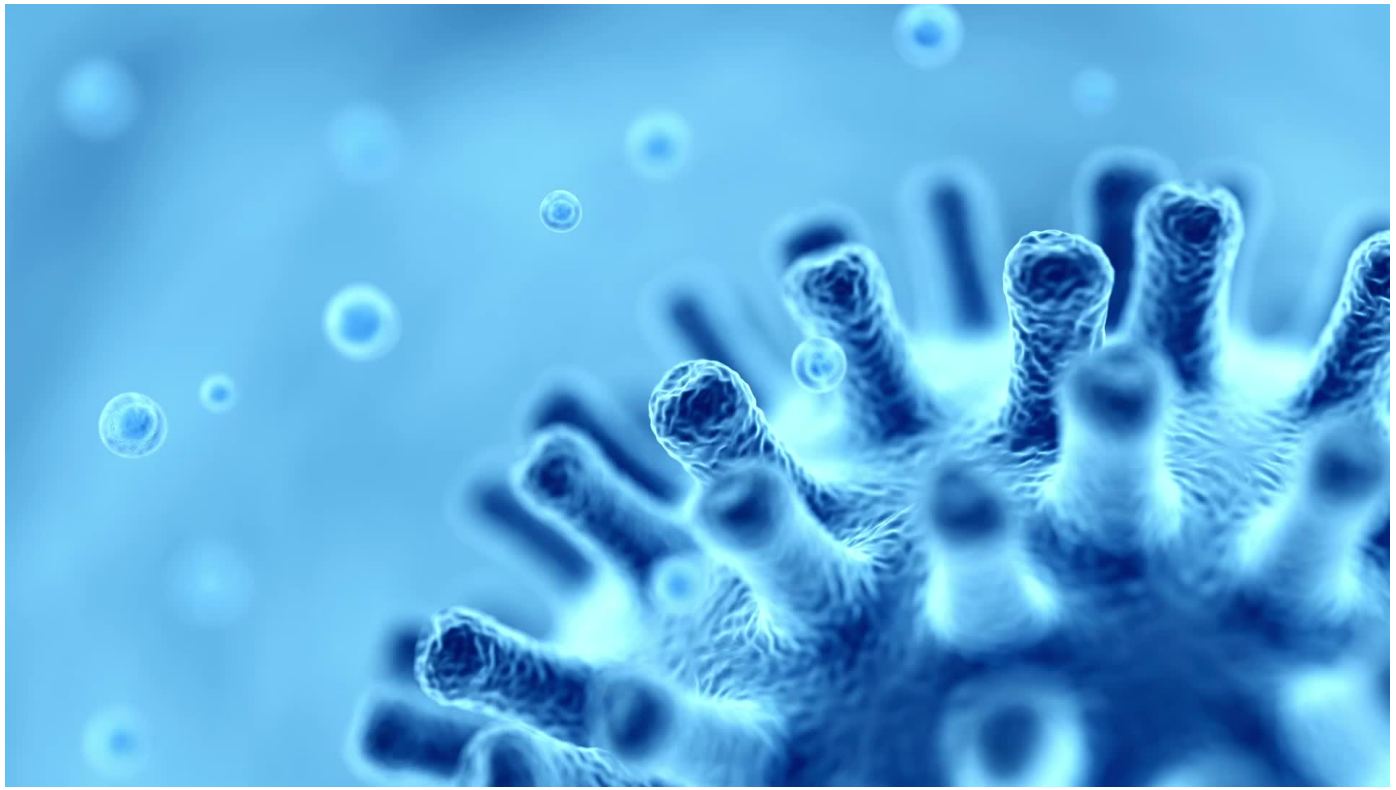


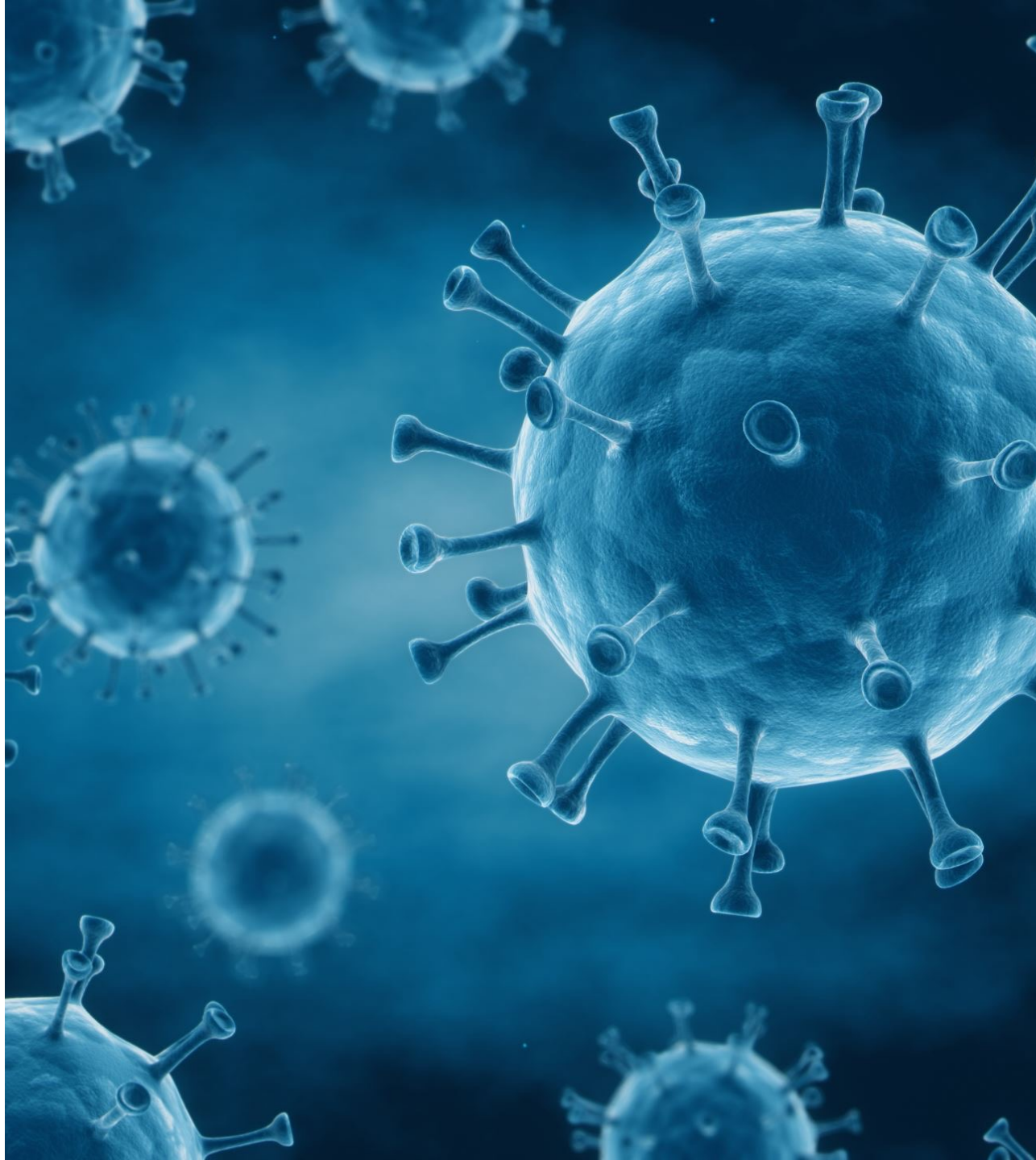
The Month In Virology

December 18, 2024

Jorge Mera, MD

Outline

- Quote of the Month
- Respiratory Virus Updates
  - COVID-19
  - Influenza
- Dengue
- Hepatitis A
- First Line App

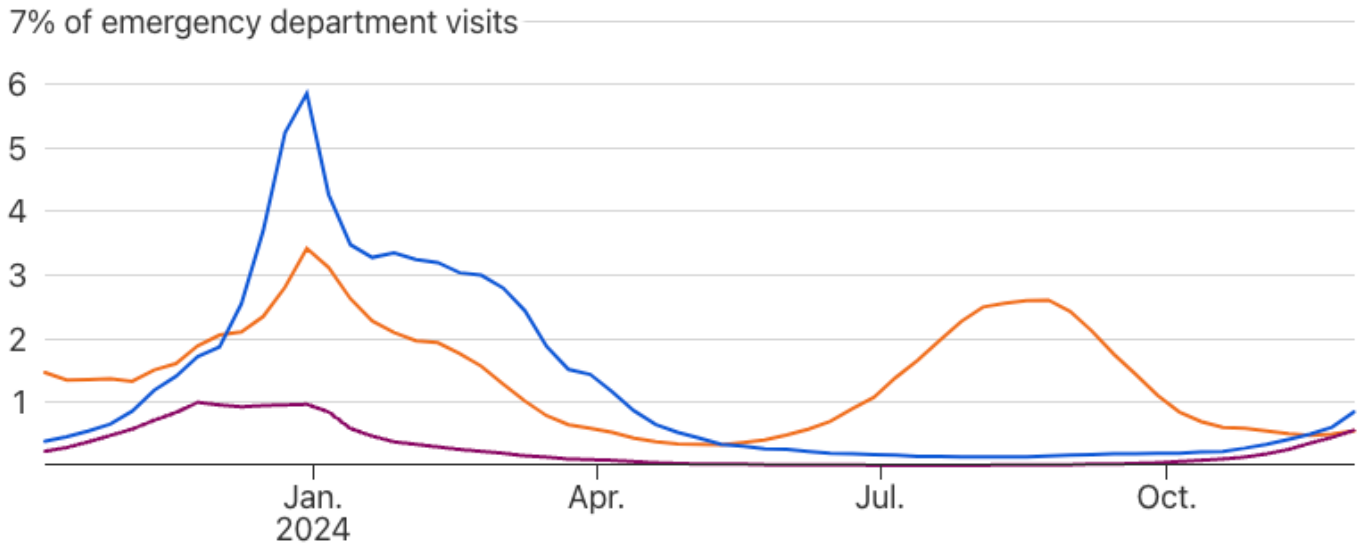


Quote of the Month

"Don't talk unless you can improve the silence."

Jorge Luis Borges

Respiratory Virus Activity



Respiratory Virus

COVID-19 Influenza RSV

Data last updated on December 4, 2024 and presented through November 30, 2024. View this dataset on data.cdc.gov.

COVID-19 Updates for the United States

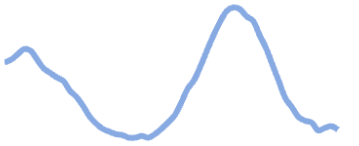
Early Indicators

Test Positivity

% Test Positivity

4.0%

Week ending November 30, 2024
Previous week 4.4%



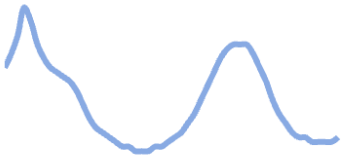
Dec 9, 2023 Nov 30, 2024

Emergency Department Visits

% Diagnosed as COVID-19

0.6%

Week ending November 30, 2024
Previous week 0.5%



Dec 9, 2023 Nov 30, 2024

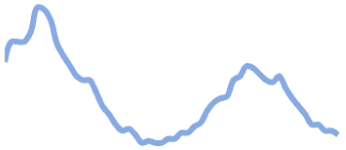
Severity Indicators

Hospitalizations

Rate per 100,000 population

1.5

Week ending November 16, 2024
Previous week 1.7



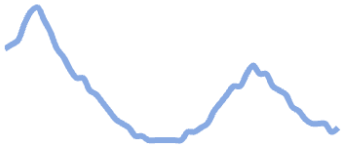
Nov 25, 2023 Nov 16, 2024

Deaths

% of All Deaths in U.S. Due to COVID-19

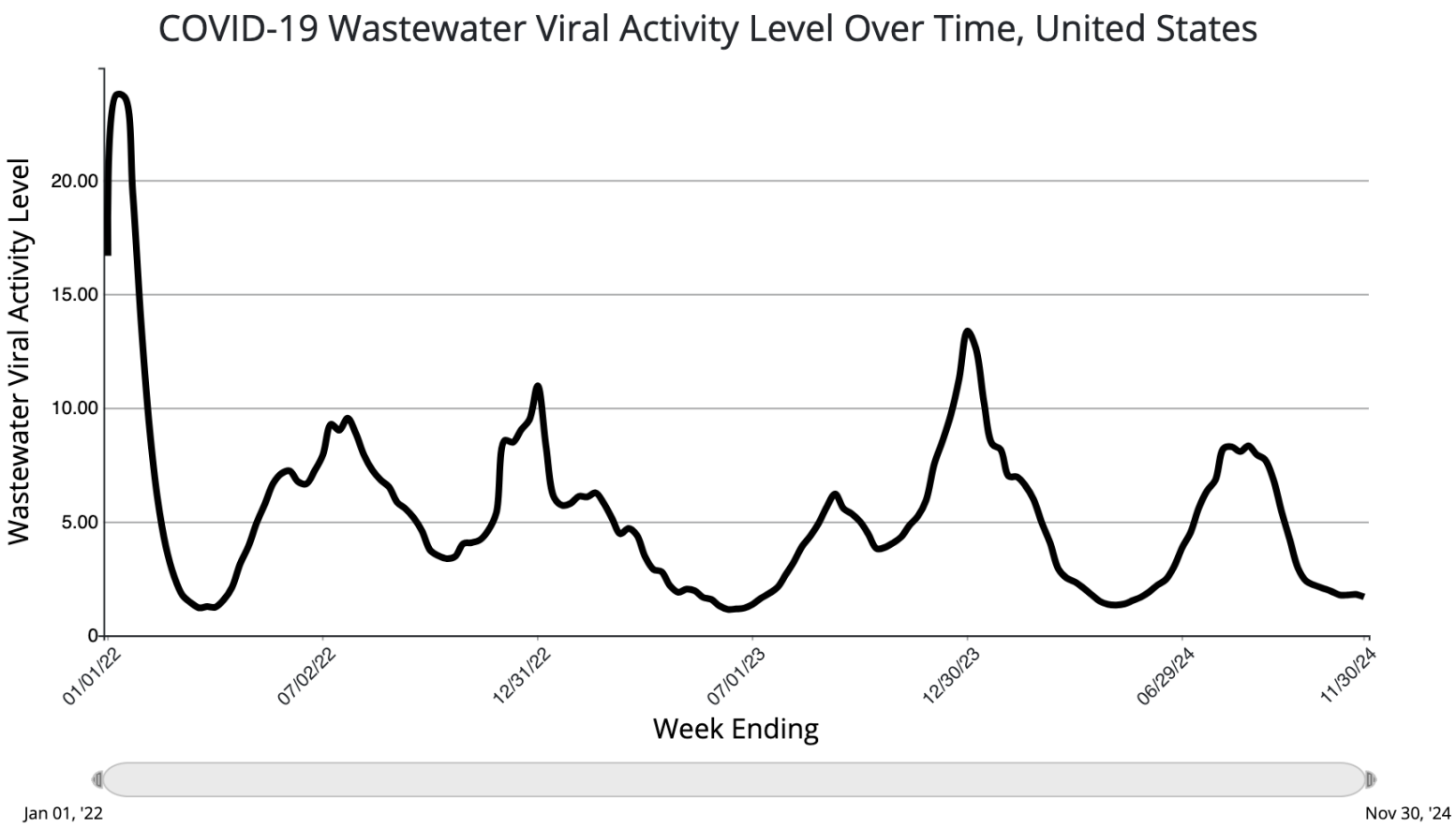
0.9%

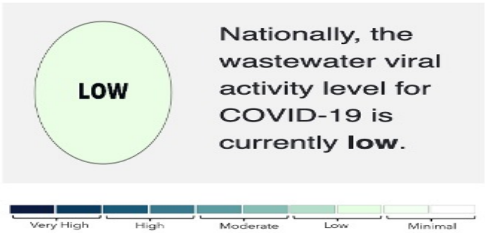
Week ending November 30, 2024
Previous week 0.8%



