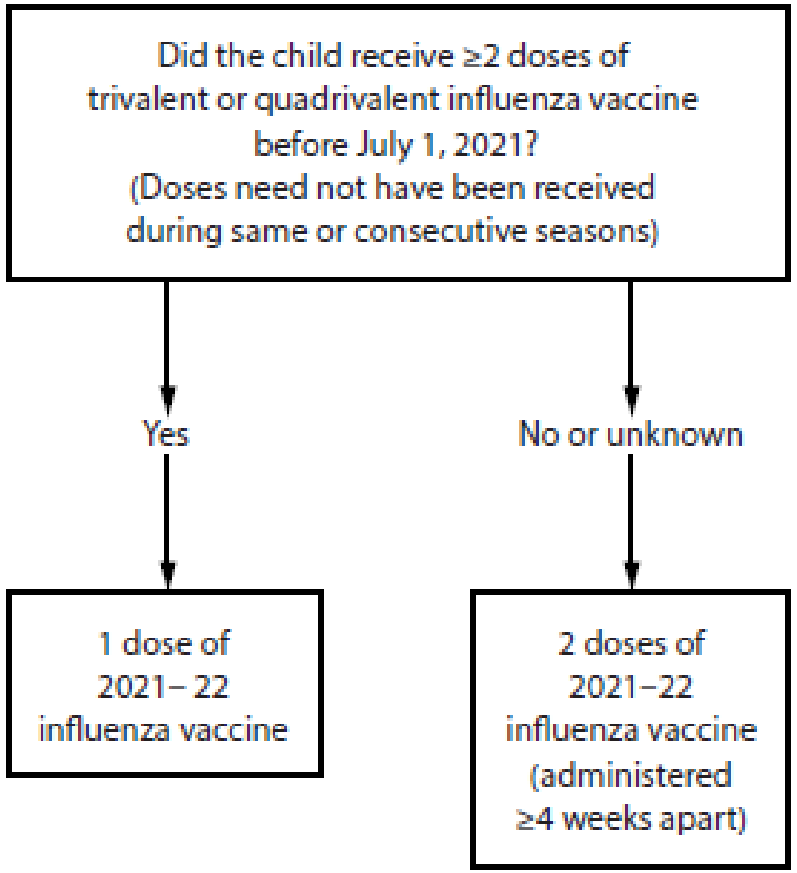
Grohskopf LA, et al. *MMWR Recomm Rep*. 2021;70(5):1-28.

Influenza Vaccine Timing: Children

- Children 6 months to 8 years who need 2 doses
  - Should receive their first dose as soon as possible after the vaccine becomes available to allow the second dose (which must be administered ≥4 weeks later) to be received, ideally, by the end of October
- Children any age who need 1 dose
  - Should ideally be vaccinated by the end of October
  - Vaccination of these children may occur as soon as vaccine is available because there is less evidence to suggest that early vaccination is associated with waning immunity among children compared with adults

Grohskopf LA, et al. *MMWR Recomm Rep*. 2021;70(5):1-28.

