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# Forecasting of Infectious Diseases

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# DISCLAIMER

The information presented today is based current preliminary data and on CDC's recent guidance. Information is subject to change.

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# **Forecasting of Infectious Diseases**

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# Why is Forecasting Important?



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- Public health investigations and information exchanges can be time and labor intensive, creating lags in data needed to support decision making.
- Public health interventions can take time to develop and execute. Early information about possible threats helps inform these planning activities.
- The public benefits from having awareness of current and emerging situations.

# How does Forecasting work?



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- Infectious diseases have typical characteristics that we can use to predict how they will behave in different situations.
- Using our knowledge of infectious disease threats, analysts can create mathematical models to provide estimates for near-real time and future disease trends.



# Forecasting in Action: CDC's SARS-CoV-2 Variant Tracker

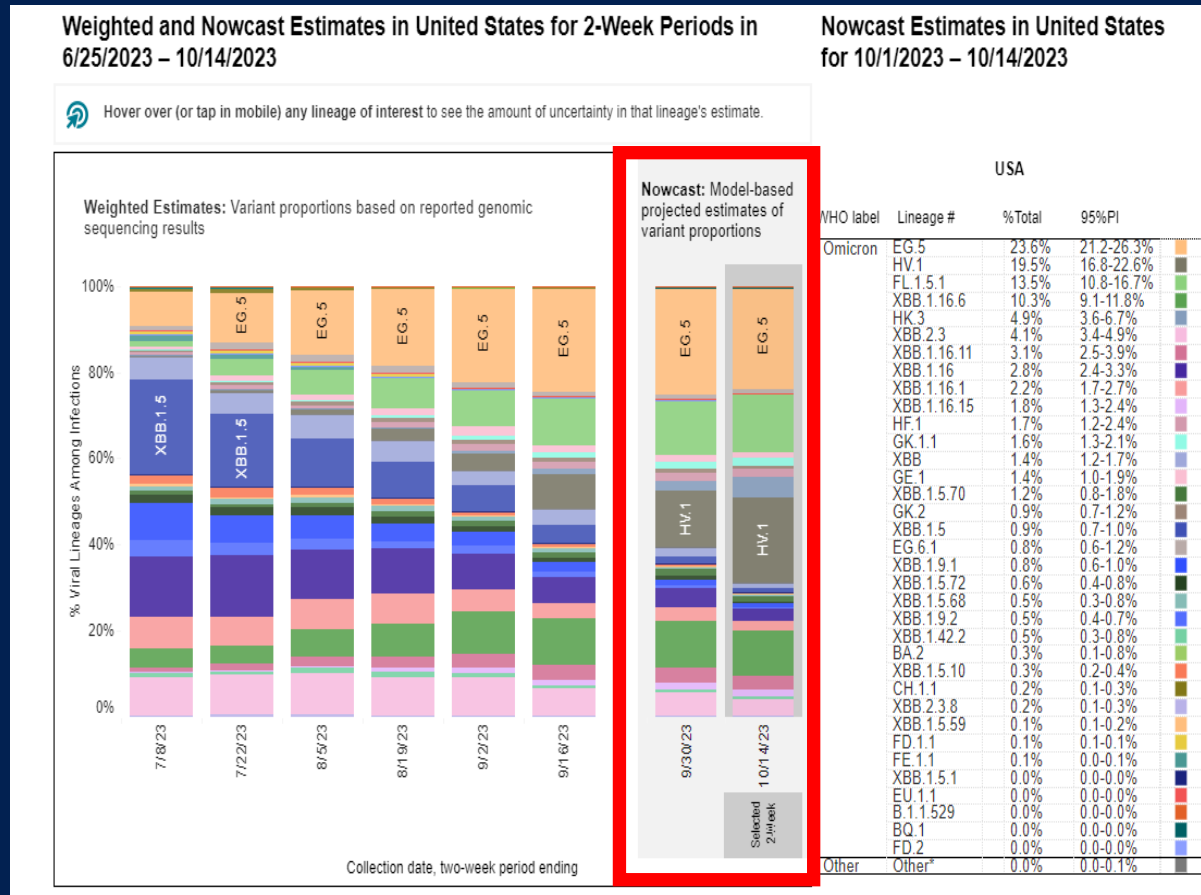
- CDC uses forecasting to project SARS-CoV-2 variant proportions for the most recent two-week period (called "Nowcast") to enable timely public health action.



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Source: <https://covid.cdc.gov/covid-data-tracker/#variant-proportions>



# CDC Center for Forecasting and Outbreak Analytics (CDC CFA)



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- Established during COVID-19 pandemic response, and officially launched April 2022.
- Goal is to enable timely, effective decision-making to improve outbreak response using data, modeling, and analytics.