Dec 9, 2023 Nov 30, 2024

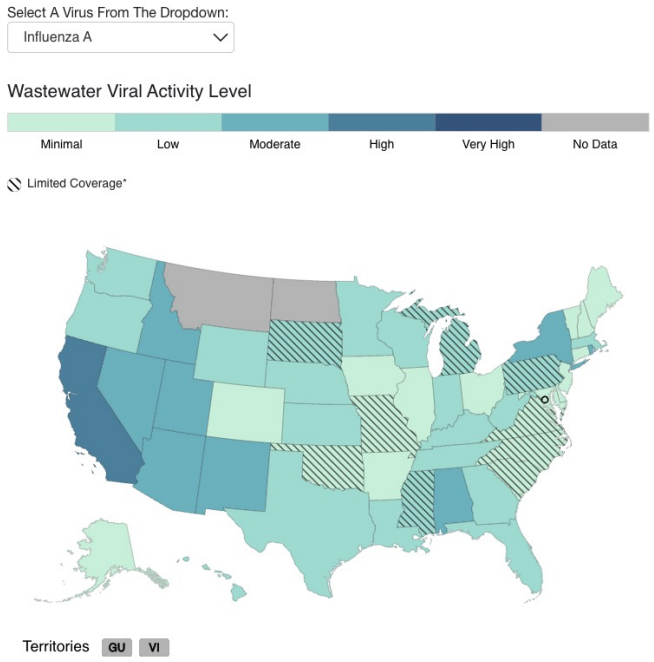
Wastewater COVID-19 National Trend



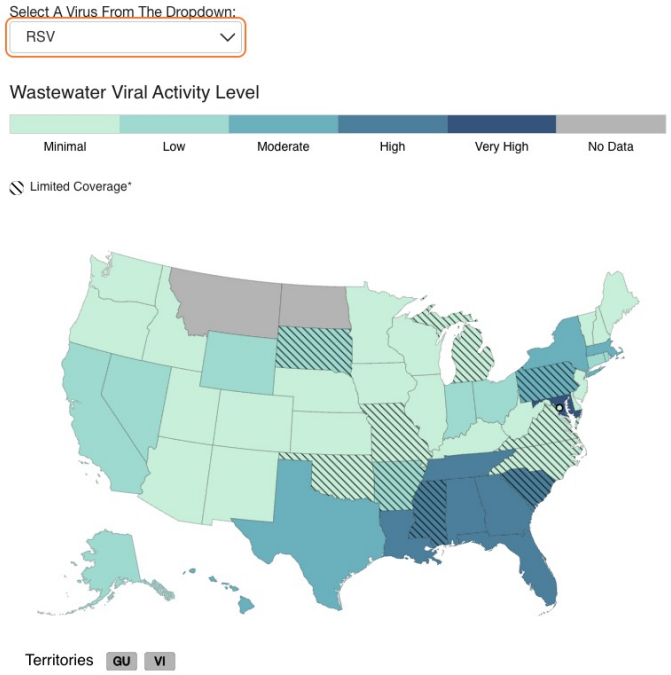


Respiratory Viruses Wastewater Activity

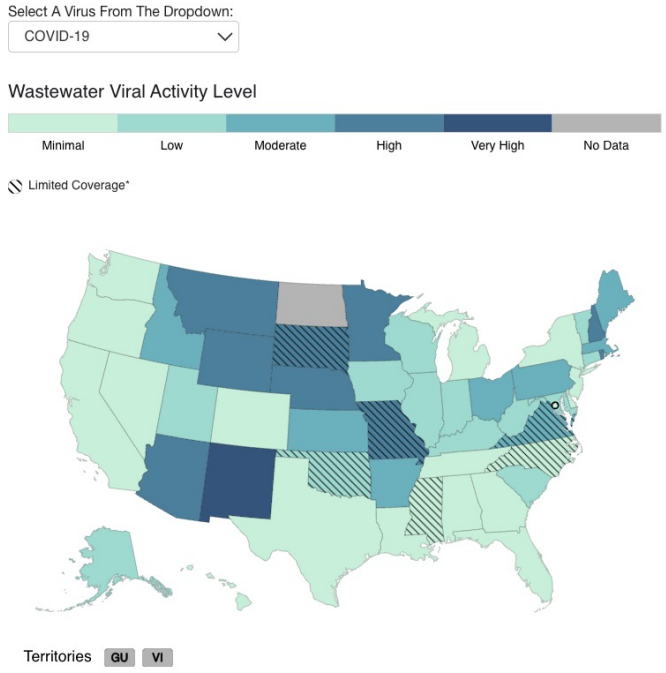
Influenza



RSV

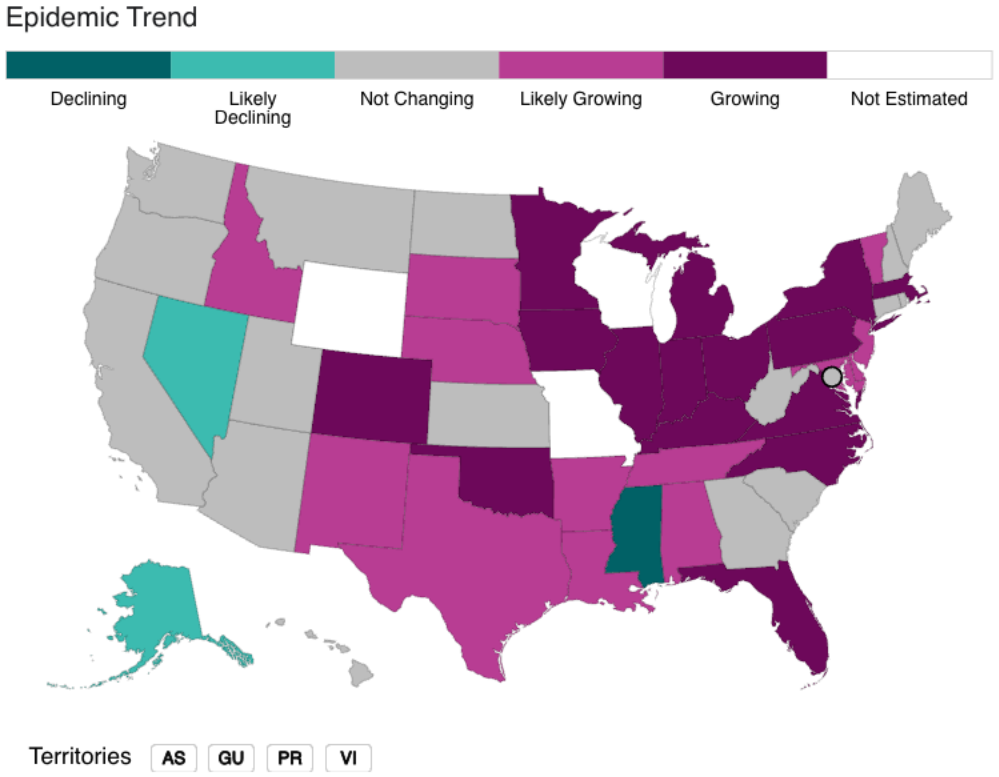


COVID



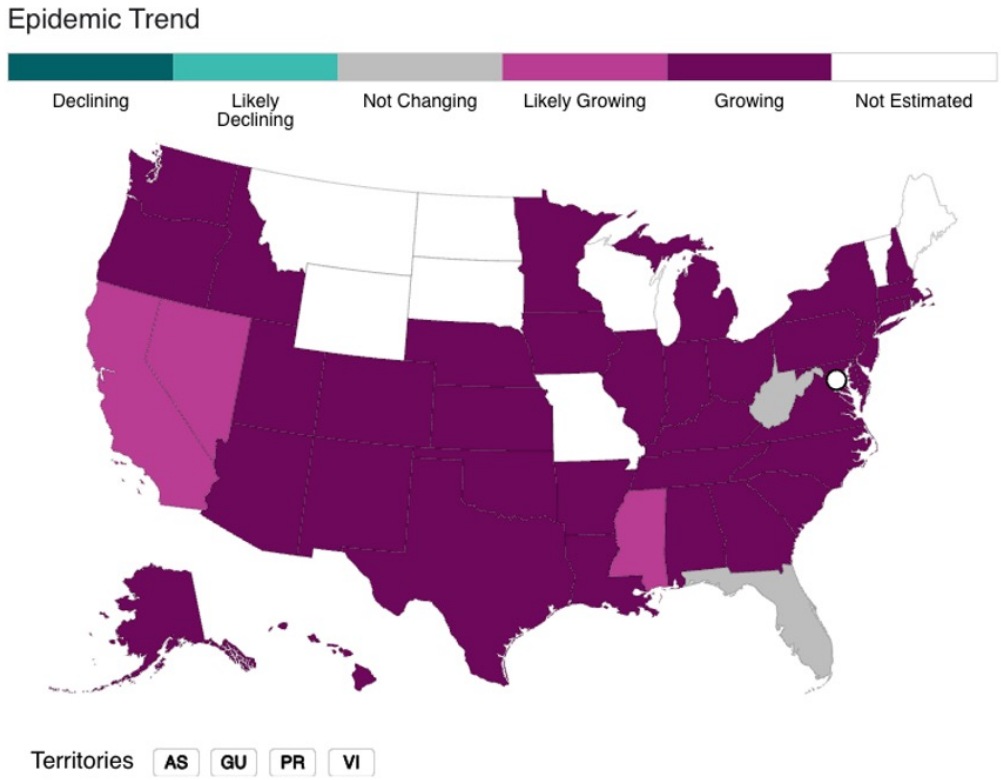
Epidemic Trends

COVID



Data last updated on December 3, 2024 and presented through December 3, 2024.

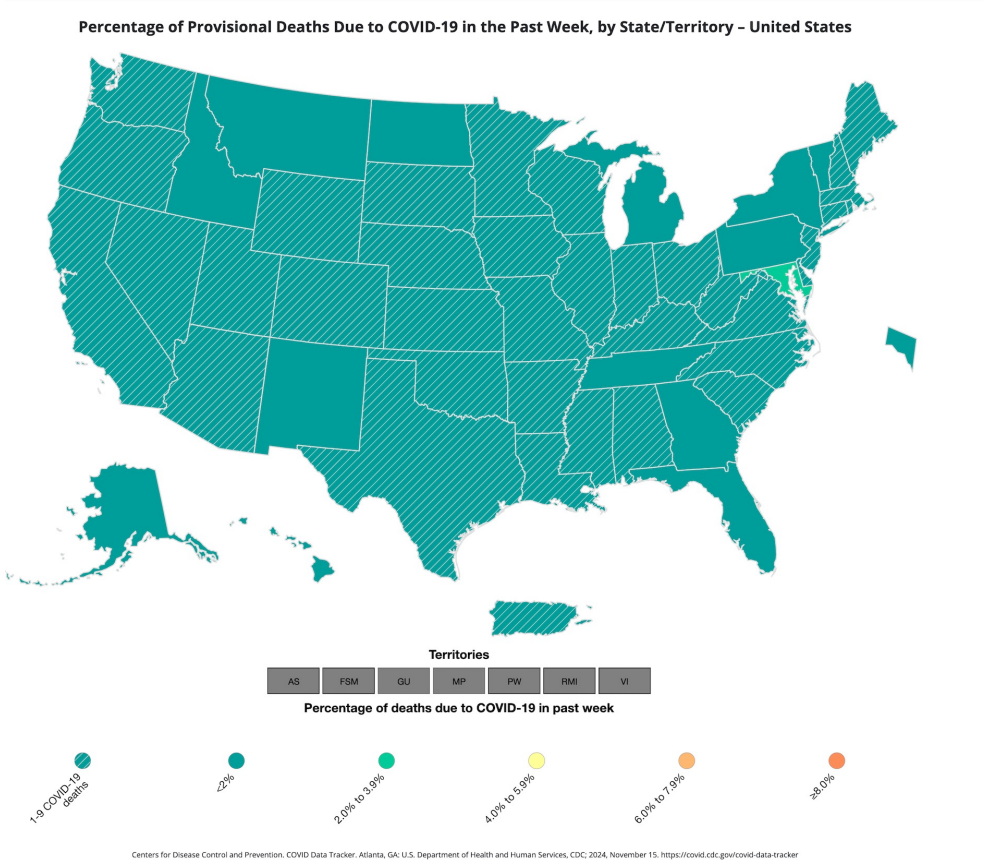
Influenza



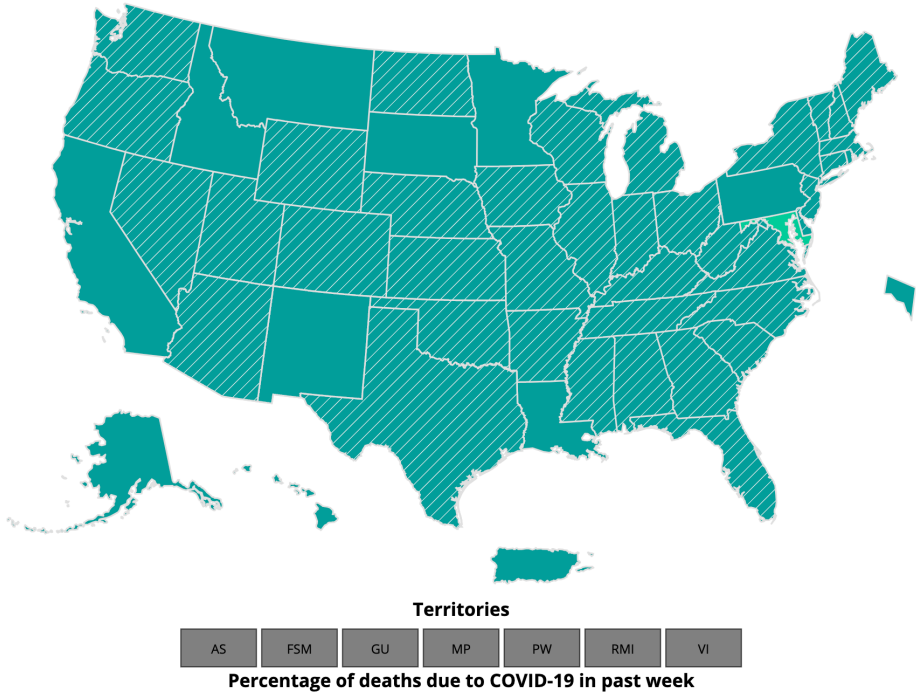
Data last updated on December 3, 2024 and presented through December 3, 2024.