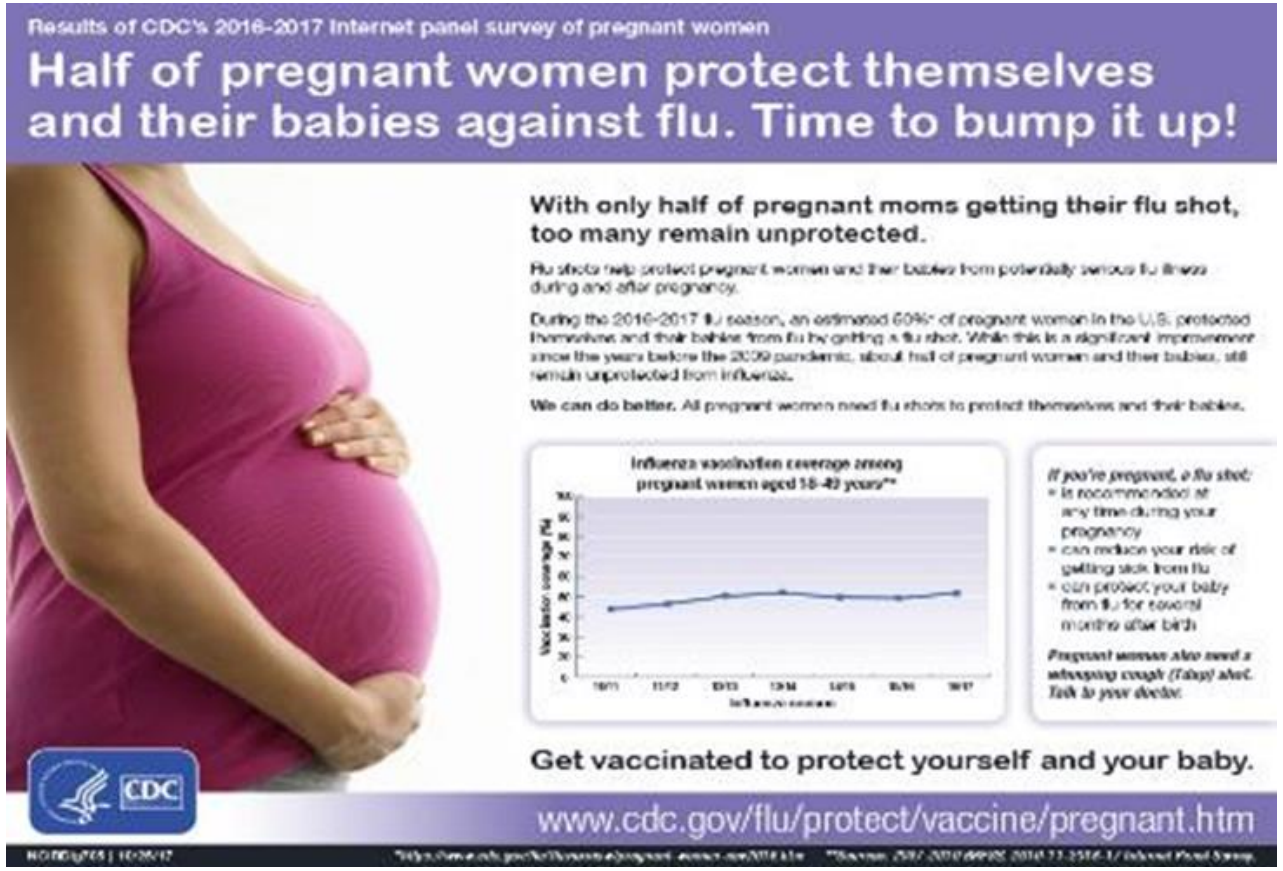
Influenza Vaccine Timing: Children



Grohskopf LA, et al. *MMWR Recomm Rep*. 2021;70(5):1-28.

Influenza Vaccine Timing: Pregnant Women

- Vaccination soon after vaccine becomes available may also be considered for pregnant women during the third trimester
- Reduces risk for influenza illness in infants during the first months of life (a period during which they are too young to receive influenza vaccine)