# CDC CFA Mission and Function



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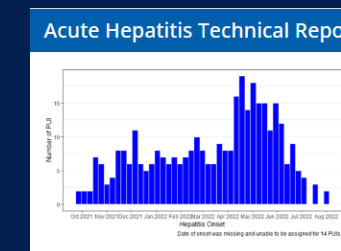
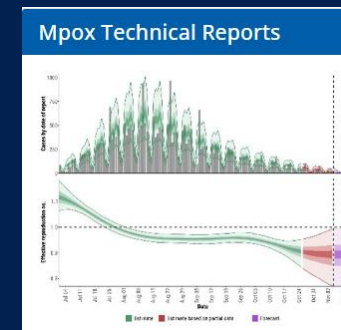
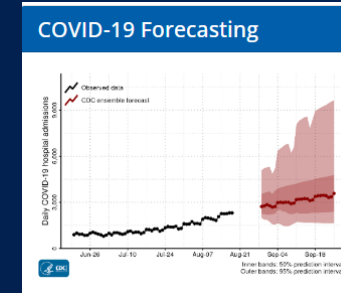
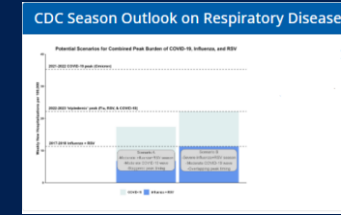
- Mission to harness cutting-edge analytics to improve responses to public health emergencies
  - Create real-time monitoring tools that estimate disease burden, show short term forecasts, and generate projections to compare intervention strategies
  - At the ready to support policy makers, answer questions about specific groups/transmission setting and impact/cost of interventions





# CDC CFA Products

- Outbreak Analytics and Disease Modeling Network.
- CDC season outlook on respiratory disease for COVID-19, RSV, and Influenza for 2023-2024 season.
- Mpox technical reports including outbreak trajectory estimates.
- COVID-19 hospitalization forecasts.
- Children with Acute Hepatitis of Unknown Origin Technical Report.



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# CDC CFA Mpox Technical Report (10/27/2022)

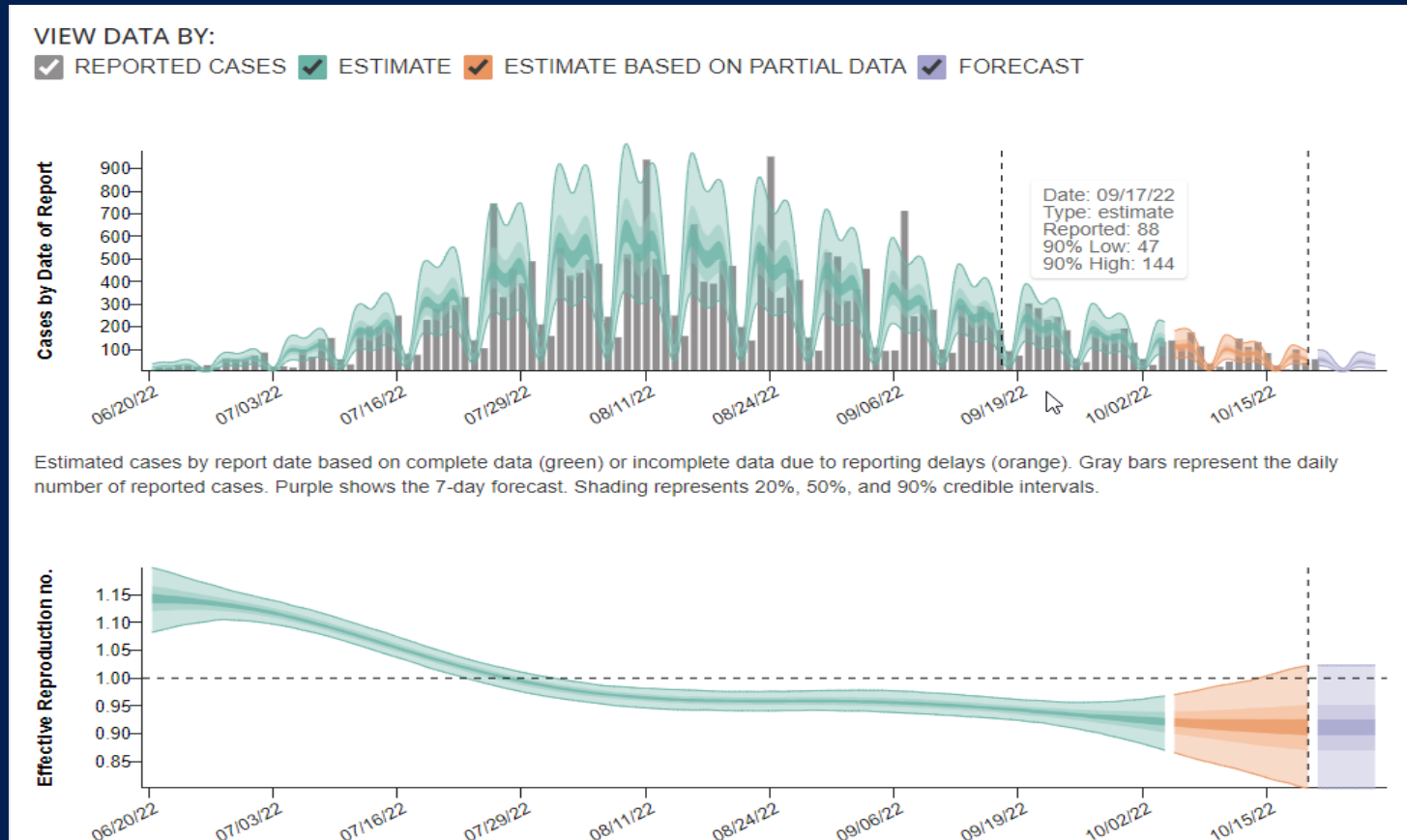
- This report demonstrates how forecasting and modeling tools are used to describe historic trends based on reported cases, estimate more recent trends based on partial data, and predict future trends.