Percentage of Provisional Deaths Due to COVID-19 in the Past week, by State/Territory-United States

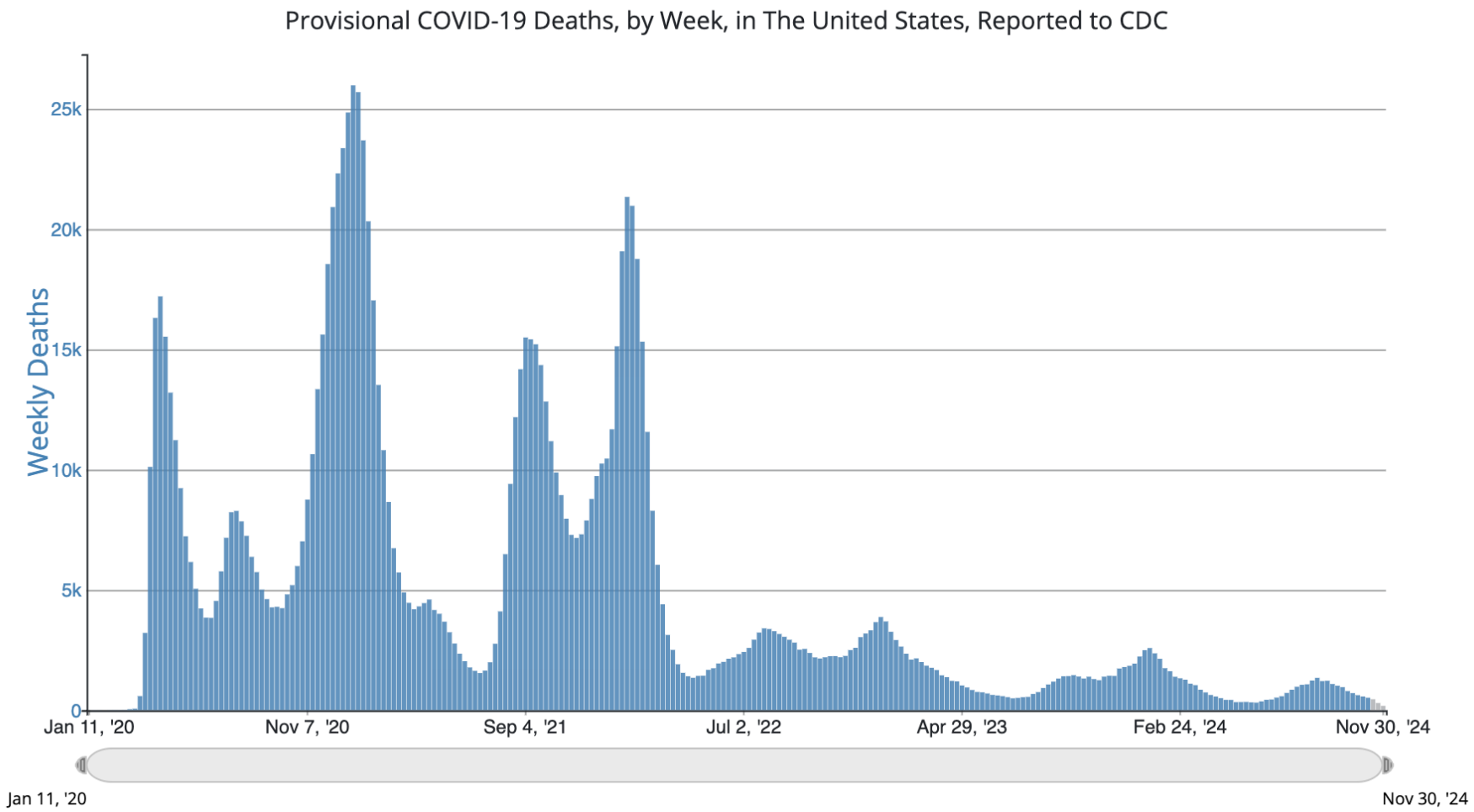
Week of November 9



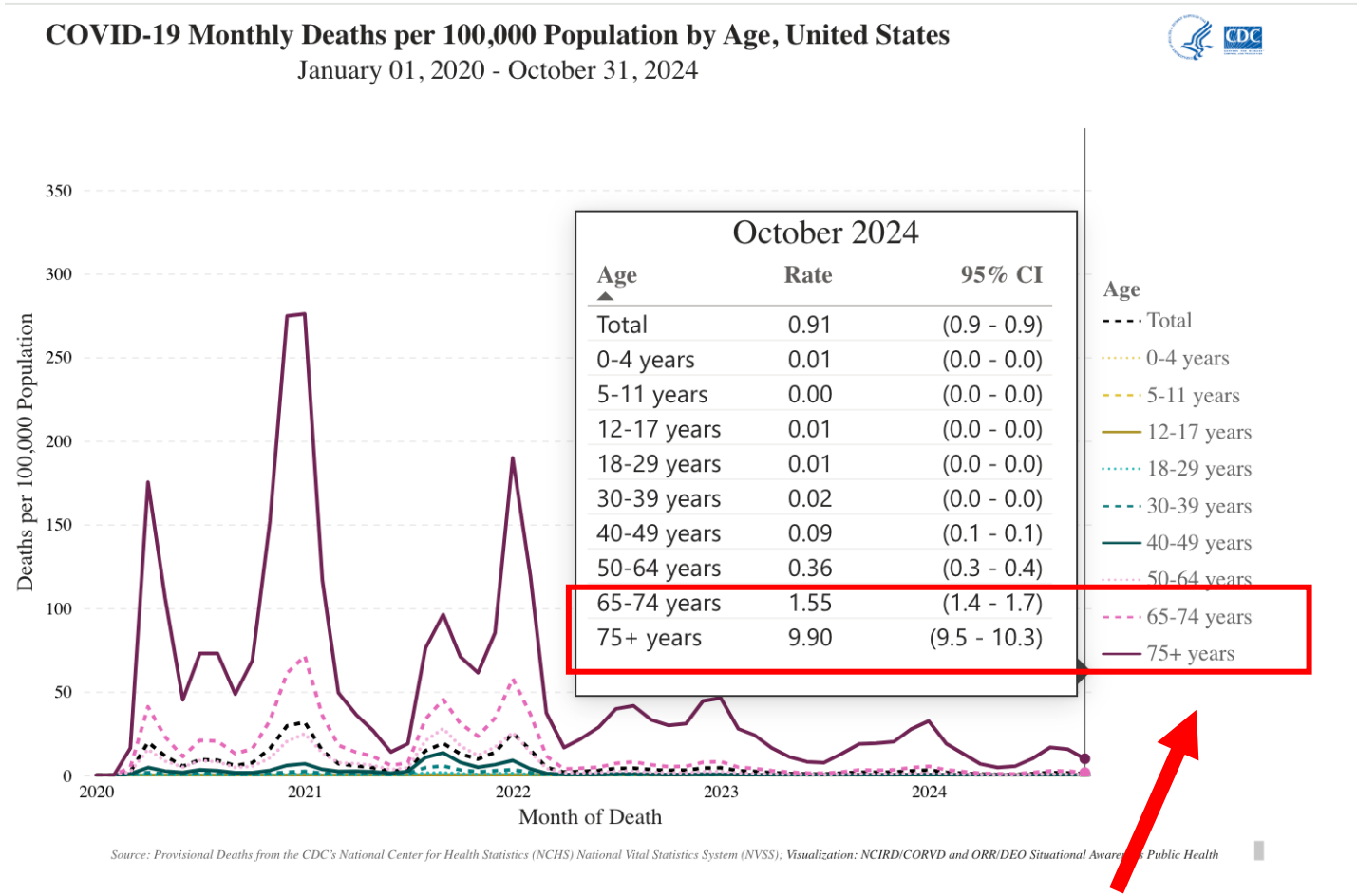
Week of December 9



COVID-19 Updates for the United States



COVID-19 Deaths by Age

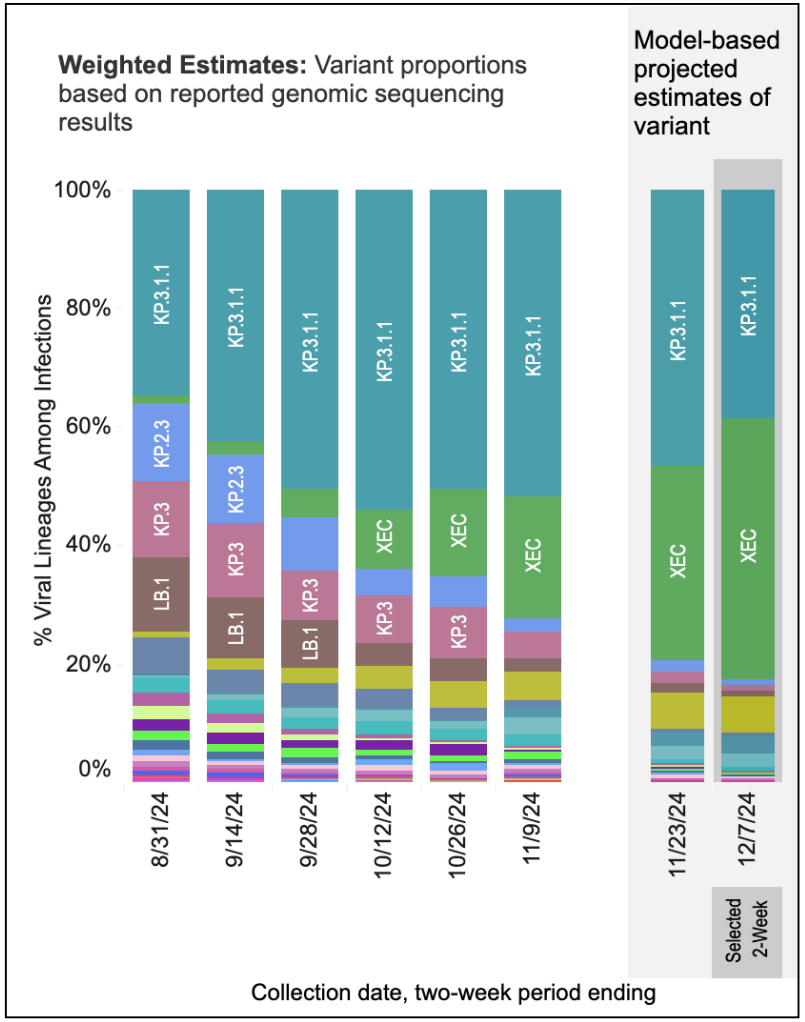


Focus on this age group for vaccination and Antiviral Treatment
Paxlovid > Remdesivir > Molnupiravir

COVID-19 Update: Variants

Weighted and Nowcast Estimates in United States for 2-Week Periods in 8/18/2024 – 12/..

Hover over (or tap in mobile) any lineage of interest to see the amount of uncertainty in that lineage's estimate.



Nowcast Estimates in United States for 11/24/2024 – 12/7/2024

USA

WHO label	Lineage #	%Total	95%PI
Omicron	XEC	44%	39–49%
	KP.3.1.1	39%	34–43%
	MC.1	6%	5–8%
	LF.7	3%	1–6%
	LB.1.3.1	2%	1–5%
	KP.3	1%	1–2%
	KP.2.3	1%	1–1%
	LB.1	1%	1–1%
	KP.1.1.3	0%	0–1%
	KP.2	0%	0–1%
	JN.1.18	0%	0–1%
	JN.1	0%	NA
	JN.1.11.1	0%	0–1%
	JN.1.16.1	0%	NA
	KS.1	0%	NA
	JN.1.16	0%	NA
	LP.1	0%	NA
	KP.1.1	0%	NA
	KP.2.15	0%	NA
	LF.3.1	0%	NA

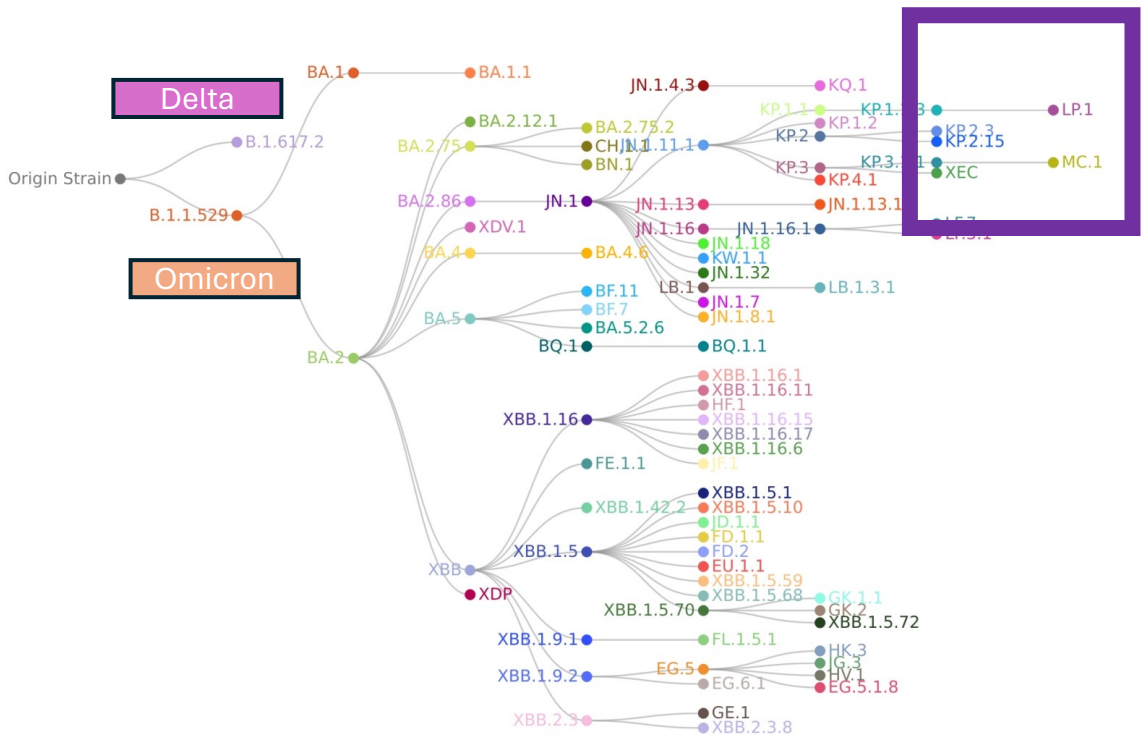
COVID-19 Updates

What's going on with the variants?