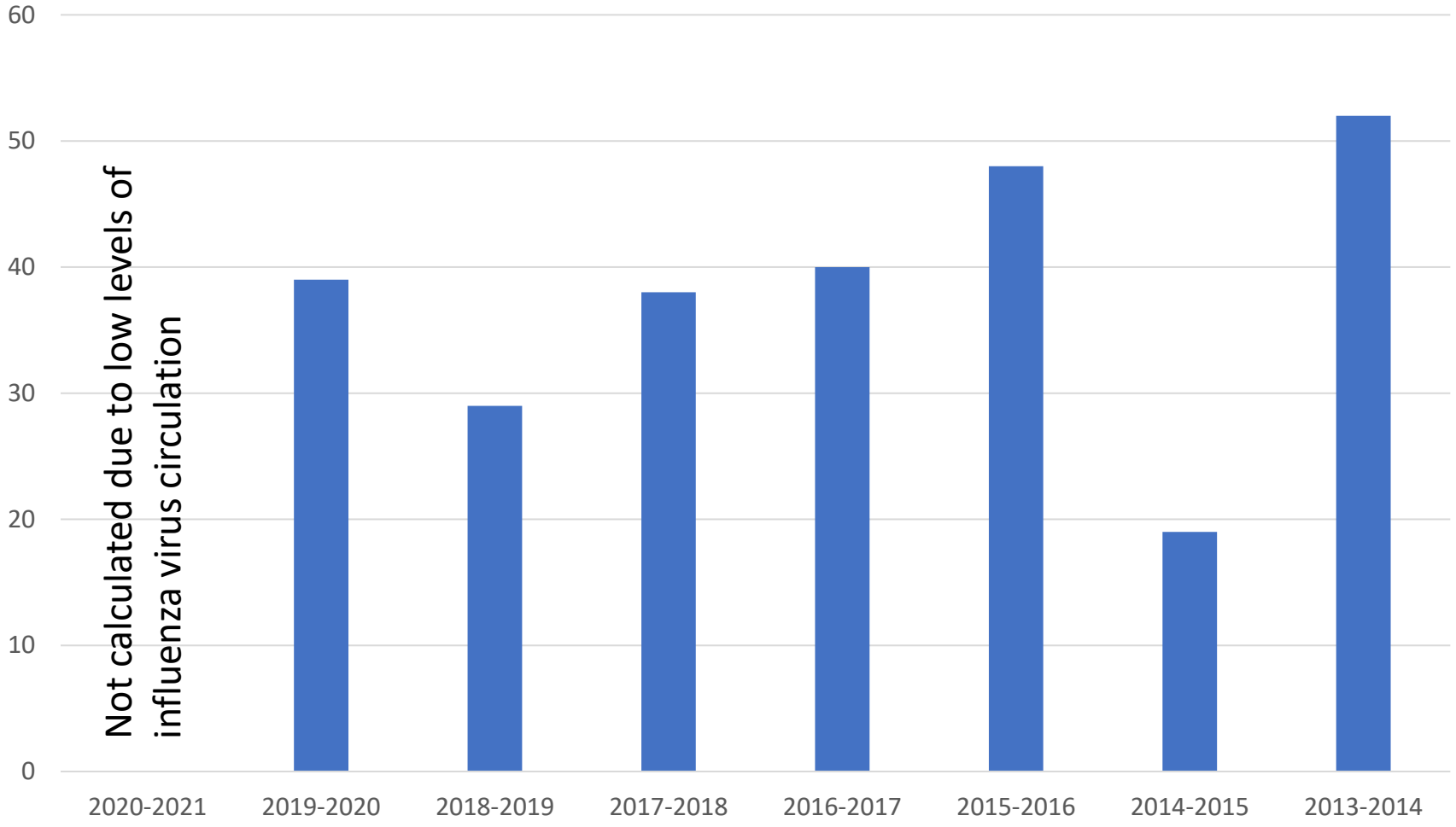
Grohskopf LA, et al. *MMWR Recomm Rep*. 2021;70(5):1-28.

Influenza Vaccine Timing: Non-pregnant Adults

- Avoid vaccination in July and August
  - Early vaccination is associated with decreased vaccine effectiveness
- Should ideally be vaccinated by the end of October

Grohskopf LA, et al. *MMWR Recomm Rep*. 2021;70(5):1-28.

Influenza Vaccine Effectiveness



Past Seasons Vaccine Effectiveness Estimates. CDC. Accessed January 6, 2022. www.cdc.gov/flu/vaccines-work/past-seasons-estimates.html#2021

Waning Immunity with Influenza Vaccines

- Decreasing vaccine effectiveness (VE) with increasing time since vaccination
  - Recipient age (more common in older adults)
  - Influenza virus (more common with A(H3N2) than with A(H1N1) or B viruses
  - Season

- US Influenza Vaccine Effectiveness Network (US Flu VE)
  - 2011-2012 through 2014-2015
    - VE decreased 7% per month with A(H3N2) and Influenza B
    - VE decreased 6%-11% per month for A(H1N1)
    - VE lasts for 5-6 months

- Hospitalized Adult Influenza Vaccine Effectiveness Network (HAIVEN)
  - 2015-2016 through 2018-2019
    - VE decreased 8%-9% per month for all adults
    - VE decreased 10%-11% per month for adults ≥65 years

Grohskopf LA, et al. *MMWR Recomm Rep*. 2021;70(5):1-28.

High-dose Inactivated Influenza Vaccine

- Egg-based vaccine
- Quadrivalent formulation
- Dose = 0.7 mL
- Indicated for older adults aged ≥65 years
- Contains 60 µg of hemagglutinin (HA) per dose
  - Compared to 15 µg of HA per dose for SD-IIV

Grohskopf LA, et al. *MMWR Recomm Rep*. 2021;70(5):1-28.