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# CDC CFA Mpox Technical Report (10/27/2022)

- This analysis enables CDC to describe potential future scenarios.

## Potential Future Outbreak Trajectory

### Short-Term Scenarios

Possible outbreak growth scenarios for the United States over the next two to four weeks are the following:

- 1) Daily cases will continue to decline or plateau
- 2) Very slow growth with daily cases rising slowly
- 3) Exponential growth with daily cases rising

Among these scenarios, we assess daily cases in the United States will most likely continue to decline or plateau over the next 2 to 4 weeks. Sporadic sub-national clusters may continue to occur in this scenario. We have moderate confidence in this assessment but note the possibility, as described above, that incidence could increase again.

Our rationale for this assessment is based on the estimates of  $R_t$  below 1. However, we note cases are not declining in all jurisdictions. Because the causes of cases slowing in the United States and other countries are not well understood and patterns have not been uniform, we cannot predict the timing and precise trajectory of case declines in the United States.

Available at: <https://www.cdc.gov/poxvirus/mpox/cases-data/technical-report/report-4.html>, accessed 10/5/2023



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# DSHS Engagement with CDC CFA



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- Opportunity to be involved in setting the direction of this center.
- Ensure the most up-to-date data is used in these tools.
- Have clear understanding of the methods used and provide feedback on data inputs which affect/informs the model.
- Opportunity to identify problems in data before flagging concerning and potentially erroneous findings.
- Importance of building forecasting/modeling capacity at the state and local levels.

# CDC CFA Grant-Funded Partnership



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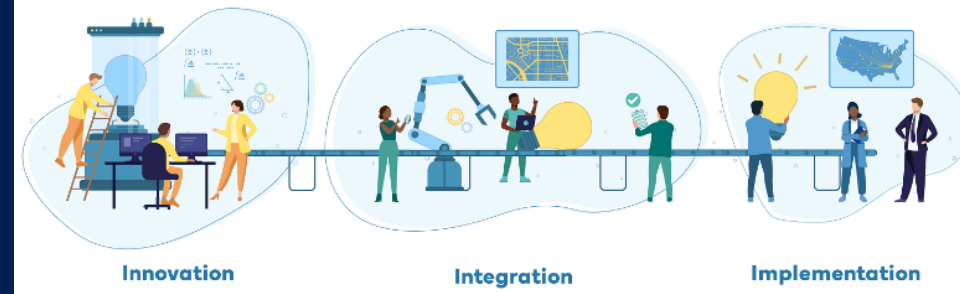
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- DSHS is engaging further in this area through a grant-funded partnership with UT Austin, a recipient of 13 funded centers as a part of the new first-of-kind national network, the Outbreak Analytics and Disease Modeling Network (OADMN).
- The OADMN will focus on innovating, integrating, and implementing modeling and forecasting tools to improve outbreak response.
- The OADMN's goal is to improve speed, accuracy, and use of data & analytics during health emergencies.

## Outbreak Analytics and Disease Modeling Network

### About the Network

CDC's Center for Forecasting and Outbreak Analytics has awarded funds to 13 primary awardees to establish the first national network for outbreak analytics and disease modeling. Many of these awardees are leading a consortium of collaborators to design, prototype, test, and scale up advances in data modeling tools and technology that can be used to support public health decision makers at all levels of government. This network of networks extends the geographic reach and technical diversity of performers focused on innovating, integrating, and implementing modeling and forecasting tools to improve outbreak response. The network's goal is to improve speed, accuracy, and use of data & analytics during health emergencies, which is an important step towards ensuring Americans have the information they need to keep themselves and their families safe during outbreaks.





# CDC CFA Grant-Funded Partnership

- The partnership activity focuses on validated analytic tools that have been developed by UT Austin and utilized in previous responses and seeks to scale them for use at multiple levels of public health (local, regional, state, and federal).
- Validated tools include:
  - The CDC platform to aggregate and display COVID-19 and flu forecasts.
  - Portfolio of validated covid-19 and influenza nowcasting/forecasting analytics at multiple scales from individual zip codes.
  - Technology for rapidly designing stage alert systems to guide communication risk and intervention policies.
  - Optimization tools to support the stockpiling, allocation, and distribution of diagnostic tests, therapeutics, vaccines, ventilators, etc.
  - Epidemic simulation platform to support pandemic planning.



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# Next Steps

- Continue to engage with federal and academic partners on forecasting initiatives.
- Further advance expertise at the state level in the use and development of these tools.
- Continue to utilize forecasting tools to inform public health decision making.





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**Thank you**

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