KP.3.1.1, XEC, and MC.1

- Accounted for most infections in the United States as of the first week of December.

We are back at endemic levels



Use of Additional Doses of 2024–2025 COVID-19 Vaccine for Adults Aged ≥65 Years and Persons Aged ≥6 Months with Moderate or Severe Immunocompromise: Recommendations of the Advisory Committee on Immunization Practices — United States, 2024

What is already known about this topic?

- ACIP recommends 2024–2025 COVID-19 vaccination for all persons aged ≥6 months.

What is added by this report?

- In October 2024, ACIP recommended that all persons aged ≥65 years and persons aged 6 months–64 years with moderate or severe immunocompromise receive a second 2024–2025 COVID-19 vaccine dose 6 months after their last dose.
- Persons aged ≥6 months with moderate or severe immunocompromise may receive additional doses based on shared clinical decision-making

What are the implications for public health practice?

- Adults aged ≥65 years should receive 2 doses of 2024–2025 COVID-19 vaccine, and
- Persons aged ≥6 months with moderate or severe immunocompromise should receive ≥2 doses to protect against severe COVID-19.

***MMWR* / December 12, 2024 / 73(49);1118–1123**

ACIP: Advisory Committee on Immunization Practices

ACIP and CDC Rationale and Evidence for Vaccine Effectiveness Based on 2023-2024 Season

Protection provided by COVID-19 vaccines

- **Immunocompetent persons:** ~50% additional protection against hospitalization for 4-6 months
- **Immunocompromise persons:** 6% against hospitalization 7–59 days after vaccination and 1% 120–179 days after vaccination

Protection lasted longer against ICU admission and death

- Started at 67% and decreased to 40% 4–6 months after the dose, with additional waning by 6–10 months

***MMWR* / December 12, 2024 / 73(49);1118–1123**

Rationale and Evidence
Safety of COVID-19 Vaccines Based on V-safe Reporting

Robust safety surveillance has demonstrated that serious adverse events are rare:

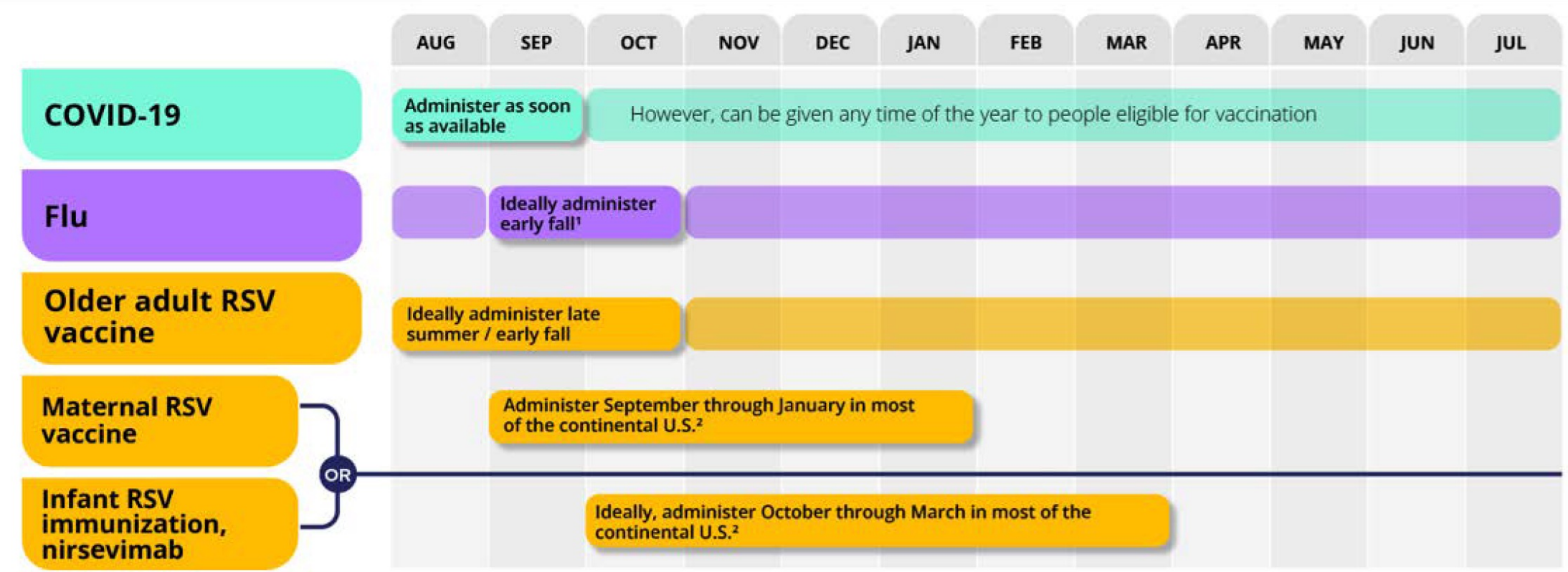
- Anaphylactic reactions have been rarely reported after receipt of COVID-19 vaccines
- Rare risk for myocarditis and pericarditis has been observed, predominantly among males aged 12–39 years
- No increased risk for myocarditis or pericarditis was observed in adults aged ≥65
- Risk in immunocompromise persons specifically is unknown.

COVID-19 vaccine doses are reactogenic, but most patients have mild reactions

- The rate of reactogenic reactions has decreased after subsequent doses of the vaccine
- During 2023–2024, ≥10% vaccine recipients reported health impact events during the 7 days after vaccination
- Reactogenicity after a bivalent COVID-19 vaccine dose was milder and less frequent among older adults

***Weekly* / December 12, 2024 / 73(49);1118–1123**

Respiratory Virus Prevention



https://www.cdc.gov/respiratory-viruses/prevention/immunizations.html

FDA Authorizes First At-Home COVID-19 and Flu Combo Test
November 8, 2024

Who should use it?

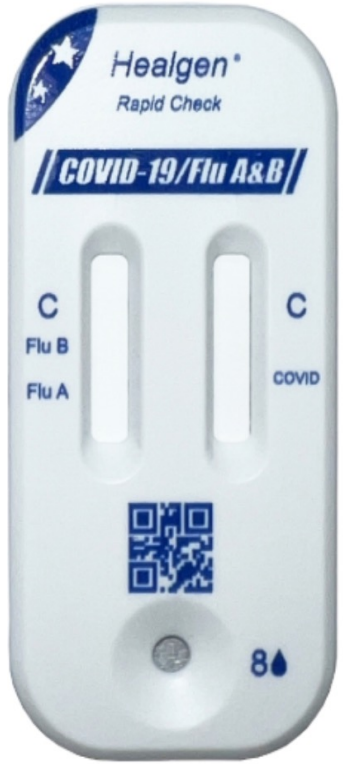
- People 2 years and older experiencing respiratory symptoms
- Those aged 14 years or older can take and test samples without adult assistance

How long do results take?

- 15 minutes

How accurate is this test?

- Correctly identifies at least 99% of negative samples.
- Delivers positive test results for 92% of COVID-19, 93% of influenza A , and 91% of influenza B samples.
- Since false-negatives, can occur, individuals who continue to experience symptoms should follow up with a clinician



"Expands the options for individuals with respiratory symptoms to receive information about their health from the comfort of their home."

JAMA. 2024;332(21):1779. doi:10.1001/jama.2024.22561

What is going on with the Bird Flu?

The mysterious case of a severely sick teenager in Canada hospitalized with H5N1

Canada

Lab confirms Canada's first case of avian flu infection in humans in B.C.

By The Canadian Press

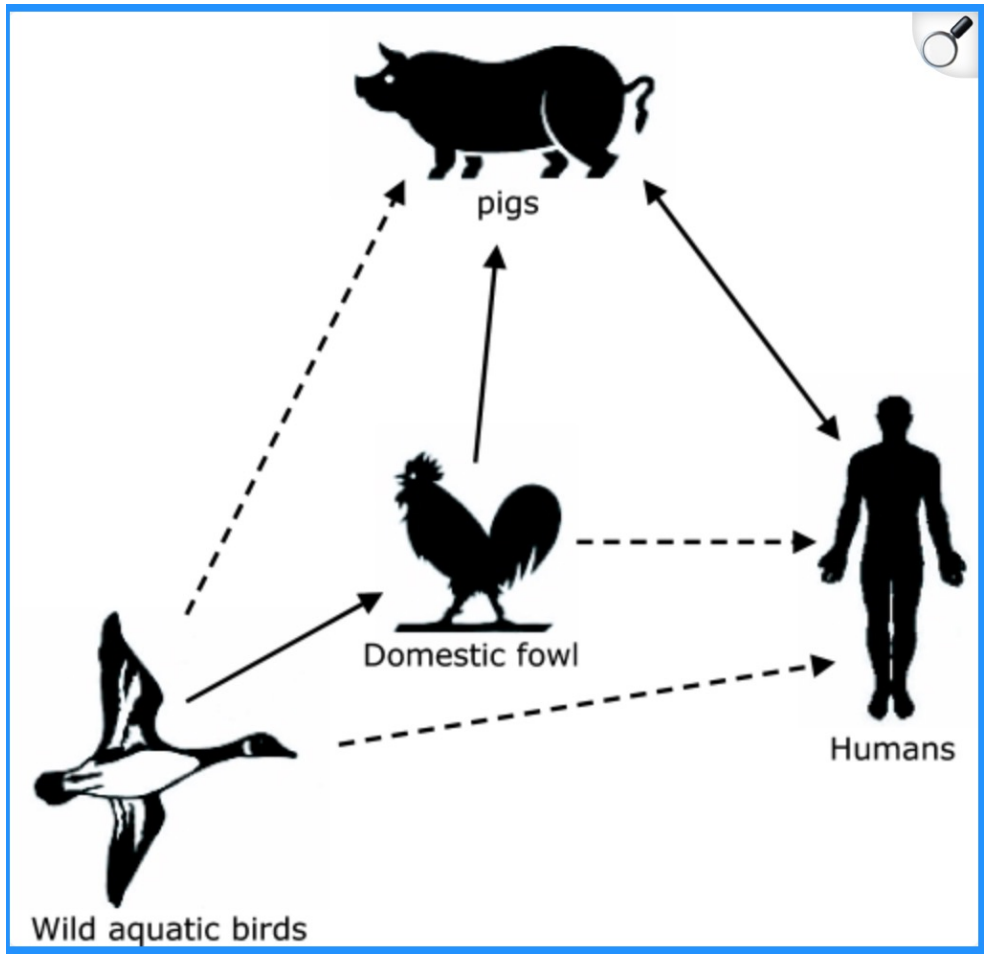
November 13, 2024 at 7:58PM EST

In this Nov. 16, 2009 file photo, chickens stand in their cages at a farm near Stuart, Iowa. Canada's Public Health Agency has confirmed that a British Columbia teenager hospitalized last Friday is the country's first ever human case of domestically acquired H5N1 avian flu. (AP Photo/Charlie Neibergall, File)

Virus sequences suggest some H5N1s had changed the amino acid at position 226H

- This is not the feared 226L mutation
- But for this upped concern about an imminent pandemic.

The pig as a mixing vessel for influenza viruses: Human and veterinary implications



The pig as a “mixing vessel” for influenza A viruses. Wild aquatic birds are the natural reservoirs for influenza A virus subtypes H1-H16. Avian influenza A viruses are frequently transmitted to domestic fowl from the natural wild life reservoirs, and also to pigs from domestic fowl. Human and avian influenza A viruses can infect pigs and reassortment can occur in pigs between avian, swine and human influenza A viruses. Influenza A viruses from pigs can also infect humans. Pigs are postulated as the intermediate host, *i.e.*, the “mixing vessel” for influenza A viruses. Avian influenza viruses from domestic fowl or wild aquatic birds occasionally transmit to humans (*e.g.*, H5N1 virus). Solid lines; frequent and/or confirmed transmission events: Dotted lines; possible and/or occasional transmission events.

Ma W, Kahn RE, Richt JA. J Mol Genet Med. 2008 Nov 27;3(1):158-66. PMID: 19565018; PMCID: PMC2702078.

If the world finds itself amid a flu pandemic in a few months, it won't be a big surprise. Why?

Birds have been spreading a new clade of the H5N1 avian influenza virus

- Worldwide since 2021

The virus spilled over to cattle in Texas about a year ago

- And spread to hundreds of farms across the US

There have been dozens of human infections in North America

- Some of those cases the virus has shown the mutations known to make it better suited to infect human cells and replicate in them.

https://www.science.org/toc/science/380/6640

No clear human-to-human transmission of H5N1 has been documented yet, but some scientists are worried

“This feels the closest to an H5 pandemic that I’ve seen,” says Louise Moncla, a virologist at the University of Pennsylvania.

“If H5 is ever going to be a pandemic, it’s going to be now,” Seema Lakdawala, a flu researcher at Emory University.

“Why didn’t H7N9 end up being easily human-to-human transmissible and cause a pandemic “I feel like there’s really no way to estimate and it could go either way.” Caitlin Rivers, an epidemiologist at the Johns Hopkins Center for Health Security.