HD-IIV versus SD-IIV in Older Adults

- Methods
  - Systematic review and meta-analysis
- Outcomes
  - Comparison of probable/laboratory-confirmed influenza-like illness
  - Hospital admission
  - Death
- Results
  - HD-IIV better protection against influenza-like illness, 19.5% (95% CI, 8.6%-29%)
  - HD-IIV more effective at preventing hospital admission from all causes, 9.1% (95% CI, 2.4%-15.3%)
  - HD-IIV more effective at preventing hospital admission from influenza, 17.8% (95% CI, 8.1%-26.5%)
  - HD-IIV was 22.2% effective against post-influenza mortality (95% CI, -18.2% to -48.8%)

Lee JK, et al. *Expert Rev Vaccines*. 2018;17(5):435-443.

Adjuvanted Inactivated Influenza Vaccine

- Egg-based vaccine
- Quadrivalent formulation
- Dose = 0.5 mL
- Indicated for older adults aged ≥65 years
- Contains 15 µg of hemagglutinin (HA) per dose (same as SD-IIV)
  - Contains MF59 adjuvant

Grohskopf LA, et al. *MMWR Recomm Rep*. 2021;70(5):1-28.

aIIV versus SD-IIV in Older Adults

- Methods
  - Community-based case control study (2011-2012 season)
  - Patients with immunosuppression were excluded
- Outcomes
  - Laboratory-confirmed influenza
- Results
  - aIIV was significantly protective at 63% (95% CI, 4%-86%; *P* = 0.02)
  - Vaccine effectiveness decreased with increasing patient age
  - Vaccine effectiveness increased in long-term care residents

Van Buynder PG, et al. *Vaccine*. 2013;31(51):6122-6128.

Influenza Vaccine Contraindications (IIV, RIV, LAIV)

- History of severe allergic reaction to any component of the vaccine or to a previous dose of any influenza vaccine

- Concomitant aspirin- or salicylate-containing therapy in children and adolescents
- Children aged 2 through 4 years who have received a diagnosis of asthma or who had wheezing or asthma in the preceding 12 months
- Children and adults who are immunocompromised
- Close contacts and caregivers of severely immunosuppressed person who requires a protected environment
- Pregnancy
- Cerebrospinal fluid (CSF) leaks
- Persons with cochlear implants
- Receipt of influenza antiviral medication (48 hours oseltamivir/zanamivir; 5 days peramivir; 17 days baloxavir)

Grohskopf LA, et al. *MMWR Recomm Rep*. 2021;70(5):1-28.

Influenza Vaccine Precautions (IIV, RIV, LAIV)

- Moderate or severe acute illness with or without fever
- History of Guillain-Barré syndrome within 6 weeks of receipt of influenza vaccine

- Asthma in persons aged ≥5 years
- Other underlying medical conditions that might predispose to complications after wild-type influenza infection (chronic pulmonary, cardiovascular [except isolated hypertension], renal, hepatic, neurologic, hematologic, or metabolic disorders [including diabetes])

Grohskopf LA, et al. *MMWR Recomm Rep*. 2021;70(5):1-28.

Influenza Vaccine and Egg Allergy

Vaccine associated with previous severe allergic reaction (ie, anaphylaxis)	2021-2022 Influenza Vaccines		
	Egg-based IIV and LAIV	**ccIIV**	**RIV**
Any egg-based IIV or LAIV	Contraindication	Precaution	Precaution
Any ccIIV	Contraindication	Contraindication	Precaution
Any RIV	Contraindication	Precaution	Contraindication
Unknown influenza vaccine	Allergist consultation recommended		

Grohskopf LA, et al. *MMWR Recomm Rep*. 2021;70(5):1-28.

Storage and Handling

- Refrigeration 36°F–46°F (2°C–8°C)
- Protect from light
- Discard frozen vaccine
- Follow manufacturer-specific recommendations

Grohskopf LA, et al. *MMWR Recomm Rep*. 2021;70(5):1-28.

Concomitant Influenza and COVID-19 Vaccines

Methods

- Multicenter (12 UK sites), randomized (1:1), controlled, phase 4 trial
- COVID-19 vaccine (2nd dose) + age-appropriate influenza vaccine (aIIV3, ccIIV4, RIV4) OR placebo
  - 340 received COVID-19 vaccine + influenza vaccine followed by placebo
  - 339 received COVID-19 vaccine + placebo followed by influenza vaccine
- COVID-19 vaccine = ChAdOx1 (AstraZeneca University of Oxford) OR BNT162b2 (Pfizer/BioNTech)
- Used intention-to-treat analysis

Results

- Primary end point (safety): Non-inferiority was met for 4 of the 6 cohorts
- Secondary end point (immunogenicity): no significant difference with anti-spike immunoglobulin geometric mean units AND haemagglutinin antibody inhibitor geometric mean ratio

Conclusions

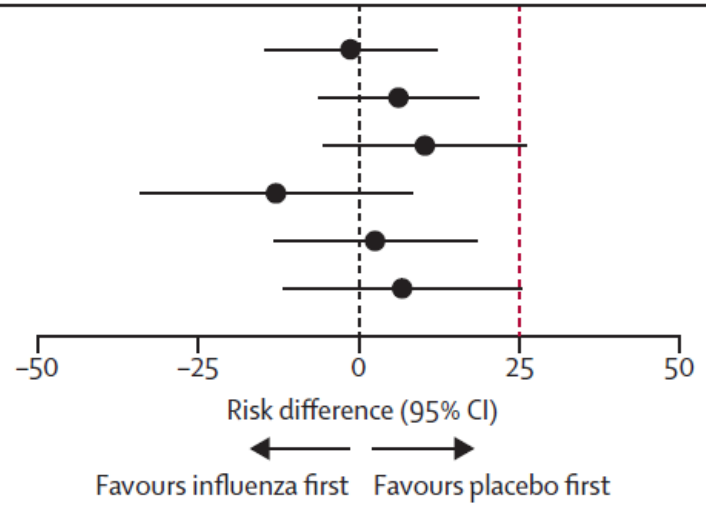
- No safety concerns / preserves antibody responses to both vaccines

Lazarus R, et al. *Lancet*. 2021;398(10318):2277-2287.