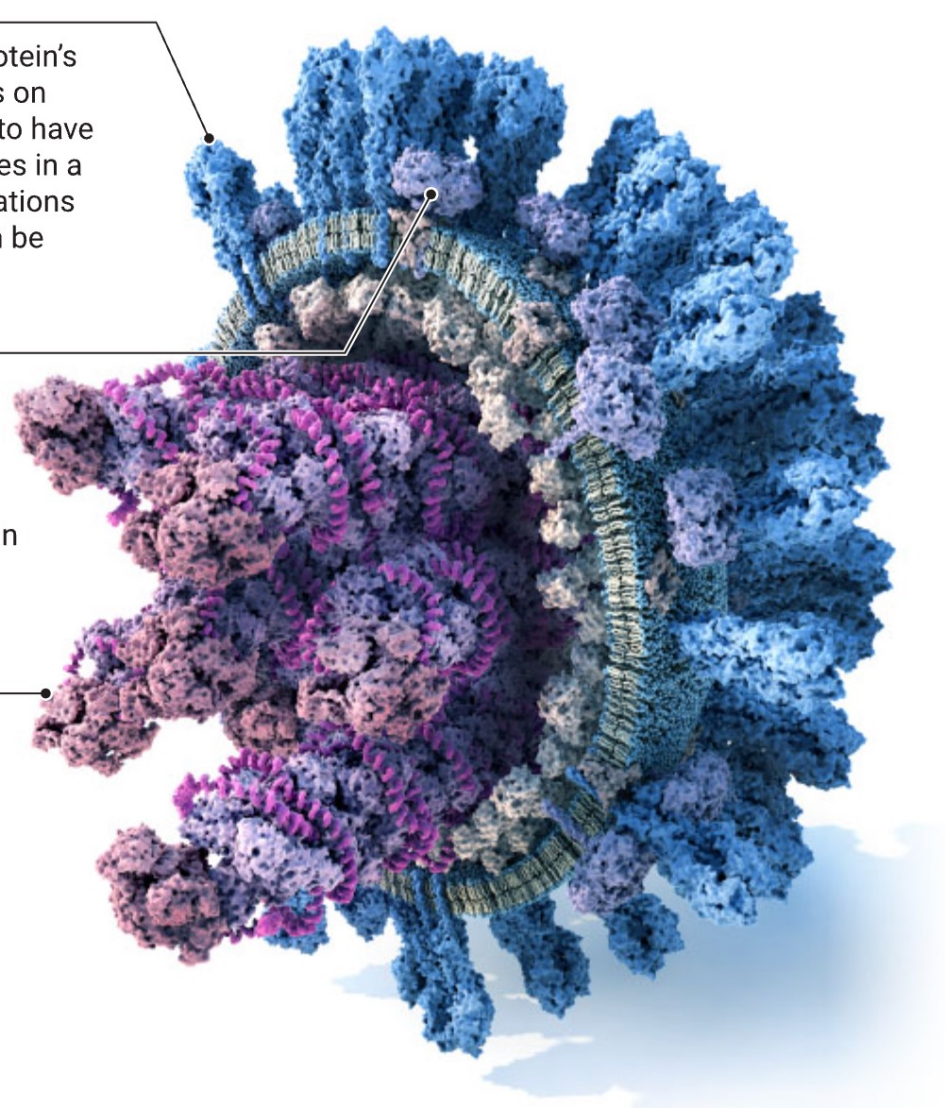
https://www.science.org/toc/science/380/6640

“A slew of recent findings all seem to suggest the risk of the current H5N1 clade in cattle and birds causing a pandemic is higher than previously thought”

The minimum mutations H5N1 needs to spread widely in humans are in its:	• Polymerase, the enzyme the virus uses to copy its genome • Hemagglutinin, the protein to attach to cells and to stabilize it for airborne transmission
Samples from workers at H5N1-infected dairy farms in Michigan and Colorado:	• Found that many human infections go undetected • Each one offering the bovine virus more chances to adapt to us
A recent study indicates currently circulating clade 2.3.4.4b viruses:	• Are better at binding to human cells in the airways than previous versions of H5N1
A *Science* paper shows in lab studies:	• That a single mutation at one hemagglutinin site, is enough to shift the virus preference from a the avian-type cell surface protein to human-type receptors • A switch based on just one mutation “means the likelihood of it happening is higher,”

So why hasn’t H5N1 touched off a pandemic yet? Dangerous steps

- For the H5N1 influenza virus to spark a human pandemic, its genome must acquire mutations that alter several of its proteins.
- Some have now been seen in viruses infecting people, but none of those appear to have transmitted onward.



So why hasn’t H5N1 touched off a pandemic yet?

 **The virus may just need more time to hit the right combination of mutations.**	The high mutation rate of influenza viruses should tip the odds in H5N1’s favor
 **The viruses in birds, cattle, and people so far show no signs of the 226L hemagglutinin mutation**	That would allow H5N1 to better latch onto human receptors.
 **Researchers speculate that change might hamper the virus in some way**	And a second mutation may be needed to offset its disadvantages.
 **The two mutations might also have to come in a particular order.**	“It’s like a dial on a bank vault: You go to the right, then you go to the left, then you go to the right, and you’ve got to get a certain number every time,”*

*Mike Osterholm, director of the Center for Infectious Disease Research and Policy at the University of Minnesota Twin Cities.

https://www.science.org/toc/science/380/6640

The mysterious case of a severely sick teenager in Canada hospitalized with H5N1

Canada

Lab confirms Canada's first case of avian flu infection in humans in B.C.

By The Canadian Press

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In this Nov. 16, 2009 file photo, chickens stand in their cages at a farm near Stuart, Iowa. Canada's Public Health Agency has confirmed that a British Columbia teenager hospitalized last Friday is the country's first ever human case of domestically acquired H5N1 avian flu. (AP Photo/Charlie Neibergall, File)

Virus sequences suggest some H5N1s had changed the amino acid at position 226H

- This is not the feared 226L mutation
- But for this upped concern about an imminent pandemic.

Unusual factors may have been at play in this case

The illness was protracted

The teenager first sought care on 2 November for an eye infection and cough and fever and was hospitalized the week after, when symptoms worsened.

This may have played a role in the hemagglutinin change, allowing the virus time to hit on a winning mutation.

The teenager's virus is the variety that is currently circulating in birds, not cattle.

The bird virus, has gone through reassortment, a mixing of different viruses, presumably in a bird infected with two different avian influenza viruses.

In the process it acquired a new neuraminidase, the N in H5N1 and the protein the virus uses to detach new virus particles from the cell that produced them.

Influenza Primer

Epidemiology

Symptoms and Complications

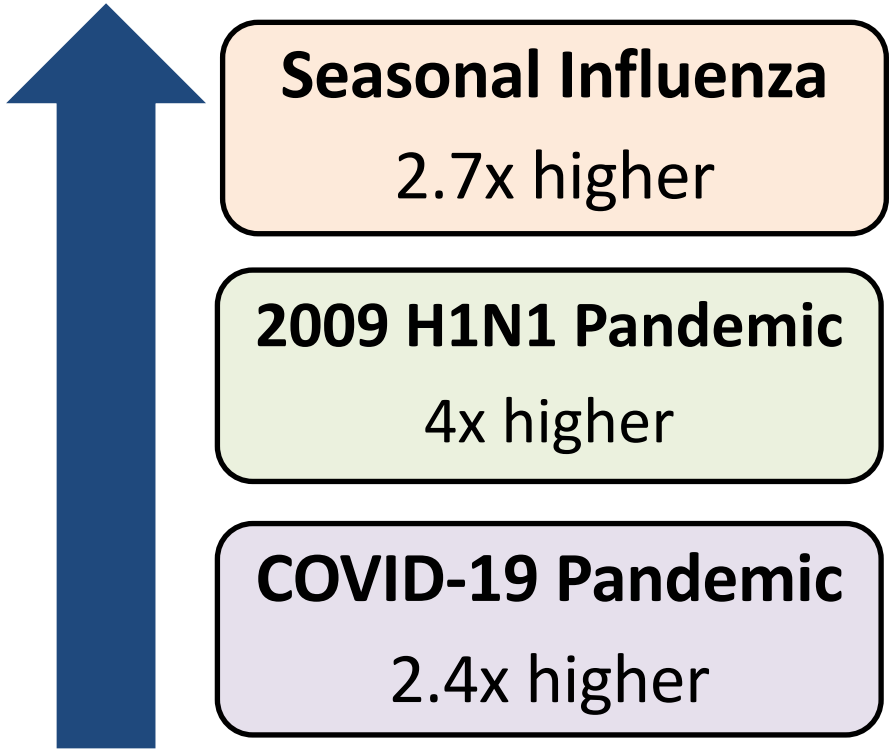
Diagnosis

Prevention

Treatment

Viral Respiratory Illnesses in American Indian Communities: *A Longstanding History of Worsened Outcomes*

Mortality among American Indian/Alaska Native populations, compared to White persons



Modifiable risk factors, immunization, and prompt medical attention are key areas to prevent influenza deaths

Doxey M, et al. *J Public Health Manag Pract*. 2019;25(S5):S7-10; Castodale L, et al. CDC MMWR. 2009;58(48):1341-1344. Available at https://www-cdc-gov.lp.hscl.ufl.edu/mmwr/preview/mmwrhtml/mm5848a1.htm. Accessed 6/30/2021; Hennessy TW, et al. *Epidemiol Infect*. 2016;144(2):315-324; CDC. Risk for COVID-19 Infection, Hospitalization, and Death by Race/Ethnicity. Available at https://www.cdc.gov/coronavirus/2019-ncov/covid-data/investigations-discovery/hospitalization-death-by-race-ethnicity.html. Accessed 6/30/2021.

Epidemiology

Replicates

- Mainly in nasopharynx

Spreads

- Mainly by droplets (6 feet away)
- Less often, by touching fomites and autoinoculation

Contagiousness

- Incubation period 1-4 days
- Beginning 1 day **before** symptoms develop and up to 5 to 7 days **after.**
- Children may transmit the virus > 7 days.

https://www.cdc.gov/flu/about/season/flu-season.

Signs & Symptoms of the Flu

- **Fever or chills**
- **Cough and chest discomfort**
- Sore throat
- Runny or stuffy nose
- **Muscle or body aches**
- **Headaches**
- **Fatigue**
- Vomiting and diarrhea
  - More common in children

Cold vs Flu

Signs and Symptoms	Cold	Influenza (Flu)
Symptom onset	Gradual	Abrupt
Fever	Rare	Common; lasts 3-4 days
Aches	Slight	Common; often severe
Chills	Uncommon	Fairly common
Fatigue, weakness	Sometimes	Usual
Sneezing	Common	Sometimes
Chest discomfort, cough	Mild to moderate; hacking cough	Common; can be severe
Stuffy nose	Common	Sometimes
Sore throat	Common	Sometimes
Headache	Rare	Common

https://www.cdc.gov/flu/symptoms/symptoms.htm. Accessed, Feb 5, 2023

Complications of Influenza

Most people recover in days to weeks, but some develop complications, some of which can be life-threatening

Ear, nose, throat

- Sinus infections
- Ear infections

Pulmonary

- Pneumonia (primary viral, secondary bacterial, or mixed)
- Asthma exacerbation

Cardiac

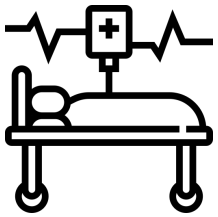
- ECG changes
- **Acute myocardial infarction**
- Myocarditis, pericarditis

Neurologic

- Encephalitis, transverse myelitis
- Aseptic meningitis
- Guillain-Barre syndrome

Muscle tissue

- Rhabdomyolysis
- Myositis



Critical illness

- Multiorgan system failure
- Acute respiratory distress syndrome

CDC. Flu symptoms & complications. https://www.cdc.gov/flu/symptoms/symptoms.htm?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fflu%2Fconsumer%2Fsymptoms.htm. Accessed 2/5/23.

Slide Credit: Prime Education LLC

Persons at High Risk of Complications from Influenza

- Children aged < 5 years, especially < 2 years
- Adults aged ≥ 65 years
- Immunosuppression
- Pregnancy & within 2 weeks postpartum
- Children and adolescents taking aspirin or other salicylates
- American Indian/Alaskan Native people
- Extreme obesity (BMI ≥ 40kg/m^2)
- Long-term care/nursing home residents

- **Chronic conditions:**
  - Pulmonary (including asthma)
  - Cardiovascular (excluding isolated hypertension)
  - Renal disorders
  - Hepatic disorders
  - Hematological (including sickle cell disease)
  - Intellectual disability/developmental delay
  - Metabolic disorders (including diabetes mellitus)
  - Neurological/neurodevelopmental conditions

BMI = Body Mass Index

Uyeki T, et al. *Clin Infect Dis*. 2019;68(6):895-902.

Slide Credit: Prime Education LLC

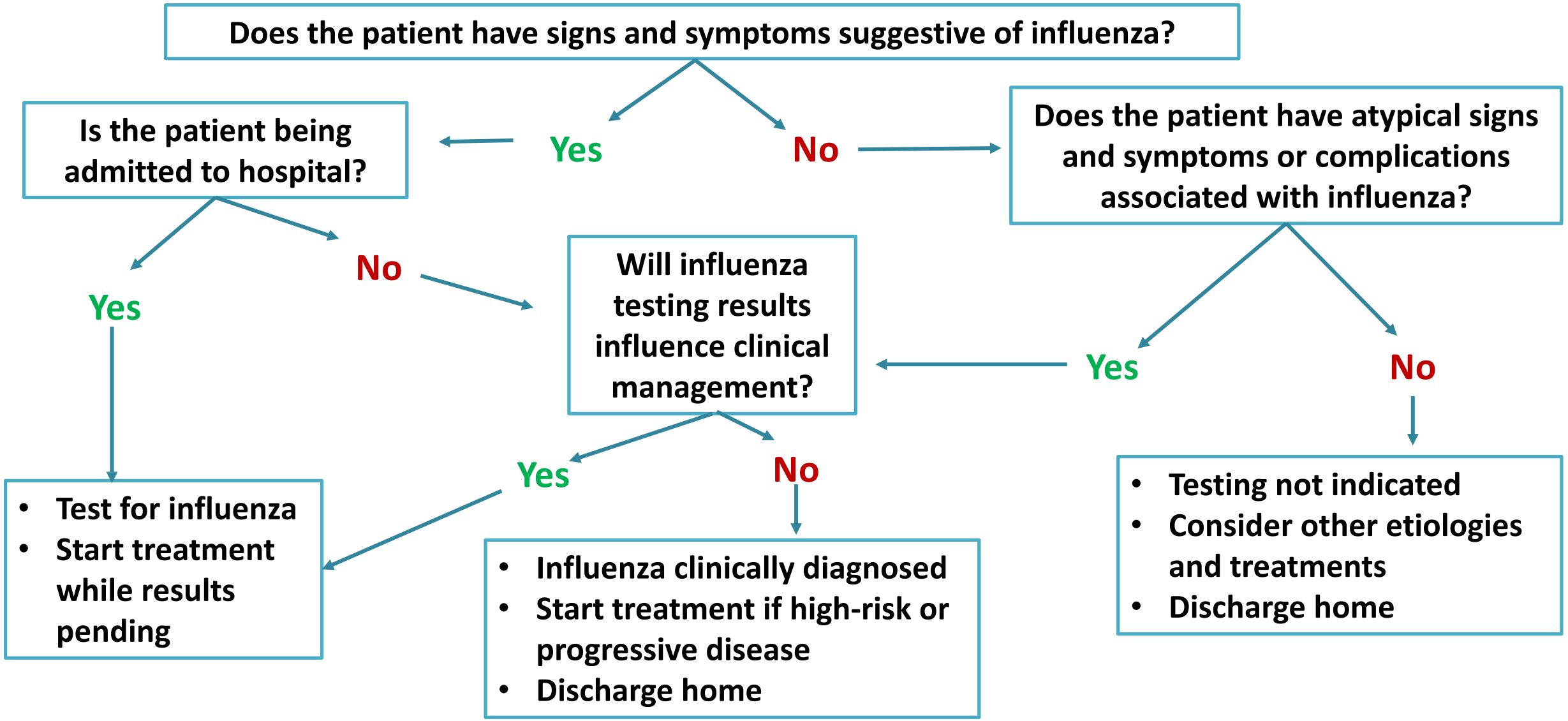
Influenza Diagnostic Tests for Respiratory Specimens