Concomitant Influenza and COVID-19 Vaccines

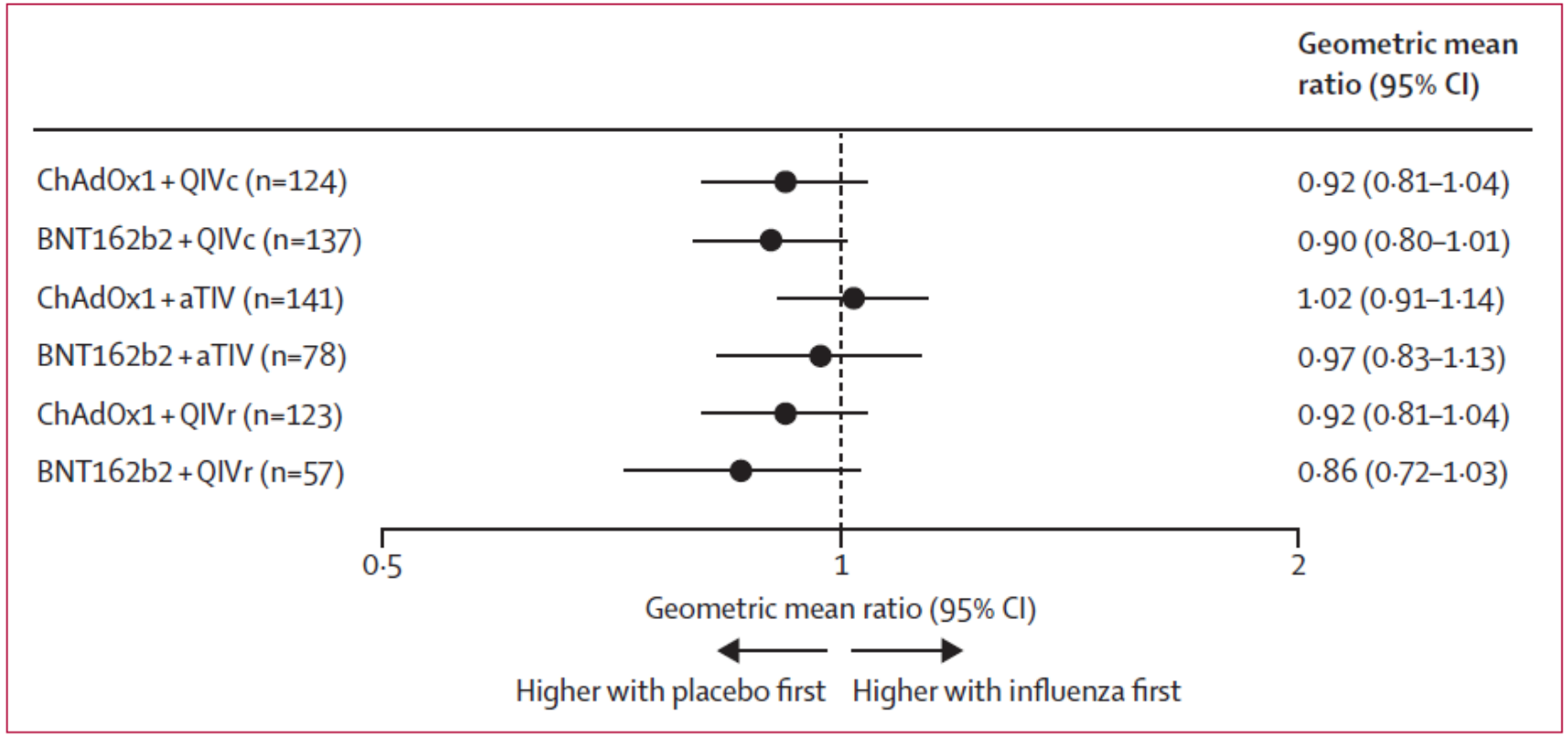
Primary End Points

	Number of participants experiencing one or more solicited systemic events in the 7 days after second COVID-19 vaccination/ number of participants with the primary outcome in each group for each cohort		Risk difference (95% CI)
	Placebo first	Influenza first	
ChAdOx1 + QIVc ITT	52/63	52/64	−1·29 (−14·69 to 12·11)
BNT162b2 + QIVc ITT	54/67	59/68	6·17 (−6·27 to 18·61)
ChAdOx1 + aTIV ITT	42/68	49/68	10·29 (−5·44 to 26·03)
BNT162b2 + aTIV ITT	25/35	24/41	−12·89 (−34·15 to 8·37)
ChAdOx1 + QIVr ITT	43/60	46/62	2·53 (−13·25 to 18·31)
BNT162b2 + QIVr ITT	23/28	24/27	6·75 (−11·75 to 25·25)



Concomitant Influenza and COVID-19 Vaccines

Secondary End Points



Pharmacist Role in Influenza Vaccination

Role of Health-System Pharmacist

- Screen for patients eligible for immunizations
- Provide patient counseling for immunizations
- Document receipt of immunizations
- Administer or refer for needed immunizations
- Formulary management
- Public education about immunizations

American Society of Health-System Pharmacists Council on Professional Affairs. *Am J Health Syst Phar*m. 2003;60(13):1371-1377.

Influenza Vaccination Patient Counseling

- Pre-vaccination counseling
  - Vaccine Information Statement (VIS)
    - What is influenza?
    - Why is vaccination important?
    - What are the adverse effects expected with vaccination?
- Post-vaccination counseling
  - Wait for 15 minutes to monitor for syncope and anaphylaxis
  - Move arm throughout the day to reduce injection site pain
  - May take ibuprofen or acetaminophen, as appropriate, if needed for pain, fever, muscle aches

Reasons for Vaccine Hesitancy

- Concerns about vaccine safety or adverse effects
- Mistrust of health care system
- Perceived risk of contracting illness, illness severity
- Religious beliefs
- Biased information sources (eg, peer group, family, social media)
- Autonomy to make health care decisions
- Fear of needles
- Cost

Murdan S, et al. *Pharmaceutical Journal*. Accessed December 1, 2021. https://pharmaceutical-journal.com/article/ld/how-to-address-vaccine-hesitancy

Conclusion

- Certain groups are at higher risk for influenza-related complications and should be encouraged to receive vaccination (young children, older adults, persons with chronic medical conditions, women who are pregnant, immunocompromised, etc)
- ACIP recommends annual influenza vaccination for all persons aged 6 months and older without contraindications
- ACIP does not have a preference for influenza vaccine
- Pharmacists are accessible immunization providers who can identify patients at higher risk for influenza-related complications

Additional Resources

- Immunization Action Coalition
  - www.immunize.org
- CDC MMWR Prevention and Control of Seasonal Influenza with Vaccines
  - www.cdc.gov/mmwr/volumes/70/rr/pdfs/rr7005a1-H.pdf
- FluView Influenza Surveillance
  - www.cdc.gov/flu/weekly
- CDC: Influenza
  - www.cdc.gov/flu

Thank you!