- **Antigen Tests**
  - 60-70 % Sensitive
- **Molecular test**
  - Recommended by IDSA
- **Culture**
  - For research or epidemiology

Method	Testing Category	Detects	Distinguishes Influenza A Subtypes	Time to Results	Sensitivity	Specificity
Antigen Detection Assays	Rapid influenza diagnostic test	Influenza virus antigens	No	10-15 min	Low to moderate (↑ with analyzer)	High
	Direct and indirect immunofluorescence assays	Influenza virus antigens	No	1-4 h	Moderate	High
Molecular Assays	Rapid molecular assay	Influenza viral RNA	No	15-30 min	High	High
	Conventional RT-PCR	Influenza viral RNA	Yes (subtype primers)	1-8 h	High	High
	Multiplex molecular assays	Influenza viral RNA, other viral/bacterial targets (RNA or DNA)	Yes (subtype primers)	1-2 h	High	High

RT-PCR = Reverse Transcription Polymerase Chain Reaction; EUA = Emergency Use Authorization; FDA = Food and Drug Administration; **Uyeki T, et al. *Clin Infect Dis*. 2019;68(6):895-902; CDC. CDC's diagnostic multiplex assay for flu and COVID-19 and supplies. https://www.cdc.gov/coronavirus/2019-ncov/lab/multiplex.html. Accessed 7/16/2020.**

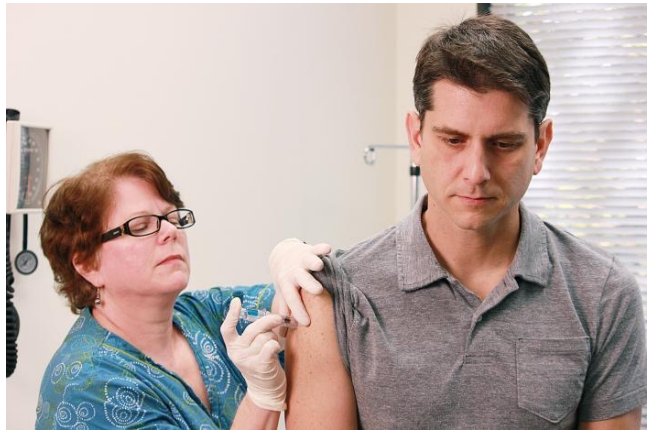
IDSA Decision Tree for Testing and Treatment of Influenza

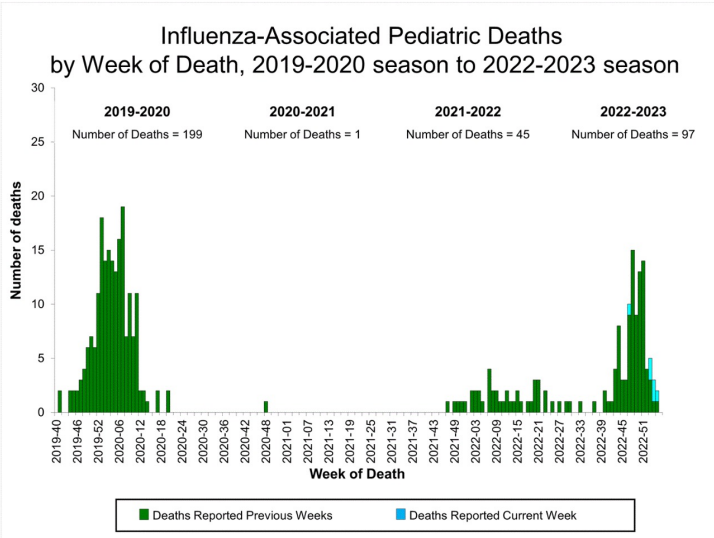


IDSA = Infectious Diseases Society of America; COPD = Chronic Obstructive Pulmonary Disease; HF = Heart Failure; **Uyeki T, et al. *Clin Infect Dis*. 2019;68(6):895-902.**

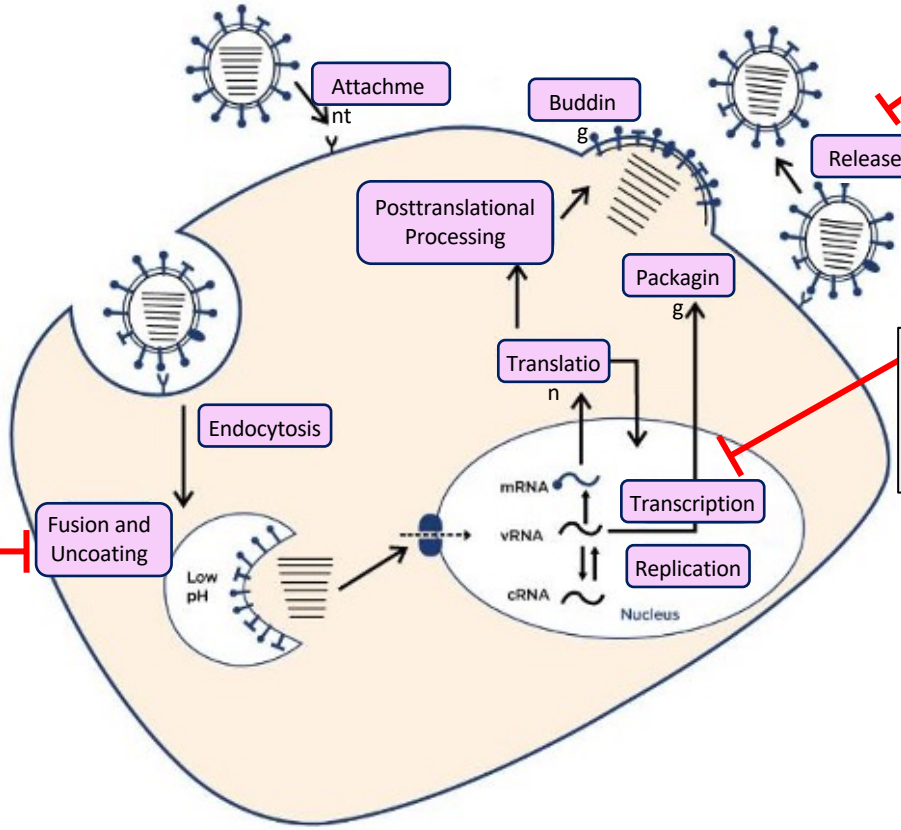
Prevention

- **Yearly Vaccination**
  - Single most important way to prevent flu
  - High level protection against complications including death.
- **Post Exposure prophylaxis**
- **Wash your hands regularly**
- **Clean and disinfect frequently touched surfaces**
- **Avoid touching eyes, nose or mouth**
- **Practice proper cough & sneeze etiquette to prevent spread of germs**
- **Wear Masks**





Antivirals for Influenza



M2 ion channel inhibitors
- Amantadine
- Rimantadine
  - No clinical role due to widespread resistance

Neuraminidase inhibitors
- Oseltamivir
- Zanamivir
- Peramivir

Cap-dependent endonuclease inhibitor
- Baloxavir

Shaw ML. *ACS Infect Dis.* 2017;3:691-694.

Slide Credit: Prime Education LLC

Antivirals for the Treatment of Acute Uncomplicated Influenza

Antiviral	Administration	Approved age for pediatric use	Use in patients at high risk for complications		Prophylaxis
			FDA approved?	CDC recommended?	
Baloxavir marboxil	Oral Single dose	≥ 5 years	**Yes**	**No**	**Yes** (single dose)
Oseltamivir	Oral BID x 5 days	≥ 2 weeks	**No**	**Yes**	**Yes** (once daily)
Peramivir	Intravenous Single dose	≥ 2 years	**No**	**No**	**No**
Zanamivir	Inhaled BID x 5 days	≥ 7 years	**No**	**No**	**Yes** (once daily)

TAMIFLU® (oseltamivir phosphate) [package insert]. Distributed by Genentech, Inc. Licensor: Gilead Sciences, Inc. December 2018; RELENZA (zanamivir inhalation powder) [package insert]. GlaxoSmithKline. June 2018; RAPIVAB® (peramivir injection) [package insert]. BioCryst Pharmaceuticals, Inc. April 2018; XOFLUZA™ (baloxavir marboxil) [package insert]. Distributed by Genentech USA, Inc. March 2021.

Slide Credit: Prime Education LLC

Treatment of Avian Influenza: CDC Recommendations

Initiation of antiviral treatment with oseltamivir is recommended as soon as possible for

- Symptomatic outpatients who are confirmed, probable, or suspected cases of infection with a novel influenza A virus associated with severe human disease.
- Oseltamivir is the drug of choice (based on observational data)
- 75 mg PO BID x 5 days

In Hospitalized or immunocompromised patients

- Treatment may be longer
- May consider combining with baloxavir to decrease the risk of emergence of resistance

Peramivir and Zanamivir are not recommended

https://www.cdc.gov/bird-flu/hcp/novel-av-treatment-guidance/

Indications for Treatment

Treatment should be provided:

- High risk of complications
- Hospitalization for influenza
- Severe or progressive illness

Treatment can be considered:

- Illness onset ≤ 2 days before presentation
- Household contacts or healthcare providers for high-risk persons, particularly immunocompromised

- ✓ Treatment should ideally start within 48 hours of symptom onset
- ✓ **Treatment started > 48 hours after onset may still be beneficial in severe illness**
- ✓ Treatment decisions should not wait until laboratory confirmation

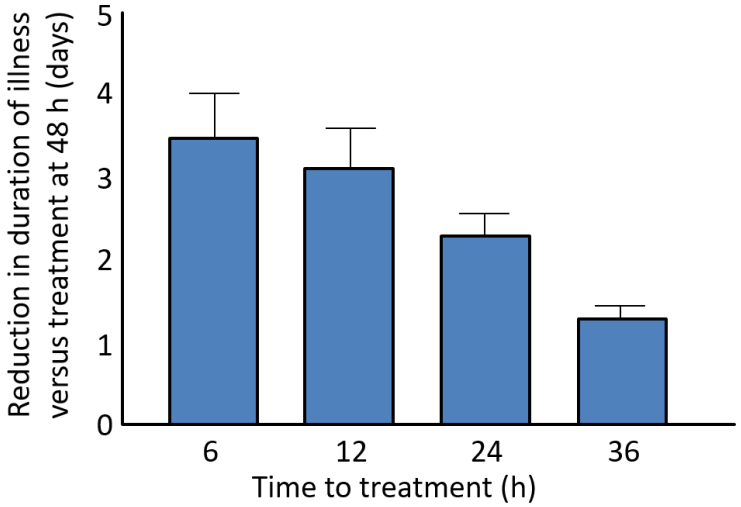
Uyeki T, et al. *Clin Infect Dis.* 2019;68(6):895-90; CDC. Influenza antiviral medications: summary for clinicians. Available at: https://www.cdc.gov/flu/professionals/antivirals/summary-clinicians.htm. Accessed 1/2/2023.

Slide Credit: Prime Education LLC

Early Presentation, Diagnosis and Treatment Improves Outcomes: The IMPACT Study

Open-label, multicenter study of 1,426 patients presenting within 48 hours of influenza symptom onset

Reduction (days) of illness duration



Duration of illness in infected intent-to-treat population (n = 955)

Duration of illness (h) between onset of symptoms and treatment start	Median duration, h (95% CI)
0-6 (n = 140)	**81.8** (70.7-105.5)
> 6-12 (n = 100)	110.2 (93.0-123.5)
> 12-24 (n = 332)	111.1 (98.5-122)
> 24-36 (n = 258)	127.8 (111.8-151.5)
> 36-48 (n = 125)	**180.0** (146.7-202.85)

Earlier initiation of oseltamivir 75 mg twice daily is associated with shorter duration of illness from influenza

Aoki FY, et al. *J Antimicrob Chemother*. 2003;51:123-129.

Slide Credit: Prime Education LLC

Guideline Recommendations for Patients with Delayed Presentation

National consensus guidelines consistently recognize greatest clinical benefit when treatment started within 48 hours of symptom onset

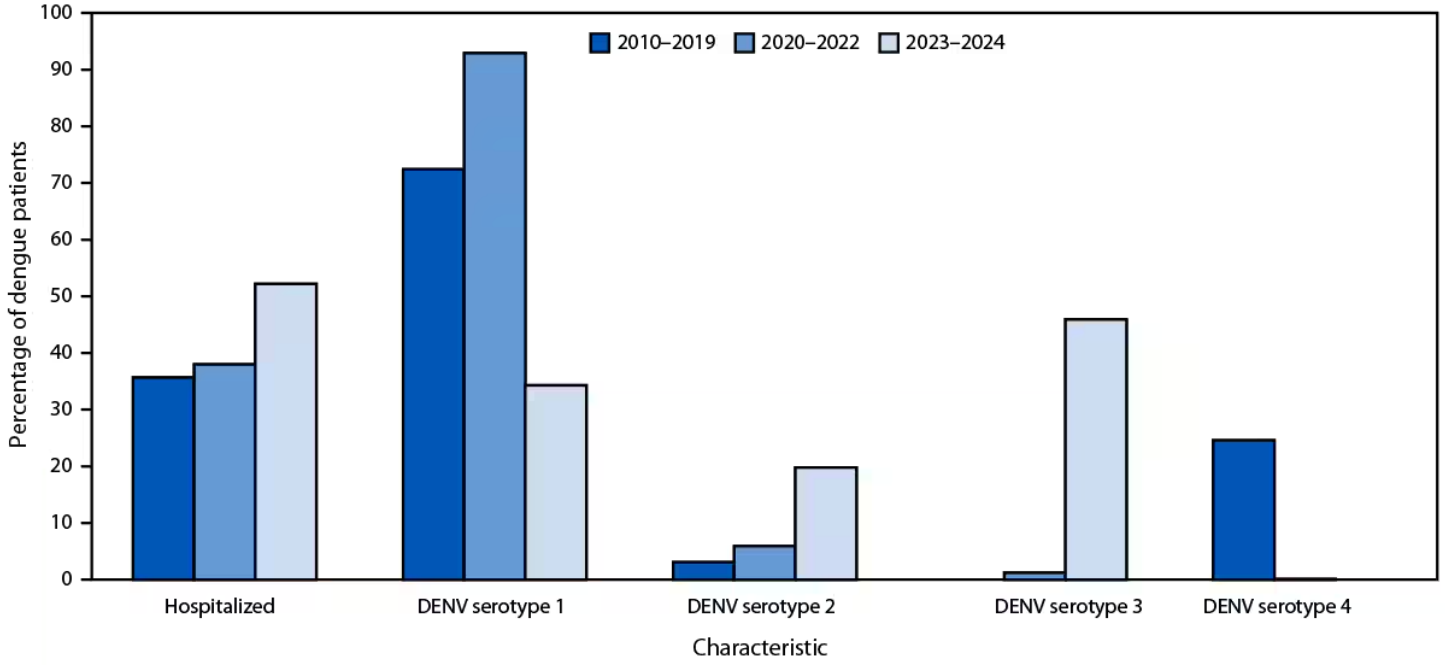
Centers for Disease Control and Prevention	• **Hospitalized** influenza patients, **especially adults**
Infectious Diseases Society of America	• Benefit was noted even when treatment was started in most patients 4-5 days and up to 7 days after illness onset • Immunocompromised patients • Critically ill adults
American Academy of Pediatrics	• Children with **severe disease** or at **high risk** of complications

Epidemiology of Dengue - Puerto Rico, 2010–2024

- **What is already known about this topic?**
  - Cases of dengue, a mosquito borne viral illness, are increasing worldwide;
  - During 2024, approximately 13 million cases have been reported in the Americas.
- **What is added by this report?**
  - During 2023–2024, the median age of patients with dengue, the percentage of patients hospitalized, and the prevalences of serotypes 2 and 3 increased compared with the previous decade (2010–2019).
- **What are the implications for public health practice?**
  - Understanding the changing epidemiology of dengue can help guide public health action, including providing clinical training, strengthening surveillance, ensuring health care system resilience, and raising public awareness.

Weekly / December 12, 2024 / 73(49);1112–1117

Percentage of dengue patients hospitalized and percent distribution of infecting serotype,* by surveillance period (N = 39,094) — Puerto Rico Department of Health, Puerto Rico, 2010–2024



Abbreviation: DENV = dengue virus.

* Number of dengue cases with information on infecting serotype divided by total dengue cases: 2010–2019 = 20,783 / 30,517; 2020–2022 = 1,512 / 2,695; and 2023–2024 = 4,753 / 5,882). Percentages were calculated among patients for whom serotype was known.

Weekly / December 12, 2024 / 73(49);1112–1117

The Burden of Hepatitis A Outbreaks in the United States: Health Outcomes, Economic Costs, and Management Strategies

Background

- Hepatitis A (HepA) vaccines are recommended for US adults at risk of HepA.
- Ongoing US HepA outbreaks since 2016 have primarily spread person-to-person, especially among at-risk groups.
- We investigated the health outcomes, economic burden, and outbreak management considerations associated with HepA outbreaks from 2016 onwards.

Methods

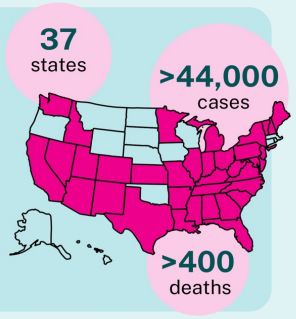
- A systematic literature review was conducted to assess HepA outbreak-associated health outcomes, health care resource utilization (HCRU), and economic burden.
- A targeted literature review evaluated HepA outbreak management considerations.

The Journal of Infectious Diseases, Volume 230, Issue 1, 15 July 2024, Pages e199–e218, https://doi.org/10.1093/infdis/jiae087

The Burden of Hepatitis A Outbreaks in the United States: Health Outcomes, Economic Costs, and Management Strategies

In the United States (US), **hepatitis A (HepA)** vaccination is recommended for adults at higher risk of HepA virus infection. However, many adults in the US remain unvaccinated against HepA.

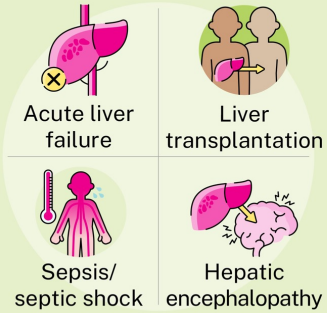
There have been **ongoing outbreaks of HepA disease** in the US since 2016, mostly spread through close personal contact.



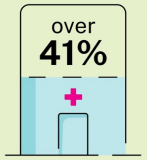
We searched through published studies to review the **health outcomes**, **economic burden**, and **outbreak management considerations** of the US HepA outbreaks since 2016.

33 studies reported on **Health Outcomes**

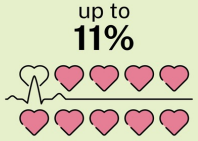
The most common adverse health outcomes from HepA disease were:



Across studies, HepA disease was reported[a] to result in:



hospitalization rate



case fatality rate

10 studies reported on **Economic Burden**

The estimated national average cost per HepA-related hospitalization in 2017 was:

over **$16,000** per person in the US

A 2017 outbreak resulted in an estimated cost of:

spent per employee evaluated for HepA by a city health department

34 studies reported on **Outbreak Management Considerations**

Challenges

- **Difficulty reaching groups** that are more likely to be infected with HepA, such as people who use drugs and people experiencing homelessness
- Public **fear or distrust** of the HepA vaccine

Successes

- **Targeted interventions**, such as vaccination events at homeless shelters
- Increasing **public awareness** of HepA outbreaks

Further details on the health outcomes, economic burden, and outbreak management considerations are described in the corresponding journal article

- The US HepA outbreaks have had a considerable health and economic impact since 2016.
- Increasing HepA vaccination coverage is needed to reduce the impact of HepA in the US and prevent future outbreaks.
- These outbreak management learnings can also be used to reduce the impact of other vaccine-preventable diseases.

Horn EK, Herrera-Restrepo O, Acosta AM, et al. J Infect Dis. 2023.

[a]Numbers may be more reflective of severe disease outcomes due to underreporting of mild HepA cases.

J Infect Dis, Volume 230, Issue 1, 15 July 2024, Pages e199–e218, https://doi.org/10.1093/infdis/jiae087

OXFORD UNIVERSITY PRESS

The Burden of Hepatitis A Outbreaks in the United States: Health Outcomes, Economic Costs, and Management Strategies:

CONCLUSIONS

This review indicates a considerable clinical and economic burden of ongoing US HepA outbreaks.

Targeted prevention strategies and increased public awareness and vaccination coverage are needed to reduce HepA burden and prevent future outbreaks.

• *The Journal of Infectious Diseases*, Volume 230, Issue 1, 15 July 2024, Pages e199–e218, https://doi.org/10.1093/infdis/jiae087

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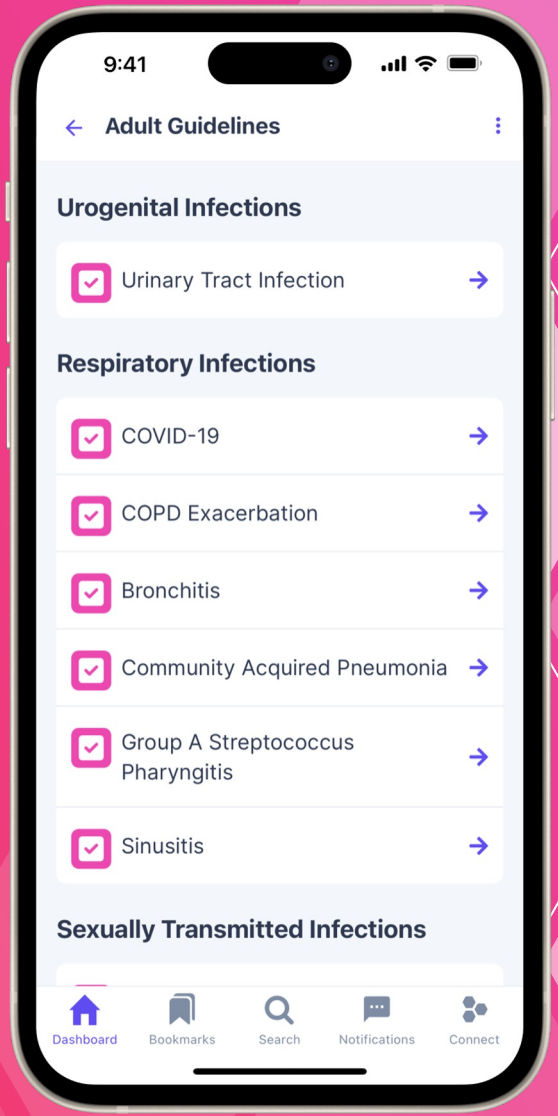
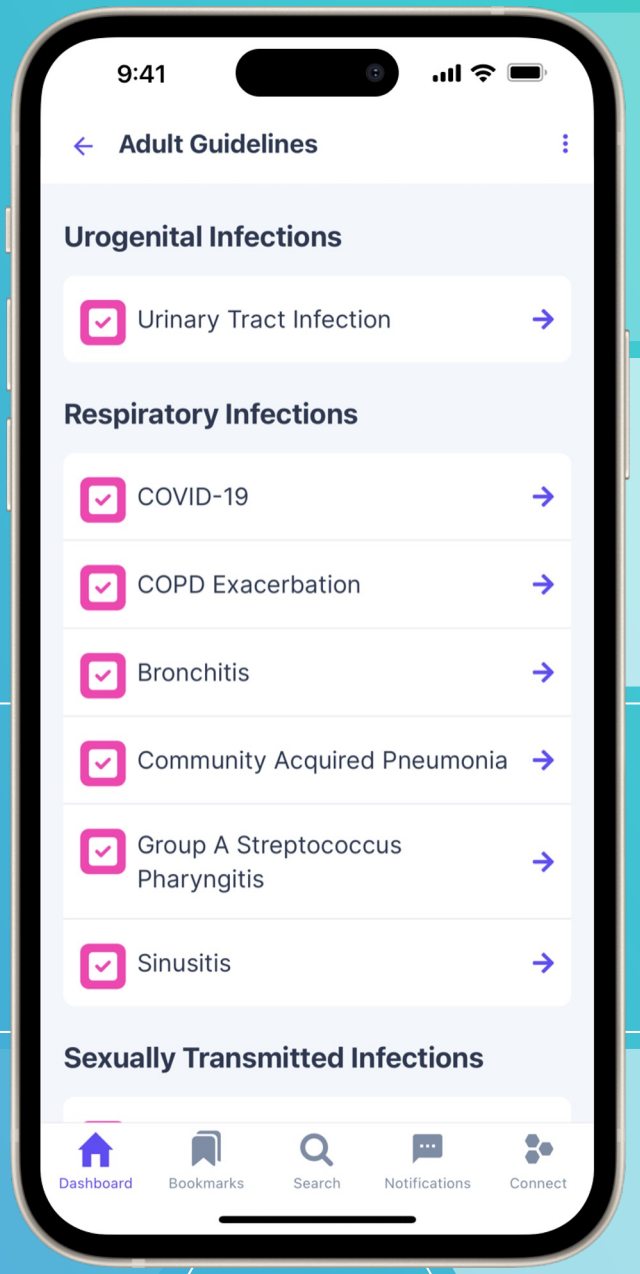


CHEROKEE NATION

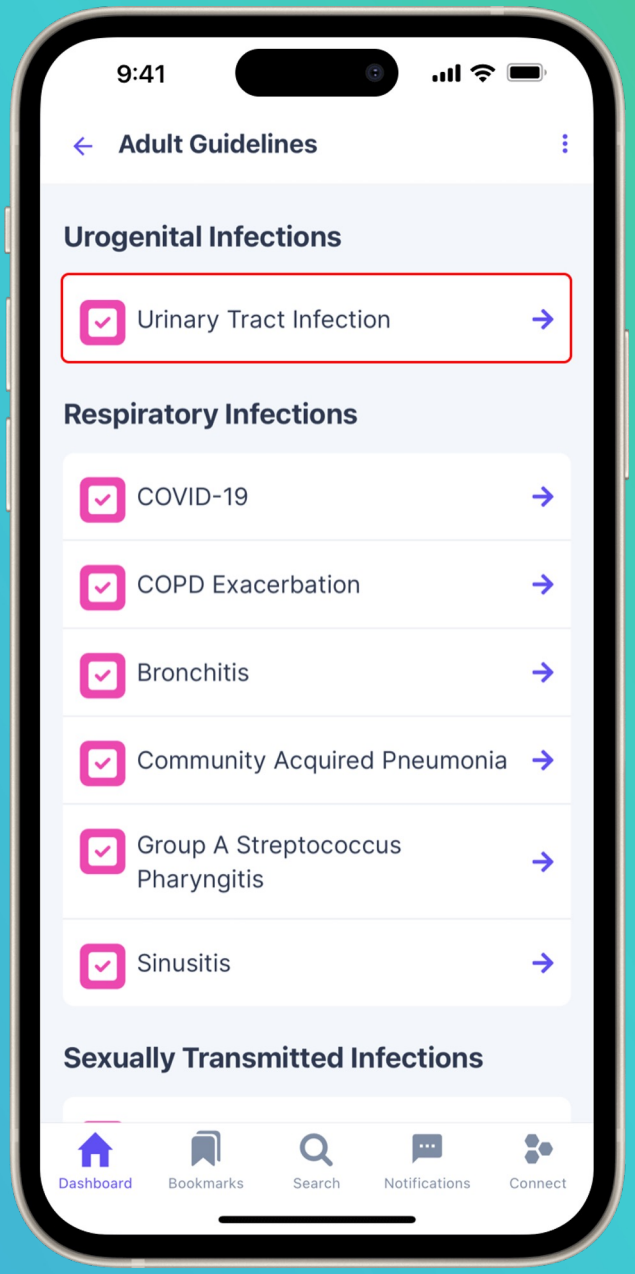
Clinical Case Study

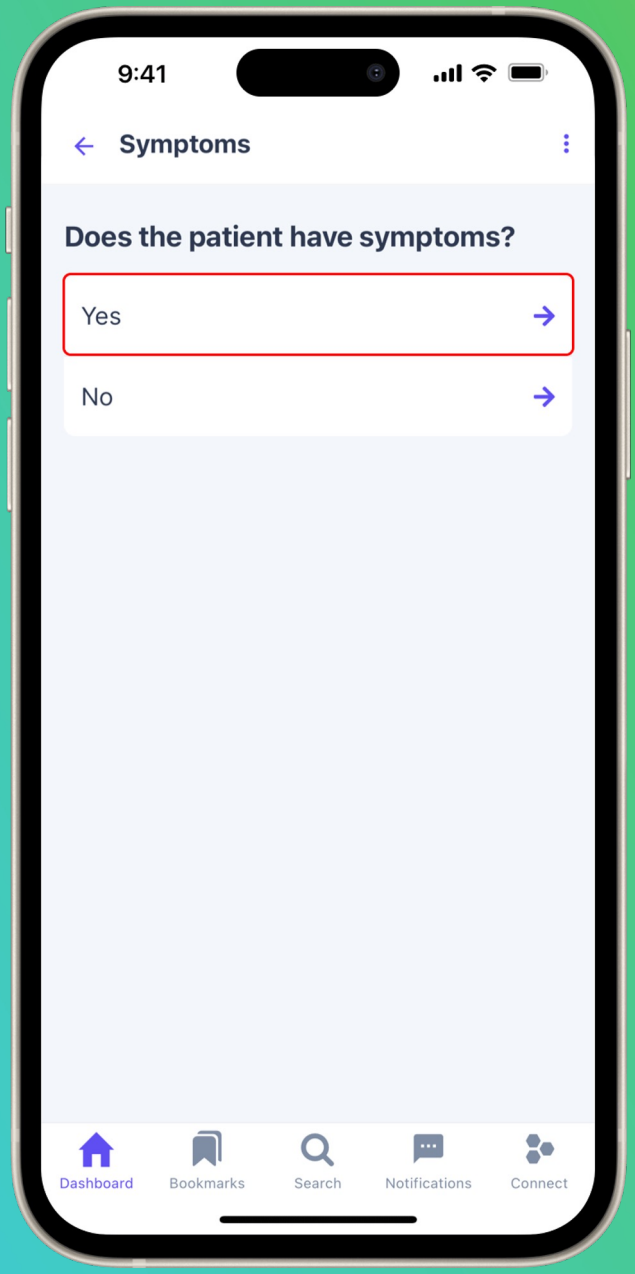
Treatment Recommendations

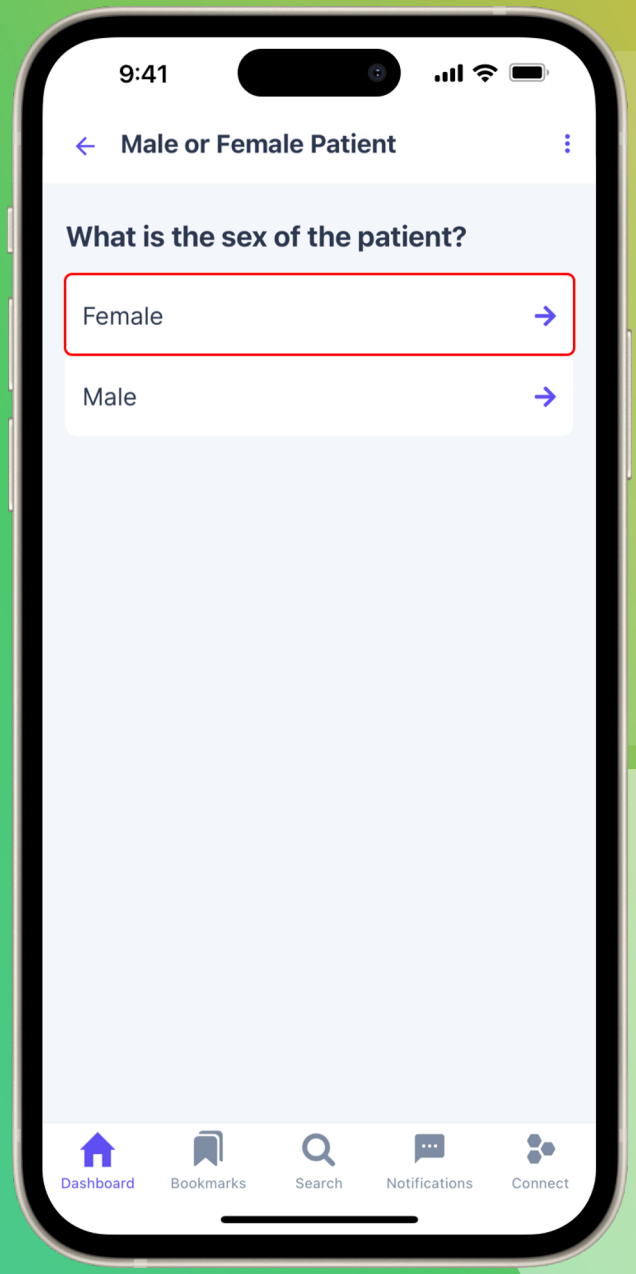
What does Cherokee Nation Health Services' localized guidance recommend?

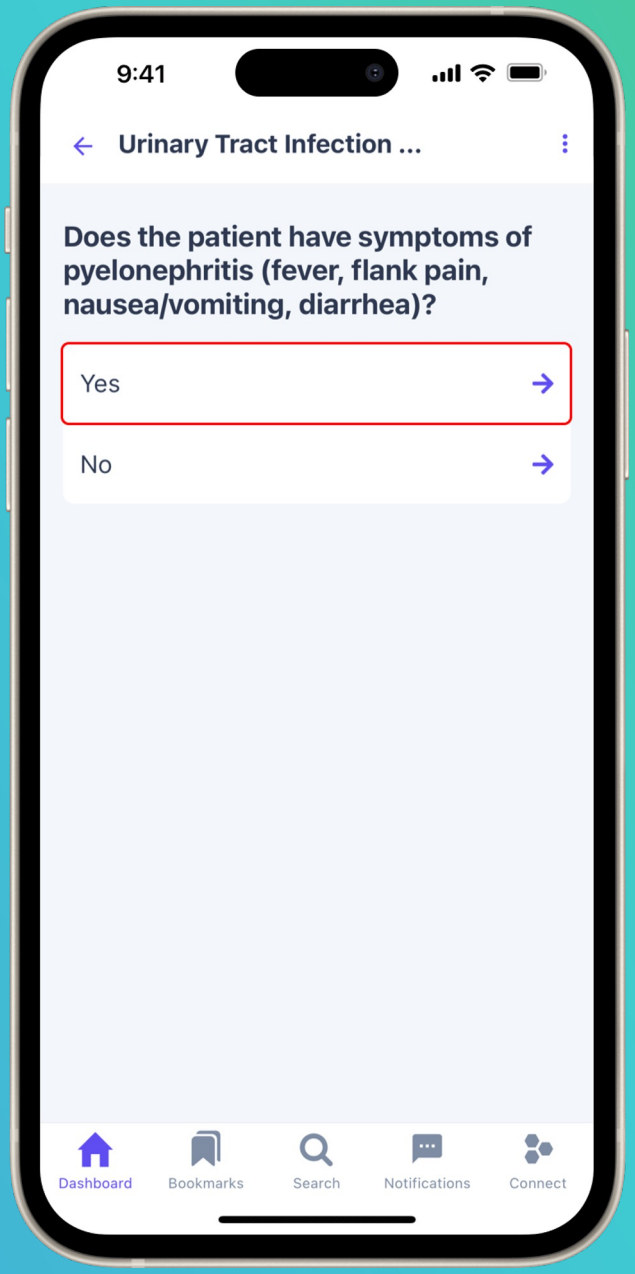


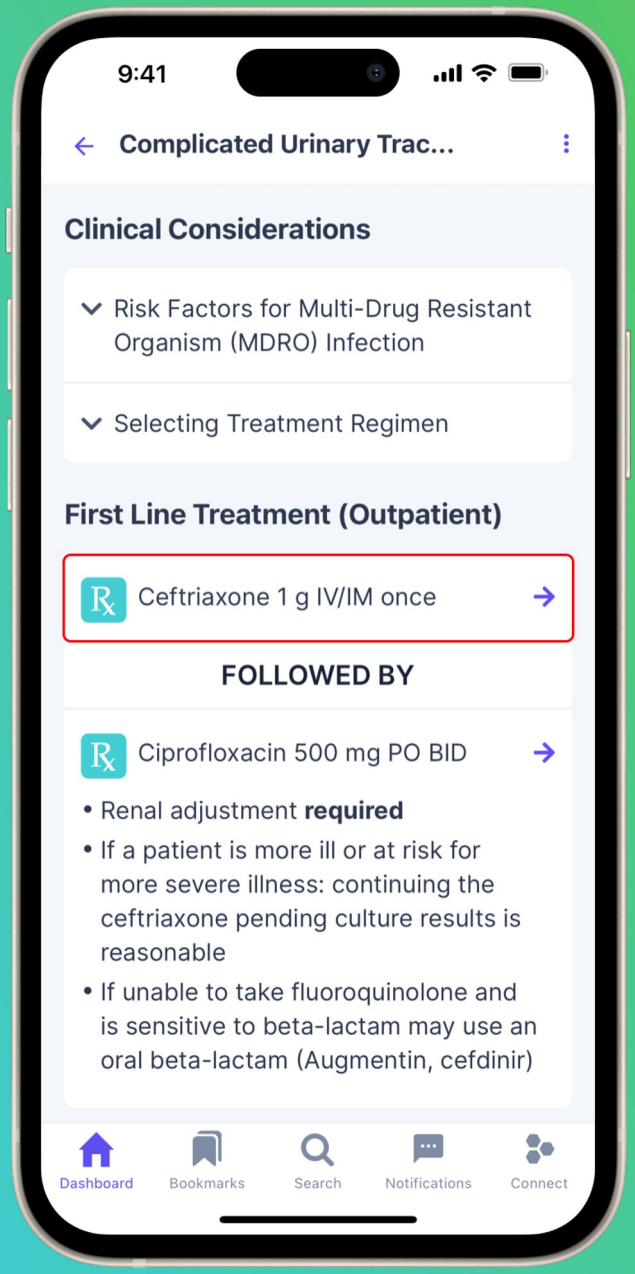
Firstline


9:41
Adult Guidelines
Urogenital Infections
Urinary Tract Infection
Respiratory Infections
COVID-19
COPD Exacerbation
Bronchitis
Community Acquired Pneumonia
Group A Streptococcus Pharyngitis
Sinusitis
Sexually Transmitted Infections
Dashboard
Bookmarks
Search
Notifications
Connect


9:41
Symptoms
Does the patient have symptoms?
Yes
No
Dashboard
Bookmarks
Search
Notifications
Connect


9:41
Male or Female Patient
What is the sex of the patient?
Female
Male
Dashboard
Bookmarks
Search
Notifications
Connect


9:41
Urinary Tract Infection ...
Does the patient have symptoms of pyelonephritis (fever, flank pain, nausea/vomiting, diarrhea)?
Yes
No
Dashboard
Bookmarks
Search
Notifications
Connect


9:41
Complicated Urinary Trac...
Clinical Considerations
Risk Factors for Multi-Drug Resistant Organism (MDRO) Infection
Selecting Treatment Regimen
First Line Treatment (Outpatient)
Ceftriaxone 1 g IV/IM once
FOLLOWED BY
Ciprofloxacin 500 mg PO BID
• Renal adjustment required
• If a patient is more ill or at risk for more severe illness: continuing the ceftriaxone pending culture results is reasonable
• If unable to take fluoroquinolone and is sensitive to beta-lactam may use an oral beta-lactam (Augmentin, cefdinir)
Dashboard
Bookmarks
Search
Notifications
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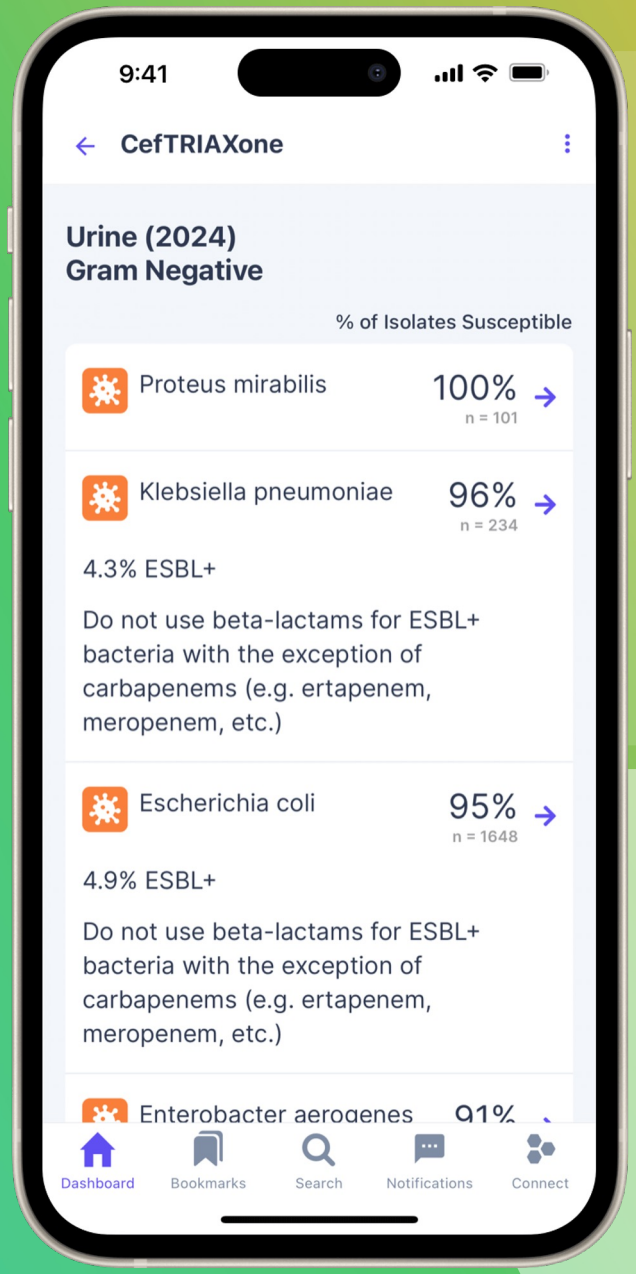
9:41
CefTRIAXone
Urine (2024)
Gram Negative
% of Isolates Susceptible
Proteus mirabilis
100%
n = 101
Klebsiella pneumoniae
96%
n = 234
4.3% ESBL+
Do not use beta-lactams for ESBL+ bacteria with the exception of carbapenems (e.g. ertapenem, meropenem, etc.)
Escherichia coli
95%
n = 1648
4.9% ESBL+
Do not use beta-lactams for ESBL+ bacteria with the exception of carbapenems (e.g. ertapenem, meropenem, etc.)
Enterobacter aerogenes
91%
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Questions?